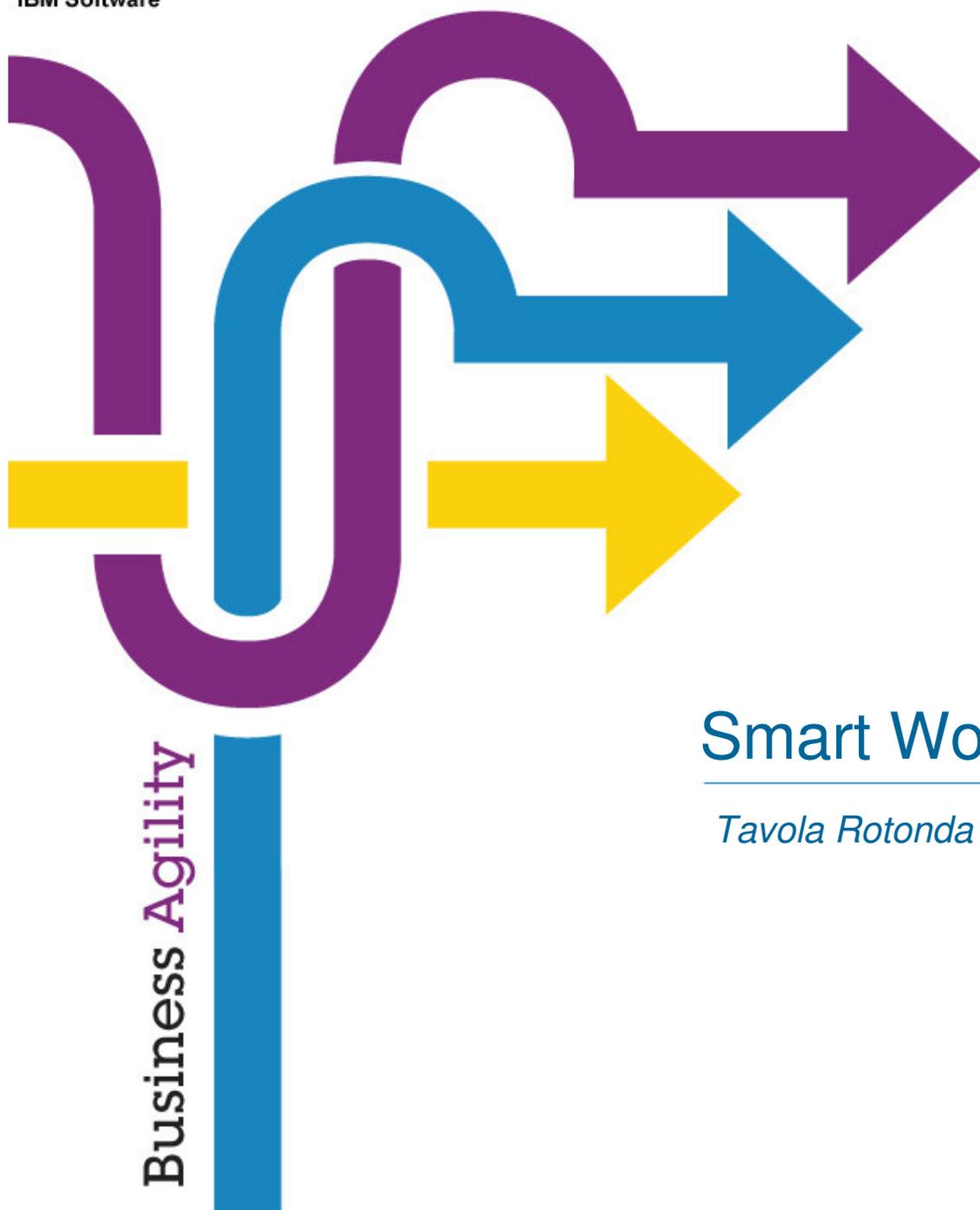


IBM Software



Smart Work for Smart Grid

Tavola Rotonda - Roma 30 novembre 2010





A Defining Moment...



