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Teamwork and Collaboration:
Case Studies in Architectural Practice

by

Pierluigi Serraino

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Architecture

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor C. Greig Crysler, Chair
Professor Galen Cranz
Professor Robert W. Levenson

Summer 2024

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Case Studies in Architectural Practice

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by Pierluigi Serraino

Abstract

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Pierluigi Serraino

Doctor of Philosophy in Architecture

University of California, Berkeley

Professor C. Greig Crysler, Chair

This dissertation examines the permutations that working collaboratively takes on in the professional practice of architecture. How do teams collaborate in an architecture office among themselves and with consultants? What makes possible the conception and execution of a project in a design firm? Given the sharp differences in skill sets, performance, temperament, commitment to one's own work, individual's sphere of power and influence, and vulnerability of staff to the volatility of the world economy, all of them invariably impinging on the project outcome, how does collaboration happen?

I adopted the case study research method and selected four large-scale practices representative of a wide range of types of group work and recipient of various levels of recognition in the world of signature architecture and engineering. Four narratives- two ethnographic accounts and two qualitatively driven reports- of the everyday life of four large-scale architecture and engineering firms in the United States are the settings for my data retrieval. They are Eero Saarinen & Associates; Skidmore, Owings & Merrill (SOM); Anshen+Allen (A+A), and The Arup Group. The four firms are here accounted around varying gradations of design authorship, from the individual to the anonymous, gauging the degrees of freedom to point to individual contributions within each organization when the work is presented in the public realm. Targets of inquiry of this study are the physical layout of these offices, their subculture, their management styles, their reward system, their ideology and allegiance to their particular understanding and ethos of modernism, and their formulation of collaboration.

In the context of this dissertation, collaboration is here defined as a joint, willful, synchronous, and professionally horizontal action toward the production of a detailed response to a complex design problem. The findings of this dissertation support that individuals do not collaborate as a default way of working but do work together under specific motivational structures: capital, reputation, a sense of destiny about themselves, and more.

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Guidance to bring this experience to a felicitous conclusion came from numerous people over a long period of time. In the absence of those critical exchanges, the outcome of what is presented would have been markedly different.

I owe gratitude to Prof. Howard S. Becker, whose insight into my research and reading recommendations were instrumental in understanding the profound social nature of the architectural world. During our few meetings at Caffe Sappore in San Francisco, he deeply affected my perspective on the topic of my dissertation.

Susan and Eric, Eero Saarinen's children, kindly offered their comments on the chapter on their father's practice. Their recollections proved to be defining in getting a grasp on the intensity of the working life and the interpersonal dynamics between Eero and the staff of that firm.

Architect and scholar Andrew Rabeneck offered critical feedback on my chapter on the Arup Group and the design and building sector in the United Kingdom. I am thankful to him for sharing his knowledge, experience, and support.

My heartfelt thanks go to engineer, and scholar Craig Huntington, who kindly read earlier versions of several chapters of the manuscript. He was particularly helpful in shaping my comprehending of how engineers and architects interact in the design of a building.

The availability of Professor Robert W. Levenson to be part of my Ph.D. committee and to understand how my interest in the 1958 Creativity Study at IPAR intersected with the topic of my dissertation, opened the first door to bring my long exposure to the Ph.D. program to a closure. I am genuinely indebted to him.

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My wife Silvia has been a patient companion in enduring with me the highs and lows of a rewarding, albeit complicated, educational experience. Thank you truly.

I dedicate this dissertation to my father, Giuseppe Serraino (1924-1999) whose embrace and support I feel every day from wherever he is.

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CHAPTER I. PROBLEM STATEMENT

At the onset of this study my assumption was that working collaboratively was going to deliver a highly desirable integrated product, for the benefits of all the parties involved. Who, I wondered, would not want a better building achieved by all working together and merging individuals' discrete knowledge of the design-construction world into collective know-how? I thought this truism to be so obvious, as a logical proposition, that its verification in the real world of the architectural office was going to be somehow trivial, and perhaps even unnecessary. To my greatest surprise, as my fieldwork progressed together with my archival digging, my skepticism to its practical implementation grew every day and at times exponentially. It is beyond reasonable doubt that people work together in the making of a building. However, that in no way implies that they collaborate. I contend that collaboration, as defined above, is systemically unattainable, given the institutional constraints impinging upon the architectural office, both within the structure of architectural firms and within the existing political, economic, and technical infrastructure that is necessary for projects to become a physical reality. The culture of architecture itself, and the ontological status of the office as a business enterprise, selling design services for monetary gains in a legally burdened profession striving for its relevance in the marketplace, are two of the most visible among the several roadblocks impeding collaboration. By default, this human chain inhabiting the development process is comprised of actors with monumental variations in financial, political, and personal interests surrounding a particular project as it relates to their careers. This fatal fracture of inner intent in team members is what the findings point to as an overriding root cause, explaining the unfeasibility of collaboration in the abovementioned description to succeed in the workplace. This study highlights built-in contradictions that systemically hamper both in-house and inter-professional collaboration. The same findings, however, show that narrowly situated forms of collaboration in the workplace do take place among actors endowed with comparable power, symmetrical depth of knowledge within their own expertise, and equal financial reward. These more situated collaborations orchestrated within a shared project-specific schedule ultimately make the office engine work. It is these highly localized episodes of collaboration that this study will bring to the foreground, as they occur in the course of the specific case studies.

Methodology

I adopted a hybrid mix of qualitative research methods to table the four case studies of this dissertation and test my initial assumptions. Eero Saarinen & Associates (ES&A) was studied through primary sources in public and private archives and interviews of former collaborators of Eero Saarinen. Skidmore, Owings & Merrill (SOM) and Anshen + Allen (A+A), were the object of prolonged ethnographies. The Arup Group was partially archival, partly interviews of several figures within the firm's structure, and partly through participant[1] and non-participant observations.

[1] Schwartz, Morris S. and Schwartz, Charlotte Green. "Problems in Participant Observation", *The American Journal of Sociology*, Vol. 60, No.5, January 1955, p.344.

Broadly speaking, I looked at four large-scale practices representative of a wide range of types of group work and various levels of recognition in the world of signature architecture and engineering. In celebrating the virtue of collaboration, scholars, as it will be discussed in a later section, have been arguing for the necessity to fix the operational wastefulness that has historically marred the building process and to achieve a highly integrated product for the benefit of the client, the users, and ultimately, society at large. The vast body of formal knowledge, widely supported or criticized depending on which academic circles debate this subject, holds that when followed as a strictly logical procedure (i.e. algorithm), collaboration does indeed remove the systemic inefficiencies plaguing the Architecture/Engineering/Construction (AEC) sector altogether. But does it? This computational view of design, as will be shown in the course of this study, has undergone substantive attacks, most adamantly from architects vocationally invested in innovative design work.

Testing my assumptions in the real world of practice became of necessity. In surveying the ethnographies of work, Vicki Smith commented:

> No single approach to the study of work has been more effective than the ethnographic in uncovering the tacit skills, the decision rules, the complexities, the discretion and the control in jobs that have been labeled routine, unskilled and deskilled, marginal and even trivial.[2]

Such resolve brought up a number of logistical challenges. Access to the site is an obvious critical step.[3]The thorniest of all is that offices in general (architectural and engineering among them) are closed settings.[4] In other words, they are routinely inaccessible to public scrutiny unless individuals work in those environments and are on payroll, therefore taking on a very specific and official membership role.[5] Without a membership role, in fact, each office community unfailingly purges individuals who do not belong to the mechanism of production, my personal experience being a case in point. After several failed attempts of my own to simply 'hang out', per the anthropological parlance, to gather data in one architectural office to do my research, I realized the inherent difficulties in gaining meaningful information over time as an outsider. To bypass this barrier, I decided to become part of those communities as a practicing architect. I applied for a job, interviewed, worked overtime, attended meetings, presented design schemes to existing clients, joined marketing efforts to get additional work for the office, cheered at my colleagues' accomplishments, and was eventually unceremoniously laid off in both places for different reasons altogether. In a nutshell, I exposed myself to the process I was seeking information about early on from the staff I had tried to observe

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[2] Smith, Vicki. "Ethnographies of Work and the Work of Ethnographers" in Atkinson, Paul A. et al. *Handbook of Ethnography*. Thousand Oaks, CA: Sage Publications, Inc., 2007, pp-221.
[3] Cranz, Galen. *Ethnography for Designers*. New York, NY: Routledge, 2016, p.26.
[4] Lofland, John, and Lofland, Lyn H. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Stamford, CT. Cengage Learning; 3rd edition, 1995
[5] Adler, Patricia and Adler, Peter. *Membership Roles in Field Research*. Thousand Oaks, CA: Sage Publications, Inc., 1987.

while at work in an effort to produce a 'thick description'[6] of the setting I was studying. Complete enmeshment of myself into the workplace so as to observe the overt and tacit practices that office community in their individual and in aggregate form can opened the doors for deeper understanding of what happens in a firm as people do work. In staying in their naturalistic settings without imposing my template for data retrieval on the team members that would fundamentally alter their behavior, I retrieved data in the most unobtrusive form: I became one of them. The experience in both firms was rich and revealing.

Qualitative research methods were the most cogent choice to zoom into the day to day of office life. In two cases, from non-participant observation, I took the leap into complete participant observation and settled on auto-ethnography, thus making myself the investigative lens of the setting I was studying by becoming a member of the group inhabiting it[7]. In going from the macro of broad unsubstantiated statement on collaboration in architecture to observing while actively participating in the micro of doing work together in two architectural offices afforded me a particular vantage point from where to compare the theoretical claims on collaboration and the way architecture firms operate. Using oneself as research subject to learn about broad patterns within the collective is an option with its own challenges. Yet all accounts are by default confined to the particularities of the self. By being subjected to the same environmental pressures of those I was trying to study, I was going to get an insider's perspective on doing group work in large-scale organizations and to understand dynamics in motion in the performance of individual tasks as it pertains to collaboration. In the other two case studies, I did extensive interviews and archival research to recover comparable data sets, and formulate broad-based conclusions grounded in the findings. To compare and contrast the case studies I set up a common framework through which I analyzed each environment using these five areas of focus:

1) Language (on problem setting);
2) Communication (formal and informal interoffice flow);
3) Culture (value systems, schools and professional affiliations);
4) Financial (circulation of capital);
5) Physical space (within the firm);

Common data for each firm are their individual organizational chart, workspace, social routine, culture (the recurring mythologizing of their own practice), spatializing their organizational models. In zooming in and out of ethnography, I engage in some auto construction, where I illustrate the field dynamic by highlighting the individual authors. A similar textual structure concludes each chapter. For each office practice I ask the following key questions here listed in no particular order:

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[6] Geertz, Clifford. "Thick Description: Toward an Interpretive Theory of Culture," *The Interpretation of Cultures: Selected Essays*. New York: Basic Books, 1973. p. 2.

[7] Shaffir, William. “Doing Ethnography. Reflections on Finding Your Way”, *Journal of Contemporary Ethnography*, December 1999, p.676.

- How does the workflow?
- Who makes decisions affecting the course of the design process?
- What is the mission of the office?
- How is the staff distributed in space?
- What is the office hierarchy?
- What office protocols are in place to communicate?
- How does the staff transfer knowledge to each other?
- Why kind of team-building activities are available?
- Where does this organization fall in the larger constellation of firms?

Four narratives- two ethnographic accounts and two qualitatively driven reports- of the everyday life of four large-scale architecture and engineering firms in the United States, ES&A, SOM, A+A, and the Arup Group, provide the settings for my data retrieval. Such retelling of how staff members understand their role when they collaborate addresses the expectations, fallacies, feasibility, built-in assumptions, sales pitch to architectural culture, and anchoring to the project of modernization that the discourse on collaboration has articulated since the 1920s to present. It cross-examines various theoretical notions of collaboration against the material production of architecture in those four practices being a representative sample of kinds of offices, that is large-scale practices. Acquiring information inside and outside the firm through human contact is a chief trait of office life and collaboration and is channeled to the final product in intangible ways. The first case study is partly archival, partly handled through a series of interviews with a few of the lesser-known surviving members of the celebrated firm ES&A. SOM and A+A were studied through complete participant observation, where I worked for several years as a salaried architect in each office. The Arup Group was investigated through nonparticipant observation, archival research, interviews, and focus groups. The four firms are here articulated around varying gradations of design authorship, from the individual to the anonymous, gauging the degrees of freedom to point to individual contributions within each organization when the work is presented in the public realm. Variables of this study are the physical layout of these offices, their subculture, their management style, their reward system, their ideology and allegiance to their particular understanding and ethos of modernism, and their formulation of collaboration.

In the larger thinking tradition, ethnography has habitually been associated with the study of otherness, both in terms of geography and social groups, until recent times. Franz Boas (1858-1942) and Bronisław Malinowski (1884-1942) pioneered this approach by inhabiting for an extended period of time- sometimes years- communities outside the influences of Western civilizations. Eskimo settlement in the Baffin Land (Boa) and indigenous groups of the Trobriand Islands in Melanesia (Malinowski) were the locus of fieldwork for groundbreaking studies that set universal standards of validity and reliability of data collection. While their students- Margaret Mead a most renown example- continued that line of work in exotic locales, the First Chicago School of Sociology under the leadership of Robert E. Park (1864-1944) and Everett Hughes (1897-1983), among others, turned the gaze of researchers to urban environments, mostly in

Chicago, populated by the underprivileged. Ethnographers' focus was now juvenile delinquency, neighborhood of immigrants, ethnic relations, and a wide-ranging array of topics linked to social inequalities and the city. In the Second Chicago School the study of occupations and professions took a dominant position (Eliot Freidson in medicine[8], and Howard S. Becker in the art world[9], for example). It was in this period that a deeper understanding developed about strategies of access to discrete spheres of power controlling human resources and the economy. Anthropologists and social scientists have continued looking at human aggregates located far away (Clifford Geertz in Bali[10], Paul Rabinow in Morocco[11]) as well as urban groups (Michael Burawoy) and the professions (Andrew Abbott). However, over the last forty years laboratories and places where scientific truths are produced and from where those statements are broadcast to the world have been of particular interest to the latest generation of sociologists. Workplaces have also been the subject of intense studies as of late. French theorist Bruno Latour was a figure of global prominence in this respect. His theoretical and empirical studies greatly reshaped the priorities and modalities of the ethnographic inquiry together with the kind of conclusions drawn from it.

The Actor Network Theory (ANT), Latour articulated in his seminal book *Reassembling the Social* (Latour, 2005), informs the analytical perspective of my dissertation. The French scholar draws a critical distinction between the sociology of the social versus the sociology of associations. The former's premise is that there exist a-priori stabilities in the external world, allowing us to frame and understand the phenomena of the collective. In this interpretation, the fieldworker's role is to recognize what is being studied as belonging to these pre-packaged classifications. The latter's starting point is that relativism is the entryway to understand internal representations of the actors being studied within the collective. "Groups are...the provisional product of a constant uproar made by millions of contradictory voices about what is a group and who pertains to what."[12] The fallacy of the social swayed the early stage of my research. Borrowing from Latour's definitions I let the *ostensive* analytical lens override the *performative* one: pre-determined ideas were forcing my understanding of the setting to fit into a box; whereas letting the associations from the setting emerge the clarity of life events unfolding will become evident.[13]

Why These Firms?

Each organization was chosen based on their engagement in program-intensive projects (i.e. hospitals, airports, university campuses, and the like) requiring significant interdisciplinary labor, on the size of its staff (at least over 100 employees with different design studios), on their status in architectural culture, and on the standards most of them

[8] Freidson, Eliot. *Doctoring Together: a Study of Professional Social Control.* New York Elsevier, 1975.
[9] Becker, Howard S. *Art Worlds*. Berkeley and Los Angeles: University of *California Press, 1984.*
[10] Geertz, Clifford. *The Interpretation of Cultures: Selected Essays*. New York: Basic Books, 1973.
[11] Rabinow, Paul. *Reflections on Fieldwork in Morocco*. Berkeley, CA: The University of California Press, 1977.
[12] Latour, Bruno. *Reassembling the Social: An Introduction to Actor-Network-Theory.* New York: Oxford University Press, 2005, p.31;
[13] Latour, Bruno. *Ibid.*, p.37;

set in the profession over decades of practice. Three out of the four offices were established shortly before World War II but entered full operations in the second wave of the Modern Movement. They all share professional longevity, are still in existence (one got recently acquired to become a subset company of a much larger conglomerate), and with varying degrees at the forefront of their own market niches. Three firms are headquartered in the United States and the fourth one has its central office in the United Kingdom, with dozens of branches all over the world. All of them, at some point of their business life, generated landmarks included in the canon of Modern architecture. In these four sites I endeavored to produce a richly textured account of what happens in these offices, describing how personnel operate while performing their project-required tasks. In the course of working on projects on a day-to-day basis, I chronicled events as I perceived them through my own experience as an employee in two of these firms, and through targeted interviews with some of the former and current staff members of the other two offices. I aimed at gaining the perspective of those I was studying in their naturalistic settings. While ES&A and A+A are strictly architectural firms, SOM is an Architectural/Engineering conglomerate, occasionally providing engineering services on projects not of their own, a notable example being the Guggenheim Museum by Frank Gehry in Bilbao. The Arup Group is primarily an engineering firm, with an architectural division modest in size and cultural capital when compared to its engineering authority. Why did I choose the Arup Group for my fourth case study as opposed to another architectural firm? Because the Arup Group has historically made a hallmark of teamwork, working very closely with architects. Over time, it has become a model office for large engineering companies across the globe. Arup owes its international standing to its distinct entry point into the design universe: an exacting technical supporting role, essential to realize the designers' utopias. The company de-emphasizes individual spotlighting of designers. Its leadership picks and chooses design undertakings that will stimulate intellectually its core workforce, mainly striving to innovate the engineering discipline rather than reinforcing the conventional boundaries of its knowledge domain. For the Arup Group performance-based, instead of prescriptive approaches, are routine guidelines in problem solving techniques based on first principles in physics. At the same time, the company has sustained economic growth. Individual authorship at bay, the Arup Group retains a position of dominance as the technical partner of the projects consequential to architectural discourse. Last, but not least, engineering is a discipline with limited exposure to the history of its own making. Although some literature on the topic exists,[14] [15] the paradigm shaping both university curricula and the profession is scientific in nature historical knowledge holds scant currency compared to technological innovation in forming its current and future disciplinary discourse.

The output of these four offices has been variably accounted for in architectural literature over the decades. In the course of their existence, they underwent restructuring of their operations to meet the paramount changes that occurred over time in professional practice. All of them at some point experienced the jump from the small boutique

[14] Addis, Bill. *Building: 3000 Years of Design, Engineering, and Construction*. London and New York: Phaidon Press, 2007.

[15] Wells, Matthew. *Engineers: a History of Engineering and Structural Design*. London: Routledge, 2010.

environment to the large office, with sizable personnel to manage through policies and sequence-driven production procedures. The 15th edition of The Architect's Handbook of Professional Practice lists three types of design firm business models:[16]

- *Efficiency-Based Firms*;
  Firms specialized in one building type (airport, schools, healthcare, etc.).
- *Experience-Based Firms;*
  Firms that have been in practice for at least two decades.
- *Expertise-Based Firms;*
  Firms that put design first, experimenting with new design approaches and novel building and digital technologies.

ES&A falls in the *Expertise-Based Firms* category. New ideas and the implementation of the latest technology under the architect's unchallenged lead are distinguishing characteristics of this class. SOM leans toward the *Experience-Based Firms* kind. This cluster typically has a much bigger office infrastructure than the first group, a large staff, is aware of new ideas coming from the *Expertise-Based Firms*, while having both the client-base and the technical apparatus to implement those breakthroughs in large-scale work on a consistent basis. A+A straddles the *Experience-Based Firms* and the *Efficiency-Based Firms* categories. This type of company markets its extensive experience in very specific building types to large corporate and institutional clients. In the case of A+A, the firm's capabilities are developed to cater to large size health care and academic organizations. In some form, The Arup Group encapsulates all three design firm business models. Its technical know-how is at the service of innovation for *Experience-Based Firms* and *Expertise-Based Firms*. They master management techniques under a well-honed quality control program.

The chart below summarizes the investigative approach adopted in the study of each firm.

Case Studies	**Firm Type**
ES&A	*Expertise-Based Firms*
SOM	*Experience-Based Firms*| *Expertise-Based Firms*
A+A	*Experience-Based Firms*| *Efficiency-Based Firms*
The Arup Group	*Experience-Based Firms*| *Expertise-Based Firms*

Although the typological system outlined above provides a framework to understand the make-up and mission of these four firms generally, a few words of caution are in order. No firm fits strictly into the aforementioned design firm business models. In fact, three of the four offices I examine in this inquiry are a hybrid of all three types. Among the most evident limitations inherent in the above characterization is to jump to the conclusion that *Expertise-Based Firms* have inadequate skills to manage their own

[16] American Institute of Architects. *The Architect's Handbook of Professional Practice. New York*: Wiley & Sons, Inc.; 15th edition, 2014, p.188.

workflow and client relationships. That is clearly inaccurate in the case of Eero Saarinen, who was acutely aware of how critical the client-architect relationship was for the end-result. To assume that SOM disregards the notion of design as professional service due to its position of dominance in the marketplace would be equally erroneous, because there are management-level employees assigned to monitor both project performance internally and trends in the AEC industry to chart the course of the firm in the years ahead. To believe that innovation is utterly absent from A+A because the company deals exclusively with health care and academic work is incorrect, since innovation is a vital prerequisite to gain advantage against competitors in the same arena. Lastly, the Arup Group makes a point of being an *Experience-Based Firm* by arguing that front-loading design fees will in fact result in substantial client savings in the building's life cycle. However, what makes it belong to one design firm business model as opposed to another is the investment quota of intellectual resources in the defining areas of those three types within the overall percentage of the firm's operation.

Together with the classification of the four offices applying business models identified in the professional literature, an alternative interpretative structure is presented below. Under this different approach, the four firms are identified through gradations of design authorship, from the individual to the anonymous, so as to gauge the degrees of freedom to point to individual contributions within each organization when the work is presented in the public realm.

The first case study on the origins, structure, and organization of the ES&A practice exemplifies the *Single Author* mode. This firm type describes the office as an extension of the capability (and authority) of a single designer. In such a setting the organization is of support to the head designer and accommodates any change in design direction, as deemed necessary at any moment in time during the ideation process. Decisions are made in a top-down fashion, with limited opportunities for collective discussions on those matters. Current representative practices of such firms are Gehry Partners LLP of Los Angeles, Kazuyo Sejima + Ryue Nishizawa/SANAA of Tokyo, Studio-Rafael Moneo Arquitecto of Madrid, and The Ateliers Jean Nouvel of Paris. A common denominator of these practices is the role of the Master architect as the gatekeeper of the firm’s design signature. Staff, largely aged between their late twenties and thirties, flock to these offices, willing to toil often below market rate salaries in the architectural sector, because they believe they will be participant in projects of high visibility and symbolic relevance, primary work that will be integral to the contemporary discourse of the discipline. In the architectural world, this is possibly the most ancient practice model whose roots date back to the Middle Ages,[17] a time when artists and architects shared similar divisions of labor under the leadership of one master. This model continued in the Renaissance[18] and became a trope of architectural literature and mythology since.

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[17] Harvey, John Hooper. *The Medieval Architect*. London, United Kingdom: Wayland, 1972, p.76.

[18] Kostof, Spiro. *The Architect*. Berkeley and Los Angeles: University of California Press, 1977, 1st paperback printing, 2000, p.96.

The second case study on SOM is characteristic of the *Collective Author* mode. This practice model is organized around a vision of the workplace representing a collection of studios under the control of an elite group, comprising a design partner, a managing partner, and a technical partner. In this environment, the firm hosts teams working in parallel on projects and reporting to their respective leaders. Even though design is held in high regard, a close eye on profit margins is kept throughout the life of the project. This is a standard instance where the status of design comes to terms with financial benchmarks, thus introducing corporate logic within the unchallenged territoriality of the Master architect in the design world. Nonetheless, high-profile commissions remain within the reach of this kind of company. Depending on the strength of the internal culture of the firm, various degrees of commitment to design excellence are exhibited, managing client pressure to meet financial goals without potentially jeopardizing the practice's standing on its design ethos within its peers. Although SOM holds a unique place in the construction of the post-war American landscape, firms comparable in size, building types, and volume of work are HOK, KPF, NBBJ, Gensler, and Perkins & Will. These offices tend to raise the design bar relative to standard work available in the marketplace, pairing it with policies and forms of working shaped in reciprocity with the clients they work for.

The third case study, A + A, illustrates the *Corporate Author* mode. Here the emphasis is on design as a conversation between client and architects. This type of participation, where the design signature disappears and the final outcome emerges out of an ongoing inclusion of the client in the decision-making process, is marketed in the building industry as a form of shared design. In this setting, the designer is just one piece among many in a horizontal distribution of merits about the building's very existence exhibiting multiple design expressions deliberately chosen on a case-by-case basis. This strategic choice de facto positions this kind of organization out of the elite pool of firms earning commissions whose cultural capital gives them prominence in circles where design is held in the highest regard. Its portfolio typically would showcase intermittently higher aspirations in design terms, but the common denominator is primarily efficiency of project delivery and the nurturing of client relationships. The firmwide attitude of the staff from principals to interns is more relaxed and humane than those offices with ambitious design agendas. Overtime is rare, and community events are central in the construction of a common identity. Here, built accomplishments by themselves rarely trigger pride and the conviction that they will enter into a lasting design lineage. This type of office is, by far, the most common in the architectural profession, and no particular proper names are at the forefront of the practice.

The fourth and last case study is the Arup Group, a design-driven engineering organization representative of the *Anonymous Author* mode. Despite its constant crossover with architecture, being at its core an engineering firm, the staff of the Arup Group all across the corporate echelon revealed a very different mindset to the one recorded in the architectural offices studied in this dissertation. While the founder Ove Arup remained a leading figure in the symbolic and literary heritage of the company's mythology, teamwork was fully embraced as the only way of working firmwide. Ove Arup personally cultivated the architectural dimension of engineering and construction

from his early days as an engineering student. He built his firm upon these values and brought on board individuals that eventually handed down those leanings to the later generations of leaders in the company. The organization prided itself on channeling purposefully the latest advancements in applied science and technology to realize innovative designs. These projects typically were worked out by pushing the normative boundaries of engineering knowledge harnessing the creative talents of the firm's engineers managed through an efficient risk prevention and risk management/quality control program. Tracking and monitoring were the essential tools in place to keep the project on the preferred course. Given the frequent experimental nature of a great many of the projects the firm was engaged in, innovative thinking was a prerequisite to rationalize often deeply complex architectural schemes. The firm's name is tied to many of the landmarks of our time and the workforce is fully aware of its prominent position within the building industry. Some of the same rituals discovered in the architectural offices were enacted in the Arup Group. However, in general proper names very rarely were known outside of the confines of the office itself. With a few notable exceptions such as Ove Arup, Peter Rice, Ted Happold, and Cecil Balmond, the question of design credit given to a specific individual was absent from the firm's culture, given the underlying technological determinism feeding the daily activities of the office. This particular practice enjoys notable cultural capital in the architecture and engineering worlds minus the built-in tensions of design credits that the two first case studies exhibited and the lack of emotional engagement of the staff into design that the third case study revealed. Although the Arup Group occupies a unique place in virtually all engineering branches, contemporary practices that approximate the Arup model are Buro Happold, Thorton Tomassetti, and T.Y. Lin International.

The chart below summarizes the authorship type identified for each case study in this dissertation.

Case Studies	**Firm Type**
ES&A	*Single Author*
SOM	*Collective Author*
A+A	*Corporate Author*
The Arup Group	*Anonymous Author*

On the Nature of Architectural Design

That group work is a default condition to practice– legally and factually– architecture is self-evident. All architectural commissions, built and un-built, are inherently collaborative, and process driven. What is then the route that makes some people the public face of the project in the social arena and the press when, in fact, an army of professionals is necessary to make that vision happen in the real world? The emotional and social consequences in the workforce of the public praise of a few proper names at the expense in terms of credit and recognition of those who help making the projects happen is also a critical part of this inquiry. Architecture is a dialogical activity known and experienced as such since the dawn of time. Yet single architects still get individual recognition, the Pritzker Prize institutionalized in 1979 being the highest

trophy for design individualism. Between the ambition to build and the reality of physically entering the building, a chain of activities involving many parties takes place often over the course of many years and, before the industrialization of the construction site, many generations. During that time, temporary communities are formed, alliances established, and knowledge shared. With various degrees of influences on the final result, these activities are an inescapable fact of the development process.

All these transactions entail people, technologies, and physical settings. Together, they outline a triangular relationship where their reciprocal link is never broken. People cannot operate outside of technologies; technologies are inert unless humans activate them; groups need physical locales to co-exist and create provisional assemblages for the project at hand. Beyond such very broad regularities, these terms rest on rather unstable grounds. What brings that instability has to do with many causes, highlighted in this study. But what appears to be prominent as both a destabilizing as well as a triumphant agent in collaborative design operating concurrently is human nature. Through an arsenal of tools and socially engineered techniques, both the system of professions and the legal system aggressively target that shakiness to mitigate only partially its effects on the final outcome.

Over time, multiple attempts at containing such operational inefficiencies and systematizing the procedures have been made. Partly due to the hyper-specialization that building-related professions have undergone in the last two hundred years, partly due to the periodical changes in focus in the culture of architecture, these endeavors have failed to deliver. The architect of today is a very different figure from that of a hundred years ago[19] [20] [21] and even from fifty years ago. In response to the increasingly more complex structures contemporary society requires for living and working, architectural knowledge has morphed and overlapped with adjacent fields threatening the very essence of professionalism, that is, its territoriality over very clearly staked out knowledge domains. And yet, against all odds, in architecture, the individual signature of projects has only moderately lost ground against collective authorship. The architect is now a "mediator within a much larger network of expertise."[22] Surprisingly, the star system still retains a secure foothold in the field. The signature of the architect has maintained its cachet and power to mobilize financial resources and to act as a phenomenal fund-raising leverage. The proliferation of star-architects from all corners of the globe is an indicator that the mythology of the architect as solo inventor of tectonic marvels is far from extinction.

When the first modernists set to save the profession by embracing the industrialization of the building sector, the technological transfer they were carrying out early on was being applied on small scale projects and only later on industrial and

[19] Kostof, Spiro. *The Architect*. Berkeley and Los Angeles: University of California Press, 1977.
[20] Cuff, Dana. *Architecture: The Story of Practice.* Cambridge, MA: The MIT Press, 1992.
[21] Woods, Mary N. From Craft to Profession: The Practice of Architecture in Nineteenth Century America. Berkeley, CA: University of California Press, 1st edition, 1999.
[22] Lorenz, Theo, and Staub, Peter (eds.). Mediating Architecture. London: Architectural Association Publications, 2011, backcover.

commercial buildings. Those pioneers eventually delivered an updated image of architecture shaped through modern technology and made the profession relevant once again. Their fascination with industrial processes has an unforeseen side effect. Because they had little technical knowledge of the building systems they were engaging in, the projects they built experienced fast obsolescence. Since technological standards undergo continuous revisions, the demands imposed today on building performance were plainly unforeseeable a century ago.

Can Collaboration Change the Design Process?

In theory, collaboration is a mode of working that fills practical epistemological and operative gaps. To a large extent, the abundance of networking applications and the ubiquitous connectivity of the Web propels such anticipations, while also exacerbating its difficulties. This applies both to collaboration within the office and collaboration across disciplinary distinct offices. An offshoot of these digital drivers and at this point a classic fallacy tied to the endorsement of a computational account of the design process is the assumption that there exists an optimal alignment of human and technical contributions leading to an ideal solution to the problem at hand.[23] It is the standard problem-solving approach inherited from the military industrial complex of World War II origins. It features ranking procedures and the certainty of a mathematical mindset with no self-doubt about its theoretical assumptions. In that perspective, any derailment from that allegedly highly efficient diagram is explained as dysfunctional workflow and breakdown in the lean course of building production. By not adhering to a strict protocol of how matters are supposed to be handled and coordinated per the collaborative protocol, staff members are walking bearers of looming errors spreading the liability of the office they work for in all design phases.

When compared to the reality of office work, however, the picture is decisively more entangled than previously described. This reductive account of the design process swiftly crumbled in the face of findings from naturalistic settings where design work is performed. Unsurprisingly, this view remains popular in Computer Science departments because it equates design to procedure, therefore amenable to coding. Alas, this stance inherently rejects the existence of those non-declarative agents that de facto impinge on how design is accomplished. Furthermore, very real key obstacles in making collaboration a reality in the construction industry and the architectural profession are the cultural and territorial challenges that collaboration presents. An obvious threat is the possibility of eliminating errors on which a solution economy within the AEC sector has been built. For every error made, a professional can fix that mistake for a fee, i.e. the hefty revenues coming from the Construction Administration phase of architectural services, something interested parties are unwilling to let go of despite contrary claims.

But just like there are no organizations without people, there is no collaboration without a firm, here understood as both a legal entity with its own business license and

[23] Alexander, Christopher. *Notes on the Synthesis of Form.* Cambridge, MA: Harvard University Press, 1964.

Tax ID as well as a community of employees with an extensive cast of characters. Architectural firms, especially large ones, are intellectual factories of knowledge workers. Their workforce is made of salaried professionals conditioned in their actions through the control exerted via their paychecks. Capital dominates the operation and social transactions in the architectural firm. Any form of collaboration, when it exists and at whatever micro/macro level, emerges from this existing background. The staff all across the board routinely labors on projects in conjunction with the entire palette of misgivings, specialized expertise, technical competence, shortcomings of personality, uneven skill sets, and assets that makes the identity of the architecture office. This intersection of discrete trajectories fashioned under the aegis of the division of labor and capital labor relationships comprises the human structure of the place of work. The economics of work, the existential and personal sphere of the individual being when interfacing with work, social expectations as they are exerted upon human beings, all impact– either positively or negatively– the feasibility of a perfect diagram/procedure of collaboration that exclude people's nature as a theoretical assumption.

Therefore, an additional set of questions comes up when designing an inquiry on collaboration in architecture. Some of them are articulated here. What is the shared meaning of collaboration in architectural culture? How many definitions of collaboration fit the broad spectrum of design firms pursuing the commissions that form the built environment as a whole? When arguing in favor of a collaborative approach to design, what are the expectations that both the profession and the general public exert on the outcome of the design and building process? Why has collaboration failed to become a predominant mode of design despite over 100 years of endorsement in parts of the architectural discourse? What has been historically in the way of collaboration in dealing with the production of buildings? Can the dichotomy between single authorship in architecture and collaboration find a credible synthesis where the community's prospect of receiving a design responsive to all its needs and the market pressure for a fully coordinated and high-performance project on budget has a positive resolution? How do design practices interface with the use of digital and analog technology? What is the rhetorical strategy that collaboration depends on to create its own relevance among architects and consultants? Why is collaboration inconsistent with the symbolic expectations of the high culture of architecture? Why is collaboration countercultural to both the office culture and the office structure? Why is collaboration unfeasible from a contractual standpoint? Why, even if it makes sense in principle, rational beings do not collaborate? How come collaboration does not sell in the media? And why is collaboration undesirable from a client's perspective? As this study proceeds, this list of questions increases in length.

Workplace: Four Case Studies

To come to grips with the long history of trial and errors (and disappointments) in attempting to work collaboratively, it is critical to examine the workplace, that is the naturalistic setting where teams perform all necessary tasks to bring a building from conception to completion. Collaboration is a main buzzword in the contemporary knowledge society. However, this word, used and abused in marketing material to advertise professional services to risk-adverse clients, is a deficient descriptor to

encapsulate the complex dynamic of teams. In the case of the Architecture, Engineering and Construction industry, these communities comprise paid employees of firms, that is, business entities contractually obligated to share information among all parties involved within the firm itself and outside consultants. While these members synchronize their work with others, the hypothesis that they work collaboratively is to be demonstrated. When examining the workplace complex questions arise, requiring equally complex answers. "Monolithic global organizations are being replaced with flatter, more responsive, real-time information rich configurations. That is said to be particularly true of knowledge-based organizations where human resources are the company's chief asset."[24] Architectural practices, small and large, are knowledge-based organizations and are reactive to economic opportunities. Their survival is predicated on the robustness of their credentials in the eyes of prospective clients and effective marketing strategies to bring business. Having financially profitable access to the profession is a long-term exercise of resilience in overcoming the numerous obstacles that both architects and the social and legal system have put in place to close the gap between overrepresentation of firms' capabilities, and the under-delivery of the design services clients expect to receive. Every license expires, continued education is required, new tests are formed, additional special credentials need to be acquired to conquer a particular market niche, new and upgraded software has to be learned and quickly put to production, and so forth. This is an ongoing pursuit.

Together with the subculture of every firm, I analyze the material arrangement of each setting. More specifically I map the co-location of people with particular expertise in relation to each other and where they are positioned in the three-dimensional space where they perform their problem-solving tasks. The correlation between spatial organization of the office and frequency of communication among staff is established: "The influence of office layouts was very strong on communication patterns."[25] Formal floor layouts are reflection of office practices, but the information available on how those plan designs either reinforce or break internal patterns of working is rather sparse. Since chance encounter is a pivotal mode of information exchange among members of a professional community, what happens when the staff is organized on two floors or even in different buildings? If there is a 90% chance of meeting on the same floor plate, the production of a particular type of knowledge will be the function of the composition of that workforce in that percentage.[26] Open plan versus cubicle, walled areas alongside glass conference rooms, public zones against private quarters shape the make-up of the office and bound finite possibilities of human exchanges; they inhibit or promote forms of communication; they reinforce the social roles internal to the very specific office. Is the principal sitting close to the workforce or in a private office? Is the corner area

[24] Pettigrew, Andrew M., and Fenton, Evelyn M. "Integrating a Global Professional Service Organization: The Case of Ove Arup Partnership." *The Innovating Organization*. Thousand Oaks, CA: Sage Publications, 2000, p. 5.

[25] Carlson, Sune. Knowledge, Information And Language in Fores, Michael and Glover, Ian (eds.) *Manufacturing And Management*. London: H.M. Stationery Off., 1978, p.139.

[26] Allen, Thomas, and Henn, Gunter. *The Organization and Architecture of Innovation: Managing the Flow of Technology.* Amsterdam; Boston: Elsevier; Butterworth-Heinemann, 2007.

devoted to meetings or inaccessible to the most? Although sales pitches in firms' marketing packages put collaboration on top of their taxonomy, a particular physical arrangement of the workstations in space might short-circuit even the most genuine intentions to work more closely. The layout of the architectural office and its position in the city impact the social life of the firm. Such an environment will pattern social relationships and their associated activities.

Archival research on the emergence of collaboration in the debate of the Modern Movement provides a historical context for the assessment of the four practices in this study. Why the isms of Modern architecture made a cult of collectives is a topic with nested questions fully interlocked in the giant changes in the production of goods and in the American and European economy that occurred throughout the 19th century. In Walter Gropius, the culture of architecture found its most committed spokesperson, rallying the intelligentsia to come to the rescue of the architecture profession, then thought on the verge of extinction in the new predicament generated through the Industrial Revolution. Gropius's clarion call to reform the mandate of the profession was largely a plea for architect's renewed relevance in order to regain control of the design process as a master builder. But how could the architect- then as well as now for that matter- be collaborative and a master builder at the same time? Each label identifies two irreconcilable ways of working. Gropius left this conundrum unsolved and no one else has succeeded in settling the matter either.

Teamwork is a word that raises eyebrows in the elite culture of architecture and in the media. For this "favored circle"[27] and the communication infrastructure, teamwork in architecture equates with corporate environments generative of creative sameness. In their view, such homogeneity stems from the social engineering of firms implementing company policies as stated documents and informal, unwritten procedures purging unfit elements that threaten the reproduction of the organization at its present state. The findings from the case studies support the view that each subculture invariably entertains a system of positive or negative reinforcements of each staff member, to make the company survive the changes of time and looming threats to its extinction. But there is even a bigger culprit to the one just described to the eyes of the signature architect: teamwork is the number one enemy of great architecture. In a personal letter William Wilson Wurster, Dean of the architecture school at UC Berkeley, wrote to Eero Saarinen on September 19, 1960, he states: "Our new Environmental Design Building by Esherick, Olsen and DeMars will be very good indeed. I hope so for I am trying to prove something with which I am sure you disagree- that a group CAN design a building."[28] Opposing factions celebrate and denigrate this idea, under the same impulse to bring renewed standing to the architect. Among the cheerleaders of teamwork is mid-century modern architect Hugh Stubbins, who bestowed an aura of epochal necessity to the concept: "To

[27] Stevens, Garry. *The Favored Circle. The Social Foundation of Architectural Distinction*. Cambridge, MA: The MIT Press, 1998.

[28] Wurster, William, Letter to Eero Saarinen, 19 September 1960. William Wilson Wurster Collection, Carton II, Correspondence, 1960-61, Environmental Design Archive, College of Environmental Design, University of California Berkeley.

me, 'teamwork' does not imply design-by-committee or planning-by-vote. It does mean the necessity of more interplay, exchange of thinking, and glimpsing of goals and coordination of effort between the structural, mechanical, electrical, financial, political, and sociological proponents that bear on most large-scale architectural or city planning projects today."[29]

Of chief relevance to the collaboration topic is the 1958 seminal study on creativity, promoted by the University of California Berkeley's Institute of Personality Research and Assessment, conducted by a team of researchers led by Donald MacKinnon, a former member of the Office of Strategic Services in Washington D.C. during WWII. This investigation focused on forty architects, considered the most creative in their field. William Wilson Wurster, Donald Olsen, Vernon deMars, Joseph Esherick, and Philip Thiel, all faculty members from the architecture school at Berkeley, formed the five-member selection committee tasked to identify the deserving architects for the study. Among the most notable figures in the list of selected architects under study were: Eero Saarinen, Louis Kahn, George Nelson, Richard Neutra, Pietro Belluschi, and Philip Johnson. The unpublished report wholly debunked the possibility of any meaningful creative achievement through teamwork. Specifically, its most consequential finding, for the purpose of this study, was that all of these architects were deeply individualistic, with a grand idea about themselves. MacKinnon wrote: "A characteristic of creative architects closely related to their clear and strong identification with architecture is a sense of destiny about themselves and their work which includes a degree of resoluteness and almost inevitably a measure of egotism."[30]Arguably, the following discovery put a final word to the correlation between group work and less creative work, compared with that of the individual designer:

> The narrow specialist is, in his style of cognition, a sensation type. In his perceptions and in his thinking he focuses upon the sensory attributes of experience and centers his attention upon existing facts. Bound to the stimulus and the present simulation, he is peculiarly unimaginative. The generalist, on the other hand is in his style of cognition inclined to be an intuitive type…All that is known about group process and problem solving suggests that architecture practiced by teams of narrow specialists will not exhibit the level of creativeness which can be achieved by broadly trained generalists or by teams of generalists or by generalists working together with specialists.[31]

Therefore, it should come as no surprise that skepticism about collaboration sovereigns among signature architects. The staunch defense of individualism of thought and action appears consistent with the thought of English philosopher Bertrand Russell (1872-1970), who argued that the role of individuality is a necessity, as it extends the long-term aspirations of modern society to innovate and grow:

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[29] Stubbins, Hugh. "The Challenge of Architectural Education", *Journal of Architectural Education (1947-1974)*, Vol. 13, No. 2, ACSA-AIA Seminar: The Teaching of *Architecture* (Autumn, 1958), p.17.

[30] MacKinnon, Donald. "The Characteristics of Creative Architects", 1964. p.84;

[31] MacKinnon, Donald. *Ibid.*, p. 86;

> If a community is to make progress, it needs exceptional individuals whose activities though useful, are not of the sort that ought to be general. There is always a tendency in highly organized society for the activities of such individuals to be unduly unhampered, but on the other hand, if the community exercises no control, the same kind of individual initiative which may produce a valuable innovator may also produce a criminal. [32]

Mythologies of teamwork and collaboration have consistently emerged in speculative publications as well as professional debates ever since the early days of the Modern Movement. But insufficient knowledge of the multiple modalities in which buildings are actually designed in offices, the day-to-day activities nested into human behavioral patterns that cumulatively produce legal documents to build, make those claims uncorroborated. The aspirations and expectations mounted through the literature have had little to no verification in the everyday of the workplace. While each organization condenses in a textual document a set of policies, beliefs, procedures, and such, a large number of areas of influence on the final outcome remain undeclared. In a nutshell, data on collaboration in action is missing.

Although repeated claims have been made in mainstream literature about collaboration being beneficial both for the design process and its outcome, no systematic and extended qualitative fieldwork on communication in collaborative teams, let alone collaboration, has been carried out in architectural firms to corroborate the foundation of those convictions. In the design field, most of the writings on the subject are either personal reflections of architects on the status of the profession and their own careers or theoretical assertions that working together will bring better buildings, whatever that means, to the physical, social and cultural environment, or a collection of interviews the researcher has conducted with architects reporting their own experience. Surprisingly though, despite many decades of disciplinary debate on what working collaboratively could do for architecture, none of the tools available from the Social Sciences have been used to provide evidence in favor of, or against, collaboration as an opportunity for future forms of design practice.

Why study these firms as opposed to others? Each of them stands for a type of practice characteristically found in the profession. Unsurprisingly architects embrace the design cause with varying degrees of commitment. For the hardcore group of design architects (embodied in the first case study), design is the very reason for the discipline of architecture to exist. To this faction, unforgiving schedules and being on charrette is a standard price to pay for design distinction and, in the most ambitious characters, ideally to earn a place in architectural history. A sense of mission and destiny about themselves singles them out from the anonymous crowd of design professionals. For collectives invested in design (as the second case study demonstrates), financial goals are very close second–if not on the same plane– to the obligation to pursue the highest bar in architecture. Not infrequently, the imperatives of project management enter in collision with the trajectory of high design, and occasionally prevail to the detriment of degree of

[32] Russell, Bertrand. "The Role of Individuality" in *Authority and the Individual*. New York: Simon & Schuster, 1949, p.25.

invention, while hitting the profit targets. In these settings, landmark buildings are within reach, yet not the bulk of the office's output. The third case study, instead, is a very close approximation of the standard large-size office to be found in any metropolitan area in the United States. In these workplaces, practice is humdrum with occasional peaks of excitement for a particular commission the staff is working on. For most of the personnel, however, this is a nine-to-five job with sought after vacation times and a rather relaxed attitude toward work. Rather than a desire to emerge as a trendsetter, the real destination is the execution of the work under professional best practice with a very close eye on high profits. Lack of distinct rhetoric about its own identity in the marketplace is a sign of a client-oriented practice, eager to please for monetary return, with little to no ambition to enter the Olympus of high design. In the fourth case study, however, an uncharacteristic intersection of business model, firm ownership, composition of workforce, and project types generates ongoing invention and ingenuity. Of the four offices examined, this is by large the most unorthodox, although it is the biggest in size. Even though its outreach extends way beyond architecture, the appeal this organization offers to the profession is significant. Room for intellectual growth and experimentation is available within the context of stable employment, benefits packages, and the possibility of an honorable career path. Such a firm is an exception in its own professional landscape and by no means a typical organization. However, it is an implemented model with build-in attributes potentially transferable to multiple design environments.

Communication in Collaboration

Beyond doubt, communication is central in the countless transactions shaping the building process. One of the focuses of this study is the exploration of how communication occurs in a large size architectural firm. Due to the social nature of architectural labor, the elaboration of a scheme is fundamentally a relational and dialogical activity. As the construction industry becomes increasingly complex in its technology and more entangled in the legalities in which architecture is constructed, architectural knowledge invariably redefines its fragile and temporary institutional limits on a consistent basis and as a matter of course. The great number of actors involved in the building process, each carrier of individual agendas, company obligations, and professional loyalties, gives rise to a highly diversified human topography that is by no means cohesive. In professional discourse the solution to such a fragmented mode of operation has been collaboration.

In the context of this dissertation, collaboration is here defined as a joint, willful, synchronous, and professionally horizontal action toward the production of a detailed response to a complex design problem. As a corollary to this designation, a rather specific question this dissertation seeks to answer is: how do people communicate in multidisciplinary teams working collaboratively in the early phase of the design process when key decisions are made?

In theory, given the parceling of expertise, bringing it back into the team will reconstitute that unified knowledge, a prerequisite for a highly integrated project. But is that simply working together or is it supposed to be collaboration as just defined? Furthermore, since the evidence that this fusion of personalities and know-how

only occurs in a localized fashion despite the aforementioned theoretical benefits, does this not constitute a signal that collaboration unsettles other aspects of the diagram "people at work for money" conditioning its very implementation in the real world? The findings of this dissertation support that individuals do not collaborate as a default way of working but do work together under specific motivational structures: capital, reputation, a sense of destiny about themselves, and more.

Structure of the Dissertation

Past the global level considerations that have been the focus of this introductory essay, chapter II makes a dent into the massive literature on collaboration. In an effort to provide a focused review on the different ways in which the subject has been studied, I look at canonical texts on cognition, architectural practice, epistemology of collaboration, corporate culture, and economics, among others, pointing to a wide array of ideas on collaboration. This vast corpus of documents is subdivided in five regions of literature: architecture, practice, cognition, workplace, and economics. In view of the current capabilities to assemble physically dislocated teams through the digital media, the effervescent collaboration industry continues its torrential production of publications, purporting unprecedented levels of neural efficiency through networking and synchronic labor. The business world also has made collaboration a chief topic for its community. The ominous figure of the individual designer is the anathema against which all these publications strive to overrule. The boilerplate language of these texts is a condensed version of business claims, where offices are profit centers, the achievement of a project is based on pure customer satisfaction, and professionals in their own fields are industry leaders or thought leaders, rather than critical agents in the development of architectural culture. Accomplishments and value in architecture understood as a human endeavor transcending commercial goals, however, call for metrics substantially different from the tropes populating the Sales & Marketing literature. Nevertheless, such vernacular was already present in pre-computer age texts even though in a far more contained tone than the current one. The merging of knowledge and the shifting of professional identities into a unified setting are theorized as the chief benefits of co-work. The Web and its associated software more specifically offer promises of implementation at a universal scale, catching talent wherever it exists.

Chapter III features the first case study. It covers Eero Saarinen and Associates, representative of the *Expertise-Based Firms* model, a practice to this day highly regarded in the world of signature architecture. Archival research of unpublished material and lengthy interviews with staff members of this firm are the primary sources of data. Given the reputation of the Finnish born (naturalized American) Eero Saarinen, a protagonist of the second-generation modernists, and the remarkable body of work his office produced in just over a decade, this case study is paradigmatic of a model where the firm is de facto an extension of the individual chief designer. In his eleven years of leadership at the helm of his firm, spanning from the death of his father Eliel to his own death in 1961, Eero Saarinen retained final and exclusive decision-making powers to steer the workforce in one design direction at his exclusive discretion, even if the partners were in opposition. This is a standard format followed to this day in design-oriented firms, from the likes of Renzo Piano Building Workshop to the smallest boutique firms. Typically, these types of

offices display such an acute dependence on their founder, that at the founder's passing the firms ultimately shut down.

Through a series of vignettes, chapter IV illustrates the inner workings of SOM in its San Francisco base. This firm, held today as a trendsetter in the design of tall buildings around the world, typifies the *Experience-Based Firms* model. With this label, I identify a practice heavily invested in maintaining a very high design standard and preeminent position in architectural discourse, while adopting a distributed format of power in dealing with the organization's operations. In the media, this multidisciplinary entity strategically presents a unified front where names singled out are always accompanied by the firm's acronym SOM. Here, I engaged in full participant observation for two and half years, going through the various steps from being hired to being laid off. I worked on several projects, many built today, located in the United States and overseas. The pyramidal structure of this office, traditionally top-heavy, is entirely led by an oligarchy of partners, each holding shares of the company, with the design partners determined to leave a legacy about their work, yet, by company policy strictly enforced, exclusively under the SOM umbrella. Decisions are top-down with little room for counter thoughts. The file-and-rank workforce is there to execute, with minimal, if any, influence on the design direction of any project that firm can take. Those who are in professional misalignment with this company culture, eventually are purged out of that system. At the managerial level, it functions as a fraternity with its own code of conduct and coterie of allies.

Chapter V narrates the operations of A+A, a firm with a consequential mid-century modern past, but victim of the aftermath of the 2008 financial meltdown and that was recently acquired by the Canadian conglomerate Stantec. This third practice is a hybrid of the *Experience-Based Firms* and the *Efficiency-Based Firms* category. Here, the emphasis on design and its author is a distant second from concerns about profitability and the nurturing of client relationships for future referrals. The staff comes together in large scale projects, in this office exclusively within the health care and academic sectors. But what is absent is a sense of deep commitment to design as a primary driver to the work and to the firm's identity. Corporate policies, a sense of community based on vague notions of equality and fairness, constitute the glue of today in an office lacking the accomplishments that had made it famous nationwide in bygone times. At least on paper, design has no traceable single author, but it is the endpoint of a series of collective agreements with no clear vision and deeply risk-averse clauses, a conservative approach decisively alien to that of the original founders. Full participation observation as well over a six-year period was my primary research method for data gathering. I took on several roles as a designer on a variety of projects, did client presentations, and organized the deliverables both for the conceptual stage and construction of a design. My job was terminated due to the downturn of the economy and the progressive decline of the firm's financial stability that led, eventually, to a change of ownership.

In chapter VI the most convincing form of collaboration takes place. The group I studied here is the English engineering firm the Arup Group in its San Francisco branch.

The Arup's community, with over 7,000 employees in its staff spread worldwide, is the closest mode of collaboration I was able to find where design ambition and a dedication to the democratic and equitable distribution of opportunities and benefits amongst the workforce amalgamate into a global business operation, with stakes in the most prized commissions of our time. Observations, interviews, and archival materials were principal modes of data retrieval. The lateral thinking about tested technologies, yet applied in non-standard solutions, singles out this organization from its competitors. Functioning like an institution for higher learning, work is paired with research and development projects under a viable business model and an effective quality control and management program. In the Arup Group, just like in SOM, the partners are typically reared early on in their career to internalize the value system of the firm, to become future gatekeepers of those values and, eventually, hand them down to the next generation of partners.

Chapter VII summarizes the findings of the four case studies in the context of the questions that were being asked in the introductory essay. Grounded into the data retrieved through archival research and fieldwork from these forms of group practice, critical considerations counter the mythologies of collaboration enucleated in the literature review. People work together in architecture firms, yet not in a horizontal chain of command. Architecture offices, no different from many other offices, are social structures. Sociologist Everett M. Rogers defines social structures as systems consisting of hierarchical positions, giving individuals in higher-ranked positions the right to issue orders to individuals of lower rank. Collaboration would have to insert itself into a social structure which is inconsistent and incompatible with the functioning of a firm as a business entity. Decision-makers are individuals. Many forms of working together exist. Collaboration is one of those. It comes with its own possibilities as well as limitations. If the merging of interdisciplinary knowledge in the architectural object is a contemporary necessity, the execution of the work in the office shatters the professional claims of working collaboratively and any hope of egalitarianism. The design process remains to this day fraught with professional rivalries, conflicting agendas, and overt practices of inequalities, that put a strain on the most determined who want to move up the corporate ladder, make more money, and assert their own individual talent against the anonymity of the workforce.

The Architecture Office

Offices are bureaucracies with clear lines of authority and power flowing from top to bottom. By default, the organization has a vertical structure where tasks and rewards are the function of experience, politics, social standings, and specific expertise. Collaboration, which implies horizontal access to relevant information to produce a coordinated and impactful solution to the design problem at hand, threatens that very power structure and pecking order. It has been argued that the traditional supremacy of the architect in the design process has been superseded by a distributed form of work. Even from a strictly legal perspective the architect has relinquished his/her master builder's role to the general contractor today, contractually responsible for the execution of any architectural project. This limits the onsite supervision- one of the routine services provided to the client according to the standards of the profession- to a more passive role-

a sheer observer of the work being performed- for the architect and the engineer alike.[33] No matter what kind of architectural practice each firm, big or small, endorses, the playground for these camps' controversies is invariably the office. In that setting, management policies can be fatal to the life of an organization. Feuds, factions, mortal enemies (figuratively speaking), and other forms of demonization poison the overall health of the workplace, with destructive results on the morale of personnel and the quality of work itself.

