

UC Berkeley

Energy Use in Buildings Enabling Technologies

Title

California Demand Response Business Network (DRBiznet)

Permalink

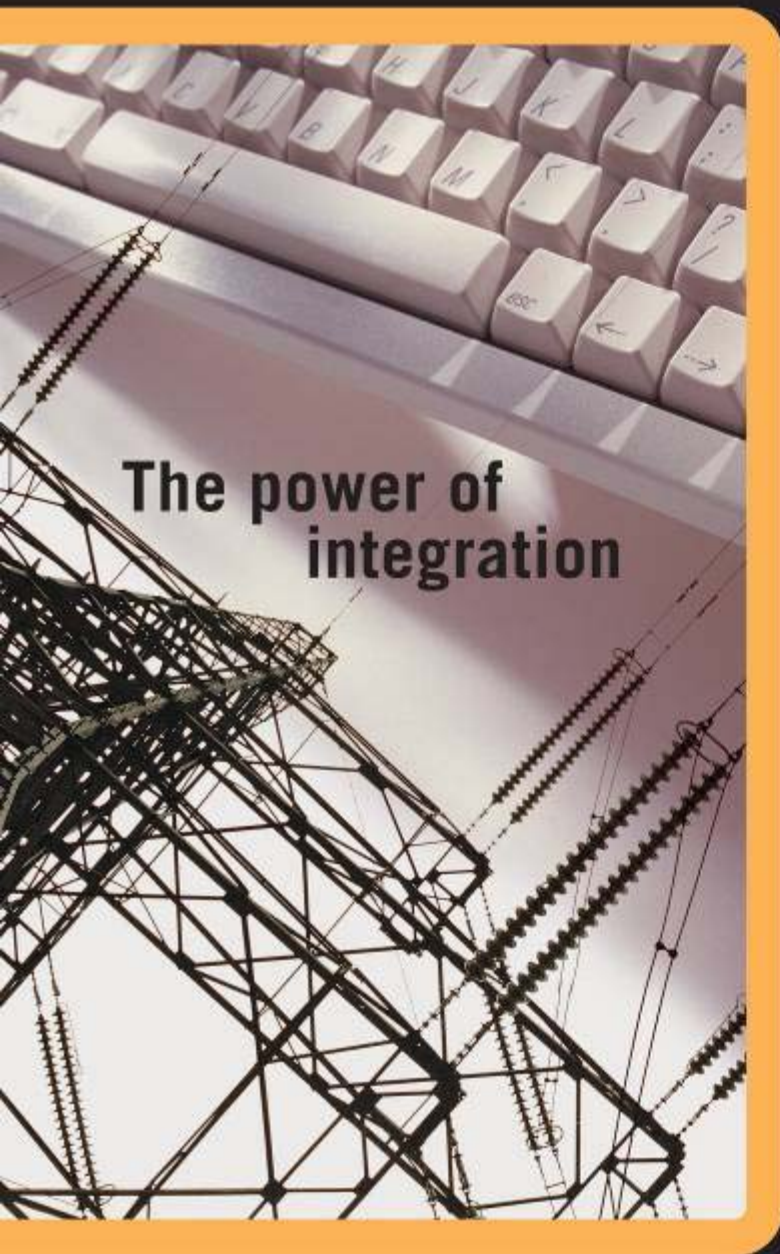
<https://escholarship.org/uc/item/2p65m9cj>

Author

Vojdani, Ali

Publication Date

2008



The power of
integration



Utility Integration Solutions, Inc.

California Demand Response Business Network (DRBizNet*)

Ali Vojdani

June 6, 2006



*For more information see www.DRBizNet.org

Agenda

- Overview of DRBizNet
 - Motivation
 - Features & Architecture
 - Roadmap
 - Field Simulation
- Highlights of BPM Use in DRBizNet
 - Software Demonstration
- Highlight of DRBizNet Architecture
 - Interface Standards
 - Information Security
 - Intelligent Agent (IA)

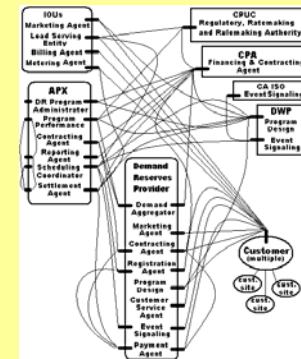
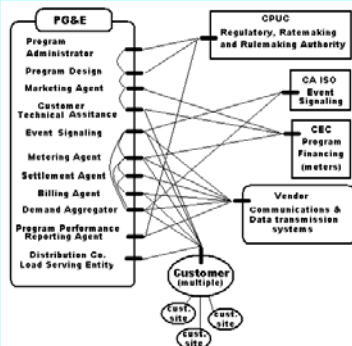
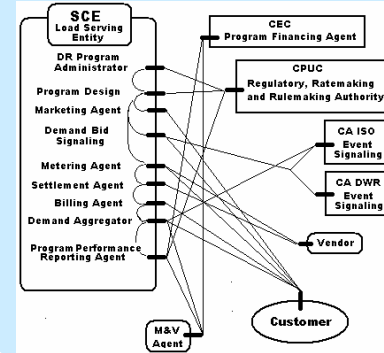
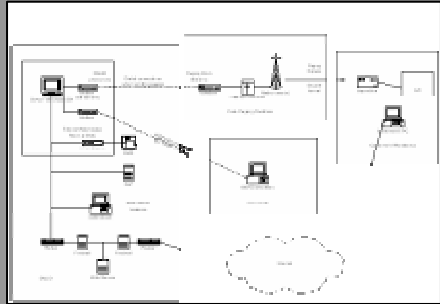
Demand Response Business Network Project (DRBizNet)



- **Funded by the Demand Response (DR) Enabling Technologies Development Project**
 - Public Interest Energy Research (PIER) Program of the California Energy Commission (CEC)
- **Managed and Administered by the California Institute for Energy and Environment (CIEE)**
 - Part of the Office of the President, University of California (UCOP)
- **Guided by CAISO, PG&E, SCE, SDG&E and Industry Advisors**
- **Multidisciplinary Collaborate Team**
 - UISOL (Prime Contractor)
 - Dynamic Networks
 - Menlo Energy Economics
 - Michigan Group
 - NEXANT
 - SAVVION
 - TIBCO

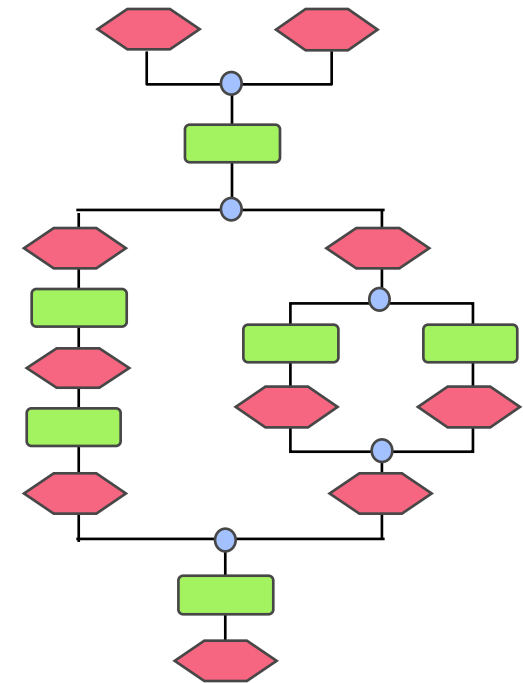
The As-Is State of DR Landscape

Sample DR Programs



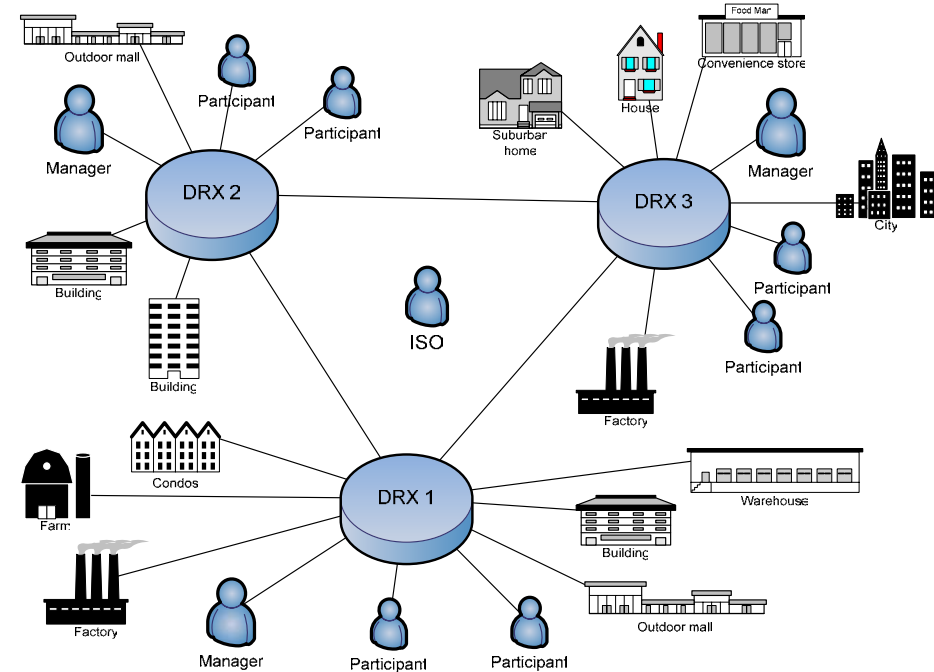
Motivation

- Are your DR business processes:
 - Easy to Execute/Efficient?
 - Consistent/Repeatable?
 - Well Documented/Auditable?
 - Compliant with Tariff Rules/Regulations?
 - Instrumented to Easily Monitor/Measure/Manage?
 - Easy to Learn?
 - Easy to Change/Improve/Optimize?
 - Integrated with your other processes/Systems (e.g., CIS, ERP)?