A key element of this moment will be the further development and deployment of the Smart Grid over the next 5 to 15 years

- Reliably manage a broad range of energy supply sources
- Maintain reliability levels with less reliable generation sources
- Integrate a diverse mix of small scale green supply options, DSM, and pricing options
- Effectively manage an ever increasing dynamic distribution grid that integrates generation planning
- Replace aging network assets and utilize new sets of grid technologies
- Enable customers to better manage and monitor their energy to reduce their costs
- Provide customers the ability manage their carbon footprint



The Smart Grid: A Transformational Journey



*Innovation through
Business & Operations Transformation*

**Grid Optimization
Cost Reduction**

Asset Optimization

Open Data Access Across Utility

Fuel Price Considerations

Condition Based Management

Standard Enterprise Data Model

Energy Management System

Renewable Portfolio Management

Aging Workforce

Automatic Meter Reading

Substation Automation

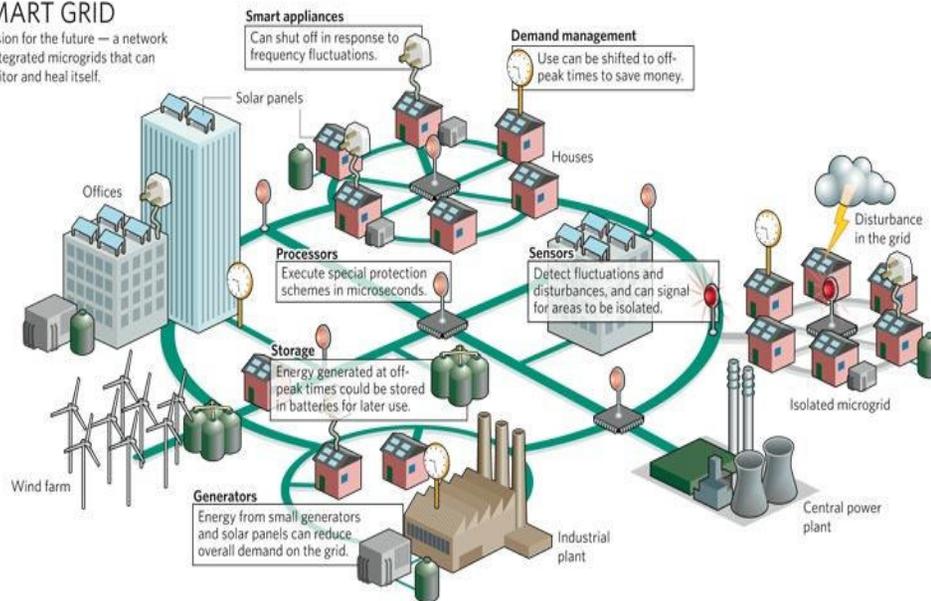


Smart Grid - IT and Automation on the Electrical Grid



SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



- Put intelligence into the grid to increase reliability, save energy and save money
- A combination of new sensor technology, the latest wireless communication technologies and advanced software analytics
- A grid that can handle distributed generators as well as the large traditional power stations
- A grid for informed users and the digital economy, with smart meters in the home and smarter energy management



Smarter utility solutions are enabled by today's technology



INSTRUMENTED



+

INTERCONNECTED

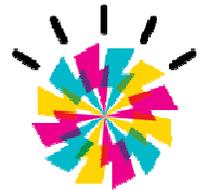


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INTELLIGENT



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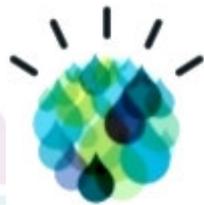


**Smarter
Energy**

Transform the utility network from a rigid, analog system to a dynamic and automated energy delivery system by driving operational excellence.

Empower consumers and improve satisfaction by providing them with near real-time, detailed information about their energy usage.

Invest in green to meet or exceed environmental regulatory requirements while maintaining a sufficient, cost-effective power supply.