Does the project the team works on make a difference in the commitment that team members have to that project and firm? It does. That commitment plays out depending on the value system that each member of that organization has for him or herself. If salary and benefits is the utmost priority for the employee, that person will seek employment that gives some job security, design being only a factor if it leads to that job security. A firm like A+A does represent an environment where the longevity of the market sector on which the company thrives- health care architecture- has a proven history of stability even in economic downturns. A firm like ES&A tends to draw talent where design is central to the emotional and symbolic universe of its members and therefore conversations on salaries and benefits tend to have a secondary role, because the staff feels that it is contributing in meaningful ways to the advancement of the field.

Does the caliber and reputation of the firm make a difference in the pride and motivation to succeed of the individual team member? Unquestionably so. To paraphrase Alain de Botton, author of the popular book *The Architecture of Happiness*, the staff needs to a see a "promise of happiness" to stick around a particular office. On one hand, Eero Saarinen was cherry picking the designers who were going to join him in the pursuit of the next masterpiece in architectural history, even though in a subordinate position to him. The incentive for them was to truly contribute to the advancement of Modern architecture. On the other hand, A+A would attract professionals motivated to enter the health care market as a steppingstone for a better paid position somewhere else. In the latter setting, the motivation is to gather specialize knowledge in a sector with more demand than supply, with higher pay checks and bigger job security. Two opposite mindsets under the same label: architecture.

Groupwork, collaborative and otherwise, is always situated in an architecture office working on a project. At its most basic level, whether because of contractual agreement or personality dynamic, in an office there are those who give directions and those who take and execute directions. That, however, is the tip of the iceberg. In the two case-studies investigated through full participant observation, specific activities/events/social markers occurring in the cycle of a calendar year are shared descriptors in the profession of office life. The job interview, the day-to-day routine, the first Thursdays, the team outings, the monthly staff meetings, the lunch time presentations, the voluntary or forced departure of employees, salary adjustments, end of

[33] Sweet, Justin, and Schneier, Marc N. *Legal Aspects of Architecture, Engineering & the Construction Process*, Stamford, CT.: Cengage Learning, 2009, pp.192-3.

the week slowing down of office work, close to holidays emotional check-out, bonding of team, introduction of new software, incentive schemes, the going after work, staging presentations, are some of them.

Each firm is a self-referential system with its own reward mechanism and purging procedures. Theorist Ulrich Beck argues that "self-referential systems thus rely on purchased consent; they are wage-dependent or hired organizations."[34] Organizations as a result are based on financial contracts, together with social ones. Their existence is primarily wage dependent. Although it might be argued that Free Will is behind the decision of an employee to become part of an organization, wages and degrees of autonomy of one's work are top drivers for any individual to stay in one firm vs. seeking another firm for career advancement. Given that in an architectural firm the staff is tied to the higher ups with a contract, legally enforceable and structured around roles and responsibilities, practices of collaboration can only take place in as long as this setup remains challenged. Performance and accountability are two primary indicators that allow management to monitor the productivity of the workforce, both for their yearly evaluation and for their informal behind closed doors warnings from management to employees to rectify one's action to avoid termination of employment.

This brings up a more prosaic, yet absolutely core issue of any business enterprise: profit. If loss of money and therefore extra-expenditure is the toll of the chaotic development process largely due to human inefficiencies, why not route that wasted money into a system of incentives where high performance is rewarded? An example could be that if buildings are delivered earlier than the completion date, the owner could distribute a bonus to all parties, with the major motivation of earlier occupancy and therefore added revenue. Somehow that possibility is yet to be enacted.

Architecture offices are organizations, which are also social systems. Their members are messengers of those organizations' standards to the outside world and bearers of those values in the firm. Those same members, however, are also part of the larger human cadre called society. Depending on the number of variables (age, race, cultural background, career paths, class systems, and more), the ideals they carry within themselves might match those of the organization they work for, or not. Should the latter be the case, a mechanism of self-survival within the firm tends to remove those members who do not act upon their allegiance to those values. In the course of this study, it will become increasingly evident that collaboration is a social technology rather than a procedural roadmap to the perfectly integrated building. Its actual implementation may be beyond the resources of the firm or outside the boundaries of its current culture. Just like rejection defines the failure of the heart transplant, rejection is the process of removing an element in and of itself functional in its autonomous state, yet dysfunctional within that particular social system or firm. All firms set in motion their immune system against agents of professional subversions to prevent their own annihilation.

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[34] Beck, Ulrich. W*orld Risk Society.* Cambridge, UK: Polity, 1999, p.97.

Furthermore, each industry depends on its workers. The know-how of the worker changes over time through exposure to technological advances and cultural shifts. Therefore, each theory that involves human material needs to confront the question of the professional literacy of its workers. That would explain the shift from locally based practices to the flat diagrams of the Internet. But collaboration involves different types of knowledge: Know-who; Know-How; Factual Knowledge; Procedural Knowledge. Typically, in each office a few key people have the most sought-after knowledge that architectural firms market. Especially in the showcasing of the firms' qualifications to get work, those key people are in demand in the interview stage in the hope to secure commissions, selling the prospective clients all the risk mitigation messages that that firm can come up with in this preliminary stage. Each principal owns the orchestration of the project life from winning the commission to the delivery of the finished product. The showmanship of the presenter is one of the most in demand traits.

Entry in the architectural market is heavily scrutinized not only by the profession, but by the clients as well. Clients put on top of their requirements for consideration previous experience on similar building types with comparable budgets. They ask for detailed CVs of the team members. Also, they want a plan of action to achieve the intended goal and a risk management plan. While the requirement of exhibiting these credentials is understandable in view of the risk involved, they also impose a bottleneck on the potential applicants drastically limiting the eligibility of the team to secure the commission.

Max Abramovitz, partner with Wallace Harrison, and designer of many renown projects in the New York area, from the United Nations to the Lincoln Center, penned the uncertainties and doubts typical of the design process in the following passage:

> A search is always, in a sense, "troubled." In order to search, one leaves familiar territory, questions himself and his surroundings, commits itself to discovery, and to the possibility of action and change. Your search for an environment that will allow for "pursuit of happiness" and "peace of mind" will be particularly complex, difficult, and troubled, for today the dimensions of change are so vast in space and so rapid in time that we often seem to be inventing solutions for problems which no longer exist. [35]

The entropic condition of design work is source of angst even among the most veterans in the profession. And since design requires constant decision making, any self-doubt is corrosive, if not paralyzing, especially as the deadline for delivery rapidly approaches. Partly because the problem is ill-defined per the Horst Rittel's definition of *wicked problem*, partly because even when the problem is more accurately defined, multiple solutions can solve the problem and the architect runs the risk of falling prey to an impasse debilitating at a financial and functional level the entire organization. In this respect, teamwork can ease the pressure of coming up with a solution, simply by brainstorming and allowing ideas to bounce from one team member to another, regardless

[35] Hardwood, John. *The Troubled Search: The Work of Max Abramovitz*. New York: Columbia University Press, 2004, p.33.

of the role that that particular team member has within the firm. Those ideas receiving the most consensus from the higher-ups provide the beginning of a working scheme. This is the *modus operandi* of the world-renowned Dutch firm Office of Metropolitan Architecture (OMA), under the leadership of the only remaining firm's founder Rem Koolhaas. A squad of second in command partners manages personnel in constant fluctuation with the office, being almost a revolving door for any young aspiring designer eager to enter the game of the star-architecture field.

Such chaotic premise in the performance of design work is source of deep discomfort to project managers. It is through the setting up of schedules and internal deadlines that they seek to control how designers use their time in the project they are teamed up. The former's business goals are typically at odds with the design aspirations of the latter, whose focus might be deemed overly narrow- design over management- compared to the broadest goals of the firm.

Collaboration as Innovation

When collaboration is argued as an innovative technology of practice an additional set of concerns arises. Its rate of adoption and its diffusion are dependent on the specific attributes of the firm. Often innovation is perception of the new and as such it triggers defense mechanism in the environments where that innovation is implemented. The introduction of new technologies is a source of power displacement, especially in the middle level workforce, the most vulnerable to lay-offs in times of economic strain. The line of command, then, cannot be challenged by the new technologies. Working collaboratively equates that having teams and doing teamwork. For team members, teams are windows of awareness into each other's worlds of concerns. Knowledge workers rebalance their know-how in teams, so that epistemic interactions and transactions take place within the timeline of an actual project unfolding in real time. Whether labeled interdisciplinary or multidisciplinary, or even transdisciplinary teams are self-regulating communities as well as temporary systems.

> In *temporary teams* with a finite lifespan, such as film crews, theatre and architectural groups, presidential commissions, senate select committees and cockpit crews, there may need to be *swift trust*.[36]

Temporary groups are a particular type of collective, where confidence-building activities are present so as to build enduring trust. The composition of architectural teams, in general and the four case studies of dissertation in particular, comprises senior figures who have been with the firm for quite some time and other team members, usually juniors, with a relatively short history with both the particular team and the firm itself. These groups need to perform on the ground and meet the deadlines that pace the life of an office dependent on capital for its existence through these ad hoc formations. Their reliability is imperative. However, in-house support is readily available virtually on a moment notice through re-assignment of more skilled and experienced staff, should the

[36] Gold, Natalie. (ed.). *Teamwork. Multidisciplinary Perspectives*. New York: Palgrave Macmillan, 2005, p.16.

team underperform so as to reach the milestone, prerequisite for client's payments. Under these circumstances:

> …the trust that unfolds in these temporary teams is more accurately portrayed as a unique form of collective perceptions and relating that is capable of managing issues of vulnerability, uncertainty, risk, and expectations…It is the configuration of these variations in behavior that accounts for the unique form that trust assumes in temporary systems, a form we call *swift trust*.[37]

This goes in tandem with Elton Mayo's argument that collaboration is a technical as well as a social question.[38] While we are equipped to deal with the technical side, the process of modernization has taken away the bond within communities, of which trust in each other is a central underpinning. Since computing dominates today's reality of the production of architectural design, this is hardly an insignificant area to deal with. Alas for the staff, to paraphrase Mies Van Der Rohe, sitting in front of the computer all day is the alienation of our digital epoch.

To initiate a new mode of working in a place with long-established habits, in the hope that both staff and management will internalize its procedures, is a very arduous thing to do. When operations are routinized, and professional identities fixed, their mutual efficiencies and dysfunctional side effects are part of the very culture of the workplace. To graft another procedure on the old one, when each architecture office has a formal (or informal) pecking order, carries very high chances of internal rejection, despite open assertions that the time to be collaborative has come for that particular enterprise. Since collaboration is a form of practice innovation "the structure of a social system can facilitate or impede the diffusion of innovations."[39]

Given that financial performance is equivalent to the firm's survival and prosperity, ironically, firms are usually unwilling to take the risk to be collaborative, when they are able to perform just as well in their typical settings. "Each firm has an internal subculture which is also a knowledge system. Any introduction of innovations has to come to grips with this knowledge system."[40] Therefore, business continues as usual. The case of SOM is the textbook case of the modern firm "balancing exploration and exploitation"[41], whose rituals and ways of dealing with rate of compliance within the staff are reinforced by the steady reputation the firm has globally and the repeat clients that feed its gargantuan professional machine.

Everett M. Rogers argues that:

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[37] Meyerson, Weick, & Kramer, Swift Trust and Temporary Groups? in Moreland Kramer, Roderick, and Tyler, Tom R. (eds.) *Trust in Organizations: Frontiers of Theory and Research.* Thousand Oaks, CA: Sage Publications, 2000, p.167.

[38] Mayo, Elton. *The Social Problem of an Industrial Civilization*. Cambridge, MA: Division of Research, Graduate School of Business Administration, Harvard University, 1945, p.27.

[39] Rogers, Everett M. *The Diffusion of Innovation*. New York: Free Press, 5th edition, 1995, p.25.

[40] Rogers, Everett M. *Ibid.*, p.4.

[41] Roberts, John. *The Modern Firm. Organizational Design for Performance and Growth*. New York: Oxford University Press USA, 2004, p.280.

…the main elements in the diffusion of new ideas are:

- An innovation;
- That is communicated through certain channels;
- Over time;
- Among members of a social system;[42]

The readiness of a working environment to adopt alternative ways of thinking and doing the object of their professional concern is something that can only be tested in the real world, rather than being forecast. In this respect, the office of Eero Saarinen displayed remarkable malleability in importing logic and processes coming from the automobile industry, after the completion of the colossal General Motors commission. Saarinen was always alert and equipped to introduce a new method into the making of his own architecture if this was going to give him a competitive advantage in the race for the enduring recognition of his name.

German sociologist Ulrich Beck states that the increased risk that globalized technology implies is hardly covered. Can discourse on collaboration be understood as an antidote to the increase in risk that design and building today entails? More interdisciplinary knowledge is required, and more complexity needs to be managed in the making of a building. But to think about collaboration as a remedy, as a patch to a faulty process is setting up a team for defeat, a temporary fix based on fear of failure to deliver according to professional standards. It is the glaring missed opportunity to recast the terms of the project delivery process and the orchestration of professional contributions that bring a building on paper into reality. Innovation and risk, unfortunately, are the two most wanted enemies of conservative clients. No matter how much risk management procedures architects put in place, statistically clients will be more risk-averse than risk-prone due to the financial and legal stakes associated with building as a real estate venture burdened with inflexible insurance obligations. Especially when clients lean on outside experts to make determination for a future course of action, which will always involve some form of financing, the most conventional route will be chosen. Here Beck's penetrating realizations come handy: "…there are expert solutions in risk discourse, because experts can only supply factual information and are never able to assess which solutions are culturally acceptable."[43]

Architects are caught in the following conundrum: to advance the field, they need to take risks, but the environment is so litigious and risk-averse that they rehash the work that has already been done, in an effort to survive in the marketplace. Their complacency becomes structural and the results in the built environment stifling. Teams and collaborative work extend the boundaries of the risk-domain to encompass increased possibilities for alternatives. Yet teams are made of individuals hired to perform a job for monetary compensation. Beyond this detectable motivation, all else is discretionary in the ability of the employee to give to the greater cause of architecture. The office is then the

[42] Rogers, Everett M. *The Diffusion of Innovation*. New York: Free Press, 5th edition, 1995, p.36.
[43] Beck, Ulrich. *World at Risk.* Cambridge, UK: Polity, 2008, p.42.

collection of such hybrid characters sharing roof, but unequal professional destiny. Any derailment from the conventional way of operating upsetting the existing order is attacked and eventually eliminated. Once again, Rogers identifies this pattern of disconnect between the innovation and the firm that is supposed to adopt and carry out that innovation: "Norms are the established behavior patterns for the members of a social system. Norms define a range of tolerable behaviors and serve as a guide or standard for the behavior of members of a social system. The norms of a system tell individuals what behavior they are expected to perform."[44]

Ultimately, this dissertation tells the story of this clash of identities, heterogeneity of input in the design process, clinging to the mythological vision of collaborative work, and readjustment of expectations about how much collaboration can realistically accomplish to deliver an integrated as well as culturally impactful piece of architecture.

[44] Rogers, Everett M. *The Diffusion of Innovation*. New York: Free Press, 5th edition, 1995, p.26.

CHAPTER II. LITERATURE REVIEW

> Here we come face to face with a sharp conflict of values in our society and in our schools today: the emphasis, on the one hand, on togetherness, the integration of the individual into the group and its activities, good group dynamics, and smooth interpersonal relations; and on the other hand, the nurturing of creative talent. All our evidence points to the incompatibility of these opposed values and goals. [45]

Introduction

The literature on collaboration is dense and vast for at least two reasons. The first is that collaboration is a mode of working running across disciplines. All fields of human knowledge in one way or another entertain some notion of synchronous labor, where people and tasks are inextricably linked to one another in the pursuit of a common aim. Managing those groups so that their efforts can be organized to meet the chosen target, whatever that is, is the subject of extensive research the origins of which date back to the discourse gravitating around the Industrial Revolution and the rise of the Social Sciences. The second is that the terms of the debate around collaboration remain semantically unstable, both to the scholars who study this area and to members of the communities that are engaged in collaborative activity or represent themselves as integral to the collaborative effort. The terms of that debate– risk management, trust, motives, authorship, group membership, self-investment, and rewards, to name a few-- take on conflicting significations depending on which subculture is being studied and, within it, who is voicing individual stances about those topics. To this day, this discursive slippery slope undermines a great many attempts to find consensus for a universally agreed-upon definition of collaboration and to understand what can be expected, or not, about working collaboratively in those settings.

A key assumption running through most literature is that collaboration has a detectable and largely positive impact on those engaged in that mode of working as well as on the final product. Being an interdisciplinary blanket term, texts on this widely debated topic are available for instance in Environmental Management (Wondollock and Yaffee, 2000; Marshall, 2005), Labor Management (Seward, 1949), Education (Sawyer, 2007), Political Science (Axelrod, 2016), Business (Rosen, 2007; Surowiecki, 2005), Social Psychology (Moscovici and Doise, 1994), Psychology (Paulus and Nijstad, 2003), Law (Estlund, 2003), Public Policy (Forester, 1999; Innes and Booher, 2010) Information Technology (Hinds and Kiesler, 2002, Engeström 2008), Anthropology (Tomasello, 2009), Performing Arts (Tharp, 2009), Fine Arts (Farrell, 2001), Philosophy (Meggle, 2002), and Organizational Theory (Haveman, 2022). As an example, in her book on film noir director Alfred Hitchcock, the author wrote:

> The essays and interviews in this section, though, show Hitchcock's deep awareness that an auteur by no means operates independently but rather in the context of stylistic

[45] MacKinnon, Donald. "The Characteristics of Creative Architects" in *The Teaching of Architecture* (Whiffen, Marcus, ed.). Washington: Office of Educational Programs [of] the American Institute of Architects for the AIA-ACSA Teacher Seminar, 1964, p. 82;

> conventions, production routines, and institutional pressures that set up the horizon of filmmaking.[46]

Similar statements are interspersed virtually in every domain where human output is communalized, and as such are equally applicable to architecture. Parallel lines of research have been carried out in other fields, especially in the business world and in the Social Sciences. If in the former field, the argument pro collaboration is articulated exclusively in terms of increasing the financial return of the business enterprise, in the latter the critical lens is placed on the social systems underlying artistic productions. In his 1982 book *Art Worlds*, sociologist Howard Becker questions the widely accepted belief that art springs from an individual mind operating in isolation. He therefore resets the attention of the scholarly forum on the interconnectedness of all members operating in the art world, such as editors, distributors, producers, authors, and audiences. In the field of psychology, Jock Abra argues in favor of collaboration, by profiling the psychological identity of those who choose to work collaboratively.[47] Of particular relevance is the body of literature coming from interdisciplinary studies examining teamwork holistically. Their central question is: What makes people collaborate? Gold, a scholar on decision making theory and its practical application, writes,

> Organizational psychology studies how motivations in teams are determined in part by aspects of personality, such as leadership qualities and by phenomena belonging to the affective dimension, such as mood and emotional contagion.[48]

The Sales & Marketing section of online and brick-and-mortar bookstores are crowded with titles forming that large chunk of literature written mainly for the purpose of maximizing the link between increased productivity and higher revenues. The title *How to Make Collaboration Work: Powerful Ways to Build Consensus, Solve Problems, and Make Decisions* (Straus, 2002) is representative of a type of handbooks on managing traffic of information shared within groups, while holding constant other structural variables integral to making collaboration a viable option in the workplace. Another strand of writing is also pervasive combining computer technology and business practices. Titles such as *The Designful Company: How to Build a Culture of Nonstop Innovation* (Neumeier, 2008) are exemplary of how arguments are patterned and delivered to an audience sensitive to the patois of innovation. The predictability of the rhetoric adopted when discussing the benefits of digital technology– and the potential commercial gains– invariably relies on the same four-step sequence of deductive reasoning. It typically starts with the author making the argument that the existing way of doing things together is an obsolete and wasteful one. What follows next is that, given this stated inefficient way of working, the case for a new mindset is made so as to route human resources and talent to some proposed alternative. The third task for the writer is

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[46] Hitchcock, Alfred. *Hitchcock on Hitchcock*. University of California Press, 1995, p. 157;

[47] Abra, Jock. "Collaboration in Creative Work: An Initiative for Investigation" in the *Creativity Research Journal* Vol. 7, Issue 1, 1994, pp. 3-4;

[48] Gold, Natalie. (ed.). *Teamwork. Multidisciplinary Perspectives*. New York: Palgrave Macmillan, 2005, p. xxii;

to discuss the picked alternative of working together as something already happening anyway, but the reader is simply being late to acknowledge. Lastly once the proposed alternative is implemented, profit will follow.

To complicate matters further, each study of collaboration conducted in its specific environment brings into the mix associated fields as disparate as the sociology of knowledge, art history, cognitive science, filmmaking, engineering, the sociology of the professions, and the psychology of creativity, among others, each with their load of disciplinary specific literature. These represent but a small fraction of the deluge of publications available, individually dissecting the particularities and nuances of collaboration as it is being enacted in the innumerable settings where it applies. Within this gargantuan number of publications, of particular interest is the work of Elton Mayo, professor of Industrial Research at the Harvard Business School (Mayo, 1944, and 1945). Mayo's focus was on the performance of dysfunctional teams and what prevented individuals from becoming team members. He understood that the problem of cooperation within the team was both social and behavioral, independent of the tools being used to perform work collectively. Through empirical research, Mayo conclusively established a correlation and causation between attitude toward cooperation and social structures. The unwillingness to cooperate and collaborate in industrial society is understood as a form of alienation of the individuals from their social milieu. His findings matched those of earlier studies done in France in the 19th century and cited in his groundbreaking book *The Social Problems of an Industrial Civilization*, specifically:

> … in simpler communities, where the chief occupation is agriculture or fishing or some primary activity, there is a stability of the social order that has ceased to characterize highly developed industrial centers. In these simpler communities every individual understands the various economic activities and social functions, and in greater or less degree, participates in them. The bonds of family and kinship (real or fictitious) operate to relate every person to every social occasion; the ability to cooperate effectively is at a high level … finding with respect to the modern and characteristically industrial community is entirely contrary … the authority of the social code is ignored, the ties of kinship are no longer binding, the capacity for peace and stability has definitely waned … the outstanding character of an industrial community is a condition of extensive social disorganization in which effective communication between individuals and groups has failed, and the capacity for spontaneous and effective cooperation has consequently failed also.[49]

Furthermore, there is a disagreement on the inherently benevolent potential of collaboration. Namely, American economist Mancur Olson unequivocally states:

> Indeed, unless the number of individuals in a group is quite small, or unless there is coercion or some other device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common or group interest.[50]

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[49] Mayo, Elton. *The Social Problems of an Industrial Civilization*. Cambridge, MA: Harvard University, Graduate School of Business Administration, 1945, pp. 5-6;

[50] Olson, Marcur. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press,1965, p. 2;

Why has collaboration historically failed to deliver? What are the operational brakes that undermine the realization of collaboration in action, panacea to all dysfunctions of the design and construction process? Answers to these vexing questions are largely rooted in the dynamics of human action, as the case studies of this dissertation reveal. What prompts individuals to partake in this meta-activity results from a permutation of factors mainly leading to what philosopher Gary Becker has called "the economic approach to human behavior."[51]

Literature in Architecture

This section surveys the wide range of positions for and against collaboration in architectural practice. While there is no prevailing definition of what collaboration means and does in architectural discourse, the common thread of these highly diverse positions is that the production and consumption of architecture does necessitate more than one individual. The coming into being of any architectural design is therefore quintessentially a relational activity. Although reduced in scope from the body of literature outlined above, the texts on collaboration covering the origins and structure of the conception of the architectural idea and its execution in the workplace are rich in quantity and contradictory in findings. The last thirty years of growth and diffusion of networking software in the marketplace has only exacerbated the already present frustration caused by studies drafted on data collection of little general applicability, to address and resolve the perceived inefficiencies in the building process as it currently stands (Heintz, 1999; Kvan, 1999). Either as speculative inquiries aimed at clarifying the nature and mechanics of working collaboratively or as commercially driven investigations sponsored by private agencies and public institutions to effect change in the pragmatics of architectural practice, studies on collaboration have resulted in haphazard reports that isolate the analysis of one aspect of the problem at the expenses of a holistic view of the broader question (Vinck, 2003; Bento, 2004). Digitally based solutions conceived to mitigate if not neutralize the entropic nature of construction find sympathetic ears in managing partners of firms and their project managers, who are used to evaluating the performance of architecture mainly through the balance of their spreadsheets. However, pervasive suspicion about collaborative design is the most common reaction among those who make design the very raison d'être of architecture and the centerpiece of their lifelong commitment to the field. This is hardly a trivial distinction given the connection between how clients hold design in their value system and the hefty professional fees a firm with a highly regarded design reputation can dictate to take on new projects. The economics of name recognition plays a powerful role in the social ecosystem of design and construction. This is a historically unique predicament. If, on one side, design can be a lucrative activity based on the artistic authority of the proper name, on the other, widening the participation of an increased number of architects into this favored circle risks the cutting of the financial benefits of that restricted group and reducing their privileges in the marketplace.

[51] Becker, Gary. "The Economic Approach to Human Behavior." in *Rational Choice*, ed. Elster, Jon, Washington Square, N.Y.: New York University Press, 1986;

While most of the literature on collaboration and teamwork originated in the twentieth century, well before then it was widely understood that the construction of any structure necessitated the coordination of very large groups of workers. In the main, civic, and religious landmarks compose the milestones of architectural history of the pre-industrial age. Due to the extended time it routinely took to realize these buildings, characteristically in the order of decades and occasionally hundreds of years, authorship of the final design to a specific individual would be a factual misnomer. Palaces and cathedrals embody the labor of several generations of master masons, their apprentices, and the anonymous crowd of manual workers, toiling on those structures. In addition, the organization of the construction site to realize these long-term projects is another critical factor to consider in the analysis of group work. Together, these aspects were just as determinant in the final outcome as the original conception of the idea. . Traditional art and architectural history practices have centered on the result, as opposed to the process that led to it. Ancient engravings, such as those representing the construction of the legendary Tower of Babel, show large crowds of construction workers feverishly laboring on the erection of real and fabled buildings (Du Colombier, 1953). The western canon of architectural history carries an over emphasis on the feats of anonymous hands in the design and construction of the Gothic cathedrals and its associated mythologies of the nameless master masons and their guilds. Yet the fact remains that all previous fabrics, whether they survived time for us to experience or exhausted their life cycles to become archeological ruins and eventually disappear, required carefully coordinated and managed multitudes of people to be fabricated in the real world. It is in the use of proper names tied to specific buildings in historical accounts of architecture, however, that determined a paradigmatic shift in focus from the nameless groups to the individuals.

Historically, knowledge of the architect's name was tied to the prestige of the commission (typically public works), the relationship between the architect and the patron that commissioned the building, and the status that the architect enjoyed in the society in which he (they were primarily men) was operating. To identify the most celebrated and oldest case known today, in ancient Egypt, the name of Imhotep is tied to the design of the Step Pyramid complex in Saqqara. Between the sixth and third century B.C. in Classical Greece, the actual names of about one hundred architects- then considered public officials- are known (Coulton, 1995), although those of Ictinus and Callicrates stand out as the co-architects of the Parthenon in Athens, due to the canonical standing of the building itself in Western history. In ancient Roman times, the names of Apollodorus of Damascus who designed the Trajan's Forum in Rome, and that of Marcus Vitruvius Pollio, who authored the only survived architectural treatise from that era, are the examples of two exceptions of attribution of a building to a person, to what otherwise would have been an anonymous relationship between design and construction. This hit and miss mode of knowledge of architectural matters continued unchanged throughout subsequent historical stages. Centuries later, hints of a change in practices of attribution emerged in the tales of determination of Abbot Suger, who reigned over France when Louis VII was on a crusade against the Islamic world. In rebuilding the Benedictine Abbey of St-Denis completed in 1144, Suger's glory among his contemporaries and posterity surged due to his decisive role on the design of the Choir of the church. A century later, Villard de Honnecourt, acquired prominence for his architectural abilities,

although his claim to fame is his greatly influential portfolio of drawings, many of them architectural. By acknowledging the designer versus the collective of master masons, these two examples were among the first known precedents that lead to the steady recognition of the superiority of the power of the creative intellect of an individual over the implementation effort of a group.

With the invention of the press and the appearance of the first architectural treatises in the Renaissance that ensued the revival of the Roman tradition, authorship in architecture acquired a standing unknown to that extent in previous eras. It was with the Italian Giorgio Vasari's *The Life of the Artists*, first published in 1550, that the earliest structured narrative on artists and architects was introduced for public appraisal. In his book, Vasari, himself an accomplished painter and architect (he designed the *Corridoio Vasariano* connecting Palazzo Vecchio with Palazzo Pitti in Florence), identified the particularly gifted talents, and arranged them as a chronological lineage crowned by the name of one of his greatest contemporaries still living at the time of the book's publication: Michelangelo Buonarroti. In telling the story of Michelangelo's accomplishments through his long career (Michelangelo died in 1564 at the age of 89), Vasari did not spare words of deference with frequent allusions to the divine, for the magnitude of Michelangelo's creative endowment, highlighting his unique role in the development of the artistic affairs of Florence and Rome, specifically the appointment of Michelangelo as the architect of the Cathedral of Saint Peter in Rome, following the depth of Antonio da San Gallo the Younger:

> Finally Pope Paul issued a *motu proprio* to Michelangelo making him the head of the building project with full authority so that he could do and undo what was there, increase, decrease or vary anything to his liking, and he decided that all the officials there should be under Michelangelo's authority.[52]

Prominent German art historian Rudolf Wittkower outlined the rise of individualism in the arts and architecture as a Renaissance phenomenon with roots in the Middle Ages. That the author's signature carries gravitas on the appraisal of a work of art, as opposed to the artwork alone, is a phenomenon the scholar believed originated with "the breaking of the guild monopoly in the course of the 15th century…Instead of being subjected to the regulated routine of the collective workshop, (the artist) was now often on his own developing habits compatible with his freedom." [53] Recent studies, however, challenge this emphasis on individualism in the Renaissance, and instead posit the rise of new group identity in the production of artwork. What for centuries had been identified as the age of individualism, upon closer scrutiny turned out to be an era of distributed authorship. (Wojciehowski, 2011)

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[52] Vasari, Giorgio. *The Lives of the Artists.* Oxford, United Kingdom: Oxford University Press; Reissue edition, 2008, p. 467;

[53] Wittkower, Rudolf. "Individualism in Art and Artists: A Renaissance Problem." Journal of the History of Ideas, Vol. XXII, No. 3, July-September,1961, p. 294;

The succeeding periods in architectural history follow suit in linking landmarks with personal names, stressing the importance of individual talent in the production of memorable work. The tales of the personality clashes between Bernini and Borromini in Rome, for example, peppered with instances of irrational and quixotic behaviors, form the backdrop against which the masterpieces of the Roman Baroque came into existence. The patronage system of early modern Europe too played an important role in bringing authorship to the foreground, further reinforcing the status and perceived aptitude of the individual architect to mobilize material resources for the financing of architectural work. Ever since, pairing a building with an architect's name became routine in informal narratives as well as the academic practice of architectural history. In the succeeding eras, the parade of architect's names and associated buildings —Claude Nicolas Ledoux and The Royal Saltworks at Arc-et-Senans, Étienne-Louis Boullée and the unbuilt Cenotaph for Isaac Newton, Claude Perrault and the Louvre, Leo von Klenze and the Alte Pinakothek in Munich, and Karl Friedrich Schinkel and the Altes Museum in Berlin, just to name a few—, demonstrates that projects and their authors are locked in a one-to-one relationship for the purpose of the diffusion of the architectural canon and the appraisal of the project's merits. While occasionally historical research uncovers some instances of collaboration—the J. Gillespie Graham and A.W. Pugin group's entry for the competition for the design of the House of Parliament in London in 1835 (MacAulay, 1984), and partnership between landscape architect Frederick Law Olmsted, Sr., and architect Cavert Vaux for the design of the New York Central Park being two such examples—the bulk of architectural production prior to the 20th century remained anchored to a pool of revered personal names.

Collaboration In Early 20th Century

The introduction of collaboration as a theoretical problem in a formal architectural discourse dates back to the beginning of the 20th century in Central Europe, in response to numerous factors related to the loss of some professional relevance of architects to the rise of power of the engineers. This shift in roles in the building process was directly connected to the epochal changes that the 18th century industrialization brought to all aspects of human activity in general, and to the building process in particular. The formation of the Deutsche Werkbund in Munich in 1907 became the pinnacle of a pervasive discontent of the national intelligentsia with the inadequacy of the arts and crafts world, and its artistic maturing and coming to grips with the methods of mass-production. The perceived decline of the visual landscape of the German built environment was understood in light of the mismatch of an aesthetic based on the rampant stylistic eclecticism that emerged from the archeological campaigns of the 18th and 19th centuries, uncritically applied to the means of production of the newly mechanized world. While the Werkbund took on a nationalistic flavor in its mandate to restore German artistic supremacy over Europe, through advocating the marriage between art and industry, a great many of the values delineated in that period were broadcast beyond the domestic boundaries and reached sympathetic audiences in the entire continent. Earlier the same year, one of the founding fathers of the organization, Herman Muthesius, delivered the inaugural speech for his appointment to the first chair of the applied arts at the Berlin Commercial University (*Handelshochschule*). On that

occasion, he established a clear correlation between the necessity of working in teams and the production of consumer goods, in synch with the industrial condition of the time:

> The speech also revealed Muthesius' distrust of the artistic individualism that at Dresden had still obscured the emerging functionalist trend. For he felt certain that the style of the future would not be the product of isolated genius self-consciously striving to create new forms but would develop out of the efforts of many individuals working in a new spirit to utilize available artistic, technical and economic ideas in the design and production of consumer goods.[54]

Despite the fact that the Industrial Revolution got its start in Great Britain in the late 18th century, it would take more than a century for the Germans, rather than the Brits, to formulate an ideology of the historical necessity to link the design activity to the mechanized manufacturing processes in an emergency effort to rescue architecture as a profession of from irreversible obliteration in view of the inexorable advance of all branches of engineering. In the late 19th century England, John Ruskin and William Morris attempted, to no avail, to restore the value of human labor in the production of everyday objects. Actually, their antithetical stance toward the inescapable expansion of machine hegemony and the prevailing significance of scientific knowledge in all human affairs undermined any long-term effects of their campaign. More accommodating theories to recognize the magnitude of the machine in structuring the life and culture of the modern individual quickly superseded Morris' and Ruskin's fight. Yet the inertia of the vast majority of architects in responding to these new working conditions in the industrialized economy for the most part was the reason why the architectural profession was lagging behind engineering. Bauhaus founder Walter Gropius (1883-1969) reiterated this alarmed view on the topic well into the late years of his long career and several decades after this subject had been first brought up: "The architect is in very real danger of losing his grip in competition with the engineer, the scientist and the builder unless he adjusts his attitude and aims to meet the new situation."[55]

Already in the 19th century, the United States was exporting its technology and expertise to all corners of the world (Cody, 2003). In the fifty years following the Expositions of 1876 in Philadelphia and 1893 in Chicago, the American steel-framed skyscrapers, the industrial facilities and the iron and steel railway bridges enjoyed markets as diverse as Africa, Argentina, Russia, Japan, and China. Engineering products, rather than architecture, were the objects of trade and admiration abroad. Construction firms such as the New York City-based Milliken Brothers Company of 1887 and the 1878 Austin Company of Cleveland, with their own team of engineers and draftsmen, were the protagonists of the diffusion of American technology around the globe. The architect, whose organizational structure most closely resembled the practice model of the engineering and construction firms, was the German-born American-transplanted Albert Kahn (1869-1942), whose very large practice was based in Detroit, Michigan.

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[54] Campbell, Joan. *The German Werkbund: The Politics of Reform in the Applied Arts*. New York: Princeton University Press, 1978, p. 15;

[55] Gropius Walter. "Gropius Appraises Today's Architect as a "Master Builder." in *Architectural Forum*, vol. 96, no. 5, May 1952, p. 111;

Significantly well before the realization of European architects to the latent potential of mass production to generate new architecture, Kahn had already internalized and implemented, in his own architectural/engineering firm, the division of labor he had observed and learned from his clients, Henry Ford, General Motors, and Chrysler among them. His output lists countless landmarks of which the Highland Park Ford Motor Co. in Detroit, Michigan (1909-1910) is among the most known accomplishments. This pioneering practice attracted national attention and numerous publications of which *The Industrial Architecture of Albert Kahn Inc.*, by noted architect/designer George Nelson and published in 1939, is possibly the most informative to date. While the firm remained generalist in scope, most of its recognition came from the feats achieved in industrial architecture. The organizational chart of Kahn's office (Fig. 1) showcases the apparatus that made possible the design and execution of hundreds of large-scale projects worldwide.

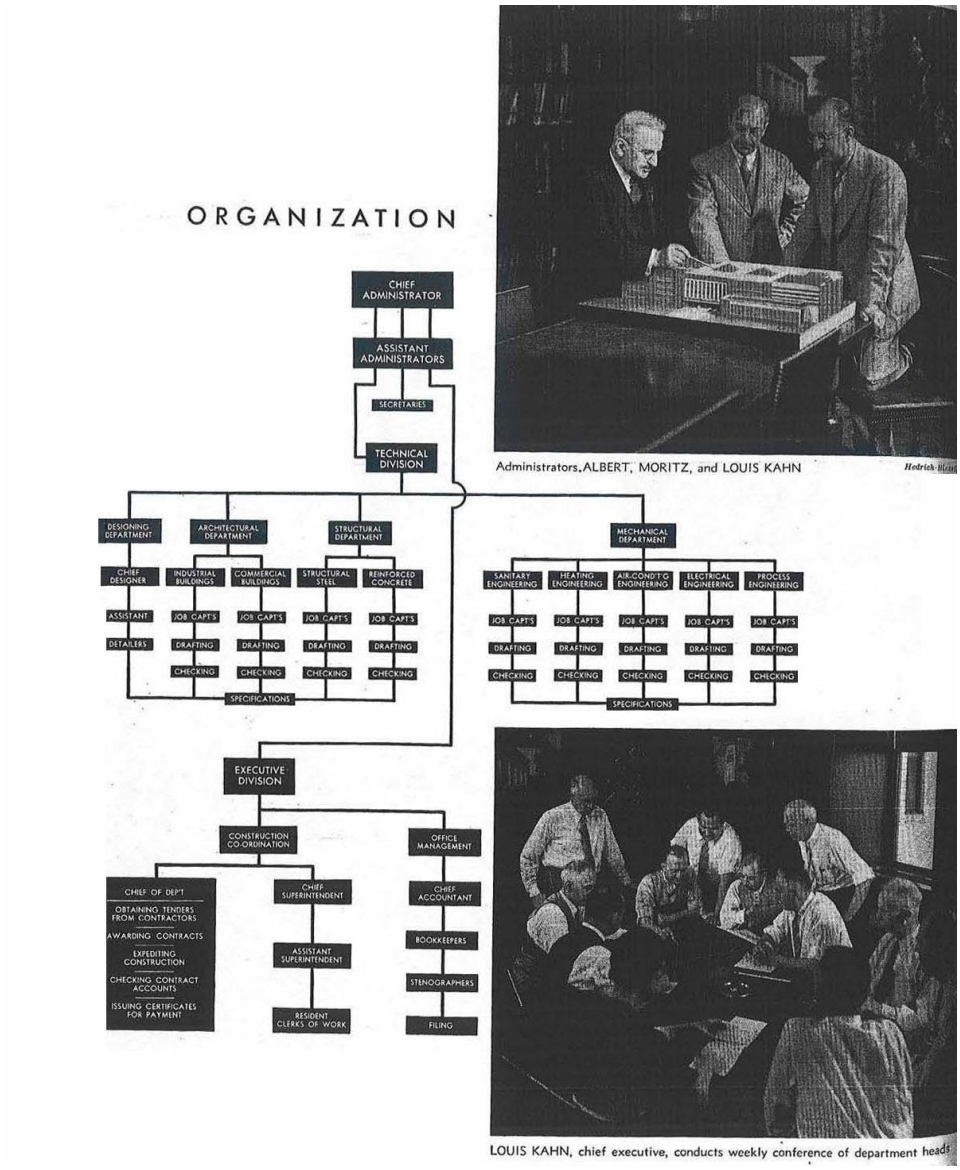


Figure 1. OFFICE CHART OF ALBERT KAHN'S OFFICE

In 1937 alone, Albert Kahn's Inc. signed 19% of the architect-designed industrial buildings for the domestic market. The office comprised the Technical and the Execution Division, each subdivided into disciplinary-specific departments. At the top of the office hierarchy was the Chief Administrator. Kahn's emphasis on architecture as a business with unique problem-solving expertise stood in reciprocity with the clients he was working for. This might be the first formal schemata of integrated design in the American architecture office. The Design, Architectural, Structural and Mechanical Departments, within the Technical Division, would work concurrently on a project's scope resulting in increased coordination of trades and faster project delivery.

In one of his rare writings authored in 1931, Kahn clearly outlined the dramatic change of scope that the architect had to undertake in the design of a building:

> In former days the architect was called upon to merely plan, design, and supervise construction. The artistic result was the chief end of his efforts. Building as compared to today, was a simpler matter. Plumbing pipes, ventilating ducts, elevator shafts, electric conduits, acoustics, artificial lighting, refrigeration, air conditioning and all the other adjuncts of building today were unknown and, therefore, required none of the architect's consideration. These are only a small portion of what must now be properly provided in a structure, Needless to say, no one person could possibly be efficient in all fields, wherefor the day of the individualist, the temperamental artist has passed. The collective efforts of groups of men cooperating under proper direction in the production of the complete whole must take place. An architectural organization today includes designers, planners, structural engineers, plumbing, heating and ventilating engineers, elevator engineers, estimators, specification writers, field superintendents, expeditors, follow-up men and accountants.[56]

The division of labor in finite tasks sequenced to maximize industrial production appeared to reflect the working procedures of Kahn's office as well. In the recollection of one of his employees:

> Andrei Burov, just out of the Constructivist movement, who [worked at Kahn's office in Detroit] in October 1930, was especially critical: "There is not any sort of theory, no design, it's all very vague.... Instead of the architects, there is this enormous bureau. It's all about business (which is not good at this time).... It seems that one chap does the draft, a second does the plan, a third the façade, a fourth the interiors, a fifth, sixth, and so forth, the structure, the electricity, the plumbing, the sewage, the heating and ventilation, and so on. The boss then approves all of this without having anything to do with it. The result is a so-called American masterpiece.[57]

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[56] Kahn, Albert. "Architectural Trends.", in *Journal of Maryland Academy of Sciences*, Vol.2, No.2, (April 1931), p.133;

[57] Melnikova-Raich, Sonia. *Andrei Konstantinovich Burov, Pis'ma, dnevniki, besedy s aspirantami, suzhdenia sovremennikov*, eds. O.I. Rzhekhina and R.G. Burova (Moscow: Iskusstvo, 1980), 35, cited in Sonia Melnikova-Raich, "Whence Did It All Come: Two Contracts, Girls in Socks, and the Great Turning Point," in *Detroit–Moscow–Detroit: An Architecture for Industrialization, 1917–1945,* ed. Jean-Louis Cohen, Christina Crawford, and Claire Zimmerman, (Cambridge, MA: The MIT Press, 2023), p. 186;

In the United States, and possibly globally, Kahn's firm had no equal competitors in terms of size of operations and quantity of completed work in the profession. His standing as well as the highly developed technical skills of his organization madeKahn's firm "the consulting architects to the Soviet Government."[58] His Ford's River Rouge Plant earned the attention of the Soviet leadership in search for qualified experts to speed up the process of industrialization for a nation that was essentially rural. A few months prior to the Wall Street Crash in October 1929, Kahn secured one contract, for the design of the tractor plant in Stalingrad, from the Soviet government, then not recognized by the United States. A second, "encompassing" contract was signed in January 1930: "The development program presented to Kahn encompassed almost the entire industrial construction under the first and second Five-Year Plans. A significant part of the design of this construction would land on the drawing boards of Kahn architects and engineers."[59]

While the emergence of the multidisciplinary office became the hallmark of the large-scale architectural practice after War World II, it remained unmatched in the pre-war period until the founder's death in 1942. The impressive chart of the hierarchal tree in Albert Kahn's office in Detroit set a highly imitated national precedent for large scale architectural practices. Previously, Daniel Burham had conceived of the office factory, but Kahn's infrastructure provided the template against for large practices. In analyzing the settings for 19th century practice of architecture in America, scholar Mary N. Woods argues that the partnership in architecture as a professional form emerged in the 1820s and 30s. Firms such as McKim, Mead, and White of New York, and Shepley, Rutan and Cooledge of Boston were national manifestations of this change in the profession. The partnership (1881-95) between Denkmar Adler (1844-1900) and Louis Sullivan (1856-1924), in Chicago, was by far the most celebrated pair in early American architecture, where the beginning of a formalized division of labor took place. Adler was in charge of the engineering and management aspects of the practice, whereas Sullivan focused exclusively on design with a workforce ranging from twenty to thirty draftsmen.[60]

This wind of change in how design and construction were being formalized and structured was perceived well beyond the architectural profession. Even the American academia had come to recognize that a paradigm shift had occurred in the ecosystem of roles and responsibilities in architectural production. The French-born Philadelphia-based practicing architect Paul Cret, an early 20th century architecture professor at the University of Pennsylvania with Louis Kahn as one of his students, admitted that, over time, portions of the knowledge base of architecture had been parceled out to engineering. Aware that this was a permanent condition structuring the future of design work, he acknowledged:

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[58] Melnikova-Raich, Sonia. "The Soviet Problem with the Two "Unknowns": How an American Architect and a Soviet Negotiator Jump-Started the Industrialization of Russia, Part I: Albert Kahn.", in *The Journal of the Society for Industrial Archeology*, 2010. Vol. 36, No. 2, p. 59;

[59] Melnikova-Raich, Sonia. *Ibid.*, p. 59;

[60] Woods, Mary N. *From Craft to Profession: The Practice of Architecture in Nineteenth Century America*. Berkeley, CA: University of California Press, 1st edition, 1999, p. 116;

> …the two professions remain complementary to each other- individual, impenetrable each to each, yet indissolubly connected, for good or ill…The architect and the engineer must perform a sort of duo, each contributing his share of special knowledge in the creation of a structure which is to be both a mechanical and an aesthetic unit.[61]

In the United States of those decades, architectural education remained firmly anchored to the Beaux-Arts model well into the 1940s. Buildings continued to be conceived in terms of grand images in watercolors, with planning needs bent to accommodate a formal vision of space. The appointment of Gropius as Chair of the Harvard Graduate School of Design following his arrival to the United States in 1937 brought to the ivy-league institution sweeping changes that eventually had national resonance in the educational system of the country. However, the first step in a different direction had already taken place a few years prior. In 1925 Detroit newspaper publisher George Booth hired Finnish architect Eliel Saarinen (father of Eero Saarinen) to found the Cranbrook Academy of Art in Bloomfield Hills, Michigan, and design all its buildings. As the Cranbrook campus got completed in increments, Eliel structured an interdisciplinary curriculum for the new institution, where design students could venture out of their normative domain to engage in collaborative projects, with peers doing metalwork, woodwork, sculpture, and textile design. In this pedagogical model, architecture was a subset of design. Concurrently, Eliel produced his version of 'total design', with the construction of his own house at Cranbrook merging into a unified architectural experience with the help of his family members furniture, lighting fixtures, glassware, chinaware, rugs, ceramic tiles.

Back in Europe, the members of the Dutch group De Stijl (in English "The Style") believed that collaboration between architects, painters, and sculptors was the conduit to generate works of total art (Troy, 1983). The movement started in 1917 and lasted until the passing away of its main figure, the painter Theo Van Doesburg, who died on March 7, 1931. The group's focus of the early period was to bring art back to what was perceived to be its original unity and leave out any form of individualist expression. Premise for a successful collaboration, especially between architects and painters, was a clear demarcation of the sphere of each person's competences and an equal voice of all artists in the design process. [62]Painter Bart Van der Leck wrote: "Architecture is not created by the will or the work of a single individual, but by bringing together in unity the work, which is free and independent, of various arts and artists." Yet painters experienced a crosscurrent when working with architects. In reality, the latter group, comprising names such as J.J. P. Oud and Gerrit Rietveld, gave a subordinate role to painting in the definition of space, and buttressed a sense of inequality on the design plane among the participating artists. In endeavoring to fuse all sister arts into the coherent artistic expression of one artifact, the group ostensibly faced clashes of incompatible personalities. This trait partly explains why any attempt in making the collaborative ideal

[61] Cret, Paul. "The Architect as Collaborator with the Engineer." in *The Architectural Forum*, vol. 49, no. 1, July 1928, pp. 97-104;

[62] Van der Leck, Bart. "On Painting and Building" in *De Stijl,* no. 4, 1918, unpaginated;

a reality invariably confronts this issue: "Historians cannot help but recognize that the personalities of artists play a crucial role in determining the nature of their works." [63] The very end of De Stijl as a movement with its own magazine is tied to the passing of Theo Van Doesburg. He was the sole ambassador in the European avant-garde of what was thought to be the dream of the collective—yet bent to please his own artistic temperament. Neither the founders nor the followers of De Stijl stepped in to take the leadership of the movement after 1931. The painter Piet Mondrian will continue his work under the umbrella of *NeoPlasticism*. Similar trajectories pattern the rise and fall of the collectives throughout the Modern Movement.

The Rise of the Collective

Broadly speaking, the first- and second-generation protagonists of the Modern Architecture in Europe and the United States held a wide array of positions about collaboration and teamwork, ranging from complete rejection to unconditional approval. Not surprisingly, Frank Lloyd Wright (1867-1959) occupies one extreme end of that gamut, emphasizing through his own editorial underlining the need to protect individualism in architecture:

> Organic architecture sees actuality as the intrinsic romance of human creation or sees Romance as actual in creation. So romance is the new reality. Creativity divines it. No teamwork can conceive it. A committee can only receive it as a gift from the inspired individual…Until the mechanization of building is in service of creative architecture and not creative architecture in the service of mechanization we will have no great architecture. [64]

In the rhetoric of the emerging modernist discourse, the ubiquitous label "Machine age", stood for the mechanization of western society. Le Corbusier (1887-1965) and Gropius consistently latched on to this label in their writings when battling for the inevitability of Modern architecture in the face of technological advancement. They held profound differences in theoretical positions about the details of how the modern architect would carry out the ideals of the Modern Movement in the real world. Yet they concurred that the knowledge necessary to design and construct a building adopting the latest technology had reached such a broad stage of epistemic advancement that it had exceeded the capacity of any one individual to hold all the relevant information in his (or her) mind. The two of them shared the belief that only a multidisciplinary team is able to reconnect the dispersed areas of expertise into a unified architectural statement. Close to the end of his life, Le Corbusier formulated his take on teamwork:

> …the sustained, patient, and fruitful conversation between the architect and engineer, engineer and architect, speaking as equals with equal responsibilities and prestige. This conversation is that of the 'constructors'…These then are the engineer's responsibilities: the respect of physical laws, the strength of materials (supply, economic considerations,

[63] Troy, Nancy. *The De Stijl Environment*. Cambridge, MA. The MIT Press, 1986, p. 182;

[64] Wright, Frank Lloyd. "The Language of Organic Architecture", in Architectural *Forum*, May 1953, p. 107;

> etc. in relation to safety, relatively speaking). And these the architect's: humanism, creative imagination, love of beauty, freedom of choice.[65]

Conversely, Finnish architect Alvar Aalto (1898-1976) cast heavy doubt on the qualitative outcome of this type of group work:

> Teamwork is to me an ominous word. I have seen bad examples of it in many countries. The work that obviously has to be done by a series of coworkers takes place in my office in familiar contexts where everyone understands one another. In certain cases the collaboration reminds one of an orchestra where each instrument should play correctly under the leadership of the conductor and at the same time have its own responsibility and a duty to adhere to a harmony. I owe my many collaborators through the years a large measure of gratitude for having understood this so well.[66]

The symbolic tension between the individual and the collective has consistently characterized the coming of age of modern architecture. At the dawn of the twentieth century, collectives proliferated at an unprecedented rate in arts and architecture alike. Presenting ideas, through manifestos carrying multiple signatures, was the preferred format the architectural and artistic elite had chosen to give voice to its aspirations for the reunification of the arts. Groups like the 1901 Darmstadt Artists' Colony comprising architects Peter Behrens and Joseph Maria Olbrich, the 1903 Wiener Werkstätte ("Vienna Workshop") headed by Josef Hoffmann, Koloman Moser, and Fritz Waemdorfer, and the 1918 November Group with architects Erich Mendelsohn (1887-1953) and Ludwig Mies van der Rohe (1886-1969) shared similar ideals about the pursuit of the *Gesamtkunstwerk*, i.e. "total work of art". Calls for the fusion of the fine and applied arts mushroomed in several of those European countries, where the Industrial Revolution had its highest impact, in varying, substantive degrees. Germany, Austria, France, the Soviet Union, Italy, Spain, and the Netherlands, concurrently sounded the trumpet of collective work as being representative of the historically determining of coordinated labor in the new era. Teams got increasingly credited for authoring experimental projects based on processes and technologies of entirely novel conception, where history and memory had no part in their coming into existence.

In a chapter titled *Elements* of his influential book *Modern Architecture* published in 1929, German architect and author Bruno Taut made clear that collaboration was a matter of necessity in the very credibility of the architecture profession in modern times. In this section, devoted entirely to the understanding and the consequences of working collaboratively, Taut enucleated the inconsistencies of both patrons and architects in concocting the architectural imagery of the upper class, in complete disregard of technological progress. Taut remarked that "in building, no personal isolation of the individual exists." [67]By his account, architecture was a rigorous problem-solving process geared to the design and execution of the building types of the new epoch, as opposed to a stylistic exercise in public taste. The models to admire and emulate were the factories

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[65] Le Corbusier. *Creation is a Patient Search*. New York: Frederick A. Praeger, 1960, p. 306;

[66] Aalto, Alvar. "Conversations" in *Sketches*. Cambridge, MA: The MIT Press, 1978, p.172;

[67] Taut, Bruno. *Modern Architecture*. London: The Studio, 1929, p. 133;

conceived for the Ford Motor Company and shipped all over the world. For Taut, in those accomplishments, the architects rose to the challenge of dealing with the technical complexities the modern times had brought about and sublimated them in unprecedented built form. Concurrently, such emphatic eulogy of the marriage between space and technology fueled the unceremonious dismissal of the traditional architects, obsolete figures in a world that had changed all around them. In the design of a hospital or a school, for example, Taut stated:

> An architect who cannot work in collaboration with health experts and schoolmasters and who professes no knowledge or understanding of the problems of these comrades of his, and who does not strain every nerve in the effort to assist them in their special province, by adapting his building as freely as possible to the requirements of schoolmasters and health experts- well, he must just be regarded as an architect who should preferably have chosen some other profession.[68]

Collective authorship, either in ad hoc groups or in structured ongoing partnerships, acquired momentum in the 1930s to include many more designers than previously done and continued well into the post-war period. Examples abound. To name a few: the Ministry of Education and Health (1936-1943) by Lucio Costa, Oscar Niemeyer, Jorge Machado Moreira, and Alfonso Eduardo Reidy under the leadership of Le Corbusier in Rio de Janeiro, Brazil; the English practice Tecton of the thirties and Architects' Cooperative Partnership of the forties; the Dutch Architektengemeinschaft of Van der Broek and Bakema of the post-war period; the Southern California collective behind the realized Mutual Housing development in Los Angeles by Edgardo Contini, Quincy Jones, and Whitney Smith; the United Nations in New York with a group headed by Wallace Harrison; the Italian QT8 in Rome led by Mario Ridolfi and Ludovico Quaroni; the 1955 Atelier 5 from Switzerland. This plurality of voices in the formation of architectural ideas appeared to be the distinct form of legitimization for projects and practices that required diversity of talents.