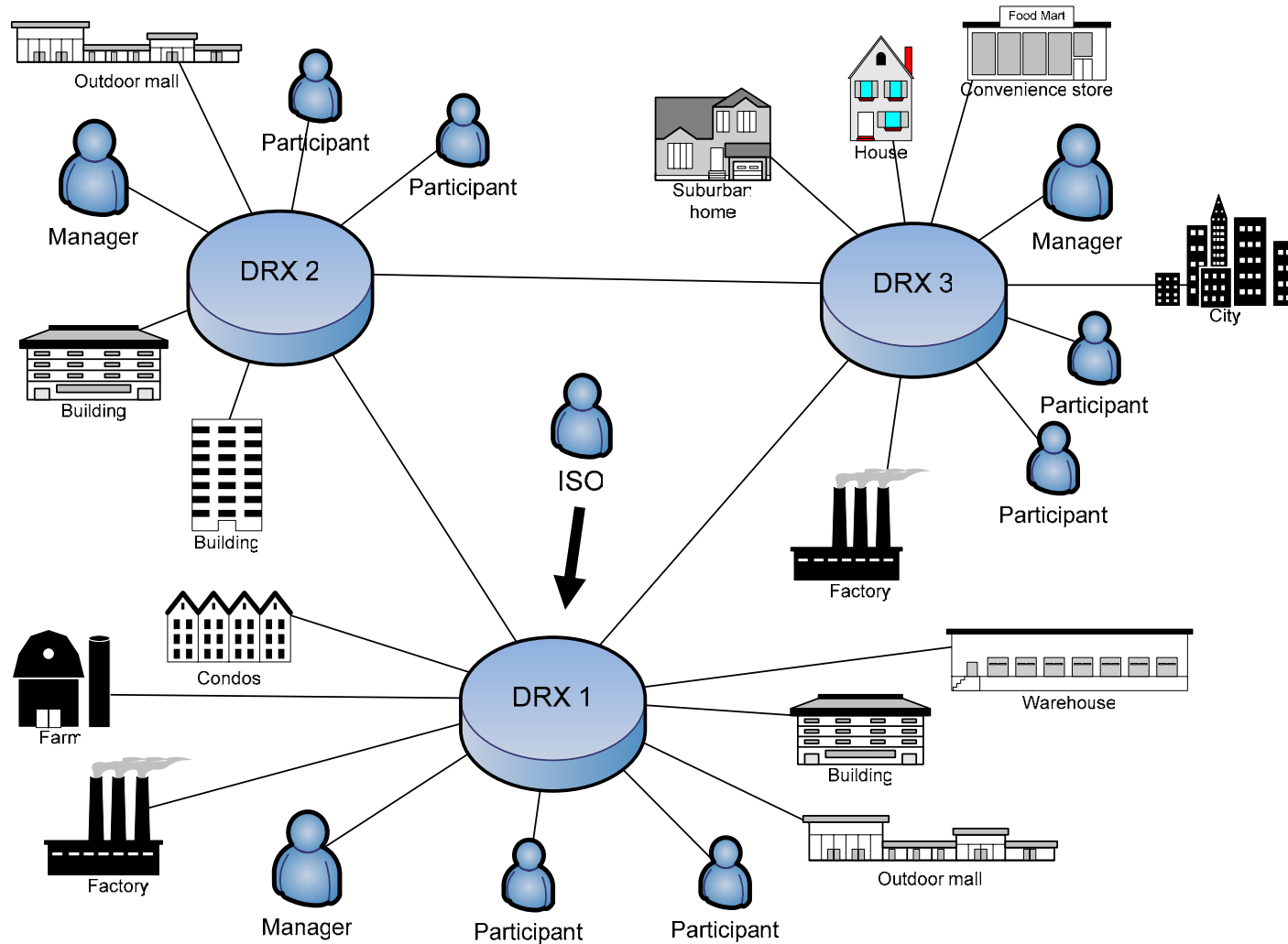


DRBizNet Features

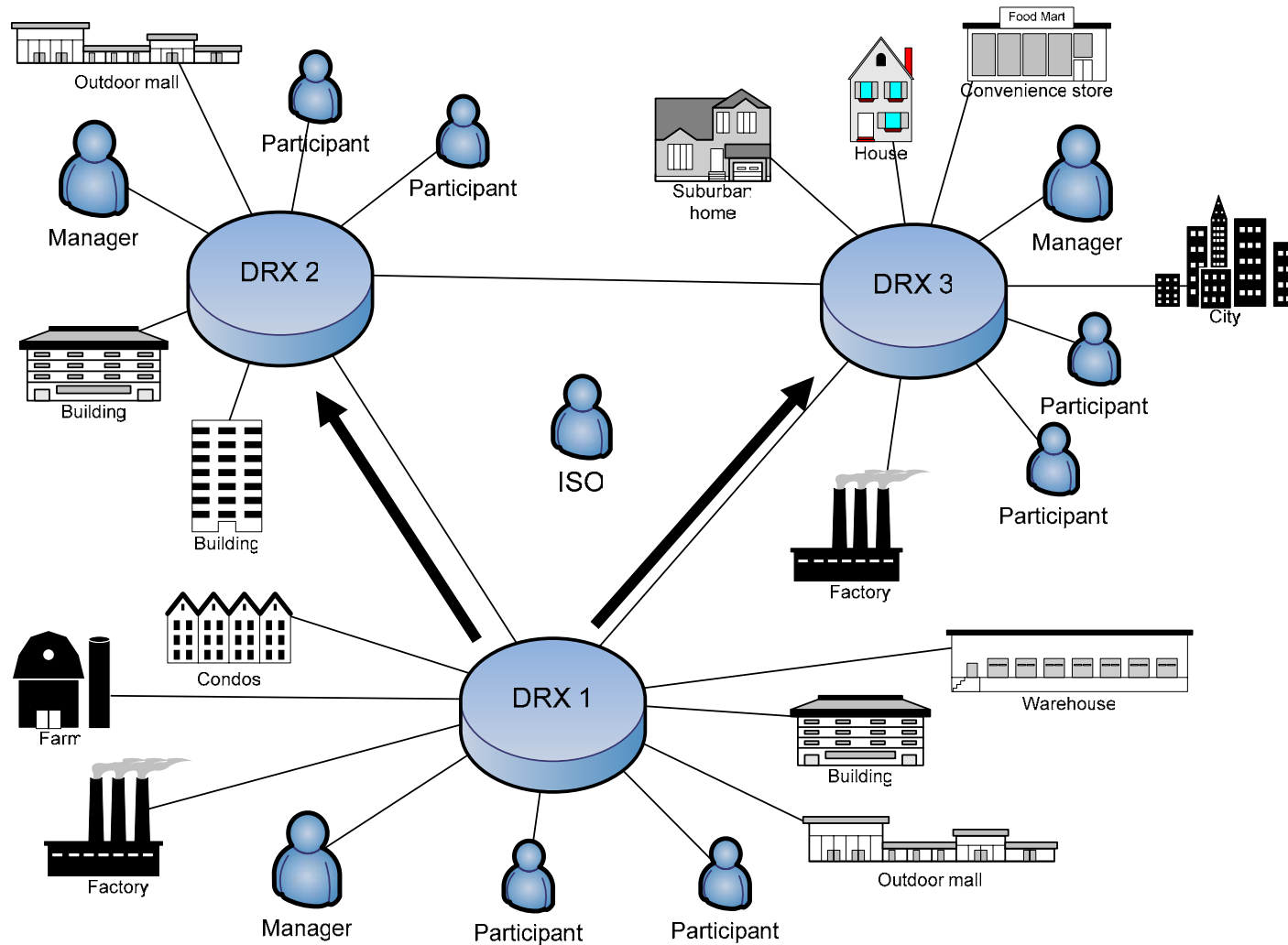
- Functionality to perform DR processes efficiently
 - DR Program Creation (e.g., CPP, RTP, DBP..)
 - Customer Registration
 - Program Enrollment
 - Enrollment Approval
 - DR Capability Query
 - DR Program Invocation
 - Load Control
- Internet-based Real-time communications & control
- Secure communications
- Scalable to residential customers
- Distributed network; not just a central DR exchange
- Open Standards/Plug & Play applications/services
- Intelligent Agent (IA) technology
- Visibility into DR processes
- Full documentation/Audit trail
- Enabling technology for *DR Process Excellence*
- Can be built today using commercial software
- Low Cost to
 - Build
 - Operate
 - Integrate
 - Change



