Network Management and Data Repository

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NASPI's Vision / Mission

- The vision of the North American SynchroPhasor Initiative is to improve power system reliability and efficiency through wide area *measurement, monitoring, and control*

- NASPI's mission is to create a robust, widely available secure synchronized data (Synchrophasor) *measurement infrastructure* for the interconnected North American electric power system with *associated analysis and monitoring tools* for better planning and operation and improved reliability

Agenda

- Network Management Overview
- Major Functions Provided
- Best of Breed Enterprise Network Management Platforms and Capabilities
- Example of Benefits
- How Functions Support Remote Management
- Remote Support & Code Upgrades
- Device Requirements /Standards to Support Remote Management

Network Management Functional Areas – FCAPS

Fault Management

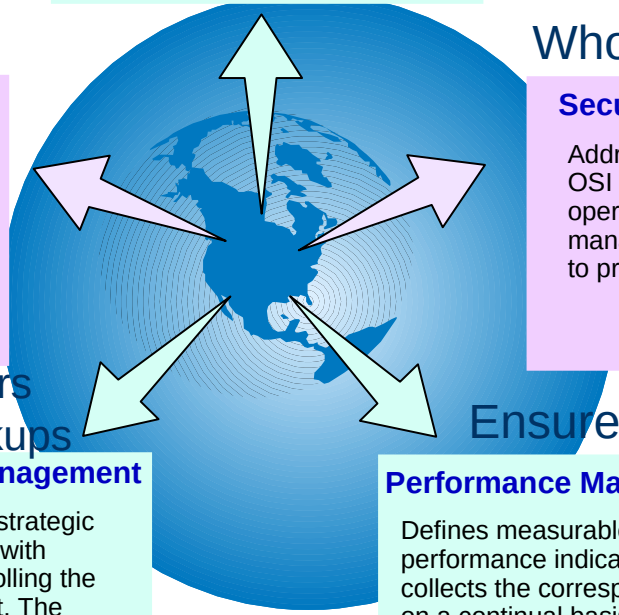
Includes all of the activities required to continuously detect the source of current and potential network problems, thereby maintaining high network availability, reliability and contributing to quick problem resolution.

Identify and fix what is broken

Who is using how much

Accounting Management

Enable charges to be established for the use of managed objects and costs to be identified for the use of those managed objects



Who can access what

Security Management

Address those aspects of OSI security essential to operate network management correctly and to protect managed objects