In the theoretical debate that accompanied over the years the implementation of the collective paradigm in the practice of architecture, landscape architects as well voiced their belief in collaborating with other professionals to design a better tomorrow. Right after World War II, noted Italian landscape architect, Pietro Porcinai, made a plea for the restoration of harmony in the built form, calling for a commitment from all professionals- the acknowledged experts of 20th-century western societies- to work collaboratively, with the higher purpose to deliver a more beautiful and dignified world. Epistemic anarchy was the real cause of the entropy of the modern cities, and only true love for an ideal of beauty and harmony would prompt brotherly collaborations between professionals. [69]

Equally pronounced was the intention to change the pedagogy of the future architect and address the pressing demands for interdisciplinary knowledge and skills, embodied into the artifacts for industrial society. Germany set the example starting from

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[68] Taut, Bruno. *Ibid.*, pp. 136-7;

[69] Porcinai, Pietro. "L'Epoca della Collaborazione" in *Il Geometra*, December 1946. Reprinted in Grifoni, Tiziana (ed.). *L'Eclettismo nell'Opera di Pietro Porcinai*. Firenze: Edizioni Polistampa, 2007, p.283;

1902. The Royal School of Art and Applied Arts, headed by expressionist architect Hans Poelzig and the Dusseldorf School of Applied Arts, with the leadership of architect Peter Behrens, are some of the most notable precedents of the world–renowned Bauhaus school, which came into formation in 1919 under the auspices of the Weimar Republic (Maciuika, 2005). However, it is precisely with the Bauhaus that the call for unity in design took the world stage. The sustained campaign that Gropius mounted about the school vision and its associated accomplishments determined the legends surrounding a compound of avant-garde thinkers, joined by a common desire to offer practical design directions to the new sensibility rising from the "Machine age". The literature on the Bauhaus is an industry on its own, reproducing the mythology of its message in the symbolic capital of its protagonists, whose proper names crowd the pages of virtually every account of the first stage of Modern architecture in Europe.

Discourse on Collaboration After World War II

By the end of the war corporate practices made of teams with their internal pecking order were the primary producers of the built environment. As the architectural landscape changed with a growing number of large-scale offices to tackle substantive commissions, new narratives of professional fulfillments got introduced in the post-war debate. Rather than the architect's self-expression, it was the achievement of the common good that took center stage in the debate on the architects' role during peace time. A watershed of articles and books replenished the symbolic arsenal of modernism, with concepts built on the necessity of working collaboratively. In 1944 German born American architect and theorist Paul Zucker, also former member of the *November Group*, organized a symposium at Columbia University in New York, where he gathered the who's who in the field to articulate how the building sector had changed with the advent of the World War II's technologies and what to expect next. In the proceedings, Zucker wrote about teamwork:

> The full effect of the social and economic energy from such a program can only be achieved by teamwork. No single group can turn this enterprise to full productive use. Its scope is too vast for architects alone, for contractors, for engineers, too big for big business and even for government administrators. We need this teamwork more than self-expression, as we need more interest in the life we live together and in the work we do together.[70]

A similar message could be read in the following years in the pages of the September 1952 issue of *Architectural Forum*, then the leading architectural magazine in the United States. Author Tyler S. Rogers lamented the fragmentation of the construction industry and advocated its integration through the shaping of a new pedagogy of the art of building drawn from the models of agricultural colleges. Teaming up, not isolated work, was the way out of the impasse the construction industry had consistently found itself in for several decades by then.[71] In 1954 noted Austrian American Richard Neutra

[70] Zucker, Paul. *New Architecture and City Planning, a symposium*. New York: Philosophical Library, 1944, p.10;

[71] Rogers, Tyler, S. "Education for an Integrated Building Industry.", in *Architectural Forum*, September 1952, p. 141;

wrote *Survival through Design*, a collection of essays outlining the interdependencies between architecture, biology, and the behavioral sciences. In Chapter 40, he maintained that the solitary dimension of architectural creation had come to an end. In its place what was needed was the orchestration of specialized knowledge to provide the operational template for collective design activity.[72] This stance was further stated in an article where the Austrian émigré emphasized the creative benefits of groups cohesion based on and a team-oriented attitude of each member. He wrote: "And in architecture soloists have so much less a chance than in music, that we should do much more to foster and develop this collaboration for the great work, training for it even on the smallest jobs. Our era should make us tend in this direction."[73] Gropius, founder of the firm The Architect Collaborative (TAC) in 1946, published in 1955 his anthology of essays *The Scope of Total Architecture*. There he pioneered the idea of the "composite mind", defined as a team of architects and engineers operating collaboratively toward the definition of a scheme. For him, the building enterprise had reached such a level of intricacy that design had become a matter of teamwork, as opposed to the solo performances of architects.[74] Architect and educator Pietro Belluschi echoed the words of Gropius:

> In older times, when Art was a way of explaining Science and a single man of genius could range over the totality of human knowledge, a strong sense of unity was apparent in all works of man; but now, when even the best minds can cover only a fraction of the available knowledge, the creative mind which attempts to achieve synthesis in lonely splendor can court only frustration, misunderstanding, and ridicule. Only by working with others, perhaps with less arrogance and self-glorification and yet without renouncing his uniqueness, will the creative man again become effective and respected. I don't mean to imply that his existence is justified only if he performs useful tasks but, as in the case of the scientist engrossed in basic research, that the test of all such work is to gain understanding, not to escape reality. And while neither of them have any duty to please society, I am sure they have in the last analysis the duty to serve it. Teamwork, therefore, as an efficient means of tapping all human resources is becoming the great tool in this age of unlimited specialization; and it works particularly well in the case of architecture, which covers a great many specialized fields.[75]

In the 1950s, the renowned Italian structural engineer Pier Luigi Nervi, professor of structures in the School of Architecture of Rome, advocated the tight collaboration between the architect and the structural engineer: "It is obvious that engineering and the mental make-up produced by engineering training do not suffice to create architecture. But it is just as obvious that without the techniques of engineering, any architectural conception is as nonexistent as an unwritten poem in the mind of the poet."[76] With *Group Practice in Design* published in 1967, Michael Middleton, British architectural historian and critic, authored the first comprehensive account on group work in the literary

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[72] Neutra, Richard. *Survival Through Design*. New York: Oxford University Press, 1969, p. 287;

[73] Neutra, Richard. "The Creative Team.", in *Architecture and Building.* June 1956, p. 208;

[74] Gropius, Walter. *The Scope of Total Architecture*. New York: Harper, 1955, p. 173;

[75] Belluschi, Pietro. "An Appraisal of Our Contemporary Architecture", in *Bulletin of the American Academy of Arts and Sciences,* Vol. 7, no.3, (December 1953), p. 5;

[76] Nervi, Pier Luigi. "The Place of Structure in Architecture", *Architectural Record*, July 1956, Vol. 120 No. 1, p. 189;

memory of the discipline. Concerns in the construction sectors, on maximizing financial and human resources to boost efficiency, mobilized the political reaction of the ruling class in England in the early sixties. A new consciousness on the complementary make-up of interdisciplinary expertise was called for. In this scenario, collaboration was deemed not only necessary, but also desirable to put an end to the Babel of irreconcilable perspectives that had tainted the construction arena since the rise of professionalism.[77]

Architectural and Art historians bear some cultural responsibilities in spreading the narrative that the formation of the canon is entirely in the hands of individual architects. By George Kubler's account, the practice of architectural history has contributed to the myopic understanding of the building process and the hyper-emphasis on the independent designer as the source of creativity and innovation. The characterization of the architect's primary role in the physical and social determination of a design has been traditionally inflated and certainly uncorroborated by the records. Kubler admonished the reader:

> Secondly, the architect would profit by unlearning, with the historian's help, another set of traditional illusions about individual authorship. The history of architecture has been written far too much as if it were the record of exclusively individual performances. Actually, every building is a collective enterprise. Multiple authorship is the rule; single authorship is the rare exception. The metaphor of the coral reef is worth recalling here; the individual artist stands upon an immense secretion or platform of prior achievements. We tend to overestimate the potential of individual achievement.[78]

But even among historians discord reigns. Henry Russell-Hitchcock had differing opinions on where the creative idea originates in architecture. In a pivotal article, "The Architecture of Bureaucracy and the Architecture of Genius", published in 1947 in the English magazine *The Architectural Review*, titled Russell-Hitchcock held the position that the creation of innovative architecture was impossible in group work settings:

> I should hasten to say that I use the word "genius" merely to define the sort of architect who functions as a creative individual rather than as an anonymous member of a team…The world of the mid-twentieth century will need some buildings by architects of genius, for only thus can the necessary monotony and the low level of plastic interest of bureaucratic architecture be balanced and relieved…we must guard against the enticement of ideas and features which promise to give to bureaucratic building something of the special expressive power that can be legitimately provided only by architects of genius working as individuals…Among architects in organizations working directly or indirectly in the public service there should also be fairly shortly a traditional specialization in housing or in the provision of such things as schools or hospitals, which would equally lead them to avoid monumental commissions. As most mature architects will be drawn into operations of bureaucratic character, the designing of types of building unsuited to bureaucratic production should be thrown open to competition or commissioned to architects of proven individuality…only complex individual structures

[77] Middleton, Michael. *Group Practice in Design.* New York: George Braziller, 1967, p. 12;

[78] Kubler, George. "What Can Historians Do for Architects?", in *Perspecta*, Vol. 9 (1965), p 302;

> of generalized symbolic meaning actually fail architecturally when there has been no individual imaginative formulation.[79]

For Hitchcock, powerful design expression was the prerogative of the architect genius, not the architectural bureau. In his view, the large-scale architecture office was unequipped to design highly symbolic buildings of enduring cultural standing. To deliver competent problem-solving strategies to clients' requests driven by real estate concerns was outside of the scope of architecture as an art form. The unwavering conviction of the central importance of the individual in amplifying the potential of architecture, to express and transcend the values of its age, was the very same reason why the design elite conclusively rejected the possibility of an architecture of collaboration, which in Hitchcock's analysis equates with an architecture of anonymity. Despite such drastic polarity, Hitchcock casts a more lenient look on the output of Skidmore, Owings & Merrill, whose organizational format allowed for a network of small studio-like structures with lead designers managing their team, by assigning the execution of their design ideas.

Despite the mounting consensus in mainstream thinking within the profession about the historical inevitability of collaboration and teamwork, the attitude of those architects who put design at the center of the architecture mandate remain dismissive of both. For them, the individual remains the sole originator of the architectural idea. What follows is just a taste of these uncompromising views in the words of some of the most radical protagonists of the Modern Movement. In conversation with architect and critic Peter Blake, Mies van der Rohe commented:

> I do not think very much of this sort of forced teamwork myself. The teamwork in our field is between architect, mechanical engineer, and structural engineer. That is where teamwork comes in. It is no use working with other architects. What can they do? Who does what? I think it would be better, say, to have different designs and choose. After all, why should I discuss my ideas with someone else? The most important things cannot be discussed anyway. I would prefer not to work with other people. I work with large firms of architects in different ways, but I don't discuss my ideas with them. I would never do that. The same with the structural engineer. We tell him what we want and he tells us if it is possible. In the field of design the structural engineers, with a few exceptions like Pier Luigi Nervi, do not know what they are doing.[80]

Bruce Goff, the eccentric architect of organic streaks, vehemently attacked collective authorship:

> What masterpiece of music, literature, sculpture, or architecture was ever conceived by more than one individual with a single idea? Those who insist that art be the work of teams and worship the concept of anonymity do so because they have nothing of their own to offer. They want to establish an architectural vernacular so that all can speak, whether they have anything to say or not, working with predetermined forms established

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[79] Russell-Hitchcock, "The Architecture of Bureaucracy and the Architecture of Genius", in *Architectural Review*, p. 6;

[80] Puente, Moisés. *Conversations with Mies Van der Rohe* New York: Princeton Architectural Press, 2008, p. 24;

> by others. Such predetermined forms, into which ideas are forced by the cunning hands of the manufacturers of art, are, at best, inadequate and artificial.[81]

Philadelphia architect Louis Kahn, arguably the most revered figure of the second-generation modernists, took equal stance with the mystique of his well-known parlance:

> …direction for the expression of a product can only come from an individual- not a committee…It must be recognized that every designer is not like another designer. There is really the question of singularity to singularity. If you get a direction from a committee, I am positive the product will be less, the expression will be less. If it can be in an individual, it will have such resources that a committee many, many times would never have. The individual has the ability to see it all as a unit.[82]

As a point of reflection, it is worthwhile noting that none of the practices of Mies van der Rohe, Bruce Goff, Louis Kahn, Richard Neutra, and Pier Luigi Nervi survived the deaths of their founders. Conversely, although under very different circumstances from each other, all the firms that are case studies in this dissertation continued to exist after the departure of their founders. Of particular importance is the case of Eero Saarinen, whose practice spun off several influential offices following his unexpected death.

In large-scale organizations, however, design in team was the expertise offered in the marketplace of the post-war economy. Welton Becket & Associates of Los Angeles, California, and Caudill Rowlett Scott of Houston, Texas, practices both extinct today, are two representative examples of firms offering design services with much wider scope than traditionally envisioned. *Total Design* was the very title of a monograph on the work of Welton Becket & Associates, illustrating the might of a professional compound capable of delivering the most complete set of documents, stopping short of actual construction. “Total design includes not only all of the traditional architectural functions and all engineering but interior design, industrial design of objects for the buildings and their surroundings, master planning, space planning, and a host of other functions.”[83] (Fig. 2)

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[81] Goff, Bruce; Murphy, William; Muller, Louis. "Architecture is Art" in *Bruce Goff: A Portfolio of the Work of Bruce Goff*. New York: The Architecture League of New York, 1971, pages unnumbered;

[82] Kahn, Louis. "Architecture is and Human Agreement" in *The Art of Design Management. Design in American Business* (Schutte, Thomas F, ed.). New York: Tiffany & Co, 1975, pp. 17 and 19;

[83] Dudley Hunt, William. *Total Design. Architecture of Welton Becket and Associates.* New York: McGraw-Hill Book Company, 1972, p. 4;

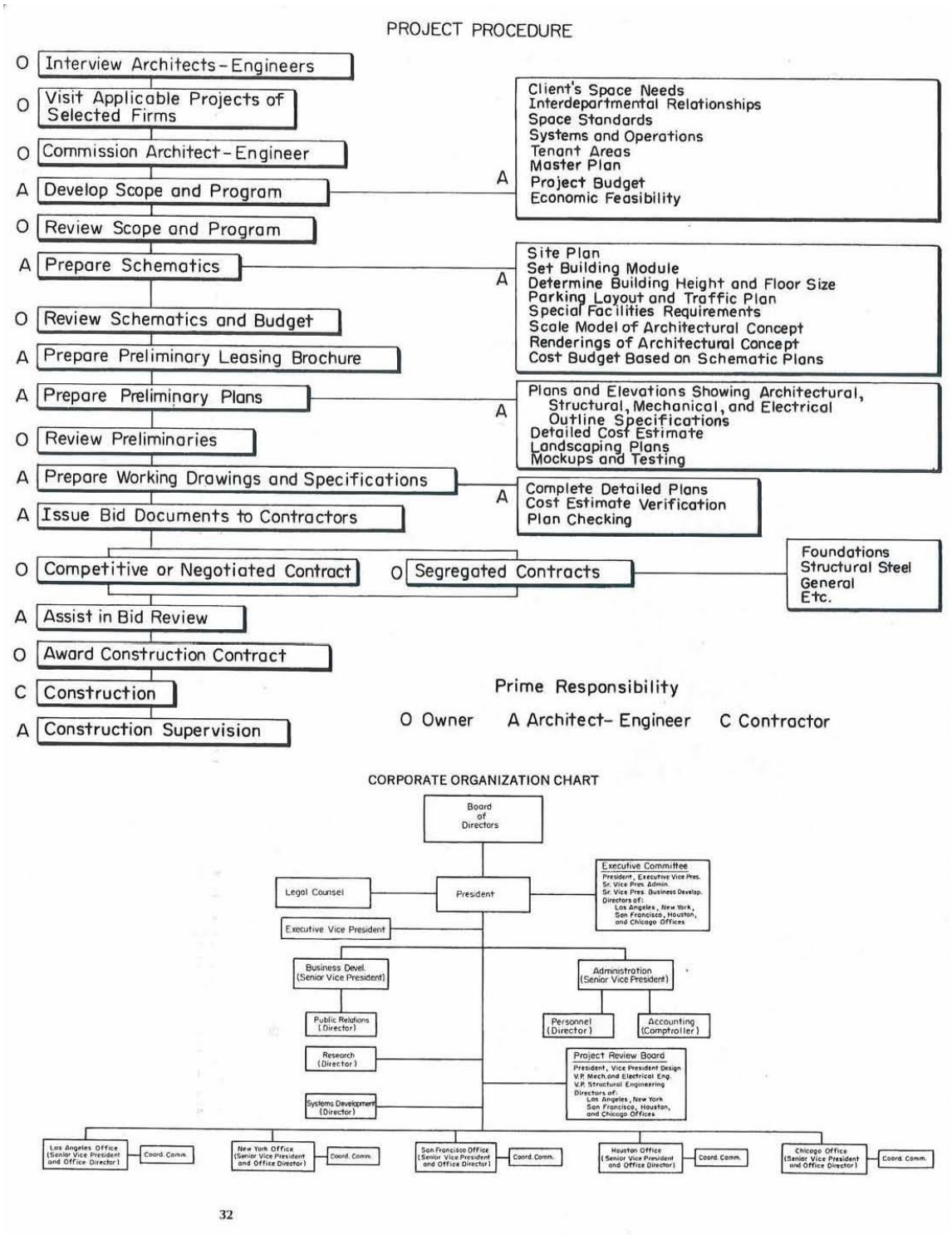


Figure 2. OFFICE CHART OF WELTON BECKET'S OFFICE IN LOS ANGELES

To match such ambitious targets, the corporate organization was managed through flowcharts and summarized division of labor, with horizontal and vertical connection across its professional body. However, despite the boasting of the

professional horsepower that this company broadcast in its heyday, like many others, overtime it declined following the death of its founder and got eventually bought out by a competitor.

Collectives, either professional or ideological, continued to flourish on the world stage, many of them sharing similar ways to claim their existence, relevance, and necessity, all bearers of some environmental message. Archigram, The Independent Group, Archizoom, Superstudio, Memphis, Atelier 5, Team 10, Internationale Situationists, and MLTW form the pinnacle of a much bigger kaleidoscope of offerings around the western world for the production, writing, and dissemination of architecture. These groups have variously contributed to the reinforcement of the idea that the act of building- both conception and execution- engages much larger communities than just their own. Yet, from the pure pragmatics of construction, maybe the most convincing collaboration has been between architects and structural engineers, examples to remember being the pairs Louis Kahn and August Komendant (a collaboration of 18 years) and Bruce Graham and Fazlur Khan of the Chicago office of Skidmore, Owings, & Merrill.

Collaboration: The Last Thirty Years

The literature on collaboration continues to grow with the impasse of its conundrum left unsolved. Doctoral programs, in institutions of higher learning, keep encompassing collaboration as an active subject of research in a variety of majors. Similarly, consulting firms, selling ready-made solutions to make the workforce collaborate routinely, enter the market, and find a niche in the building sector. If there is agreement that the conception and execution of an architectural idea revolves around a complex ecological system of human contributions, that common path branches off in opposite directions when it comes to understanding how to bring efficiency of resources and knowledge back into an integrated product. Due to the ubiquitous nature of web-based digital technology, communication, interconnectivity, and network are the latest "buzzwords"in the debate, all pointing to the renewed currency of collaboration and group work. In the architectural realm, at the intersection of research in design theories and computer-aided-design, are the annual proceedings of the Association for Computer-Aided Design in Architecture (ACADIA) and the Design Thinking Symposia, where collaboration is examined with emphasis on the digital interface between knowledge and its representation. From the respective annual proceedings and publications what is missing are the longitudinal studies examining the dynamic of the iterative negotiations among the vested parties, while the project is being worked on in a team composed by paid employees in a scheme of division of labor under the rules of capitalistic production. Furthermore, what is yet to be accounted for is an assessment of the office culture including its actors, schedule, routines, and rituals, in essence the social and physical setting, where architectural projects are in fact generated.

The introduction, over fifteen years ago, of Building Information Modeling (BIM), a digital simulation of constructing building as it is being designed, rich in information, integrative of interdisciplinary input, and shared among the team members, is fraught with legal impediments. "BIM is a collaborative effort, yet the law allocates

responsibility upon the individuals. Who is responsible for the design defects on a collaborative design? How is insurance coverage allocated? Who owns the copyright in a BIM model?"[84] These are questions that vex architects and software developers alike. There might be the technology to collaborate. But is the legal and contractual environment welcoming of these imminent changes in the practice of architecture? The adoption of BIM triggered what the American Institute of Architects (AIA) coined "Integrated Project Delivery": "Integrated Practice/Integrated Project Delivery (IP/IPD) leverages early contributions of knowledge and expertise, through the utilization of new technologies, allowing all team members to better realize their highest potentials, while expanding the value they provide throughout the project life cycle."[85] BIM is increasingly used for documentation of a building design, but hardly for the conception of the building in its formative stage. This is a consequential distinction since routinely at the onset of the design process multiple design options are produced and presented to the owner for approval, so as to move to the next phase. Those options are only approximately worked out just to the point of being credible with digital and analog tools other than BIM, which requires very specific data input to yield a reliable model. At that early stage, designers are typically unable to make such fine grained determination, when the big vision about the particular project is still a moving target. Even BIM's effectiveness, as a cost control platform, is in question. General contractors are contractually in charge of producing detailed cost-estimates. They establish the amount of contingency built into the cost-estimate at every stage of the project. This contingency is to consider the unknowns of both the cost of materials per availability and their assemblage in the final product, plus the cost of inflation. These, and others, are highly discretionary factors in a party who has significant stakes within the economics of the building process. The problems outlined for BIM remain the same for IP/IPD. These forms of risk management are designed to mitigate the sources of litigations, generative of the belligerent climate characterizing the construction process in the United States. Yet the difficulties in adopting this model, among professionals, are deeper than simple reluctance. They are fundamentally countercultural to the very nature of the territoriality of the profession.

Despite the fact that the Mid-century period saw the rise of the acronym to name large-scale architectural offices (SOM, HOK, KPF, for instance), and that these companies mainly design the bulk of new construction, the influence of the charismatic individual in steering human and material resources, to translate drawings into an actual structure, has remained largely intact. Sociologist, Magali Sarfatti-Larson, argues that architecture oscillates between the autonomy of its own discourse and the heteronomy of architecture's dependence on patronage, to generate the commission and eventually build exemplars[86], some of which will become canonical in the field. Fiction writer Tom Wolfe

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[84] Sweet, Justin and Schneier, Marc M. *Legal Aspects of Architecture, Engineering and the Construction Process.* 8th Edition, Stamford, CT: Cengage Learning, 2009, p. 375;

[85] *Integrated Project Delivery: A Guide*. 2007 Version 1. https://info.aia.org/SiteObjects/files/IPD_Guide_2007.pdf, p.2;

[86] Sarfatti Larson, Magali. *Behind the Postmodern Facade*. Berkeley: University of California Press, 1993, p. 12;

pointed out a similar condition in his renowned book *From Bauhaus to Our House*. This hybrid predicament elucidates the tension between architects and the designers of the knowledge-domain adjacent to architecture.

Practicing collaboratively has made a major comeback in the era of wireless networks. Because the building process constantly changes its scope and procedures, architecture invariably has to redefine its relatively fragile and temporary institutional limits. Collaboration is, once more, put forward as a response to delivering a complicated project in the face of inherently fluid and often relentlessly demanding and even contradictory conditions. Noted architectural historian, James Ackerman, astutely observes that architecture "is always made to order."[87] The architect is reactive to a client who wants a building, whose program may or may not be outlined for a site sometimes identified, other times to be pinned out through further studies. To Dutch architect, Rem Koolhaas, these layers of uncertainties are structural to the condition of the practice:

> Architecture is a hazardous mixture of omnipotence and impotence. Ostensibly involved in "shaping" the world, for their thoughts to be mobilized architects depend on the provocations of others- clients, individual or institutional. Therefore, incoherence, or more precisely, randomness, is the underlying structure of all architects' careers: they are confronted with an arbitrary sequence of demands, with parameters they did not establish, in countries they hardly know, about issues they are dimly aware off, expected to deal with problems that have proved to be intractable to brains vastly superior to their own. Architecture is by definition a chaotic adventure.[88]

In *Architecture: The Story of Practice*, scholar Dana Cuff touches on collaboration in a cross-sectional study on the professional practice of architecture in the United States. In line with what has been mainstream thinking among designers, however, she holds that signature architecture is still produced by the individual designer, not by a team, even though this statement needs to be understood in context of teamwork.[89] Veteran figures, such as Portuguese architect Alvaro Siza, concedes that "…the basis of architectural quality lies in multidisciplinary work and the built-up knowledge by an architect, whose work consists precisely of organizing the tasks done by each specialist."[90] Finnish architect, Juhani Pallasmaa, makes of collaboration the true nature of architecture itself. And he extends its operational range to include collaborations with artists, even those that have been dead for a long time.[91] And the literature sponsored within the profession further breeds the hopes in the thus far untapped possibilities of teamwork. The lexicon of business literature informs the analytical perspective of the writer of the latest edition of *The Architect's Handbook of Professional Practice*. Teamwork is presented as the only viable and sustainable form of

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[87] Ackerman, James S. "Transactions in Architectural Design", in *Critical Inquiry*, Vol. 1, No. 2 (Dec., 1974), p. 229;

[88] Koolhaas, Rem. *S,M,L,XL*. New York: Monacelli Press, 1995, p. xxi;

[89] Cuff, Dana. *Architecture: The Story of Practice.* Cambridge, MA: MIT Press,1991, p. 251;

[90] Siza, Alvaro. "The Meaning of Things (A Conversation with Alvaro Siza), in *El Croquis 140: Alvaro Siza 2001-2008.* 2008. p.11;

[91] Pallasmaa, Juhani. *Encounters. Architectural Essays*. Helsinki: Rakennustieto 2005, p. 346;

professional practice, and firms should just plainly come to grips with that. “The era of the arrogant individual designer who is also successful, if it ever existed is over.”[92] A similar refrain is to be found in the books on evidence-based design: “And yet, the myth is clearly just that. Most architects will never have the chance to exercise complete control over the design, and on larger project it is almost always a team that creates the design.”[93] In these last two references, teams are envisioned operating virtually in autopilot, each team member fully aware of where their individual role falls in the large scheme of things. Empirical evidence, however, shows otherwise. Without the leadership of an individual, even the most talented team is an idle assemblage of human resources.

“What Happened to Total Design?” is the provocative title of a 1998 seminal article, architectural historian Mark Wigley wrote for the *Harvard Design Magazine*. Total Design is the result of the architect’s desire to over-determine the world, “a space with no gaps, no cracks, no openings onto other possibilities, other worlds.” [94]Concurrently Total Design brings up ideas about architecture as management of interdisciplinary expertise, lacking in the knowledge base of the architect. At the tail end of postmodernism in architecture, Wigley speculated on the noticeable absence of such ideals of total design from the horizon of the then contemporary design-oriented architect. Little did he know when he wrote those remarks how fast this concept was going to resurface in discourse, due to the vertiginous ascent of the Web, and its staggering consequences on knowledge transfer and communication protocols in western societies.

Renowned architect William Lescaze, who designed in the 1932 the first International Style skyscraper known as the Philadelphia Saving Fund Society, wrote in his autobiography: “Could we not once and for all agree that the very nature of a building problem implies the utmost collaboration of every one of us?” [95]The ensuing case studies will dissect aspects of the contradictions outlined to answer this very last question raised.

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[92] Ronco, William C. "Team Building for Architects" in *The Architect’s Handbook of Professional Practice*, 14th Edition. Hoboken, N.J.: John Wiley & Sons, Inc. 2008, p.131;

[93] Hamilton, Kirk, and Watkins, David. *Evidence-Based Design for Multiple Building Types*. Hoboken, N.J.: John Wiley & Sons, Inc., 2009, p. 3;

[94] Wigley, Mark. "What Happened to Total Design? " in *Harvard Design Magazine*, Summer 1998, Number 5, p.1;

[95] Lescaze, William. *On Being an Architect*. New York: G.P. Putnam’s Sons, 1942, p.105;

CHAPTER III. EERO SAARINEN & ASSOCIATES: EXPERTISE-BASED FIRM

> The success or failure of practically every architectural effort is largely dependent upon the collaboration of a group of individuals. In the contemplation of an architectural project significantly successful in both the conception of the design and its execution may be recognized the guiding hand of a master designer working in the closest possible harmony with the representatives of whatever collaborative artists may be involved.[96]

Introduction

The design and construction of architecture call for a cluster of individuals to synchronize and sequence their professional efforts. This choral design endeavor makes the community of the architecture office the primary environment where the information exchange occurs in the real world. These content transactions are inclusive of the hybrid dynamic of human-to-human interactions as well as of computer-mediated communication. Large architectural firms, with dozens of employees on staff, are optimal research sites to gain meaningful insight into how projects of sizeable budgets, requiring multidisciplinary expertise and management skills, are conceived, and executed. In these settings, ongoing verbal interaction among community members and the acting out of the rituals and routines specific to the subculture of the workplace, are the day-to-day activities bringing cohesiveness to the disparate and parallel actions taking place during the design process. In the theoretical realm working collaboratively has been a central idea in modern architectural discourse and still is at present. However, the leap to the reality of architectural practice has historically proven to be far more complex to implement than theorized. As expectations about what collaboration can deliver meet the actuality of how offices operate, the gap between what is and what should be surfaces as self-evident. The office is the locus where collaboration unfurls. It follows that an examination of the workplace is the steppingstone to understanding how the multifarious forms of collaboration- de facto a first principle and a logistical necessity in the practice of architecture- intersect with the cultural specificity and social dynamics of the offices supposed to implement them in the real world. Collaboration calls for an organizational form enabling that way of working to occur. Since each firm has an organizational form, the examination of specific practices sheds light on the likelihood of staff in it working collaborative. A closer look at firms doing design in their own architectural offices will yield critical insights to understand the intersection of the human factor and technology in the practice of architecture.

Historical Picture

The first of the four case studies I set to examine in this inquiry is Eero Saarinen & Associates (ES&A), the firm famed Finnish architect Eero Saarinen (1910-1961) founded in 1950. In this setting a particular form of groupwork took place. As a business entity, this practice carried this name from 1950 till 1966 and was responsible for the conception and execution of many landmarks of Post-war America. The Trans World

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[96] Saarinen, Eliel. "The Kingswood School for Girls. Cranbrook, Michigan", in *Architectural Forum,* vol. 56, no. 1, January 1932, p. 37;

Airlines (TWA) terminal at the John Fitzgerald Kennedy Airport in New York, the Dulles Airport in Chantilly, Virginia, and the Jefferson Western Expansion Memorial in St. Louis, Missouri, are three among the most notable accomplishments visible in the public domain. One of the most recurring observations, that characterizes the scholarly appraisal and popular commentary of Saarinen's works is how much was designed and built in the relatively short amount of time for what is typical in the building sector, between his father's passing - Eliel Saarinen died in 1950- and his own death in 1961. With the exception of a few small structures mostly done in the early part of his career, his portfolio encompasses mid-size to large-scale projects, each uniquely endowed with programmatic and technical complexities exemplary of a post-war society, increasingly invested in blending corporate capital and technological advancements. Although the staff increased substantially from a dozen people to one hundred members under Eero's leadership, the name of the practice never changed in the course of its existence. Eero Saarinen is credited in the popular media and scholarly references as the design architect of that entire body of work, although most of it was built after his death by his own office orphan of its leader, although operationally speaking fully functional. Following the classification of the three types of business models of design firms, published in the 15th edition of The Architect's Handbook of Professional Practice, Saarinen's practice falls squarely in the *Expertise-Based Firm* category. This class points to an architectural firm carrying the proper name of its founder and identified as such by its peers, to brand its design expertise among competing offices in the same marketplace.

In spite of Eero Saarinen enjoying national and international acclaim as the mastermind of every project, his workforce appeared singularly invested in the qualitative results of the final product. This chapter looks at the make-up of that workforce and the social and material world of that firm to understand what prompted these young practitioners to dive without hesitation into a grueling work schedule, for the ultimate celebration of the office leader. It delves into the design culture Eero fostered to jumpstart and sustain the remarkable energy that allowed this organization to operate in full swing for many years, even after his untimely death at age 51 due to an aggressive brain tumor, diagnosed only two weeks prior to his passing.

The personal and professional dimensions were utterly inseparable in Eero Saarinen's trajectory. This essay covers a few of the social and organization routines enacted in the office where those two layers coexist. Some of the practices ordering the function of ES&A were how prospective employees were selected in the interview process, the physical arrangement of the office to structure the division of labor, the differential treatment that Saarinen himself bestowed on designers versus the personnel slated for production, and the staffing of the teams to preserve the consistency of the design inquiry and its outcome per the founder's standards. What organizational machine did Saarinen concoct to have his staff commit so resolutely to the increasing demands his high-profile clients put on the firm's human resources? What was the motivation for the staff to endure demanding work schedules, weeks after weeks, with no personal reward other than salary and the belief of being part of something major in architecture? Possible answers to these questions will be articulated in the course of this chapter.

The Saarinen name in architecture is linked to a lineage of buildings dating back to 1896 in Finland with Eliel Saarinen (1873-1950) – the leading architect in his native country prior to moving to the United States in 1923- and ending with the sudden death of his son Eero Saarinen (1910-1961), together with the firm's name change from ES&A to Roche, Dinkeloo & Associates in 1966 to complete the ownership transition. While the office had several different formats throughout its stages the Saarinen's- a family of architects, artists, and textile designers- were the core members and the acknowledged leaders. The Saarinen name, on the firm's name, was the continuous reminder to their associates that throughout its life the architecture office remained, in essence, a family business.

Eliel raised his only son- he had another daughter called Pipsan- in a household where artists and musicians of national stature- Sibelius is routinely mentioned in the Saarinen's literature- were regulars of the family's social gatherings. The arts were the chief interests of this circle, with modeling and drawings as customary activities at home. Eero was born on August 20, 1910, in Kirkkonummi, Finland, the same day as his father's birthday, and became an architect after a short stint as a sculptor. In Eero's formative years and in the first part of his career, Eliel's shadow obscured his son's design talents, resulting in a strained relationship between the two that would shape Eero's attitude toward his architecture career throughout his life. Per Susan Saarinen's, memories Eero's daughter:

> Around 1900 the dividing lines between art, design and architecture were more of a continuum than it is today. Like his father, Eero believed deeply in the concept of Art in Architecture, and as he learned and worked with his father, whose architecture was often heroic, he came to believe in the idea that there was another way to express the importance of architecture in our lives.[97]

It was the uncontainable desire to outdo his father and to be acknowledged for his own merits that propelled his energy to sustain an exhausting work schedule, something very well known, and by many disliked, but no less admired among his peers. On this point, Susan comments:

> I think his desire to outdo his father was really a desire to measure up to him. He was very insecure about his abilities early in his career and always strived to learn more, get better, earn more approval. He was "a genius" by way of extraordinary effort, while his father was something of a renaissance man and a natural talent willing to work.[98]

In the course of an unpublished interview with the principal investigator, Neil Smelser, of the UC Berkeley Creativity Study and recorded in 1958, eight years after Eliel's death, Eero admitted:

> My father was always remote from me—by his own choice. He is a very famous architect, a good one, a hard worker. He drove himself. A beautiful delineator. A fine

[97] Saarinen, Susan. E-mail to Ph.D. Candidate. July 19, 2023;
[98] Saarinen, Susan. Ibid.;

> intelligent man. He was interested in biographies. I aped him, read history. He was my image—I would try to follow him.[99]

Eero Saarinen was an individual of uncommon ambition, whose stamina and determination to succeed, in the art of architecture, can be explained in light of the existential nature of this emotional competition with his father that lasted well after Eliel's passing. Personal recognition outside his blood affiliation, with such architecture celebrity, remained the target of a lifetime. It was a private race of Eero against Eliel the true driver behind the creation of landmarks that are part of the canon of post-war modern architecture. Eero's fears were not entirely unfounded since, in spite of the numerous feats he had accomplished during his short, but intense career after Eliel's death, his own obituary in the New York Times was subtitled "Disciple of his Father", a heading that would have most likely displeased him.[100]

Winning the 2nd prize in the 1922 Chicago Tribune contest brought $20,000 to Eliel, who -at age 50 and at the height of his fame in his native country- decided to emigrate from Finland to the United States, due to changed political and economic conditions in his homeland. His entire family followed him a year after and settled just outside of Detroit, in Bloomfield Hills, Michigan, land of giant automakers such as Ford, Chrysler, and General Motors. Susan Saarinen adds her perspective on the move to the United States:

> Certainly, changed economic and political conditions in his homeland were relevant to his decision to move to the United States, but they were not the only ones. Eliel's patron, Julius Tallberg, and Eliel's father, Juho, both died in 1920. Then, in 1922 he won 2nd prize for his design of the Chicago Tribune building. He moved his family to Chicago 1923 and worked on designs for the Chicago Lake front, then received an invitation to teach at the University of Michigan in Ann Arbor, Michigan and moved there. He was on the quay in NY, about to board a ship to return to Finland when he received an invitation from George Gough Booth to visit Cranbrook. The family moved to Bloomfield Hills in 1925.[101]

The publishing tycoon, George G. and his wife Helen Scripps Booth founded the Cranbrook Academy of Art in 1925. Eliel designed most of the building buildings at Cranbrook, including the Academy of Art. The school established twelve years prior to Walter Gropius assuming the academic leadership at the Graduate School of Design, at Harvard University, in 1937, and transplanting the Bauhaus principles in American soil. Among the most prominent visitors to the school were Le Corbusier, Walter Gropius, and Frank Lloyd Wright, the Modern masters Eero was exposed to growing up, and would try to emulate all along. Over the years Cranbrook (Fig. 1) became a crossroad of future talents Eero had the opportunity to meet and work with. His lifetime friendship with

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[99] Saarinen, Eero. Personal History and Professional Field Interview File, April 25, 1959. IPSR Archive, University of California Berkeley;

[100] Associated Press, "Eero Saarinen, 51, Architect, is Dead," *The New York Times*, September 2, 1961, p. 15;

[101] Saarinen, Susan. E-mail to Ph.D. Candidate. July 19, 2023;

Charles Eames, Alexander Girard, Dan Kiley, Harry Bertoia, Ralph Rapson, and Harry Weese, to name a few, started during his Cranbrook years.



Figure 1 CRANBROOK ACADEMY OF ART, BLOOMFIELD HILLS, MICHIGAN.

The remoteness of the school's geographic location conspired to form an insular academic community, held together by the open-ended exploration of design avenues through hands-on workshop exercises and classroom work. Eliel Saarinen remained at the top of that pedagogical pyramid, played the role of the father figure for the youth, who affectionately called him "Pappy", and set out to make of Cranbrook an alternative to the Beaux-Arts model prevailing in the American institutions of higher learning.

Parallel to his teaching career, Eliel set up a practice that garnered wide recognition and numerous design awards, bringing the Saarinen's name to the forefront of the American architecture limelight. Shortly after the death of the German-born Detroit-based Albert Kahn (1869-1942), the architect of choice for Detroit's auto manufacturing heavyweight, such as Ford and Chrysler, the executives of General Motors approached Eliel's office- at the time called Saarinen, Swanson, Saarinen (1946) - for the design of its new headquarters in Warren, Michigan. While the early design under the elder Saarinen fell through, due to financial difficulties and the labor the industrial conglomerate was going through in the late forties, the later scheme entirely conceived under Eero's exclusive control of the practice was the one eventually realized and completed in 1955. Already during WWII, GM employed half a million people and was, by far, one of the most prominent clients in the country. Its headquarters was budgeted at over $ 100 million and was considered the commission of the century at the time. The

fanfare, with which the complex was hailed at its completion in the media, brought him huge popular praise nationwide to the point of having his stylized portrait on the cover of the July 2, 1956, issue *Time* magazine, when the architect was barely 45 years of age.

Despite spending most of his life in North America, Eero neither lost his thick accent nor rejected his Finnish origins. Of her father, Susan notes:

> Eero was 12 years old when he moved to the US. His Finnish thinking was well established. His young mind was eager to explore his new country, but his close relationship with his parents, no doubt, reminded him of his Finnish roots. Eero was a very deliberate thinker and speaker.[102]

Many of the key collaborators remained with the young Saarinen when he assumed command of the office. Some of them were the master illustrator Jay Barr, project manager Joe Lacy, technical mastermind John Dinkeloo, and model maker Jimmy Smith. Kevin Roche, an Irish-born architect, who will later have a unique professional relationship with Eero, also joined the Saarinen office in 1950, after work experiences with British architect Maxwell Fry in London, Mies van der Rohe in Chicago, and with Harrison & Abramovitz working on the United Nations Headquarters in New York.

The then unknown architect Louis Kahn introduced Joseph N. Lacy (1905-1997) to Eero in the late forties. Lacy was a graduate from the University of Pennsylvania and worked for a few years in Paul P. Cret's office, in Philadelphia, before joining the Saarinens'. He took a leading role in project management and was instrumental in keeping the business solvent, where overtime work was a routine rather than an exception under Eero's leadership. His title was Partner and Business Manager, a position he assumed in the early fifties, when Jay Barr was also a partner. John Gerard Dinkeloo (1918-1981), in charge of technical development, working drawings, specifications, and construction supervision was hired in March 1950, made associate in April 1951, and partner in August 1956. His professional pedigree, starting in 1939, lists years of employment with Skidmore, Owings and Merrill, where in 1947 he was made chief draftsman and production manager of the firm's Chicago office, interrupted by 30 months in the US Navy. In October 1951, ES&A had 31 members on staff, among them Robert Venturi, Gunnar Birkerts, Niels Diffrient, and Charles E. Bassett, all of whom will have an impactful role on the development of post-war American architecture. At the time of Eero's death on September 1, 1961, Lacy and Dinkeloo were the only two other partners. The list of key members of the staff included: Kevin Roche, Head of Design Department; J. Warren Platner, Principal Designer; William H. Gardner, Project Manager; Maurice B. Allen, Project Manager, and Joe E. Jensen, Structural Engineer and Cost Estimator.

Between 1950 and 1961 twenty-two projects were either completed or in various stages of construction, with the exception of the Terminal Building for the Athens International Airport in Greece, which was never realized. They ranged from the General Motors Technical Center, completed in 1955, at a cost of $70 million dollars to the North

[102] Saarinen, Susan. Ibid.;

Christian Church in Columbus, Indiana, for $800,000. The catalog of projects includes research centers, airport terminals, manufacturing plants, governmental buildings, religious facilities, memorials, theatres, company headquarters, and a number of college dormitories. Very rarely the office took on commissions of single-family residences, notable exceptions being the Irwin Miller House in Columbus, Indiana, the summer house for J Irwin and Xenia Miller, Llanrwst in Muskoka, Canada, and the house for Saarinen's mother, Loja, in Bloomfield Hills. Furniture design, a highlight in Eero's early part of his career, also took a backstage role in later years. Equally out of the ordinary was the roster of clients that went through ES&A, among them the U.S. Department of State, Deere and Company, Columbia Broadcasting System, and the Federal Aviation Agency. No other contemporaries of Saarinen could match such remarkable scale and range of work.

Methodology

Of the four case studies presented in my investigation, this is the only one based exclusively on archival research (primary and secondary sources) and interviews with individuals who worked closely with Eero Saarinen, at various times during his career. Although per legal agreement in 1966 the company was renamed Roche, Dinkeloo and Associates, my research focuses on the period when Eero Saarinen took the leadership of the office in 1950 following the death of his father Eliel, occurred on July 1, 1950, until his own death on September 1, 1961. The archival findings are drawn primarily from three key sources:

- Unpublished documents retrieved in the Eero Saarinen Papers at Yale University Library;
- Unpublished correspondence between architect and former UC Berkley Dean William Wilson Wurster and Eero Saarinen;
- Unpublished interview transcripts of Eero Saarinen's participation in the 1958-59 Creativity Study on Forty Architects, held at the Institute of Personality Assessment & Research (IPAR) at the University of California Berkeley, under the leadership of Dr. Donald MacKinnon and Dr. Wallace Hall;

Furthermore, I personally interviewed either in person or over the phone the following people, who had direct contact with Eero Saarinen:

- Jimmy Smith, over the phone (chief model maker of Eero Saarinen, from the late forties till 1961);
- Ruth Clemens Pudists, over the phone (Personal secretary of Eero Saarinen, from Spring 1954 until Saarinen's death in 1961) on April 12, 2003;
- Jack Goldman, in person twice (Special assistant to Eero Saarinen in the design of the London American Embassy and a member of the design team of the Irwin Miller House) on October 22, 2008 and November 13, 2009;
- Richard Knight, in person three times (designer and staff photographer, from 1957 until Saarinen's death in 1961) on March 2 and March 16, 2007, and September 20, 2008;

- Gary Brown, in person once (a member of the design team of the Dulles International Airport), on June 24, 2009;
- Don Knorr, in person over three times (a member of the design team of General Motors Technical Center);
- Donald Olsen, in person over five times (a member of the design team of the Drake University Dormitories and the General Motors Technical Center);
- James Ream, in person (a member of the design team for the John Deere Headquarters);
- Kevin Roche in person, at the offices of Roche & Dinkeloo in Hamden, CT, on February 20, 2018.

Another primary source was a set of unpublished interview transcripts Richard Knight (1927-2008) produced became available to me. He interviewed the following associates:

- Glen Paulsen (interview conducted on 8/8/2002)
- Don Knorr (interview conducted on 10/16/2001)
- Ruth Clemens Pudists (interview conducted on 8/12/2002)
- Cesar Pelli (interview conducted on 6/2/2003)
- Harold Roth (interview conducted on 5/31/2003)

With the exception of Cesar Pelli and Kevin Roche, these primary sources have rarely, and some of them never, been tapped by researchers on Eero Saarinen and his output; despite being repository of intimate knowledge of the office's working methods, division of labor, staffing practices, as well as the circumstances and anecdotes surrounding the realizations of some of the landmarks of mid-century modern American architecture. The personal recollections of the interviewees will disclose the climate of hierarchical relationships, comradeship, and sense of membership that made this design community stationed in Bloomfield Hills, Michigan, a united front in the pursuit of a particular notion of architectural excellence for post-war America.

The Setting

Eliel and Eero founded the original firm in 1937, under the name Saarinen and Saarinen. As the practice grew in size its make-up changed with the scale of the projects and the expertise required to address their programmatic complexities. From different accounts, it appears that there were contractions and expansions of the office. When Chuck Bassett, later design partner and leader of the San Francisco office of Skidmore, Owings & Merrill, came on board in 1950, he remembers that the staff was around 20 people. [103]However, according to Cesar Pelli, when he joined the office on August 2, 1954, and the General Motors commission was in full swing, there were only ten people

[103] Bassett, Charles E. Oral History of Edward Charles Bassett. Interviewed by Betty J. Blum, Chicago Architects Oral History Project, Department of Architecture, The Art Institute of Chicago, 1992. Revised Edition, 2006, p. 42;

working in the company. [104]By the time of Eero's death, however- the office had 105 employees. In this latest size, the workforce was subdivided according to the following titles:

1. Partners	3
2. Principal Associates	6
3. Architect-Designers	30
4. Senior Architects	10
5. Architectural Draftsmen	28
6. Specification Writers	3
7. Estimators	1
8. Construction Superintendents	10
9. Clerical	9
10. Other	5 [105]

Eero Saarinen's personal title was Principal Partner, whereas both Joe Lacy and John Dinkeloo were simply Partners. Up until 1954 the same team members would be in charge of design, working drawings, and construction supervision. That was not the case for the General Motors commission, however. The Detroit office of *Smith, Hinchman, &* Grylls undertook the working drawings for the General Motors campus, under the direction of Japanese American architect Minoru Yamasaki. From Cesar Pelli's account the project for the Concordia Senior College in Fort Wayne, Indiana, brought about a number of problems. He remembers:

> Eero was unhappy, and from then on John (Dinkeloo) was in charge of all working drawings, production and detailing. And then the office was divided between those that did working drawings and those that did design, and they were in two different parts of the office.[106]

This sharp division of labor turned out to be a social one as well. Eero carried out differential treatment between the designers and those in charge of production. He would spend countless hours with the former group and nurtured their aspirations to succeed in their own pursuit, while having virtually no direct contact with the latter, except through John Dinkeloo. Hamburgers and beers at the Plywood Room- a barbecue place in Bloomfield Hills- late at night was a standard treat Eero had for his stable of designers, [107]loyal to his agenda to work on projects until the leader was satisfied. Being part of this exclusive club meant to have access to Eero's time and observation of his work ethic. In the numerous interviews, conducted directly or by Richard Knight and collected at

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[104] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Cesar Pelli. June 2, 2003. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 23;

[105] Eero Saarinen & Associates, Architects. Birmingham, Michigan. Undated. 3. SIZE OF ORGANIZATION. Document in 8 sections describing the firm. Revised after Eero Saarinen's death. Eero Saarinen papers, Manuscript and Archives, Archives at Yale, Yale University, unpaginated;

[106] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Cesar Pelli. June 2, 2003. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 22;

[107] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Don Knorr. October 16, 2001. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 1;

different times and places, frequent mentions to his extraordinary stamina and focus on work were made. "Elephant time"[108] is how Eero himself labeled the long and winding road to bring a design concept into built form. It is an objective fact to state that of the known second generation modernist architects, a group that includes Eero Saarinen Louis Kahn, Paul Rudolph, Gordon Bunshaft, and Minoru Yamasaki among others, Saarinen was the most focused of them. Indeed, he could plough through the conception of a design for decades, as he did for the Gateway Arch in St. Louis, without a decline in both design standards and determination of intent for its entire duration. In the transcription of an unpublished interview Richard Knight conducted with Harold Roth, a designer who worked on the CBS Headquarters in New York, the interviewer recounts:

> Harold remembers, at his young age then, being exhausted at nighttime. He remembers Eero coming back to the office after a black-tie party and start working in the middle of the night—taking off his jacket, rolling up his sleeves. The young designers could not keep up with him. He had extraordinary energy and drive.[109]

On the same topic, Cesar Pelli remarks:

> I traveled many times with Eero and he would not even look at the women. He would usually bend over making sketches- and if you'd lift your eyes because a handsome young woman going by- if you'd mention to him, he'd go huh and go back to drawing. He was extremely, extremely focused on his work, like nobody else I know.[110]

Glenn Paulsen, a designer whose opinion Saarinen had in high regard, adds:

> To work there, for Eero, took real commitment; it wasn't just a job. There was commitment to the art of architecture. We worked overtime all the time. At the time of the Tech Center there was overtime pay- time and a half. Joe Lacy's constant worry was how to pay their bills. Eero didn't worry about that.[111]

In the course of the interview I conducted with Jimmy Smith, the chief model maker for Saarinen, he repeated often that he worked extremely long hours to a point of complete exhaustion. Smith would then disappear for a week or so, without giving notice to the office, something the architect and Joe Lacy had become accustomed to, to then return to the same grinding routine. The recollections of his collaborators are a mixture of awe, admiration, and reverence for his physical and mental performance at work. In a personal communication, James Ream, another alumnus from the Saarinen's office who labored on the John Deere Headquarters, said that Eero would leave for three weeks once a year, for some exotic destinations and then work all the time.[112]

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[108] Saarinen, Aline (ed.). *Eero Saarinen on His Work*. New Haven, CT: Yale University Press, 1962, p.9;
[109] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Harold Roth. May 31, 2003. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, unpaginated;
[110] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Cesar Pelli. June 2, 2003. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 26;
[111] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Glen Paulsen. August 8, 2002. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 14;
[112] Ream, James. Personal Communication to Ph.D. Candidate;

Following the media sensation of the General Motors compound, the company went through sustained growth. New commissions started coming in and a more structured approach to staffing was implemented. From then on employment at ES&A was very stable. Common reasons for turnover of personnel were work visa expiration, a departure to teach at a university, entrance into private practice, or to fulfill a travel grant. As the practice progressed and widened in scope, Eero's assistant, Kevin Roche, was given the permanent role of being in charge of the design section of the firm.

> Kevin Roche told me that when the office was small, Eero was involved in every aspect of every project, but by the time the office started to enlarge, it became Kevin's job to steer Eero into the part of each project that would be most interesting to him, would benefit from his thoughts, but would not bog him down into the details of every aspect of every job. Kevin kept Eero on track.[113]

Each project had three key people assigned to it: Eero himself, Kevin Roche, and a lead designer (the lead designer for TWA was Cesar Pelli, as an example). This pecking order was set up with the belief that two people out of three might reach consensus on design issues, as they arose. Eero, however, maintained veto power to overturn the decision of the other two if he disagreed. Below this triad, a variable number of designers would study specific portions of the building per the direction Eero had given to the scheme. Although variable in size, the teams kept this format. Once the project had reached client approval at design development, it would be handed to John Dinkeloo to manage the production of working drawings sets for construction. Eero listened to anyone who voiced a rational response when in disagreement with the design direction given to any particular project. By all accounts, he was very open to suggestions and expected candid reactions from the designers. But when it was time to make decisions, besides Kevin Roche, the key people he would listen to were Cesar Pelli, Glen Paulsen, Warren Platner, John Dinkeloo, and his second wife Aline.

When Saarinen was away either on vacation or out of town for projects, Kevin Roche managed the design staff, which was highly devoted to its leader. Less than talkative, Saarinen displayed no panache. There is little, if any, remembrance of him losing his temper, or raising his voice with his personnel. The gravitas of his persona alone commanded the attention of both the workforce and the clients. Speaking slowly, but assertively, he would labor over project after project without pause. Jack Goldman recalls:

> I don't think he really had that many conversations with people, because he was so involved in his work…He affected my life tremendously...his attitude toward design, him more than anything else, more than education.[114]

For many, the experience of working in that office was transformative, certainly a highlight of their career. Both the type of commissions, the rate of development of the

[113] Saarinen, Susan. Ibid.;
[114] Goldman, Jack. Interview with Ph.D. Candidate. October 22, 2008;

design options, and the unique process Eero devised determined a legacy impacting at least three decades in the professional careers of those who worked with him. Reunions of the Saarinen alumni are still happening, over sixty years after his death, and the friendships forged during those years lasted a lifetime for many of them. In the office Eero was called the "benevolent monarch", whose charisma and aura were the glue that kept the community together. His sudden and untimely death shocked the community, causing the diaspora of part of his workforce when the office moved to Hamden, Connecticut, two weeks after his passing, as it had been planned all along. Ruth Clemens Pudists said:

> I like them both (John Dinkeloo and Kevin Roche), but it never jelled it right for me in Hamden. Very soon it was clear to me…Eero had promised me that in this office we were going to have a fireplace and real China cups and all that and we did have all those things, but Eero wasn't there. And sitting in Eero's office was John and I think that was such a mistake…he shouldn't have been in there.[115]

In the course of my phone interview with her, she admitted that she would have stayed with Eero for the rest of her life, had his fate been different. Eventually she went to work for Minoru Yamasaki. In the aftermath, many others from the Saarinen office, unwilling to move to the East Coast, followed suit or moved to the West Coast, among them Cesar Pelli and Anthony Lumsden. What is central, however, is the human regard, in which Saarinen's closest collaborators, and in his case his personal secretary, were held by their leader. In the transcripts of the interview of Ruth Clemens Pudist, Richard Knight wrote:

> We both spoke of the office as being more like a big family than a collection of employees. Aline frequently came to the office with their son Eames, about the same age as our son Tim, who would visit me there. He knew where I worked and was royally welcomed by all. That pleased Aline & Eero, who nurtured the idea that we all work and live in close proximity.[116]

These feelings were shared among the members of the firm. Architecture felt like a mission requiring unconditional devotion from those loyal to the firm's head. While working around the clock was a routine affair, Saarinen was virtually in another time zone, often coming to the office late at night at the end of social functions. By all accounts, the only individual who was always by his side at work was Kevin Roche, whether late at night, or weekends, or holidays. In those late hours, when most of the staff would be gone for the day, he would review the work done at the drafting tables of the designers and leave notes with his feedback on what was being proposed. (Fig.2)

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[115] Ruth Clemens Pudists. Interview with Ph.D. Candidate. April 12, 2003;

[116] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Ruth Clemens Pudists, personal secretary of Eero Saarinen from 1956 until his death. August 8, 2002. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 6.