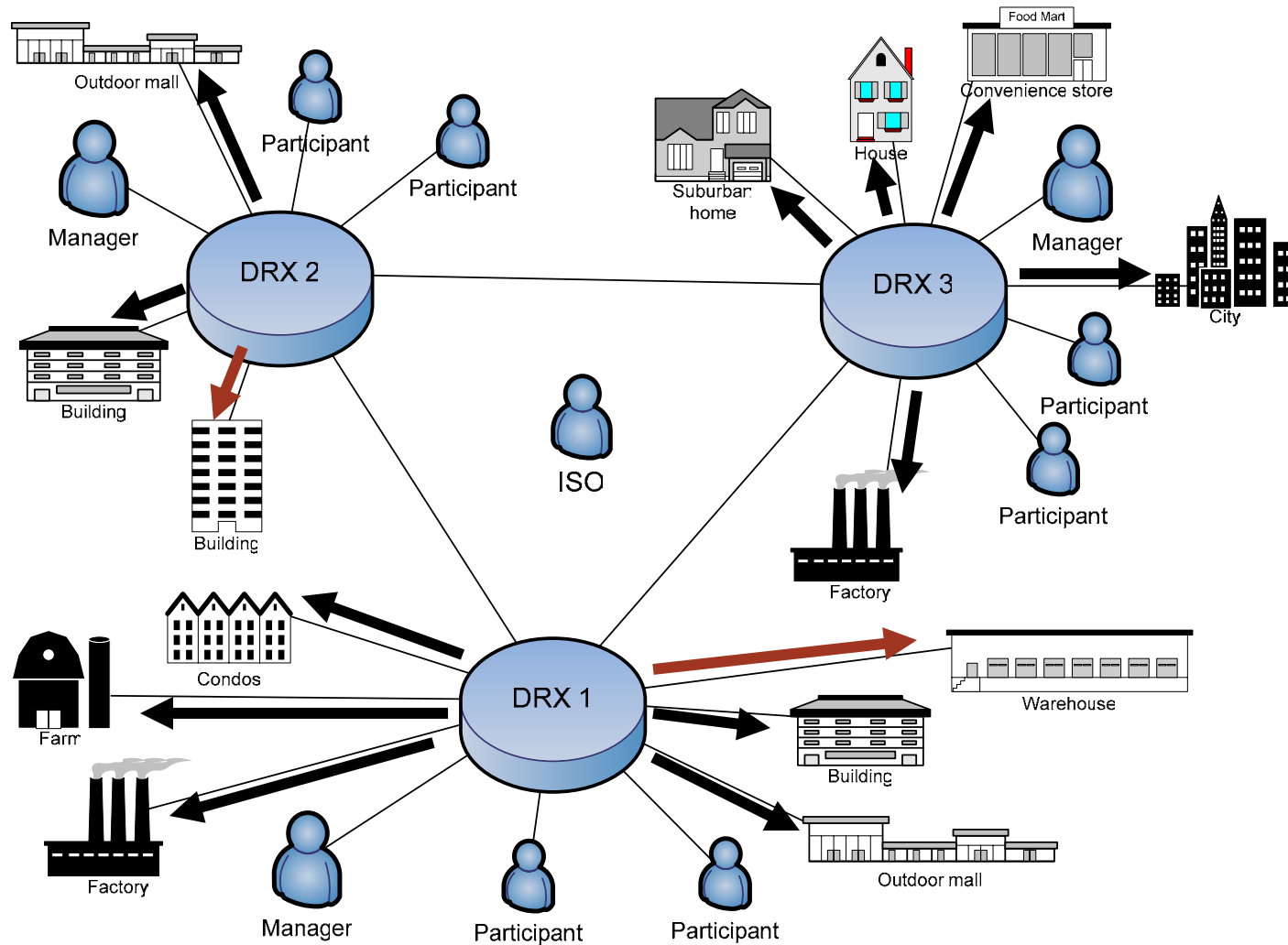
Example: Market Signal from ISO



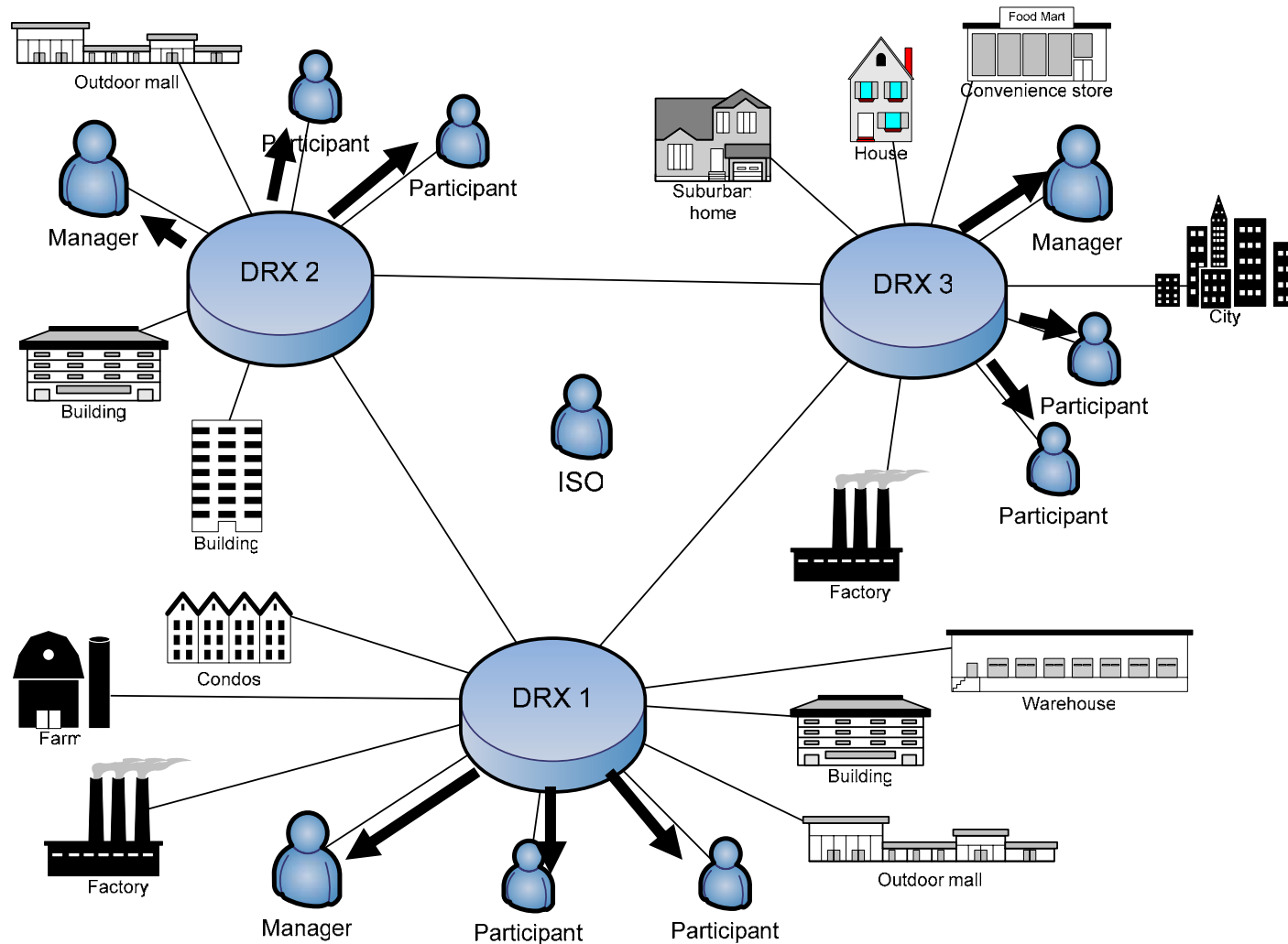
Example: Federation of Market Signal



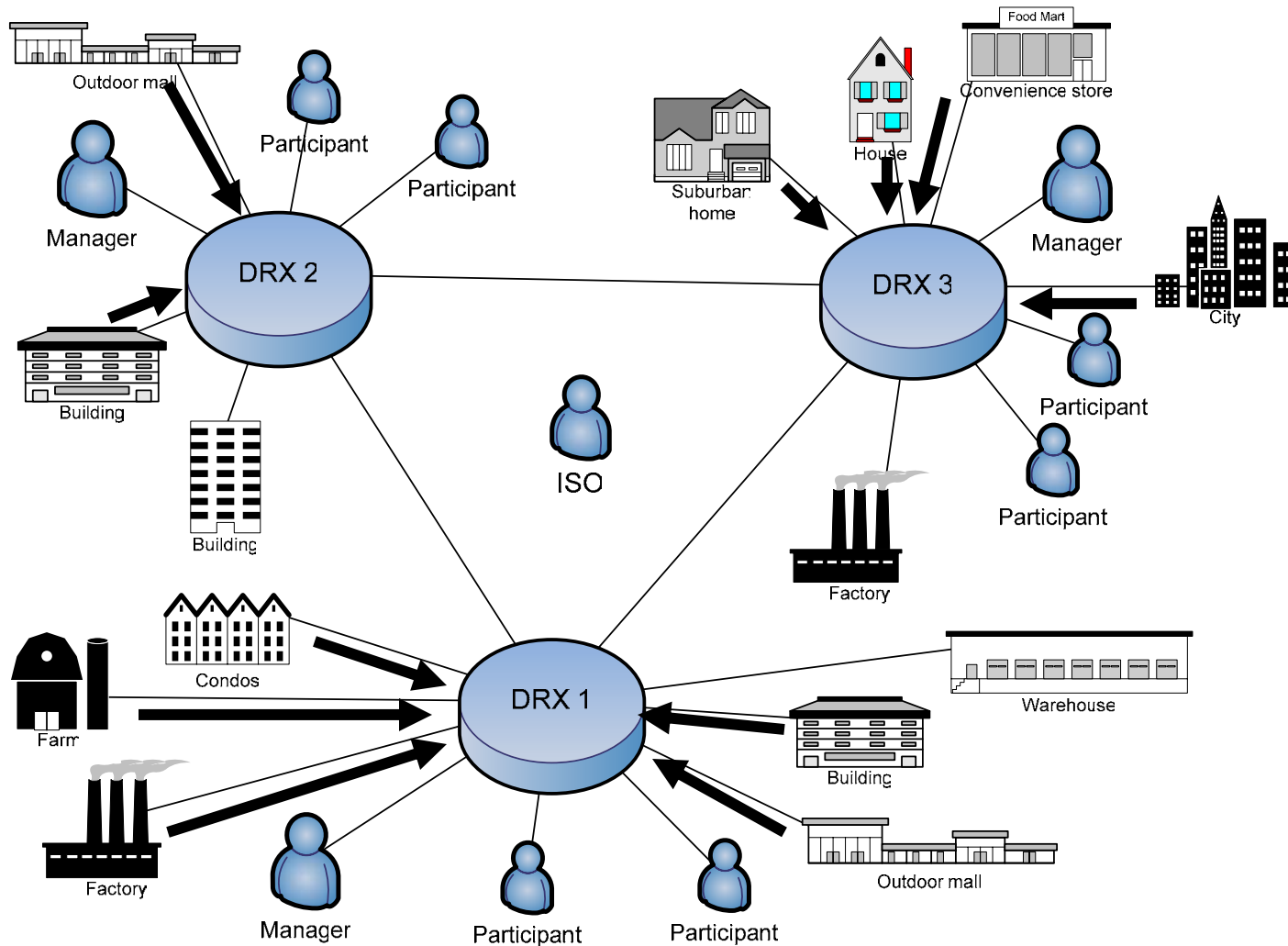
Example: DR Requests Sent to IAs



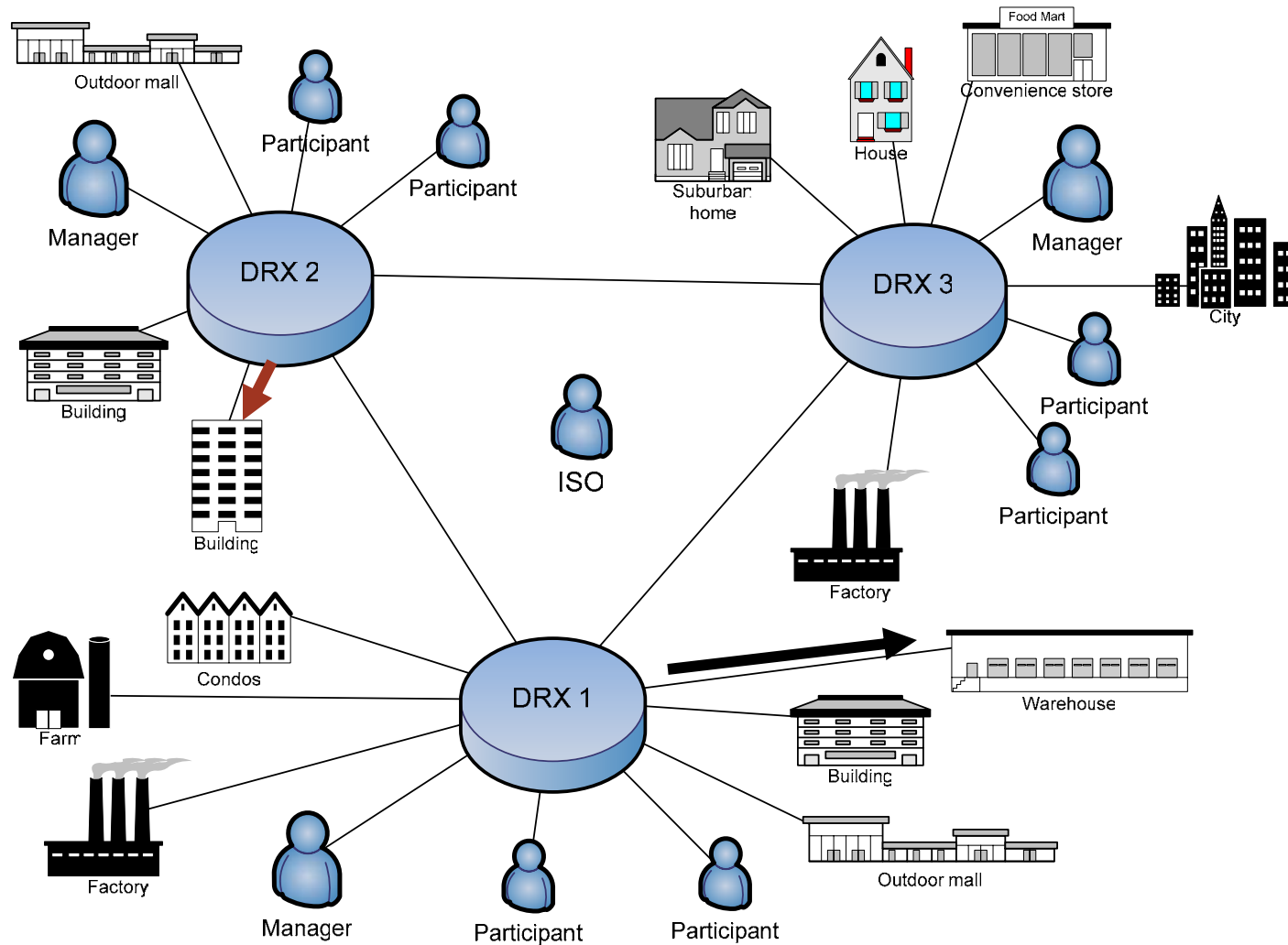
Example: Notifications to Contacts



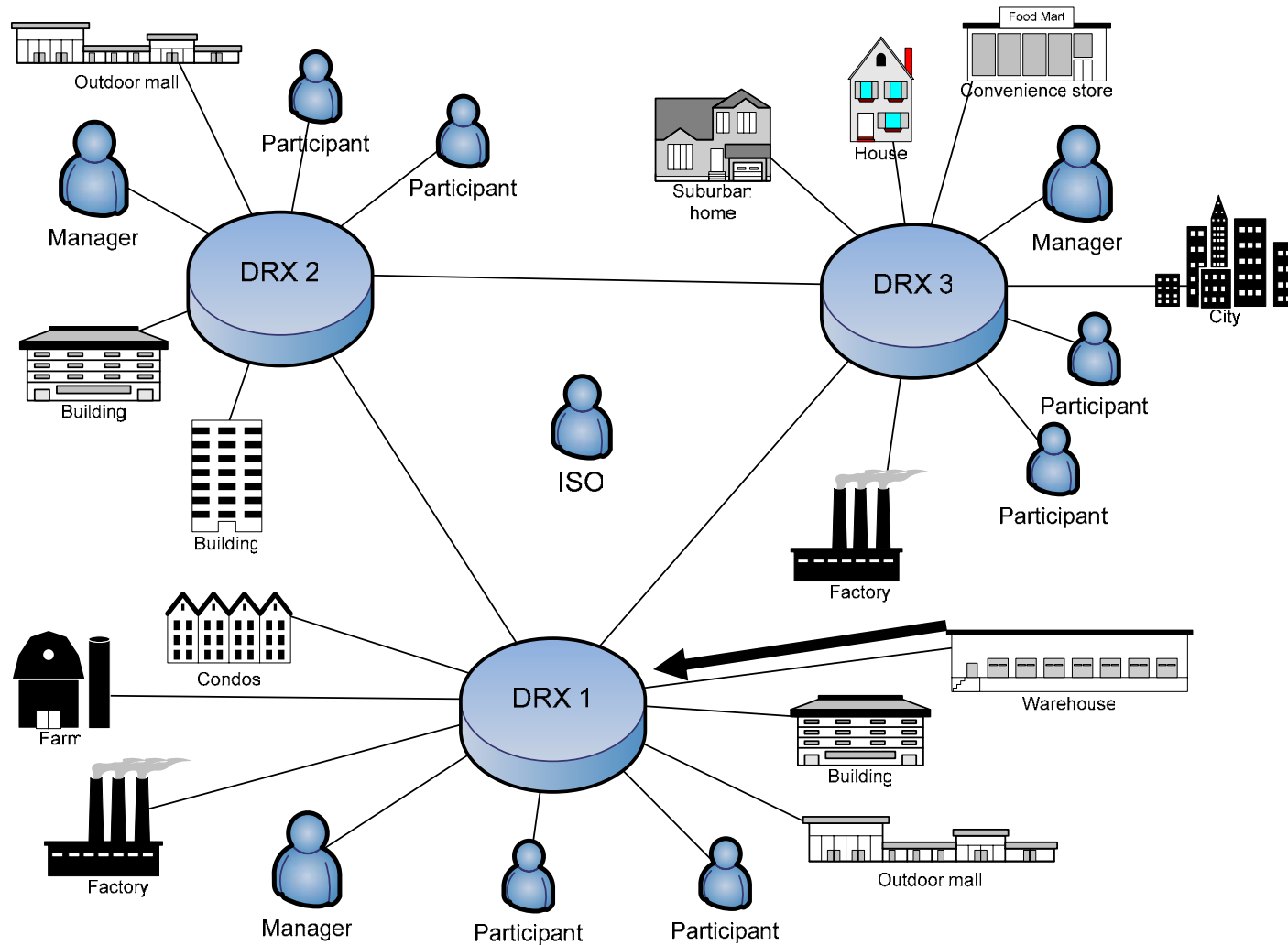
Example: IA Response and Verification



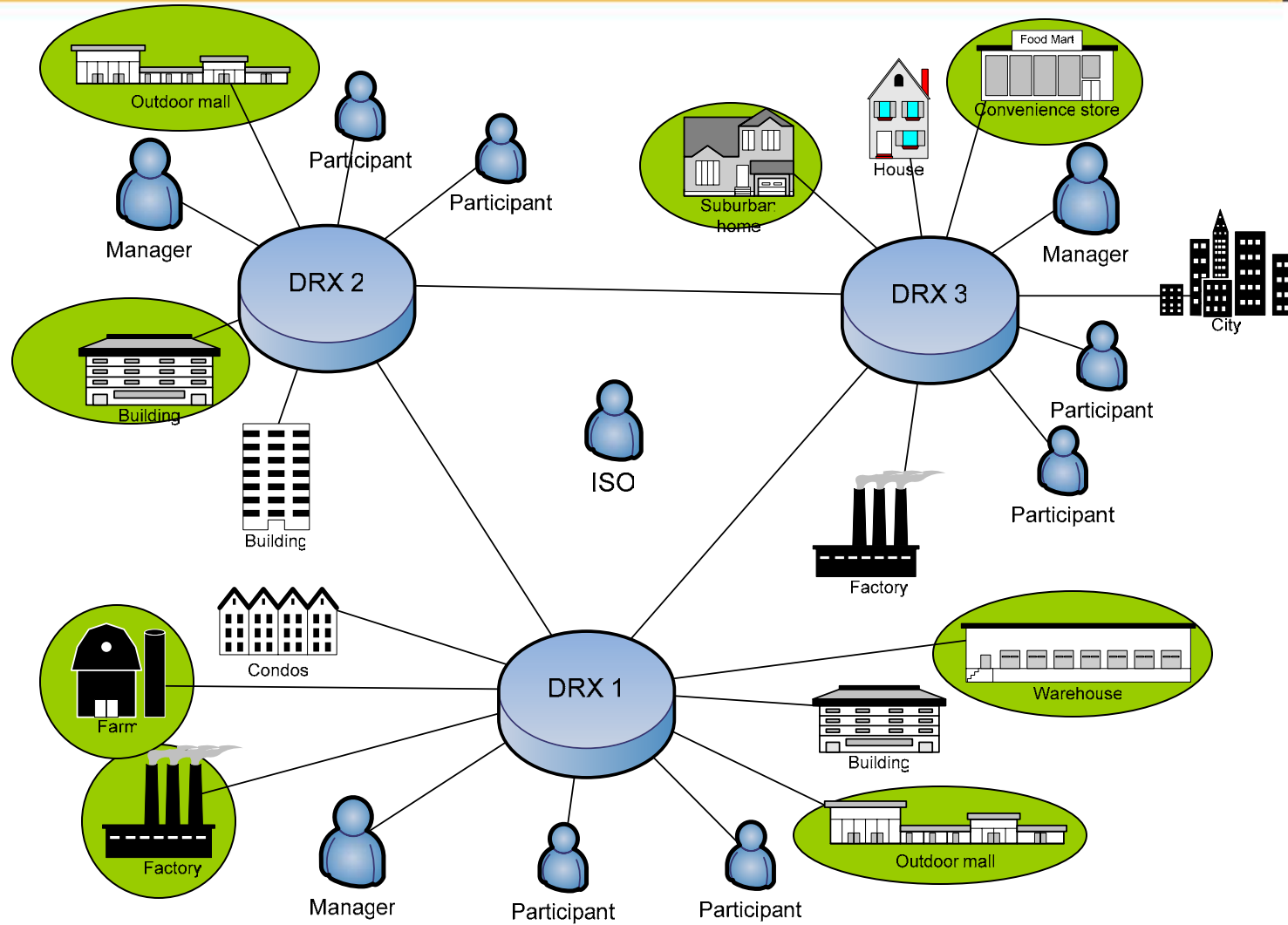
Example: Retry Processing



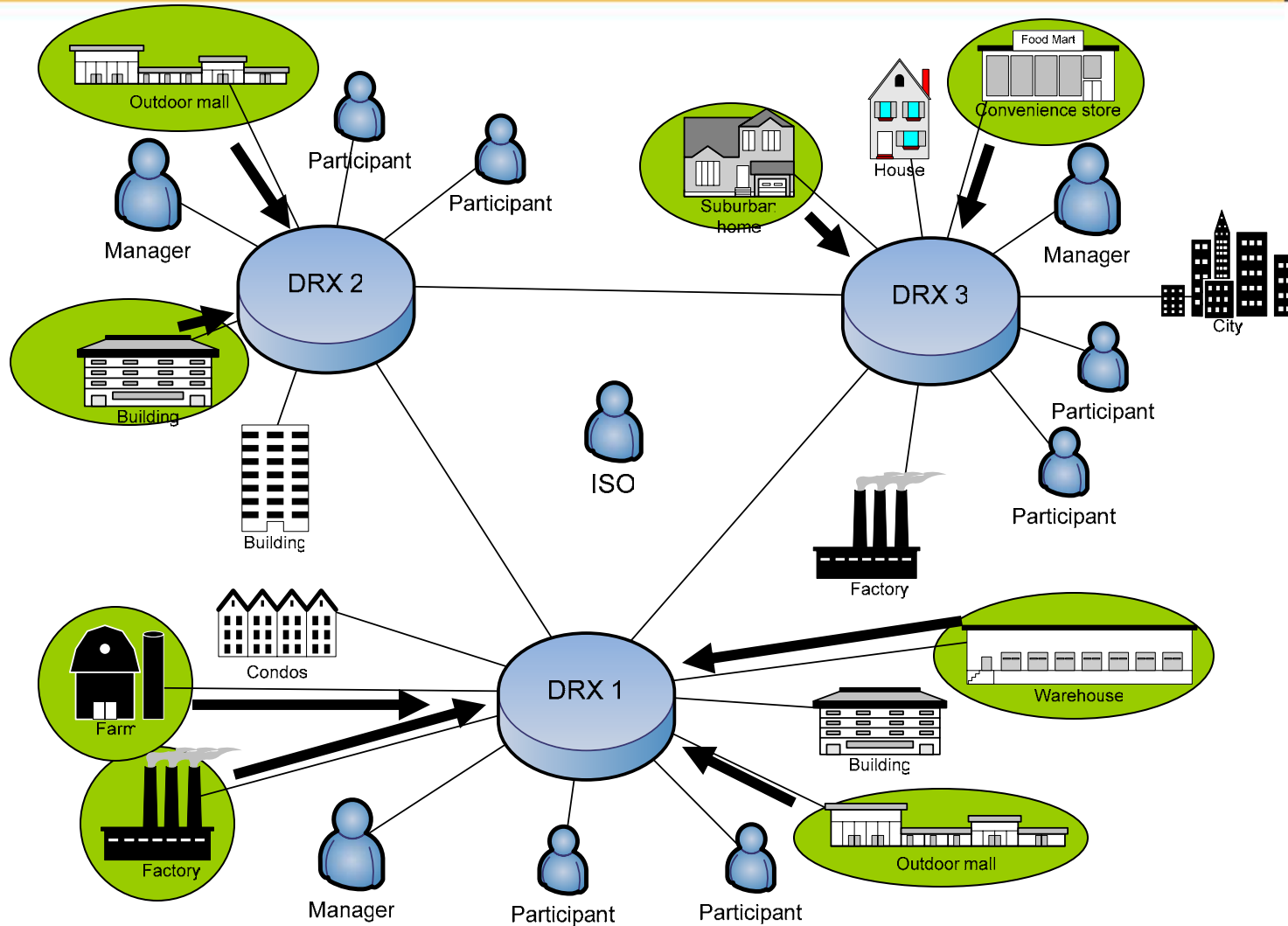
Example: Retry Processing



