

The power of
integration



Utility Integration Solutions, Inc.

California Demand Response Business Network (DRBizNet)

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Scott Neumann

June 2, 2005



*Dynamic
Networks*







Summary



- California is investing in IT infrastructure for DR programs.
- We are building these DR programs without a unifying architecture.
- We can protect our investments and get more DR by designing a suitable DR IT architecture--the sooner the better.
- To create a rich and dynamic marketplace for DR that can ultimately reach the 11,000,000 California residential customers, we need three cornerstones:
 1. *Automation of DR business processes*
 2. *Distributed intelligence*
 3. *Standardization*
- The *DRBizNet Architecture* envisioned, designed, and demonstrated in this project lays a solid foundation for these three cornerstones.
- The California DR stakeholders could build DRBizNet in a distributed manner in the next five years if their work is coordinate through a self-funding User Group.
- DRBizNet can result in 10x10 benefits—10 times DR at 1/10th of investment.
- The critical next step is to create champions for DRBizNet through a field demonstration aimed at communicating the architecture and proving feasibility.

Acknowledgement

- Technical Advisory Committee (TAC)
- California Energy Commission (CEC)
- California Institute of Energy & Environment (CIEE)
- California ISO (CAISO)
- Pacific Gas and Electric (PG&E)
- Southern California Edison (SCE)
- Sempra Utilities (Sempra)

Project Team

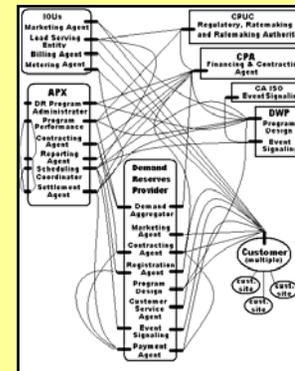
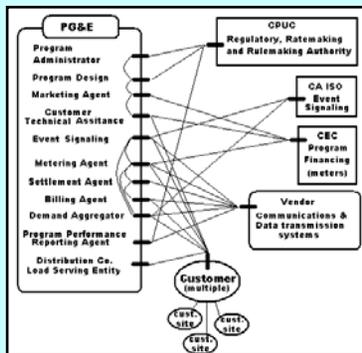
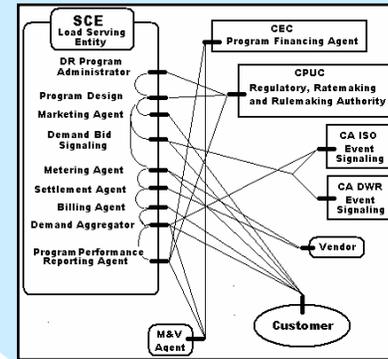
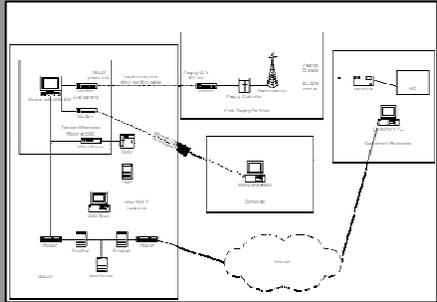


Company	Team Member	Sample Customers
Utility Integration Solutions (uisol.com)	Ali Vojdani (<i>PM</i>) Scott Neumann Matt Cain Victor Lecha	British Columbia Tx, CAISO, CEC, ISO New England, PG&E, Silicon Valley Power, Western Area Power Admin.
Dynamic Networks	Eamonn McCormick	PX, Del Monte, Harry Fox
NEXANT (nexant.com)	Daniel Engel Robert Hinkle	CEC, DOE, National Grid, PG&E
SAVVION (savvion.com)	Omid Razavi	BofA, Boeing, Cingular, Cisco, Morgan Stanley, Sprint
TIBCO (tibco.com)	Don Adams	BP, CAISO, Delta Airlines, ERCOT, FedEx, MISO NYISO, NASA, Yahoo



The As-Is State

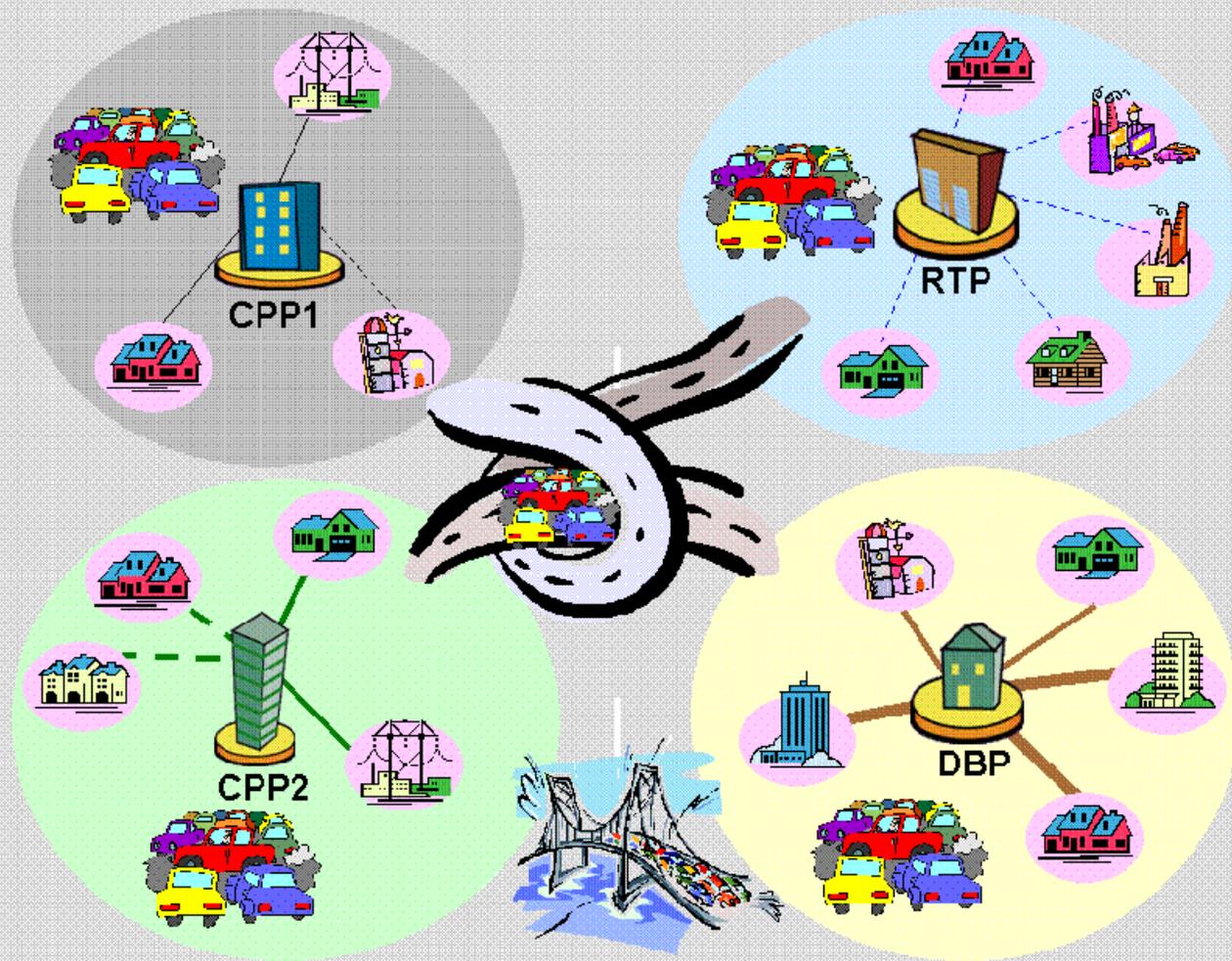
Sample DR Programs



The California DR Landscape

An Analogy

- No unifying architecture
- Inflexible to change & Evolve
- Difficult to leverage investments/ reuse
- Costly for everyone
- Cannot support growth