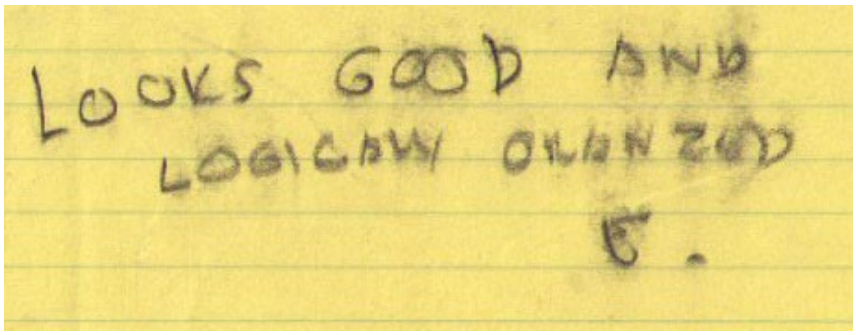


Figure 2. NOTE FROM EERO SAARINEN LEFT ON THE DESK OF JACK GOLDMAN

Saarinen's secretary shared with me his daily schedule, during his marriage with Aline. He would arrive closer to 9 AM to the office to have meetings, respond to letters, make phone calls, receive clients, and to deal with administrative items for the whole morning. At lunch he would gather the designers to get a bite often at the same place, the Plywood Room on Long Lake Road and Woodward Avenue for a hamburger and a beer. Upon his return to the office, he would start working on various designs. Around 6 PM he would go home to have dinner with Aline and their son, Eames. He would then return at 8 PM and stay there until 2 AM. During the working week, this schedule would happen every day.

Social and Material World of the Firm

Design and production were two worlds apart for Saarinen. He was personally invested in the recruiting of the designers he had personally identified and were going to work closely with him. This favored circle enjoyed his distinct attention during their tenure at ES&A and beyond. Deans of architectural schools (Harvard, University of Illinois, and the University of Pennsylvania, to name a few) would introduce to him the most talented graduates presented with the prospect of joining what was deemed, at that time, one of the most consequential and coveted practices of post-war America. These designers were his key and most loyal allies in the achievement of his goals as an architect. Fiercely competitive, with them he shared daily routines, long hours, and weekends at the office, and asked their opinion on the projects they were involved in. He took part consistently in the many parties held for winning a competition, completing a building, the opening of their own practice, or their embarking on an academic career. If one of them were to share some travel plans to particular destinations, Eero Saarinen in person would outline, in drawing format, elaborate itineraries of places to go to and others to avoid. (Fig. 3, 4, 5, 6)

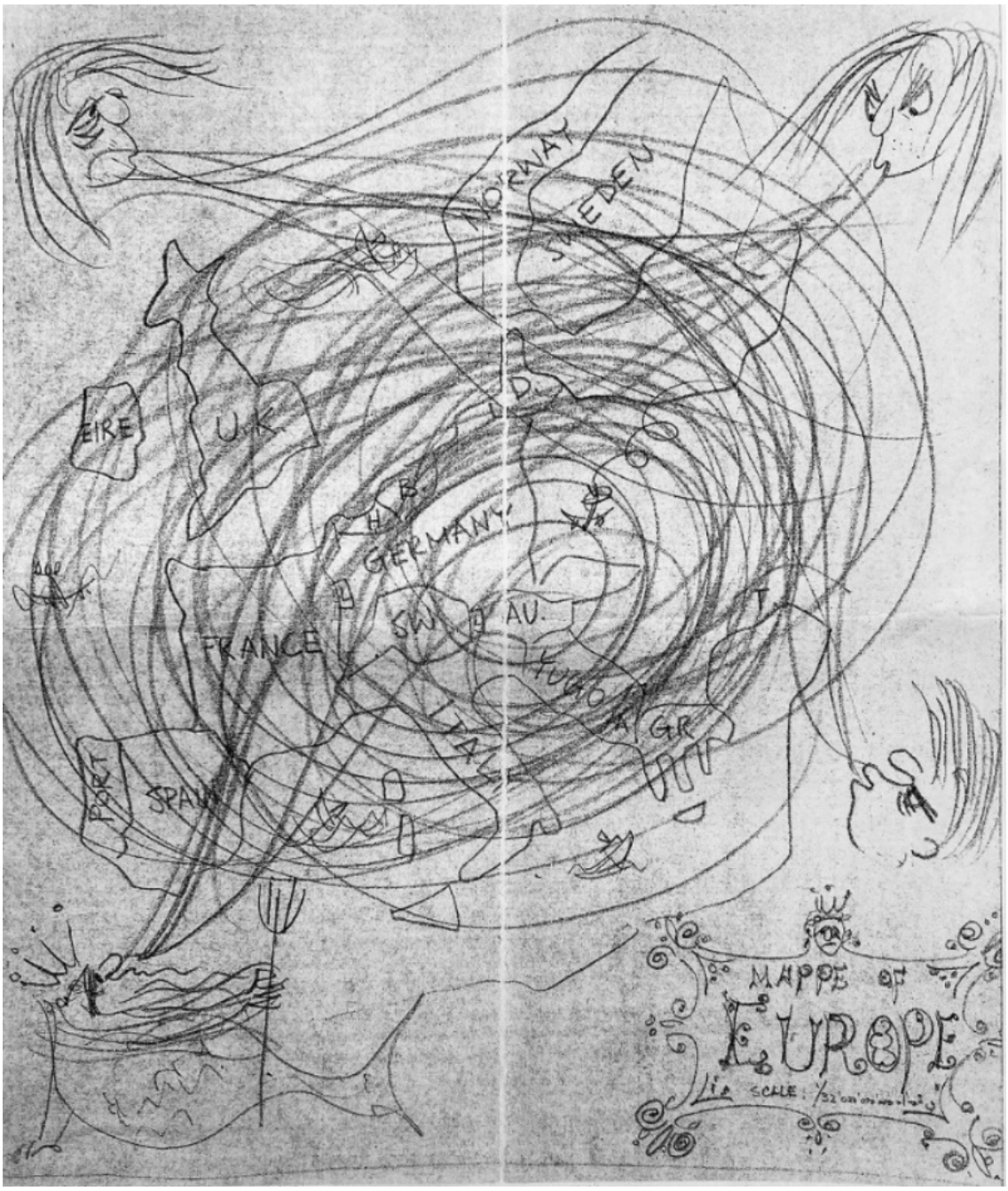


Figure 3. EERO'S SKETCHES FOR THE SIX-MONTH TRIP TO EUROPE FOR JACK GOLDMAN.

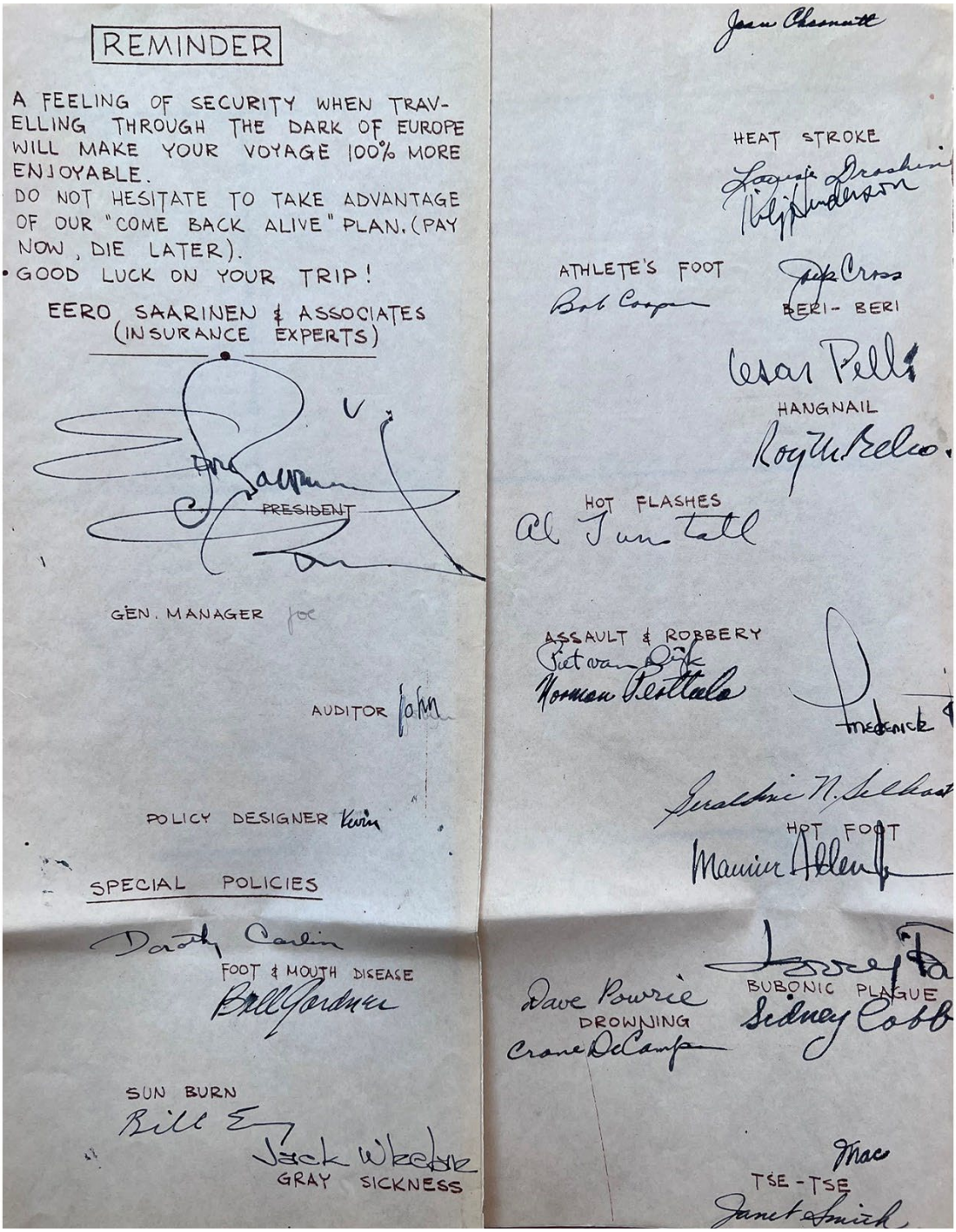


Figure 4. EERO'S SKETCHES FOR THE SIX-MONTH TRIP TO EUROPE FOR JACK GOLDMAN.

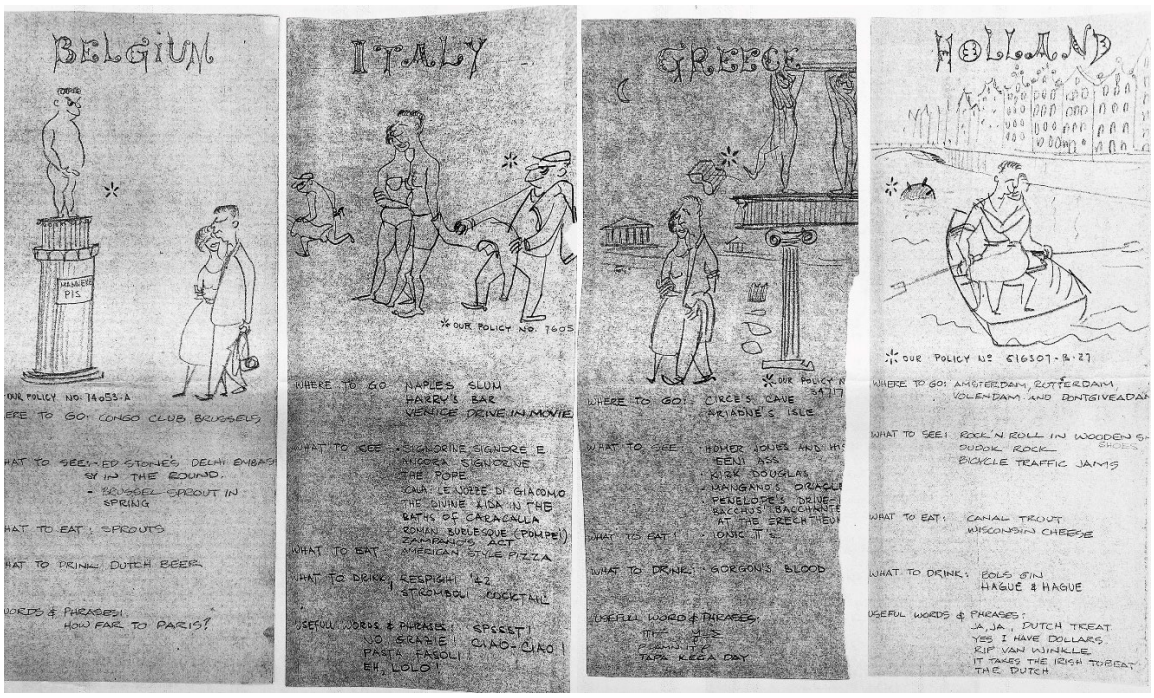


Figure 5 and 6. EERO'S SKETCHES FOR THE SIX-MONTH TRIP TO EUROPE FOR JACK GOLDMAN.

While he had great trust in his closest collaborators, he also deemed his presence necessary to keep the pressure on the staff to produce the work he wanted. In response to an invitation of William Wilson Wurster to come to San Francisco, Saarinen wrote in a letter dated March 30, 1954:

> Now, let's get down to the realities whether all this can be fitted in. First let me cry on your shoulder about all the traveling that takes time away from the office. This spring we have several diverse projects in the design stage in the office and somehow these sink like a motor boat when the engine is turned off, when I don't have time to get to them.[117]

Per the recollections of the interviewees, Saarinen had an intensity about himself that was evident at the firm's in-house parties, where he talked primarily about architecture. These venues could be rather elaborate *mise en scène* involving costumes. Customarily there was heavy drinking and cigarette smoking. Jack Goldman remembers flooding his own apartment to set up a Venetian scene with a gondola with Eero appearing in marine uniform (FIG 7,8, and 9).

[117] Saarinen, Eero. Letter to William Wurster, dated March 30, 1954. William Wilson Wurster Collection. Project/Folder Carton 2: Wurster/Saarinen, Eero, 1957-58, Environmental Design Archives, University of California Berkeley;



Figures 7, 8, and 9. VENETIAN-THEME PARTY AT ES&A. JACK GOLDMAN FLOODED THE BASEMENT OF HIS RENTED APARTMENT AND PLACED A GONDOLA FOR THE OFFICE PARTY.

Part of this immersive experience could be attributed to the fact that the Saarinen's office was an insular community in Bloomfield Hills, Michigan. All the social life was really tied to the office environment, as there seemed to be a rather limited choice for the staff for alternatives outlets to work pressure. This was a constant since the days of Eliel Saarinen and continued under his son's era. The younger Saarinen would find housing for them; he would write letters of recommendation for fellowship applications, stay in touch with them after their departure, often trying to recruit them back.

For Saarinen the designers, the majority being married Caucasian males in their late twenties and early thirties- some with children, were a cast apart from everybody else and he treated all of them accordingly. In his design staff, he instilled a sense of destiny, of common participation in something big and historically inevitable. The mythology he had created around himself was a powerful draw for an energetic generation, eager to be an integral part in the unfolding of Modern architecture in the United States. In return for his attention, Saarinen would enjoy the designers' complete dedication of their time and mental resources. For many of them, their devotion to him lasted a lifetime and remained a standard unmatched in their professional lives after his death. Notwithstanding this mutual loyalty, it was always clear, even to this privileged group, that Eero would be the primary designer of every single project in his office and that they would be an extension of his capabilities. This status quo was the primary cause of departure for those eager to give an independent outlet of their design talents (noted architect Harry Weese would be one of them). Conversely, with the exception of John Dinkeloo, head of production for the entire office, Saarinen had no direct contact with any member of the production personnel. This would happen despite the fact that the firm would routinely take on contracts for projects to be worked on, from conception to completion, doing all the working drawings in house. This rigid division of labor and staff is an organizational diagram that was inherited by the offices that came out of the dissolution of ES&A, among them Roche, Dinkeloo & Associates, and later Cesar Pelli & Associates.

The three facilities where Eero Saarinen practiced architecture throughout his lifetime were within a few miles of each other. For an architect of such international renown, the continued physical proximity to his paternal roots despite his own emotional conflicts with Saarinen the Elder is a conundrum of note, in the context of this inquiry. What is even more contradictory, for someone so invested in the cause of modern architecture, is that the younger Saarinen lived in a remodeled Victorian house, as opposed to a new structure of his own design. Furthermore, the future headquarters of ES&A in Hamden, Connecticut, was another Victorian structure, originally an old cigar baron's estate overlooking Lake Whitney. During the era of Eliel, the office was in the school building at the General Motors Technical Center ook Academy of Art. Edward Charles (Chuck) Bassett (1921-1999), who will later be the design partner at Skidmore, Owings & Merrill, San Francisco, from 1955 to 1981, talks about the space Eliel brought him in, when looking for employment:

> It was a Victorian school that was the offices of Bob Swanson, who was Eero's brother-in-law, and Eero, and his father. A wing had been added. The Saarinen office was in the

> school and the Swanson office was in the wing. We walked in. There was a conference room with no ceiling. It was simply a walled-off area at the edge of a single, high-ceilinged room. Pappy opened the door and we went in.[118]

In the early 50's Eero Saarinen moved the office to a plain two-story concrete structure, with large expanses of glass on both the long sides of its rectangular footprint on 91 W. Long Lake Rd. Resting on a stepped site, the edifice appeared as a one-story box, along the main road, but was actually two-story tall on the opposite side. Access was from the upper floor, with a narrow stair taking staff and visitors down. (Fig. 10 and 11)

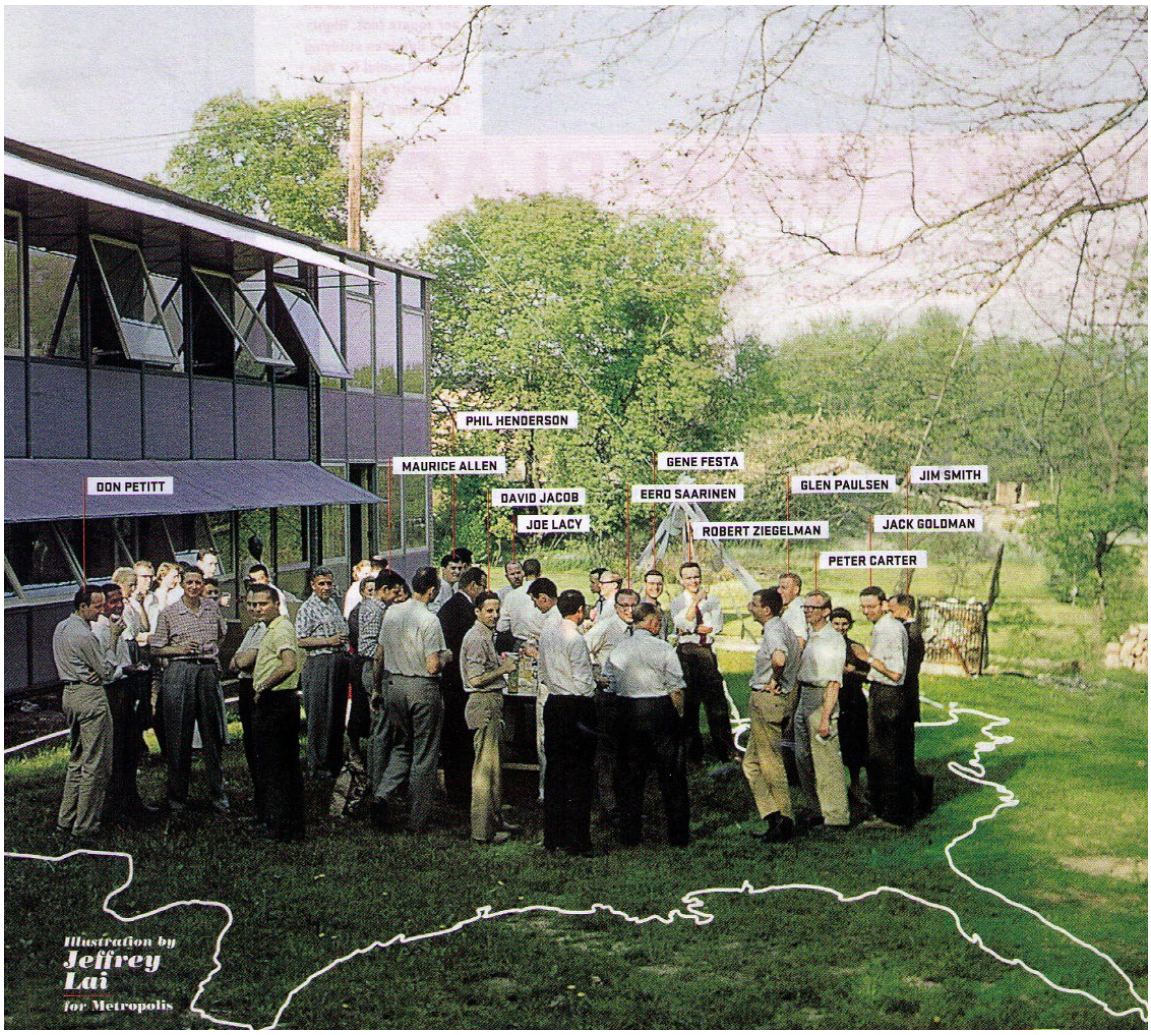


Figure 10. OFFICE ON 91 LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN. BACKYARD.

[118] Bassett, Charles E. Oral History of Edward Charles Bassett. Interviewed by Betty J. Blum, Chicago Architects Oral History Project, Department of Architecture, The Art Institute of Chicago, 1992. Revised Edition, 2006, p. 41;

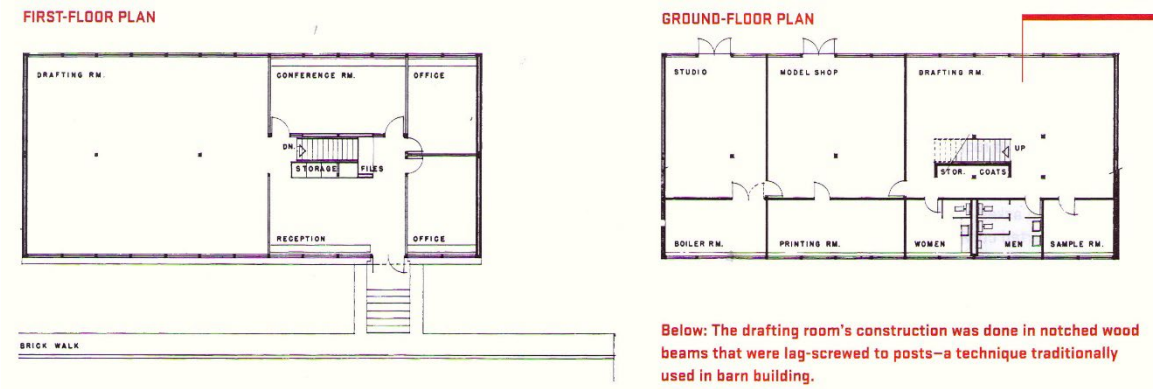


Figure 11. OFFICE ON 91 LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN.

Ruth Clements Pudists, the secretary, was at the entry. The only closed offices were those of Eero Saarinen and Joe Lacy. Besides one conference room for office use, all the other areas were open. The production department was on the upper level as well. John Dinkeloo, who was in charge of coordinating the production of all the office working drawings, had his desk there, but as part of the labor force. The designers were on the lower level, next to the model shop and the material library. That area could open to a yard where full scale portions of buildings could be tested. It is here that Saarinen would spend most of his time designing his projects. Kevin Roche would have his drafting table in the lower level also as part of the personnel. (Fig. 12 and 13)

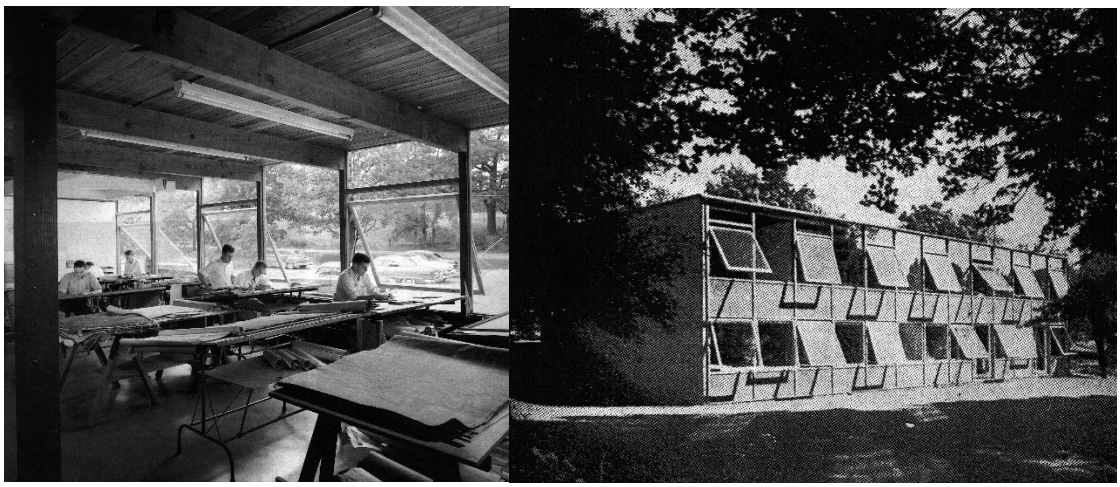


Figure 12 and 13. OFFICE ON 91 LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN.DRAFTING ROOM AND EXTERIOR

After his direct exposure to the design process the engineering teams were using for automobiles at General Motors, Eero Saarinen changed his own method of design. In a personal communication, Donald Olsen, who worked in the firm then named Saarinen, Swanson, Saarinen, stated that there was very little use of models when he was there. It was in the mid-fifties that model making started prevailing over drawings in the practice and became the hallmark of his signature. Kevin Roche stated that he was the one who came up with the idea of using large-scale models as a way of keep Saarinen engaged,

given the numerous designs that were happening in the office at the same time. Large-scale models were also used in the laboratories of the General Motors Technical Center. While these might be parallel facts, it is entirely possible that having worked both might have influenced Saarinen in making model-making a primary tool of design from that moment on.

In a letter dated September 4, 1957, to Jack Goldman, Saarinen wrote:

> In general, we are building more models than ever before. The drafting room is all cardboard and glue and paper. Nobody draws around here anymore! Everything is really going quite well here; the whole office is working as a very good team now and the morale is high.[119]

The extensive use of models triggered a participatory process of unprecedented intensity in the office. Unlike drawings, done typically by one person at the time, models were made with multiple people working on portions of them at the same time. Models were a means for collective engagement in the project for the whole staff. It became standard procedure to make a site model for any new commission, before even starting to design. It was also a way for the team to gather around the project and keep the focus on the design challenge. All designers worked on them, some more strongly than others. As labor intensive as it was, the making of them was rewarding given the unique insights yielded into the type of architecture of increasing geometric complexity and sculptural forms Saarinen was pursuing. For the design staff the entire premises had turned into a Research and Development laboratory. (Fig. 14 and 15)



Figure 14 and 15. OFFICE ON 91 LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN. MOCK-UPS.

Building materials, assemblies, and systems were tested in the yard. Full size mock-ups appended to the building exterior were constructed to test glass for solar heat

[119] Eero Saarinen. Letter to Jack Goldman, dated September 4, 1957. Jack M. Goldman Collection of Eero Saarinen and Associates Material. Cranbrook Archives, Cranbrook Center for Collection and Research;

gain. In one extreme case a full-size mockup was erected, to establish the most suitable relationship between the treads and the risers, all slightly different for the Arch in St. Louis, and convince the clients about the feasibility of the project. In another case another full-size mockup of one room of the Stiles and Morse Colleges was built with butcher paper, for Cesar Pelli and Eero Saarinen to test how they felt inside. Smaller models were being built, before the bigger models were made to study interior details. It was Roche who would decide the scale of the model to be made and the staff to execute it. Since both Saarinen and Roche were not talkative people, by the interviewees' accounts, models became artifact to gather around and solve specific problems. Jack Goldman reminisces that Eero once sat and looked at the model and drawing for quite a while quietly, to see where to go from there. The project for the TWA terminal, at the New York JFK airport, made that process especially necessary. Cesar Pelli, the lead designer assigned to the TWA project, said about the process:

> The process was very interesting. We built the model until it looked good. Then we made the drawings of the form as built. From those drawings we made another model. Sometimes the new models and drawings were made until it was right. That was all before anyone even thought of computers. They didn't exist. Today all of those things with computers are becoming much simpler. But at that time, with existing technology, it was amazing.[120]

The start of the TWA project coincided with the 1955 completion of the neo-expressionist Chapel of Ronchamp in Notre Dame du Haut, by Le Corbusier, and was developed during the rediscovery of the exotic forms of Catalan architect Antoni Gaudì, through the 1957 NY MoMa exhibit. In both projects model making was critical to control form. Those two experiences compounded with Saarinen's introduction to the design process of the GM carmaker making full-scale clay models in the design process, were the background for his pioneering of the extensive model making that he will endorse for the rest of his career. For the TWA terminal, countless cardboard maquettes of the shells were made to find the optimal solution. Eventually a ¾" model of the entire terminal was made and a more refined version, in fiber reinforced plastic, executed by the master modelmaker Jimmy Smith. Cesar Pelli commented on how he imported this process in his own large practice:

> I learned that from Eero. And many more architects do use models than ever before, which I think goes back to Eero's influence. Once you have the experience of designing with models and you see for yourself what the actual relationships are, you realize there are key relationships that you had no idea of from drawings- this tool is indispensable.[121]

Most of the models in ES&A were truly study objects and were never meant to be showcased or to be used for client presentations. Knight maintained that many of them became part of a bonfire. They were not built to last, but only instrumental to detect a problem and solve it. Some of them would be used for parties:

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[120] Knight, Richard. *Saarinen's Quest- Interviews*. Interview with Cesar Pelli. June 2, 2003. Richard Gamble Knight papers, Manuscript and Archives, Archives at Yale, Yale University, p. 27;

[121] Knight, Richard. Ibid., p. 23;

> One of the spherical models for the dome of the GM Styling building would be used for the potato chips, a silver award bowl for the dip, smoked oysters, a few veggies, etc.[122]

He remarked that in the office of Minoru Yamasaki, model making had an entirely different role. The models were much more precious and built by professional model makers. In Yama (as that young generation of designers called him), the level of inquiry was not as far reaching or deep compared to Saarinen's. The key for him was the treatment of the surface and its texture. But for Saarinen models were part of a larger strategy, to give a singular solution to a unique problem. Of him, Charles Eames- one of his closest friends- wrote: "He had already a practical instinct for problem-solving methods of a kind which in a formal version would be called operation research."[123]

Following the popularity of the GM Technical Center, the practice grew exponentially. In the early fifties Saarinen ended his first marriage with Lillian Swann, with whom he had two children, Eric (a filmmaker based in Bloomfield Hills, MI) and Susan (a landscape architect based in Boulder, Colorado). In December 1953, he married Aline Bernstein, former associate art editor and critic for the New York Times, and with whom he forged a powerful alliance to gain prominence for his own work. Aline would become the liaison for Saarinen in the publishing world, taking charge of the public relations for the office. Based on the content of the interviews, Saarinen confided in Aline and relied on her unique interpersonal skills, to pave the way for publicity and recognition for his architecture. The couple was widely admired, in and out of the office, and invited to attend social events further extending Saarinen's visibility in the public realm. The introduction of Aline in the architect's life coincided with the tail end of the completion of the GM Technical Center, a time when architectural commissions were coming in, on the basis of his reputation alone. Given her expertise in communication, she fine-tuned a campaign to single out the unique role that Saarinen played among the architects of his generation in actualizing, in the United States, the visions of the founding fathers of Modern Architecture.

On January 1, 1958, the office moved parts of its operations to a former Wilson-Pontiac-Cadillac dealership, to accommodate its growing workforce. It was a one-story facility of negligible architectural merit, located on North Woodward Avenue, in Birmingham. (Fig. 16) The separation between designers and drafters was ratified in the workspace arrangement, with closed offices only for Saarinen and Joe Lacy. For a short while, the model shop remained in the building on 91 West Long Lake Rd. In the new space, an entire room was assigned to a ¾" =1'-0" model of three spans of the latest design of the Dulles Terminal in Chantilly, Virginia. (Fig. 17)

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[122] Knight, Richard. Interview with Ph.D. Candidate. March 2, 2007;
[123] Eames, Charles, "General Motors Revisited" in *Architectural Forum*, June 1971, p.24;

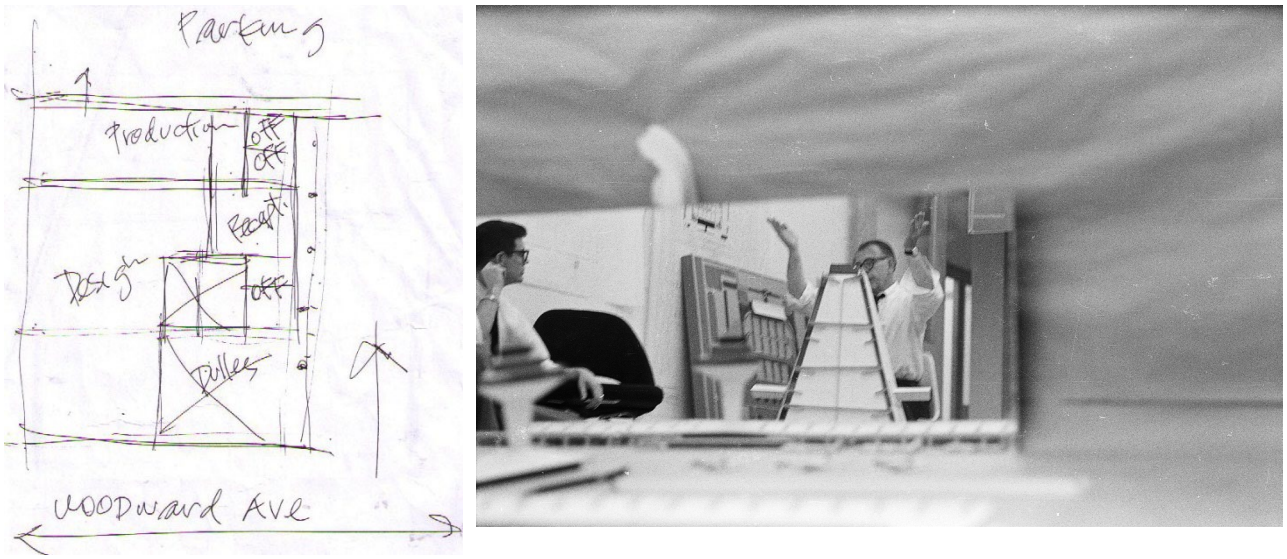


Figure 16 and 17 OFFICE ON NORTH WOODWARD AVENUE, BLOOMFIELD HILLS, MICHIGAN. SKETCH BY RICHARD KNIGHT. PERISCOPE FOR THE DULLES TERMINAL.

The team built a periscope and lanes where the automobiles would travel to simulate the approach to the terminal. In the same period a full-scale mockup of a corner portion of the base of CBS building (completed in New York well after Saarinen's death) was made to test the stone cladding of the rotated pillars. The scale of each undertaking was bigger than the previous one, in a mad race to beat the previous performance. Whatever Saarinen wanted, the staff executed it. This was a practice of extremes with no equals among its peers.

The thoroughness of the investigation was a tour de force of unmatched strain on the staff. In the long run, this continuous charrette was unsustainable for most, who although away from the distractions of big cities, could only conduct a life of work and minimal recreation. Many personalities came by the office to visit him. Paul Rudolph, Charles Eames, Eliot Noyes, Gordon Bunshaft, Louis Kahn, Kenzo Tange, Philip Johnson, and many others were matched by cult figures in the corporate world. However, it is equally worthwhile noting that Alvar Aalto, Mies Van der Rohe, Walter Gropius, and Frank Lloyd Wright did not pay him a visit, even though they all knew of his accomplishments. Executives from General Motors, IBM, bankers, museum curators, high profile patrons, and similar entered the front doors of a practice in full swing, capable of matching the ambitions of an increasingly larger consumer society. The presence of such major figures of American life buttressed the belief in the staff that this was an office casting a long shadow in Modern architecture. This realization would propel even more commitment to the next pursuit, thus establishing an extraordinary circularity between power, fame, and unrivaled work ethic.

Conclusions

In this chapter I have sketched the setting and working process of ES&A, one of the most prolific and highly regarded firms of postwar America. This office is

representative of the *Expertise-Based Firm* category, in that its existence, as a professional entity, and its standing in the field is uniquely dependent on the proper name of its leader and his charisma. In the modern American profession, the format of this type of firm (not its cachet) was rather common up until World War II, when corporate practice emerged as an alternative form of professional delivery. In this case, the entire office was an extension of Saarinen's capabilities and will, to actualize his own exclusive architectural visions. He relied on the complete devotion of his staff to tackle some of the most prestigious commissions of the *Affluent Society*. In return, these young practitioners were being awarded with Saarinen's consideration and the opportunity to work on projects that made them part of architectural history. This group of individuals was particularly driven. They accepted a relentless pace and unforgiving work schedules. Saarinen himself would carefully select its members for their perceived capability to devote themselves unconditionally to the project goals and deliver to meet his design expectations. Following the unexpected death of Saarinen, the office was able to carry on completing the pending projects but did not survive its departure. It eventually morphed into a different company altogether and developed an alternative subculture, with very few of the original members retaining the association with the new arrangement. In the ES&A environment the decision-making process was based on a rigid hierarchical pyramid, with Saarinen at its top. Given the extraordinary drive that fed his ambition, it is unlikely that, had he lived longer, he was going to share the glory for his achievements with his collaborators, by putting their names on the firm's name. Yet, despite this ceiling, a lot of young talent went through that office and from it a remarkable number of prominent practices were born.

In the next chapter I will focus on the San Francisco branch of the firm Skidmore, Owings & Merrill (SOM), brand name for many of the canonical high-rise structures in the United States and abroad. *Experience-Based Firms* is the heading under which this organization is accounted for since the agency of the team prevails over the discretional direction of an individual principal. Although a signature firm in a category of its own, the emphasis of SOM on proper names for design credit is significantly less than the previous case. The network of mutual legal commitments between the members of its leadership is a powerful built-in break, to suppress any possibility of tying the firm's design accomplishments to the overpowering presence of one designer.

CHAPTER IV. SKIDMORE, OWINGS & MERRILL LLP, SAN FRANCISCO: EXPERIENCE-BASED FIRM

Introduction

The previous chapter illustrated the case study of Eero Saarinen & Associates under the heading of *Expertise-Based Firm*. Through archival research and several interviews, I conducted with former members of that office, I charted the make-up of that firm's practice model. Although the substantial number of large-scale commissions required a concerted effort to be performed by design and production teams, the hierarchy of decision-making was conclusively top-down, with Eero Saarinen being the sole arbiter of all decisions on architecture matters. All employees knew that their role was to be of support to his master vision. Despite the inflexible vertical structure of the organization, the bond among the team members, their loyalty toward Saarinen, and the belief that they were part of something symbolically significant, made the workforce a well-oiled machine, able to survive the sudden death of its founder.

In this chapter the site of my inquiry is the prominent architectural and engineering firm Skidmore, Owings, & Merrill (SOM) in their branch office in San Francisco. What drew my attention to this organization is that, shortly after World War II, SOM become one of largest and business-wise most successful practices in the architecture profession in the United States. Geared toward the design of large-scale commissions for the public, private, governmental, and military sectors, SOM enjoyed the endorsement of the business world, the press, as well as architectural discourse, with works included in surveys of American 20th century architecture. This organization exhibited a number of characteristics that made it a unique case study to learn their understanding and protocols of collaboration and teamwork. These characteristics include its sizeable personnel of interdisciplinary composition, the nature and location of the projects on the boards based on demands linked to globalization, and the tangible influence of its internal office culture both on the staff and on its cult of outside followers– clients and admirers alike. Broadly speaking, SOM represents a benchmark for organizations of design professionals similar in undertaking and project types. In the four kinds of firms constituting the case studies of this dissertation, this practice falls under the category of the *Experience-Based Firm*. Its organizational form is based on the notion of a distributed design signature authoring a vast output whose formal references, at least in the early stage of the firm's life, is rooted in the works of German architect Mies Van der Rohe.

Historical Picture

Considerable scholarly literature has captured the beginnings and evolution of SOM. Its genesis is the result of a fortuitous collaboration between Nathaniel Owings, Chief of Concessions, and Louis Skidmore, Chief of Design, at the Chicago World Fair of 1933, also known as "A Century Progress". In the course of that professional experience, and afterwards, they individually wrote a series of articles published in

Architectural Record,[124] [125] [126]and *American Architect*[127] drafting what essentially became the mission statement of the firm the two of them founded three years later. Both of them celebrated the Fair as a window into? the future, filled with innovations and nationalistic pride for what technology was going to bring to the American way of life. The two men were profoundly different in character. Owings was a hardcore marketer and businessman, a salesperson of remarkable persuasive skills and charismatic personality. Compared to his colleague, Skidmore was subdued socially, yet well versed in designing buildings with competent know-how despite their young age. Owings was barely 30 years old in 1933, whereas Skidmore was 36.

The bond between Owings and Skidmore was first personal and then professional. Louis Skidmore married Owings' sister, before the beginning of the partnership. In Owings' words: "Our partnership started there." [128] The company got its formal commencement in Chicago in 1936, and within a few months a New York office was opened due to the numerous commissions the young firm got for the imminent New York World Fair, thanks to their previous involvement in the Chicago Fair. From that moment on, Skidmore led the New York office and never returned to Chicago. John C. Merrill, a structural engineer, joined the firm as a 'limited partner' in 1939. From its beginning, the agenda of the firm was to give back to the architects their "role as the creator and coordinator of big projects," [129] in those days controlled by engineers. The firm grew very rapidly; after the first six months the New York branch opened. SOM accepted all jobs, except small-scale residential work, carving a primary position in the market with a consistent presence in the building sector up to today. Owings noted:

> The plan was that we would develop a brotherhood…and we were dead serious about it… of individuals who were dedicated to the betterment of mankind …anonymous…as nearly, anonymous as possible like the brotherhood of the Benedictine Order. I am a Unitarian and Skid was an agnostic; it wasn't a matter of being connected with the church. But we wanted an anonymous body of dedicated people working together toward the betterment of mankind through a better relationship between man and nature.[130]

The current business model of the firm continues this original practice of de-emphasizing the proper name of its designers, in order to give its organization unchallenged prominence. SOM comprises various design studios. In those teams the

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[124] Owings, Nathaniel A. "New Materials and Building Methods.", *Architectural Record*, Vol. 71, No. 4 (April 1932), pp. 279-288.

[125] Owings, Nathaniel A. "Amusement Features of the Exposition.", *Architectural Record*, Vol. 71, No. 4 (May 1933), pp. 355-362.

[126] Skidmore, Louis. "Expositions Always Influence Architecture.", *American Architect*, Vol. 141, No. 2607 (May 1932), pp. 26-9, p. 78, and p. 80.

[127] Skidmore, Louis. "Planning the Exposition Displays.", *Architectural Record*, Vol. 73, No. 5 (May 1933), pp. 345-6.

[128] "Interview: Nathaniel A. Owings, FAIA.", *Architecture California*, Vol. 5, No. 2, March-April, 1983, p.15.

[129] Hitchcock, "Introduction," Architecture of Skidmore, Owings & Merrill, 1950-62, p.10.

[130] "Interview: Nathaniel A. Owings, FAIA.", *Architecture California*, Vol. 5, No. 2, March-April, 1983, p.16.

contribution of a particular designer in a praised scheme does appear in the public relation materials. Due to this marketing policy SOM is a borderline case between an *Expertise-Based Firm* and *Experienced-Based Firm*. Unmistakably client oriented, the labor force of this company is capable of working concurrently on projects of various scale on a fast track and still deliver, on occasion, design statements that are widely acknowledged contributions to the architecture field.

Personal recollections of those who met Nathaniel Owings, a self-made entrepreneur from Indianapolis, depict a complex, and often contradictory picture of his personality traits. For example, Owings' public claims to protect the land and the natural environment can be read as self-serving, considering that his staunch campaign for the preservation of the coast around Big Sur from new construction followed the completion of his own retreat known as *The Wildbird* and completed in the mid-1960s on a site with unparalleled views of the coastline. The California Coastal Act became a legal reality in 1976 under the strong political push of Owings himself. Mark Mills, the actual designer of Owings' retreat, reminisced about him in unflattering terms:

> Nat at the time was running around living in a paper bag doing big, big business. He knew how to get big business in Washington D.C. and all over the place and drinking a lot.[131]

Equally controversial statements about Owings' difficult character came from Olof Dalhstrand, an architect in the SOM office in San Francisco in the fifties, who worked in the role of project manager for eight years. Dahlstrand faced a confrontation about a project Owings erroneously believed he had taken away from the firm to open his own practice:

> Suddenly I got a phone call from Nat Owings. He was boiling, really mad. I tried to calm him down. He went on and on and on. Then I thought 'If I stay with SOM, I am gonna be dead meat for a long time.' So, I just told him 'I resign. You just convinced me to resign.' And we hung up. I got a call two hours later from John Merrill Jr., who was then a senior partner. He said: 'I just took Nat to the airport and wanted me to call you and say all is forgiven, please come back.' We parted as good friends.[132]

[131] Mark Mills. Interview with the author in Carmel, CA, on August 5th, 2003.

[132] Olof Dahlstrand. Interview with Ph. D. Candidate in Carmel, CA, on August 5th, 2003.

William E. Hartmann

S.O.M. Organization

S.O.M. Origin

In 1936, Louis Skidmore and Nathaniel A. Owings established in Chicago, Illinois, a partnership for the practice of architecture. In 1939, John O. Merrill joined the original two, and Skidmore, Owings & Merrill, now widely known as "S.O.M.," was created.

Growth

In the ensuing years, the firm has evolved from a small architectural group working on comparatively small projects in the Chicago area to an architect-engineer organization with four semi-autonomous offices located across the United States, engaged on projects in all parts of North America and elsewhere throughout the world. The office in New York undertakes projects in the Eastern part of the country, in Europe, the Middle East, and South America; and the San Francisco office works on the West Coast and in the Orient. The Portland, Oregon, office (originally developed in association with Pietro Belluschi) operates in the Pacific Northwest and Alaska. The original, Chicago office, the central office from the aspect of administration, handles projects in all sections of the United States.

National Operation

The establishment of offices across the country was a natural development from the type of professional service the firm offers to American commercial and industrial clients. Many of these clients function nationally, and it was obvious early in the firm's history that the highest quality of service could best be given by serving these clients in each area in which they may be operating.

Partnership

Organizationally, S.O.M. is a partnership. From the original two, the partnership has grown to the following thirteen, listed chronologically as they were admitted to the firm:

Louis Skidmore (semi-retired, consultant)
Nathaniel A. Owings
John O. Merrill
William S. Brown
Gordon Bunshaft
Robert W. Cutler
J. Walter Severinghaus
John B. Rodgers
William E. Hartmann
Elliott F. Brown
James W. Hammond
Walter A. Netsch, jr.
Edward J. Mathews

S.O.M. also established as an early principle of its operation, an "organization in depth." Supporting the partnership with a direct interest in the firms' successful performance are two groups of key technical and administrative personnel: Associate Partners and Participating Associates.

Associate Partners

The sixteen Associate Partners are all professionally trained architects, engineers, city planners, or landscape architects. Individuals in this group are responsible for major sections of the firm's activities in respective offices or manage specific projects of various types.

Participating Associates

In addition, there are twenty-seven Participating Associates operating nationally. These comprise individuals with varied technical or administrative responsibilities.

Office Organization

There is a general similarity in the organization of each of the four offices. Under a managing partner, there are five functioning groups:

Project Management

Design
- Programming
- Design of Projects
- Interiors
- Research (Materials and Methods)

Production
- Architectural
- Civil Engineering (Structural, Site, Foundations, Soils)
- Mechanical Engineering (Electrical, Plumping, Process, Heating, Ventilating, and Air Conditioning)
- Estimating

Construction
- Contracts
- Construction Supervision
- Field Offices

Administration
- Office Procedures
- Records
- Accounting
- Non-technical Personnel

Within this basic structure, there is maintained deliberately a wide degree of national and local flexibility. Personnel, including the partnership groups described above, are considered to be fluid so that by balancing experience and availability the strongest possible technical team can be applied to solution of every project. It is this operating principle which contributes greatly to the unity of the firm's production.

Design

From its early origin, S.O.M. has strongly emphasized design; and a Partner in each office is responsible for this important aspect of the firm's activity. Under his guidance, architectural designers (or project architects, as they are usually designated) are selected for each project, with responsibility starting with the first determination of requirements and extending completely through its development and construction, until completion and final use. These designers work frequently in groups of two, three or more, varying with the magnitude, complexity, and time schedule for any particular project. Integration of the work of the design team is achieved through common understanding and respect of its members for basic philosophic principles underlying architectural, structural, and mechanical concepts in modern architecture.

The design team has assigned to it engineering specialists, either from within S.O.M. or from consultants, to assist in solution of technical phases of projects. An intimate relationship is encouraged among the designer, the electrical engineer, the structural engineer, and other specialists in such fields as acoustics, landscaping, process engineering, plumbing or air conditioning.

The final building resulting from this approach reflects all these technical elements, coordinated and integrated in the overall concept by the architect. S.O.M. recognizes the increasingly vital role that the mechanical systems will play in modern buildings in the United States and undertakes research into new developments in this area as well as structures, materials, and construction techniques.

Figure 1. SKIDMORE, OWINGS AND MERRILL HIERARCHY IN THE 1950s.

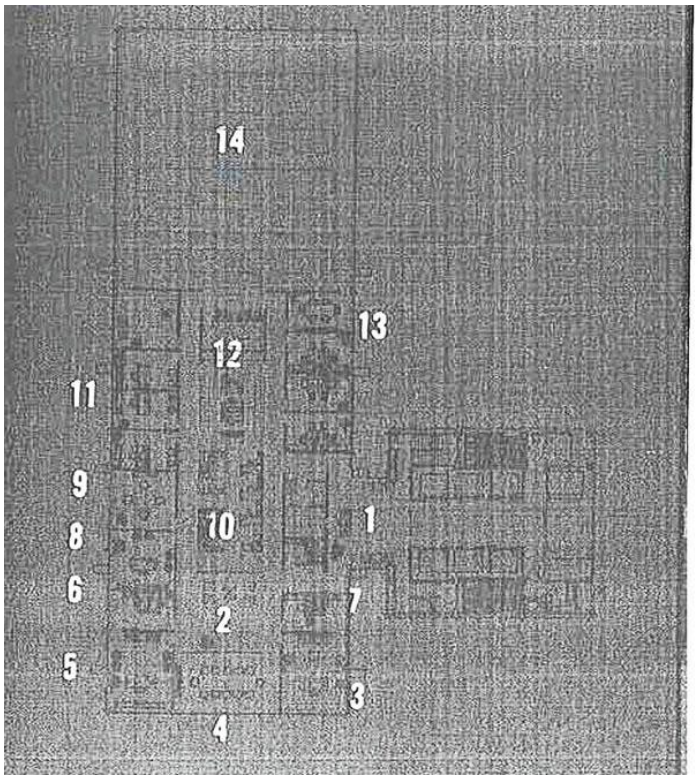
In the first phase of the firm's life, under Owings' managerial direction, upon gaining a project a core team would be formed:

> If we got a job, we would put somebody who knew how to handle the political side or the business side together with a designer and project manager and we'd have a mini-firm of three people. That mini-firm would carry a job from beginning to end.[133]

This small lineup was in charge of the conception and execution of the project from the beginning to end. One characteristic of these mini teams was that they were composed of young people- sometimes even just out of school- with limited experience in the building type. More senior personnel were to provide expert advice, when needed, to bring the design to technically competent results. While the project manager was held accountable for the job to the eyes of the client, it was the designer who ran the design part of the project from its inception and was present at all client meetings. Such a diagram of integrated responsibility explains the historical emphasis of SOM on design, marketed as a firm's asset, instead of being purely market driven entirely at the mercy of the client's demands. With schedule and staffing addressed to adequately meet the client's expectations, the design bar was to be firmly held under SOM control.

The firm's growth ascent intensified after World War II. A West Coast presence was established in San Francisco, in 1946, to consult with local architect Timothy Pflueger- designer of landmarks such as 450 Sutter St. and the Castro Theatre, in the construction of a hospital, and in Portland in 1951 by acquiring the practice of noted Pietro Belluschi, the architect of the Equitable Building of 1936. By 1956 SOM listed 13 partners and over 350 person- staff. By 1981 the number of partners rose to 33 and the staff grew to 2,100. Five more branches were opened: Washington D.C., Los Angeles, Houston, Denver, and Boston. In 2001 SOM employed a full-time staff of 800 in a total of 8 branches: Chicago, New York, San Francisco, Los Angeles, Washington D.C., Houston, London, and Hong Kong. As of 2023 there are eleven branches located in Chicago (headquarter), New York, San Francisco, Los Angeles, Washington D.C., Seattle, London, Hong Kong, Shanghai, Melbourne, and Dubai. (Fig. 2 and 3)

[133] "Interview: Nathaniel A. Owings, FAIA.", *Architecture California*, Vol. 5, No. 2, March-April, 1983, p.16.



Plan of SOM-Chicago's offices, below left, shows how entire floor was released for use by concentrating elevators, toilets, stairs, etc. in a separate structure. Space handling is typical of SOM's precision, attuned to its own working needs: Division of office space into three long sections, with office-length aisles created by plaster partitions on one side, alignment of desks and files on the other, both jibing with the building's 62" module. Private offices are in outer sections, more public areas in the center. Large drafting room at one end shifts the axis 90°. Key: 1 Reception; 2 Executive lobby; 3 Office for partner in charge; 4 Conference room; 5 Partner's office; 6, 7 Private secretaries; 8 Partner's office; 9 Conference room; 10 Secretarial area; 11 Offices; 12 Main filing area. Publicity; 13 Offices; 14 Drafting room (photo, page 102). Reception area (opposite page) is a symmetrical space, the furniture placed to emphasize its symmetry. Rear wall and receptionist's desk top are both solid butternut. (Nameplate, incidentally, is not on wall but on glass partition). Photo at left, looking into a partner's office from drafting room, illustrates well a characteristic of the SOM style: painterly composition of planes and spaces. Below: Secretarial area. (Suppliers and contractors are listed on page 171.)