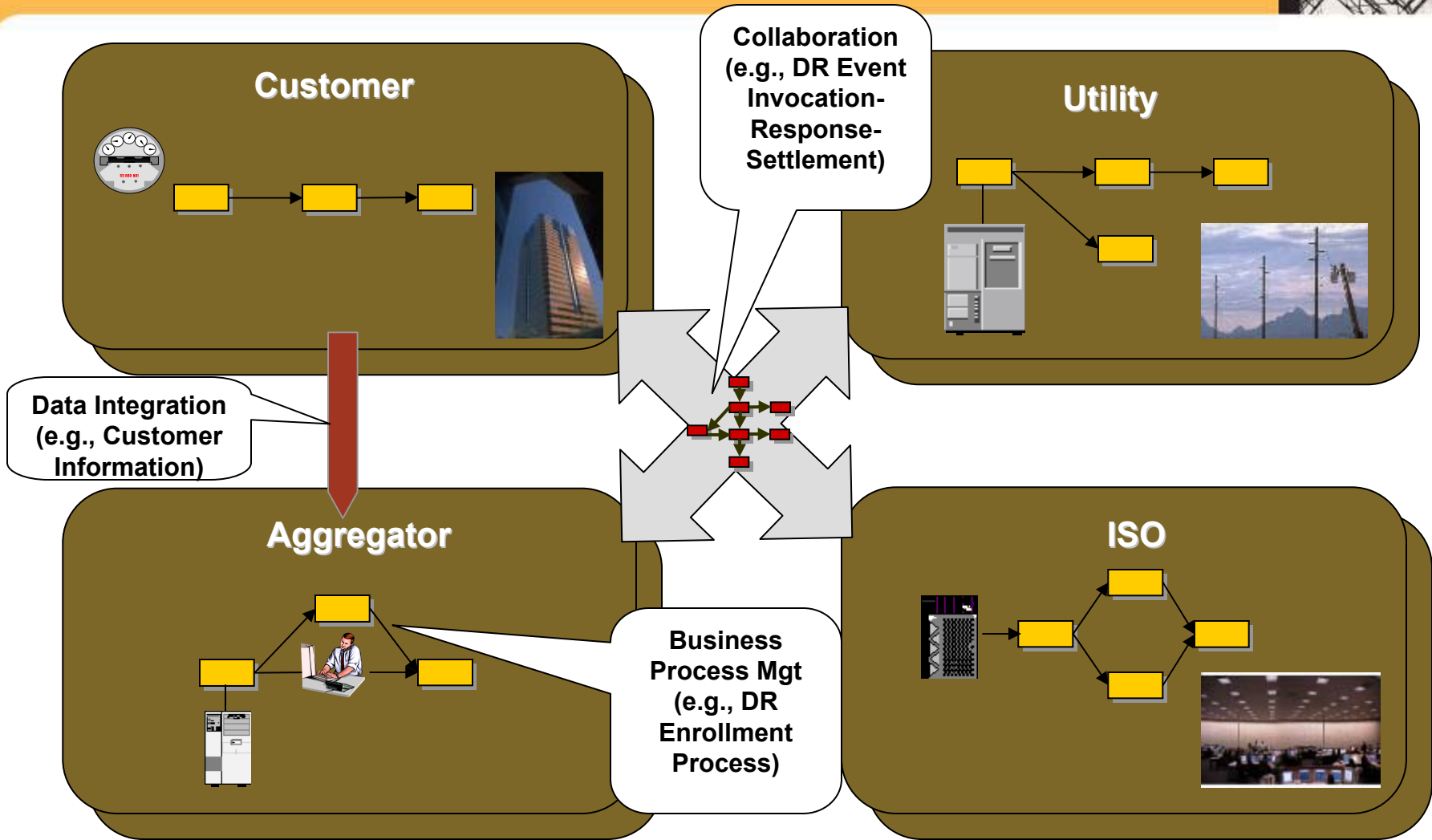
Example: Delivery Action

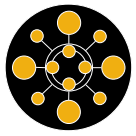


Example: Confirm Delivery Action



Business Process Management & Collaboration





DRBizNet

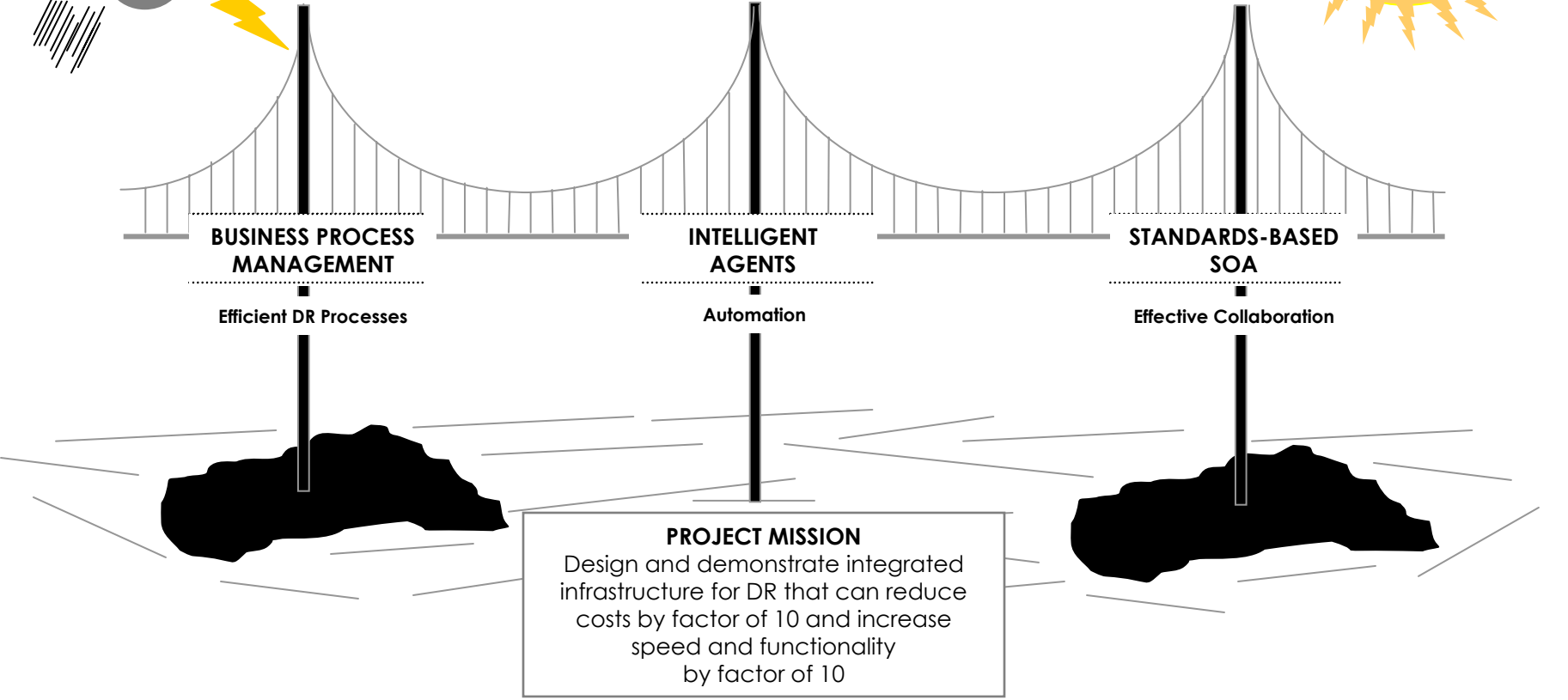
Demand Response Business Network



DRBizNet is a distributed business network ("eCommunity") designed to facilitate communications and business transactions among a large number of DR stakeholders

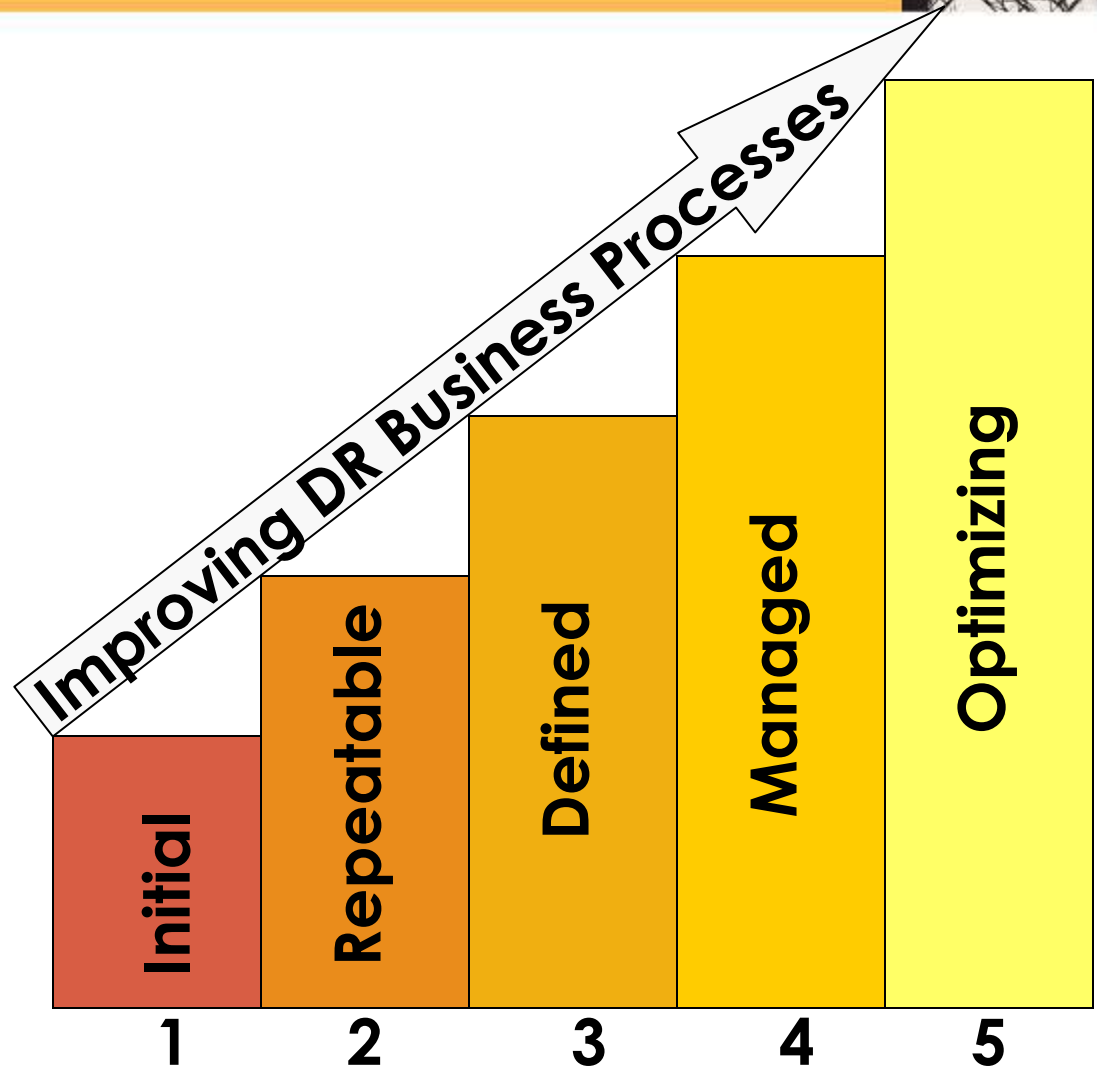
AS-IS STATE
Inefficient, error-prone, slow, inflexible, and non-scalable.