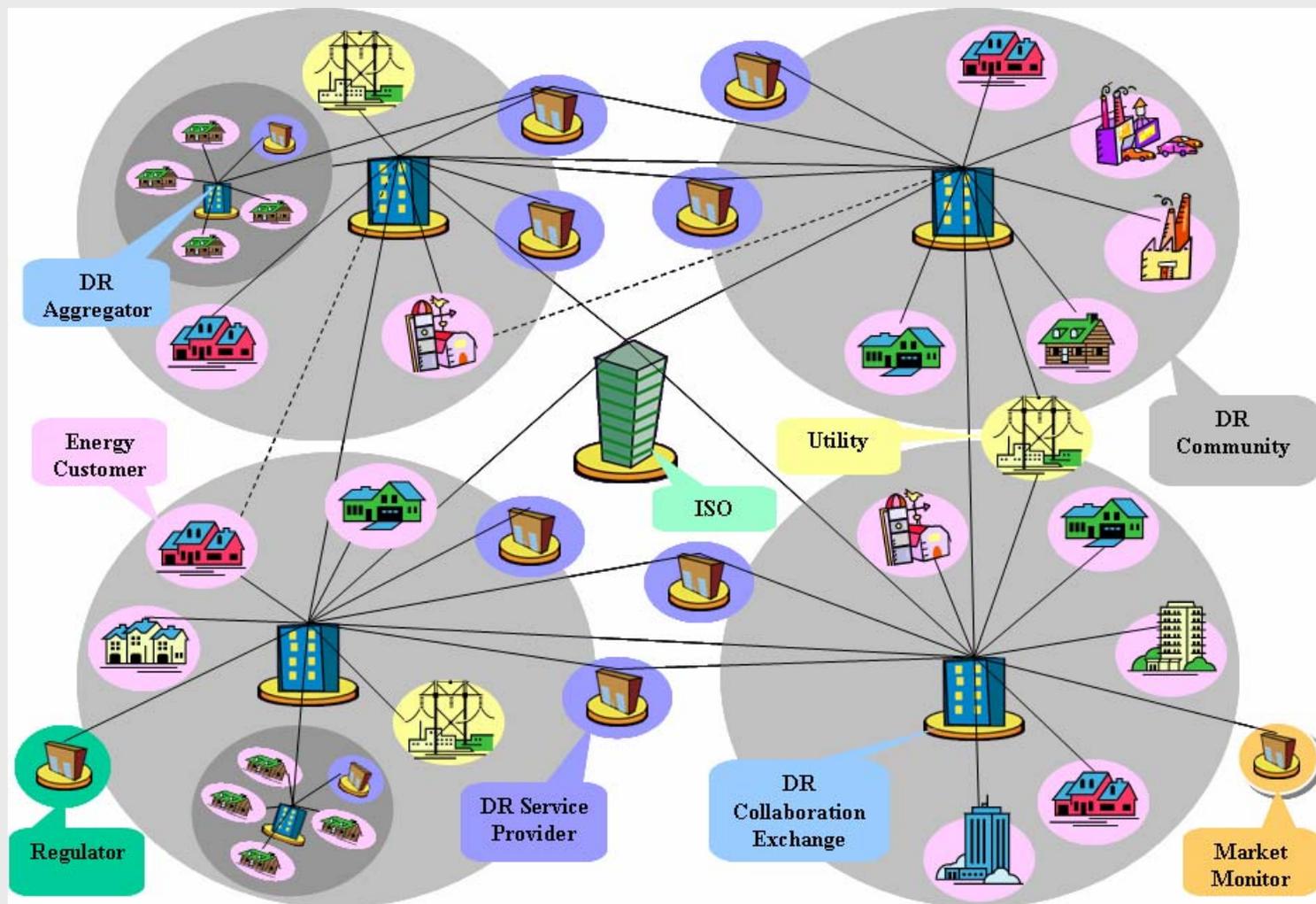


DRBizNet: Demand Response Business Network

A Highly Automated and Flexible Network of Collaborative DR Applications and Intelligent Agents Enabling Efficient DR for over 11,000,000 California DR Stakeholders



- Unified & open architecture
- Plug and play services
- Flexible to change
- Protects investments
- Lowers cost for all
- Scales to residential customers

