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Research Solutions

Evidence, Information, and Knowledge: Key Contributors to Organizational Resilience

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Who's in the room?

- Us
- You

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What we're going to talk about...

- Resilience engineering
- Evidence, Information and Knowledge (EIK) and how it contributes to organizational resilience
- Intersection of resilience engineering and EIK
- Skills that can contribute to an organization's EIK (from librarians' perspective, but broadly applicable)

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What we're not talking about...

- **Data** occupies a slightly different space in its relationship to EIK
- **Personal resilience** (though also important!)

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Organizational Resilience & Resilience Engineering

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Organizational Resilience

Organizations/processes that are:

- Robust yet flexible
- Proactive
- Adapt as required

Information and knowledge, built upon evidence, are key to informing the future.

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High-risk industries *must* have resilience engineered in!

4 Aspects of Resilience Engineering

Components/Aspects of Resilience	
Aspect	**Description**
Monitor	Scan, listen, observe, attend to, examine the system operation over different time scales to understand the current state of the system
Respond	Act or react, intervene, correct, tune, adjust, tweak, trade off, sacrifice to achieve specific goals
Anticipate	Project, foresee, look ahead, forecast, predict, simulate within the system to understand likely and unlikely future conditions and events
Learn	Incorporate, grasp, review, study experiences and integrate the resulting knowledge into structures available for future practice

Fairbanks, R. J., Wears, R. L., Woods, D. D., Hollnagel, E., Plsek, P., & Cook, R. I. (2014). Resilience and resilience engineering in health care. *Joint Commission journal on quality and patient safety*, *40*(8), 376-383.

Evidence, Information & Knowledge (EIK)

EIK in Practice	
Aspect	**Description**
Evidence	Studies
Information	Packaged data and text for front-line application; synthesized evidence
Knowledge	Lived experience - "what the knower knows"*

*Davenport T, Prusak L. Working Knowledge. Harvard Business School Press. 1998.

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Resilience Engineering

Just like safety, resilience engineering is:

- Focused on culture rather than individuals
- Oriented toward holistic and systems solutions
- Incumbent on frontline and C-suite leadership
- Enabled through learning
- Buttressed by information

Øyri, S. F., Braut, G. S., Macrae, C., & Wiig, S. (2021). Investigating hospital supervision: a case study of regulatory inspectors' roles as potential co-creators of resilience. *Journal of Patient Safety*, *17*(2), 122.

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Evidence

Monitor	Establish search mechanisms to track published studies
Respond	Interface with experts to provide studies and materials as the need arises
Anticipate	Use organizational and team knowledge to provide service and content in real time and ensure systems for access are reliable even in downtimes
Learn	Listen to experiences and hone search, retrieval and dissemination tactics in context

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How Evidence Contributes to Organizational Resilience

Evidence in hand can help answer:

- What has been studied
- What is known to work
- What gaps exist to apply to and how to fill them