TO-BE STATE
Efficient, error-free, fast, flexible, and scalable.

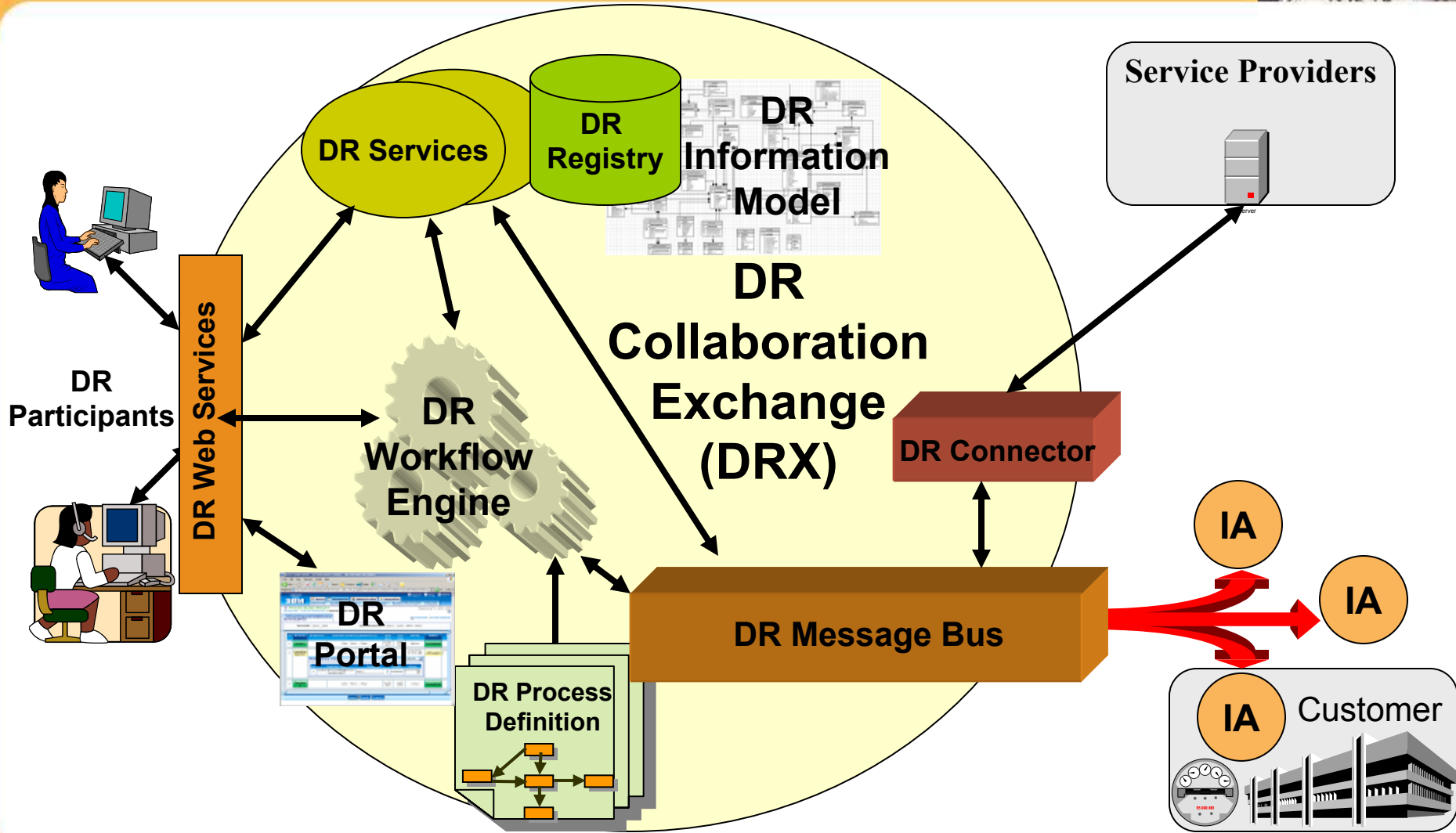


DR Process Excellence

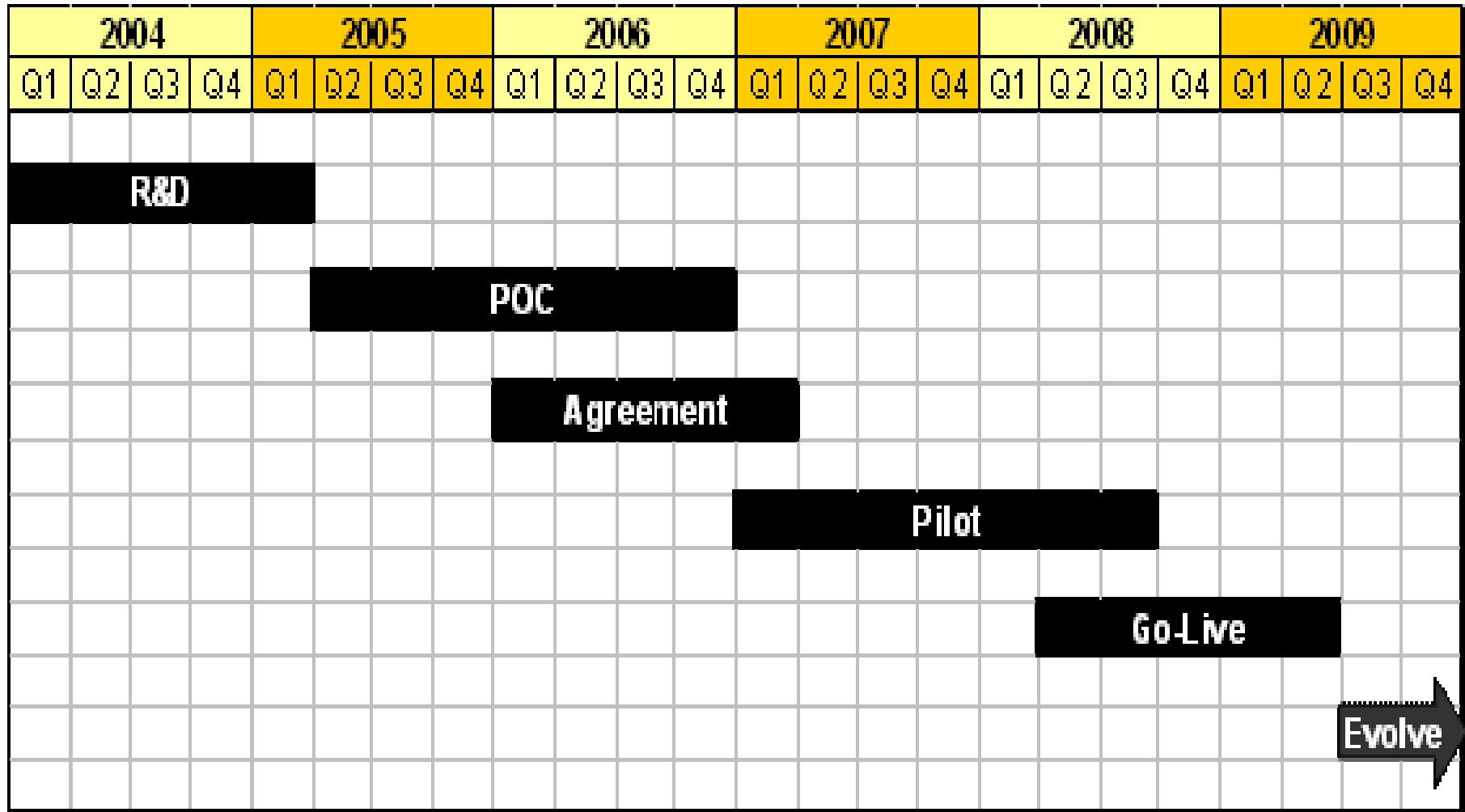
Improving DR performance by defining, standardizing, managing, measuring, and continuously improving DR business processes



DR Collaboration Exchange (DRX)