Figure 2. SOM OFFICE LAYOUT IN INLAND STEEL BUILDING in CHICAGO in 1950s



Figure 3. VIEW OF OPEN OFFICE PLAN IN INLAND STEEL BUILDING in CHICAGO in 1950s. Photo by Ezra Stoller

In its 87 years of existence, SOM has generated landmarks that are permanent fixtures in architectural history books. Among them: Lever House in New York City, Inland Steel Building, John Hancock Tower (Fig. 4) and Sears Tower all three in Chicago,

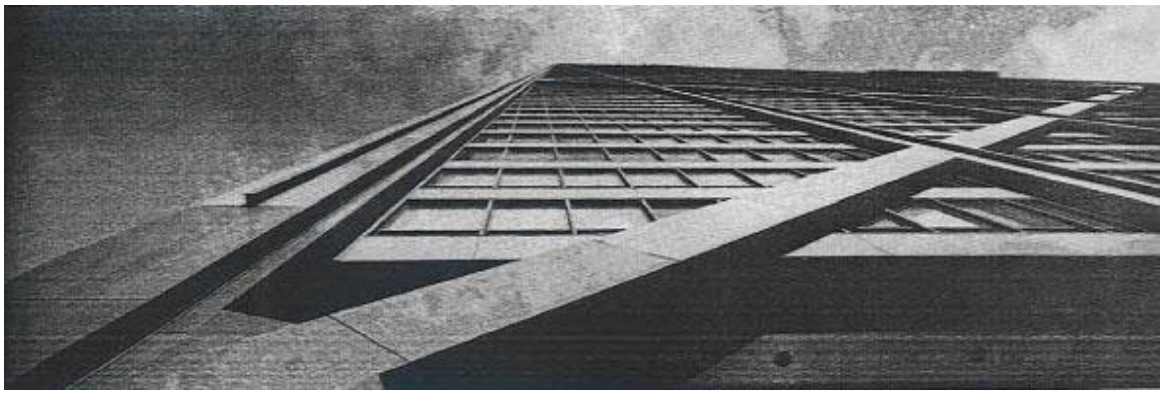


Figure 4. JOHN HANCOCK CENTER, CHICAGO. Photo by Andreas Feininger

the MacMath Solar Telescope in Kitty Peak National Observatory in Tucson, Arizona, the United States Air Force Academy in Colorado Springs, Colorado, and the Rare Books and Manuscript Library at Yale University. In this long trajectory the portion of the portfolio of broad-based acclaim, scholarly and otherwise, was produced mainly in the post-war period. Although the firm enjoys global esteem, its built outcome has been met with uneven responses in architectural criticism and history. All things notwithstanding, the combination of being a financially successful practice with the production of highly regarded designs made of SOM a professional phenomenon, closely followed in the media when dealing with the marriage of architecture and corporate America. Curiously, SOM was never a corporation, but a partnership, a business choice that gives insight into the monolithic culture of this organization and its ability to regenerate itself well over its sixth generation of partners.

From earlier days, the notion of the collective was deeply ingrained at the partnership level. However, the conviction of the leading role of the architect in managing group contributions remained firm. In a rare essay, William E. Hartman, SOM managing partner of the Chicago office, wrote:

> It is evident in our work that coordination and integration of all phases of architecture and engineering are best performed by a professional organization or groups of organizations working under the direction of the architect.[134]

The unwritten bylaws of SOM were drafted in the early days of the firm's history and were never in essence fundamentally questioned. The road to partnership is paved internally by breeding young to entry-level employees to the highest ranks, through progressive steps of promotion, financial raise, and power influence. Partners are never brought in from another firm but are usually raised professionally right out of graduate school. In this scripted itinerary, the partners have fully internalized the value system of the company and secure the transmission of that culture to younger staff on its way to partnership following generational changes. The mandatory retirement age is set currently at 65, a milestone repositioning partners to a consulting role, at times still at the

[134] Hartman, William E. "Big Buildings from Big Offices." *The Voice of America. Forum Lectures, Architecture Series 7*, Washington D.C., 1961, p.3.

helm of the firm but without the day-to-day managerial duties. On the topic of partnership, Owings emphatically stated:

> Our firm has created an environment in which these partners have grown. We didn't know any of these people, they were just youngsters when they came with us. None of the partners in our firm were famous when they came to us, not one. And many, many of them have turned out to be. But the anonymity is far greater than you might think.[135]

From the start the work produced was interdisciplinary in nature and located in the United States, Europe, and Southeast Asia. The expansion to the Middle Eastern market was the result of the 1973 recession, due to the oil embargo that brought the domestic construction industry virtually to a halt in the mid-seventies. Rather than part of a well-thought-out strategy, the overture to the Chinese market was the result of fortuitous circumstances and personal contacts of the individual partners.[136] Throughout its history until today, SOM's professional services are marketed both as a complete package and as separate expert skills in the fields of architecture, interior design, urban design and planning, structural, mechanical, end electrical engineering, and graphic design. As an example of non-strictly architectural related commissions, SOM- Chicago provided the structural engineering services for the Guggenheim Museum in Bilbao, designed by Los-Angeles based architect Frank Gehry, and was hired to do investigative work on the collapse of the World Trade Center, after the 9/11 attack in New York. Despite these various offerings, the preference within the leadership of SOM is to be hired for complete design services, to retain control of the final outcome and improve coordination of information, therefore minimizing errors, omissions, mistakes and acts of negligence in the drawing sets and specifications.

Methodology

Before entering into the specifics of the method used for this case study, a few remarks are in order. The ongoing challenge of retrieving qualitative data on protocols of collaboration in situ is that architecture offices, like any other offices, are closed settings[137], that is they are commonly inaccessible to the general public. Unless the researcher has a membership role in the setting under investigation, his/her presence is eventually rejected as non-functional– if not an actual interference– to the day-to-day operations of the office. Design work is intensely dialogical and interpersonal. It unfolds through an extended period of time, where the object being designed takes its shape through endless negotiations between the parties involved in and out of the office. Architectural design escapes predictable procedures, no matter how declarative the specialized literature is on roles and responsibilities of each team member and stakeholder in the design process. In fact, it is conducted in a constant state of alert, shifting, and adjusting the design strategy to account for the ongoing intake of

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[135] "Interview: Nathaniel A. Owings, FAIA.", *Architecture California*, Vol. 5, No. 2, March-April, 1983, p.16.

[136] Craig Hartman, Consulting Design Partner. Personal Communication with author.

[137] Lofland, John, and Lofland, Lyn H. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis*. Stamford, CT. Cengage Learning; 4th edition, 2005, p.33.

progressively more precise information. To document this prolonged exposure to the declared and tacit processes taking place in the firm while a project was being designed, I made the choice to enter the workplace as an active participant through complete membership[138], experiencing upon myself the various stages of interviewing, introduction to the staff, daily production and in-house events, and my own professional exit. Qualitative methods provide the instruments to record, in a holistic fashion, the network of cooperation between all these agents central in working collaboratively. These layers of simultaneous activities hardly lend themselves to be examined through nominal, ordinal, or ratio variables (meaning numbers?). Quantitative research techniques assign a numerical value to a specific instance, ignoring the context that produces that particular action in the first place. A consequential inquiry on collaboration calls for an approach that considers the human setting, with its load of politics, and social interactions, where working together takes place in the real world.

Two distinct qualitative techniques have been carried out in the course of this research: nonparticipant observation[139] [140], in the first phase, and ethnography in the second. In the first stage, lasting three months, I spent time in the office to get attuned to what could be relevant to my topic and to look for discrete events. One of the design partners in the firm, with whom I had developed a personal relationship on previous occasions, granted me access to the field. A former colleague from college, working full time in that organization, acted as a key informant. She told me that the project she was working on seemed to be ideal for my research interests. The follow up was to ask that design partner I knew permission to come to the office once a week, to observe the project and ask questions about the project and the team dynamic to those involved in it. To obtain an answer to my particular request alone took almost a month. Once in the field, the ethnographic approach itself turned out to be fairly problematic, as it is virtually impossible to be in that environment without having a membership role, in this specific case working there as part of the in-house staff. Since I had no membership role, and the architects working there were too busy trying to meet the weekly deadlines to share their time and attention with me, I was unable to gather meaningful data. To justify my presence there I asked my key informant to have a couple of informational interviews, but as soon as I decided that my design partner contact informed me about the denial of the client to give permission to observe the project. At that point, I was able to get into the field a few more times, reaching a total of seven (a couple of hours each time) in a span of four months. I got some data about the physical and social context of the office, but none about the actual working collaboratively on a project. I then turned to full participant observation.

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[138] Adler, Patricia and Adler, Peter. *Membership Roles in Field Research*. Thousand Oaks, CA: Sage Publications, Inc., 1987, p.67.

[139] Adler, Patricia and Adler, Peter. *Ibid.*, p.36.

[140] Gold, Raymond L. "Roles in Sociological Field Observations." *Social Forces*, Vol. 36, No. 3 (March, 1958), pp. 221.

Early attempts on my side to observe a project in that environment as an outsider failed, because I was interfering with the production process of the firm. In light of that experience, my plan was to reenter the field by following the steps a new employee would go through in the hiring process before being assigned to a supervisor. As my research focus was on understanding how people work together in collaborative teams, I figured that the only way I could retrieve the data I needed for my study was to be part of that organization and work with a design team on a project. To do this, I had to disappear as a foreign element and become a component of this environment. Since my hiring day I had been working 20 hours a week as part of a team assigned to a project on fast track, but still in the schematic phase of design. This part-time position allowed me to have a closer look at the group dynamic while collaborating, with particular attention on the language team members were using to communicate amongst themselves. Yet a lot was happening when I was not there during office hours. Whenever possible I tried to spend more time there, particularly in the late afternoon, when the bonding between co-workers took place most often. Part of my job duties was to write the job memos of the weekly meetings between architects, clients, and consultants. This granted me access to these sessions that are typically off-limits even to people inside the office. I also sat in numerous in-house meetings relevant to the project I was assigned to. I have used field notes, structured and unstructured interviews, and observations of formal meetings at various levels of the organizational ladder of the office and informal (one-to-one) exchange of data. I kept a logbook with sketchy notes to rebuild the narrative outside the office. Every time I detected a pattern, I tried to map it to when and where it reappeared.

However, even this further engagement proved to be insufficient to fill the gaps between a full cycle of work week and my 20 hours. I therefore became fully employed, technically 40 hours a week, but more routinely 50 to 60 hours a week like everybody else. My full-time employment lasted two years and three months, when I was laid off during one of the market contractions that the firm experienced. My full-time employment as a junior architect from January 2001 to May 2003 gave me complete exposure to the processes of integration and rejection that each employee undergoes while being absorbed in the firm. Becoming invisible from the setting the researcher is studying through full engagement in the same working and social life of the community members was essential to experience the office dynamic in the midst of project cycles, calendar of internal events, personal affairs, and implementation of office policy. This is a typical routine in the entropic semi-structured working environment. To textualize this experience is hardly possible. Yet, it is my contention that I gained significantly more awareness than in my earlier attempts about the realistic prospects of collaboration as defined in Chapter 1 of this dissertation in environments that require division of labor coming from work experience and internal office politics. Much communication is actually non-verbal with numerous cues apparent once I enmeshed myself fully in the workforce locked in the limits of my position of my job description. On a day to day basis, I became aware of patterns of behavior, verbal and non-verbal cues, what happens when the staff works under intense pressure for a deadline, what it takes to prepare a presentation for clients, and the chain of command in dealing with production of contractual drawings as well as the administrative efforts needed for offices to operate.

The Setting

In *The Condition of Postmodernity*, David Harvey wrote: "Power relations are always implicated in spatial and temporal practices."[141] In all the case studies of this dissertation, the physical premise where the workforce is located and co-located in their respective teams is closely examined. That material setting is central to get an on- the-ground grasp of the centrality of the human interactions, verbal and otherwise, for the execution of work beyond declared protocols.

At the time of my ethnography, the San Francisco office of SOM employed 145 design and engineering professionals providing a full range of programming, planning, architectural, interior design, structural engineering, graphic design and signage services, each area of professional expertise organized and located in separate departments within the open plan. The number of employees, however, kept fluctuating depending on the staffing needs and on the economic climate affecting the building sector. SOM is an architectural/engineering (A/E) firm that has broadened its design opportunities by assembling a task force of highly assorted and integrated expertise. The diversified firm's portfolio encompasses large and small-scale projects including office buildings, mixed-use complexes, corporate headquarters, bank and financial services facilities, commercial and retail space, government and court facilities, museum commissions, and residential developments.

When I conducted my ethnography, the office occupied the 24th and 25th floors of a high-rise building of SOM design and located in the San Francisco Financial District. The current location of the branch has relocated since to the Alcoa Building, another SOM landmark of its Mid-Century period. The premise I conducted my investigation in was entirely wired with workstations at every single desk except for a few older employees, whose extensive work experience was a precious asset to the firm, in spite of their lack of computer literacy. These seasoned professionals were working at their drafting tables using pencils and other analog tools. Five full-time employees formed an IT department, in charge of securing the proper functioning of the digital infrastructure.

Computers were used extensively for production, scheduling, and general project management. There was no shop for in-house model making and only cardboard mock-ups- many of the simple white cardboard models- were produced on a few cleared tables. Each employee was given an e-mail address and extension number with office directories available for both. The average age of the workforce was late thirties representing diverse ethnic backgrounds, primarily Asian and Caucasian. The general level of education was undergraduate, although numerous people had a master's degree from Ivy League universities, the Harvard Graduate School of Design being well represented among the highest ranks in the office leadership.

At the top of the organizational ladder was a board of senior partners, age average late forties/early fifties, all males and mainly Caucasian, who had been with the firm for

[141] Harvey, David. *The Condition of Postmodernity*. New York: Wiley-Blackwell, 1992, p. 225;

at least two decades. Right below them, there was a cluster of associate partners who shared many of the responsibilities of their senior colleagues, having neither full decisional power nor the same pay as the partners. Next in the hierarchy were several associates, with internal differences in responsibilities, managing, occasionally in pairs, the day-to-day work production of seven design teams present in the firm. Each team also comprised a senior technical, in charge of project management and scheduling, and a group of young designers, ranging in number from 3 to 8 at most. Architectural interns were typically integrated in one of the teams and assigned exclusively to the documentation of the design ideas coming from the associate principal and the associates, with the approval of the design partner. The newcomers routinely went to either the associate architect or the senior technical for any question they had. Rarely interns, if ever, were invited to interact directly with the client; however, they did have access to the senior partners. Support personnel such as human resources, executive assistants, the IT group, and those in charge of taking care of office supplies, mail services and more, completed the social composition of the firm. An open plan established visual and acoustical connectivity among team members. The open plan was a panopticon where I was exposed to the exchanges of others while others could see all the actions I was taking. It was a form of visual control of management as well as of internalized regulation as my exposure to the others' gaze had an impact on my chances to keep my job. SOM is like that. Everybody noticed when you were coming in and when you were leaving. This collective surveillance was palpable and permanent. The team would notice who left at 5:30 sharp versus those who would put extra hours to the project.

Computers, employees were evenly spaced along narrow long desks Drawings, books, models were stacked next to the workstations. All around me were models, photos, and drawings. Between these long rows of desks (about 25 linear feet in length) there was a rack for fluorescent lights, whose top was covered with small white cardboard neatly arranged. From where I was, I could see a perspective of four rows with these tiny mock-ups of high-rise buildings. (Fig.5).

The Structure of a Typical Workday

> Instead, the architects work with models, casual sketches and, especially at S.O.M., lots of talk. After "millions of meetings," as Bunshaft says, the design evolves into its final stages and the technical staff takes over to produce the huge number of blueprints and detail drawings necessary for construction to begin.[142]

In the implementation phase of a design a great deal of questions requiring an answer are quantitative in nature. Edge of slab, top of concrete, center of mullion and the like, were a few examples of the items that need to be dealt with on an ongoing basis during the workday, in an effort to document whatever design vision SOM lead architects had sold to client. The massive effort the team exerted was the constant coordination of information sitting in drawings issued by different consultants about the same project. As members of the workforce came and went in each firm, due to weekly cycles of hiring

[142] Jacobs, David. "The Establishment's Architect-Plus." *The New York Times,* July 23, 1972, pp.18.

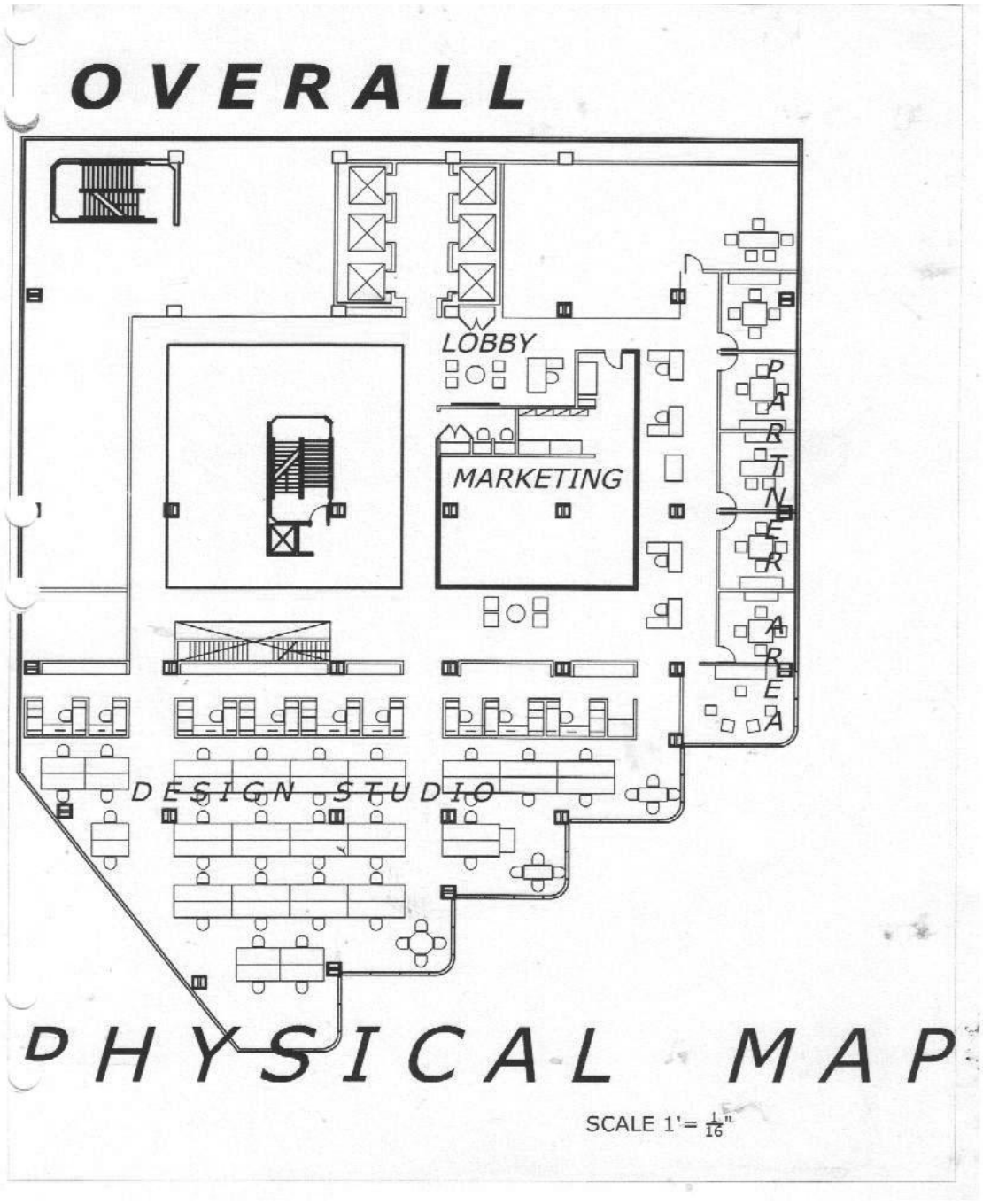


Figure 5. OFFICE PLAN OF THE 25TH FLOOR IN THE SAN FRANCISCO BRANCH

and layoffs, the level of complexity and associated risks of this task increased significantly. Often these gaps of knowledge on a specific project escaped even the established capabilities of the more senior staff. The question of knowledge transfer consistently came up as a result. How to capture the knowledge stored in one individual so that it could become available to the firm when that person left the firm, voluntarily or not? That was, and still is, a vexing challenge architectural firms of almost any size have to face during their business existence.

What follows are four vignettes from my observations showcasing situations where information is exchanged, negotiated, decided, tossed, and the social and material context in which these happenings occur. Their number was determined once it was clear to me after the first few weeks that there were repeating patterns socially and professionally. As I understood it, since I was part of the setting, additional vignettes would have not added any meaningful insight in how the personnel of this office was collaborating based on its office culture. These four illustrations narrate me in the center of actions and situations where I recorded specific facts as well as picked silent influences on the day-to-day of the office life. These strips[143] are intended to capture "the way informants naturally talk and act when they are doing ordinary activities rather than activities imposed by the researcher."[144] Although I did have numerous one-to-one exchanges with individual members of the firms, asking questions about the office way of working and their perceptions on people and projects, those questions were tailored to the specific person as opposed to being pre-formatted prior to entering the field. (Fig. 6)

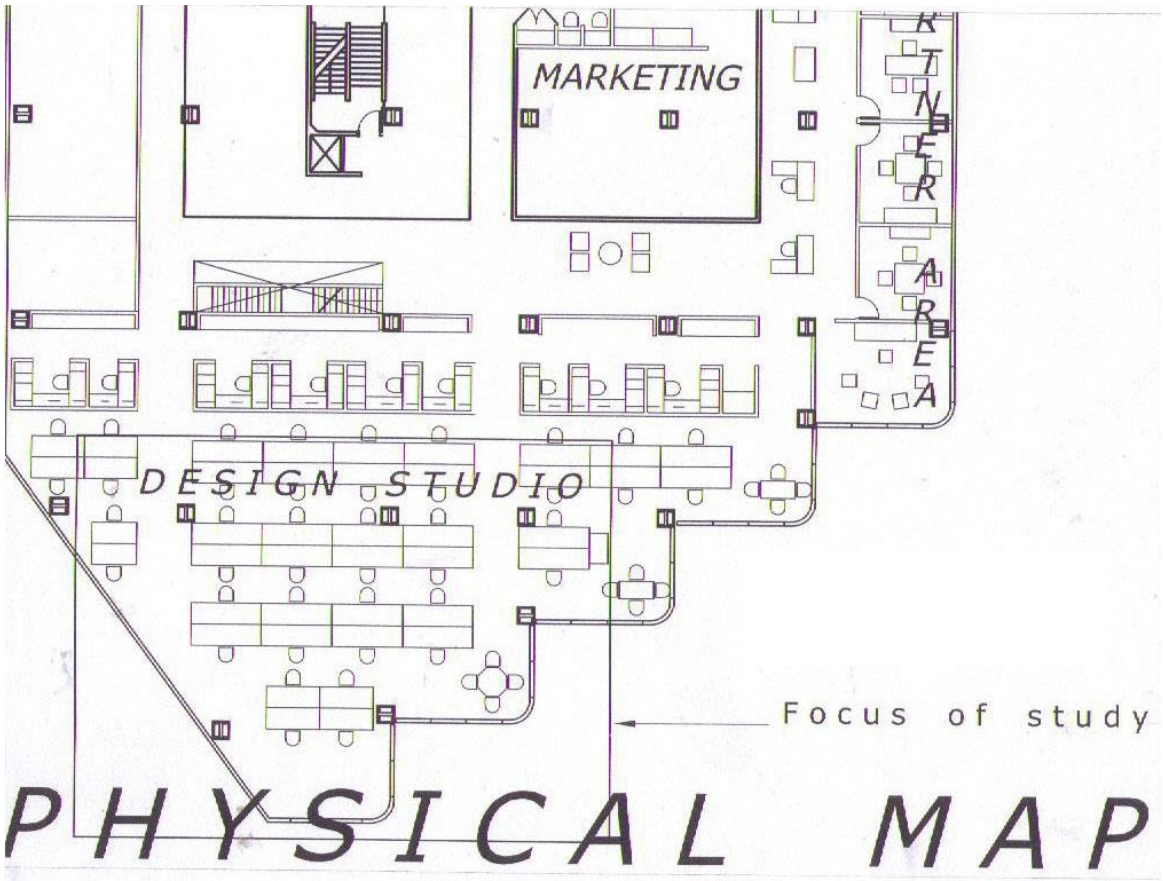


Figure 6. CLOSE-UP OF THE 25TH FLOOR PLAN

[143] Agar, Michael H. "Ethnographic Evidence", *Urban Life*, April 1983, Vol.12, Issue 1, p.33.
[144] Agar, Michael H. *Ibid.*, p.34.

They were written during my full-time employment and were representative of a pattern of social behavior and professional conduct I observed throughout my entire stay in the firm. Taken any other day throughout the course of my employment, these notes about specific situations would reappear with essentially the same structure. The intent behind the vignettes is to give a vivid rendition of the dynamic that would take place among team members in the context of the office hierarchy I was embedded in. The goal is to demonstrate the fluctuations that design knowledge underwent while the project was in formation. The staff was working together, but the collaboration was taking place among individuals with comparable levels of expertise in their area, but at the service of the power structure of the firm. Middle management would collaborate among its members but would give one-directional directives to the lower staff without asking for any real input. By the time I left the firm, no meaningful additional data for the purpose of my research topic had emerged for several months. Routines were securely formed and constantly enacted. Since the time of my research, I have been back to the office at least four times a year on average for different reasons for close to a decade after my employment. Until the firm relocated to a new space, none of the layout and routines described here had changed.

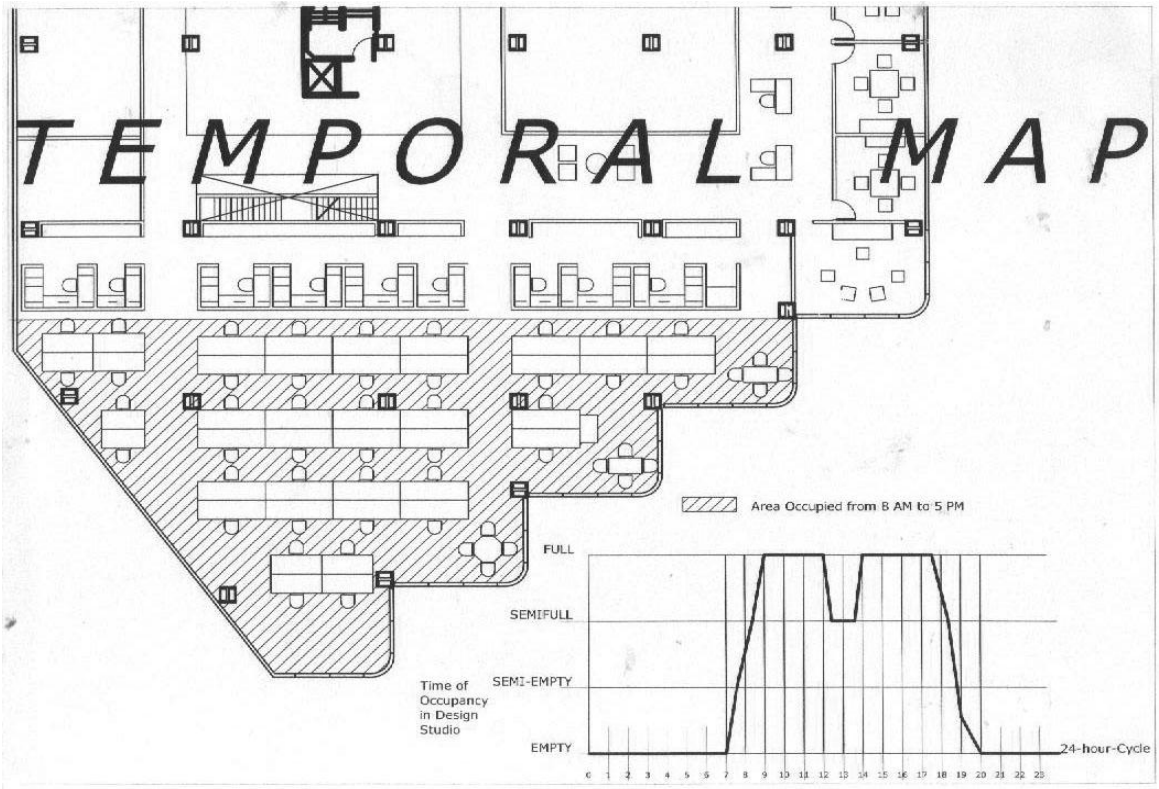


Figure 7. TIMES OF USE DIAGRAM OF THE 25TH FLOOR

Vignette #1

In the office the atmosphere is relatively quiet. (Fig. 7) I hear people, gathered in groups of two or three, speaking softly. From that position I have an overall view of the

entire section, where around 20 people are evenly distributed in the area. Each person faces a computer. Long and narrow counters stretch several feet across the space. Stacks of drawings, notes, books, pile up on this horizontal surface. I perceive all these counters as a continuum plane, with similar objects on each covering the whole design studio.

I realize that it is virtually impossible to have privacy. A few feet from where we are, at least four designers within a 5-foot radius can overhear our conversation and check me out. I see people getting up from their chairs and go to other people in the same space asking questions. This makes me think that, despite my effort to keep the sound of my conversations low, probably many more than I could imagine actually overheard what I have been saying. I start thinking how this set-up, this being exposed affects the work practice. Unless someone is a partner, everybody shares the same space, looks at someone else's screen, overhears phone calls, and essentially monitors the other, becoming objects of permanent observation during office hours. It is a kind of a massive collective surveillance of each other. It seems impossible to have a separate agenda.

I later learn that, although an established procedure is absent, it is fairly common to either call or directly walk over to someone who might have the answer to a problem that is slowing down the production process. Technically it would not be feasible to map out all the movements of every team member, since getting up to talk to someone in the office or call up is a routine practice, resulting in simultaneous hundreds of concurrent interactions per hour. Yet, through the exchange I just had with my informant, I know that a vertical organization is superimposed in that same space. There are partners, senior designers, junior designers, and other intermediate figures. How does communication occur within this set-up? Staying on schedule seems a primary concern and informing every member of the team is another important priority.

For each project a project manager, a senior designer and a senior technical architect are assigned. Since their focus in the office is primarily on one project, they are those who can give details of the specific facts relevant to the project's history.

During a conversation I have with a firmwide CAD coordinator and project manager in charge of the digital resources of the organization, I learn that the firm is going through a transition about its digital communication protocol. Lately some concerns have been raised pertaining to the accessibility of digital drawings and data files on the office Intranet on behalf of every single employee in the firm. "Communication has been messy," he says. They use FTP to transfer drawings and they have a protocol for that, but there are protection issues of its content and unauthorized circulation of data: "Technically everybody can get a hold of the password and make changes." Since the introduction of the Web in the work practice, new applications provide varying degrees of security and a more systematic and orderly approach to the chronological recording of conversations, meetings, and documents at different phases of each project. WHO? SAID, "We want to create a hierarchy of security through Project Net Manager" (an application the firm intends to implement in their working practice). The introduction of this networking application is "meant to be used also by all the outside consultants involved in the project", he continues. In the St. Regis Museum Tower, a hospitality

project now built in San Francisco, users would be able to download either AutoCAD or PLT files, which could not be edited on the website. Instead, now they do revision files and send them back to my informant who could post them back on the web. “It is pretty time consuming to record”, he maintains. The problem they are facing right now is that the firm wants to implement this application on a project that is already in an advanced state of design. He confesses that there is a growing concern among the employees and the employers about the time-related drawbacks of learning new software using the budget of the client. The time needed to acquire the necessary skills is hard to justify.

Vignette #2

While walking in the office with the project manager, I realize that the plan layout on the 25th floor is just like that on the 24th floor. Until then, but I never had the chance to visit it as if they were two separate worlds. That architectural barrier was a mental barrier. The open plan created unencumbered sightlines where everybody could see everybody else, while also creating a vertical blockage of sorts. The same set up, furniture and atmosphere make it indistinguishable from its twin floor at the upper level, with the exception of maybe deeper outside views toward the bay. (Fig. 8) The head designer is the first person I meet. He had been informed I was on my way, but we never had the opportunity to meet before now. He is in his late thirties, Caucasian, very energetic and cheerful. Dressed corporate with white shirt, tie, and dark pants, he speaks fast and to the point. In a matter of minutes, he makes me acquainted with the project. He presents the scheme as a residential and commercial development. At this moment, they have almost completed the schematic phase of design. I will be assigned to the office part of the project.

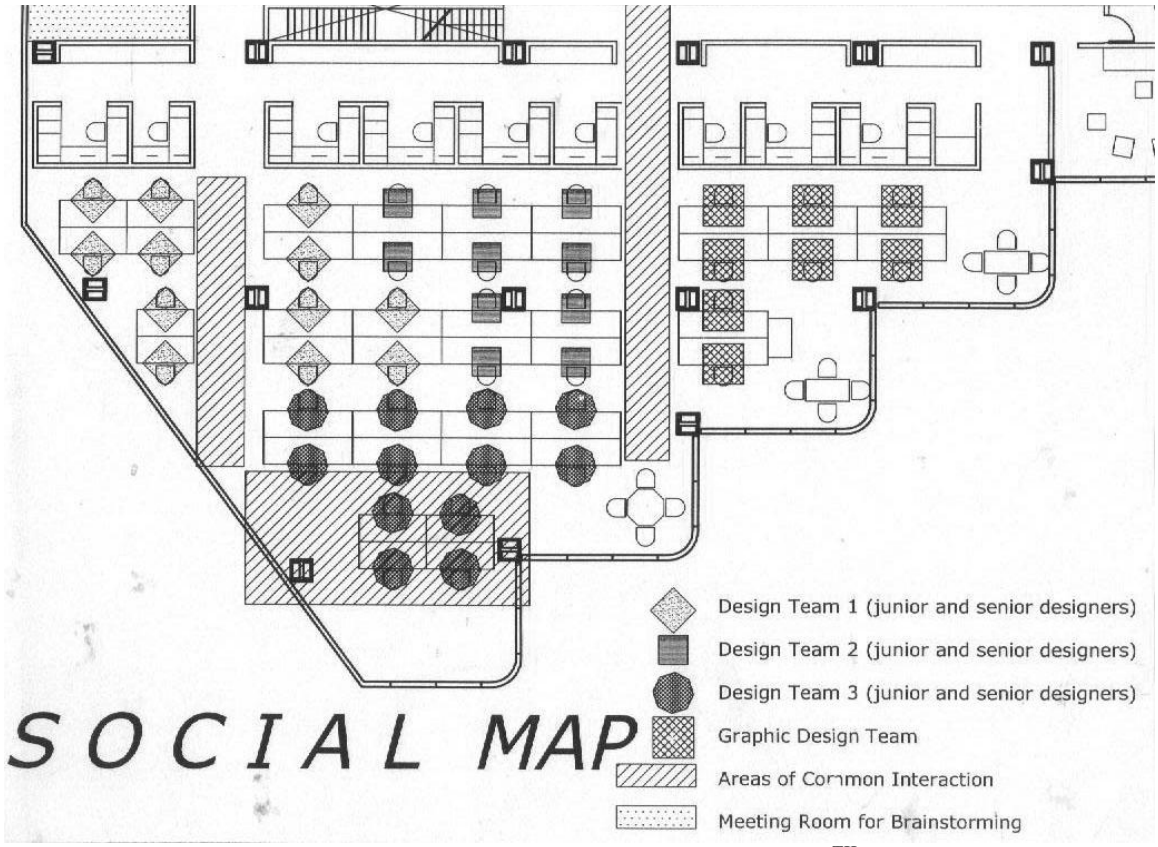


Figure 8. SEATING MAP AND FUNCTIONAL ANALYSIS OF THE 25TH FLOOR PLAN CLOSE-UP

The Associate Partner, to whom I report to about my job duties tells me that the team is about to have an in-house meeting in the white room, to troubleshoot the structural core of the high-rise portion of the office building I will be working on. He is going to grab a sandwich with other people from the office, in a fast-food located at the ground level of this building, and he invites me to join them. I felt that this is a great way to start bonding with officemates and I readily accept his invitation. In the elevator going down, there is a carefree atmosphere, with jokes and funny talk. I follow them to the food spot and place my order. In the meantime, I chat with a senior technical figure who is also part of this small group. Since everything is new to me, I make sure that someone precedes me in what to do next, so that I can follow this unconscious lead. Our food order is to go. We grab our sandwiches and go back up. Once we are in the office we go directly to the white room. The senior technical staff member pins up CAD plans and a section for an associate principal in charge of design and a different senior technical figure, in charge of office wide quality control, to start their session. This latter individual has a strong Southern accent, wears a bushy mustache, and acts very cheerful. He wears corporate attire as well: a white shirt, tie, and dark brown pants. I had seen him before upon doing a site visit on a project that this firm had done. He proved to be source of encyclopedic knowledge in technical matters and an indispensable source firmwide, well beyond the San Francisco branch. In front of the pinned-up drawings, the issue being discussed is the general functioning of the core, egress, elevator shafts, and positions of

the exit stairs. Both of them are standing in front of their drawings. They sketch on the plans to exchange ideas from the design and technical perspectives. References to previous technical solutions are made during the conversation. Functional considerations constantly come up during the session. The Project Manager comes in and adds his comments to the table. “This is a spec building” he says repeatedly to focus the terms of the concerns of both firm leaders. Questions about how many tenants will actually rent the space are raised, as they can provide further context for producing specific responses to the design problem.

As I just entered the field, I am not completely aware of the magnitude of the issues under discussion. I am struggling in taking notes to record what they are talking about at the same time. Taking notes takes my attention away from what is going on and I am afraid it will make them self-conscious. I decide to listen as much as I can and simply get more and more familiar with the matter at hand. It is already clear to me that the associate principal has limited knowledge about the structural/technical component of the core and is asking the senior technical architect for some insights before he decides to move the project forward. To me this reads already as a form of collaboration. Drawings are the basis for the discussion. The two of them almost never look at each other. Instead, they always keep their eyes on the drawing. At the end of the session the associate principal tells me that this project is under a very tight schedule. The owner wants to start breaking the ground at the end of May 2001, but the project is still in schematic design! Foundations will probably be cast in the upcoming fall. There is not much time.

Vignette #3

The imminent meeting is delayed, and people take time to engage in some light-hearted conversation. I offer my help to acquire a membership role, this being the primary problem I have had ever since I approached this field. The Associate Principal asks me to make some copies. I immediately stumbled into the office procedures on how to perform tasks and how to keep track of relevant expenses. To use the copy machine, I need a user number that I do not have and a project number that I do not know. I feel the anxiety of these minor expectations weighing on me. Tasks are given in great hurry, and I feel I cannot respond adequately to what is needed. Also, I was never given a complete orientation on the use of the machine. The fastest strategy is to simply ask someone that is walking by the room where the copy machine is to help me.

The most common attire among male employees is formal, that is, tie on shirt and suit. Other days, I have noticed that the same people come to the workplace with a more casual wardrobe, but the client’s upcoming visit seems to prompt some form of professional presentation as far as clothing. I renew my offer to help to another team member and he invites me to pin up the drawings in the white room. When I reach the room, I notice an informal meeting of faces I had never seen before and decide to hang out there. Several Caucasian men and an Asian man, ranging from late thirties to early fifties, gather around some of the drawings pinned up. The white room has three walls each covered with three rows of CAD drawings, and a fourth wall of glass for the fenestration. One large site model, 1:50 in engineering scale and made out of foam-core

and cardboard, is sitting on a stool. A large table is in the middle of the room surrounded by chairs and in one corner there is a cart full of sodas, water and coffee. I asked the same team member I helped if it was ok to sit at the meeting, but he kindly replies: “Actually, they don’t like to have too many people in there.” In view of this answer, I decide to walk back to the same table I was sitting at when I first came in and started writing notes. I am feeling invisible. Each person is sitting at a desk, while I am taking notes during this gray afternoon of early January. To get off the hook, I decide to go and visit people that I know in the office to make myself comfortable in that environment, but even those I share some school past with and are in different teams dismiss my attempts to socialize quite quickly, as there are other deadlines looming for them as well. Frustrated, I go back to the same desk that seems out of the way of everybody and start writing again. In the entire office on the 25th I am the only one who is not involved in any activity.

I decide to walk back to the white room to ask another architect if it is ok to stay in that room to sit for that meeting. He says that he was expecting me to do so: “Isn’t it what you here for?” His answer throws me off, as it appears to me that there is some miscommunication between the design team members about what I can and cannot do. The Project Manager, who is also in the room, tells the architect: “He can stay. He is different.” All of sudden I feel visible again, greeting this new situation with great relief. I help to arrange the chairs around the rectangular table and stay on one side waiting to see what happens. I have no idea about the identity of the participants in the meeting, but something tells me that owners, architects, and consultants will be on board. I just do not know who they are. More and more people get into the room and when the meeting officially starts, I count sixteen individuals, excluding me. When the main client comes into the room, the participants pay extra attention to find him a seat in a position where he could comfortably look at the drawings. He appears very self-confident both in carriage and tone of voice. Mid-to-late forties, Caucasian, athletic, six-foot-tall, he exudes a strong presence in the room. He dresses formally yet behaves casually. When he takes off his jacket, the outline of his body muscle proves that he works out regularly. He appears very image conscious, and this meeting seems to be a stage for him. Before he reaches his chairs, he moves around the room checking the material on the walls and greeting all those present there. Everybody is sitting around the table except me, sitting next to the window wall. The Project Manager opens the meeting by announcing the issues to be addressed for the day. Right after that, the Design Partner comes into the room, reaches for the tray to pour some coffee in a paper cup and keeps standing in the back of the room. He notices me in the room and smiles at me. All along he has been supportive of my research, ever since he gained access to the office for me. He is from the Midwest, just turned 51, Caucasian, with a substantial portfolio of built public projects. He is himself a public figure in the architectural world and his professional career has unfolded within the organizational boundaries of this firm. He behaves quite understated, but his eyes look focused. Now there are eighteen people in the room, in total.

I sit quietly in the back, outside of the circle of people sitting around the table. Occasionally, I am glanced at as if the person that is turning back to see me was wondering who I was. The Project Manager did not announce my presence in the room, although my role is overt, since I was told that he asked permission from the client to

pursue my investigation. Some of them nodded at me. One invited me to join them within the circle, but I declined. Out of these eighteen individuals, there were only two women, young in appearance and quiet at all times, and one Japanese man, the structural engineer. Everybody else was Caucasian, dressed very formally, carrying notebooks and folders filled with data. The scope of the meeting is to verify the status of the project at this stage. Later the Project Manager tells me that these meetings are held on a weekly basis, on Wednesday afternoons, and provide common directions for the development of the scheme.

The Project Manager acts as a mediator between the city, the clients, consultants, and the in-house workforce for various projects in the office. I have seen him several times already just in the first week of my part-time internship. Constantly running around the different design studios, he makes sure that projects meet clients' requests and stay on schedule. When he opens the meeting, he mentions that the issues at hand are partly related to the city requests for further information regarding material and design/technical issues. It is hard for me to follow exactly what is going on. Since I am unable to identify who the participants are at this stage, I have a hard time crediting the different inputs given to the design problem at hand. In the room there are two representatives of the general contractor, two mechanical engineers, a structural engineer consultant, four architects, the landscape architect, and at least six people representing the client/owner group.

The Associate Principal opens the session introducing the new changes implemented both in the residential and commercial portions. The presentation hinges on functionality, budget allocation, parking efficiency, circulation system, building envelope, structural and mechanical decisions involved in the proposed configuration. In this initial phase the client/group would ask for some clarifications concerning how the budget is allocated in the proposed scheme. A senior technical architect shows a novel solution for the curtain wall of the high-rise portion of the commercial building. The jagged outline of the building envelope is intended to create an architectural signal for the drivers cruising along the adjacent freeway and give the structure an urban identity in this suburban area of town. The proposal is accepted with interest by the client/owner group. However, renewed concerns are expressed regarding how this choice would impact the allocation of the budget on the project. The client/owner group shows no flexibility as far as the financial plan is concerned. Their intention is to make the space as sellable as possible for future tenants. Since the economy is not as promising as it was a few months earlier, the client/owner group is deeply concerned about keeping the financial threshold established at the very beginning of the project.

A major issue is the geological condition of the soil in the area where the project is supposed to be built. Massive layers of rock have a significant impact on the definition of the cross-section of both the residential and commercial portions. Because of the fact that budgeting is so restricted, the goal is to limit as much as possible the amount of sitework needed for this project, to meet parking requirements and city ordinances. The building has taken its almost final shape, yet its ultimate layout is far from being defined. Within this session, constant references to the environmentalists and the community at

large are made by the client/owner group. “What are we giving back to the community?” another architect on the team says, when troubleshooting on how to make this project palatable from the standpoint of the local constituents. The proposed scheme, also, is planned to be built partly in a protected natural area and the environmentalists have been extra-sensitive to significant alterations of the contour lines of the existing hills. To address the expectations of the community, the client plans to donate an auditorium for cultural and entertainment purposes, operating also outside office hours and with a separate entrance. To appease the concerns of the environmentalists, both the building cross-section and the landscaping of the open space will have minimum impact on the existing topography of the hills. Two layouts of the auditorium are presented: one is grander in nature, with double-height space and larger entry; the other maximizes the rentable area, at the expense of the architectural presence of the auditorium in the building. The Design Partner mediates between the Associate Principal and the client/owner group, as the highest-powered figure from SOM that the owner can have about the quality of the design ideas. They all choose the first option.

While addressing some of these issues, I see several people getting up and referencing the drawings as a way to further clarify issues under discussion. Many of the design issues on the table are fleshed out pointing at drawings, mounted on boards and pinned up to be seen and promoted collective understanding. All the participants are able to read architectural drawings. There is little reference to the site model, sitting next to them. I start thinking about some of the built-in limits of this way of investigating design, but also about why those drawings are needed to establish this multidisciplinary dialog. All these drawings are 2D diagrams. There are no three-dimensional representations on the wall of such a large-scale development. This way of flattening out architecture reads to me as a strategy to make it quantifiable for all of the parties involved in the project. The general contractor is gross estimating the structure in terms of square footage; the client/owner group coaches its interests in terms of rentable square footage; the structural engineer is concerned with the area that will build up the load, insisting on every single element of the bearing structure; the mechanical engineers needs to have the surface of floors and walls, to calculate the heat dispersion of every building component and design the appropriate HVAC system. The architects are the only ones that appear to be concerned with the sculptural presence of the project in the landscape. What seems to be happening is that the architects propose some design ideas that they will defend, unless it conflicts with financial constraints imposed by the client. Every design idea is analyzed by the client through the lens of the general contractor. The client asks the general contractor: “How much is this going to cost?”. The general contractor answers with some financial figures. In response, the client makes decisions on the spot that impact the architecture.

Toward the end of the meeting, around 5:30 PM, the eighteen people break up in small subgroups, talking about specific issues in the project. The in-house design team members start taking down the drawings, while the participants in the meeting walk out of the room. An Associate Principal, in charge of project management, introduces me to one of the client/owner group as a doctoral student from the local university doing research on collaboration in architecture. He is likely to be in his late thirties, stocky, at

least six feet tall, and very cheerful. I sense from him that he is curious about my impression about the meeting: “Did we scare you away?” he said smiling at me. I interpreted that as a sign of acceptance from him. He might be someone I should speak with at a later moment as he seems to be willing to spend time talking about it. He asks me where I am from. I tell him and add that I am familiar with his work, as I had done an article on a project they had developed. We shake hands as he leaves.

In the white room, who is left are the Associate Principal in charge of the design, the Associate Principal in charge of project management, and all the design team members of the commercial portion. The former recounts for them how the design was received and what needs to be done next. He compliments the team and gratifies their effort: “I think we have a pretty good building!” For each member there is a new task that needs to be taken care of, and at the same time, he reminds them that the project is on a fast track. His tone and demeanor are supportive and cordial. These are in-house meetings after the Wednesday sessions with the client, where the transfer of information occurs. From what I have seen so far, these two head figures are a critical piece in the collaborative process concerning the project. They both mediate between the battery of clients, consultants included, and the production levels of the office. Knowledge about the client perspective and new understanding of the technical make-up of the building are delivered through these gatherings, when content is still fresh in the design team leader’s mind. The design team members take notes and ask questions.

Vignette #4

When I get in, the architect I was assigned to respond to when I got hired and me walk down the aisle to reach the area where my design team is seated. The office is almost filled with employees. I stumble into the usual problem: where to sit. There are vague promises of possible workstations available the week after this, but there is really no commitment. Despite the discomfort of this situation my meandering in the office, looking for a place to do my work, provides me with the opportunity to get to know many more people than those in my design team. However, I feel that I am progressing in getting settled. I greet everybody in my group by name and I am greeted back. They do remember my name and make some jokes with me. One of my initial informants is surprised to see me there, as he remembered our agreement. And I immediately justify my presence by saying that I was there to help meet the deadline. He seems pleased with my decisions and welcomes me in the group. After having distributed greetings to my co-workers, I approach another architect assigned to help me to formulate the customary dilemma: “Where can I sit today?” His infinite patience in taking care of the logistics of my working conditions in the office is reassuring to me, considering some behavioral ambiguities I experienced from others. He expresses sympathy for my “nomadic” seating state and promptly takes care of finding a workstation I can use. One thing that I have noticed already is that there are some behavioral inconsistencies in several individuals as far as the daily attitude toward my presence there. One day we greet each other, when our paths cross; other days the same people, that were so friendly the day before, would not reciprocate my greetings. They would just go straight as if I were invisible. Luckily, others kept a consistent line of behavior with me. The architect I go to typically for help

is one of them and since this is my third week in the field, I have no reason to believe that he will change any time soon. Even in my design team there are some discrepancies, but at the same time there is definitely more availability to entertain a dialog with me.

The architect who checks on me comes back with good news. Someone is taking a long weekend to go skiing. I am going to be sitting at her desk. As I follow him, I noticed that some employees from the long rows of desks track my movements with their eyes' tail end. Once I reach the desk I am designated for the day, I introduce myself to the local "community" of designers. In the course of my visits, I noticed that each design studio is a socio-political entity within the office. Members of that studio develop their own lingo, social references, alliances that do not really trespass the boundaries established by the project they are working on. My understanding of how this firm works is that once a new commission is accepted, a design team is constituted and will be in charge of conception, production, and delivery of the project to the client. This group is composed of a design partner, a project manager, a senior technical consultant, a head designer, a design coordinator and a few designers and interns. Because this firm is involved in numerous projects, these design teams, forming a design studio headed by the design partner, take a life of their own and run parallel to other design studios. Once you are part of a design studio you have much more limited interactions with members of another team. Each team will then build a social identity and a subculture within the firm. My temporary presence to simply use the workstation feels like an infringement in a network of supports, jokes, and even invitation to some social events.

The architect who coaches me gives me instructions on what needs to be done. When he imparts me directions on what to do, that exchange turns into a small training session. Since the project is unclear to him as well in the details, he takes advantage of my questions to further develop the design. In this case, I have to refine and complete the cross section of the high rise I had started two weeks earlier. He leans down on my desk sketching on tracing paper some options on how to organize the joinery of the curtain wall and the structural system. He constantly refers to previous projects done by the same firm, drawing from a mental database of typical floor-wall conditions that can be easily adapted to the project we are working on. I start thinking that this strategy is cost-effective, as some of the reasoning has been done in another project with different time constraints and, simultaneously, I realize that this approach also builds a uniformity of architectural traits, readily detectable in other constructions designed by the same firm. When he is unsure in which direction to take the solution of that particular problem, he says that the Associate Principal in charge of design will make the decision. That statement confirms my hunch that collaboration occurs at the intermediate level of the organization. I am not sure if I can make this as a full-fledged hypothesis, however I get several clues that that is the case. I am left to work on my assignment.

I spend three hours drawing the section before taking my lunch break. During that time, I experienced the same dynamic I have seen in my team. Jokes and design as well as technical dialogs are frequently exchanged between the design team members. I am an outside spectator of all this local activity, but never involved or asked to be part of it. During this role of undesired guest, I am further exposed to the psychological unity of

this group. The verbal exchange is purely internal to the group and not even more long-term employees have easy access to it. In the background the operator makes regular announcements of either general or personal concern. The task I am attending to is rather mundane, which allows me to further refine my observations in the field. It is my belief that, by simply being there sooner or later, the ice will be broken, and I will be able to continue my investigation. I decide to take my lunch break.

On my way back, I continue working on my section. My understanding is that there are no meetings scheduled that day and all the interaction is in-house. To verify that my work is done correctly I walk to the desk of the architect who follows me for guidance. As soon as I do that, I realize that this is probably something that everybody does. Since the production of blueprints is a collective task, this is one of those informal, unofficial methods to make sure that your work is in line with what is being done by the rest of the team. Cross-referencing and cross-checking are two major aspects of architectural design. During my few days here, I have seen this constant fluctuation of people going from one desk to the next asking for something. Although everybody can be reached by phone, if employees are on the same floor, they tend to prefer face-to-face interaction over digital mediation, as many of the issues to be discussed occur in front of a drawing. I walk back to my desk with the architect to check on my performance. He then gives me further instructions and informs me about some decisions that the Associate Principal has made which impact the section I am drawing. All the CAD work relevant to the project I am involved in is on a server protected by a password. In the CAD file there is extensive use of the X-referencing tool. To streamline the production process and keep geometric correspondence between the different sheets, we all tap into the same sources for the production of new drawings. There are several servers that store all this digital information accessible to those who know the relevant log-in name and password. I am then told that this is how the entire office is structured, and why there is an IT department. However, from what I have seen so far, the design interaction in-house and with the consultants takes no advantage of the web for information exchange. E-mail is the primary vehicle for formal communication within each team. The senior technical would put together a mailing list of all those involved in the specific project and then send updates about deadlines, naming conventions of files, project schedule, and much more. All these messages are text-based and there is no trace of image files. They are either text or excel files.

Few minutes after my architect guide has gone back to his desk, a young Asian designer goes along the aisle distributing chocolate bars. I see her exchanging a few words with every person she gives sweets to. I am engrossed in my monitor when she reaches me. When she offers me the chocolate, I thank her and ask what the occasion we are celebrating is. She replies smiling: “It is Martin Luther King Day! You are American now, and you should remember these things.” I never thought of myself as an American, not because I am indifferent to that, but because of the nature of my current visa, my participation in public and political life is put on hold by the INS. This little gesture of hers brought me back to the office community and granted me one step further toward acceptance. At least that is what I believe. The day passes by uneventfully: the usual announcements, the customary getting up and down of designers to get to someone else’s

desk, and the familiar exchange of jokes pace the rest of the day. I am losing myself in the section I am drawing. As an intern, I do not have much information about the site. I mean, I know where it is, who is commissioning and who this is for, however I have never been to the actual site, and I could easily do these tasks without ever getting into the physical experience of construction. I cannot help asking what kind of awareness about architecture this mode of working produces in me as well as in all of those who have the same job responsibilities. It is quite difficult for me to distance myself between the role of architect and that of researcher, but I guess that that is exactly the challenge of this experience.

Conclusions

These four vignettes cast light into the day-to-day life of this large-scale practice from the perspective of a junior architect. Their content gives an overview of the social composition of the staff in general and the design studio I was assigned to in particular, their co-location in relation to the office layout, and the nature of the decision-making progress as it was happening along the lines of the office hierarchy. These vignettes provide two levels of information. On one side, they offer a window into office life structured along a pecking order that is part of overall corporate culture in the industry and of this office in particular. On the other they give examples of the innumerable big and small situations where decisions are made that constantly keep the team in a marching order established through deadlines and deliverables tied to specific projects.

If Eero Saarinen & Associates represents a model of practice where the head of the firm makes the key design decisions, SOM falls under *Experience-Based Firm*, because it features a form of collective authorship. While both firms engage in projects similar in scope and visibility, the latter relies on a staple of in-house signature designers- never singled out without the name of the firm next to their proper names- to retain its cultural capital in the elitist environment of the corporate and cultural institutions, as well as in the world of developers. Throughout its history this firm has typically assigned roles and responsibilities per its own internal flowchart (Fig. 9)

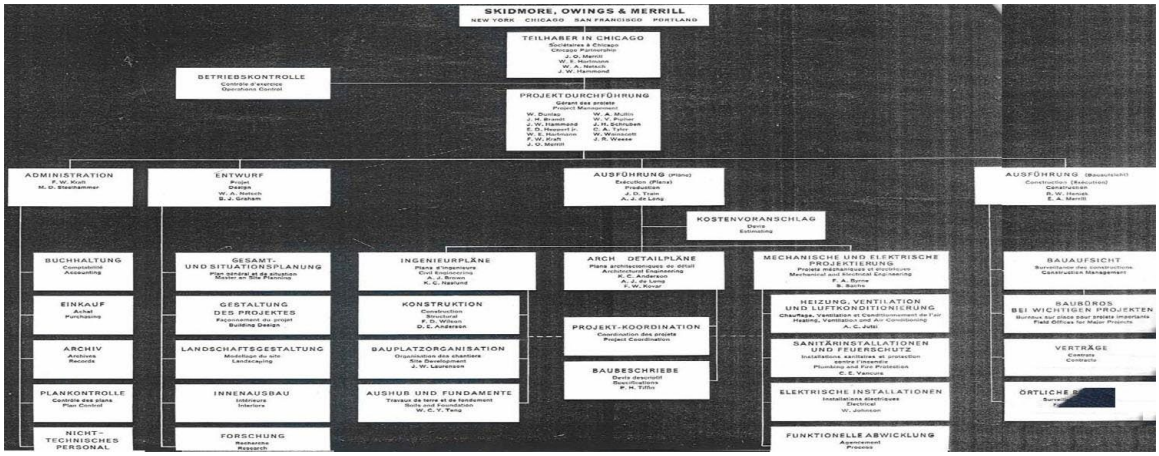


Figure 9. ORGANIZATIONAL CHART OF SOM IN THE 1950s.