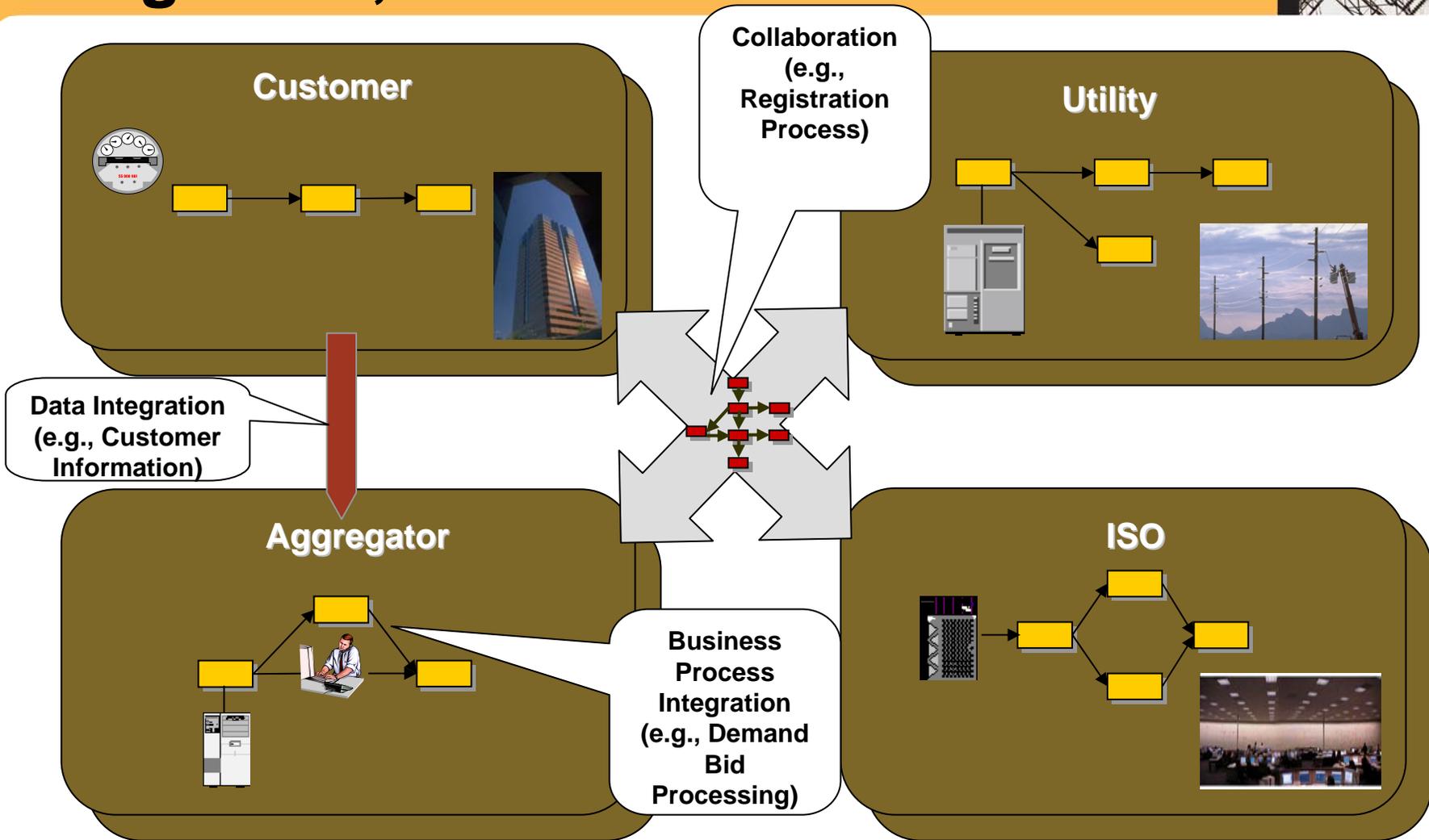


DRBizNet High-Level Requirements

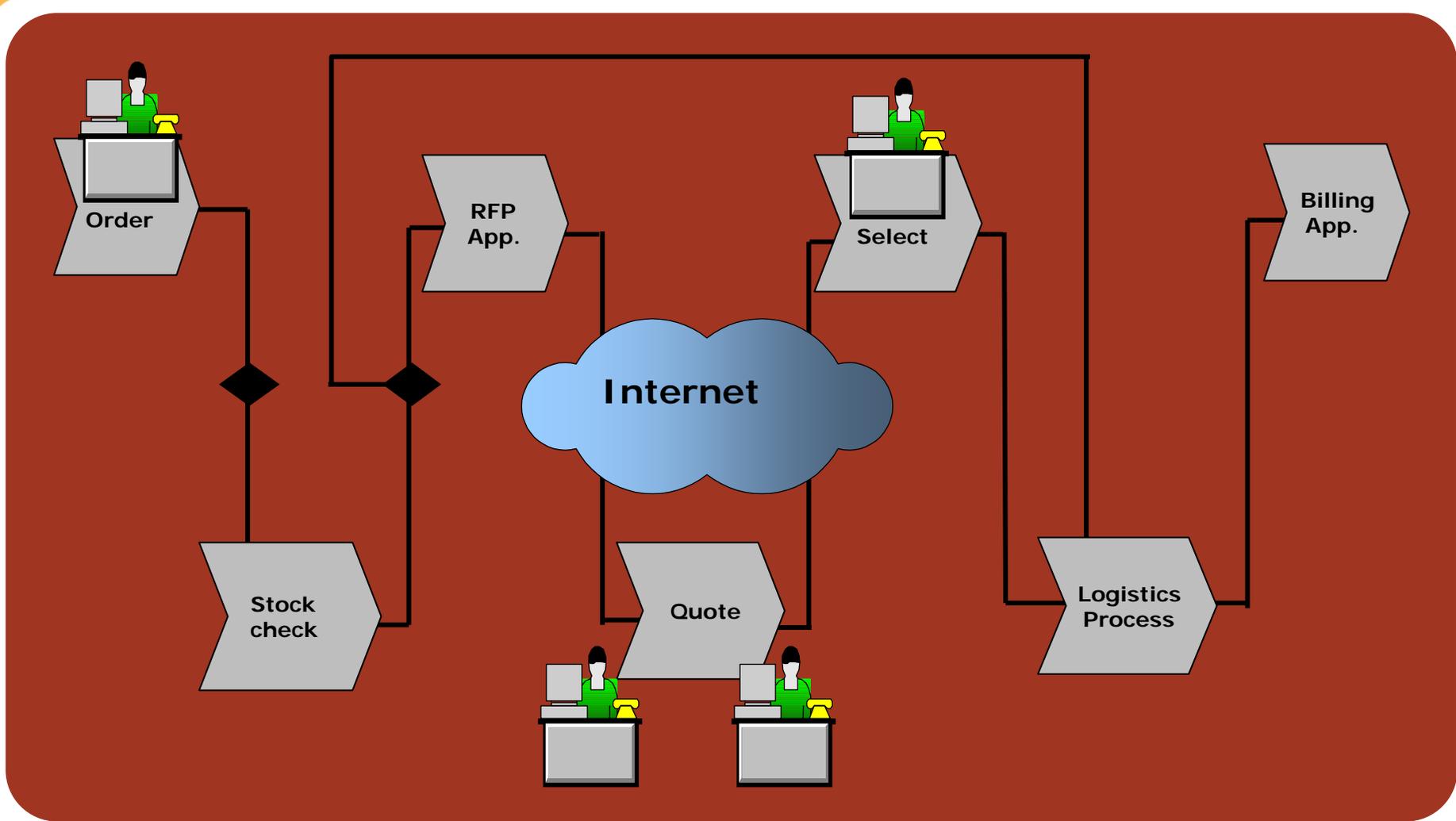


- Scalable to ultimately support residential class
- Flexibility
 - *Easily create new DR program or change an existing program*
- Efficient coordination of DR services
 - *Automate business processes & workflow in DR value chain*
- Efficient real-time communications
- Speed of operation
- Reliability
- Security
- Cost minimization
- Open Standards

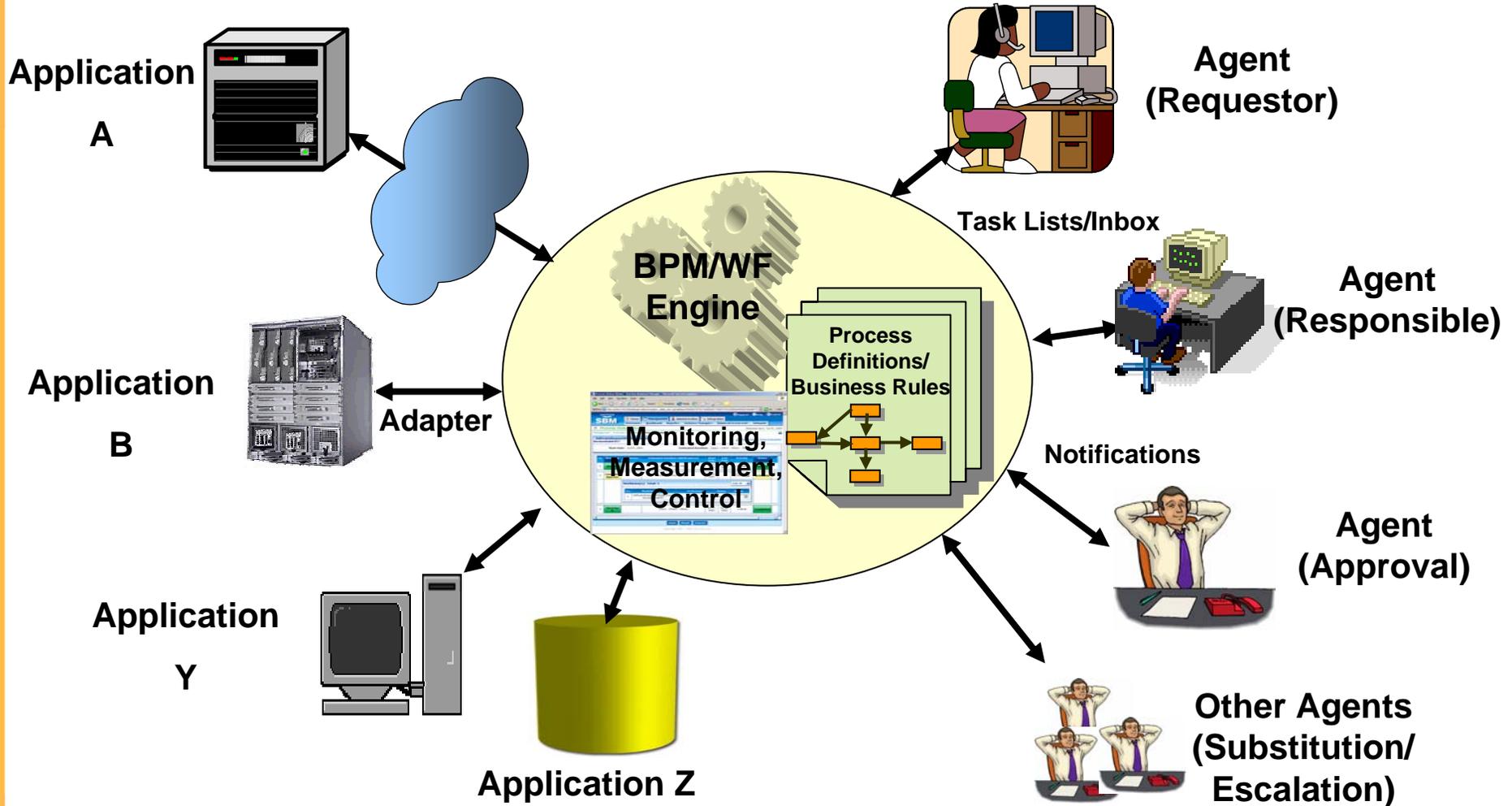
Data Integration, Business Process Integration, and Collaboration



Business Process Management/Workflow (BPM/WF) Model, automate and manage business processes



Efficient Business Collaboration Using BPM/WF



Workflow Tasks

Task List - Savvion Business Manager - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: http://localhost:8181/sbm/bpportal/myhome/bizsite.task

SAVVION SBM Home Management Administration Integration Support Help Logout

Tasks My Applications SBM Applications Links Profile Preferences

Task List Welcome ebms Apr 19, 2005

Home : Tasks

Application: All Task Status: Assigned Filter: No Filter Go

No.	Application	Task	Workstep	Creator	Priority	Assigned Date	Due Date
1	DRBizNetParticipantPT1	DRBizNetParticipantPT1 (333)	Enter Information	ebms	Medium	Apr 19, 2005	Apr 19, 2005
2	DRBizNetParticipantPT1	DRBizNetParticipantPT1 (334)	Enter Information	ebms	Medium	Apr 19, 2005	Apr 19, 2005
3	DRBizNetParticipantPT1	DRBizNetParticipantPT1 (335)	Enter Information	ebms	Medium	Apr 19, 2005	Apr 19, 2005
4	DRBizNetParticipantPT1	DRBizNetParticipantPT1 (336)	Enter Information	ebms	Medium	Apr 19, 2005	Apr 19, 2005