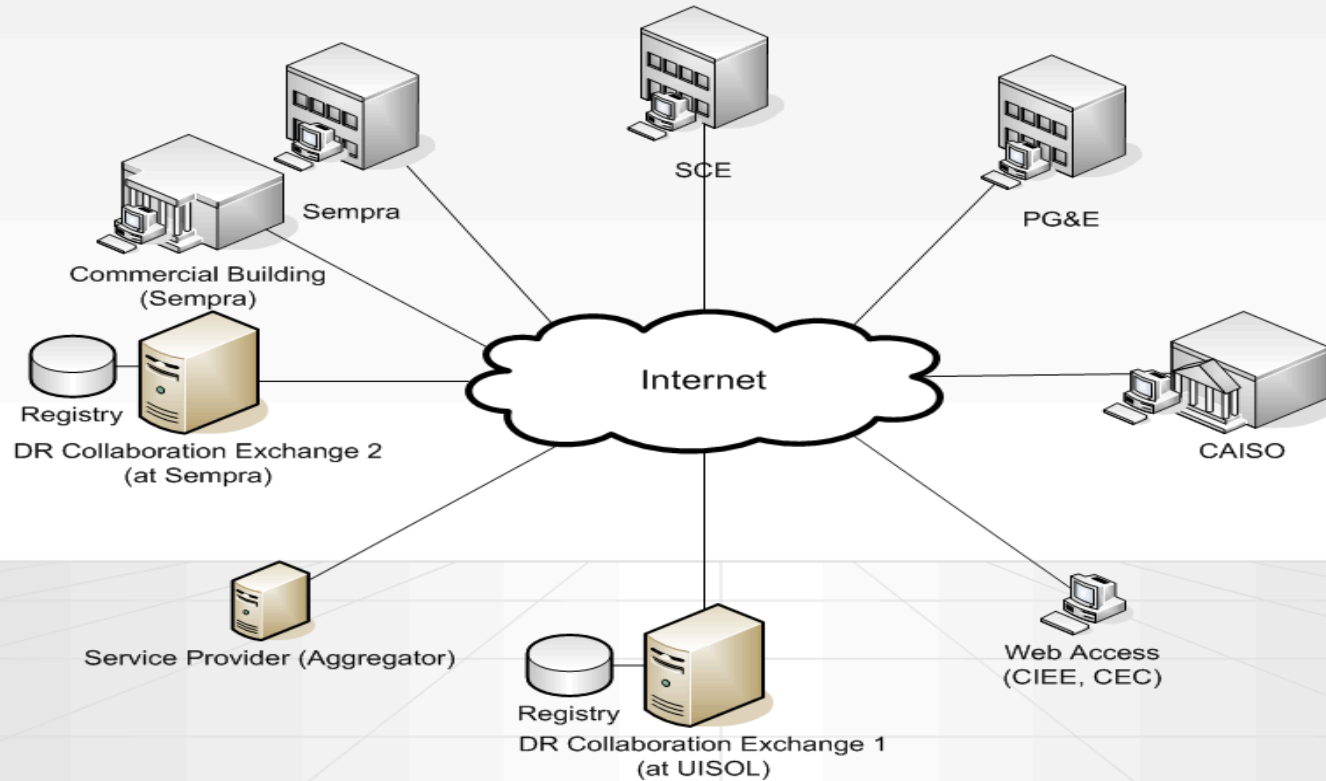


DRBizNet Phased Implementation



DRBizNet Field Simulation

DRBizNet Field Simulation Configuration



Status

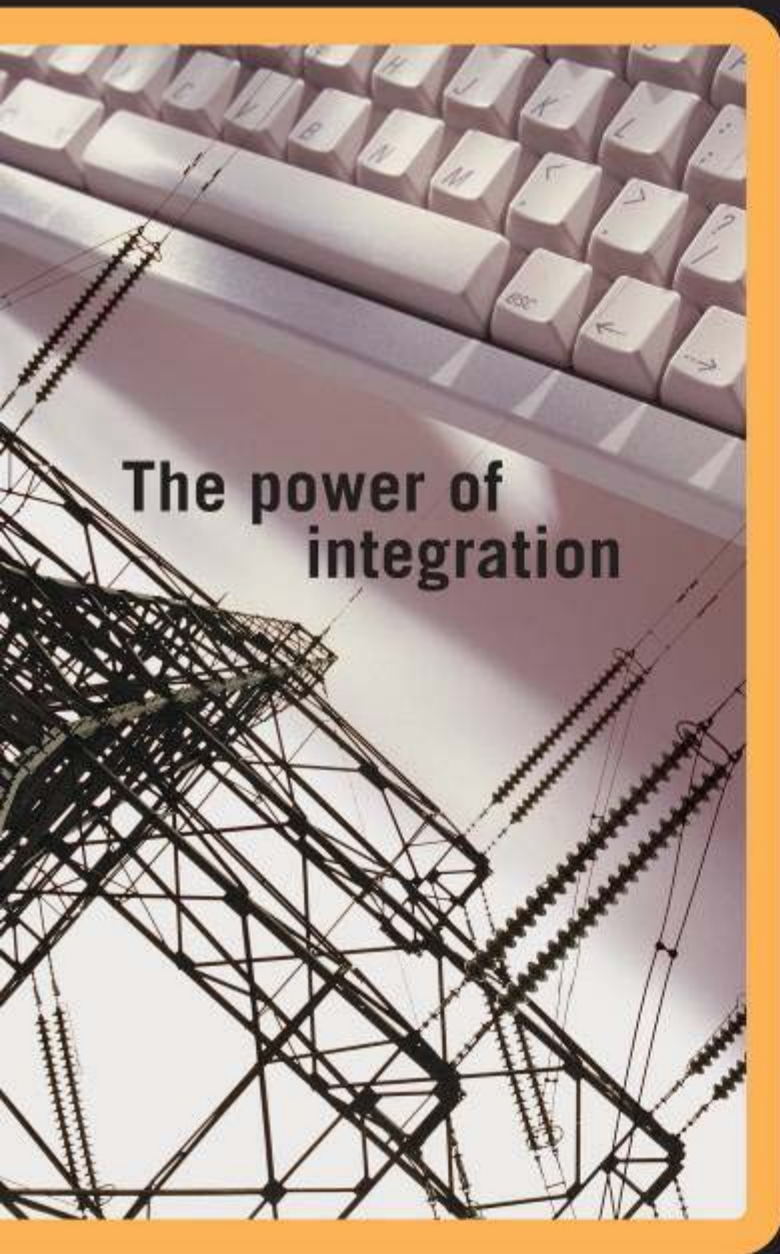
- Basic R&D completed
- Field Simulation software developed
- Training provided to Demo participants
- Dress Rehearsal in June
- Field Simulation workshop August 11, 2006
- Next step, DRBizNet Pilot, is being planned

Benefits (Partial List)

10x10 Improvements



- Efficient building blocks for an open and efficient DR e-Community
- Real-time communication and visibility
- Complete documentation/audit trail for all transactions
- Comprehensive platform for efficient and consistent end-to-end DR process management/collaboration
 - Electronic workflow mgt with powerful features (e.g., portal inboxes, deadline monitoring, escalation, substitution, e-mail notifications)
- Drastically reduces manual steps and errors
- Reduces need for training of process actors
- DR process optimization tools
 - DR process repository, DR process metrics/management dashboards, process simulation & forecasting, process bottleneck detection, what if analysis)
- Eliminates need for multiple systems for managing different DR programs
- Easy DR program creation
- Easy interface with other corporate systems through standard adaptors
- Easy, standards-based, interface with external parties
- Secure communications with DR resources
- Option for automating customer response through Intelligent Agents
- Dramatically reduces cost of making process changes through graphical process editors, integrated business rules engine, and rapid prototyping tools.
- Reduced O&M cost by replacing coding with configuration & empowerment of business users



**The power of
integration**



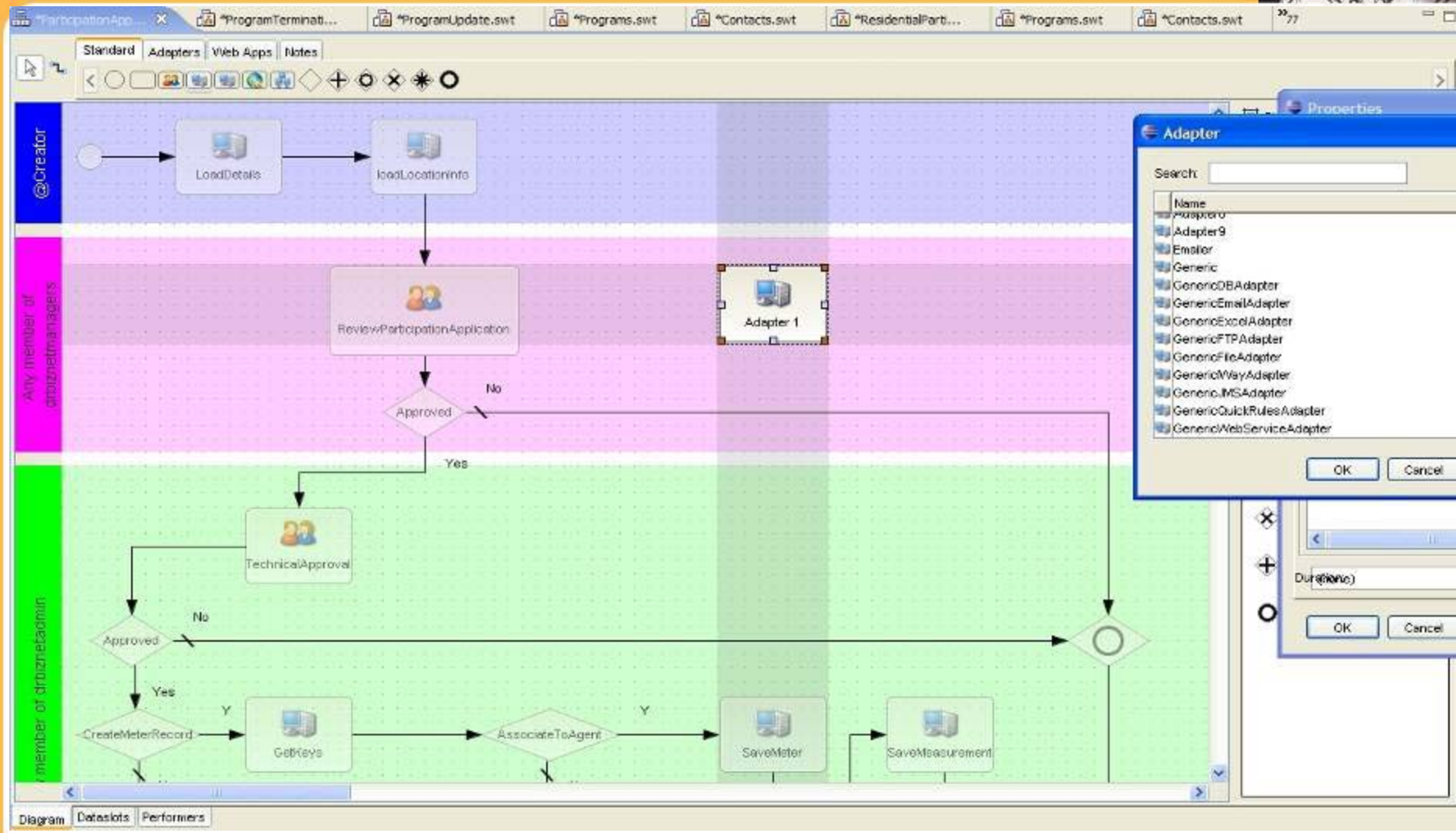
Utility Integration Solutions, Inc.

Highlights of BPM Use in DRBizNet (Mini SW Demo)

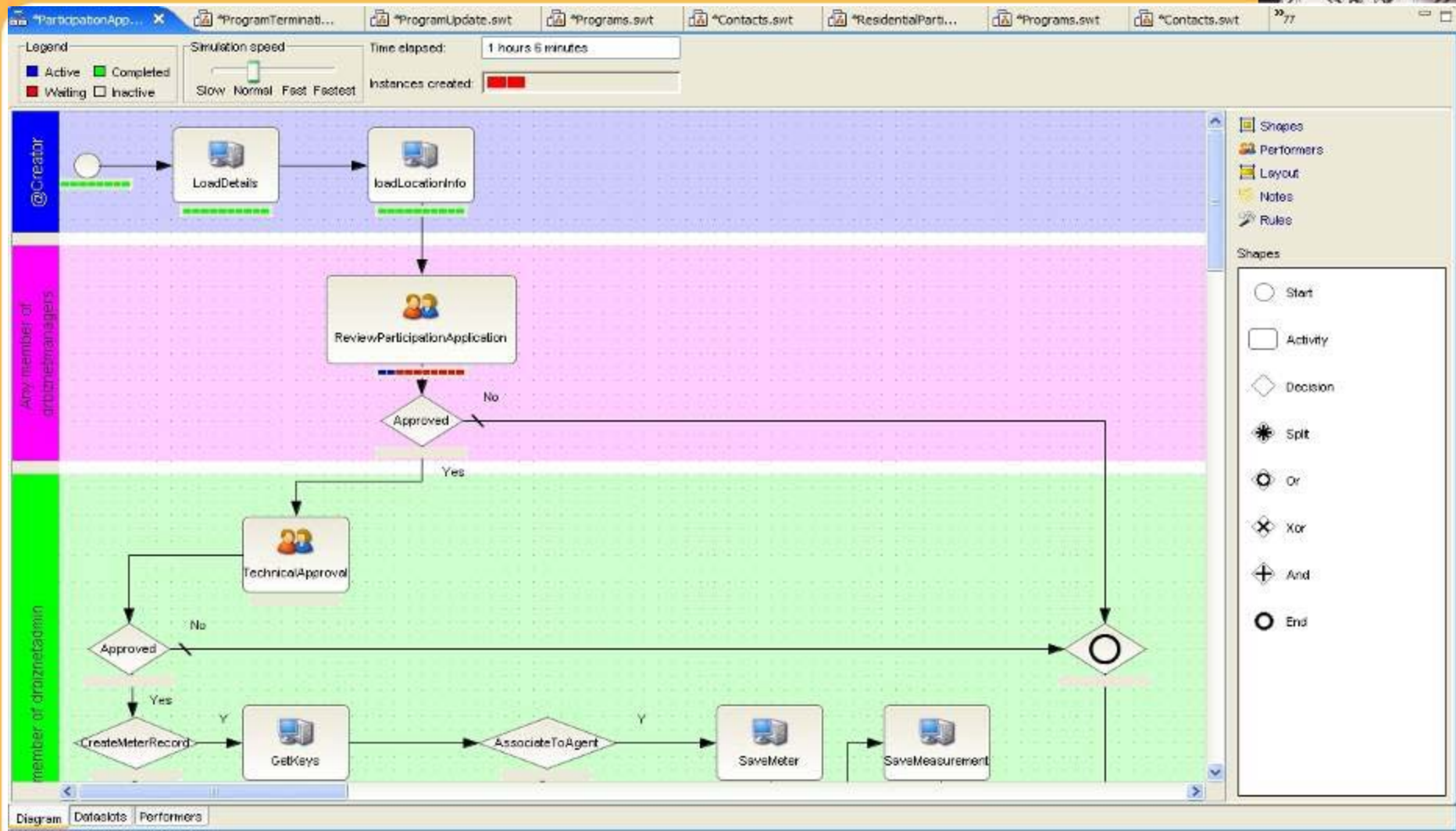
Hannu Huhdanpaa



Modeling & Flexibility



Simulation



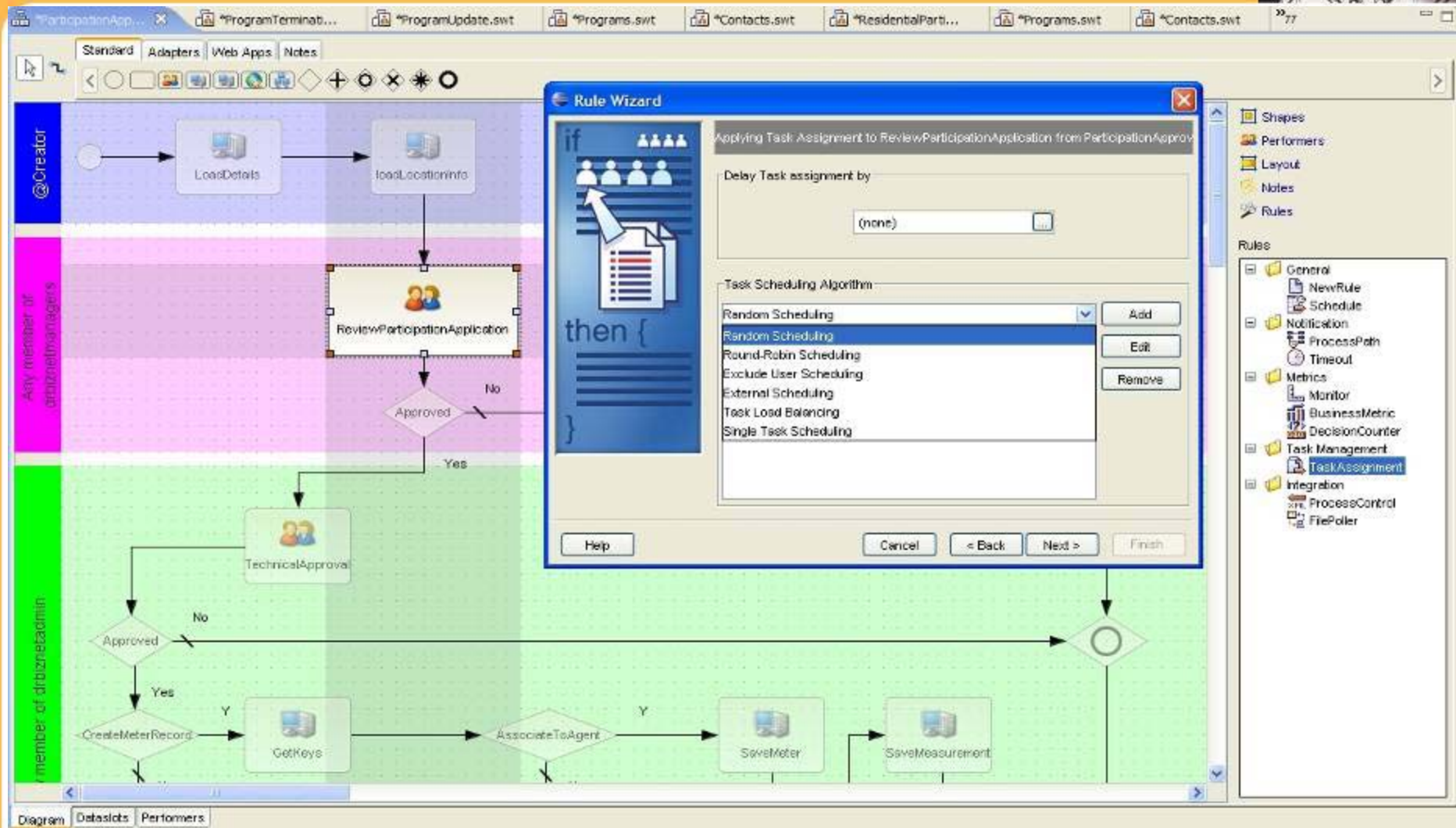
Simulation (Cont.)