The strong focus on design remains in spite of the strict business practices that make it a profitable company, able to survive times of severe recessions and ride waves of accelerated growth. Design Partners and Design Associate Partners hold veto power to release drawing sets considered substandard to their reputation. This power is exercised discretionally at any time in a top-down fashion during Schematic Design, Design Development, and Construction Documents, even when very close to the deadline project managers have negotiated with their clients. This modus operandi keeps the internal team in a constant state of charrette, with long workdays and often working weekends and holidays. This schedule is considered as a given, once the newcomer has been socialized and indoctrinated in the office culture. In a personal communication, current Design Partner in the SOM San Francisco office stated that the lack of release of design authority to individuals is what prevents a more horizontal collaboration in the firm. It is through collective authorship that SOM holds on to its ambition to remain at the forefront of signature architecture.

SOM adopts an organizational model based on the oligarchy of designers, where through a strategic distribution of authorship, the cult of the designer's role is still maintained, but enlarged to an elite group. This is purposefully done to avoid the vulnerability of the firm's design signature from the professional or personal departure of that one individual from the organization. The firm constantly redistributes its own resources, by continuing the knowledge transfer across different generations of employees, by having the workforce internalize the office hierarchy, by reproducing its belief system, and by creating a mechanism of incentives that rewards those who reinforce and never challenge the culture already in place. It is a survival mechanism of remarkable efficacy. All members deemed unfit to abide by these values are purged, regardless of performance or credentials. Within the firm, there is a core group whose exclusive members have been in SOM at least for two decades, directing a much larger group of people with intermediate to junior skills that actually draws under the direction of senior staff.

There is constant cross-checking of junior employees with senior architects of what they are working on to enable the transfer of basic knowledge of architectural practice, whereas political orders are transferred within a very well-established pecking order. Design professionals at mid-level with adjacent expertise tend to collaborate horizontally as their expert knowledge is unchallenged, decreasing their chances to be laid off in times of financial difficulties due to market strictures. The interface of their knowledge with that of their colleagues occurs smoothly and does become a vehicle for an integrated design. Their lines of authority, however, run parallel and are unthreatening to each other in time of volatility of the marketplace in the building sector.

While emphasis on collaboration was recurring in the firm's founders' formal and informal statements, their individual recognition was formally declared. Louis Skidmore received the AIA Gold Medal in 1957, before Walter Gropius (1958), Ludwig Mies Van der Rohe (1960), and Eero Saarinen (1962). Nathaniel Owings was awarded the AIA Gold Medal in 1983. In his acceptance speech, Skidmore outlined the mission of the firm

from its founding as an extension of his own belief about the scope of architecture and the role of the architect:

> Because architecture, even in its narrowest limits, is the housing of all human activities, it immediately involves all the approaches to, and the extensions of these activities. The boundaries recede at once, and the architect discovers the need of knowing all that he can learn of human living, of its needs, its conducts, its ends…The architect must, therefore, constantly grow in stature, and his younger partners with him; and the collaboration must have a life beyond and greater than his own, that its services may be continuous to the community that it serves.[145]

SOM was the first recipient of the AIA Architectural Firm Award in 1962. SOM is also the only firm to receive the Architectural Firm Award twice. They received it again in 1996.[146] The reasoning about the firm's eligibility to receive the award a second time was that enough time had passed that there was a whole new generation of architects steering the firm.

The next chapter will focus on the San Francisco-based firm A+A Architects. If the firm at the onset would undoubtedly fall in the *Expertise-Based Firm*, in its later development it turned into a constellation of distributed power. In A+A proper names disappear for the benefit of the collective, and buildings carry no designer's signature per se, but are the result of a community effort at least in the way they are pitched to clients and to the specialized audience. This later evolution turned A+A practice into an *Efficiency-Based Firm.*

[145] Skidmore, Louis. AIA Gold Medal Acceptance Speech, May 16, 1957, Board minutes and Convention transcripts of the 1957 AIA National Convention, AIA National Archives, Washington, D.C., p.307.

[146] Jack, Michael. "SOM: A Model of Resilience", AIArchitect, February 1996, pp.1-2;

CHAPTER V. ANSHEN + ALLEN, SAN FRANCISCO: EFFICIENCY-BASED FIRM

Introduction

The previous case studies highlighted two prevailing modes of teamwork in architecture offices, where design is held as a mainstay of the firms' identity. ES&A had in its leader--Eero Saarinen--the bottleneck of all design decisions and the controlling force in the allocation of the necessary human resources, to generate consistent outcome per his highest personal standards. Conversely, collective authorship through studio structures under a design leader is one of the models that SOM has embraced ever since the firm's beginnings in Chicago in 1936 to present as a multinational Limited Liability Partnership. In this second setting, decisions are made according to a strict hierarchy of power, resulting from the position that each individual member has in the organizational ladder, and the influence that this person can exert on the client commissioning the current project. Following the scheme of this dissertation, this third practice represents the *Efficiency-Based Firm* category. This particular class purposefully puts significantly less emphasis on the design signature of individuals. Instead, it makes a case that design springs from a close client-architect relationship, therefore making a final design a collective outcome.

The third case study that follows Anshen + Allen Architects (A+A), a large organization that was founded and headquartered in San Francisco. It has specialized in the planning and design of health care facilities and academic buildings. This office represents a third alternative of architecture collective to the two just examined. In this setting, distributed authorship, the absence of crediting buildings of social prominence using proper names, and a formally stated commitment to community, both in terms of staff well-being, and clients' relationships were the core values the firm's leadership endorsed at the time of my study. Despite the high volume of work, the firm maintained a warm and family-oriented atmosphere, similar to that of ES&A in terms of human relationships, and in contrast with the subculture that was recorded in SOM.

In 2010, due to the duress of the global economic climate ensuing the collapse of the financial markets in 2008, A+A, a firm in existence for 70 years sold itself to Stantec, a giant engineering conglomerate headquartered in Edmonton, Canada. The primary reason for its capitulation was its inability to secure new commissions commensurate with their sizable workforce (over 160 people), and the internal fracture due to power struggle within the partnership, exacerbated by the conditions of the building sector at the time. By 2011, the name of A+A had disappeared from the professional scene and its professional memory was virtually erased in the marketplace. Prior to the ownership transition to Stantec, a third generation of principals was leading this organization. The expansion and distribution of power, through an increase in the number of principals, reflected the latest business goals the firm had undertaken with the implementation of its strategic plan drafted in 2003. As opposed to SOM, true to this day to its initial goal of dominating the market for office buildings and large-scale projects in the academic, research, infrastructural, and mixed-use development sector, A+A over the years morphed into an entirely different enterprise in the course of its professional presence.

From a small office, doing primarily residential architecture, it changed into a corporation with hundreds of employees, with an exclusive focus on health care and academic commissions. To understand its relation to the issues of collaboration today, an account of its transformation in the 70 years of existence of the firm is helpful.

Historical Picture

Although the birth of A+A dates back to 1940, it is only in the decade following World War II that this practice acquired momentum and met increasing recognition locally and nationally for its body of work. Robert S. Anshen (1910-1964) and William S. Allen (1912-1992), the firm's founders both born and raised on the East Coast-- the former from Boston, Massachusetts, the latter from Neptune Township, New Jersey-- were colleagues at the School of Architecture at the University of Pennsylvania, in the 1930s. Granted a traveling fellowship, they embarked on a worldwide trip together that took them to Germany, Italy, and Japan, among other places. During that trip they both realized that world politics were going to turn for the worse. While giving a talk to the staff in the early eighties, after his retirement, Steve Allen recalled the thoughts he harbored during that trip: "I had the absolute feeling that there was going to be a war and that I was going to be in it. Nobody in architecture schools had heard of these looming events or anything connected to social problems." [147] That realization prompted the young architects to focus their practice on solving problems believed to be priorities of the times they were living, affordable housing being one of their strongest pursuits.

They landed in San Francisco in the late thirties, apprenticing for two years in local architectural offices prior to opening shop in the city. Under the leadership of the two founders, the practice was generalist in scope, designing a wide range of building types. In that early stage, their stated goal was to give a contemporary answer to the design problems of the day, without the commitment to a predetermined formal language, whether historical or industrial. They rejected the dogmatic stance of the Modern Movement, in favor of reinterpreting the specificity of the site and generating an architecture unique to its place. This explains why the portfolio of projects was so diverse in scope and design expression. The expanding architectural repertoire of A+A was met with growing consensus among the clientele and hailed in the local and national tabloids for its originality and freshness. It was a time of wide-ranging exploration in a number of design directions: furniture, interiors, installations, prototypes, logos, master planning, residential, commercial, and institutional architecture were the outlets for the architects' imagination. The renown the practice acquired in the post-war era attracted young talent. These newcomers gained entrance to the office following the master-apprentice model typical of the architectural culture of the time, a prevalent way to secure intergenerational knowledge transfer in the profession. The alumni of the office from this period include notable architects. Among them Raymond Kappe (founder of the Southern California Institute of Architecture in Los Angeles), Germano Milono, Robert Marquis (founding partner of the firm Marquis & Stoller practice), Mark Mills (a Taliesin Fellow who

[147] Wm. Stephen Allen. In-house presentation of Steve Allen after his retirement in the San Francisco office of A+A video recorded on September 16, 1988, Anshen & Allen Collection, Environmental Design Archives, College of Environmental Design, University of California Berkeley.

worked later with Paolo Soleri), Donald Olsen (professor of architectural design at the College of Environmental Design at the University of California Berkeley and one of the architects of Bauer Wurster Hall), and Norman Foster, the celebrated British architect of many landmarks in our time and who worked in A+A in 1960.

Stephen (Steve) Allen himself drafted the genealogy of the first phase of the firm, from the early 1940s through 1970. This chart illustrates the progressive expansion of the firm, from its first job to the numerous and diverse commissions that followed. (Fig. 1)

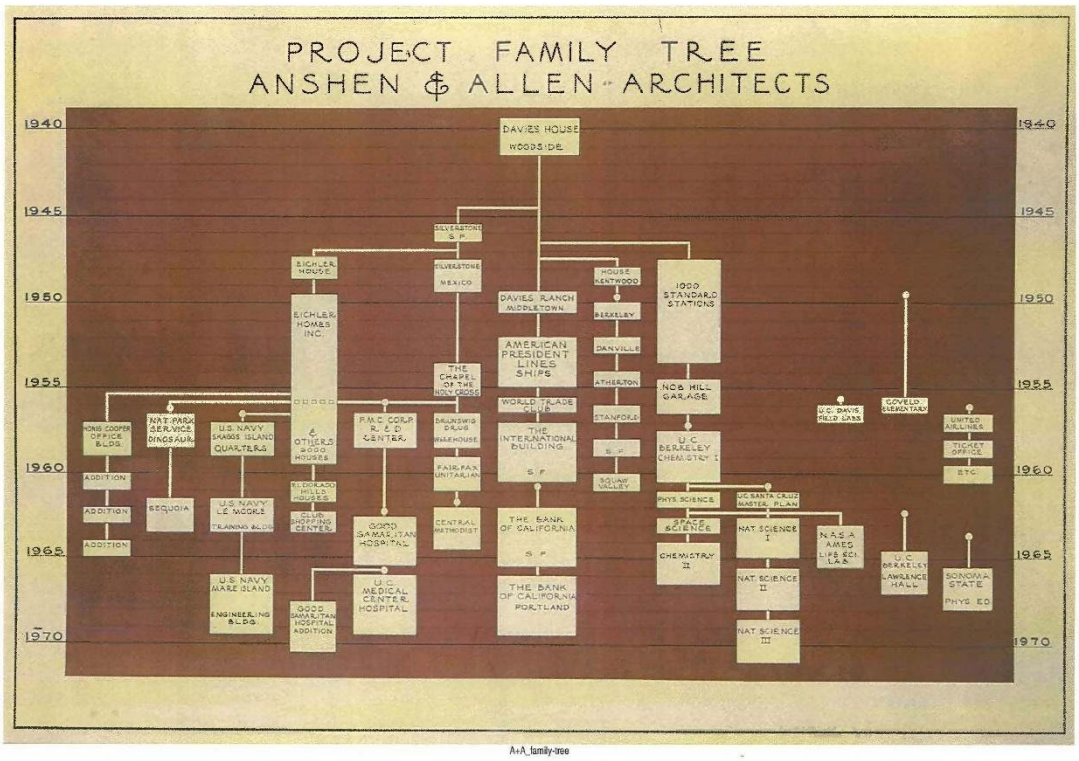


Figure 1. GENEALOGY OF PROJECTS IN A+A FROM 1940 TILL 1970. DRAWING BY STEVE ALLEN (UNDATED).

Despite the profound differences in character and public persona, this unlikely couple functioned as a highly efficient unit in the professional arena. Robert (Bob) Anshen's buoyancy and entrepreneurship--still very vivid in the memories of those who met him--coupled with the spontaneity of design talent of Steve Allen, a highly gifted draftsman and illustrator, turned out to be one of the most consequential associations in the professional scene in Mid-Century modern in the country. Anshen's entrepreneurship made him the rainmaker of the practice. Through his social and interpersonal skills, he secured a number of key residential commissions with prominent patrons leading to a steady stream of sizable institutional work that in a matter of less than a decade catapulted this duo from relative obscurity to the forefront of the national press. In this

first half of the life of the firm, fortuitous circumstances, and an unorthodox tactic, rather than a conscious plan, shaped the future trajectory of A+A.

Their first assignment was the Ralph K. Davies House in Woodside, CA, for the then Vice-President of the Standard Oil Company of California.[148] Built following the completion of Thomas Church's landscape design, this mansion took two years to construct. It embodied the tenets the young practitioners had embraced in reaction to the formative period in the Ivy League school, still imbued in the Beaux-Arts idiom. The end result was a mixture of modernity and regionalism, with scale variations, low-pitched roofs, adoption of native materials, and a deliberate lack of references to the machine-like design language emblematic of modern architecture coming from Europe. A strong Wrightian pitch gave an incipit to the design, without making the final outcome derivative of the American master. The completion of the Davies house dated November 30, 1941. A week later the Japanese bombing of Pearl Harbor precipitated the entrance of the United States in World War II. Its media splash went under the radar, as the focus of the general public on war affairs had taken over. Toward the end of the conflict, media coverage ensued. It was lavishly published in *New Pencil Points,*[149] a periodical later renamed *Progressive Architecture*, and several other local and national magazines.[150]

As the war ended, the founders resumed their private practice and established their office at 461 Bush Street in San Francisco. Their association with Ralph K. Davies proved to be the primary source of several commissions for the American President Lines and the Standard Oil Company. Dozens of gas stations, the logo of Chevron, interior naval architecture, and other miscellaneous assignments, supplied the young firm with frequent opportunities for projects with significant public exposure. Those early achievements became the most effective marketing tool to gain the attention of powerful clients in San Francisco society. A building designed in the early fifties for the University of California Davis was the first commission the firm won in the academic arena of the building sector. [151]However, it will take at least another decade for A+A to establish a strong foothold in that market niche. It was the beginning of the firm's specialization in the two building types, health care and academic, that will become with a few exceptions their primary kind of commission.

The design of a gas station and parking garage, still standing on 100 California Street in Nob Hill, San Francisco and located right across the Pacific Union Club, was the catalyst for new projects. Given its urban prominence, the architect recessed the gas station underneath the most public edge of the parking structure and reestablished the pedestrian continuity of the neighborhood so as to mitigate the utilitarian nature of the

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[148] Wm. Stephen Allen. "Ralph K. Davies As I Knew Him.", unpublished manuscript, Anshen & Allen Collection, Environmental Design Archives, College of Environmental Design, University of California Berkeley, pp. 1-9, and Insert X.

[149] "Comfort Produced by Coordinated Planned Equipment", *New Pencil Points*, October 1943, pp.52-61.

[150] Joseph A. Barry. "The Graceful Growth of a Good House", *House Beautiful,* 97, June 1955, 86–91, 181.

[151] Derek Parker. Interview with Ph.D. Candidate, November 30, 2003.

project's function. This sensitive design choice caught the attention of Don McLaughlin, chairman of the Homestake Mining Company and chairman of the UC Regents, a regular of the Pacific Union Club. That project indirectly led to the later award of the College of Chemistry I at UC Berkeley, the first academic project of prominence carrying the A+A signature. It was completed in 1963 and from there on similar projects followed.[152]

The remodeling of an apartment in San Francisco landed a new project for the same client in Taxco, Mexico. Completed in 1949 for Mrs. Sonya Silverstone, this residential design opened the doors for the first national recognition of the emerging firm. Indoor and outdoor areas coalesced into one seamless space, with changing levels, sleeping porches, and a procession of concrete beams that gave a unique flavor to an undeniably modern design. Building on the metaphor of an archeological ruin in a tropical garden, this project left a profound impression in architectural circles and launched A+A to the next level of celebrity. Using native techniques, fifty local craftsmen worked for three years on its execution. Influences of Southern California designer Cliff May, and overtones of the late work of Frank Lloyd Wright made this design familiar, yet hardly derivative. The plan layout is a sequence of sheltered porches on two levels, completely immersed into the lush surrounding landscape.

The wide press coverage the Silverstone House[153] [154]received gave the firm access to new commissions, the most notable being the Chapel of the Holy Cross in Sedona, Arizona, finished in 1956. The client, Marguerite Staude, wanted to make a gift to the Church in memory of her parents, the founders of the Los Angeles-based Brunswig Drug Company. The extraordinary natural setting was profoundly inspirational and generative of an unprecedented design for the time: a concrete shell, 12" thick, integrally colored, and sandblasted, halfway between a folded hardscape and an elemental volume. In 2007, the Arizona Chapter of the AIA selected the chapel, together with Taliesin West of Frank Lloyd Wright and a few other landmarks, as one of the most important pieces of architecture built in the state in the last 150 years.

While custom projects were routine in the office, A+A invested a great deal of effort in raising the design quality of merchant builder homes. With the renewed interest in Mid-Century modern in the last three decades, Eichler Homes are a claim to fame of A+A, who designed countless model homes for developer Joseph Eichler from 1950 to1962 and propelled the firm into the popular limelight. Eichler had lived in the 1941 Sidney Bazett House in Hillsborough, California, a Frank Lloyd Wright design, and had remained spellbound at the effect that architectural space had on the day-to-day quality of his life. He wanted to make that experience he had available to the masses. Following the design of a house for Eichler himself, A+A was the first firm the developer hired to draft residential schemes to be built at a regional scale and at an affordable cost for the general

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[152] Derek Parker. Interview with Ph.D. Candidate, January 29, 2008.

[153] "Textured Mansion on a Mexican Hillside: a Colorful Paradise", *Architectural Forum*, January 1951, pp.136-41.

[154] Vance Bourjaily. "Cloud Castle in Mexico", *San Francisco Chronicle*, The World of Leisure, Sunday October 16, 1949, p.1L, 8L, and 9L.

public. The Eichler Homes were marketed as the bearer of a unique domestic experience for middle-class America. Post-and-beam construction, wood paneling, radiant heating floor slabs, and a courtyard for indoor-outdoor living formed the constants of the architectural backgrounds visible in the period photographs, advertising a comfortable lifestyle for the post-war home buyer. Nowadays collectors' items, the Eichler Homes enjoyed great success from their first appearance on the market and were widely advertised in shelter magazines and California newspapers.[155]

As the practice gained momentum, the two architects landed larger and larger commissions of significant prestige. With the American President Lines Headquarters Building, in San Francisco, also known as the International Building of 1961, A+A entered the market of office buildings, largely dominated already then by SOM, with the idea of conceiving a high-rise designed outside of the formal conventions of the International Style. Due to the small size of the lot, the building was shaped to cantilever on all sides, using 125% of the parcel area. Considered exemplary for its unique mechanical design, the International Building showcased the vertical shafts for the main mechanical risers directly on all four elevations. These were fully integrated architectural elements in the building skin, a concept far ahead of its time, and today mainstream. A few years later, A+A finished the construction of a new high-rise- the Bank of California of 1963, in San Francisco. This granite covered 20-story building features a 30-foot cantilever hovering over the existing historic 1908 banking hall. With the restoration of the great hall, the top of the building, previously an eyesore of mechanical equipment, was changed into a roof garden.

The relationship with the University of California clients yielded numerous projects in the following years and established a firm foothold in the academic sector. In 1962 the University of California launched a competition for the design of the Lawrence Hall of Science, to be built on the hills overlooking the Berkeley campus. This research center was devoted to the improvement of science instruction at the high school level and college science teachers. A+A's entry was selected over submissions by Louis Kahn, Vernon de Mars, and ES&A, bringing the firm once again to prominence in the national press.[156] The projects built at the University of California Santa Cruz came after that project in Berkeley, this time a joint venture with John Carl Warnecke, at the time a very well-known architect in the country. Noted landscape architect Thomas Church drafted the master plan. Church's central idea was to maintain the meadow with new construction organized around it. A+A designed the Natural Science Unit 1 and 2 and the Science Library. Once these projects reached completion, the academic side of the firm became dormant, as no new projects of this type came in for a long while.

In its generalist period, A+A extended its design effort in numerous directions. In religious architecture, the Central United Methodist Church in Stockton, California, of 1964 proved to be the most successful example. A sequence of singular concrete frames

[155] Adamson, Paul, and Arbunich, Marty. *Eichler: Modernism Rebuilds the American Dream.* Salt Lake City, UT: Gibbs Smith, 2002, p.22.

[156] "Anshen and Allen Win Closed Competition", *Architectural Record*, February 1963, pp.13-4.

following a consistent module but changing in dimensions along a main axis, the main chapel generated a soaring image of commanding effect both in the public realm and its interiors. Branching out beyond architectural building types, A+A became involved in projects of public infrastructure. The Division of Bay Toll Crossing hired, as an architectural advisor, Steve Allen, who was at the time president of the AIA California Council. The architect designed a slender ribbon of concrete known today as the San Mateo Bridge in the San Francisco Bay and completed in 1967. Allen also consulted on the Coronado Bridge in San Diego in 1969 and led the design for the Southern Crossing from Alameda to the South Bay. In that same period, the interest of the firm's leadership partially shifted to technologically advanced and program intensive buildings. These types of projects routinely took a much longer time to design and build, due to their complex nature and the close dialog necessary between architects and the community of users. The start of this new direction in the company was the Good Samaritan Hospital in the Santa Clara Valley of 1962, the first health care commission A+A designed. Curiously, the office was selected because they had no experience in this building type. In the view of the Board of Directors of this newly formed institution, given A+A's track record in professional achievements in architecture, the firm was likely to bring fresh ideas to the design table. Since its beginning, embracing innovation had been a mainstay in the practice's design philosophy. On that basis, the firm was selected.

The decline of the post-war years in California in the early sixties, however, coincided with the premature death of Bob Anshen in 1964, at age 54, in circumstances that have never been fully explained.[157] The ensuing period marked the beginning of the practice's specialization in two building types. In a matter of ten years, health care and academic projects became the exclusive design concern of this organization. Such a shift of emphasis resulted also in an internal change in the way work was structured. From the atelier-like format, where A+A authored some of their most renowned work, the firm acquired a corporate set-up with significant expansion and contraction of its staff, susceptible to the unpredictable fluctuations of market forces and economic trends as neoliberalism became dominant in the national economy. Furthermore, with the loss of his alter-ego, Steve Allen lost enthusiasm for architecture and his interest in the practice waned. He progressively released power to his younger colleagues, reared to take a leading role in the future of the firm. While Steve Allen's involvement in the firm dwindled away, Derek Parker, an architect from the United Kingdom hired in 1960 in his early thirties and who passed away in early 2023, exhibited entrepreneurial skills. He filled this void in leadership with the blessing of the surviving founder and his longtime collaborators. Parker's professional target was entirely in health care and academic buildings with highly complex briefs and demands. In the early Parker era, the structure of the office was tripartite: Design, Production, and Construction, with a leader for each department. When Steve Allen retired the only partners were Derek Parker and another fellow by the name William Richardson.

[157] "Mysterious Death of S.F. Architect", *San Francisco Chronicle*, Tuesday, May 26, 1964, p.1, and p.19.

Straddling its mid-century modern past and the changed climate in the architecture profession, a new course was charted that led A+A to another permutation in size of roles of partners. The firm stayed true to its direction after the death of Bob Anshen, by deepening its unique expertise in health care and academic architecture. In 1979 the firm became a corporation, marketing was established as a separate activity, and the first computers appeared in the workplace. Stemming from the original values of the founders-- collaboration, exploration, social purpose, and the adoption of the latest tools --reframed the firm's practice of architecture in this subsequent phase.

If the first phase of the A+A existence bracketed its meteoric ascent in the realm of signature architecture, the second phase marked the beginning of the structural transformation of the firm. In the course of a personal communication, architect Roger Swanson, CEO of A+A during the transition from Derek Parker to Stantec, while commenting on the flow chart of the office' growth that Steve Allen had carefully mapped, drafted an informal diagram outlining the evolution of the firm, from the ensuing period after Bob Anshen's death and the makeovers that took place in the forty years that followed (Fig. 2).

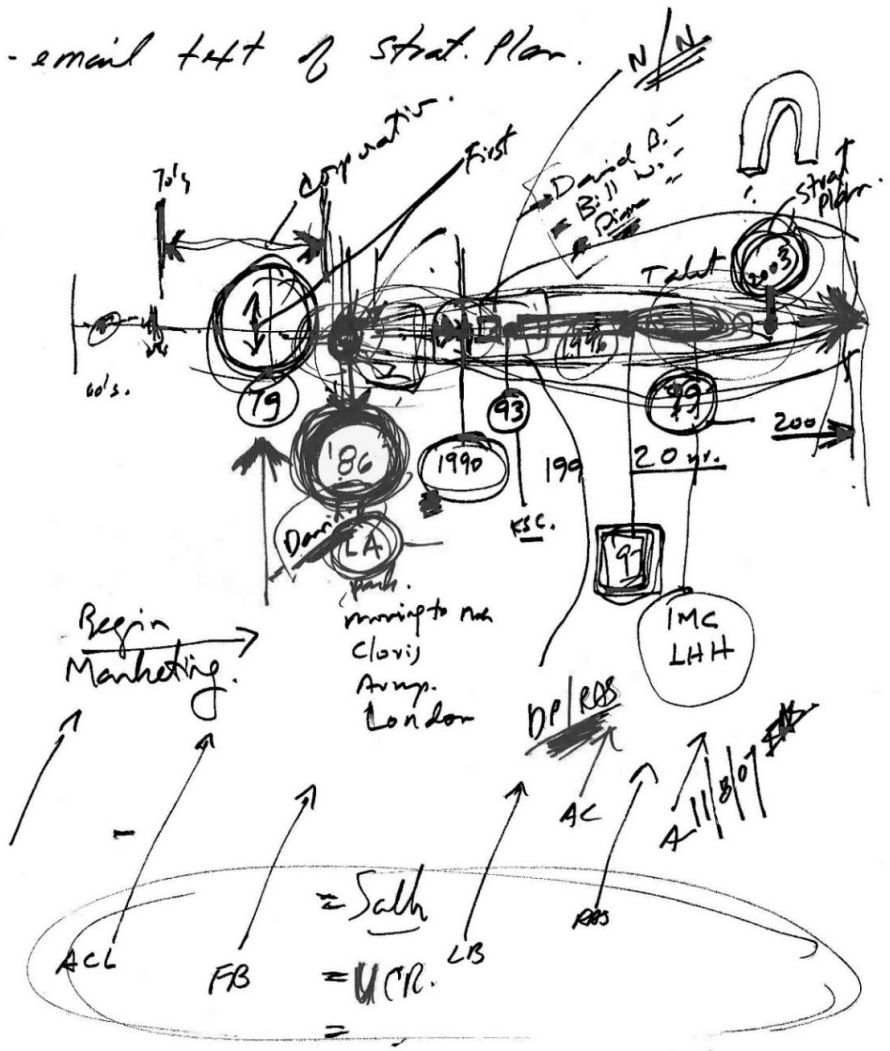


Figure 2. GRAPH OF THE EVOLUTION OF A+A FROM 1970 TO FIRST DECADE OF THE TWENTY-FIRST CENTURY. SKETCH BY ROGER SWANSON DRAFTED ON 11/8/2007.

The years circled in the diagram represent some key events that shifted the operational models and business targets of the firm. Strategic hiring, internal reorganization, expansion of business through the opening of new offices, and two consequential projects denoted the transition to the market of large-size health care buildings. What follows is a description of some of the dates that are shown in Roger Swanson's graph. In 1979, marketing, conceived as an effort with its own staff, separate from just personal relationships of the principals, began. In early 1985 an ongoing collaboration with the English engineering firm Ove Arup & Partners was established[158]. In 1986, A+A opened an office in Los Angeles, and won three major awards. In 1990, the firm partnered with Jack McAllister, original supervising architect of Louis Kahn's Salk Institute in La Jolla, California won A+A the commission to design an addition to the

[158] Anshen + Allen. "Our New Engineers.", The Reveal, December 1985, Company's Newsletter. Anshen & Allen Collection, Environmental Design Archives, College of Environmental Design, University of California Berkeley, p. 32-33.

complex, bringing further visibility to the practice in its new phase. In 1993, the firm secured the design of the Kaiser Santa Clara hospital in the San Francisco South Bay, determining A+A's presence as a national player in the market of large-scale healthcare architecture. In 1996 the firm pursued Asian projects, but eventually abandoned them as not cost effective. Up until the ownership transition to Stantec, the work of A+A was entirely within the domestic market (the bulk of it in California) and the United Kingdom, with a few exceptions of built work in Southeast Asia, and Italy.

For this organization, the seventies were years of transition. The bulk of the work was primarily in planning and the principal effort was to survive the severe recession generated by the oil crisis in 1973. It was in the eighties that A+A experienced a solid comeback on the market. A steady stream of academic projects was tied to the founding of the Los Angeles office, under the leadership of Jack McAllister. In addition, the personal invitation of Derek Parker to Ove Arup & Partners of London to open an office in the United States to help the firm work on the Clovis Community Hospital in Clovis, California completed in 1988, gave indirect exposure to A+A. Ove Arup & Partners settled on 461 Bush Street, where the original office of A+A was before the English firm got a premise of its own.

The ten-year-remarkable growth of A+A up until 2008 was largely the upshot of a concerted effort to conquer and manage the market of large-scale health care facilities. The business strategy proved to be particularly valuable during the collapse of the Internet economy in 2001, where most of the architecture firms in California were having sizable reductions of personnel, whereas in a complete reverse of trend A+A nearly doubled in size.[159] A far more tiered organization had to be devised to manage the complexity of financially sustaining such a composite workforce, while remaining competitive in the marketplace. These mega-structures were typically over a million square feet in area, and lasted several years, from pre-design to completion, a timetable of tangible financial stability for the architecture profession so vulnerable to the volatility of the world economy. Toward the tail end of its existence, A+A submitted its qualifications and was invited to participate in a limited competition for the design of the main hospital for the University of California San Francisco in Mission Bay. The firm won the first prize and completed the project in 2014. This commission helped A+A to weather the severe downturn of the market as it entered the Great Recession of 2008. Yet this prominent commission was insufficient in the end to sustain the regular payment of the salaries of the staff, after 2007. Multiple waves of sequenced layoffs decimated the workforce in the course of three years, leaving the layers of principals and associate principals virtually unscathed. With Stantec as the new owner, principals and associate principals were increasingly being laid off or parted voluntarily from the firm, leading to full replacement of the organization's leaders.

[159] Roger Swanson. Interview with Ph.D. Candidate, November 8, 2007.

Methodology

I investigated the site through complete participant observation. Following my layoff from Skidmore, Owings & Merrill as part of a firm's downsizing. I sought employment in another large-scale firm with comparable office size and program intensive projects. The interview process took several rounds of meetings and eventually was admitted as a Project Coordinator, a job title given to design professionals with experience but without a California architectural license. From there I took part in all aspects of the life of the office, professionally and socially. I effectively became part of the workforce and observed the overt and informal behaviors that paced the life of the office. I presented projects, offered critiques, was given yearly evaluation, celebrated promotions, welcomed new hires, charrette to meet deadlines for the various phases of the project, attended team meetings, and so forth. As a new downturn hit the economy, I was let go after working there for over 6 years. I observed many others going through the same ritual. This longitudinal investigation revealed patterns and social dynamics undetectable otherwise through interviewing and self-description.

During the entire length of my ethnography in the firm, the break-up of the project types was healthcare related for the most part, with a rather minor component in the academic sector. On average, the design and construction of a hospital ranged from eight to ten years from early conception to completion. Having multiple projects of this magnitude running parallel gave the firm over a period of time both high profitability and business stability. In fact, the prolonged timeline for the generation of this building type is a stabilizing factor in providing some sense of job security in the architectural profession, notoriously vulnerable to market fluctuations.

Broadly speaking, it takes a particular personality type to develop stamina and to maintain the required focus to stay engaged mentally in these long-term endeavors. Staff can be assigned to these projects for many years with no end in sight and/or a sense for the start of construction. Those who can withstand the overexposure to a single project, with no tangible reduction of performance, are typically retained even in times of financial crisis, as they are perceived as a global asset to the firm. Furthermore, a major boost in health-care architecture was an early 2000s state legislation mandating the seismic retrofit of all hospitals in California by 2013, with consequent increase in commissions and revenues. The impact of this legislative directive was felt in the professional scene. A number of corporate architectural offices, in the San Francisco Bay Area, set up internal divisions to specialize in health–care projects. Among them, the Smith Group, Kaplan, McLaughlin & Diaz, and Skidmore, Owings, & Merrill, among others. This led in turn into a very competitive search for expert talent, whose financial incentives were significantly higher than for architects working on other typologies. At the height of its economic expansion, A+A had offices in San Francisco, Columbus (OH), Seattle, Salt Lake City, Boston, London, and Manchester, globally amounting to about 300 employees.

The Setting

As of May 8, 2009, the directory of the San Francisco office of A+A Architects listed 173 people structured in nine communities: a Marketing Team (six staff members),

Information Services Team (eight staff members), Accounting Team (six staff members), Reprographics Team in charge of mail, deliveries, printers and plotters maintenance, and material logistics of the office layout (two staff members), Human Resources Team (five staff members), an administrative team (approximately 5 staff members), an Interior Design group (about 12 staff members), sixteen principals in the San Francisco office (there is a total of 24 principal in the constellation of offices of the firm), and the remaining population assigned exclusively to the conception and production of architectural projects. The billable hours of this last part of the personnel mentioned were entirely charged on active commissions.

Within these communities, a subset of groups held various degrees of power and exerted influence in specific spheres of the office functioning. At a principal level, there was a CEO, a Managing Principal, and a four-principals Executive Committee that ratified deliberations to be implemented firmwide. Furthermore, there was a project director for the nine Practice Areas representing the operational model of the firm: Marketing, Practice & Project Management, Support Operations, Knowledge & Information Services, Planning, Design, Interiors, Technical Design, and Construction Administration. The role of the project director was to monitor the performance and overall quality of the execution of the work against internal benchmarks and profit margins, established in the most recent version of the business plan and adjusted per the latest data on market trends in the healthcare and academic sector of architectural design. In this administrative armature present in each architecture project, the team was composed of a Principal-in-Charge- who stamped and signed the set of architectural drawings for permit and construction, a Project Architect, a Project Manager, and a variable number of employees with diverse skill sets and levels of experience to actually draw and coordinate the information on the drawings and the construction specifications. The job titles for the architecture teams-- each with their own billable rates-- were based on years of experience and registration to the California Architects Board:

- Architect or Interior Designer (5+ years of experience);
- Designer I (0-3 years of experience);
- Designer II (2-5 years of experience);
- Project Coordinator or Interior Project Coordinator (5+ years of experience without a current California architecture license);
- Sr Architect or Interior Sr Designer (10+ years of experience);
- Sr Project Coordinator or Interior Sr Project Coordinator (10+ years of experience without a current California architecture license);

Staffing needs were determined on a case-by-case basis depending on the scale and schedule of the project. The team would therefore vary in size and overall expertise due to the nature of the client, the required level of specialized knowledge, and the compatibility in personality of specific employees to work together functionally and effectively for the goal at hand. Typically, the projects' duration tended to run from a minimum of a year to over a decade. Gathering the right team for the job was a central task with consequences over the course of the project. The human factor, that is

interpersonal skills, ability to work in a spirit of trust and genuine cooperation, and the willingness to work through conflict resolutions, were high on the list of considerations in the firm's leadership deciding the team composition. Furthermore, the capability and reliability of each member to deliver the assigned tasks based on an agreed upon work plan between the project manager and the client were the other determining factor in having the right mix of personality and skills.

Although information about the ownership percentage in the company of each of the principals was confidential, based on daily observation of social dynamics over a long period of time it did appear that a few principals had a significant share, given their timely appearance in the decision-making process for each project and for firmwide decisions. Inevitably the weight their position had on topics of debate, regarding the present and the future of the organization, would influence the development and implementation of the business plan, together with the allocation of human and financial resources. It was in those restricted meetings that alliances, territoriality, and personal agendas would become sources of political friction and power struggles. Knowledge of these serious disagreements was informally spread throughout the staff and did percolate in the office dynamic, as well as in the way it operated. How so?

Social and Material World of the Firm

The composition of the workforce varied in age, ethnicity, sexual orientation, gender, and class. Virtually all ages were present in the firm at the time of my study, although the highest percentage fell between late twenties till mid-forties. While there were few African American employees, one of them was a principal, there was a sizable Asian American community; only a few Spanish speaking members; a handful of European born employees; the rest was composed of Caucasian Americans. In matters of gender, the entire workforce was virtually split in half; with women occupying all positions in the organizational ladder; three of them were principals at the executive level. A calendar of venues and rituals paced the work week in the office and contributed to building a bond among the personnel. All computers were connected to a network with several drivers for active architectural projects, archived work, personal folders, marketing material, and mixed content. A very efficient Intranet accessible to everybody- with the exception of financial reports and equally sensitive data- was constantly updated with messages of company-wide impact. The Intranet Home Page was a portal into practice areas with their own internal links, online forms, protocols of communications, who was assigned to what project, and a lot more information dealing with the operations of the firm. It was packed with a lot of useful data. Alas, their retrieval was anything but intuitive, lost in a Daedalus of hierarchical levels within the interface, with consequent loss of efficiency and expert knowledge. Despite such compromised functionality, it was through the Intranet that most of the internal information exchange and digital transactions would take place. The connectivity among the members of the organization was essential for the smooth running of its day-to-day operations.

A+A was located in a six-story building, occupying the top two levels. Every first Thursday of each month, staff meetings would be held on the 5th floor, where the largest common area had enough capacity to contain the workforce in its entirety. During these

monthly gatherings, principals would take turn to inform the staff about their marketing endeavors to garner new work, any awards that projects might have received, welcome new hires, celebrate the anniversary of employees as well as their promotions when they occurred, show selected designs of more immediate relevance, and broadcast any announcements about information technology changes, sustainable classes, and miscellaneous subjects.

Many social events, unrelated to job tasks and yet integral to the generation of comradeship across all ranks, took place customarily virtually every week. Some of them were birthday parties in the office, team lunches to celebrate the reaching of a milestone in a project delivery schedule (such as 100% Design Development or 100% Construction Documents), lunch presentations of vendors marketing their products in the firm, holiday events (such as the Halloween party and the Christmas Holiday party), softball tournaments, with competing architecture offices in San Francisco, bowling games, and so on. These happenings, although informal, were vital for the staff at all levels since they would advance the likelihood of an authentic allegiance of the individual employee to the collective. It was in strained circumstances that the strength of these ties was tested, either to secure some political shelter against possible job terminations or pave the way to a partnership track or even, more simply, in getting help in completing workload that proved to be too heavy to be handled for the people who were assigned to it.

This informal dimension in the workplace existed in parallel to the explicit rules declared in the company policy handbook. Protocols and etiquette set the tone for rites of passage of various kinds for every individual to be given permanent access to the firm, or ejected through termination, if the subject under scrutiny was considered unfit to the culture of the company. The interview process was the time when the screening of potential employees went on. With the exception of strategic hires, handled at the highest level, it was middle management that offered the first filter to determine whether or not a candidate's persona matched the information provided through resumes and samples of work. All the interviews with applicants took place behind closed doors. However, they could be seen while they were taking place as they were visible to anybody walking by the conference rooms. The impression of the candidate the interviewer received granted either the next round of interviews or gave a formal pass to the qualifications offered. Although, broadly speaking, the workforce was diverse, there was a fundamental homogeneity of personality traits that made the person compatible with the subculture that the A+A executive group wanted to foster.

The exit interview was equally critical for the firm, to get unofficial feedback about its inner workings from the workforce. When an employee voluntarily left the company, human resources and at least a principal routinely would make attempts to gather as much information as possible for the reasons while this departure was in the works, occasionally leading to financial counteroffers to persuade the most valuable employees to remain. This kind of interview would routinely take place behind closed doors in what was known as the "Archive Room", where the firm's archive was. This space was just as visible as the conference rooms--although screened through shades--to anyone on staff who happened to walk by. Although the content of what was being

discussed was impossible to hear, knowing that a meeting was taking place was common knowledge. This theatrical visibility was an integral part of the social choreography of the firm, a common ritual with different manners but existing in all the case studies of this dissertation. None of the findings gathered in the exit interview would become part of the public domain. All valuable comments were routed to upper management, for further analysis and possible actions if deemed beneficial for the company interests.

The yearly evaluation of each employee was a formal affair taking place in a closed session. Three staff members, in a higher position than the employee being evaluated, and a human resources representative would open the meeting. Its content was the overall assessment of the individual's performance, discussing merits and shortcomings. This ritual was a customary practice in organizations structured around the capital labor relationship, however the infantilizing of the individual being given the yearly review was evident and pronounced both in the seating arrangement and in the management of the conversation. In fact, the performance review was typically a one-way assessment, since the set-up did not allow for a counter assessment by the employee to the staff members in charge of the evaluation, to determine if systemic and firmwide dysfunction would generate patterns of underperformance. The physical set-up where this practice would take place was a round table with all the parties sitting around in similar chairs. But the staged egalitarian nature of the performance review fell apart in the economy of who was doing the talk, what was being said, in what sequence, and who would determine the adequacy of the person's performance. Having gone through several of these yearly appointments, my ability to relay my point of view on why certain situations of adverse impact on my performance was significantly curtailed due to my anxiety about any repercussions on my standing in that organization, financially and otherwise. Per numerous personal communications I had with other colleagues at my same rank, the structured unwillingness of the leadership to critically understand the content of my experience as a subordinate in that internal pecking order was common to virtually all of them.

A particular type of conversation was also held in private. It could be loosely labeled as a warning talk. When rank and file employees were in misalignment with the targets that upper management had set for the project and the group and were deemed unsettling subjects in the team dynamic or even vehicle for animosity and arguments, lines of authority were openly declared to stake out the territory of power in the firm. The message delivered was that, unless there was a concerted effort on the behalf of the subordinate to work in harmony with the team and the directives set up at the onset of the project, there were going to be negative consequences concerning the subject's future employment in the company. The tone was cordial, but firm leaving virtually no room for counter arguments or alternative explanations about what could have caused that strained predicament.

It was within this framework of official and unofficial arrangements that human relationships were handled, managed, coordinated, and choreographed. The chief purpose of these structured and unstructured venues was the social construction of a cohesive workforce able to deliver desired outcome at the waving of the baton of an executive to

create financial profit, shared according to politics, legal agreements, and ownership level. Collaboration was an absent concept in the politics internal to the organization.

The Physical Set-Up of the Office



Figure 3. FLOOR PLAN OF LEVEL 6 OF THE A+A OFFICE.

Originally the business was located on 461 Bush Street in the San Francisco financial district. It was organized on three floors with the upper level assigned as the personal offices of the firm's founders, while the middle floor was an open plan layout entirely devoted to production. In the early 1980s, the office was moved to a building at the corner of Market Street and 5th Street and occupied on the 5th and 6th levels. The doughnut-like floor plans wrapped around an enclosed courtyard covered with skylights (Fig. 3). In its latest layout the workplace was physically organized around clusters of four desks arranged on the corners of a square grid and distributed on an open plan. At the center of each square formation there was a common desk, where drawing sets for team review were kept and informal team meetings were held. This arrangement was replicated in all the work areas on both floors, with the exception of a few workstations located abutting against the walls facing the courtyard and the personal desk of the CEO and his personal assistant, both positioned in a linear fashion. The only enclosed areas were the Executive Committee room, the Accounting Office, and six conference rooms of different sizes and functions for team and client meetings. All principals sat on the aforementioned pods with the workforce, regardless of the position of the employee

within the firm's rank. Did the differences between the first building and the later one have any influence on the workforce or the issue of collaboration?

Typically, the selected members of each team were grouped on adjacent clusters and established their own community, with their official schedule of deliverables, their team lunches, set of jokes and stories tied to the evolution of the project they were dealing with. Occasionally other employees were added temporarily to the team, according to the staffing needs prompted by the schedule of deliverables but were not seated in the same area. Eventually those members were either reassigned to another project or absorbed as stable constituents of the group and reseated in the team common area.

An intended side-effect of this plan layout was that each staff member became a bystander to all the formal and informal events surrounding the radius of three pods of desks. Mobile phone ringtones, voices coming out of someone's ear buds while talking on a landline, ongoing visual access to everyone's computer screen, and conversations became a matter of public affair and gave audio-visual feedback about what individuals were actually doing in the office to everybody else. This collective tracking of who came in, who went out, and at what time added a new layer of transparency- and monitoring- that mitigated the hierarchical barriers and yielded an impression of organizational equality. Most activities would occur before everybody's eyes, an ongoing spectacle of the workforce becoming aware of the most visible affairs of its members. Conversely, more sensitive matters, such as yearly evaluations, promotions, lay-offs, fee negotiations, staffing meetings, would take place consistently behind closed doors.

Structuring of the Workday, Team Building, and Project Cycles

What follows is a collection of diverse structural conditions and vignettes I experienced in the course of performing my duties in the office. These were fairly common situations and routines pacing the workflow throughout the day for hundreds of knowledge workers laboring concurrently in the same space, albeit engaged in the many different projects being worked on.

Office hours were from 8:00 AM to 6:00 PM Monday through Friday and every other Friday was off. Established in 2002, this schedule found firmwide support when introduced. The resulting three-day weekend was often experienced as a mini-vacation and was habitually timed with official holidays. The lunch hour was from 12 (noon) to 1:00 PM, but there was great flexibility all across the board about when the lunch break was taken and how long it would really last. The understood agreement was that the work would be completed in a timely fashion and, as long as that promise was unbroken, that time flexibility was considered part of the culture of the place.

While the workload was distributed over the five-day week, each day yielded its unique pressure and priorities. Mondays were always days of great productivity, whereas toward the end of the week a more relaxed attitude would take over, unless a deadline was looming. In that case all team members would work feverishly to complete their tasks regardless of the standard office hours. The project manager assigned to each team

would call for group meetings, monitor that specific milestones were being hit at the targeted time, and make sure that the project was going to be delivered on schedule. Unless the project manager called a meeting at the beginning of the workday, ordinarily the day started with greeting everybody (one's arrival (and time) was visible to all), getting settled at the workstation, checking emails, and phone messages. Once the preliminaries were over, each employee would open the files relevant to their job title on the assigned project and start work on their portion of the project. The execution of the work would hardly ever happen in the isolation of the individual workstation. From each desk at least ten people and often their screens were visible. With the voice operator in the background, a constant back-and-forth of information took place among team members. The subject of these informal verbal exchanges often were coordination items between building components, making sure that an item agreed upon the day before was being documented in the drawings, answering questions from a peer, reporting to the project manager, updating the drawing with the latest information, and the like. The work was heterogeneous in nature and, although technical in content, its pace was interspersed with jokes and convivial contacts. Everybody was exposed to everybody else in a sort of collective vitrine, all indirectly policing what the others were doing. By the end of the week, the realization of the exorbitant amount of time spent in the office with the team members, and the necessity to just get along was suddenly obvious.

While digital drafting and modeling were primary daily activities, verbal and written communications were on equal footing. The type of work a member of this organization was going to perform was directly correlated to his/her role in the firm's hierarchy. The more responsibility of broader impact on the project an individual had, the less time that individual would spend on drawings and more on managing human resources and communication with outside parties. Yet the physical proximity of all these workers was essential to supervise the functionality of a team. Since all teams were stationed in one large open plan, the acoustical overlap was a standard phenomenon of the work week. There was not a single moment when the office was quiet unless it was the end of the workday, off-hours or during the weekend. All other times there was constant chattering happening. As a result, the concentration of the individual was directly proportional to his/her ability to tune out that environment and focus on the work needed to be done, a very arduous task for some. Some used music through their earphones, others turned on the radio and made their own acoustic environment. No matter what, each person had to come to terms on a daily basis with this soundscape.

Once a commission was earned, the standard office procedure entailed the formation of an adequate team to cover the necessary skill set to deliver the work. Depending on the budget available, the target profit, and the complexity of the design, a finite number of people with various strengths and levels of experience would be assembled. Furthermore, one or two admin people were to help to tackle miscellaneous tasks, primarily of clerical nature. The project manager in concert with a principal in charge staffed the team and conveyed critical information to impart a direction and coordinate the production of the project according to a known schedule. Although some of the team members were more integral than others, no team members were at any time indispensable. That meant that in the midst of a deadline some might go on vacation, or

get sick, or get laid off, or leave the firm for another job offer, or take a leave of absence, and still the firm had its own ways to compensate for whatever side effects the departure of one or more individuals would cause to the project path. While it was true that some had more extended exposure to the project, no one had its complete picture, not even the owner or the owner's representative. This distributed vulnerability was the project's safety net, as it was always protected from the fallout of extensive/invasive changes in the team make-up.

Unsurprisingly, drafting was entirely digital using Autodesk products. Even the senior members of this organization did their work on the computer. Sketching was still the prevailing method, however, for mark-ups on drawing sets. The great number of files (CAD files) of these large-scale health care projects made naming conventions extremely challenging, if not a daunting task. In a project I was temporarily assigned to in the Construction Administration phase, (a large hospital in Eugene, Oregon), the CAD files alone were 2,052! This file count leaves out the thousands of image files (JPG and TIFF), 3D files, spreadsheets, and word documents, all part of this gigantic data set, available in the network of the firm just for one single active project. At the time of this inquiry, this firm had about fifteen active projects, five of them of enormous scale (over one million square feet). While the firm had established some naming convention standards to facilitate the sorting of files and the interpretation of their content, the workforce rarely conformed in full to those conventions. Either because they were unaware those conventions existed (despite orientation at the time of hiring and team meetings when permanently assigned to a project), or because they were unenforced, or because they were unclear and unevenly applied, this process of naming and file retrieval was also excruciatingly chaotic. In the A+A office, typically in each team, there was one person who was more conversant with CAD technology. That person would compensate for a lot of the team shortcomings and would suggest changes from what could be otherwise a transmissible set of conventions. Once that person either left the firm or was assigned to a different project, the rest of the team was left with the overwhelming task of figuring out where the files were on the network. Just like misplaced books in libraries are impossible to find, CAD files improperly named and filed disappeared in the black hole of CAD management. A great deal of time was spent identifying reference points (technically known as workpoints) from where to measure critical parts of the building. The further along the project was in its development, the more exacerbated the problem was to become.

Staffing was a routine conversation in the office. Who works on what? What level of expertise is necessary? How many junior and senior people will be assigned to these projects? Often these were the questions included in discussions between project managers and principals. The task of the project manager was to have the pulse of where everybody in the team was and where the work was going, without getting caught in the nitty-gritty of the specific problems. Each team had at least a weekly meeting where the exchange of information occurred. A project architect, with over thirty years of experience, shared with me over coffee, during a personal communication, "Although team roles are established from the beginning, it is the team dynamic that prevails."

Chemistry between humans, rather than the impersonal rationality of the spreadsheet, was the driver of the energy of a project.

When an architectural concept was developed at a schematic level the designer had a reliable sense of the technical reality of the project. This bird-eye view was where the designer stood cognitively based on the stage of the design. As the project progressed, knowledge of construction came into place. While individuals with extensive experience could control the team discussion, they never knew in their entirety and interconnectedness all the factors influencing a particular project. General contractors took on that role when clients hired them for pre-construction services, with the hope of getting a solid figure for the project construction cost. Once the general contractor was to become part of the team and was in charge of building the project, he/she had to establish a sequence of actions translating the architects' drawings into an artifact. Moreover, the pricing exercise that general contractors and subcontractors did to develop their estimate, held the owner and the architect hostage to the contractors' reading of the market forces, as well as to unclear financial interests. On a number of occasions, schemes that were monitored weekly for cost, were without any warning suddenly over budget for an exorbitant amount (tens of millions of dollars), on the basis of some foggy explanation neither the owner nor the architects were able to refute. This rollercoaster of project cost was and remains standard in the building industry. Its side effect, then and now, was that it put tremendous pressure on the architecture team and often unrealistic expectations on the client's side, to keep the project on budget. That target was consistently elusive and generated palpable tension in meetings. The meetings between the general contractor and the architect were routinely contentious. Since no one had complete understanding of the complexity of a project, each party had command of a certain aspect of the project and relied on the expertise of the next party for the part that he/she was not cognizant of. Characteristically this entropic exchange was at the very core of any project in this practice. This is also a standard scenario in the building industry.

Similar to many other large-size offices, A+A had an internal quality control protocol intermittently enacted, being dependent on available fees to pay for qualified staff for this task. They were intended to mitigate inconsistencies between drawings and specifications and to catch items of coordination between different disciplines. When carried out, it usually comprised the following steps. Once the team had compiled a complete set of drawings, typically at 90% Construction Documents, an outside reviewer, often a retired former employee familiar with the firm's standards and mode of working, reviewed all the documents for a fixed fee, to check cross-references between drawings and highlight inconsistencies of information between the sheets, errors, and omissions. At the end of the review period a set of comments were issued and routed to the team members responsible for their assignment, to pick up those red marks and finalize the documents prior to the full delivery of the architectural drawings set to the client. Despite the extensive cross verification and editing of the graphic and textual documents team members carry out, to minimize big and small oversights at various stages of the project documentation, invariably some mistakes were found, even in the final stretch of this phase before issuing the set for bidding. These mistakes would eventually affect time and budget, impacting adversely the client.

Another instance of frenetic activity was being shortlisted to compete for a project. These compressed design exercises were periodic endeavors to revisit the marks of distinction and the identity traits of A+A in relation to its competitors. Some of the questions that kept coming up in the preparation for interviews were: "What is that we are trying to do", "What are the alternatives?", "What are the consequences of doing something?" The great unknown, however, was precisely the client. The result of such uncertainty was a split attitude in the firm's leadership between the desire to please the prospective client at all costs, versus the belief that singling yourself out from the competition, by devising distinctive solutions to the client brief, was the way to go. In recent decades having a flagship design for a health care or institution academic was a powerful strategy to attract and retain talented professionals. Marketing studies were brought up, both in internal discussions and in conversations with clients, about this correlation between design quality and talent retention. The latest trend of hiring firms with a strong cultural capital in the design world, an *Expertise-Based Firm* that is, generated in the main conflicting attitudes on the institutional client side. In one instance, reflecting on a commission A+A was shortlisted, but ultimately not selected, one of the principals said: "If something is too collaborative, nobody is in charge." The client expected a more assertive role from the architect in leading the project's design, whereas A+A was presenting its ability to work collaboratively with the client as a central asset of the firm's identity. The irony of wanting to function collaboratively was that it required a visionary leader to bypass the fine-grained territoriality of the expert individual wanting to make him/herself indispensable to the firm by sharing only limited portions of that expert knowledge with the team and enforce that desired collaboration. This I believe to be the chief reason why in times of market downturn, the third generation of the A+A leadership failed to craft a stable image of the organization to the institutional clientele in the pursuit of new commissions, eventually leading to the demise of the company after 70 years of existence in the professional scene.