**Smarter
Water**



Success Story - Remote Supervision of Electric Network



Business Goal - Improve reliability of the grid

Business Problem - needed quicker filtered data to help operators

IBM Solution - A Business rules management solution to support faster decision when faults occur

IL1	Measured Current on Phase 1	0- 4000
IL2	Measured Current on Phase 2	0- 4000
P	Calculate active power	- 2000 to 2000
UL1	Measured voltage on Phase 1	180 to 250

- **Business Problem**
 - Allow the company to monitor its electricity network and prioritize investment in equipment upgrades
- **Solution**
 - IBM JRules will provide a fully integrated online IT decision support system to enable the distribution company to act on both the real-time data and historical data during planning tasks to enable the operation centre to make better decisions faster when faults occur.
- **Benefits**
 - Reduce outage by 25 to 50%
 - Up to 90% on capital savings
 - Rule-based technology helps you react to complex real time conditions and correlate events to provide reduction of alarm flow
 - Business users can directly create, update and deploy business rules instantly

Business Rule Example

Check the received measurements for each field to determine if in allowed range. If within range set measurement quality field to GOOD, if out of range set to BAD and send alert to operator.



Success Story - Outage Management notification



Business Goal - Improve Customer service

Business Problem - Customers would like to be notified of the expected time of recovery during an outage

IBM Solution – Event Management solution for shorten reaction time and empowered users



Business Events Manager Example

Customer enters their preference for contact on a website. This information is used during an outage. i.e.: Customer A elects to only be notified when outage will be longer than 60 minutes. Customer B wants text message updates on his cell phone every 15 minutes with latest Expected Time of Recovery.

- **Solution**
 - WebSphere business events manager provided the LOB and BA a tool to automate notification
- **Benefits**
 - Personalized customer services
 - Business users can directly create, update and deploy business rules for customer services instantly
 - It is easier to filter and interpret data stream, simplifying decision making process and shortening reaction time



Success Story - Smart Grid AMI



Business Goal - Smart Grid

Business Problem - AMI project involved many dynamic rules that were expected to evolve as the market matured and varied depending on the specific jurisdiction

IBM Solution - A BRMS solution to manage the Business rules related to the Meter Infrastructure



Business Rule Example

*AMI data Cleansing rules
AMI service connection and disconnection rules
AMI tariff administration*

- **Solution**

- WebSphere Business Events Manager will provide one place to capture the rules which can be easily updated by LOB or BA that multiple applications can call

- **Benefits**

- Reduced programming costs to build
- Changes easy to implement
- Easier to support dynamic rapidly changing environment



Success Story - Pricing Flexibility to support UK market



Business Goal – Dynamic pricing to influence demand

Business Problem- Their pricing rules and logic were embedded within a rigid and complex contract management system and required a 3rd party SI contract and up to 6 months to implement a new pricing product.

IBM Solution – Integration of a BRMS solution with the existing contract management system



Business Rule Example

AMI tariff administration

Real Time Pricing

Time of use

Demand side management incentives

• **Solution**

- IBM JRules used to configure rules based pricing service
- Rules management in plain language

