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NRECA

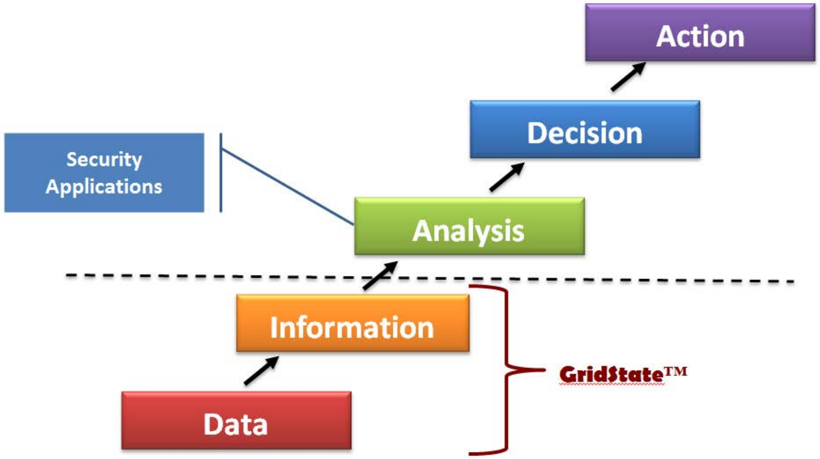
# Essence

Cybersecurity for Energy Delivery Systems Peer Review

August 5-6, 2014

# Summary: Essence

- **Objective**
  - To develop an integrated security appliance that will enable utilities (especially co-ops) to define, configure, manage and monitor utility networks with high fidelity
- **Schedule**
  - Oct. 2013 – April 2016
  - Prototype Design Completed (Feb. 2014)
  - Lab Test (Dec. 2014)
  - Field Test (Feb. 2015)
  - Essence will produce an open specification for network management



- **Total Value of Award: $4,707,222**
- **% Funds expended to date:** 26%
- **Performer:** NRECA
- **Partners:** Pacific Northwest National Lab, Cigital, Honeywell, Carnegie Mellon University

# Advancing the State of the Art (SOA)

- **Network security is currently mostly prescriptive.**
- **The next generation is reactive and adaptive.**
- **Essence builds on decades-old principles of system abstraction while leveraging new database technology.**
- **Utilities will enjoy next generation network security at a price accessible to any size organization.**
- **Essence will use deep packet inspection with knowledge of utility protocols.**
- **Firewalls are easily penetrated. Essence will provide a more agile and adaptive approach to cyber security.**

# Challenges to Success

- **Data gathering and processing**
  - Ultra-fast databases needed
    - *High speed dedicated processors for primary collection*
    - *Hybrid database technology*
    - *Hadoop platform*

- **Confidentiality**
  - Making sure that sensitive IP packets remain secure
    - *Content-based filtering*
- **Acceptance**
  - Essence may seem like a too-radical departure from traditional approaches to interoperability
    - *Co-op community is ideal for testing*
- **Attack Surfaces**
  - Concern that Essence represents another attack surface
    - *Out of band data collection*

# Progress to Date

- **Data sensor prototype built and tested**
  - *Secure data collection technology already deployed at one utility*
- **Network simulator created**
  - *Essence team can now simulate network data from a utility*
- **Interfaces between layers identified**
  - *Essence team members can work on different project layers in parallel*