Piper PA-28-180 Test Aircraft (N4859L)
VG Installation on Horizontal Stabilator

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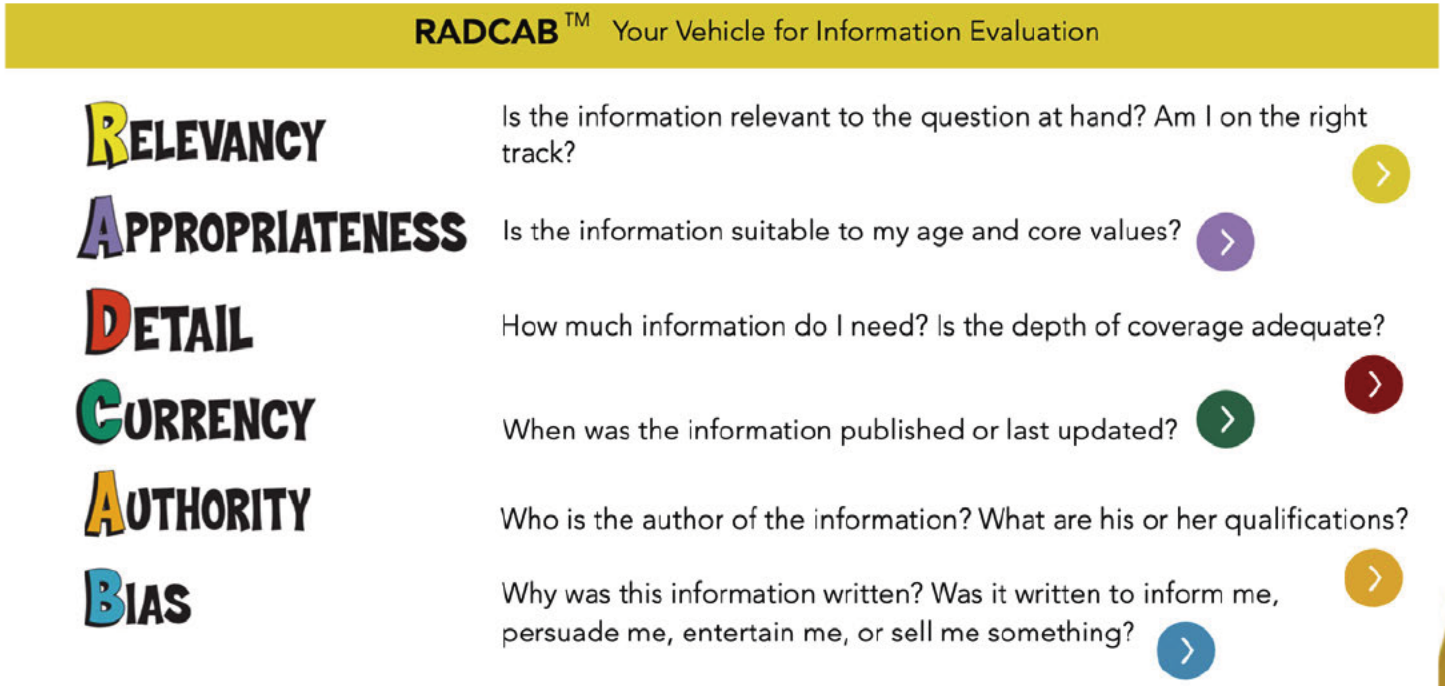
Evidence: Skills

- Knowing where and how to find quality evidence
- (search and database abilities)
  - Includes knowing how to evaluate the evidence



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Evidence: Skills

Knowing how to appraise evidence for quality & relevance

Table 1: Bibliographic Databases in Agricultural Sciences

Type	Database Names	Publisher	Description	URL
Comprehensive	AGRICOLA	National Agricultural Library	AGRICOLA combines the catalog of the National Agricultural Library collection and an index of thousands of journals on agricultural sciences from 1970 to the present. Some historical materials from the collection (pre-1970) are also included. Formats include books, journal articles, reports, white papers, conference proceedings, multimedia and other types of special materials.	https://agricola.nal.usda.gov
	AGRIS	United Nations Food and Agriculture Organization	AGRIS is a collaboratively compiled database of agriculture and technology literature for the agricultural sciences. Multilingual content and indexing is a unique feature of this database.	http://agris.fao.org
	CAB Abstracts	CABI	CAB Abstracts comprehensively covers applied life sciences including agriculture from 1973 onwards (1913- in archive) with over 8 million records. Unique content includes non-English journals, books and conference proceedings, from over 120 countries. CAB is produced by an international non-profit research organization.	https://www.cabdirect.org
Multidisciplinary	Google Scholar	Google	Google Scholar is a broad multidisciplinary collection of peer reviewed literature from across all disciplines and topics. Content is provided by Google Scholar partners, some of whom are publishers, and also compiled through a proprietary process developed by Google to crawl literature or partner content.	https://scholar.google.com
	Scopus	Elsevier	Scopus compiles peer-reviewed literature across disciplines in the sciences, technology, medicine, social sciences and humanities, and also emphasizes interdisciplinary subjects. Scopus also includes a set of analytical tools for citation, journal, author, and subject field impact.	https://www.scopus.com
	Web of Science	Clarivate Analytics	Web of Science selects the most significant journals, conference proceedings and books across a range of disciplines including the sciences, social sciences and humanities. This database includes historic citation indexing content that helps facilitate tracing ideas over time and measuring impact of scholarly work.	https://clarivate.com/products/web-of-science/
Specialized	BIOSIS Previews	Clarivate Analytics	BIOSIS Previews covers journals, meetings, books, and patents from the biological sciences. Content is indexed using a specialized vocabulary and MeSH terms for enhanced discovery through search.	http://wokinfo.com/products_tools/specialized/bp/
	FSTA	International Food Information Service	Food Science and Technology Abstracts broadly collects food and health related content from journals, trade publications, books, reviews, conference proceedings, reports, and selected patents and standards.	https://foodinfo.ifis.org/fsta

Issues in Scitech Librarianship:
https://journals.library.ualberta.ca/istl/index.php/istl/article/view/1727/1638

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Information

Monitor	Observe the evidence in order to understand it and form hypotheses
Respond	Use information gleaned to highlight gaps in understanding and identify information and tools for various audiences
Anticipate	Work with experts to identify mechanisms to organize information to ease identification and dissemination
Learn	User experience hones identification activities to assist in curation of what is useful to whom

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How Information Contributes to Organizational Resilience

The right information in hand/at the right time and place can:

- Help link between evidence and knowledge
- Help make the evidence more actionable
- Provide updates to a wider audience
- Allow for development of communications, teambuilding, etc.