• **Benefits**

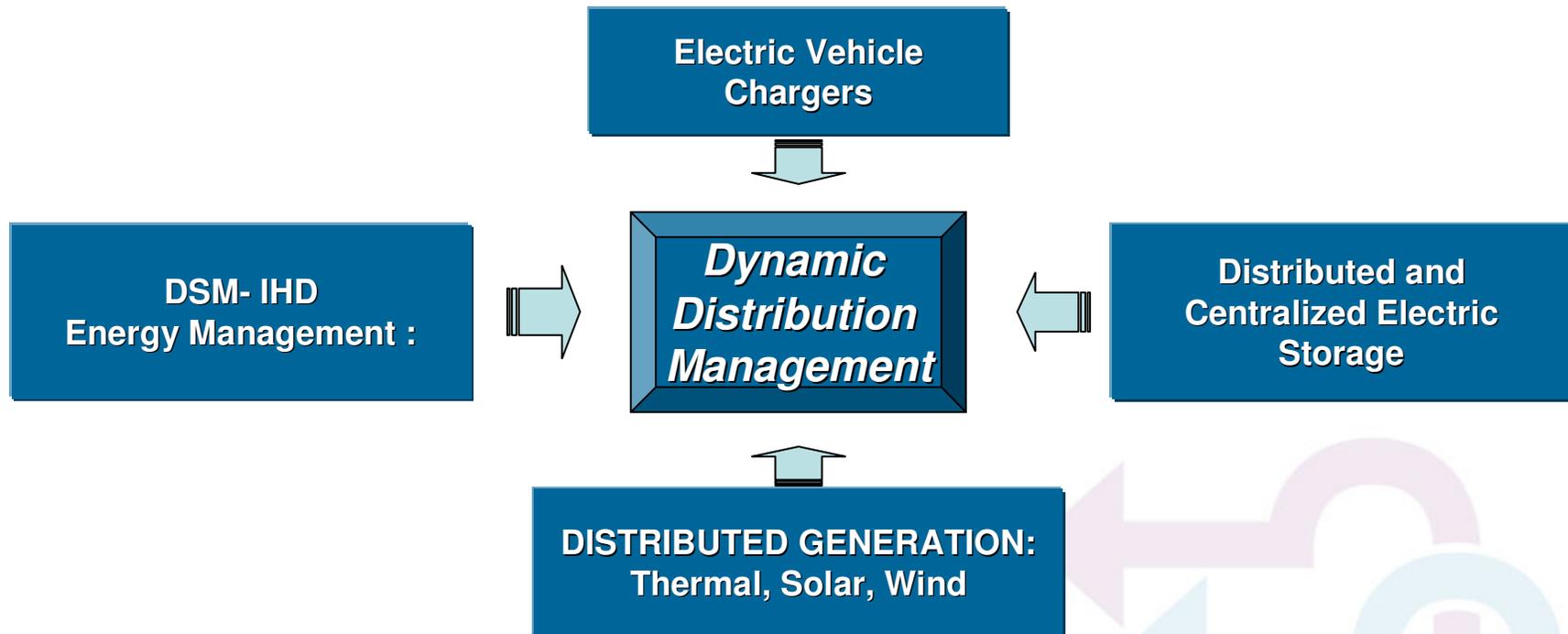
- Delivered in just 3 months
- New pricing products implemented in hours rather than months
- Business users and non-IT personnel able to implement new or modify existing pricing rules expressed in clear English like syntax



Smart Grid projects other than AMI



Create “virtual power plants” by aggregating and optimizing across distributed resources



Challenges

- Encourage user DSM without impacting lifestyle
- Dynamic Distribution Load Management
- Reduce Carbon Footprint
- Economical electric dispatch
- 6 9's Reliability



Success Story - Pumped Storage Optimization at DTE



Business Problem – Maximize market impact of Detroit Edison’s Ludington Pumped Storage Plant by optimizing its operating schedule to Midwest Independent System Operator (MISO) market signals



- Constraints
 - Market Price forecast
 - Reservoir capacity
 - Unit generation and pumping capacity
 - Generation and pumping efficiency
 - Reversible turbines cannot start in pumping mode above certain reservoir level
 - Limit on pumping sessions: only once a day
 - Unit availability
 - Unit startup interval & ramp rate
 - Initial and final reservoir levels for the period of analysis
 - Standardized business procedure providing mathematically validated schedule
 - Model finds opportunities which may not be obvious
 - Helps an operator to value the water in the pond and make a decision to deviate from the schedule in real-time
 - When asked to deviate from the original schedule, gives analysis of opportunity lost so operator knows cost of deviation
 - Increased utilization of the plant
- ☞ The bottom line:
- **Expected improvement opportunity of as much as \$8M annually with an initial goal to achieve at least 10% of that opportunity**



Success Story - Market Clearing by Energy Market Company



Business Problem – Ensure a reliable source of electricity at the lowest cost for the National Electricity Market of Singapore, first wholesale electricity market liberalized in Asia