Conclusions

This firm claimed to be collaborative in its marketing literature and in the subculture of the workplace. Nonetheless the office operated under a rather sophisticated managerial hierarchy, monitoring the technical and financial performance of every active project. In addition, although the atmosphere in the day-to-day routine was rather friendly, its personnel marched along stated rules of roles and responsibilities, according to the position that each employee held within the vertical arrangement of the firm, from the summer intern to the company's CEO. Through a series of vignettes, I endeavored in this chapter to sketch how work was getting done, how designs were slowly shaped, the decision-making process behind its progressive development toward completion, and what identities were co-constructed in the course of doing a project. Drawing sets and specifications are the physical deliverable architects, together with their ongoing presence on the job, provide to clients for a fee through contractual agreement when they sell professional services. Behind this linear diagram of capital-labor relationship abstract in its logic, there are countless interpersonal communications-- verbal and non-verbal-- taking place in a team within an architectural office. My chapter zoomed into the

specifics of a few of those exchanges occurring in daily practice to reveal the dense texture of transactions characterizing group work.

While the literature on the profession presents post-rationalized narratives on how assignments are executed in a firm, the design process is on the contrary deeply entropic. Frequently, the workforce spends a great deal of time trying to resolve conflicts between incompatible information in the architectural drawings, to grapple with the side effects of consistently incomplete documents, and the mismatch between architectural drawings and those of consultants. In addition, while the technology of recording with its vast array of digital offerings has reached unprecedented levels at present compared to the past, team members all across the office hierarchy retain uneven memory of their mutual agreements. Issues are discussed recursively, typically reiterating understandings already agreed upon in earlier phases of the design process. A practice of compensation on the behalf of the senior staff therefore kicks in directing junior employees so as to meet benchmarks along the project timeline and bring closure to the design of a building. It is the recursive nature of these inefficiencies that decreases, at times drastically, the project profitability, eventually putting at stake the very survival of the firm.

What complicates this state of affairs further is that on average clients, through their representatives, tend to change their mind on the scope of the work as the design takes shape with increasing levels of detail. They see opportunities for further refinement or improvement that were invisible to them prior to getting to such an advanced phase of the design process. Even at the last stage of construction documents, where teams are under pressure to complete the drawings on the basis of a specific formal arrangement, owner-directed design decisions are constantly made, thereby jeopardizing the meeting of a deadline. Cost overrun becomes the rule, and the animosity surrounding the inflation of the construction cost, and the associated professional fees, often generate a tense dynamic in the client-architect relationship. This last predicament is a standard condition of architectural production, not an exception.

This chapter has outlined the inner workings of A+A, a now extinct large-scale practice, bearer of a notable mid-century modern heritage and profoundly transformed by an extreme makeover of professional identity due to the death of one its founders. In its new phase, the firm's focus became highly serviced buildings, mostly multi-million-dollar healthcare projects. This narrow specialization proved to be fatal to its survival when such project types dwindled as market conditions changed for the worse. Its workforce included several hundred people to provide clients with the full range of architectural services for the two markets to which A+A catered. Protocols of communications, internal procedures, rituals, and managerial techniques have been described here to outline a third alternative of collective work to those presented in the two previous chapters. While teamwork is always present in the actual design of a project with all the tasks entailed, this third case study indicates that collaboration occurs among individuals holding compatible (not overlapping) knowledge, similar levels of experience, and equal power agency within the firm's pecking order, securing their own professional survival in the company. The next chapter will chart a fourth model of collective work through the case study of the San Francisco branch of the engineering firm Ove Arup of London

CHAPTER VI. OVE ARUP & PARTNERS, SAN FRANCISCO. A HYBRID OF EXPERTISE-BASED FIRM, EXPERIENCE-BASED FIRM, AND EFFICIENCY-BASED FIRM

> Can one ‘serve architecture’ if one does not know exactly what architecture is? What is the fundamental difference between the architect and the engineer, if any? When does an

engineer become an architect and *vice versa*? How should architects and engineers collaborate? [160]

Introduction

Expertise-Based Firms (*Single Authorship*), Experience-Based Firms (*Collective Authorship*), and Efficiency-Based Firms (hybrid of *Collective Authorship* and *Anonymous Authorship*) are three gradations of group work the previous chapters of this dissertation have illustrated. The British engineering firm Arup Group (former Ove Arup & Partners) is a paradigmatic case of fusion of the Expertise-Based Firms, the Experience-Based Firms, and the Efficiency-Based Firms. In this dissertation, this model is referred to as *Anonymous Authorship*.

The first case study on ES&A charted how its organizational efficiency hinged on the complete loyalty its workforce personally had to the firm's undisputed leader, Eero Saarinen. His highly regarded reputation in post-war American architecture was due to his own contributions to the field and his being a living link to the Modernist tradition as the son of Eliel Saarinen. His standing secured him unquestionable authority on all design matters in the office, a setting structured to enact his lifelong project of becoming part of architectural history. In the firm, he was the one and only arbiter of all final design decisions for all projects, big and small. Although the personnel at the leadership level were of the highest caliber in the profession and the design graduates were at the top of their class when Eero Saarinen hired them personally, their exclusive role was strictly confined to be an extension of Saarinen's own capabilities. Saarinen directly identified, interviewed, and selected every individual designer whom he was going to have a close relationship with. To all intents and purposes, it was a professional monarchy.

The second case study on SOM highlighted a managerial structure one step removed from the previous example with respect to who got the credit for the architectural vision and how the office was organized to be of support to the design leaders. In this environment, design authority was bestowed to an oligarchy of design partners, figures who were assigned distinct powers connected to the sphere of competencies different from technical and managing partners. Virtually all partners were brought up for their entire duration of their professional career from entry level positions to the highest ranks in the ingrown world of the company. The search for talent to supply the next generation of partners took place by scouting the most highly rated graduates from the top architecture schools in the country. The chosen ones for the partner track would spend all their careers in the firm. The partners, an elite cluster, held veto power to any design direction that the associate partners, second in command, might be pursuing without their approval and gave top-down directives to move the project forward. Those commands from the higher-ups were carried out through the pecking order institutionalized in the vertical structure of the organization, reaching the lowest level workers of each team in a quasi-military fashion for strict production. That arrangement

[160] Arup, Ove. "Art and Architecture: The Architect: Engineer Relationship." *RIBA Journal,* no.1 (August 1966), pp. 351-359. Full address given by Ove Arup on receiving the Royal Gold Medal 'For Service to Architecture' on 21 June 1966, p.351;

was inflexible with little, if any, room for adjustments to the status quo. Large team meetings were held for the exclusive purpose of giving updates on where the project stood and distributing action items each member had been assigned to. The associate partners, de facto agents and representatives of the design partners, were the executors of all design options handed down from the top. Everybody else at the bottom of the office hierarchy was slated, and paid for, to document verbatim those ideas. Any attempted rearrangement of this diagram from the workforce would result in the ejection of the involved employees from the firm.

The third case study on A+A architects, was representative of a further degree of separation from the centralized model of design authorship ES&A exemplifies. In this setting design decisions, beyond their technical content and coordination, were atomized amongst the team members, despite the fact that a project designer was assigned to each commission. Largely due to a more permissive culture of the office, everyone had access to some form of design, even though it was still in alignment with the direction the project designer gave. A more flexible staffing arrangement granted team members a few degrees of freedom to contribute to the final outcome beyond stringent production delivery limits. A less visible line of power apportioned authority to deliberate on design matters to a limited and favored few. The project manager then implemented those decisions, instructed the team members on how to proceed and what was expected from each of them and by when. The firm enjoyed moderate ranking in the design arena, with no design awards to its credit compared to the two previous case studies. This was the least design-oriented firm of all those examined in this dissertation. Both in the professional arena and internally, the company was perceived as a business entity providing design professional services with a specialization in health care and academic buildings. In the main, this environment was experienced as more democratic as far as having access to some form of direct design on a project and a fairer distribution of earnings across staff than the previous examples.

The fourth and final case study was the British engineering firm Arup Group in their San Francisco branch. The study of this setting yielded a fourth version of group work in a design-oriented company. In this site, the cachet of signature design, so central to the identity of the firms in the first and second case studies, was fused with the more compassionate and democratic leanings of decision making and human treatment of staff observed in the third case study. Similar to the three previously studied firms, a robust legacy of involvement and built contribution to the history of Modern architecture in Europe informed the currency of the company's identity and its historical import. The founder understood the culture of modernist architects and positioned the engineering services his firm offered from its start to support their goals, making Arup a preferred consultant in the design vanguard. Furthermore, its unswerving ability to remain prominently relevant in the world of high design for its technical expertise and professional dependability were what made Ove Arup & Partners a recurring contributor behind numerous landmarks in the history of Modern and Contemporary architecture. They are engineers first and foremost, paid to facilitate the vision of others. While throughout the firm's life Arup sold its services to work for unglamorous designers, the company was heavily involved in the documentation and realization of projects for

famous architects. The Arup Group is a global firm of engineers, and Arup Associates, a small entity born in 1963, are architects. The organization keeps growing in size and remains in a primary position in the marketplace by advertising the complete spectrum of engineering services. The socio-cultural conditions that made this remarkable expansion possible are the object of study of this chapter.

Historical Picture

British-born engineer Ove Arup (1895-1988) of Danish descent founded his structural practice in London on April 1, 1946, with the name Ove N. Arup, Consulting Engineers two weeks prior to turning 52 and well after having established a solid reputation as a structural engineer who specialized in reinforced concrete. The early period of his formal education comprised the study of philosophy at the University of Copenhagen for five years, graduating in 1916. He subsequently enrolled in structural engineering in the same institution, six years later earning a degree focusing on the theories and methods of construction of reinforced concrete. His first work experience in his newfound field occurred in 1922. In that capacity he was an employee for Christiani & Nielsen, a Danish general contractor, implementing his sought-after knowledge of the then new material in the first modern infrastructural buildings in Denmark first and the United Kingdom later.

Due to his expertise in this construction technology, Arup's knowledge of reinforced concrete was sought after. According to Marian Bowley, between the wars the United Kingdom was lagging behind compared to the European mainland regarding concrete technology[161], so was a fertile market for Christiani & Nielsen. Mouchel with Hennebique was just about the only other show in town before Arup arrived, a near monopoly in concrete structures. Early in his professional life, Arup sought contact with architects. In 1921 he was introduced to Mies Van der Rohe in Berlin. In 1935, he became part of the executive committee of the MARS (Modern Architectural Research Group), where architects such as Maxwell Fry and the Tecton group, headed by the Russian émigré Berthold Lubetkin among others, were active members with strong ties to Le Corbusier's ideas. Arup credited Lubetkin for his own introduction and understanding of both Modern architecture and what mattered to architects. At the same time, Arup provided significant technical support to many of them in designing the structures in reinforced concrete of their early projects. Further contact with the milieu of the visionaries came through his joining the Architectural Association, the pioneering London-based private architecture school where Modernity and its ideology was entering design discourse in the country. In those years, a number of expatriates of the German avant-garde, among them Erich Mendelson, Serge Chermayeff, Ernő Goldfinger, Walter Gropius, and Marcel Breuer, had settled in the British capital, setting the stage for a lively debate on architecture in modernist circles. It was through his personal associations with many such figures that Arup got his full exposure to a set of ideological priorities and artistic modes of working that modern architects were forwarding in their young practices. Arup visited Le Corbusier's newly completed Swiss Pavilion in Paris in 1933,

[161] Bowley, Marian. *The British Building Industry: Four Studies in Response and Resistance to Change*. Cambridge, United Kingdom: Cambridge University Press, 1966, p. 39;

a project that made a deep impression on him. His indoctrination to the tenets of the Modern Movement occurred also through the reading of Le Corbusier's writings as well as his participation in the MARS activities. He became acquainted with the architects' priorities, what mattered to them, their expectations from the new building materials and technologies industrialization made available to them, together with their attitude and rhetoric. Arup attended the CIAM meetings held in Hertfordshire and London in July 1951[162], cultivating personal relationships with the protagonists of the Modern Movement, and hearing their ideas about the making of buildings, cities, and on the modern architectural practice directly from them. Although there was great enthusiasm for concrete technology among the modernists, Arup detected that they lacked fundamental technical knowledge of how the material behaved and of its optimal use. As a result of these early experiences, bringing visionary design and the latest construction technology into one coherent approach to provide total design, that is, integration of all systems forming the building, became his lifelong focus. Arup set up his practice to offer that supporting function expert role to the modernist visionaries, a service the firm provides to this day.

In 1949, the business structure of the firm was changed into a partnership. In this new format Ove Arup & Partners included mathematician Ronald Jenkins, Geoffrey Wood, and Andrew Young.[163] Arup very carefully and personally selected the individuals who would become part of the office. In his view, getting the right fit was absolutely essential to create a collaborative environment. He was already aware that constant scientific advancements in building technologies required teamwork among engineers to harness their potentialities into the world of design and construction. Therefore, disposition, character, personal integrity, eagerness to learn, and ability to work harmoniously in teams were just as important as technical competence in the selection of prospective hires. Arup conducted the interview himself until the firm got too big to be able to personally carry out this protocol, something of concern to him all his remaining life.

As the firm consolidated its presence in the profession, it was involved in projects of consequence for the development of Modern architecture in the United Kingdom and abroad. Some of the landmarks of note were: the Penguin Pool at the London Zoo, completed in 1934, and Rosebery Avenue Flats, completed in 1949, both located in London, (Architects for both projects: Tecton); Hunstanton Secondary Modern School, Norfolk, completed in 1953 (Architects: Alison & Peter Smithson); Ibadan, University, Nigeria, completed in 1954 (Architects: Maxwell Fry & Jane Drew); Coventry Cathedral, completed in 1962 (Architect: Basil Spence); and St. Catherine College, Oxford, completed in 1964 (Architects: Arne Jacobsen). [164]

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[162] Jones, Peter. *Ove Arup: Masterbuilder of the Twentieth Century*. Yale, CT: Yale University Press, 2006, p. 151;

[163] Rice, Peter. "A Celebration of the Life and Work of Ove Arup.", in *RSA Journal*, June 1989, Vol. 137, No. 5395, June 1989, pp. 428;

[164] Arup, Ove. "Jubilee Forward", The Arup Journal, Vol. 6, No. 1 (April 1971), pp.2-28;

Starting from the early 50s, the firm opened its first office in Salisbury, Southern Rhodesia (currently called Republic of Zimbawe), quickly followed by other branches across the African continent. While the engineering enterprise had already acquired renown among specialists, it was with the opening of the Sydney office, in Australia, that a worldwide audience took notice of its existence. The commission that brought Arup to the limelight was the celebrated Sydney Opera House designed by Danish architect Jørn Utzon (1918-2008). This was a personal and professional threshold for Arup as he shared Danish roots with the architect. Leslie Martin and Eero Saarinen, both in the competition selection committee, introduced Arup to Utzon because they were concerned that his competition entry had no engineering. Nor had the selection committee for that matter. He acknowledged Utzon's uncommon design talent as well as the challenges the project posed. The geometric intricacy of the concrete shells, and their structural complexity, exceeded the architect's knowledge. Utzon, who had worked in the office of Finnish architect Alvar Aalto prior to opening his own practice, was in his late thirties when he won the open competition that attracted hundreds of entries from all over the world. Eero Saarinen was in the jury that selected the project and campaigned to have Utzon's scheme be the winner from a pile of rejected entries. While the visionary design was initially praised for its sculptural novelty, its execution protracted for decades in an increasingly litigious environment. Cost escalation and discontent on the client side brought the relationship with the architect to a breaking point leading to Utzon's definitive departure from the project. The Australian government, acting as the client for the project, kept Arup's firm to take the lead in solving the intractable engineering challenges and complete the construction of the Sydney Opera House. Since that feat, Arup's name has been associated with the most forward-thinking projects of our time, the Pompidou Center in Paris by Piano Rogers among its most famous.

The dissemination of Arup's ideas on how to organize the practice and the role of the engineer in the modernization of the built environment was a chief concern for the founder. His background in philosophy set him into a speculative exploration of the role that engineering, and its practitioners had in 20th century society. Arup's uncommon education in philosophy and engineering set him apart from his contemporaries, who were steeped into the certainties of the technological determinism that supplanted millennia of empirical construction. The conception of the building as the synthesis of specialized knowledge became the cornerstone of his practice. The emphasis on integrated design appeared consistently in his writings. He configured his practice to offer this holistic approach within a professional scene deeply engaged in the reshaping of the built environment in the post-war era. He offered modernist architects a team of experts equipped to solve the unprecedented construction challenges that the new architecture was presenting.

After hundreds of years of art historical practice crediting the architect as the sole form giver of the built environment, in the 20th century a rebalancing act expanding the credit to engineers for the making of structures took place. As the role of technology became increasingly present in the process of modernization, the technical figures populating the construction process acquired social and cultural distinctions distinct from older notions of being peripheral to the architect's will. Above all the other branches of

engineering, the professional role of the structural engineer reached an unparalleled repute and recognition entirely independent from the architect. Names of structural engineers, such as Pier Luigi Nervi, Riccardo Morandi, Sergio Musmeci, Owen Williams, Felix Samuely, Frank Newby, Eduardo Torroja, Mario Salvadori, Fazlur Rahman Khan, Paul Weidlinger, Fred Severud, and Eladio Dieste, for example, entered the attention of the media and got their share of celebration with their own monographs, lectures, and buildings carrying their names. In this respect, a new historical consciousness in the engineering field emerged in the thirties. The historian Sigfried Giedion saw in the structure of a building and the expert knowledge required for its realization a form of tectonic authenticity the discipline of engineering was fundamentally to be credited for. Engineers were the legitimate representatives of the Industrial Age. They were the bearers of scientific knowledge channeled in the design of structures and all the building systems necessary for their performance per the latest standards. Therefore, they earned a seat at the design table with the architects as co-authors of buildings in this new era. Master architect Mies Van der Rohe believed, though, that occasionally the structural engineer, such as with Pier Luigi Nervi, performed a higher function as a co-designer, than the other type of engineers in establishing the partis of the scheme. [165]Architectural historians were equally convinced that the engineer was a figure of primary importance in the building process:

> It is necessary to declare that no theory of modern architecture can be logically complete which does not postulate the collaboration immediate or remote, of architect and engineer. And here collaboration must stand for the design of components in factories as well as the personal achievements of a Nervi or a Candela. [166]

Famed architect Eric Mendelsohn echoed Summerson's words:

> The relationship between design and construction cannot turn into a positive challenge unless the engineer is receptive to both of them. [167]

Later in the 1950s, Italian engineer Pier Luigi Nervi advocated teamwork between the architect, engineer, and contractor to yield an integrated product and prevent the construction of architectural visions contrary to engineering rationality and building economics. Like many of his contemporary colleagues, however, he made his argument on pure technical grounds, structuring his own practice along traditional lines with him at the head of an office that failed to outlive him as the founder. Many of these admired engineers fell in the same authorship trap that architects were being charged with.

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[165] Puente, Moises. *Conversations with Mies Van der Rohe*. New York: Princeton Architectural Press, 2008. p. 24;

[166] Summerson, John. John. "The Case for a Theory of 'Modern' Architecture.", *The Unromantic Castle and Other Essays*. London: Thames & Hudson, 1990. Originally published in the *Royal Institute of British Architects Journal*, June 1957, p. 265;

[167] Mendelsohn, Erich, quoted in Guy Battle and Christopher McCarthy in "Die Fassade als Klimamodulator." *Arch+*, No. 113, September 1993. Citation quoted in Sommer, Degenhard, Stöcher, Herbert, and Weisser, Lutz. *Ove Arup & Partners. Engineering the Built Environment*. Basel, Berlin, Boston: Birkhauser Verlag, 1994, p. 17;

Arup took a different path from his peers, establishing a practice on the basis of an alternative mindset. His ideas touched two critical areas of the ecosystem surrounding the division of labor in the profession and the world of construction: the role of the engineer in the design process and the conception of the building as the outcome of concurrent, rather than sequential design.

Regarding the first area of concern, from the start of his practice, Arup positioned his role in the design process as that of consultant to the architect. This was particularly effective in staking out an area of direct design without interfering in the territoriality of the design authorship of utmost importance to the architect. The non-threatening nature of his claim allowed him to be fully participant in the early stages of the design process without displacing the architect in the established social custom of assigning credit for a design. Additionally, it secured a position of neutrality to the firm should the design turn out to be contentious in the outcome. Tellingly, in an interview that noted British architectural historian Charles Jencks conducted with Jack Zunz, a partner who joined Ove Arup and Partners in 1965, this position was declared in no uncertain terms. When Jencks pressed the engineer on how he saw the firm's responsibility in the controversial design of the Park Hill, Sheffield housing scheme, something the historian labeled "the unacceptable face of Modernism"[168], the engineer responded:

> I don't think we are culpable. If these schemes are unacceptable, and don't forget there was a great deal of theorising at the time which seemed to indicate that this was just the right type of housing that was needed, then surely sociologists, clients, planners and architects must be responsible. Our contribution is engineering: the decision as to what is to be built is not in our hands. [169]

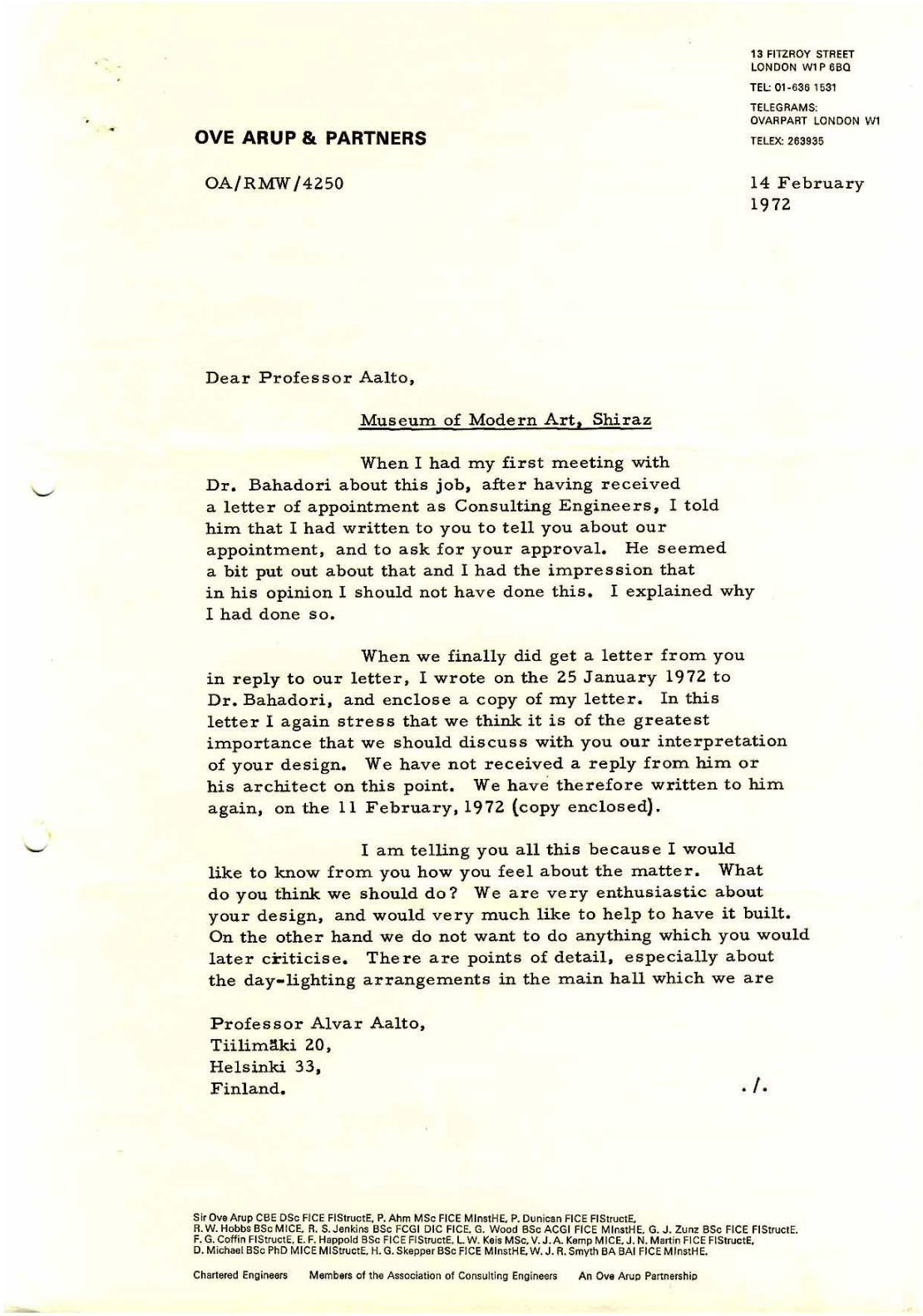
This position and approach have remained unchanged to this day in the firm. As an illustrative example of this point was the interaction that Ove Arup had with Finnish architect Alvar Aalto in the design of the Museum of Modern Art in Shiraz, Iran, an unrealized project. Arup wrote a personal letter to Aalto stating: "We are very enthusiastic about your design and would very much like to help to have it built. On the other hand, we do not want to do anything which you would later criticize. There are points of detail, especially about the day-lighting arrangements in the main hall, which we are not quite clear about- in fact there are a number of points on which we would like to have your views." (Fig.1 and 2). Arup maintained deference to the authority of Aalto on design matters, while carving out room for material changes in that design resulting from technical demands. In a typewritten summary of a meeting held on the 4th and 5th of April 1972 in Helsinki in Aalto's office on that project in the presence also of Hamilkar Aalto, the architect's son and a structural engineer himself, the General section of the text reads:

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[168] Jencks, Charles. "The Aesthetics of Engineering. Charles Jencks Interviews Jack Zunz.", *Architectural Design (AD)*, Vol. 57, No. 11/12, 1987, p. 40;

[169] Jencks, Charles. Ibid., p. 40;

- Professor Aalto stated that he was pleased for Ove Arup and Partners to act as structural engineers on the Iran Museum of Modern Art;
- Professor Aalto explained that he would not administer the working design and construction stages of the project, and that these would, therefore, be the responsibility of others;
- Professor Aalto agreed to the principle of any changes in detail that Ove Arup and Partners considered necessary for structural reasons, providing that the overall concept was not changed;
- Sir Ove Arup promised to keep Professor Aalto informed of progress on the project;
- Professor Aalto offered his further participation in special matters by commenting on drawings or by further discussions. (Figure 3)



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OVE ARUP & PARTNERS

OA/RMW/4250

14 February
1972

Dear Professor Aalto,

Museum of Modern Art, Shiraz

When I had my first meeting with Dr. Bahadori about this job, after having received a letter of appointment as Consulting Engineers, I told him that I had written to you to tell you about our appointment, and to ask for your approval. He seemed a bit put out about that and I had the impression that in his opinion I should not have done this. I explained why I had done so.

When we finally did get a letter from you in reply to our letter, I wrote on the 25 January 1972 to Dr. Bahadori, and enclose a copy of my letter. In this letter I again stress that we think it is of the greatest importance that we should discuss with you our interpretation of your design. We have not received a reply from him or his architect on this point. We have therefore written to him again, on the 11 February, 1972 (copy enclosed).

I am telling you all this because I would like to know from you how you feel about the matter. What do you think we should do? We are very enthusiastic about your design, and would very much like to help to have it built. On the other hand we do not want to do anything which you would later criticise. There are points of detail, especially about the day-lighting arrangements in the main hall which we are

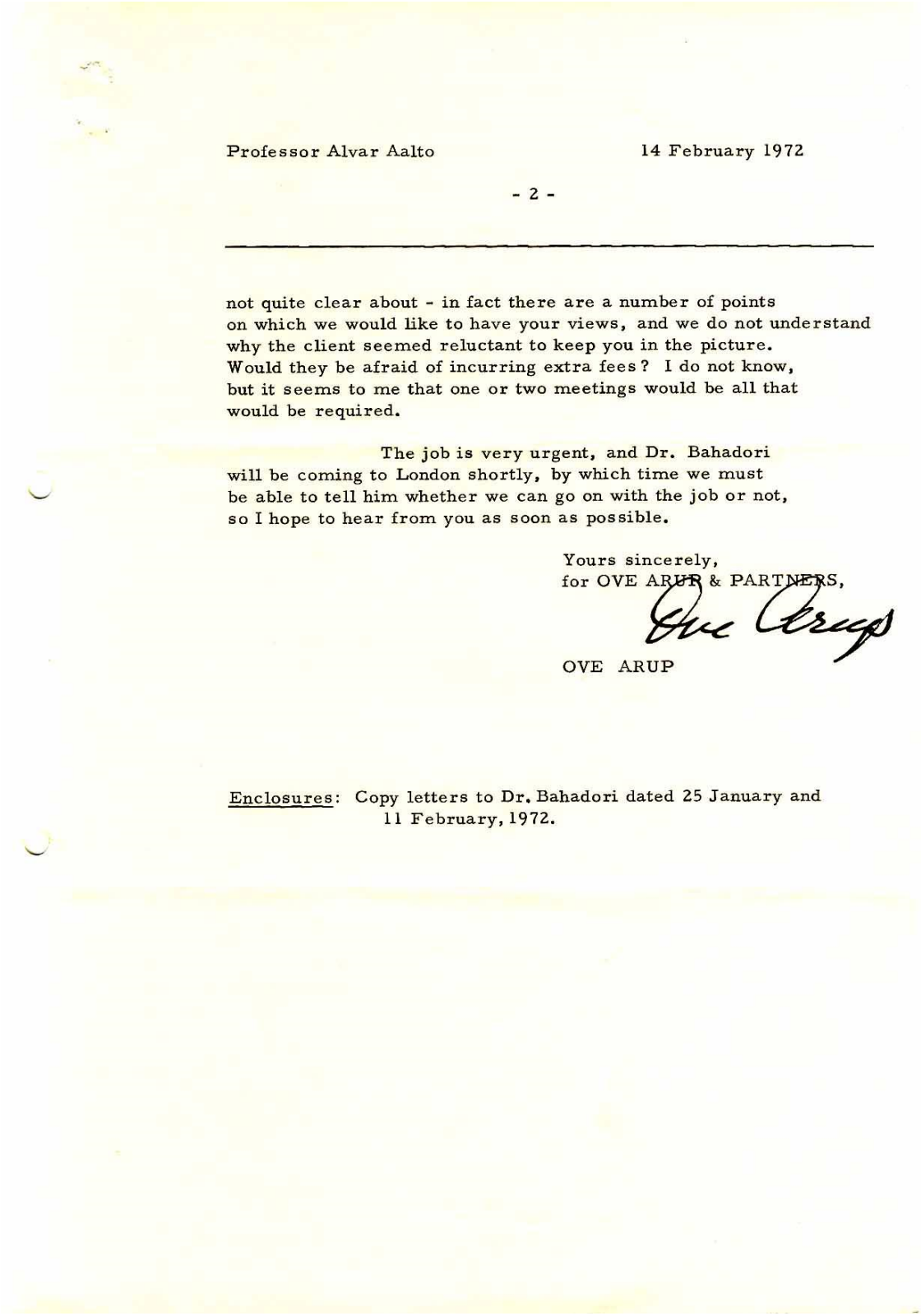
Professor Alvar Aalto,
Tiilimäki 20,
Helsinki 33,
Finland.

./.

Sir Ove Arup CBE DSc FICE FIStructE, P. Ahm MSc FICE MInstHE, P. Dunican FICE FIStructE,
R. W. Hobbs BSc MICE, R. S. Jenkins BSc FCGI DIC FICE, G. Wood BSc ACGI FICE MInstHE, G. J. Zunz BSc FICE FIStructE.
F. G. Coffin FIStructE, E. F. Happold BSc FICE FIStructE, L. W. Keis MSc, V. J. A. Kemp MICE, J. N. Martin FICE FIStructE,
D. Michael BSc PhD MICE MIStructE, H. G. Skepper BSc FICE MInstHE, W. J. R. Smyth BA BAI FICE MInstHE.

Chartered Engineers Members of the Association of Consulting Engineers An Ove Arup Partnership

Figure 1. LETTER OF OVE ARUP TO ALVAR AALTO, DATED 14 FEBRUARY 1972. PAGE 1. COURTESY OF THE ALVAR AALTO FOUNDATION.



Professor Alvar Aalto 14 February 1972

- 2 -

not quite clear about - in fact there are a number of points on which we would like to have your views, and we do not understand why the client seemed reluctant to keep you in the picture. Would they be afraid of incurring extra fees? I do not know, but it seems to me that one or two meetings would be all that would be required.

The job is very urgent, and Dr. Bahadori will be coming to London shortly, by which time we must be able to tell him whether we can go on with the job or not, so I hope to hear from you as soon as possible.

Yours sincerely,
for OVE ARUP & PARTNERS,

OVE ARUP

Enclosures: Copy letters to Dr. Bahadori dated 25 January and 11 February, 1972.

Figure 2. LETTER OF OVE ARUP TO ALVAR AALTO, DATED 14 FEBRUARY 1972. PAGE 2. COURTESY OF THE ALVAR AALTO FOUNDATION.

OVE ARUP & PARTNERS

MUSEUM OF MODERN ARTS - SHIRAZ

Summary of Discussions with Professor Alvar Aalto in Helsinki on 4th and 5th April 1972

Present:	Professor Alvar Aalto	Architect
	Mr. Suihkonen	"
	Mr. Hamilkar Aalto	Engineer
	Mr. Aarne Hollmen	Bureau M. Malmberg
	Sir Ove Arup	Ove Arup & Partners
	Mr. Peter Ayres	"

General

1. Professor Aalto stated that he was pleased for Ove Arup and Partners to act as structural engineers on the Iran Museum of Modern Arts.

2. Professor Aalto explained that he would not administer the working design and construction stages of the project, and that these would, therefore, be the responsibility of others.

3. Professor Aalto agreed to the principle of any changes in detail that Ove Arup and Partners considered necessary for structural reasons, providing that the overall concept was not changed.

4. Sir Ove Arup promised to keep Professor Aalto informed of progress on the project.

5. Professor Aalto offered his further participation in special matters by commenting on drawings or by further discussions.

Detail

6. Professor Aalto stated the importance to his design of the colour and nature of the brick. The brick must also be strong and durable enough. It must be approved architecturally as well as technically before the design proceeds. If a suitable brick cannot be found an alternative finish must be sought.

Figure 3. SUMMARY OF DISCUSSIONS WITH PROFESSOR ALVAR AALTO ON THE 4TH AND 5TH OF APRIL 1972. COURTESY OF THE ALVAR AALTO FOUNDATION.

The second area of concern was equally consequential for how his firm operated in the design of any modern building, understood as the amalgamation of engineering systems. The founder saw the building as the outcome of unified knowledge domains taught separately in engineering, yet of concurrent impact on its functionality and efficiency. Bypassing the customary emphasis on one branch of engineering at the expense of others (such as structural engineering being a primary concern over mechanical and electrical) in design was a necessary step to intervene in a multidisciplinary fashion on the making of a building. Meeting these competing challenges all at once in a balanced way was a more enduring response than prioritizing one area (structural for example) downplaying the impact of adjacent areas of engineering just as important for the final product. As a result, Arup set up an organization that over time would increasingly expand its offering of professional services to its clients so as to encompass as many engineering specialties as possible, periodically recalibrating due technological advancements and changing needs. This built-in mechanism of regulated expansion has maintained the company on a constant ascent in terms of revenues and complexity of high-profile projects involved since its very beginning, even with the added complication of growing a bigger and bigger workforce.

The writings of Arup added an unusual moral dimension to the culture of the company. Even though it was a business enterprise from the onset, his essays and speeches were speculative in nature and instrumental in instilling a sense of group cohesion in the staff. Their effectiveness in creating allegiance to the organization and its guiding principles has been remarkable as they remain current in the company culture. Arup's literary contributions are a central part of his legacy just as much as the body of work his practice completed during his lifetime and beyond. He was a prolific writer and authored a number of seminal articles [170] that established the philosophical stance his fellow engineers and collaborators abode by, and still do. In crafting a new standard of engineering services, he outlined a series of guidelines antithetical to the prevailing architectural tropes in an effort to rewrite the roles and responsibilities of the parties involved in the development process. For Arup, stardom was divisive, whereas teamwork was not. He called for an internal renunciation of any personal ambition to public visibility for the benefit of the firm seen as a united community. "Good Design should embody a sensible way of building," [171]Arup penned this as a reaction to the modernist dogma *Form Follows Function* pointing to a conception of the building as an organism designed by considering equally all the systems that it entails.

The establishment of a library in the London office in 1959 formally sanctioned the importance that Arup assigned to texts, his own and those of others, in the construction of his identity as a critical thinker and as the head of his firm. His life-long pursuit of art and a sensitive way of building that was both logical in its tectonic quality

[170] Tonks, Nigel. *Ove Arup: Philosophy of Design*. Munich, Germany: Prestel, 2012;

[171] Arup, Ove. "Art and Architecture: The Architect: Engineer Relationship." *RIBA Journal,* no.1 (August 1966), pp. 351-359. Full address given by Ove Arup on receiving the Royal Gold Medal 'For Service to Architecture' on 21 June 1966, p.352;

and sound in the economics of construction was at the basis of his practice, predicated also on ongoing education in design and technological literacy. In March 1966, the first issue of *The Arup Journal* was published. Its launch was the culmination of a desire to promote connectivity and knowledge sharing in the workforce between the London office and the satellite branches that kept being opened at a fast pace around the world. Even though since the introduction of web technologies in the office most of the knowledge sharing takes place through a vast intranet, *The Arup Journal* keeps remaining a central document gathering the collection of accomplishments that this organization has achieved so as to cumulatively build the firm's institutional memory for the present and future generations. With 193 issues published to date, its primary purpose was to consolidate the internal culture of Arup, while also being an effective marketing tool to forge new alliances with the emerging voices in design as well as strengthening existing working relationships. "Enthusiasm is a necessary lubricant for any collaboration" [172]Arup wrote, reminding the reader that collaboration is a human matter, autonomous from the technology of the time. Yet, with a staff turnover of about 1 in 10 each year and distinct annual growth in numbers, more than a quarter of the staff typically had less than two years in the firm. The construction of a common culture was vital to secure staff retention and a sense of collective purpose.

A sample of quotes from a few essays Ove Arup wrote over the years provide an overview of the ethos permeating the firm concerning communication, the role of the engineer and the architect and their dynamic, as well as teamwork:

- "Communicating ideas is a technical, but also a psychological requirement for successful collaboration." [173]
- "The work ethic of each Arup office rests primarily on the engineers' individual technical achievements and the combination of these personal efforts for the sake of a communal benefit." [174]
- "…architectural design is much more complicated than engineering design. This is mainly because engineering structures cater for the forces of gravity and other natural phenomena, whereas buildings cater for people. And people are complicated. The engineer need not bother about the purpose of the design- he is told what is required." [175]
- "The architect, whose main concern is art and commodity, often in that order- produces the sketch-design which is based on the data available to him, and the engineer and other specialists add their solutions to the technical problems. This works and if the collaboration is good, it can give excellent results."[176]

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[172] Arup, Ove. Ibid., p.353;

[173] Sommer, Degenhard, Stöcher, Herbert, and Weisser, Lutz. *Ove Arup & Partners. Engineering the Built Environment*. Basel, Berlin, Boston: Birkhauser Verlag, 1994, p. 17;

[174] Sommer, Degenhard, Stöcher, Herbert, and Weisser, Lutz. Ibid., p. 17;

[175] Arup, Ove. "Art and Architecture: The Architect: Engineer Relationship." *RIBA Journal,* no.1 (August 1966), p.355;

[176] Arup, Ove. Ibid., p.355;

- "Architects should think of themselves as master builders." [177]
- "Architectural reputations are built on art, not on technology." [178]
- "The architect, therefore, should shed some of his habits to make him team worthy." [179]

In Arup's body of writings, the chief document is the *Key Speech*. [180]He drafted this text on the occasion of a talk he gave on July 9, 1970, in Winchester, England, at a partners' meeting when the firm was going through a generational transition of ownership. Ever since its publication, this foundational article gained a unique function: it was expected that each person joining Arup would read its content to learn what the firm was about and its priorities. The Arup leadership upheld the founder's philosophy since it was formally introduced in the company culture and continues to do so, expanding its outreach as needs change over time. The six principles listed in that manuscript were:

- Quality of work;
- Total architecture;
- Humane organization;
- Straight and honorable dealings;
- Social usefulness;
- Reasonable prosperity of members.

In those principles, the founding partner outlined the moral program of the firm for the decades to come and continues to provide the guidelines for the organization today. Writing and publishing in a structured way through the *Arup Journal* since the mid-1960s and other initiatives was an ideological glue that promoted cohesiveness in the firm. It helped to stay the course for a company which was both a business enterprise and a professional laboratory where people with uncommon talent in their respective fields could coexist and work together on projects.

In 1974, Arup received an honorary doctorate in his engineering school, Polyteknisk Læreanstalt in Copenhagen. On that occasion he gave a speech where he made two critical remarks on collaboration as he reflected on his relationship with Lubetkin, encapsulating both his ideas and the reason why he structured his practice as he did:

> The significance of Highpoint, for me, lay in the almost perfect integration of architecture, structure, and building method. It happened in this case because there was an unusually close collaboration between Lubetkin and myself; because between us we possessed- within the limits of this particular job- all the artistic and technical knowledge

[177] Arup, Ove. Ibid., p.355;
[178] Arup, Ove. Ibid., p.355;
[179] Arup, Ove. Ibid., p.359;
[180] Arup, Ove. "The Key Speech", The Arup Journal, Vol. 5, No. 4 (December 1970), p.2-5;

required; and because we had the authority to make all the necessary decisions, limited only by the budget. It is pretty unusual for all these conditions to be fulfilled at once… [181]

In the same speech, Arup later added:

I started on my prolonged effort to persuade people, by means of lectures and articles, of the need for architects and engineers to collaborate from the start. A work of art could only be produced through a proper mutual understanding and pooling of ideas, since the structure was an integral part of the architecture. And indeed, nobody really tried to contradict me, they all agreed – only it didn't in practice change anything, or at least, only extremely slowly. [182]

Methodology

Non-participant observation, interviews, and participant observation working directly on an architectural project with Arup were the methods informing my data campaign retrieval. In the course of my research the office moved from its original location (the second and third floor of the same building where A+A was located) to a new location in 2010 in the South of Market area. My exposure to the firm on and off had been for ten years (from 20xx to 20xx) working directly with them both before and ? after my departure as an employee from A+A. I observed presentations of Arup engineers of several of their San Francisco projects, was invited to join their office holiday parties and weekly gatherings, took knowledge-sharing classes scheduled for their staff on both technical and speculative matters such as focus groups on broader questions regarding the future of the built environment and associated needs, participated in project meetings related to a variety of health care and academic projects, attended Thought Leadership events scheduled on a semi-regular basis in the office, was involved in brainstorming sessions between engineers and architects, and was exposed over the years to the content of the *Arup Journal*. I conducted both informal and structured interviews as the Arup office was located on the 2nd floor of the same building where the firm of my third case study in this dissertation, A+A, was headquartered. I had daily exposure to the company staff during the working week. My main informants were business developers, structural and mechanical engineers at partner levels, marketing operators, and professional staff at all levels of experience. Extensive interviewing took place with a Senior Partner who held a Ph.D. in Mechanical Engineering and was an Arup Fellow, and with a Senior Marketing Director. They both had vast inside knowledge of the firm's inner workings and had direct access to clients.

The Setting

At present, the Arup conglomerate has a three- level hierarchy of governance. A central board headquartered in London represents the highest level. At the second level there is a separate board for each of the five regions, all reporting to London. A separate board for each office is the third level, and its body reports to the national board. In 1977, the founding partner and the other five partners, Peter Dunican, Bob Hobbs, Jack Zunz,

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[181] Arup, Ove. "The Philosophy and Art of Building." Speech given at the Polyteknisk Læreanstalt in Copenhagen, in Arup, Ove N., Morreau, Patrick, and Zunz, Jack. *Ove Arup. 1895-1988*. London, United Kingdom: Institution of Civil Engineers, 1995, p. 21;

[182] Arup, Ove. Ibid., p.22;

Povl Ahm and Philip Dowson, agreed unanimously to reshape the business structure of the firm. They sold their individual shares to the organization for a symbolic amount and turned it into an employee-owned non-profit company. By 1979 all the necessary paperwork was completed for that ownership transition. A trust was set up with no individual shareholders or external advisor. It was Ove Arup himself that initiated the internal discussion that developed into a binding agreement to avert the risks associated with ownership changes. This business reorganization already reflected existing and long-established practices in the fair financial distribution of the firm's profits with the workforce in an egalitarian spirit. As of 2023, this organization has 91 offices on five continents, and each office is tapped for the individual expertise it can bring to a particular project. It employs 15,608 individuals (Feb 6, 2023) assigned to cover the entire spectrum of all branches of engineering covering the full spectrum impacting the built environment across five regions: Americas, Australasia, East Asia, Europe, and UKMEA (acronym for United Kingdom, Middle East, and Africa). The firm also has an architecture division called Arup Associates providing the full range of architectural and engineering services. This architectural branch, however, represents a negligible portion of the overall revenues the firm brings in annually. The Arup leadership encourages staff members to move among the offices spread around the world and get exposure to the broad range of projects the company is undertaking, having direct experience of how multidisciplinary expertise available in the firm is activated to work out all aspects of the design at hand. London, the main headquarters of Arup, gets 15% of the revenues of each job from the network of offices. Partners are typically brought in from the early days of their professional career, reared in the firm to retain the core values of the organization, and instill them in the new generations. There have been some cases of partners coming from the other offices. While the firm remains collaborative at its core, it occasionally lets individual figures receive the limelight of celebrity and public recognition. Irish structural engineer Peter Rice (1935-1992) and Sri Lankan/British engineer Cecil Balmond- who retired from the firm in 2010 after 40 years of service to go on his own- are two of the most visible examples of creatives retaining their allegiance to the Arup group while trying to emerge as design creatives in a broader community and enjoy direct credit for their artistic endeavors.

Former chairman of the Board Director of Arup Group from 1995 to 2000, Michael Duncan drafted an unpublished document circulated internally within the Arup Group's staff at the time of this study. It explained the rationale behind the form of ownership started in 1979 and illustrated the genesis for the organization's autonomy from potential acquisitions and ownership transitions. An extensive passage follows:

> We have to go back maybe 40 years to see why and how Arup has come to have its current form of ownership. In 1946 at the age of 51 Ove Arup started what is now Arup Group. He and his colleagues attracted a lot of interesting engineering design projects, in various countries, and attracted many bright young people. He soon shared his ownership with a few other engineers in partnership. It was a special business, not nearly as big or capable as we are today but maybe with more edge to it. The partners would have been debating how to keep the miracle going. The passage of time is irresistible, and something had to be done to give our future its best chance. Choices would have included selling out, letting it pass to the partners' families, letting new partners buy in, breaking

> up and so on. None of these appealed enough, one has to conclude. With widely varying family situations, with high taxes and with the difficulty of accumulating capital in the business to finance the opportunities, along with the large amount of talent in the staff, we can see in the clarity of hindsight that none of these would have been a good way ahead. The search was for an arrangement that would keep control in the hands of the practitioners working in the firm whilst gaining for the firm the maximum freedom to develop itself. That control was to be with only a few, the best people - whatever that means. Independence from outside ownership was to be used to let us develop freely. [183]

As of August 2009, there were 221 people on staff in Arup San Francisco, with thirteen principals. The following engineering branches were represented: Risk, Mechanical, Electrical, Transport, Planning, Acoustics, Environmental, Geotechnical, Foresight Innovation, Fire, Lighting, Civil, Infrastructure, Public Health/Plumbing. Additionally, administrative functions were subdivided into: Administration, Human Resources, Marketing, Finance, Facilities Management. Miscellaneous areas such as CAD, Information Technology, Research & Knowledge Management, Cost Estimating, Quality Systems, Quality Assurance, and Project Management were of support to the functioning of the engineering's capabilities. To the core group of employees, contract workers were intermittently brought in so as to carry out work in excess of the current staff capabilities to perform it. By hiring temporary workers, the cold practice of sudden layoffs of the core workforce observed in SOM was eliminated. The office was very collaborative both internally and externally. Mentoring happened as a matter of course. There was decisively less territoriality about design authorship than in the architectural offices surveyed for this dissertation. Over time, I observed that the working atmosphere was consistently cordial in the office. At the time of observation, the California Academy of Sciences by Renzo Piano Building Workshop was one of the projects Arup was involved in. That commission was an opportunity for firmwide updates on an ongoing basis to let the workforce know both progress on its design and construction and lessons learned. Those venues were also recurring occasions for social gatherings and bonding. The sense of the collective was palpable with principals being approachable and friendly to the staff members.

For Arup the open plan format was the standard layout for the office arrangement (Fig. 4 and 5).

[183] Duncan, Michael. "The Trust Ownership of Arup Group", undated document circulated in the firm at the time of the investigation for staff to read;

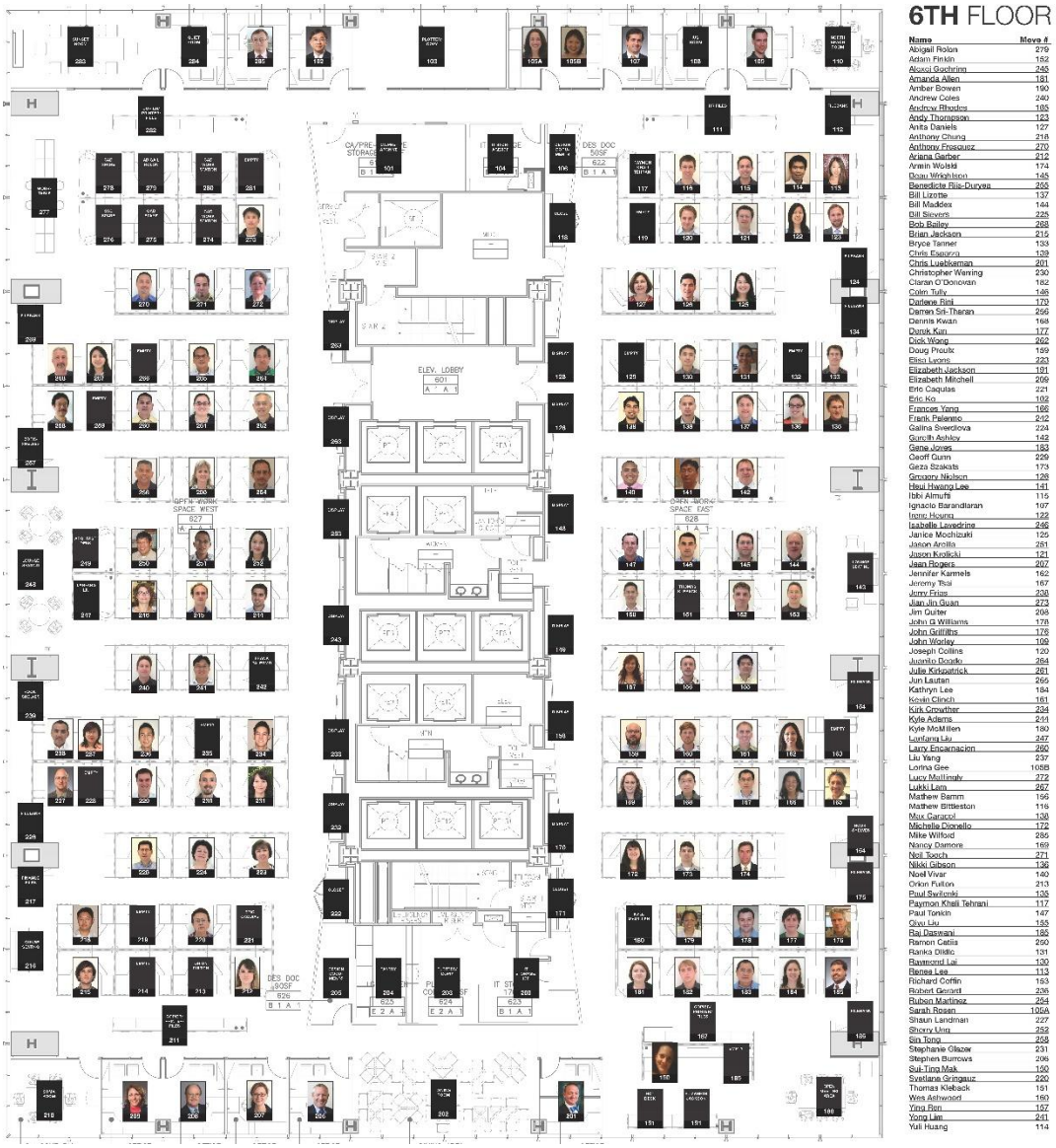


Figure 4 SIXTH FLOOR PLAN OF THE ARUP OFFICE IN SAN FRANCISCO

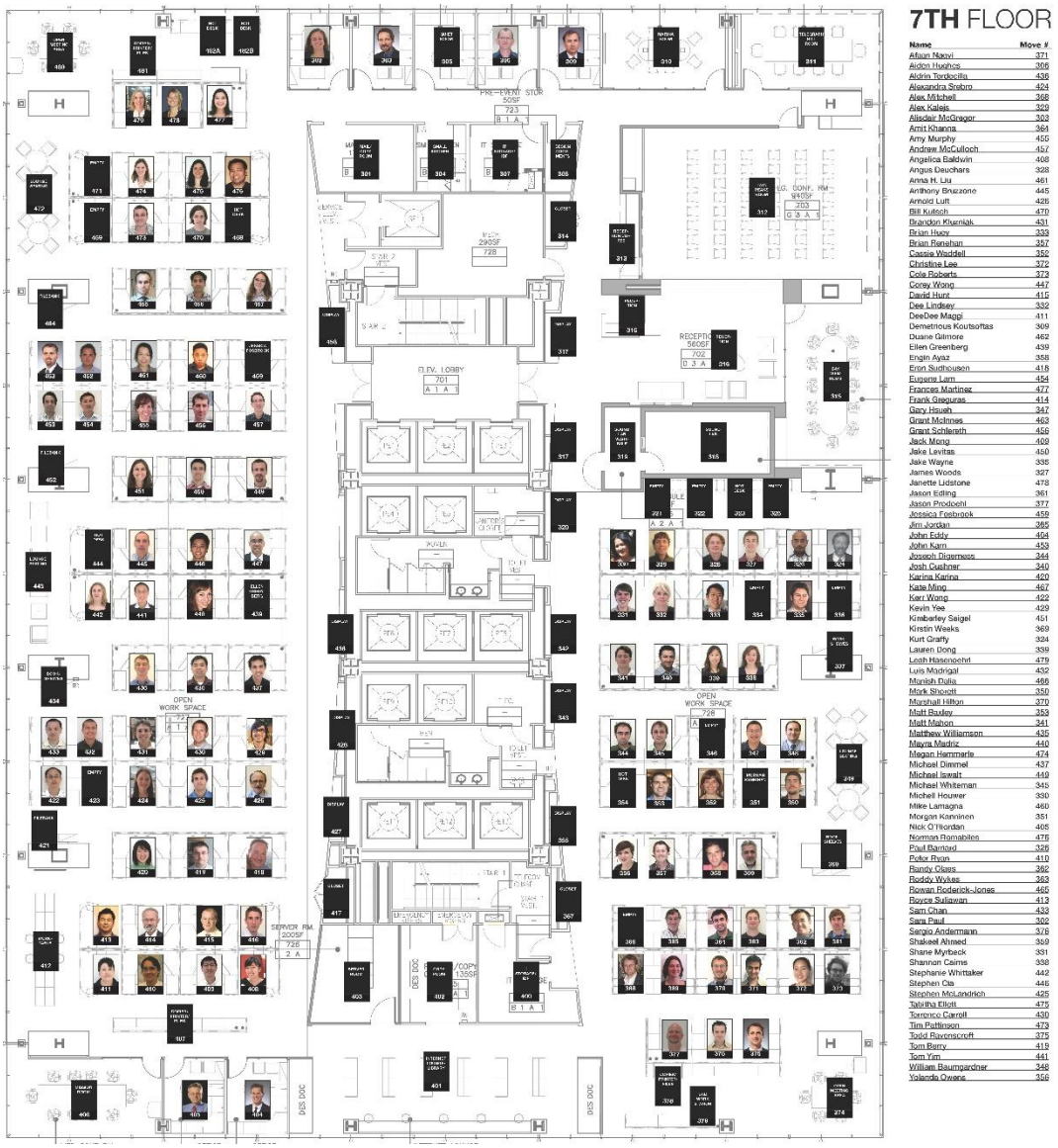


Figure 5. SEVENTH FLOOR PLAN OF THE ARUP OFFICE IN SAN FRANCISCO

The areas represented in the staff of the San Francisco office of Arup were: Mechanical (29 people), Civil (28), Structural (19), Environmental (11), Geotechnical (11), Electrical (10), Transport Planning (10), Acoustics (9), Risk (8), Fire (7), Bridges (5), Plumbing (5), Lighting (4), Facilities Management (3), Infrastructure (2), Quality Assurance (1), Tunnelling (1), Water (1), Façade (1), Foresight Innovation (1), and Research and Knowledge Management (1). Of support to the engineers and to the office operations, there were: CAD operators (15), Administration (12), Marketing (8), IT (6), Finances (5), Human Resources (4), Facilities (3), and Project Management (1). The ruling body was composed of thirteen principals from the various engineering branches. Three of them were structural engineers, despite their subgroup being the third in size of

their specific branch of knowledge. There were also thirteen Associate Principals, whereas there were no architects on staff.