Control operational parameters & maintain configuration backups

Configuration Management

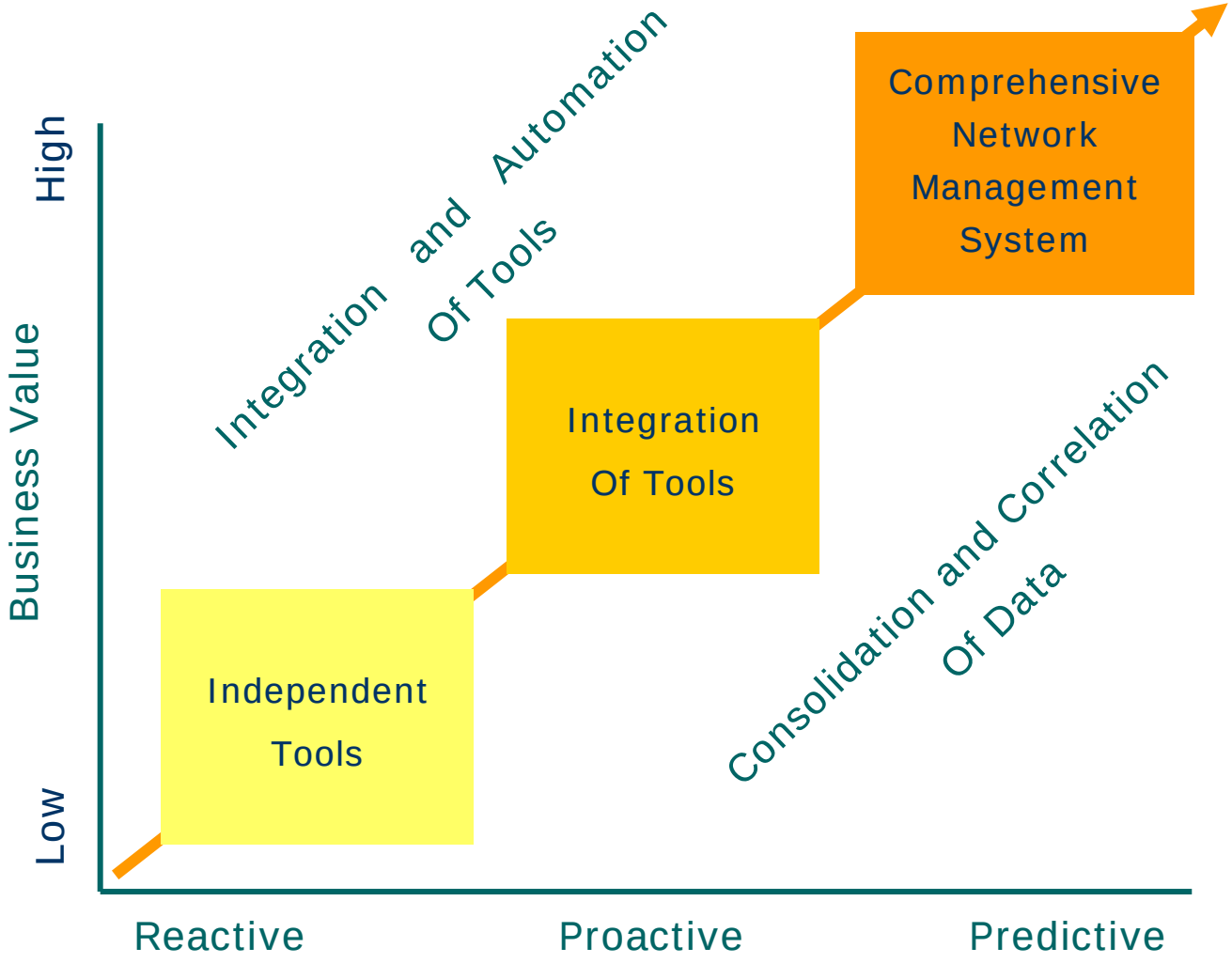
A set of tactical and strategic activities associated with managing and controlling the network environment. The services include inventory control and topology management as well as name and address management of the network's logical components.

Ensure Responsiveness

Performance Management

Defines measurable network performance indicators and collects the corresponding data on a continual basis. In addition, this data may be analyzed to make informed improvement decisions.