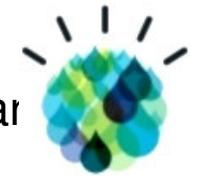
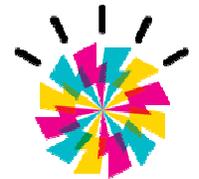
- Every half-hour, power companies update their rates for selling electricity to the exchange
- EMC must assemble these rates into a mix of prices and generation schedules that will satisfy consumer demand at the lowest cost possible
- Using ILOG CPLEX, the Market Clearing Engine (MCE) **solves the problem within 30 seconds, addressing more than 15,000 constraints and bounds with each trade**
- Using ILOG CPLEX in the MCE has helped EMC:
 - **Consider all possible constraints with each trade**
 - **Achieve the lowest generation cost for electricity offered to the Singapore wholesale electricity market while considering system security and reliability requirements**
 - **Improve the performance of the electricity market**
 - **Reduce the maintenance time for the trading system**
- EMC's IT team is more efficient in developing and maintaining the MCE using ILOG Concert Technology



Software is critical to enabling smarter energy and utility solutions



- **Software is increasingly viewed as a *strategic business asset***
- ***Software* is helping utility companies:**
 - Drive grid transformation with standards and flexibility
 - Increase visibility and control for operations and support IT
 - Turn network data into actionable information throughout the compar
- **Leaders everywhere are deploying *increasingly intelligent* software, systems and products**
- **Accelerating innovation and enabling effective change is highly dependent on the ability to *manage effective software delivery***