This knowledge sharing at the micro and macro level was a practice that Ove Arup specifically emphasized in his 1966 speech at the Royal Institute of British Architects when he was awarded the Gold Medal on Architecture. Coincidentally, 1966 was the year when the first issue of *The Arup Journal* came out. In that delivery, Arup said:

> …I do suggest that, if all the members of all the different offices and firms contributing to our environment could be made aware of, and respect what the others are doing, and could join in wanting to create total architecture in the best sense- could in fact be made team worthy- then our joint efforts, in whatever combination, might be able to create a better environment for man. [184]

Curiously, in the current setting, cubicles were still used on an open floor. Accounting, Human Resources, Meeting Rooms, and Principals offices were closed environments. Mechanical, structural, and electrical engineers were seated in a mix of disciplines. Seating did not happen by grouping engineers per project.

There were two major office parties: one at Christmas and one during the summer. Monthly staff meetings, typically on Friday morning, were scheduled to inform personnel about a variety of initiatives from the local office and from the Arup network of branches. Just like the other case studies, these parties were rituals to promote bond and a sense of belonging in the staff. Achievements and celebrations were staged and cheered as a collective award. They characteristically happened in the largest spaces where maximum participation of the personnel could be accommodated, and widest visibility could be attained. The spectacle of the accomplishments was a constant reminder to the staff about the quality of work Arup was involved in and the growth opportunity for each employee. Unless they were scheduled for some emergency announcements (upcoming layoffs or critical internal changes that were time sensitive) these venues usually took place toward the end of the week.

The required connectivity between team members largely took place through in-person meetings and the web. A digital bulletin board in the Intranet connecting all the Arup engineers around the world was used to upload technical questions looking for answers from those who tackled similar issues in other offices within the Arup network. Consistent with the founder's belief, knowledge sharing remained a mainstay for all the offices in the Arup Group. The Intranet was also designed to capture in a stable and retrievable form as much knowledge as possible from the senior professionals prior to either their retirement or their professional move to a different firm. When a particular engineer problem came up, a question was posted on the Intranet (then called OVANET) and someone somewhere in the world from the Arup community would provide the answer with technical documentation and case studies on where that suggested solution

[184] Arup, Ove. "Art and Architecture: The Architect: Engineer Relationship." *RIBA Journal,* no.1 (August 1966), pp. 351-359. Full address given by Ove Arup on receiving the Royal Gold Medal 'For Service to Architecture' on 21 June 1966, p.359.

had been implemented before. Mining the global expertise of the firm rapidly was its major strength as it extended its technical capabilities exponentially compared to its competitors.

Since a large number of schemes were innovative in nature, during my study I was informed that Arup routinely submitted its projects for building permits using the performance code as opposed to the prescriptive code. While the latter required the strict adherence to the use of the exact terms for each building component and their assembly as described in the building code, the former called for the engineers to prove that their solution could meet the building code requirements for all parts of that construction. Arup was organized to meet, and, often by their own choice, exceed those requirements using the performance methods as part of their standard of practice.

Part of the knowledge sharing also took place during lunch time meetings where employees sought feedback from their colleagues or disseminated lessons learned for the firm's overall benefit. Lastly, given the considerable level of expertise the senior employees in the firm had, once they reached retirement, they remained connected to the organization as consultants, making their knowledge and experience still available to Arup.

As of 2024, the Arup Group has twelve offices in the United States with over 2,000 people on staff. The company opened its first office in the United States in 1985 in San Francisco through the direct invitation of Derek Parker, partner at A+A, to team up to get the commission for the Community Hospital in Clovis, California. A New York office opened shortly after, consulting on the overseas work of New York-based architects. Through business development and personal alliances, the company expanded rapidly on North American soil. The Seattle office, I was told, was the result of a connection made in California. More than 50% of the projects the firm had were repeat work from clients with whom Arup had an ongoing working relationship. Then as now, Arup primarily acted as a consultant to the architects for architectural commissions. It acted as a prime, instead, for infrastructural works. One such case was the Central Utility Plant for the University of California Merced, with Skidmore, Owings & Merrill as the architectural design consultants. "Finally, the world is in order!" One of the ARUP partners said to me jokingly during one of my interviews, as a commentary on the different culture engineers and architects had in their respective camps. Very early on in the firm's life, the management level made the conscious decision to take a step back from marketing architecture as a primary service of the organization. While upper management did not forecast growth projection in general terms for the firm, it identified profit level targets. Although Arup is one of the most expensive engineering groups in the marketplace, owners typically perceive value in their expertise for their program intensive buildings.

Typically, the team structure comprised a single project manager coordinating the different types of engineers involved in the project. The right mix for the team was essential according to the staffing experts for smooth and efficient workflow. Already in these team experiences, there was a search for prospective future leaders to secure the

firm's survival and have the next generation take on its governance as the older guard came close to retirement. Management was keen on having all team members go from Schematic Design all the way through Construction Documents (CD) and Construction Administration (CA) for the same project. It was the partners' belief that deskilling of staff took place as a result of the team involved in the early design not having exposure to the CD and CA phases for their project. As a business practice, the preference of the firm's upper management was to have the firm involved from conceptual design through CA, but that scenario was a function of the project budget the client had. Clarity of role and responsibilities as well as planning were cornerstones of the firm's engagement as consultants to the architects: "Fuzzy stuff is uncomfortable to engineers!", one of the partners told me. For them, a $20—25 million design-build was a feasible model, where the performance of work per the firm's standards could be achieved and the training of project managers to govern multidisciplinary teams could take place. Multidisciplinary ways of working were routinely encouraged.

One of my informants was a firm's principal with the title of Director for Global Foresight and Innovation. His formal education comprised a Ph.D. in architecture and studies in geology and engineering. He held a unique position within the firm in the Research & Knowledge Management area. He periodically traveled to visit all the Arup offices around the world conducting focus groups with their local employees on specific themes and retrieving data on a variety of societal indicators. Primary goal of these trips was to gather information about the most pressing concerns the workforce perceived in their region and how they could be scaled so as to ground predictions on future developments and offer professional services to clients that would help them achieve their goal. At the end of these tours, the accumulated records were organized and tabulated to produce forecasting on areas where Arup would eventually do further Research and Development work so as to expand their design footprint. Since 2006, these findings have been periodically published- in the first two editions in a 5x7 format set of cards under the title "Drivers of Change"- with data organized under Social, Technology, Environment, Economic, and Political headings. Over time the scope of the research widened to capture content related to specific sectors or areas that would be having long-lasting effects on future developments, such as Food, Oceans, Climate Change, Security, Population Growth and Distribution. When first introduced, the publication of this worldwide effort was announced with firmwide announcements in the San Francisco office, where the principal tasked to spearhead this data collection and to synthesize them for the practice was permanently based, but virtually always absent (because on the road). Non-Arup affiliated professionals were also invited to learn about the findings in an Arup organized venue.

His deliveries- I attended a few of them- were characteristically imbued with the rhetoric of the futurologist and the clairvoyant. The lexicon he adopted was largely borrowed from scientific literature, conveying to his audience unbound enthusiasm for what was next to come based on the data collected. He compiled vast amounts of information on a variety of indicators retrieved at a global scale. Once the data was processed and tabulated, it provided the firm with a projection of needs for the medium-term future. This would help Arup offer professional services designed to attend to those

needs and to protect the interests of the stakeholders. In one of the workshops I participated, he stated that based on scientific findings coming from Stanford University, children born in the year he was giving his talk were predicted to have a lifespan of 120 years, something to which the spectators, mostly in their late twenties and thirties were particularly receptive, especially as young parents. Allegedly grounded on fieldwork and statistics, other statements of similar appeal peppered his delivery, projecting an effective image of both him having a reliable pulse on large-scale factors affecting the environment and the trajectory of Arup as a research-based practice positioned to capitalize on this collected content. By apportioning parts of its earnings to fund non-project related studies to gain reliable forecasting on the world's future needs, the practice could modify the professional services it would offer to its clients globally and retain its leading role in the marketplace.

The Key Interview with a Senior Principal at Arup San Francisco

What follows is an excerpt from an extended interview I conducted with one of the most senior principals in the firm, now a consultant to the organization. Although I had multiple exchanges with this source over my extended period doing fieldwork, I explicitly requested a meeting to discuss the culture of the firm as he saw it and the organization's overall functioning. Born in the United Kingdom, he earned an undergraduate degree in Civil Engineering and a Ph.D. in Mechanical Engineering at Leeds University, spent all his professional career in Arup, and took on a leadership role on a global scale. He joined the firm in 1981 and was stationed in London for seven years working directly with Peter Rice, one of the most notable structural engineers in the company's history, and Tom Barker, a renowned mechanical engineer who worked on the Pompidou Center. The first project my informant was involved with when he started in the firm's headquarters was the Lloyd's of London by Richard Rogers, architect.

My informant spoke about buildings as integrated energy systems to reduce their carbon footprint, a fusion of cognitive areas of which architecture was part of. His views reflected a firmwide approach to design as well as the long-term goals of their work. He also articulated an array of strategies for the firm to retain its competitive advantage and cachet against competitors. The text of the interview is grouped and formatted to link its content to headings highlighting the priorities ranked highest to sustain the organization in the marketplace.

Firm's Philosophy: from the Early Days to Today

The way Arup is corporately organized to thrive and survive is an important part of how we operate. Arup started as a structural firm. But even then, Ove (the founder) always had this idea of total collaboration. In the early days he was always working very closely with architects. He had worked for Christiani & Nielsen, who was a contractor for many years, so he had worked on the contracting side. He started Arup in his fifties. The firm started to spread out to multidisciplinary in the late 60s, early 70s. At that time, he came up with this phrase "Total Architecture," he called it. He basically meant with what he called Total Architecture that you consider all things equally. It is a total team approach. There is not a linear approach, striving just to get the best structural solution is not a good design, if it means you ignore everything else. You have to look beyond your

discipline. That philosophy is continued through. I am a mechanical engineer and just getting the mechanical engineering solution, "don't come back to me if you have a problem" attitude is not the way we want to think. We want to understand everything. A successful project is one that is working for the client, and it works well. That is a successful project for us. We try to accommodate design aspirations, dealing with architects as an equal partner from the start. We are reactive to the architect's idea, and from there we start a design dialogue. For us this is a form of ecological design.

Risk and Innovation

With risk, there's got to be a balance. We encourage innovation in the way we design. We encourage young people. If you have good ideas, come up with them and challenge your leader. At the same time, if someone is pursuing a new idea, it is about making sure that there is a safety net. You got someone senior to review it. So, someone would say "That is a great idea, but have you considered the following…?" Innovation requires the right client because there is risk in innovation. Not everything innovative ends up working. So, if you do not have a client who is prepared to share some risk it is a problem for us. We've been lucky to have some who wanted to do that. There are some variations across the offices about those branches that are more risk-prone and others that are more risk-averse, variations due to cultural climate and legal frameworks of where these practices exist. When I speak with clients and architects at conferences and social events, 90% of the time, they come to us because of the perceived ability to be creative and innovative. They are not coming to us to manage basic tasks. They precisely ask us that question: "How do you manage to keep being innovative?" We encourage innovation and an outcome onto some of the more formal structures. If we swung too much the other way, of being "don't take too risky projects" or "don't suggest any new ideas, when we can just drop out something that we've been doing the same thing for ten years", that short term would probably make us more profitable, but long term it would kill us. It would kill the reason why people come to us in the first place. We try using existing technologies in different ways and do these technological transfers to solve routine problems.

Arup Set-Up and Research Opportunities

We have an Innovation committee. The way we are set up is kind of unusual. From the mid-seventies as the practice expanded, the partners of the time basically pulled their equity, and the company was set up into an ownership structure of two trusts. One trust was set up to promote high quality design and the membership of this trust is somewhat democratic. People are recommended. What that means is that we are essentially an employee-owned firm. Any money we make we get to decide what to do with it. Whereas a lot of our big rivals in the eighties went into public ownership, which meant that they could generate a lot more cash quickly, which has some advantages, but then it meant that their future was not entirely in their hands. What happens is that whatever money we make, some goes into reserve, some goes into profit sharing. Everyone who works at Arup has access to profit sharing and the more senior you are the more shares you have. They are not sellable shares; it is really a profit-sharing scheme. But it is equal across the whole office and there is no incentive in terms of marketing to keep something secret from the Los Angeles office, because we are all on the same profit

scheme. Then the remaining money gets put into internal investment. So, we have a not inconsiderable sum of money that is available for internal investments and that can cover a range of things. If you got a great idea of something that needs a lot of work, you basically go on the Arup website and you fill out a grant application and depending on what area it is and what region it is, it gets funded by different groups. I actually sit on a committee that reviews the ones from America. Our Director of Research is the one advertising for research. We still have funds available for globally collaborative research projects. And collaborative research projects are those where we basically team up with universities or with several Arup offices. So, the work we do with the Center for the Built Environment in U.C. Berkeley is partially funded through that. We have those programs, and a big push is to make sure that people don't just do the work, but that it gets disseminated. I can give you one example of one that I was involved in promoting. It was about looking at this idea of heat rejection usage when we have underground parking, which these days is quite common in buildings and other environments. It is about putting a pipe mesh. A pipe mesh was something we developed for a job at Wall-Marts, for providing cooling. By taking that idea, instead of putting the pipes in the slab, it is much, much cheaper to put them in the basement walls and in the basement floor of an underground parking lot, and then running condensed water from the chillers to that and rejecting heat into the ground. It is a cheap way to do a ground source heat pump. So, we actually applied for a grant of $20,000 to do some computer analysis and modeling to basically generate design guidelines, so as to realistically comprehend what kind of climate you can use this in and how much heat you can reject. There are ideas like that. In our planning work, we integrated resource models, which is a way of being able at a very conceptual level to look at alternatives and say what the carbon footprint is of different ideas. Do you cluster all buildings here next to a transit or do you put them here where you have better access to sunlight, comparing different planning modules, for example, and actually come up with a numeric answer? That effort was all developed through our internal investment. The knowledge acquired through these research endeavors becomes available on our intranet. We have 2 to 3 applications for every grant that we can offer, therefore it is quite a rigorous process. Then we follow up. What we are doing next month is a meeting where we are reviewing projects that we have already funded here in America, and checking on people who haven't made any progress on the stuff they got funding for in April. We are taking your money and giving it to someone else. Because the difficult thing is, once you get approval to spend the money, you should treat it exactly the same way you treat an external project. These internal research projects have a job number and can be done during work hours. Otherwise, you find that if you entirely rely on developing innovative ideas as a hobby, it does not get very far and there is no real incentive to share, unless you are incredibly self-motivated, there is no motivation to share that information. We also encourage Arup employees to speak at conferences and provide travel money for that.

The Intranet

We have all these skills groups. Membership is open to these skills networks. I think I subscribe to five or six of them. For example, there exists the mechanical engineering skills network, the sustainability network (which is actually split into three), and a healthcare network.

Authorship

About the question of authorship of design ideas, culturally we have some difficulties with it. There is recognition that ideas take a team to develop, but the external world needs a figure head. We have instituted this program: the Arup Fellows. It started 10 years ago. I am an Arup Fellow on Sustainability. We are always on the look for high performers with that ability to work in a team.

Innovation

I do not have my own definition of innovation. I can talk to Chris (the Director for Global Foresight and Innovation). The reason why I said that is that a year ago he sent around questions to a bunch of people at Arup asking what their definition of innovation was. I think he summarizes that. It is not easy. I mean a lot of what we do in designing buildings is use existing technologies but use them in a different way. So, it is not coming up with something completely new. It is about looking at different combinations of stuff that has been done before.

We tend to import technologies developed in other fields into engineering applications, sometimes. For example, prefabricated pipe mats. How that started is, for 5 to 6 years we've been working with Walmart, when we started to look at stores in the Southwest region. We said that in a dryish climate, to have a very efficient way of creating cooling, rather than using conventional all-air systems, we would have a chiller to produce cool water and pass it through pipes, except that they do not have any finish on that floor, they have polished concrete.

Conclusions

This chapter concludes the case studies presented in this inquiry. Four different modes of collective work have been investigated through three different qualitative research methods and examined in their material and social worlds. The findings retrieved have disclosed four working alternatives to perform distributed work, each with specific financial and cultural make-up. In exploring these professional environments, the practical difficulties of teaming up staff with uneven levels of expertise and drive in investing in the work have also emerged. These assemblies of individuals, of radically different age, race, skill sets, seniority on the job, and cultural provenance, intersect under specific conditions of capital labor relationships, generative of their own human dynamic. Of the four practices analyzed, the Arup Group exhibited a cluster of managerial attributes potentially transferable to architecture firms, provided that parallel opportunities for the expression of the individual talent in the workplace are offered. The alignment of personal aims at all levels of the firm with the company's goals, and the sharing of the benefits- both financial and social- in the pursuit of work symbolically relevant to the field appeared to be the necessary ingredients for a sustainable collaboration. The final chapter of this dissertation expands on these aforementioned considerations to reflect on what has been learned in the fieldwork and to open up additional avenues for research and clarifications.

For the Arup Group the philosophical approach fed the engineering enterprise. The technical realm was raised to the level of a more profound statement that the work of the firm would fundamentally better humankind. That gave an enormous thrust of self-belief in the agency of engineering on the footprint of the built environment globally. The founder, Ove Arup, sublimated the quantitative nature of engineering questioning to arrive at a totalizing commitment to using applied science at the service of lasting culture. All his life, he pursued the overall view of building, not just one branch of engineering over others. He was able to transmit these values to his partners and to hand them down to subsequent generations. He chose his collaborators for this collective human project very carefully, individuals who responded to him accordingly and delivered their performance to their full potential for the overall benefit of the organization, rather than Over Arup as an individual. Knowledge integration and collaboration were inherently embedded into that collective endeavor.

CHAPTER VII. COLLABORATION: THE TALKING CURE OF THE ARCHITECTURE PROFESSION

Summary of Data and Critical Considerations

Several findings have emerged in the course of this inquiry. I will delve into each elaborating on their fallout on collaboration in architecture.

The first finding is that there are significant differences in understanding across community members about what collaboration is, what it entails, what it does, what is to be expected from it, and how it is enacted in the workplace. Collaboration remains an umbrella word with no fixed semantic boundaries. It takes on as many significations as the individuals writing on architecture whether scholars, journalists, members of the general public, and those directly involved in professional practice- architects, their associates, and consultants. At its most abstract level, collaboration is relational. It implies an unspecified number of individuals working together toward a stated outcome. Additionally, it hints at a perceived necessity to bring to the table parties with complementary knowledge so as to produce an integrated design. Beyond this point, however, the link between the word collaboration and what it points to gets looser and looser for knowledge workers of all sectors. The increasing elusiveness of the meaning of collaboration among different communities of practice is its mark of distinction. Collaboration is a rhetorical term connecting hybrid statements on group work as it pertains to the contemporary practice of architecture. In its countless definitions, its connotation ranges from being heralded as the panacea against the entropy of the development process to positing collaboration as a strategy for the survival of the architecture profession in the fragmented coalition of design professionals coexisting within the current marketplace. What is apparent is that in performing their professional duties within the hierarchies and policies specific to each individual office its personnel realize the actual amount of collaboration taking place. The gap between what is said about collaboration and how the work is done in an office remains wide.

The lack of general consensus on a binding definition of collaboration is one central cause, among several others, of why it has failed to become a more widespread mode of practice. The inexact semantic terrain of this line of research renders the incremental accumulation of its specialized knowledge literally unattainable, since endeavors scholars make to systemize its underpinning are often a new starting point in this quest, rather than a build-up of progressive contributions to the topic. According to Foray, a specialist in economics and management, “Cumulativeness is not possible where there is doubt and uncertainty.”[185] What is even more significant is that it explains why to this day collaboration has yielded determinate outcomes measurable only in controlled circumstances in architecture, rather than being a commonly accepted way of working independent of project type and scale. The expectations that collaboration raises about achieving full integration of the building systems and overall performance goals in architectural projects are fundamentally counter to the very idea of professionalism.

[185] Foray, Dominique. *The Economics of Knowledge*. Cambridge, MA: The MIT Press, 2006, p. 99;

Architects are only partially responsible for this predicament.[186] Professionalism breeds division among the different professions, each entrenched in safeguarding their epistemic territoriality through jurisdiction over matters of both knowledge and ethics as it applied to its licensed membership. This institutionalized social and legal praxis appropriates defined portions of technical knowledge and makes it proprietary to members admitted into a restricted group through licensure. Such customs are generative of default lines of demarcation further deepened through professional liability insurance policy, factual breaks to the collaboration in architectural practice. Furthermore, the fact that the architecture office is a business enterprise with profit-making goals structures clear power relationships established through who controls the capital. This rationalizes why the leadership of architectural offices elects to refrain from a revision of its process and the update of its equipment, should these changes be perceived as compromising the existing internal pecking order. Lastly, there are the realities on the ground of building projects. To anyone who has been exposed-- even briefly to the realization of a design, the fact that construction is a site of professional aggravation and source of anxiety for owners, architects, consultants, and general contractors is a real fact, socially and legally speaking. The harms that collaboration is supposed to identify, and fix, are systemic to the building trade and touch a much larger population disseminated throughout the food chain of the development process.

The second finding of this study is that team members at all levels of experience and expertise navigate the course of any project in a permanent state of having insufficient knowledge and scant information to make accurate determinations and provide solutions to the problem they are dealing with on the first round. They continually adjust the trajectory on what needs to be done as new information comes in, clarity is acquired, and clients' and consultants' feedback is received. This perpetual rebalancing of realizing what needs to be accomplished to get the work done relies heavily also on something I have observed happening during my fieldwork consistently. I will call this particular mode of operating the "compensation factor." With this term I point to the action that each team member takes when another team member fails to deliver his/her portion of the given assignment and completes what is required for the design to move forward and for the team to meet the formal deadlines of every phase of the project. This stands for the actual execution of an ad hoc strategy, reactive to what was learnt in the moment. In the absence of such intervention occurring on a day-to-day basis, the project's conception and documentation would fail to materialize. This happens because the sequence of essential actions needed for the progressive refinement of the architectural solution would stop, fatally disrupting the production of any scheme. Consequently, a project comes into existence under different stages of approximation, timed in sequenced steps aimed at developing an increasingly precise response to specific design challenges. The cumulative effect of these chronological successions of adjustments yields the construction set that will be used to actually build the project designed. I have personally observed this happening countless times in the two ethnographies I conducted for this dissertation as well as in the accounts I have gathered

[186] Brain, David. "Practical Knowledge and Occupational Control: The Professionalization of Architecture in the United States." *Sociological Forum*, Vol. 6, No.2, (June 1991), p. 240.

for both ES&A and the Arup Group. My personal witnessing of these events confirms the legitimacy of Clifford Geertz's concern of "the relationship between abstract and concrete knowledge"[187] as experienced through fieldwork. Once an office has won a commission, meeting project deadlines is the primary core activity, as clients' payment of professional fees is strictly contingent on contractual deliverables. The negotiation between legal commitments to deliver professional services to a client per the standard of care that each profession holds, and these ever-present approximations were steadily found in the four case studies. Team members carrying out the "compensation factor" do so under a variety of motivations. Some of them are compelled to step in to retain their professional relevance to the eyes of the leadership in times of crisis and keep their position as rank-and-file personnel are let go when work dwindles. Others intervene in the hope of getting further financial rewards beyond their scheduled salaries. Others tactically take on that mantle with an eye toward future promotions and career advancements.

A third finding, equally relevant, is the understanding of how architects operate with ever evolving tools, client-directed changes, and modifications of the regulatory environments. Collaboration would need to take place in this precarious setting. A key ingredient for survival in the architecture profession is to develop a functional comfort level with this endemic insufficient knowledge and the invariable unknowns at all design phases of the project present. Moreover, the continuous updates of the national, regional, and local codes as well as product literature, further leave the team performing under conditions of recurring uncertainties. Cyclical changes in the planning and building codes of any municipalities, ongoing upgrades in digital technology, construction industry changing trends, and environmental regulations keep architects and all the building professionals in a constant state of alert. The knowledge base of architecture is a perennial moving target. When this is compounded with incessant software upgrades and associated training, the workforce is spread thin between catching up to retain its own professional weight, and the basic demands of production, which if unmet would cause the demise of the business that employs them.

The Architecture/Engineering/Construction (A/E/C) sector imported available labor management techniques that had been tested and effectively implemented in the war years to meet new standards of production under the fierce competition of the free market. Technological transfer, that is the bringing of technological innovations into architecture from an adjacent design field, such as car or airplane design, was an established pattern during the Modern Movement years. Collaboration can also be interpreted as a case of practice transfer from sectors concerned with coordination and assembly. The chapter devoted to ESA, the only archival case study here presented, precisely illustrates how exposure of the architect to the practices of production of the firm's clients such as General Motors and John Deere looped back into the protocols enacted in the design process carried out in the office. The personal trajectory of the Finnish American architect is symbolic of the transition from the design sensibility

[187] Geertz, Clifford. *Local Knowledge. Further Essays in Interpretative Anthropology*. New York: Basic Books, 1983, p. x.

permeating the early decades of the twentieth century, present in the work of Eero Saarinen's father, Eliel, to the transformation of the atelier into the modern corporate office. The technological transfers readily available from the automotive industry in Michigan, where the Saarinen's office was located, prompted radical changes in Eero Saarinen's studio structure and in the mode of practicing architecture, virtually within a decade. The frequent use of full-size mockups and the extensive number of work meetings with technical consultants set up a new trajectory in the conception of program intensive structures. The young apprentices working there who, later, went on with their separate celebrated careers, Cesar Pelli and Gunner Birkets among others, internalized this novel practice approach in their own working process. Due to the scale and the civic character of many of his buildings and the roaster of his clients, protagonists of the American corporate ruling class, Saarinen's became a model office of architectural practice in the United States in the fifties and sixties.

A fourth finding this study yielded was the split in attitude pro and against collaboration in the workforce within firms. Collaboration has received consistent attention in numerous publications in a wide variety of fields, due to its interdisciplinary potential, an intellectual connector of specialized knowledge. The findings in this study point to an answer loosely located between these two poles. They reveal that to design a large-scale project, following the current standards of care of the profession, it takes a sizable team of people internal and external to the architecture office, with various levels of expertise and experience. The need for a large team is also due to the fact that the cost model firms adopt to achieve profitability hinges on a sliding pay scale, where workers are compensated according to the weight their knowledge has on the design problem requiring solution. Within an architecture team, tasks range from contract negotiation all the way down to sheer drafting under the supervision of senior personnel. Staffing for a project reflects the nature of these diverse demands that its intricacy brings about. Compensation follows along the same lines. Yet, because of the complexity of each knowledge domain- distinctly protected under separate licensure- teams are composite and interdisciplinary, from the onset of the design course. The management and coordination of all these different professional voices, to provide benchmarks of stated performances and still safeguard the original design intent, imposes a substantial effort on the spokespersons of each team.

Since offices are learning environments, entry level employees customarily need to be instructed on how to do their portion of the work. At times, senior staff will share some of the knowledge in an informal fashion through desk critiques. On other occasions, a group review will become a teaching session for a wider pool of workers. This is aided by efficient project management, an optimal physical layout of the location of team workstations, networking resources for file exchange, establishment of digital standards, accounting procedures, protocol of communication, and more. Yet, high-profile clients often demand a design idea with a proper name attached to it, as shown in the ES&A and SOM chapters. That proper name must be associated with a track record of previous buildings of recognized merit. The name of the designer often needs to be prominently shown, to address the political and cultural dimension of the building process for both funding and approval reasons in political circles. For very expensive fees, clients buy

both the technical know-how of the firm to conceive and document a building, and the signature of the designer that will bring cachet to the project, increasing fundraising opportunities. Ownership of the design ideas connected to identifiable names is likely to generate political consensus on the proposed scheme and to attract potential donors. For the power of the proper name to come into full force, the structure of the office is organized so as to cater to that particular individual, whose influence on the financial return and prestige of the firm is paramount. That scenario limits the factual likelihood to work collaboratively, as much of the labor the staff exerts simply reinforces the status of that individual. Over time this creates turmoil in the workforce. These two antagonistic models- collaborative office on one side versus the firm as an extension of a single designer- were observed frequently in my fieldwork.

A fifth major finding is that the motivation for working together has a great impact on the success of the collaboration. To start with, offices host people coming every day to work to make a living. In an organization, most of the employees go to work because they must do so to meet the financial obligations of modern life. Earning a living is a part of their being there at work. For that reason, the storyline of workers coming together joined in a common spirit to pursue the same aim, is a structurally different scenario than personnel who need to make a living and are obliged to revisit their working routine through company policy. Group formation has distinct flavors depending on external factors impinging on that social proximity. The aggregate result of ongoing exposure to each other over time eventually develops into a localized culture. Sociologist Samuel Gilmore notes: “A common practice may be produced through tacit agreement by participants conforming to past agreements because they expect others to do the same.”[188] In the workplace collaboration is orchestrated and organized, instead of being a spontaneous and self-organizing modus operandi. Paradoxically, the common denominator of various scholarly disciplinary voices is that collaboration is far from a self-fulfilling prophecy. As a matter of fact, by itself, collaboration fails to occur. Empirical evidence found in the four case-studies of this dissertation shows that collaboration is hardly a spontaneous way for individuals to come together for collective work. Review your evidence there; that is, briefly remind the reader of the evidence from the chapters. Collaboration infringes on the many territories where human action is parceled within the structure of an organization, whose members are connected to each other through capital-labor relationships. Collaboration, in fact, upsets the power structure of the settings where it is carried out. It requires management, and most importantly it is still far from a reality in the workplace, where collective labor should bear tangible fruits to all its members, even in varying degrees.

The prose of scientific management delivers the fiction of an automated worker capable of quantitatively generating a predetermined amount of labor per day to be inserted as a spreadsheet entry in a business plan. However, the nature of architecture work is at its core entropic. This is unsettling to project managers who are uncomfortable with the unpredictable, often the cause of profit loss for which they are responsible to

[188] Gilmore, Samuel. "Schools of Activity and Innovation." *The Sociological Quarterly*, Vol. 29, No.2, p.206.

their superiors. Teams are temporary knowledge communities formed on a project-to-project basis. Each new job benefits from previous experiences on similar building types and reuses tested solutions, to march production along and minimize the risks that the pursuit of innovative designs might present. Different mindsets animate the employees who join organizations. Some are there to stay and climb the corporate ladder, aspiring to a principal position. Others are there to gain experience. Others accepted the best offer from that office in the course of their job search. The motivation of the individual entering a particular office culture and identity, and the drive to hold on to the core values of that organization shape the chances to being at risk of becoming a casualty in a period of downturn in the economy and building sector.

Glass ceilings to career advancement within the firm for groups based on their ethnicity, age, and gender as well as office politics come with the territory and restrict the possibility of embarking on that partner track to a selected few. Formally, during the hiring process, human resources in large firms provide their prospective employees with packet of their policies, some of them dealing with questions of ethnicity, age, and gender. Despite disclaimers, these barriers do exist and are very real in those firms. They emerge in the micropolitics of team assignments, promotions, and pay increases. In this sense, the fieldwork yielded plenty of evidence that cultural and racial politics affect the shaping of the organization past the entry level positions in tangible ways. Upward mobility and an established ritual for the transfer of power from subsequent generations of owners are the necessary, although not exclusive, ingredients for the long-term survival of the firm as it is and its prospering in the decades to come. The eventual demise of A+A is a paradigmatic example of breakdown in the reallocation of power, from one generation of ownership to the next, and the mishandling of the office politics. These missteps turned out to be fatal for its survival under extreme conditions of the free market.

A sixth and paramount finding of this study is that the reward system that each firm has- expressed itself in financial remunerations and promotions- is based on singling out the individual knowledge worker, as opposed to the whole team. Although some achievements can be measured and are visible to the staff, that process remains largely political and inaccessible to third parties without an insider's knowledge of the dealings concerning that particular advancement (or demotion). To the eyes of the personnel some promotions seem just, but to others they raise feelings of resentment and unfairness that filter back into the everyday life of the office. The most loyal staff buys into the rating system of each office subculture and experiences triumph or defeat in the yearly announcement of company promotions. This predicament that touches all organizations further compromises a general practice of collaboration. Whose voice will make the project go forward, who controls the budget, who has access to the client, who knows more about a particular vital aspect of that project, often very different people, start an undemocratic course of design where decisions are top down and hardly horizontal, because the rewards of that collaborative input are unevenly distributed in the office population.

In sum, it is a true statement that people work together, but not in a flat hierarchy. Differential treatment is enacted early on when decisions are made by management about who to select to work on a particular project. Indeed, there are two types of hire in an architectural office: those who are hired to be assigned right away to a specific job; and those the company wants to retain and invest in for the long term, even if they do not have a specific job for them. Rarely these two types are one and the same. The latter tend to have more global benefit for the firm.

Offices are hierarchies of human affairs with their internal frictions, divisions, alliances, unspoken barriers, and personal wars. The ramifications of these conditions set clear limits to what can be accomplished through collaborative design. In a penetrating essay, architect and designer Misha Black mapped out in detail the motivational structure and the distinct social dynamic that make design groups flourish and other perish.[189] To a large extent most of the intuitions he outlined in that brief writing, I encountered too in both my ethnographies as well as in learning the culture of ES&A. Nonetheless, clients and firms themselves constantly refer to collaboration as an important part of their selection process. It is a buzzword of great appeal, especially for clients who need to build consensus among users who expect to have an impact on the final outcome and on the smoothness of the design process.

Collaboration also lends itself to the latest call in the entire A/E/C industry: climate change and sustainable practices. Collaboration is equated to streamlined delivery process with minimum waste and fully integrated results. Because it is so unspecified in what it truly means, collaboration provides a unifying label to gather highly diversified resources under one common project. In principle, collaboration is intended to yield integrated design, as long as there are complementary knowledge domains, a readjustment of fee structures, compatible software, and increased expenditure of financial and human resources at the front end of the design process. The biggest question is: who coordinates all these parties? How are the fees structured? Who pays for it? Who takes on the liability for what goes wrong? And most importantly, does collaboration in fact produce the integrated design it is supposed to deliver? Architects and engineers have to make an economic case, an operational case, and nowadays an environmental case as well, to convince a client to embark in a working process that will require higher upfront costs, with the promise of a building with optimal performance.

Conversely, a strong dynamic against collaboration is the recounting of architecture in the media and in history books. While it is commonly taken as a given that buildings are complex entities requiring extended labor and intertwined expertise, the tales of architecture excellence carry- once again- proper names. Despite past efforts to acknowledge the merits of teams in giving tectonic clarity and workable representations to the early fuzzy sketches on paper conceived in the black box of the designer's mind, the press transforms buildings into accessible narratives to tell for the consumption of popular and expert audience. Collaborative authorship is hardly exciting for magazines. It

[189] Black, Misha. "Leadership and Rewards: II", in Middleton, Michael. *Group Practice in Design.* New York: George Braziller, 1967, pp. 288-89;

deprives the subject matter of that theatrical breadth that keeps alive the cult around design personalities. From a signature perspective, collaboration makes architecture nameless. The maverick designer, instead, becomes the story behind the project to be launched in the media and, therefore, sells both as an editorial statement and as a vehicle for broader circulation of the individual issues. The dismissal of collaboration is without appeal in the world of signature design. Even in those cases where an acronym is put forward in the press to point to a design team, such as the Dutch firms OMA (Office of Metropolitan Meeting) or MVRDV, a strong personality gains the foreground of the media limelight. This status quo is so profoundly institutionalized that is virtually inescapable within the profession.

In this regard, it must be noted that the Pritzker Prize is given to individuals, not teams. As such it directly sustains the mythology of the individual designers and the expectations of their agency in the building process, within and outside the profession. In 1988 Gordon Bunshaft was given the prize, not SOM, although Bunshaft never had a practice outside of his relationship with SOM. Therefore, in architectural culture and in the construction of the disciplinary history, teams are a matter of necessity to produce the required work but fail to be acknowledged entities to be awarded. Is it even conceivable, in light of the institutional pressures of the media on architecture, to give a team award for design excellence? Given where architectural discourse is today, it is unlikely. This outside perspective of the designer as an individualist has such a popular grip on the collective that it loops into the internal subculture of any architecture office invested in design as a structural part of its business identity, especially for the strong idea firms. The cultural standing of the designer brings a flavor of aristocracy to the image of the architect, thus putting in crisis the very heart of collaboration. Throughout the last decades, it is that symbolic capital that has consistently neutralized the various attempts to produce a truly democratic arena, where every voice in the workplace gives design input that will be incorporated in the final layout, with accurate credit assigned for the most valuable contributions.

Typically, in an architecture office, there are those who design and those who execute the design. There are those who are invested with the task of giving the vision, and there is the rest of the staff that is assigned to bring that vision to reality. It is a sharp division of labor, with minimal possibility for overlapping. In the context of this study design deals with space planning and the formal resolution of the client's program and needs. Functionality of the scheme, efficiency of the layout, and the three-dimensional and esthetic quality of the building is the protected province of the designer. Execution is the collective effort of coordinating the building documentation and securing its constructability. Who owns the design and how a particular individual ranks as a designer greatly influences the team dynamic and it affects the routing of design responsibilities. Still, for even partial forms of collaboration to function, each team member needs to have some sense of ownership of the project to be able to develop the areas they have been assigned to, according to an agreed upon standard within the team and the firm. The metaphorical release of authorship from the grip of the designer is the bottleneck the collaborative process has to go through in order to work. In its most idealized terms, collaborative design equates to the authoring of a collectively unified statement, a

position counter to how architecture offices currently operate and further themselves in the marketplace.

In undertaking the investigation of the work process, as it happens daily, it became clear to me that written and spoken language is an additional critical piece to understand collaboration in the broadest possible sense. More than sketching, drawing, and making 3D digital models, architects spend most of their workday communicating verbally and in writing. They talk to their peers, to their clients, to their assistants, to their managers, to their consultants; they communicate, at a formal and informal level, with everybody inside and outside the office. The word choice, the references, the driving points of each dialog, the tone, the setting where the words are spoken, the eye contacts, the delivery of their speech, are all behavioral clues that give insight to what the priorities are for who utter those words and their recipients. It brings in sharp focus the role of staging a constructed personality made conspicuous to the workforce to enforce power in the firm. In turn, its staff calibrates its own response directly in response to the agency of that power figure. To the world outside the office, that persona's standing will position the firm to pursue and often secure highly paid commissions of social and professional prestige.

In a design setting, language is tentative. Its degree of semantic uncertainty is significantly higher early on than in later phases of the design process when the project is more defined. As the design progresses, the vocabulary shared among team members to talk about it is more and more precise. The lifting of the semantic uncertainties of words reduced in their range of possible meanings is largely due to the increase of strictly technical content in the drawings. During that trajectory, the accurate visual description of a design invariably is factually embodied into sets of construction drawings delivered to the client's representative for its realization. The ubiquitous role that language plays in the countless transactions for the project definition is of paramount importance as it relates to collaboration. To a large extent, projects are the results of ongoing extended conversations between individuals of diverse communities with stakes in that enterprise yet holding often conflicting perspectives on the necessary course of action to move the project forward. This ongoing exercise in speech codes has a decisive impact on how the final design is going to be shaped.

Opposite goals repeatedly create a tense environment in the course of designing a project. A classic example is the mindset of the contractor versus the client. Broadly speaking, the general contractor aims at making the maximum amount of profit with the minimum amount of construction. The client, on the other hand, goes in the opposite direction, that is the resolve to spend the minimum amount of money while actively working at getting the maximum amount of built outcome. Architects and consultants sit between these two poles and try to reconcile what is a disheartening conundrum, coloring all the professional exchanges in the course of architectural production. To counteract different understandings of what is to be done and to manage the risks of innovative designs carrying greater margins of errors and omissions, each party builds up a sizable number of contingencies in contractual agreements. In an attempt to standardize the workflow, firms tend to reuse details from their own repertoire of past projects hoping to

streamline the productive effort and to increase revenues. The more conventional a project is in its technology and building type the higher the surplus value generated. Conversely, the more unusual the design is from standard construction, the higher the barrier to manage its latent risk during and after its realization.

Another important finding observed is that the construction of a subculture characterizes the life of the large-scale office and that of subgroups of workers within that office. Each organization enacts social rituals, designed precisely to promote bonding and to establish a subculture that sustains its core values and associated expectations. All the case studies described exhibited this phenomenon. The importance given to design was the critical differentiator in the office culture of each environment. When architecture was conceived as an art form, the level of emotional and personal investment in design of both staff and leader far exceeded in time allocated to the project and the intensity of the commitment when compared to conventional architecture offices of comparable size and project scale. ES&A epitomizes this type of practice. Conversely, when architecture is practiced strictly as a professional service in an array of offerings in the marketplace, the interpersonal dynamic in the organization and the type of division of labor are profoundly dissimilar. A+A is a firm representative of this different model. SOM and the Arup Group are hybrid versions of the aforementioned models.

The formation of a subculture, usually comprising the genealogy of the firm's birth and the mythology of its founders, is a central piece in the casting of an identity distinct from its immediate competitors. Within that community some members are more invested in carrying on that message, whether it is for having been in that workplace for a large number of years or because they embrace the office practice and the building types that set them apart. Others are transitioning from job to job, whereas others are simply coasting along. Allegiance to these ideals and leaders is loose and distributed within the firm. Organizations establish reward systems that the workforce internalizes for their own self-esteem. Once on a path of upward mobility, employees tend to strengthen the office subculture to find power and internal validation for their efforts. The attitude of the prospective employees, trying to become part of the organization, is to enmesh themselves with the group and become fully integrated. Already at the interview stage prospective employees are screened to assess both their professional capability and for their potential to become long-term advocates of the firm's legacy in the present and future. That bottom-up endorsement from personnel is strictly dependent on the firm's cachet in the profession and the perceived potential of their employees for their personal career advancement. Firms are social systems where all individuals belonging to it must fit into, else they get purged. In this respect, the SOM case study is paradigmatic. Similar arguments apply to technology and to the alternative modes of practice proposed in firms with established protocols for doing work. If those technologies and practices put at stake the alliances and sphere of power established, they get rejected with the argument that they are unfit in the firm's culture.

It is apparent that flexible organizations are necessary to reap the benefits of collaboration. In the world of construction, a significant amount of applied knowledge is put in place to provide adequate dimensional tolerance in construction joints to allow for

building's movements. Metaphorically speaking, multidisciplinary teams joined through a common schedule need to have epistemic and financial tolerances to be operational under standard conditions, and functional under straining circumstances. Working protocols too scripted, constraining the autonomy of individual talents, lock the course of design production often in a state that is incompatible with the changes that collaboration fosters. The insights a group can gain in working on a particular problem to arrive at a possible solution frequently emerge from extensive exposure to that problem. Clients themselves often short-circuit genuine attempts to sustain a smooth delivery process, by consistently changing their minds about the design, even when that project is at a very advanced stage of construction and in contrast with the contractual schedule. These two facts inevitably have a ripple effect on the workflow and on the quality of the final product. Design and programming changes, routine events distributed throughout the design process, often involved an adjustment of the scope of the work- also known as "re-scoping". These client-directed changes trigger additional design services and associated costs because they require further work than what was originally contracted. Conversely, a collaborative workflow promotes the making of early commitments from clients and the design team to one design option. This is due to the fact that all parties having stakes in the project can analyze the merits of numerous iterations and identify early on potential areas of crisis, and all parties have early buy-in to the selected design.

Within an organization each individual has a membership role, determining his/her position in the firm's pecking order. In the architecture professions, there are two types of offices: generalist firms, whose design focus is independent of the building type, and specialized practices selling expert knowledge in a narrow segment of the construction sector. Signature architects customarily fall into the first category. Retail architects, hospitality architects, health architects, housing architects, and the like belong to the second group. Although large-scale practices tend to be specialized entities to secure their market niche and meet their business goals, within that list generalist offices are present as well. In the generalist setting, employees are hired with the understanding that they will follow a career path in one of the three tracks: designer, technical architect, or project manager. In the case of a specialized firm, an expert with current knowledge of the building type of the firm's strength is added to the three roles just listed. The building design is typically the exclusive privilege of the firm's principal, despite all assertions that the office works collaboratively. Because of the long life of many of these big projects, the highest ranks of the office reserve the right to take on them the conceptual design phase, leaving to other figures the daunting chore of solving the countless matter-of-fact issues that design concept entails. The technical architect, usually a senior person with many years of experience in these specific tasks, bridges the gap between the realm of the vision of the designers and the practicalities of the scheme to meet the program. Technical know-how, understanding of the building code and the regulatory constraints, familiarity with building systems, ability to synthetically represent in drawings how to realize the architectural object in an intelligible fashion, mastery of a robust and clear vocabulary to converse with the crowd of consultants and contractors engaged in the projects, constitute the essential skill set of the effective senior technical architect.

Project managers are the primary point of contact between the client and the architecture firm. They receive the heat and praise for the highs and lows of the project performance. A temporal and financial clock looms on the relationship between clients and architects, as well as architectural teams, within themselves. The project manager puts pressure on the team to get their deliverables out, according to a schedule agreed upon with the client, and keeps everybody on track.

Both figures are present in all the case studies examined with significant differences in political clout that they have in each organization. Project management figured on par with architectural design in SOM, whereas in A+A project management was more highly regarded in the overall functioning of the firm.

Conclusions

The various conceptions of architecture held by the members of the community of practice decisively impact expectations, behaviors, norms, and types of practices. For those who believe architecture to be an art form, the unwavering commitment to the field takes a totalizing dimension on all other aspects of people's life. Eero Saarinen embodies this archetype. Conversely for those who chose to enter the architectural profession as a service industry, the ensuing mode of production will share similarities with other business practices in managerial styles and protocols of delivery. These two modes have been identified under the labels *School of Activity* and *School of Innovation.*[190] Asymmetries of financial rewards in wealth distribution and personal standing in the cultural capital one enjoys within the field are two paramount reasons explaining why collaborative design in architecture fails to be a common model. In all the case studies examined, the tensions coming from the openly differential treatment members of the same organization experience from leadership and the lack of credit of the individual's design idea within the firm, strain and curtail the latent potential of multidisciplinary teams to work to their full capacity and integrate their knowledge into a qualitatively superior end result. Although economic gains weigh heavily on job applicants' resolution to embrace one organization vis-à-vis a competitor, the symbolic importance of the project they will be working on significantly affects their degree of emotional investment in the object of their professional attention. Of the four settings analyzed, the Arup Group surfaces as the most viable and transferrable operational schema architectural offices can realistically embrace, while retaining the aspirations and ambitions endemic to architecture discourse.

Despite the fact that ES&A presents attributes particularly palatable to a self-selected group of designers desirous of the limelight that the commissions they labor on offer, the associated work schedules that Saarinen's mania for design entailed are unsustainable in the long run. The sheer fact that the age of most of Saarinen's staff was between 20s and 30s years old is indicative of the excessive demand placed on individuals, at the expense of other aspects of one's personal life necessary to carry a balanced existence. Furthermore, the relative isolation of Bloomfield Hills, a town next to

[190] Gilmore, Samuel. "Schools of Activity and Innovation." *The Sociological Quarterly*, Vol. 29, No.2, p.237.

Detroit, where the Saarinen's office was located, away from any metropolitan allure, inevitably made the workplace the center of gravity of an extended family, where the Saarinens were the metaphorical parents of these young employees, infantilized in their dedication to the tenets of Modern architecture. The Master-Apprentice diagram this case study illustrates is very much alive today and a natural extension of the design studio culture fresh graduates go through in their college experience.

SOM retains the credentials of being a current protagonist in the unfolding of contemporary architecture in North America, while fully exhibiting the make-up of a business partnership. This organizational structure comes with layers of corporate strategies and bureaucracy. It gives room to cult design figures in the firm, but always dependent on the overarching order that the company enforces through its bylaws. The retirement and passing of Gordon Bunshaft, Walter Netsch, and Bruce Graham, the three significant architects of the SOM post-war mythology, signaled a generational change at the helm of the firm's leadership, as opposed to the annihilation of the firm's relevance. In contrast, the passing of figures like Louis Kahn, Mies Van der Rohe, Richard Neutra, and similar architects determined the extinction of their practice. SOM escaped this fate by design. In distributing the design credentials across the elite body of partners, occasionally singled out, but always carrying the SOM acronym next to their names whenever there is media coverage on that particular project, this firm carries on with the same sense of mission that the founding partners imbued in their associates from the onset. Concerning its own functionality, however, SOM exhibits some of the same working practices as ES&A: unforgiving schedules, tour-de-force work that consumes the physical and emotional resources of the staff, and almost a military style vertical hierarchy. The stress, an undercurrent of the day-to-day in the personnel, is exacerbated by the knowledge that the SOM population is subdivided into two basic groups, not dissimilar in its fierce divisive power from a caste system. The former is a very narrow one, whose members are selected virtually after graduation and bred throughout their career to reach partnership. The latter is a very large one, bound to remain in a subordinate standing within the firm hierarchy, even when a few of those same firm's members commit their work lifetime to the organization suffering disproportionately fewer financial rewards than the partners.

A+A is representative of a setting with a more humane atmosphere when it comes to working schedule and treatment of the rank and file. Since its beginning and throughout its lifespan, the firm has undergone profound transformations. It started as a boutique firm with design at the forefront of its concern to a corporate entity consumed by overhead, winning commissions, and cash flow. The more relaxed approach in working style and the expectations toward competent design outcome puts significantly less pressure on the labor force at the expense of its delivery standards. Over time this proved to be fatal for the survival of the organization in terms of workforce loyalty and standing in the marketplace. Design has decisively a lesser status than ES&A and SOM. The result is that its design relevance in the profession was negligible, whereas its specialized expertise in the two areas of focus, health care and higher education building types, was praised and sought after in the domestic market. The firm's origins catapulted A+A into a level of design distinction that was a distant memory in the later phase of the

company. Prior to the firm's acquisition in the Stantec group, the last generation of leaders placed utmost priority on profit, marketing its capabilities to servicing clients' needs, with design invention offered as a dispensable extra in the pool of highly specialized expertise available in the organization. The lack of incentive for personal development at the employee level, beyond basic benchmarks of continuing education and upgrade of skill sets, deflated any efforts from the individual to bring innovation in the delivery of a building. What remains dormant in this kind of site is the inner capacity of the individual to overcome personal limits and embark on a process of discovery, to bring fresh ideas and lateral thinking to a set of highly routinized ways of working. Until market conditions adversely affect the revenue stream of such firms, no rethinking of its own internal practice is set in motion. Time is suspended in a cycle of repeat projects, with the same actors and similar processes, without alteration. Consequently, projects will be as collaborative as entrenched habits will permit, with constant deflection of any effort to promote change. If it is true that no single architect gets the credit for a particular design, the building is orphaned? of its leadership, displaying in its architectural expression all the compromises that overindulgence the clients' whims will entail.

The Arup Group stands as the closest approximation to a setting where full collaborative design is enacted. This organization puts business acumen and intellectual labor at the services of the field advancement on a close plane, within a carefully monitored risk management program. It fosters an ecology of transactions and knowledge sharing where collective design is the consequential result of system thinking. Everything matters in what is conceived as an infrastructural universe. A clean water gravity pipeline project, for example, while less glamorous than a museum in the press, is deemed equally important to the latter for the proper running of the built environment. In this venue, all experts have equal voice in the design process because of their coordinated and specialized sphere of influence on the final outcome. The lack of hierarchy of knowledge domains translates into a diagram of specialists, each representing a unit into a total organism of discrete parts working synchronically. Such an approach is consistent with engineering thinking invested in producing numeric answers to fuzzy problems, something architects traditionally resist in order to preserve inner instinct as a design source for practical solutions. In refraining from the over-endorsement of one branch of engineering over another, the Arup community experiences a kind of disciplinary democracy where all engineering fields matter, as shown in the portfolio section of the company website with projects realized worldwide.

To further develop awareness of how collaborative environments operate and what can be learned from the dis-functionality of large firms, it would be particularly enlightening to perform an ethnography at Arup Associates in London, the architecture division of the company with over 300 architects at present. Based on what was learned in studying architectural offices, how this firm within the larger company distributes roles and responsibilities, and the mindset it promotes would prove invaluable to understand how much of the Arup egalitarian conception of the engineering branches can be transplanted in the architectural world. Equally informative could be to do ethnographies of design communities whose popularity is partially tied to the rise of digital technologies and share parallel interests with architecture. Fieldwork in companies, like IDEO and

Pentagram, would be of particular significance to scholars of the built environment, because of the overlap that their products present with design challenges, in earlier periods thought to be of exclusive purview of the architects. These types of business enterprises nest their novel output within the framework offered by social and cultural factors, since sociologists and anthropologists are typically on staff and an integral part of the design team.

Architecture is a service industry whose scope is externally defined by others in the context of a development system ruled by capital. The very idea of innovation lures some of the most adventurous practices to travel uncharted paths, sometimes as a social practice,[191] while other times in a genuine spirit of discovery.[192] It will continue to come into being within the system of professions, a social contract with a historically defined apparatus rules, regulations, and social norms, which will be continually recalibrated to deal with changing conditions of practice as technology and its socialization unfold. This condition is unlikely to change in the near future. The progressive erosion of professional control was and is part of the enactment of collaboration, but also at the basis of that control's ongoing redefinition. How to maintain the integrity of distinct professional claims among design professionals while allowing for the synchronic integration of their expertise and their sale ability in the marketplace is at the center of enacting a sustainable form of collaboration. The concurrent advent of the digital revolution that started in the late 1980s and the rate of technological change (and built-in obsolescence) continue to upset the professional order. In conjunction with the rise of the Web, it has further accelerated the realization that the architects of tomorrow will be network managers of an ever-larger community of knowledge formed every single time around the production of a piece of architecture.

[191] Vinsell, Lee, and Russell, Andrew L. *The Innovation Delusion: How Our Obsession with the New Has Disrupted the Work That Matters Most*. New York: Currency, 2020, p.10.

[192] Gilmore, Samuel. "Schools of Activity and Innovation." *The Sociological Quarterly*, Vol. 29, No.2, pp.205.

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