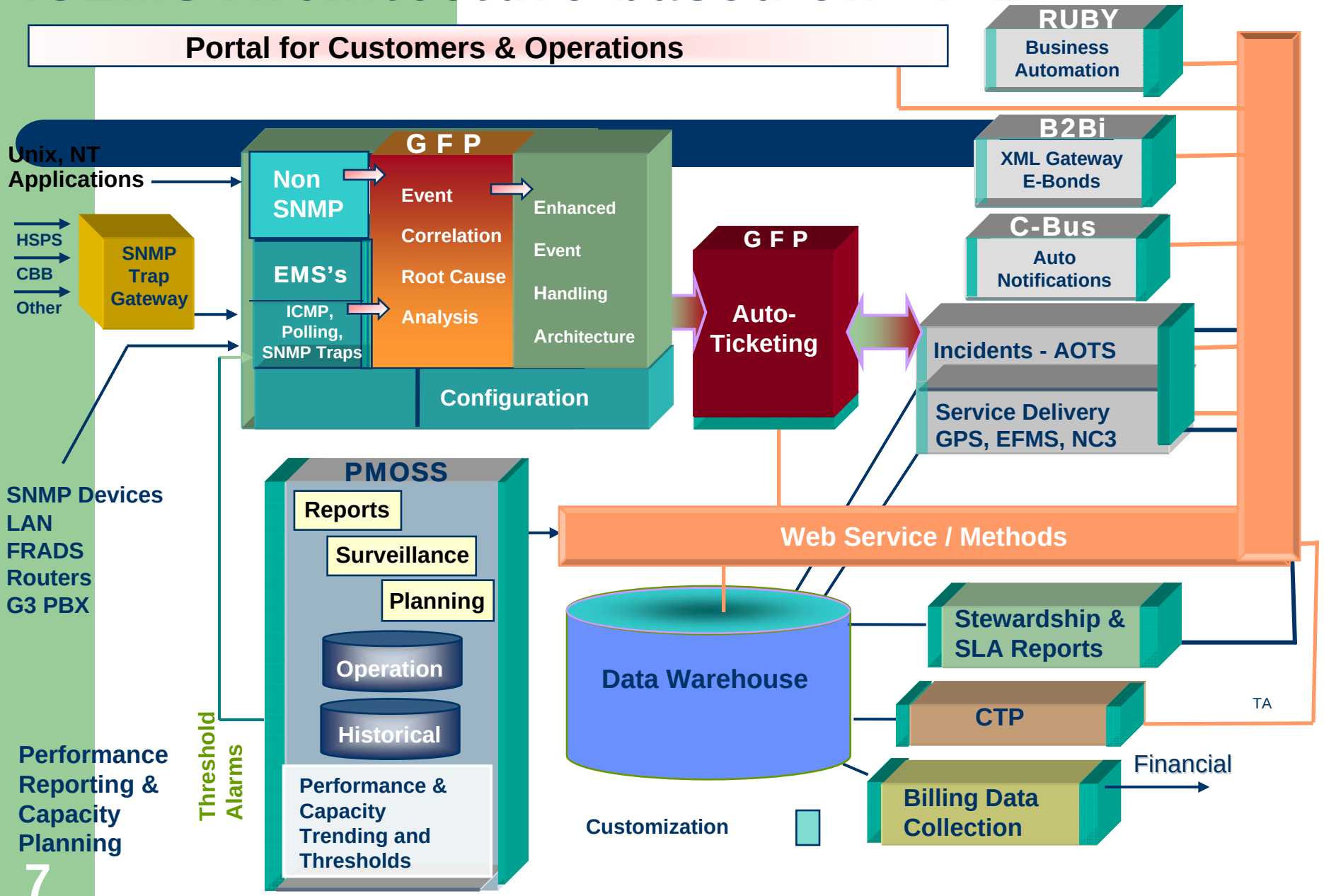
Network Management Value Stairway



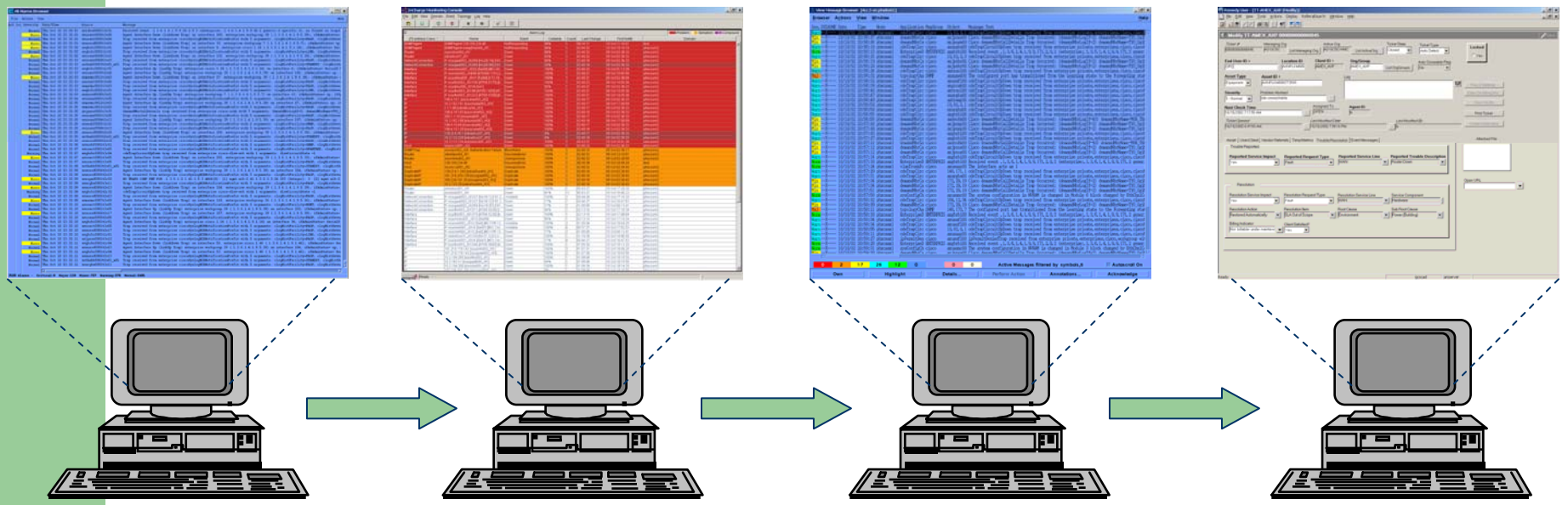
iGEMS Network Management Capabilities

- Device Up/Down
- Device Alert
- Performance Statistics
- Performance Alert
- Consolidation of Events
- Correlation of Events
- Auto Ticketing
- Inventory of Devices
- Automated Transport Testing
- Change Management
- Standard Configuration Compliance
- Security Compliance
- Event and Performance Reporting
- Service Level Reporting
- Procurement
- Provisioning and Engineering Workflow
- Ticket / Change eBonding
- Business Portal