A	B	C	D	E	F	G	H	K	L
1									
2	Scenario Comparison for ParticipationApproval								
3									
4									
5	Activity Time and Cost								
6									
7	Activity	ReviewParticipationApplication							
8	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
9	Scenario 1	50	1075.4833	1175.3833	23.5075	\$25,057.50	\$501.15		
10	Scenario 2	50	352.4333	455.75	9.115	\$25,911.68	\$518.23		
11									
12	Activity	TechnicalApproval							
13	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
14	Scenario 1	25	0	50	2	\$9,750.00	\$390.00		
15	Scenario 2	25	357.8333	407.8333	16.3133	\$0.00	\$0.00		
16									
17	Activity	ActivateParticipationEntry							
18	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
19	Scenario 1	12	0	0	0	\$0.00	\$0.00		
20	Scenario 2	17	0	0	0	\$0.00	\$0.00		
21									
22	Activity	DeleteParticipationEntry							
23	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
24	Scenario 1	38	0	0	0	\$0.00	\$0.00		
25	Scenario 2	33	0	0	0	\$0.00	\$0.00		
26									
27	Activity	EmailApproval							
28	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
29	Scenario 1	6	0	0.1	0.0167	\$0.00	\$0.00		
30	Scenario 2	10	0	0.1667	0.0167	\$0.00	\$0.00		
31									
32	Activity	EmailRejection							
33	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
34	Scenario 1	19	0	0.3167	0.0167	\$0.00	\$0.00		
35	Scenario 2	19	0	0.3167	0.0167	\$0.00	\$0.00		
36									
37	Activity	GetKeys							
38	Scenario	Occurs	Waiting Time	Total Time	Avg. Time	Cost	Avg. Cost		
39	Scenario 1	6	0	0	0	\$0.00	\$0.00		
40	Scenario 2	8	0	0	0	\$0.00	\$0.00		

Simulation

Business Rules - Predefined



Business Rules - Custom



New Rule

Rule Header | Rule Body

Available Events

Event Map For: ParticipationApproval

Filter by Attributes: All

- EVT_8 -loadLocationInfo Workstep Completed
- EVT_9 -ReviewParticipationApplication Workstep Activated**
- EVT_10 -ReviewParticipationApplication:: Workitem Created
- EVT_11 -ReviewParticipationApplication:: Workitem Assigned
- EVT_12 -ReviewParticipationApplication:: Workitem Available
- EVT_13 -ReviewParticipationApplication:: Workitem Completed
- EVT_14 -Approved Workstep Activated
- EVT_15 -Approved Workstep Completed
- EVT_16 -Or 2 Workstep Activated
- EVT_17 -Or 2 Workstep Completed
- EVT_18 -DeleteParticipationEntry Workstep Activated
- EVT_19 -DeleteParticipationEntry Workstep Completed

Rule Activation

Events used to activate this rule:

Conditions for activating this rule:

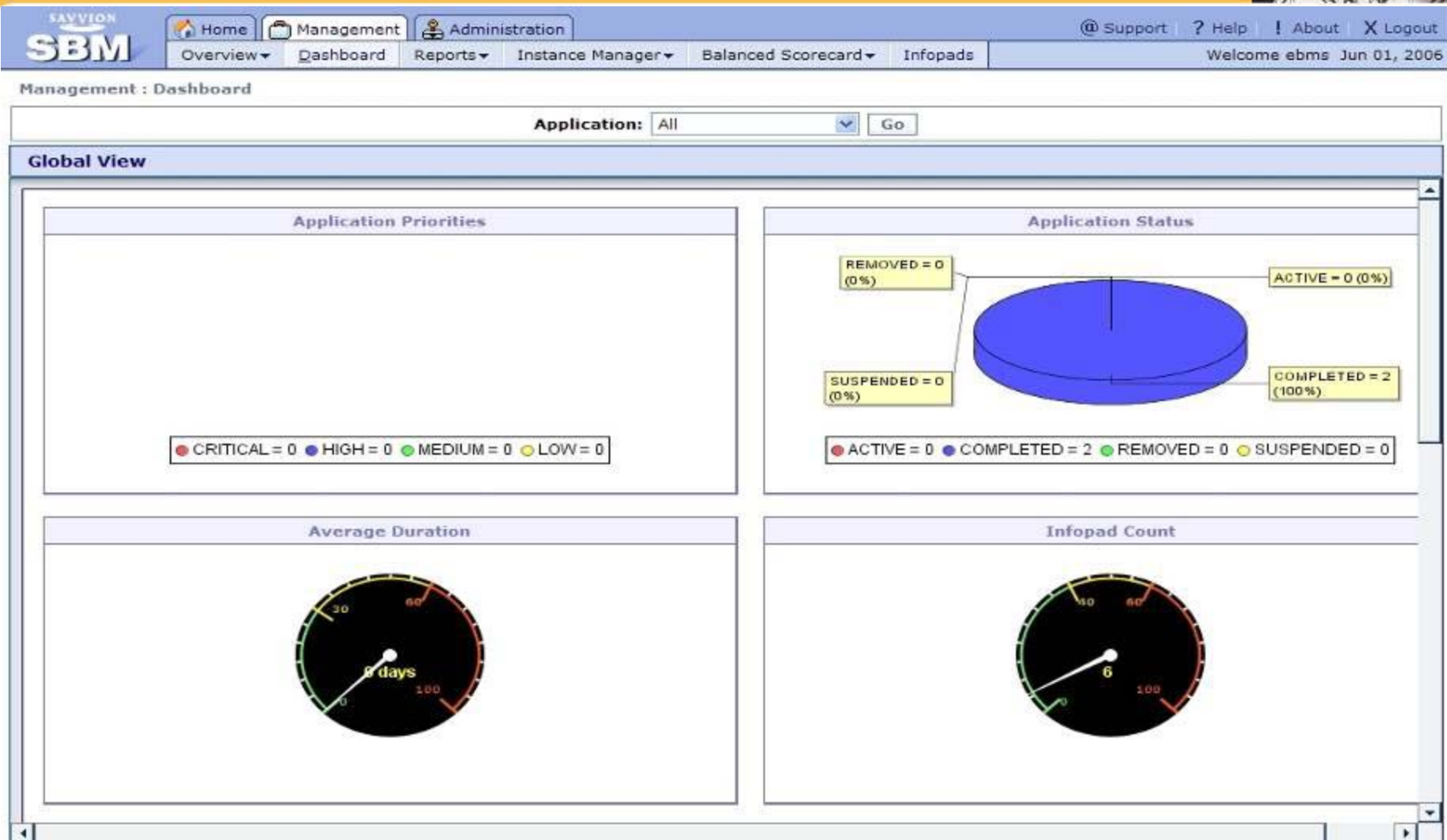
Actions

Edit Action: [] Action: Discard


- Discard
- Generate
- Perform
- Send Mail**
- Schedule Event
- Unschedule Event
- Infopad Access
- Discard Index Entry

OK Cancel

Management Dashboard – Process Metrics



Management Dashboard – Process Auditability


 Home Management Administration

 @ Support ? Help ! About X Logout
 Welcome ebms Jun 01, 2006

Overview Dashboard Reports Instance Manager Balanced Scorecard Infopads

Management : Reports (Time Analysis)

Analysis for: Performer

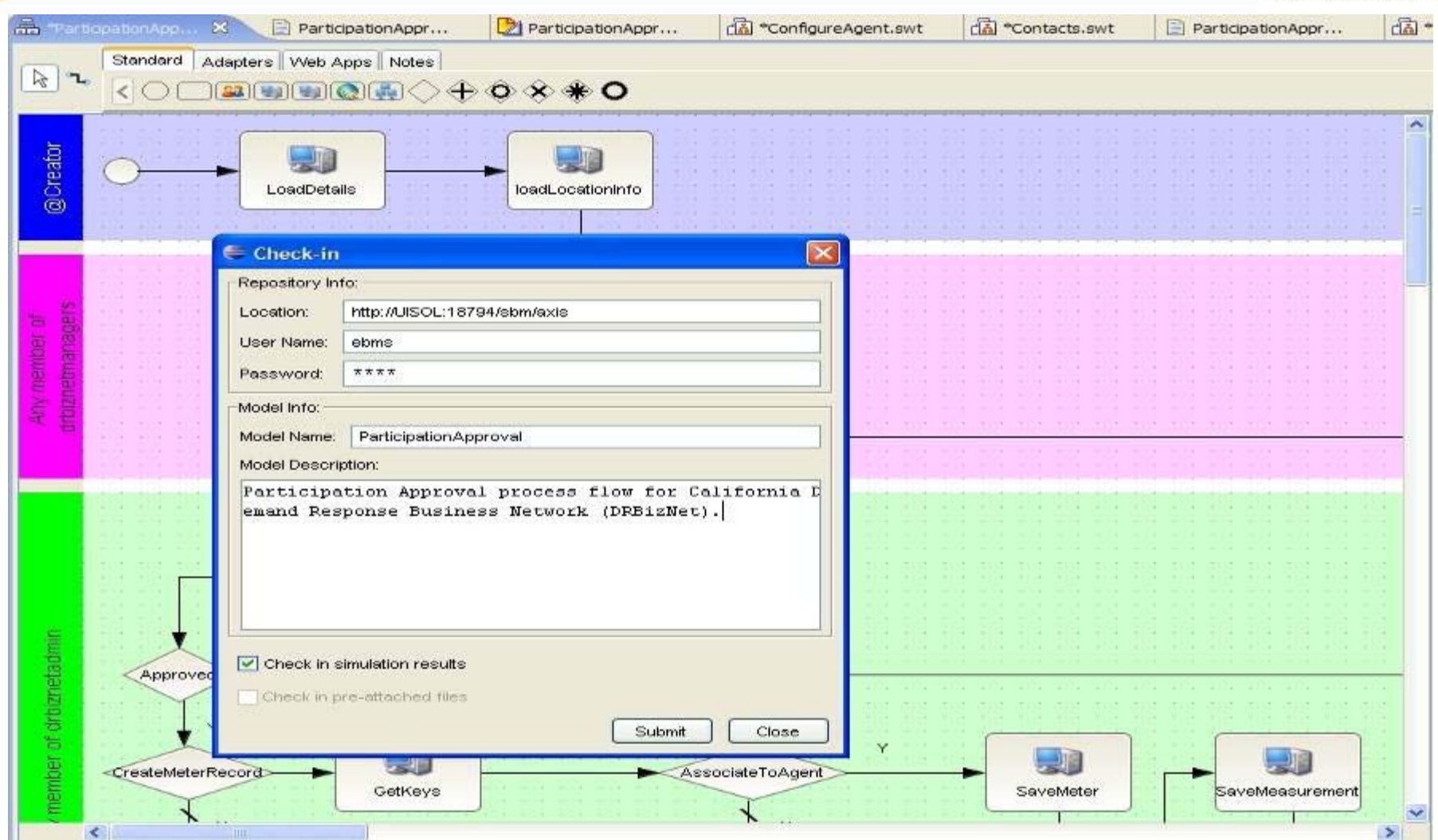
Application: ParticipationApproval Analysis Time: Completion Time
 Date: This Year From: 01/01/2006 12:27AM To: 06/01/2006 12:27AM Go

Task Completion Time for ParticipationApproval Performers

Performer	Workstep	Instance	Start Time	End Time	Completion
ojdani	ReviewParticipationApplication				
		ParticipantApproval#874	4/19/06 9:47 AM	4/19/06 9:49 AM	1m 37s
Minimum Performer Completion Time					1m 37s
Maximum Performer Completion Time					1m 37s
Average Performer Completion Time					1m 37s
Std Deviation Performer Completion Time					0s
juhdanpaa	TechnicalApproval				
		ParticipantApproval#874	4/19/06 9:49 AM	4/19/06 9:50 AM	27s
Minimum Performer Completion Time					27s
Maximum Performer Completion Time					27s
Average Performer Completion Time					27s

Report Format: HTML View Email..