Pages: <Previous 1 Next> Total: 4

Complete

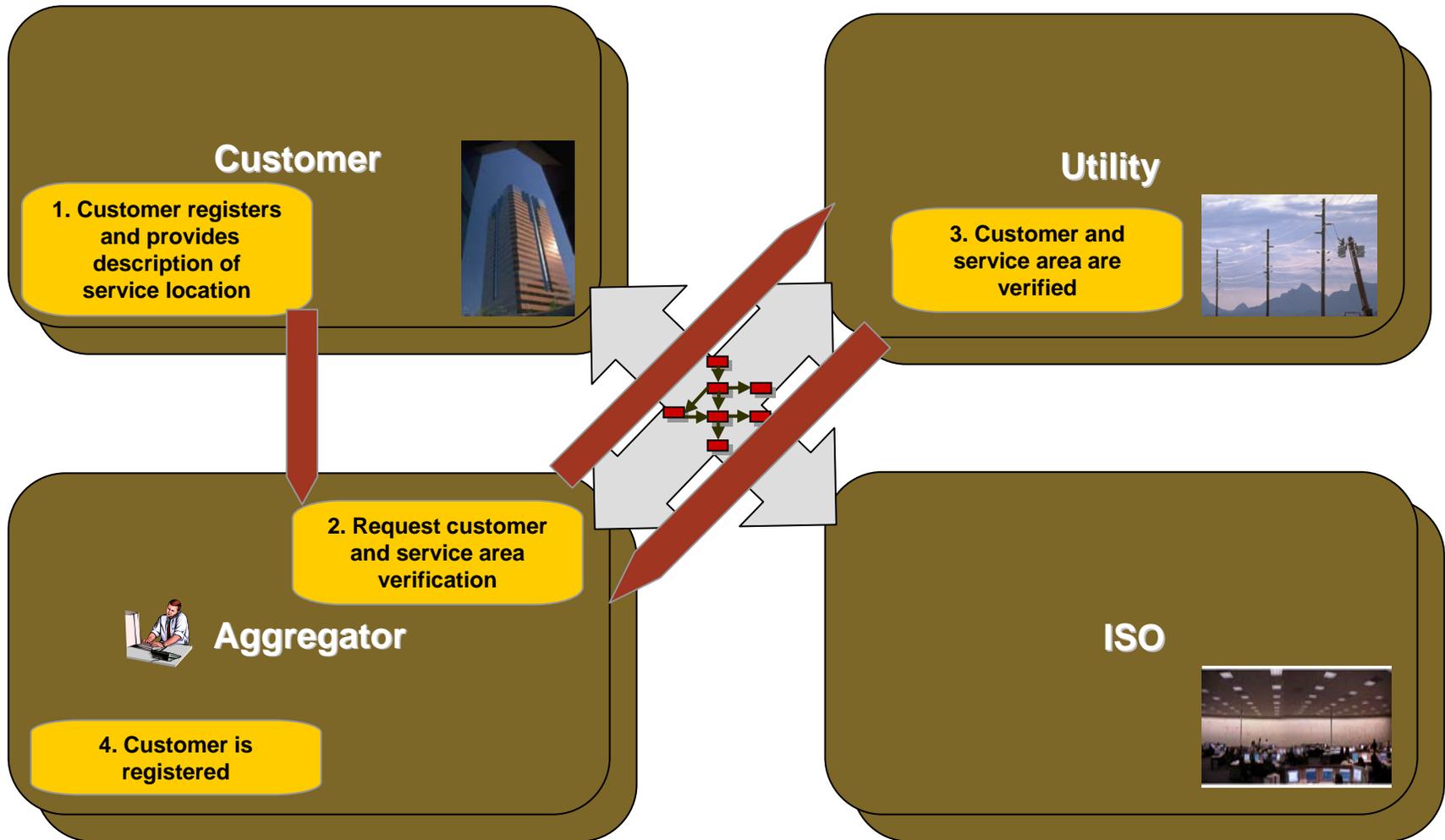
Copyright 1999 - 2004, Savvion, Inc.

javascript:goToTasks() Local intranet

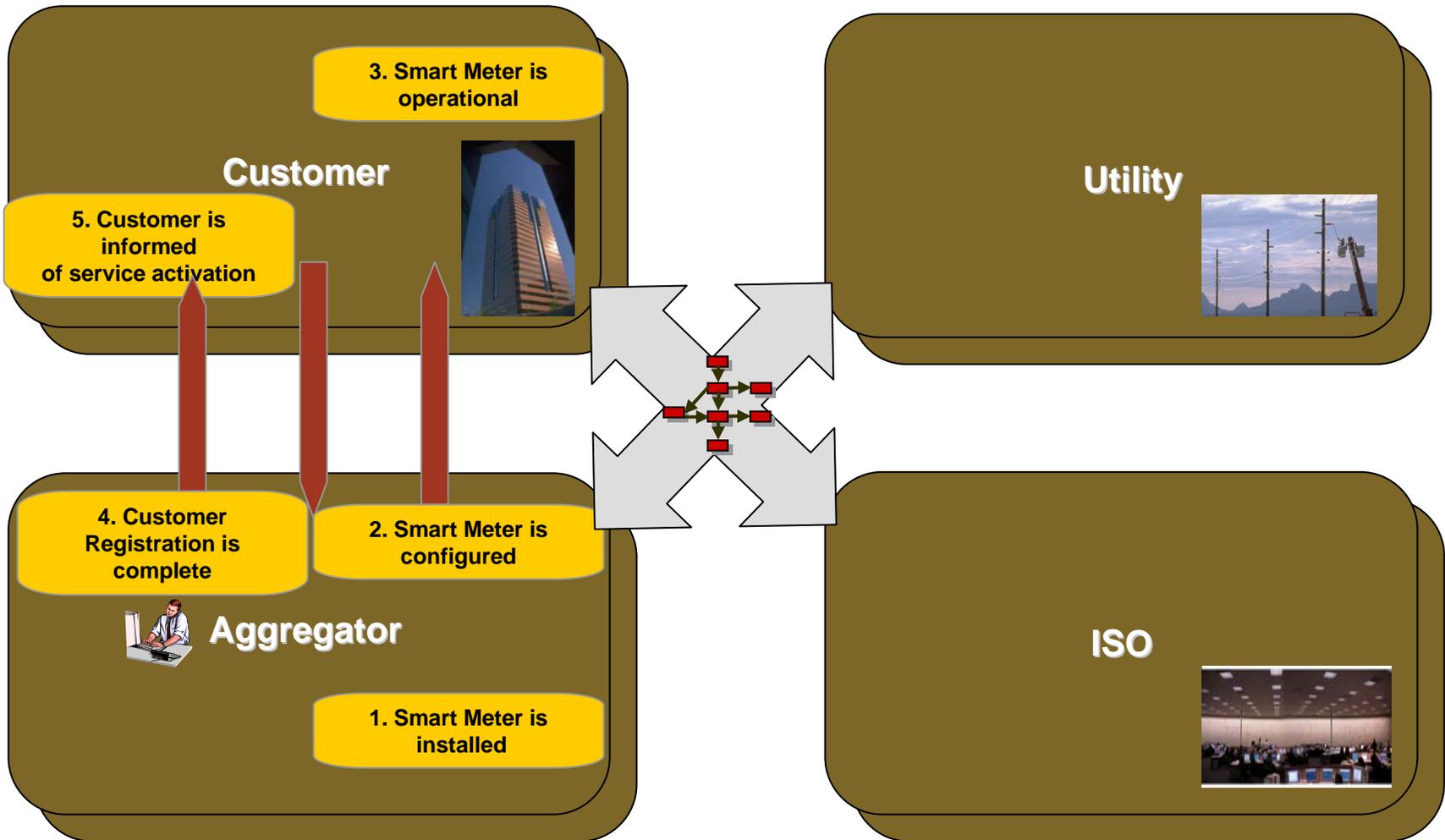
start Sent - Mozilla Thunde... Windows Comman... vlecha's Buddy List W... DRBizNetParticipantP... Task List - Savvion Bu... DRBizNet_SBM_Scree... Desktop 5:10 PM Tuesday 4/19/2005