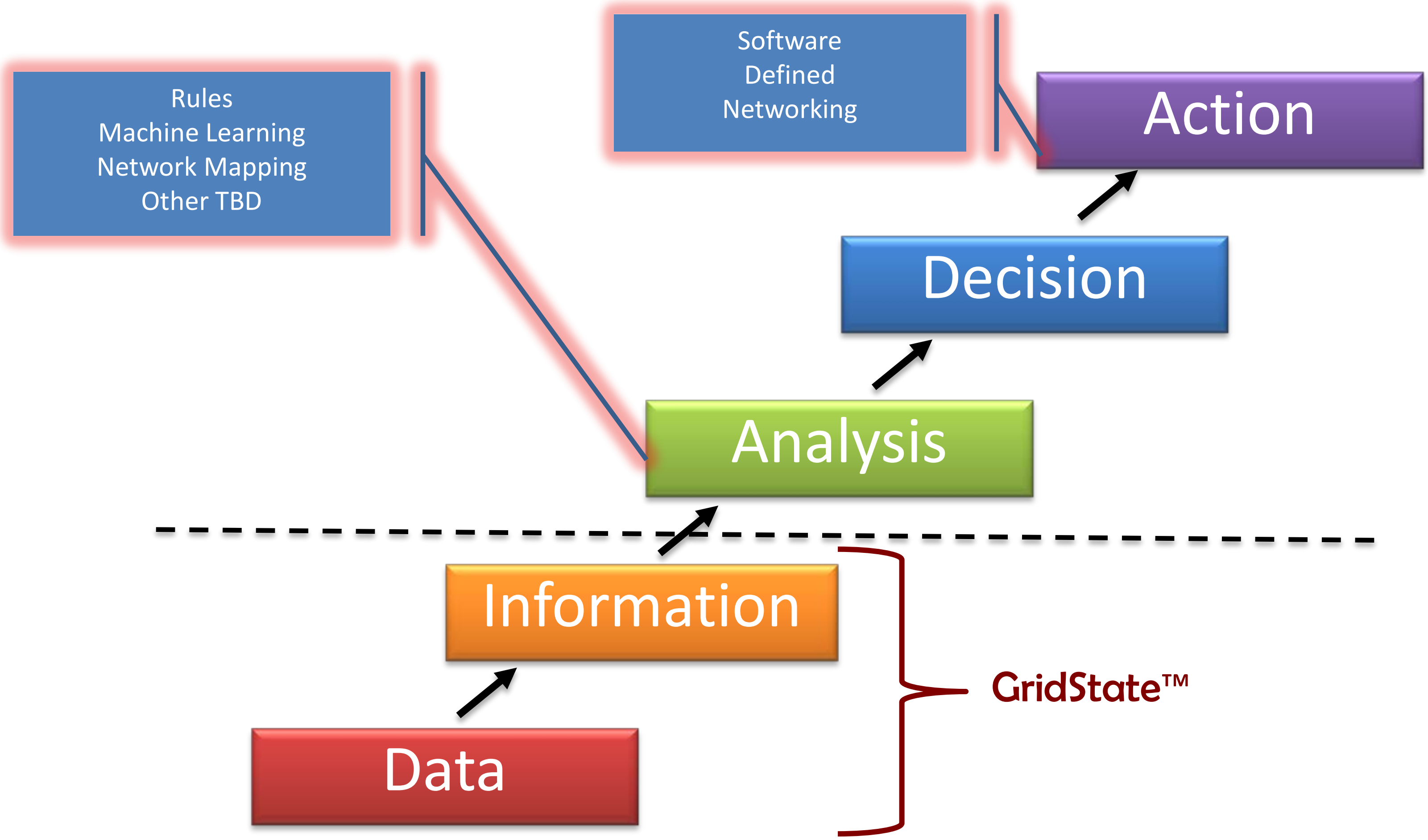
# Collaboration/Technology Transfer

- **Plans to transfer technology/knowledge to end user**
  - What category is the targeted end user for the technology or knowledge?
    - **Asset owners**
    - **Vendors**
  - What are your plans to gain industry acceptance?
    - *34 potential commercial customers already engaged*
    - *In negotiation with 2 to support development (major companies)*
    - *Abstraction model with open specification invites others to participate*

# Next Steps for this Project

- **Lab Testing in fall of 2014 at PNNL**
- **Deployment to test at utilities in first quarter 2015**