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Information: Skills

- Knowing where and how to find usable and understandable information
- Knowing how to appraise information for quality & relevance
- Communicating information at the right time, to the right people
- Managing information for people to return to in the future

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Knowledge

Monitor	Understand points of interest on which to focus attention
Respond	Apply front-line action based on context, team dynamic and individual competencies
Anticipate	Use gut feeling and nuance to prepare for action
Learn	Integrate experiences into processes built by doing the work to make improvements

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How Knowledge Contributes to Organizational Resilience

- What to monitor
- With whom to connect with
- Where and how to apply what is happening in real time
- How to best learn from disruptions afterwards

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Knowledge: Skills

- Reflecting, seeking and providing feedback
- Asking good questions
- Seeking additional EIK resources
- Networking
- Considering change impact
- Respecting the ideas of others

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How does EIK support organizational resilience? What skills are needed?

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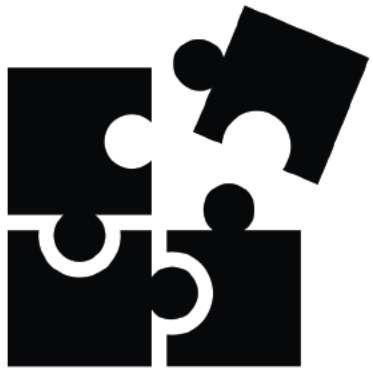
EIK: Healthcare Examples

- Evidence: studies and reviews that inform development of information targeting patients and non-clinicians
- Information: JAMA patient page
- Knowledge: "lived experience" of clinicians providing care service *and* patients/families who have the condition



Guirguis-Blake JM, Evans CV, Perdue LA, et al. Aspirin Use to Prevent Cardiovascular Disease and Colorectal Cancer: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA.* 2022;327(16):1585–1597.

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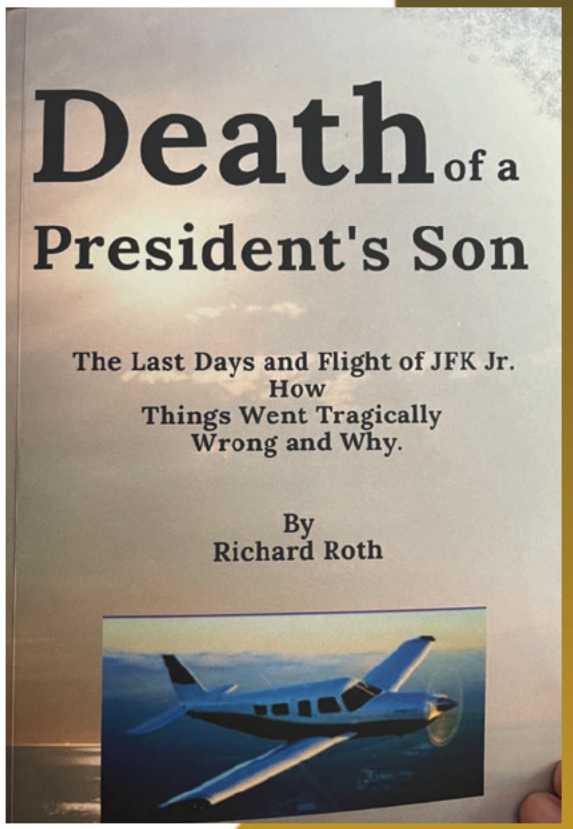
EIK: Aeronautical Engineering Examples

JFK Junior's tragic plane crash and lessons learned

- Evidence:
  - The NTSB Report (# NYC99MA178)
  - Articles, e.g.: "10 Mistakes JFR Jr. Made: Lessons from a national tragedy" (AOPA ***Pilot***, 7/5/2010)
- Information:
  - Recent book (picture) by a pilot that aims to explain the crash to lay people
- Knowledge:
  - Flight instructors and pilots incorporating all the failures into their practices, to avoid them!