iGEMS Architecture based on ITIL



Example of Intelligent Network Fault Management



Network Node Mgr
14,114 SNMP Messages Received by Network Node Mgr

Problem Correlation
65 problems as correlated by Smarts

Problem Consolidation
14 events as a result of consolidation by ITO Template

Ticketing
Resulting in 3 new tickets and updates to 7 existing tickets

Data from existing client for random 40 minute period

Event and Life Cycle Management

- Event
  - Remote
    - Diagnose and Collect Data, Modify Parameters, Reboot
  - Dispatch
    - Hardware Failure
- Life Cycle Management
  - Remote
    - Code and Parameter Updates
  - Dispatch

Management of Remote Devices

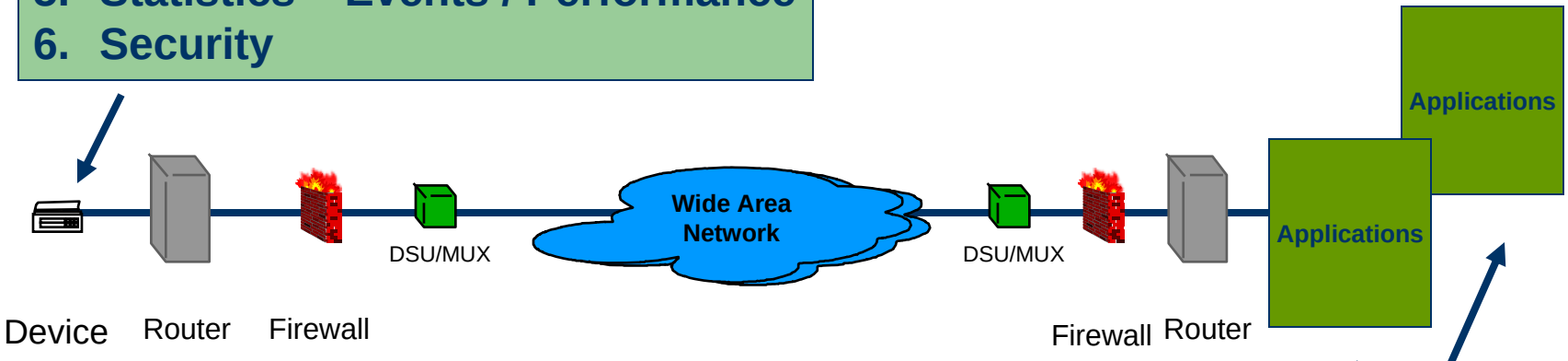
- **Management of Wireless Devices**
  - Devices are small and simple but numerous and distributed
  - Frequent upgrades due to security vulnerabilities and new features
  - Some features vary by model and need to be managed differently
  - Too expensive to have local upgrade support everywhere
  - Too slow to have remote upgrade support done manually
  - Need to use a remote upgrade tool to solve this

Configuration Management of Remote Devices

- **Wireless Code Upgrades**
  - Upgrade thousands of devices in 1 job
  - Upgrade different wireless device types in 1 job
    - Automatically finds exact device type and loads appropriate code
  - Can initiate download/reboot through terminal (ssh, telnet) or SNMP
  - Job(s) can be immediate or scheduled
- **Wireless Configuration Upgrades**
  - Upgrade thousands of devices in 1 job
  - Automatically merge an existing configuration with a standard template and produce a new configuration (reboot usually required)
  - Alternatively, determine differences between an existing configuration and a standard template and produce a delta file (no reboot usually required)
  - Job(s) can be immediate or scheduled

Device Management

1. Address Required
2. Configuration Parameters
3. Send Alerts
4. Read / Write Protocol
5. Statistics – Events / Performance
6. Security



1. How to locate & discover
2. Applications
3. Alerts, Correlate, Consolidate
4. Data Base
5. Query