# Abstraction Model



Rules
Machine Learning
Network Mapping
Other TBD

Software
Defined
Networking

Action

Decision

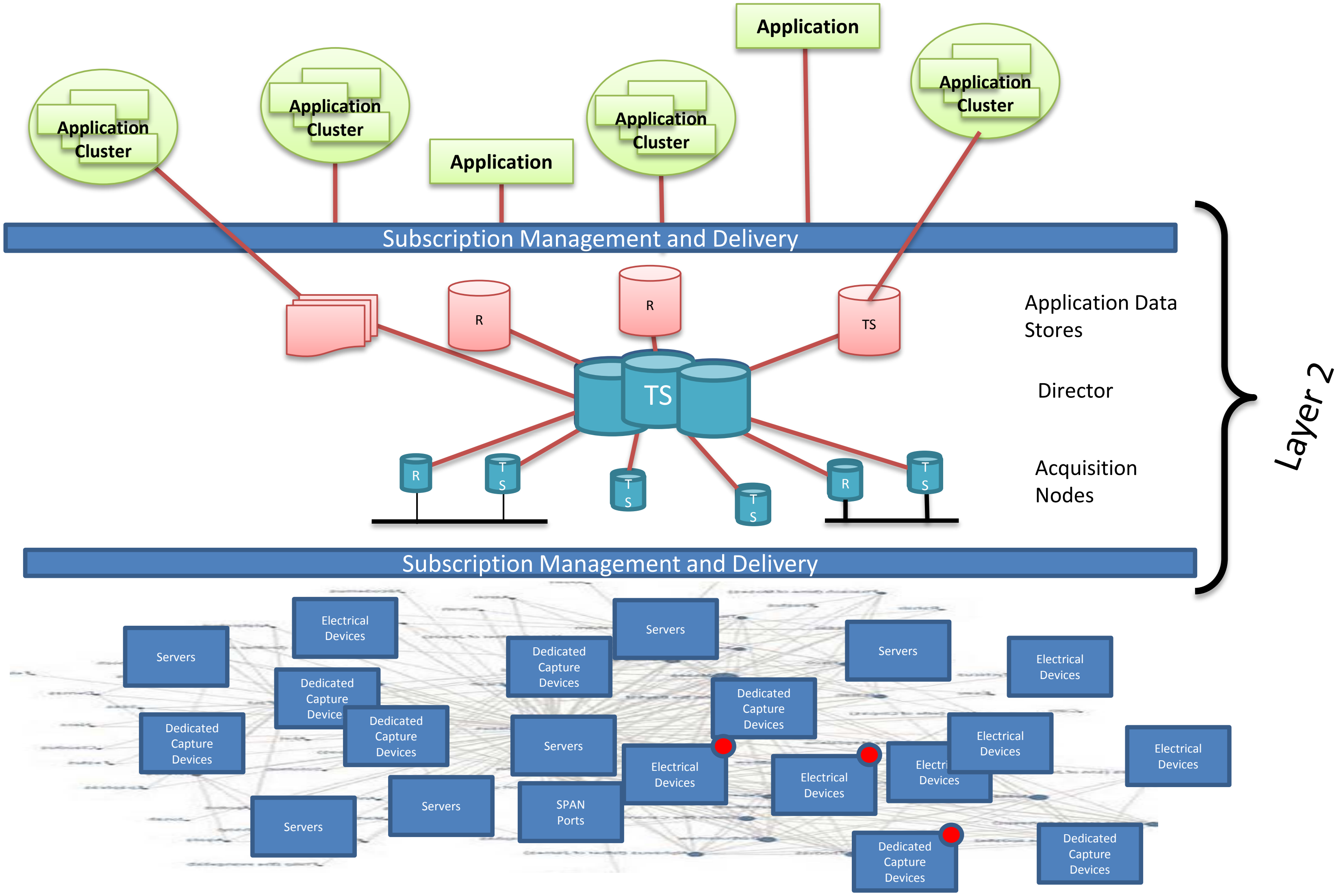
Analysis

Information

Data

GridState™

# General Architecture of Layer 2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Application Cluster
Application Cluster
Application
Application Cluster
Application Cluster
Subscription Management and Delivery
R
R
TS
Application Data Stores
TS
Director
R
T S
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R
T S
Acquisition Nodes
Subscription Management and Delivery
Layer 2
Electrical Devices
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