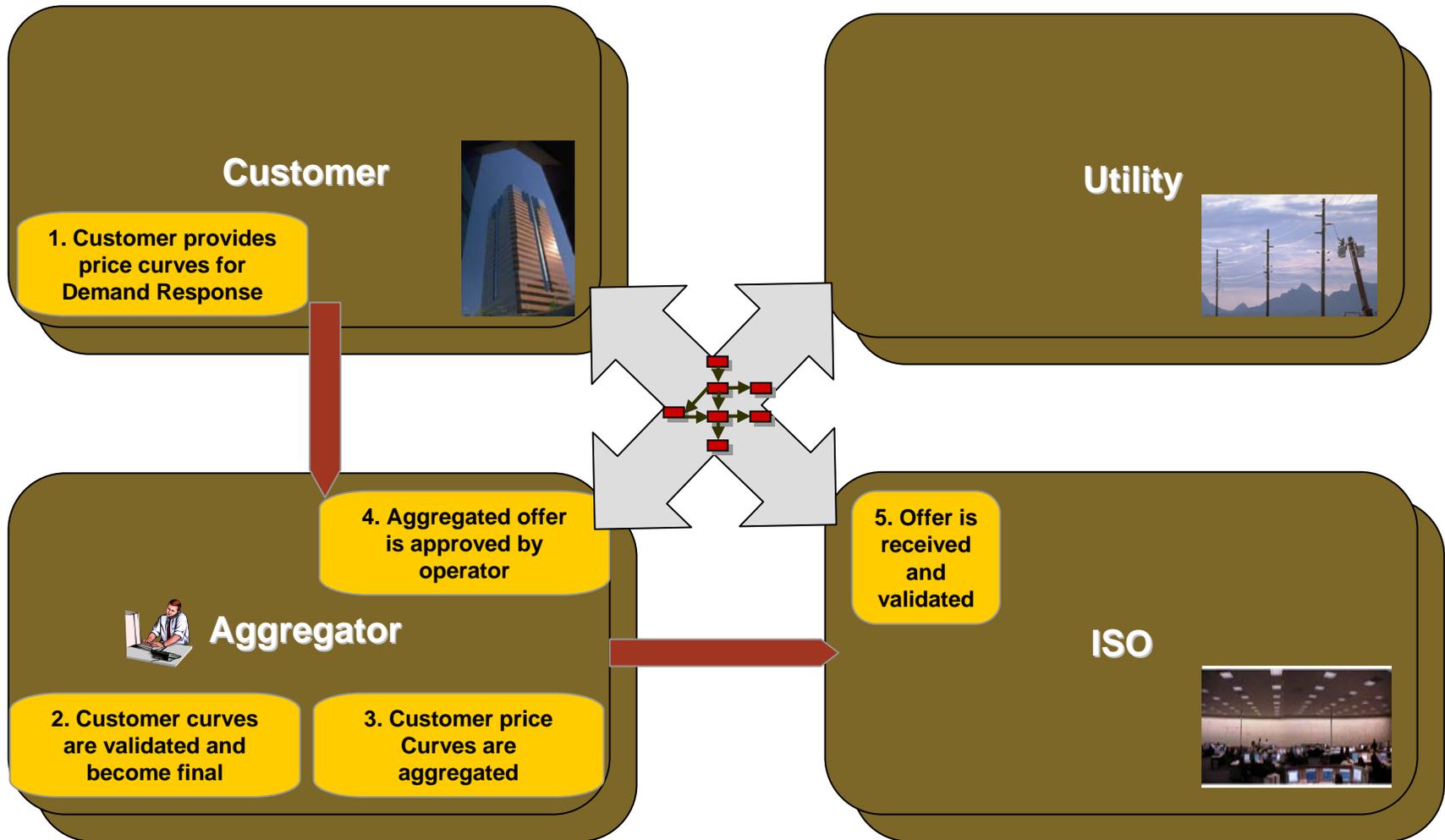
Example: Customer Registration



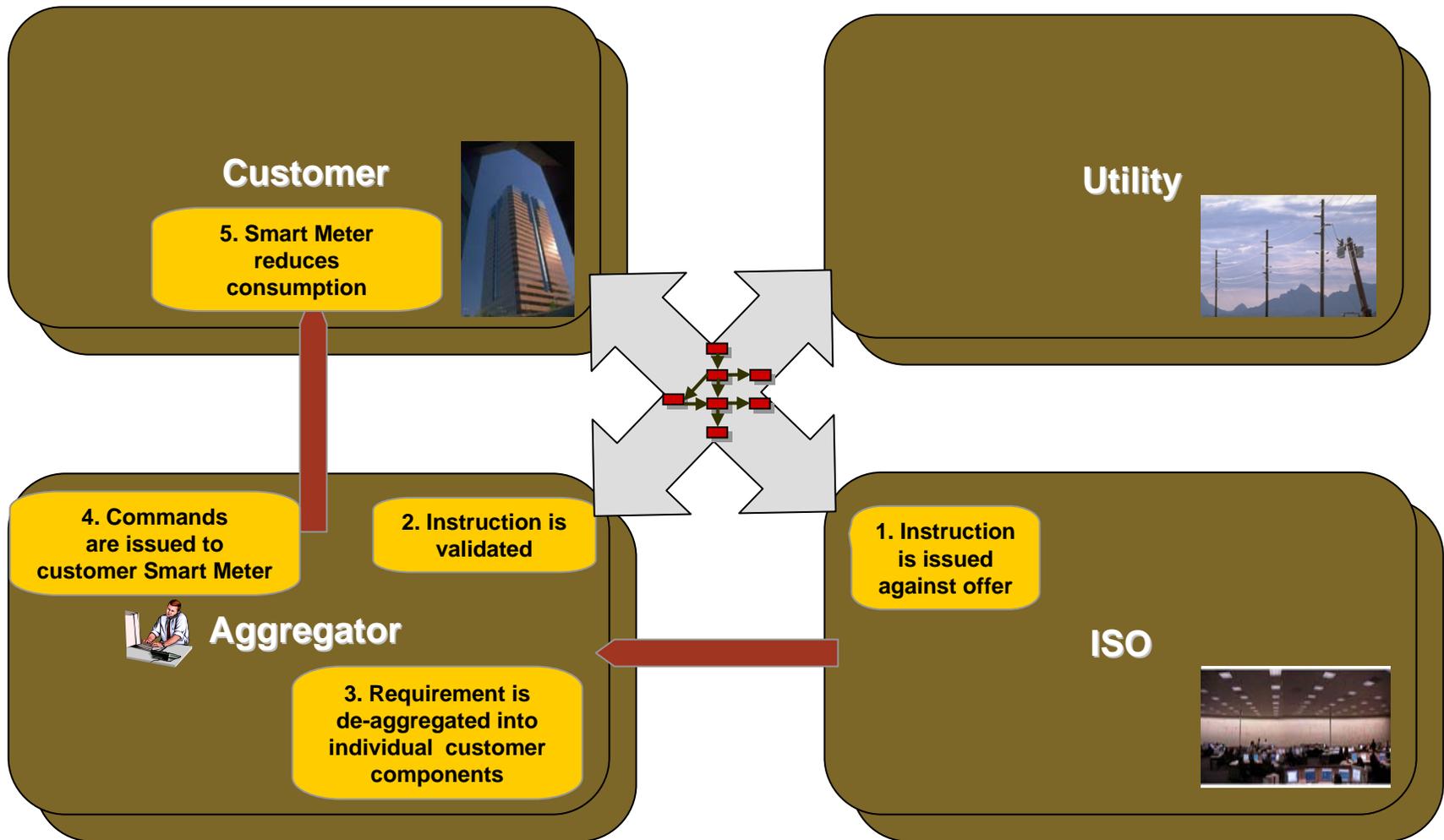
Example: Meter Installation



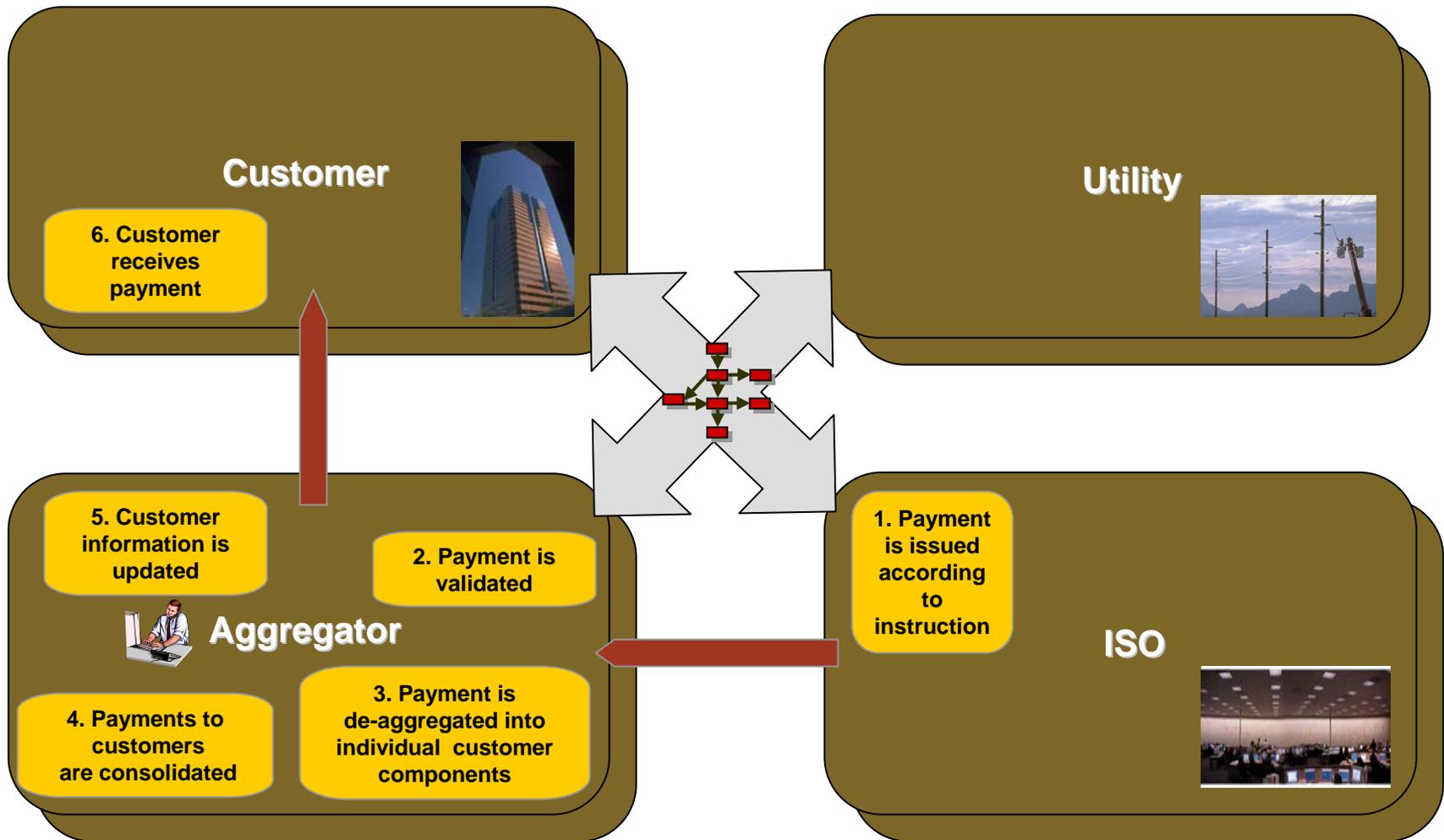
Example: Bid Processing



Example: Dispatch



Example: Settlement



Foundation of DRBizNet Architecture



DRBizNet Architecture

A **Service Oriented Architecture** Designed Specifically For DR Value Network To Integrate and Automate DR Business Processes

SOA

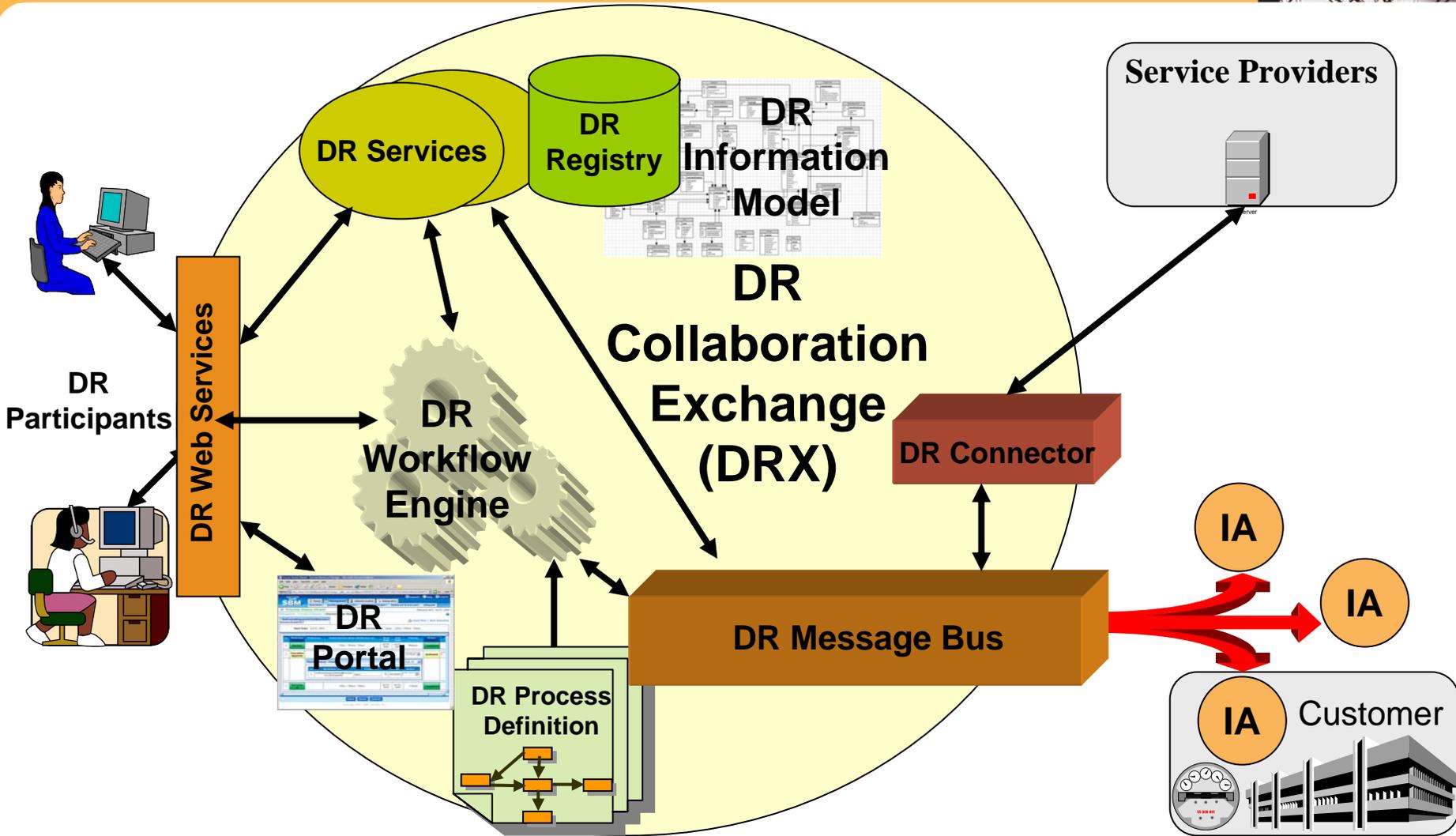
Integration of **Intelligent Agents** to Enable Automation, Uniformity, and Extreme Flexibility

IA

Open Standards (e.g., CIM, SOAP, Web Services, XML)

Standards

DR Collaboration Exchange (DRX)



“Configuring” a DR Program

The screenshot displays the TIBCO Designer - DRBizNet* interface. The main workspace shows a workflow diagram for the `/FormFlows/BidRequest` process. The workflow consists of the following steps:

- Map Data**: The starting point of the workflow.
- Save Bid Request**: A JDBC Update activity, highlighted with a dashed box. It is connected to `Map Data` and has an `Error` path leading to `Log Error`.
- Log Bid Request**: A logging activity connected to the `Save Bid Request` activity.
- Can Publish Bid...**: A decision or gateway activity connected to the `Log Bid Request` activity.
- Log Error**: A logging activity connected to the `Error` path from `Save Bid Request`.

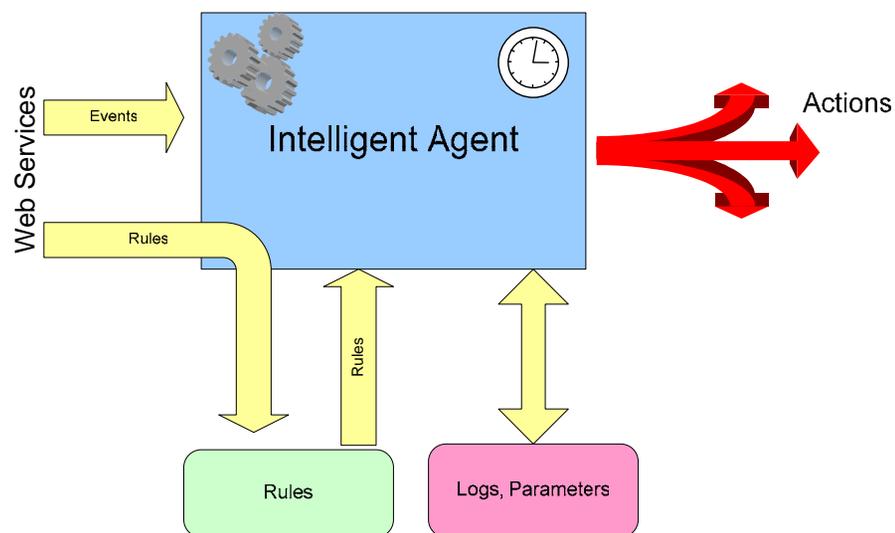
The configuration panel for the `Save Bid Request (JDBC Update)` activity is visible below the diagram. It includes the following fields:

- Name:** Save Bid Request
- Description:** (empty)
- JDBC Connection:** /SharedResources/DRBizNet JDBC Connection.sharedjdbc
- SQL Statement:** `INSERT INTO DRBidRequest (drBidRequestId, programId, marketS...`