Process Repository – Check in



Process Repository Browser

The screenshot shows the 'Process Model Repository Browser' application window. It is divided into several sections:

- Repository Info:** Contains fields for Location (http://UISOL:18796/sbm/axis), User Name (ebms), and Password (masked with asterisks).
- Query:** A list of search criteria including General, Workstep, Creation History, Check-in History, Save History, Deployment History, Simulation, and Attributes. The 'General' section is expanded, showing dropdown menus for Process Model Name (ParticipationApproval), Process Model Version (1.0), Process Template Name, Author, Category, Group, Manager, and Last Modified. There are also checkboxes for 'Exact match only' (checked) and 'Case sensitive search' (unchecked).
- Model(s) List:** A tree view showing '1 Model(s)' with a sub-entry 'ParticipationApproval' containing a file 'ebms - 06/01/2006'.
- Summary Tab:** A table displaying details for the selected model. The tabs include Audit Trail, Summary (selected), Diagram, Simulation, Attributes, and Attachments.

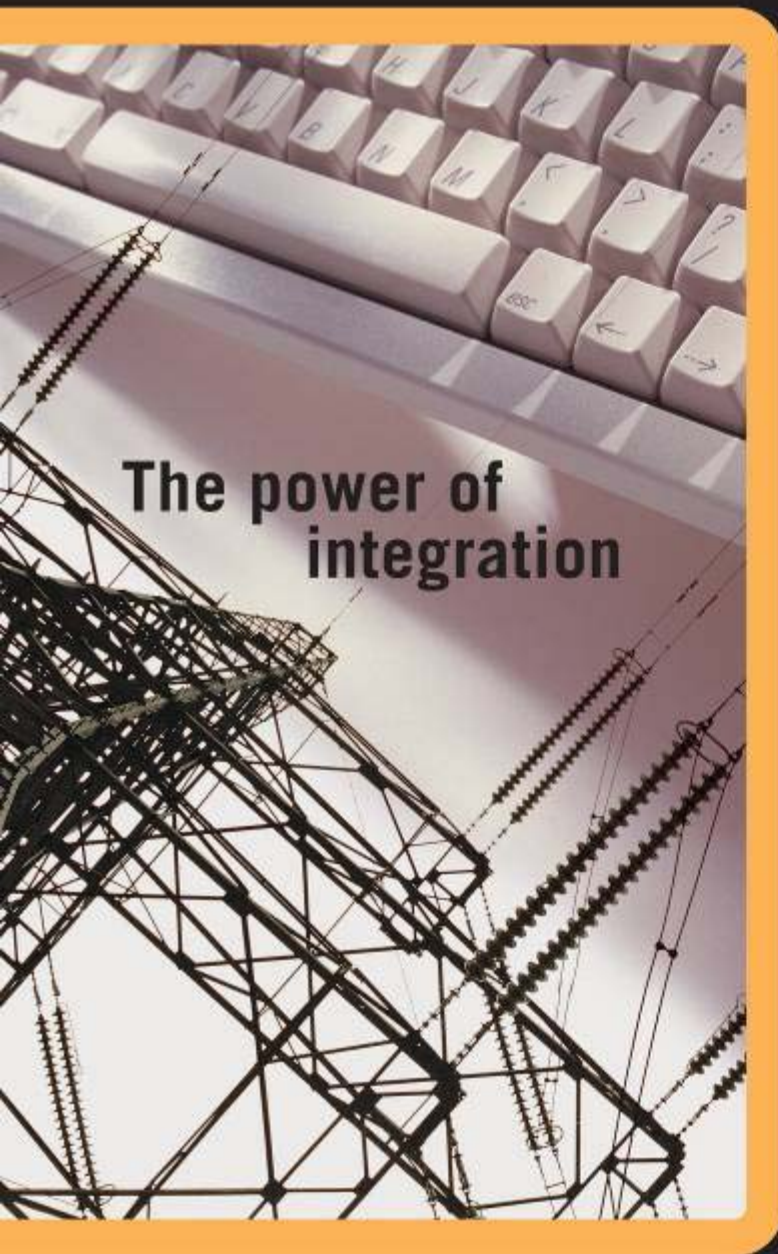
ParticipationApproval (ParticipationApproval)	
Process Name	ParticipationApproval
Label	ParticipationApproval
Manager	ebms
Category	
Version	Process Version N/A Model Version 1.0
Author	Hannu Huhdanpaa
Group	
Duration	6 Hours
Created	Friday, October 14, 2005 12:07:03 AM EDT
Last Modified	Thursday, June 1, 2006 12:45:38 AM EDT
Description	



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Highlights of DRBizNet Architecture

Scott Neumann

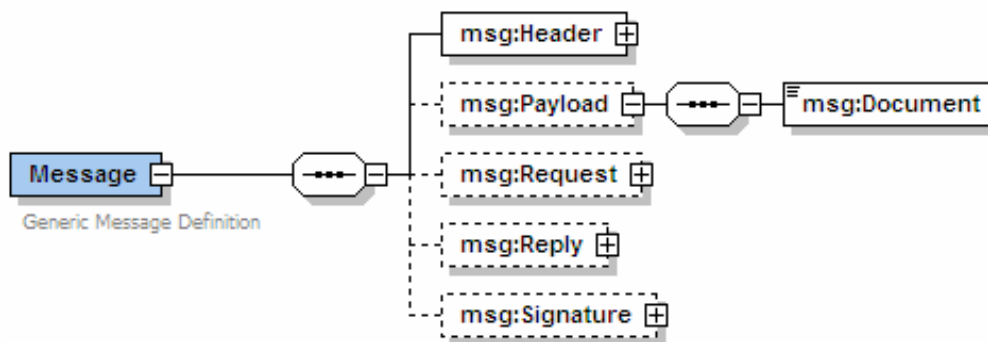


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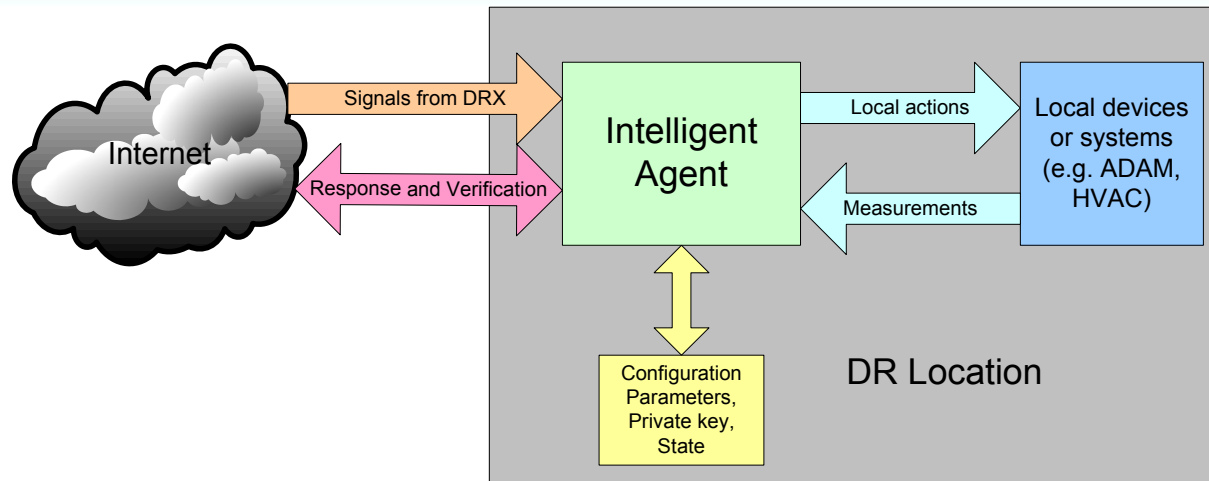


Interface Standards

- Web Services
- CIM
- IEC 61968-1
- IEC 61968-9 (draft)
- XML Signature
- SSL/TLS
- XML
- XML Schema
- XPath
- SOAP
- WSDL
- HTTP
- XSLT
- SQL
- JDBC



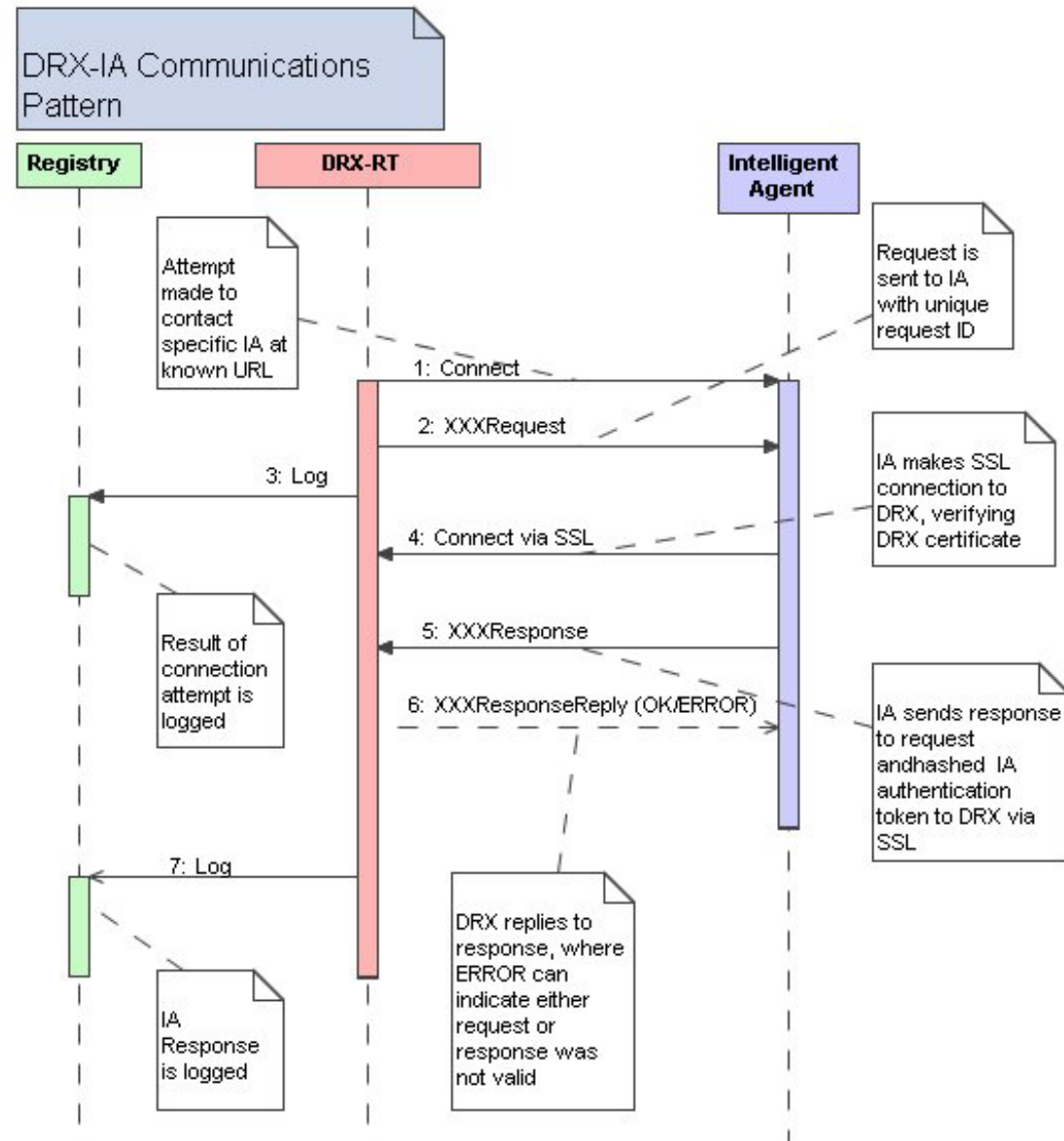
Intelligent Agents



- Intelligent Agents: *Programs used extensively on the Internet that automate repetitive tasks, such as retrieving and delivering information*
- Key to any specific IA implementation is the support of DRBizNet messages and related security mechanisms
- Local DR resources (e.g. HVAC, pumps, ...) can be integrated using DLLs, Modbus TCP, OPC or other interface mechanisms as appropriate
- UISOL has implemented a PC-based Reference IA that integrates with ADAM-6000 distributed I/O modules using Modbus TCP protocol
- IA interface and logic could be integrated within low cost devices

Security

- IA can be configured for listening or polling communication patterns
- IA authenticates requests by reconfirming with DRX
- DRX authenticates IA using PKI
- IA to DRX communications use SSL encryption
- Messages from IA are signed using XML Signatures
- DRX logs signed messages (transactions) from IAs with current public key, providing non-repudiation





Utility Integration Solutions, Inc.

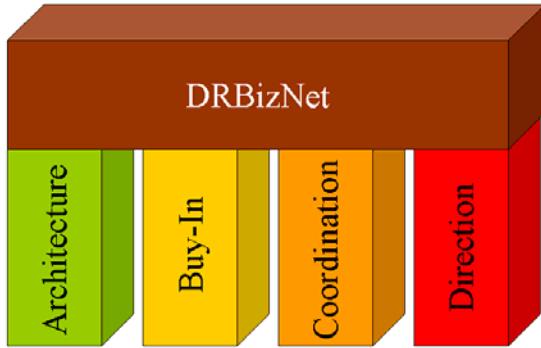


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Backup slides



Building and Supporting DRBizNet



DRBizNet Committees	Support Services
<i>Steering Committee</i>	Direction, goals, and priorities
	Sponsoring/Advocating DRBizNet Build Out
<i>Management Committee</i>	DRBizNet User Group Formation and Operation
	Organizational Policies and Procedures
<i>Marketing Committee</i>	Membership
	Communication, Marketing, and Promotion
	DRBizNet User Website
	Newsletter
	List of Compliant Products
<i>Technical Committee</i>	Technical Maintenance of DRBizNet Architecture, Information Model, Message Definitions, Services Design
	Technical Publications
	DRBizNet Helpdesk
	Resolution of Technical Issues
	Training Events, Workshops, Conferences
	Facilitation of Electronic Forum for Technical Discussions
	Integration and Conformance Testing Support
	Product Certifications
	Statistics/Reporting/Monitoring
	Liaison with Standards Organizations