

# TRONE: Trustworthy and Resilient Operations in a Network Environment

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Presented by  
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**ICT PORTUGAL Workshop:**  
**New Projects in Networks, Software, Energy and Security**  
March 1, 2011

**TRONE**

Information and Communication Technologies Institute  
**Carnegie Mellon | PORTUGAL**  
AN INTERNATIONAL PARTNERSHIP

# Motivation

- Technology push:
  - Next Generation Networks (NGN)
  - Need for seamless integration of new and heterogeneous technologies
- Consumer pull:
  - More demanding requirements
  - Increased QoS and QoP: *fast is not enough*
- The challenges:
  - Increased operational risks
  - Inadequate network operation and management

# Vision

- Innovative solutions for *Network Operation, Administration and Management (OAM)*
  - *Proactive* hazard reduction: **architectural robustness**
  - *Reactive* hazard reduction: **detection and recovery**
- Achieve **trustworthy network operation**
  - Dynamic dependability and security enforcement
    - Diagnosis, detection and prevention/tolerance
    - Automatic reconfiguration
  - Self-stabilizing like behavior

# Project Team



**FCUL:** Paulo Veríssimo, António Casimiro



**FCTUC:** Filipe Araújo, Marília Curado

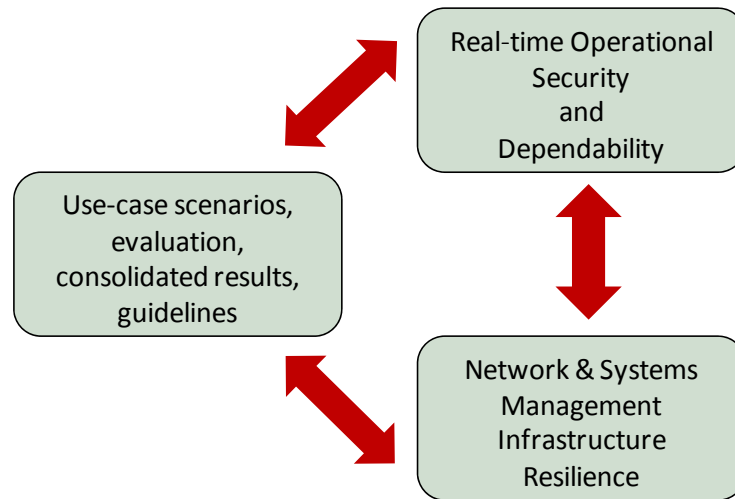


**CMU:** Priya Narasimhan



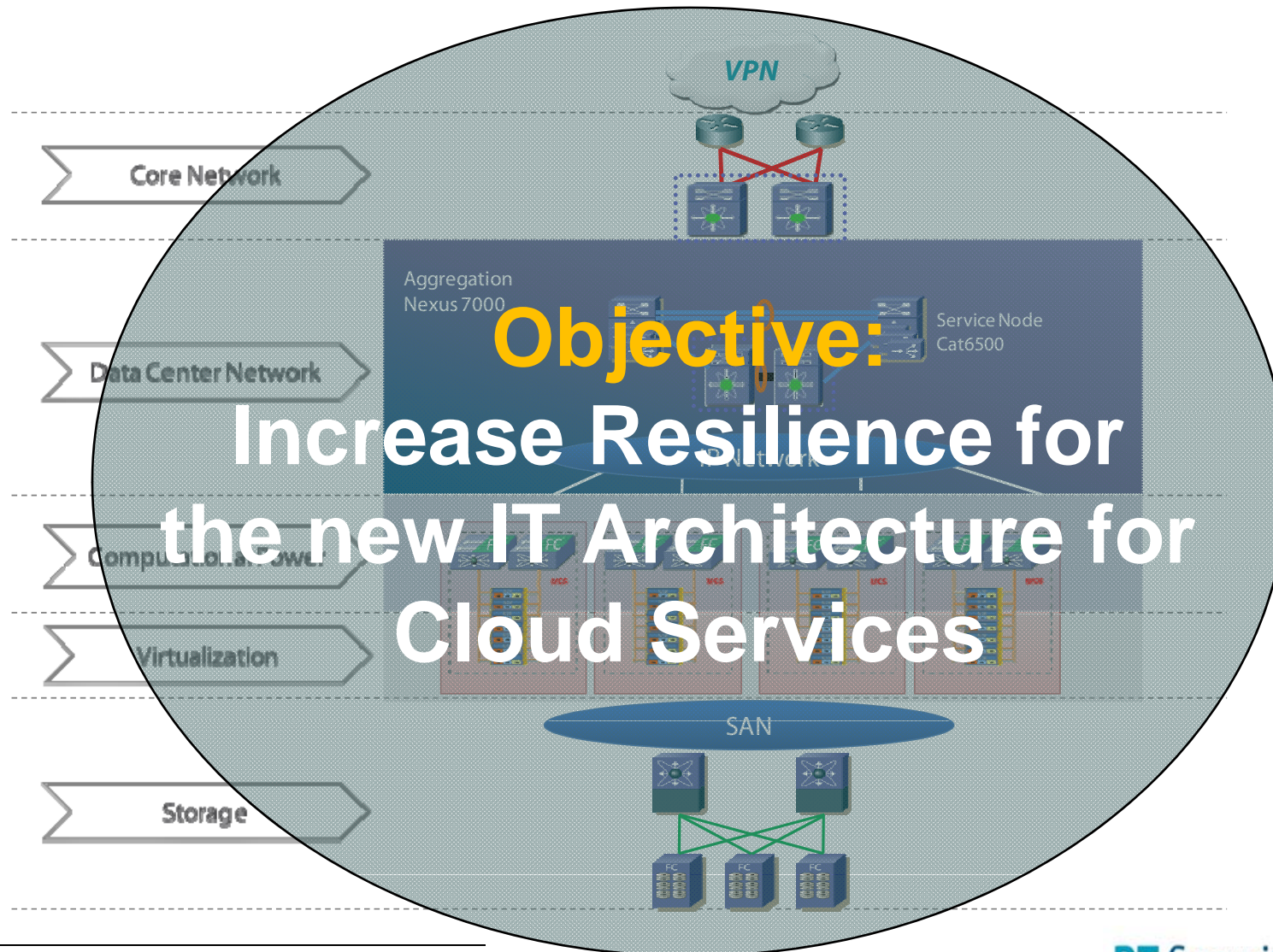
**PT:** José Constantino, Maximilian Xavier

# Approach



- Measures to ensure real-time operational security & dependability
  - On-line fault/failure diagnosis
  - Automated reconfiguration and dynamic adaptation
- Architectural components & middleware
  - Resilient firewalls, based on redundancy and proactive recovery
  - Resilient communication protocols
- Technology demonstrators & prototypes
  - Use cases from operator supplied scenario

# PT Cloud computing scenario



# Potential threats

- Attacks to Cloud Computing infrastructure
  - Hypervisor
  - Virtualization platform
  - Other guest virtual machines
  - Network components
  - Storage platform
  - Deployed controls
- Attacks to Orchestration/Management Controls
  - Privilege escalation in front end systems
  - Disruption of order entry
  - Unauthorized use of resources

# Impact



- Security and resilience are crucial to IT providers
- TRONE is performing **cutting edge research**
- Results and knowledge in this area will represent a **competitive advantage**, directly applicable in new infrastructures



TRONE on the web

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