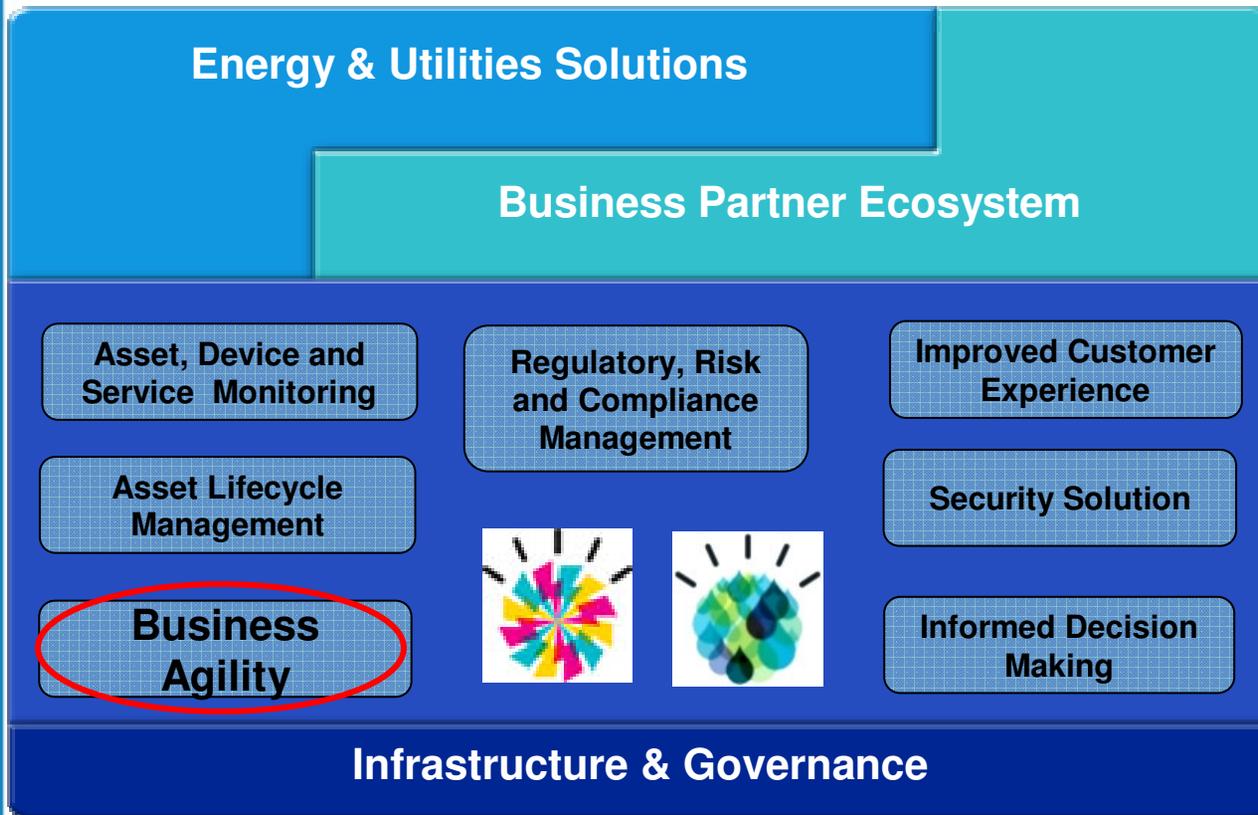




IBM provides a comprehensive Energy and Utilities framework that delivers smarter solution deployment



The framework gives you speed, flexibility and choice in deploying solutions while reducing cost and risk!



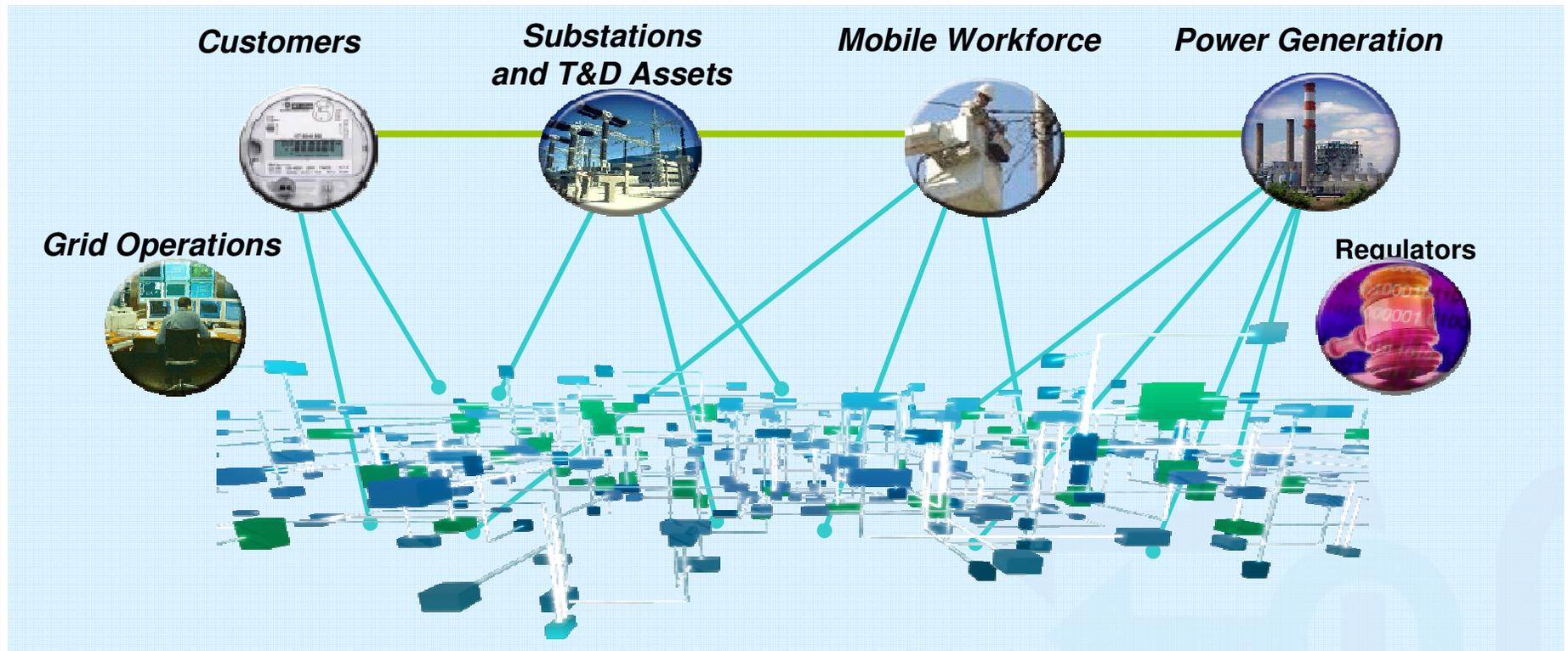
The framework provides...