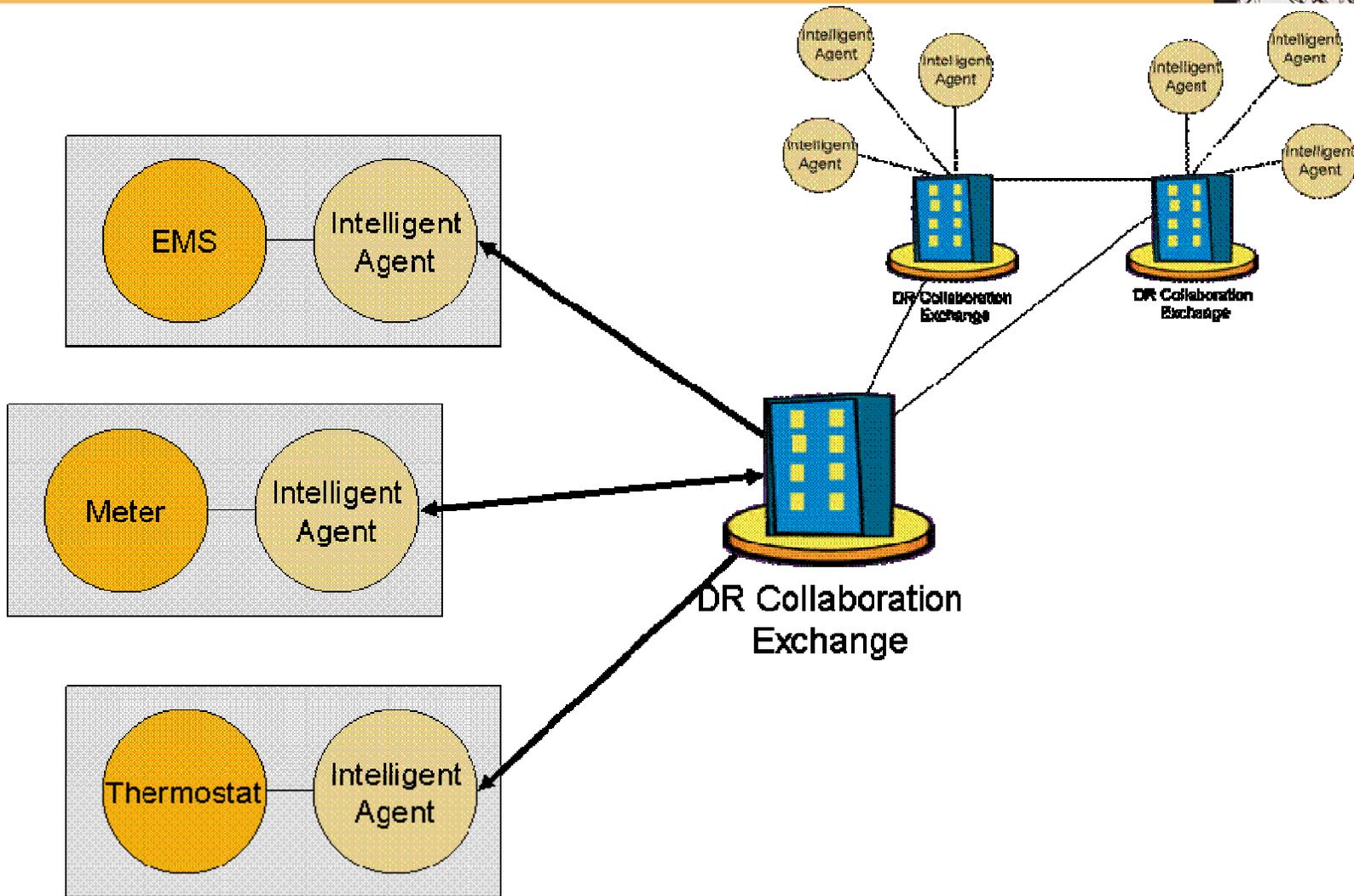
Buttons for `Apply` and `Reset` are located at the bottom right of the configuration panel. The status bar at the bottom indicates `28.9M of 42.9M`.

Intelligent Agent

- Is configured with rules for specific program(s)
- Has a defined parameter set used by rules, which reflect customer configuration, program, thresholds and bid parameters
- Responds to configuration changes, bid requests, acceptance of bids, RTP changes and schedules
- Interacts with DRX through internet in real-time

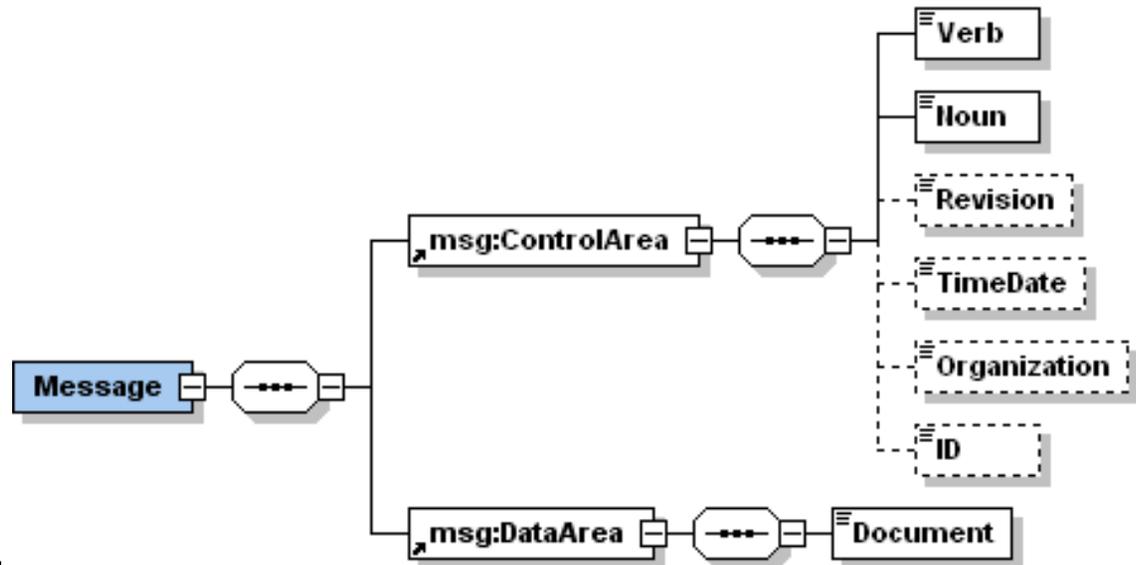


Integration of Intelligent Agents



DRBizNet Message Structure

- Defined in XML Schema
- Generalization of IEC 61968 message structure (fully compatible with IEC 61968)
- Uses nouns and verb to define payload
- Will support a variety of programs, including those not yet defined
- Document payload could be encrypted



Document Payloads

- Message payloads are document types defined by the DR Registry
- Program types identify a sequencing of documents
- Structure of each document type defined using XML Schema

