



A

AREVA

Situation Awareness (SA) and Decision Support System for Grid Operations

Lawrence Jones

Situation Awareness is Critical to Power System Operations

- ▶ **August 14, 2003 - Northeast US/Canada**
 - ◆ “*Inadequate situation awareness*”
- ▶ **August 10, 1996 - Western US**
 - ◆ “train operators to make them aware of system conditions and changes”
 - ◆ “develop displays that give operators immediate information on changes in status”
- ▶ **July 2, 1996 - Western US**
 - ◆ “review need ... to monitor operating conditions on a regional scale”
- ▶ **July 13, 1965 - Northeast US/Canada**
 - ◆ “System control centers should be equipped with display and recording equipment which provide the operator with as clear a picture of system conditions as possible”

Industry Trends and Risks

Trend	Risk
Aging transmission infrastructures	Potential for equipment failures
Lack of new transmission facilities	More transmission bottlenecks
Market-driven transactions	Unpredictable transactions and system usage
Cutbacks in system maintenance	More frequent and unexpected equipment failures
Dependence on telecom & computer systems	Failure may results in “uninformed” operators
No integrated system planning	Insufficient/improper generation/transmission resources
Trend toward interconnection	Increasing potential for cascading failures
Aging Work Force	Inexperience operators, system planners and engineers making incorrect decisions

**Greater Uncertainty in Day-to-Day System Operation
- LOWER LEVELS OF SITUATION AWARENESS -**

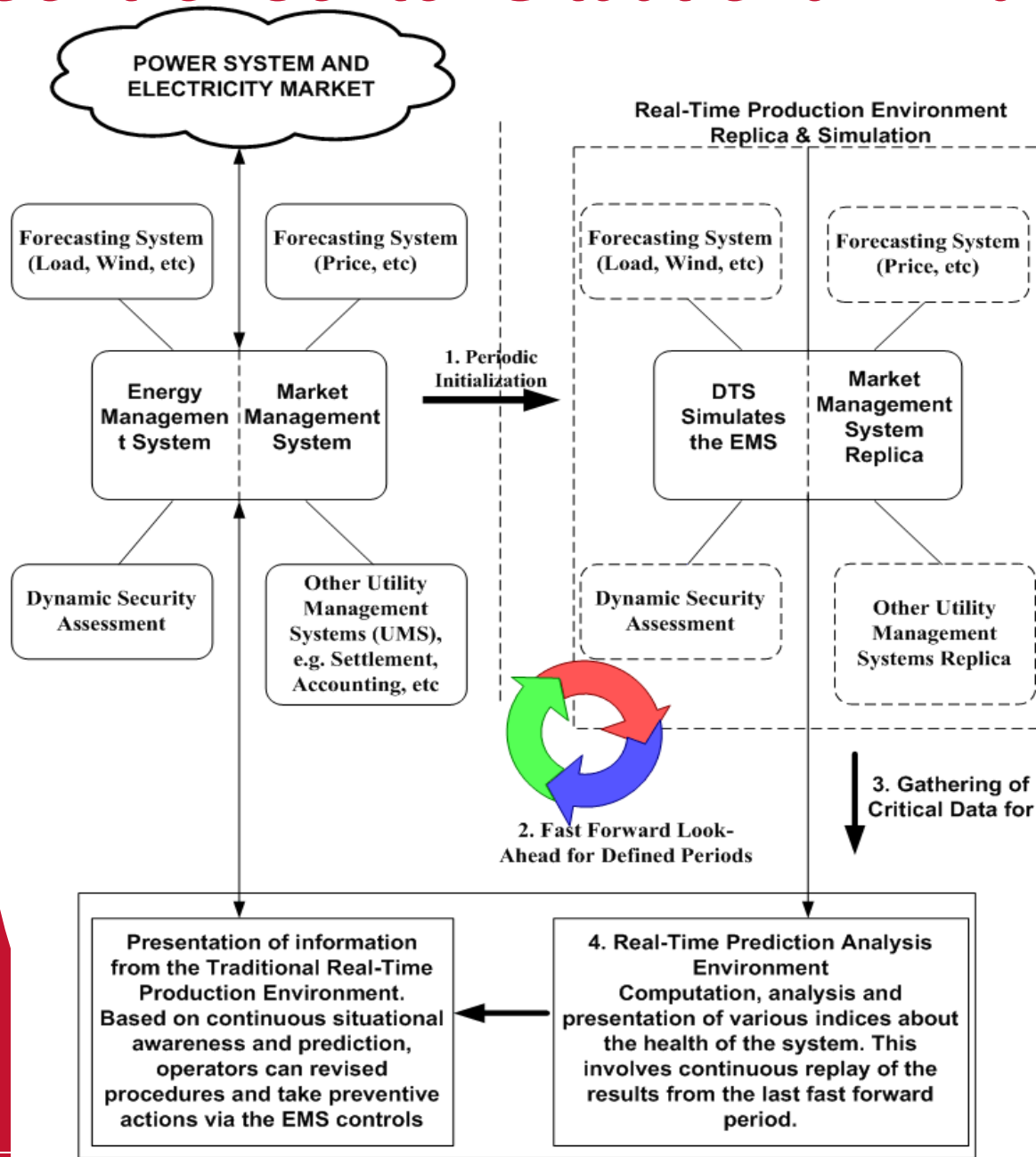
What would a DSS for Control Center Include . . . ?

- **Diagnostic tools that give recommendation(s) of remedial actions**
- **Ability to perform "What-if analysis" based on look-ahead simulation**
- **Real-time probes for measuring situational awareness**
- **Business Process Management**
- **Automated access and management of operational policies and practices**
- **Monitoring of T&D assets**
- **Wide area views of neighboring power systems**

What would a DSS for Control Center Include?

- **Intelligent User Interface (IUI)**
- **Dynamic displays and visualization techniques**
- **Integration and display of data from multiple sources**
- **Dashboards**
- **Control Center Ergonomics**
- **Advanced event notification systems including intelligent alarm processing**
- **“Cause and Effect” maps and event tracking**

Control Center Situational Awareness (CCSA)



- ▶ Look-ahead simulation for real-time system prediction and disturbance mitigation
- ▶ A platform for Decision Support and (DSS)