- An approach to align technology with utility business needs
- Utility industry best practices and solution accelerators to speed deployment
- Re-usable implementation patterns to lower risk
- Support for adoption of open and industry standards
- A choice of business applications from IBM business partners



Business Agility

Model, manage, and optimize business processes inside the Smart Grid



Know What's Happening, When to Act, and What to Do

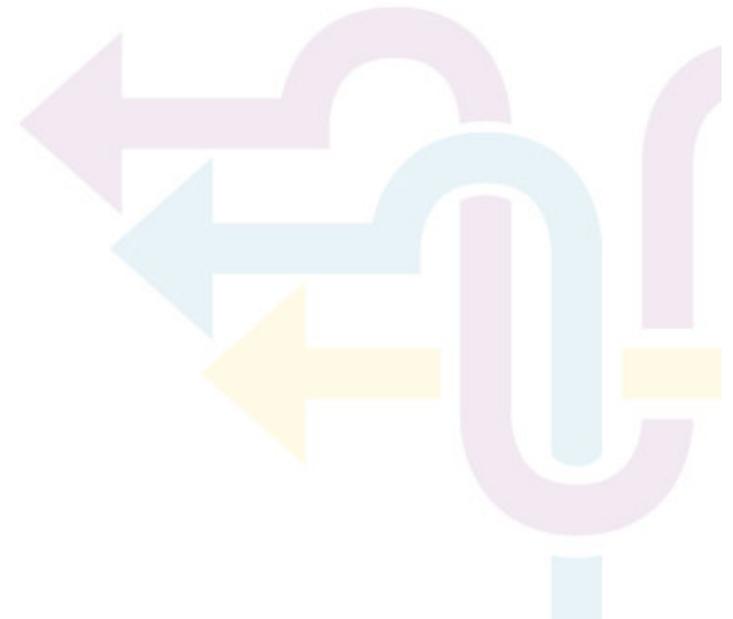
- IBM Decision Server: know what's happening
- IBM ILOG JRules: what to do
- IBM ILOG Optimization: how optimize the value for the company
- IBM Lombardi : how to improve the process



Spunti di discussione



- Is it possible to replicate projects like these in Italy ?
- How to leverage on AMR infrastructure already in place to improve processes in areas like
 - Grid intelligent maintenance,
 - Customer services
 - Demand side management and In Home Display
 - Pricing flexibility
 - ...
- Dynamic Distribution Management

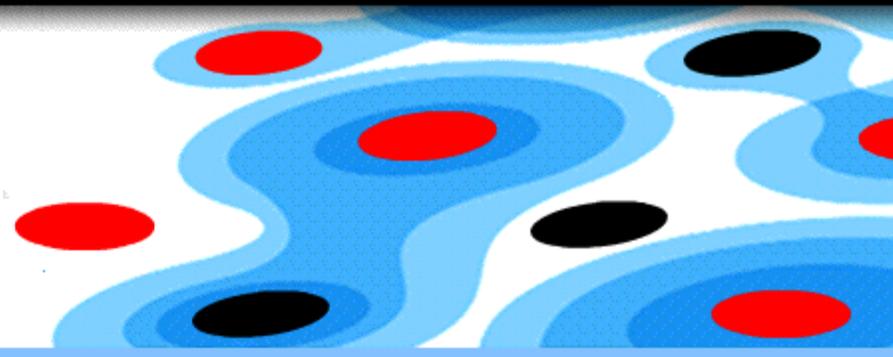




IBM.

Smart Work

Resources to help drive business
from the Smart Work Team



Un sito dedicato:

- alla Business Agility per rendere più dinamici i processi aziendali,
- alla Strategia Smart Work di IBM,
- alle Applicazioni specifiche di questi approcci innovativi nei diversi settori d'industria

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