Document Types

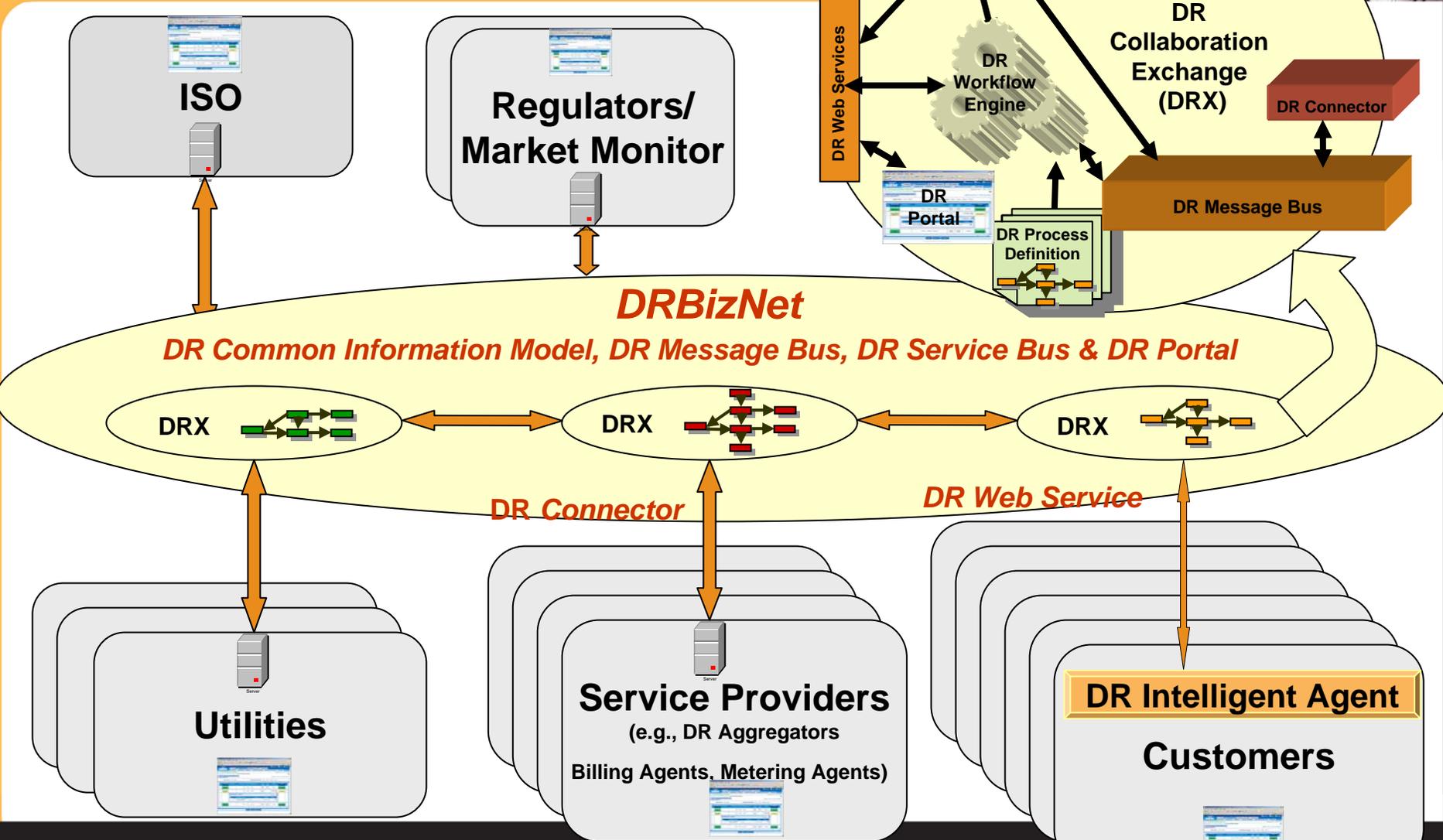
ID	Name	Description
1	DemandBidRequest	Demand bid request
2	DemandBidResponse	Demand bid reponse (bid)
3	RealTimePriceSignal	Real time price signal
4	LoadControlSignal	Load control signal
5	DemandReductionRequest	Demand reduction request
6	DemandReductionResponse	Demand reduction response
7	ConfigurationRequest	Configuration request
8	ConfigurationResponse	Configuration response
9	DemandBidAcceptance	Demand bid acceptance
10	DeliveryActionConfirmation	Delivery action confirmation
11	StatusCheckRequest	Status check request
12	StatusCheckResponse	Status check response

Summary of DRBizNet Innovations



- Configurable rules by program, managed centrally and executed locally
- Intelligent Agent used to make local decisions
- Ability to support multiple programs
- Interfaces and messages defined using XML Schema and WSDL in a manner which avoids the need for redeployment of agent software in the event new programs are defined
- Messages are published using SOAP to virtual subscribers
- DRBizNet Registry can be federated
- Variety of transports can be used, including SOAP/HTTP and SMTP
- Message transformations can be defined as needed to meet the needs of participants

Demand Response Business Network (DRBizNet)



DRBizNet Prototype Software



Use Cases Demonstrated on April 20, 2005

- Program Registration
- Customer Registration
- Load Control Program
- Real-time Pricing Program
- Demand Reduction Program
- Demand Bid Program

DRBizNet Prototype Demo



UISOL DRBizNet

- Home
- Login
- Customer
- Program Manager
- Administrator
- Information
- Contacts

Invoke Demand Bid Program

UISOL DRBizNet

- Home
- Login
- Customer
- Program Manager
- Administrator
- Information
- Contacts

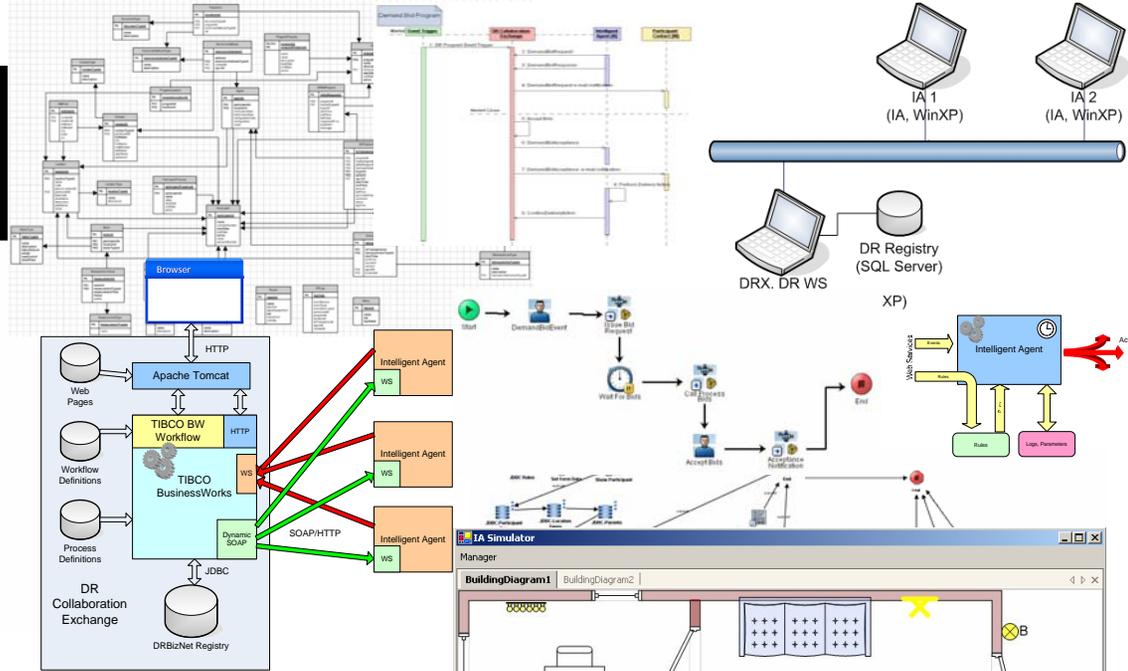
Issue Real-Time Price Signal

Message:

Start DateTime:

End DateTime:

Desired Price:



Accept Demand Bids

Bid Request ID	<input type="text" value="1000001"/>	Total KWH	<input type="text" value="7515"/>
Start Time	<input type="text" value="2005-04-21T11:00:00-05:0"/>	Clearing Price	<input type="text" value="0.55"/>
End Time	<input type="text" value="2005-04-21T16:00:00-05:0"/>	Bids in range	<input type="text" value="4"/>
Notes	<input type="text" value="8 bids received, 0 bids accepted"/>		
Total Cost	<input type="text" value="3690.25"/>		

Define New Participant

Name:

Address:

Phone:

Role:

Notes:

Submit

Define New Program

Program Name:

Program Description:

Program Type:

Program Manager:

Location:



IA Simulator

BuildingDiagram1 BuildingDiagram2

(status: reducing)

Desired Price:

Input message:

Minimum (60 KWH)

Maximum (200)

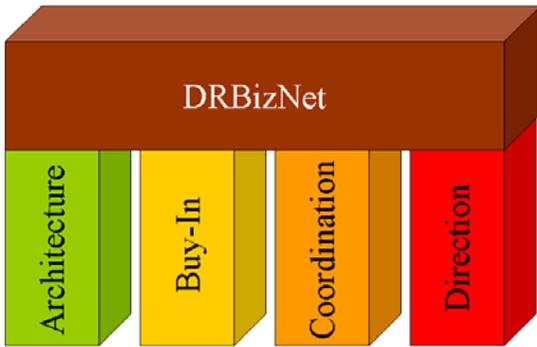
130.00

Price Signals

ID	Program	Message	Issued	Issues	Start	End	\$/KWH
3	2	enquire	2005-03-29T19:16:09-357-06:00	1	2005-03-31T00:00:00-06:00	2005-03-31T00:00:00-06:00	0.77
7	2	price signal	2005-03-30T07:59:16-17-06:00	1	2005-03-31T00:00:00-06:00	2005-03-31T00:00:00-06:00	0.35
8	2	price signal	2005-03-30T08:00:26-937-06:00	1	2005-03-30T18:00:00-06:00	2005-03-30T18:00:00-06:00	0.43
297000	2	test	2005-03-30T15:29:16-107-06:00	1	2005-03-31T00:00:00-06:00	2005-03-31T00:00:00-06:00	0.55
304000	2	test	2005-03-30T15:52:52-357-06:00	1	2005-03-31T00:00:00-06:00	2005-03-31T00:00:00-06:00	0.77
305000	2	test	2005-03-30T15:54:41-5-06:00	1	2005-03-31T00:00:00-06:00	2005-03-31T00:00:00-06:00	0.66
314000	2	web test	2005-03-31T19:06:08-06-06:00	1	2005-04-21T12:00:00-05:00	2005-04-21T15:00:00-05:00	0.45



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

Concluding Remark



We need to build on a sound Demand Response Business Network Architecture