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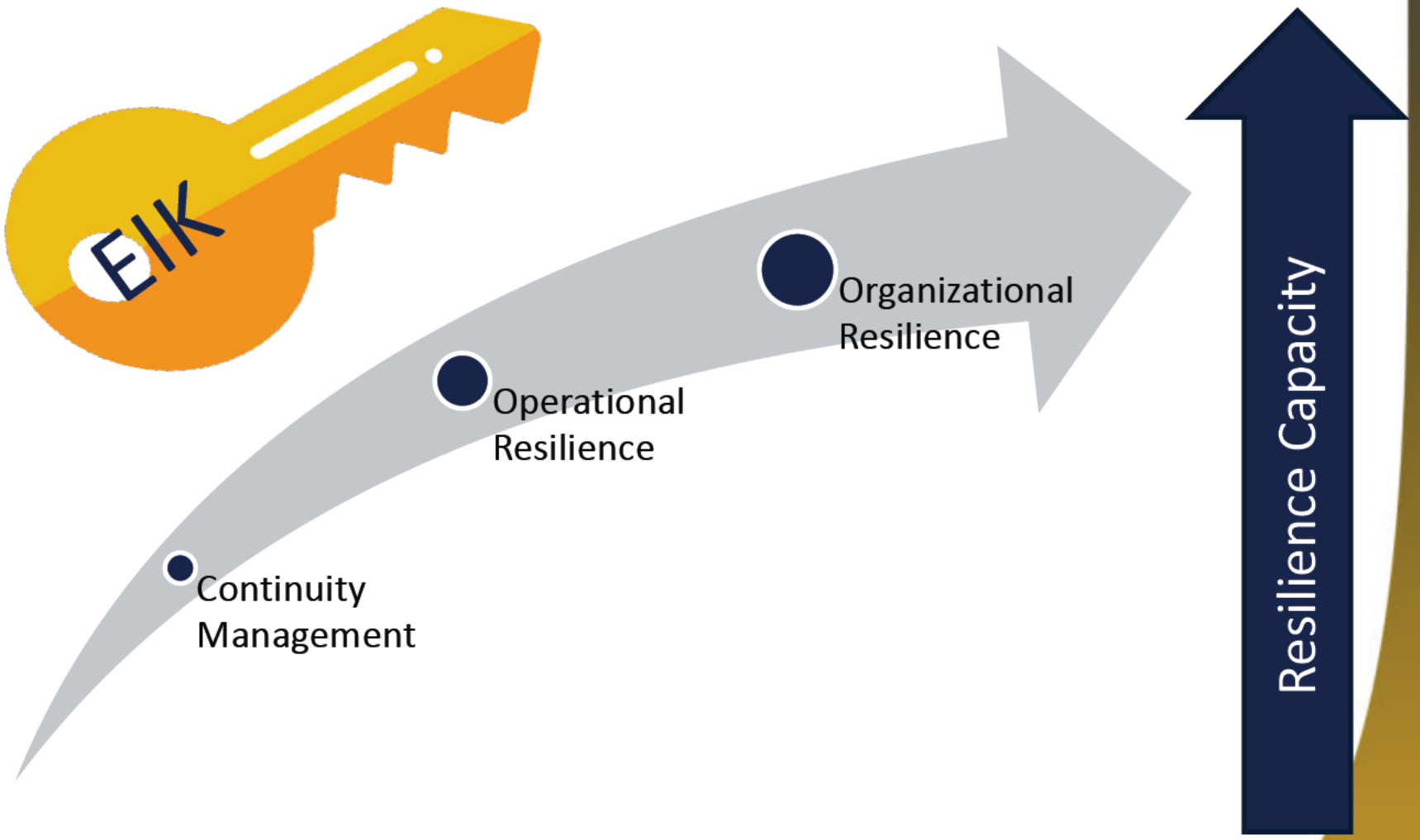
EIK Builds Resilience Capacity



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EIK and Disruption: a Story & Discussion

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Closing conversation …

Acknowledgments

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Further Reading

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Be in touch!

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Discussion Case

An organization receiving government funding to design a new product, tests processes to ensure the safety and effectiveness of the product in high-stakes situations. Given the nature of the product, proactive risk analysis is performed, and a prototype is tested in real conditions. A failure results in unanticipated harm. The organization has a high profile it its industry. Negative media attention asserting ethical and safety breeches regarding the product exerts pressure on the government funding source. The funding stream is temporarily shut down until a full examination of the failure is completed. The organization does an internal review of the processes involved, identifies failure points, publishes the report. No staff were fired. Post-incident, additional review elements were built into risk analysis processes to improve safety. Safety therefore has been reinforced and infused in new ways into every layer of product development and implementation.

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