Network-centric Middleware for Service Oriented Architectures across Heterogeneous Embedded Systems

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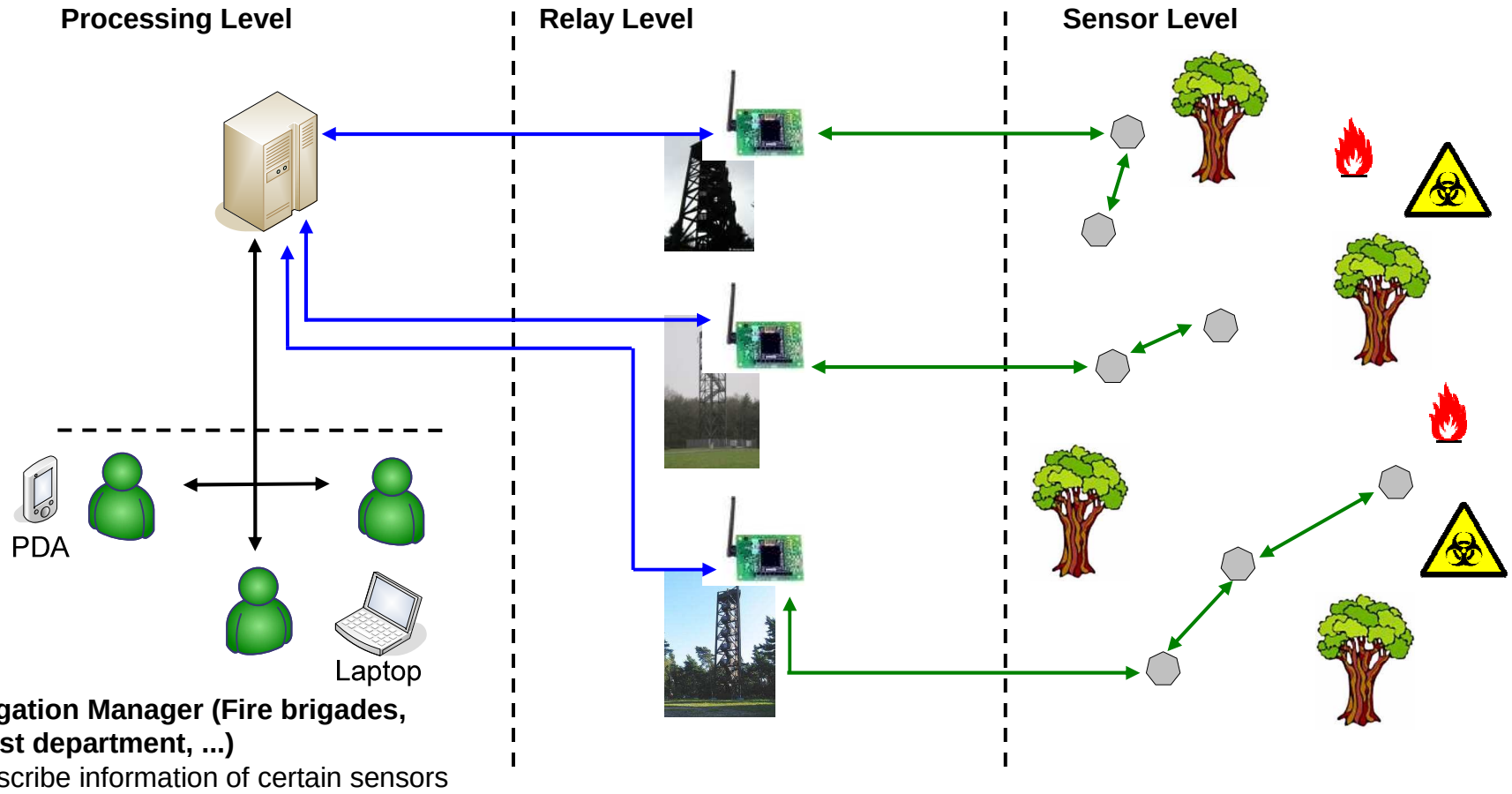
Overview

- Motivation & Requirements for Embedded Web-Services
- The µSOA Approach
- MORE Middleware Architecture
- Deployment Example
- Conclusions & Outlook

Exemplary End-user scenario: Environmental monitoring



Mitigation Manager (Fire brigades, forest department, ...)
Subscribe information of certain sensors

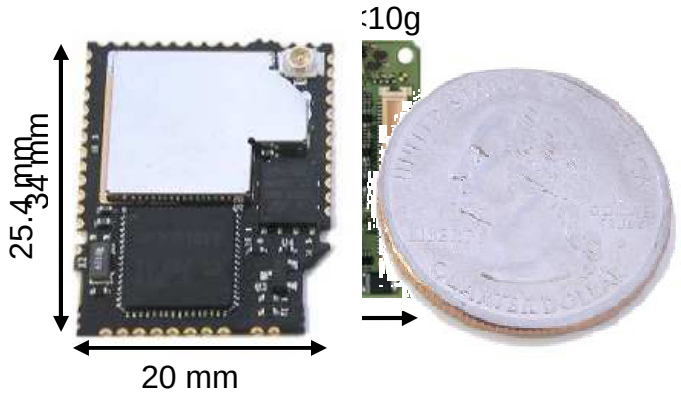
Challenge: Energy, communication link and real time constraints

Requirements for embedded Web-Services

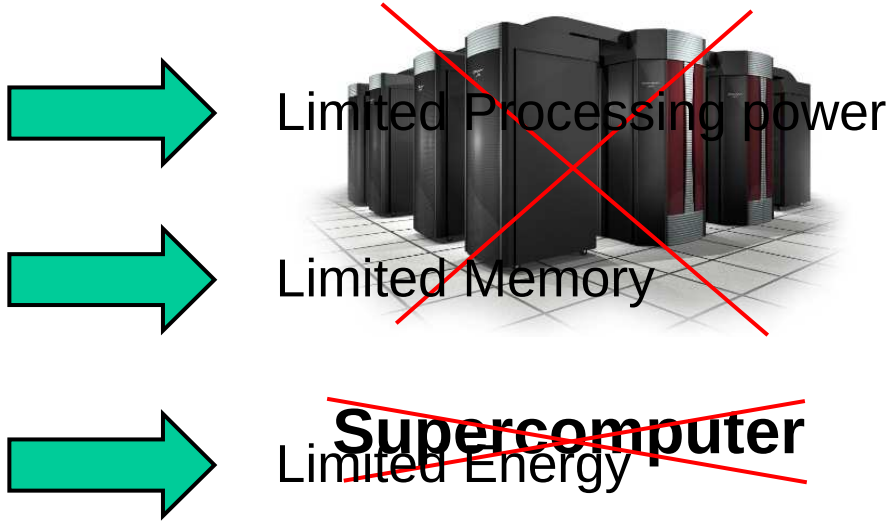
- Real-life Scenarios
  - Environmental Monitoring & Mitigation Management
  - Remote Chronic Care Support
  - …
- Common requirements
  - Distributed and connected via Internet using integrated Web-Services
  - Heterogeneity of devices
  - Embedded system conditions
- Aims of the MORE project:
  - Generic Middleware for resource constraint scenarios
  - Reduce deployment time, Reuse of services

Resource constraints of Embedded Systems

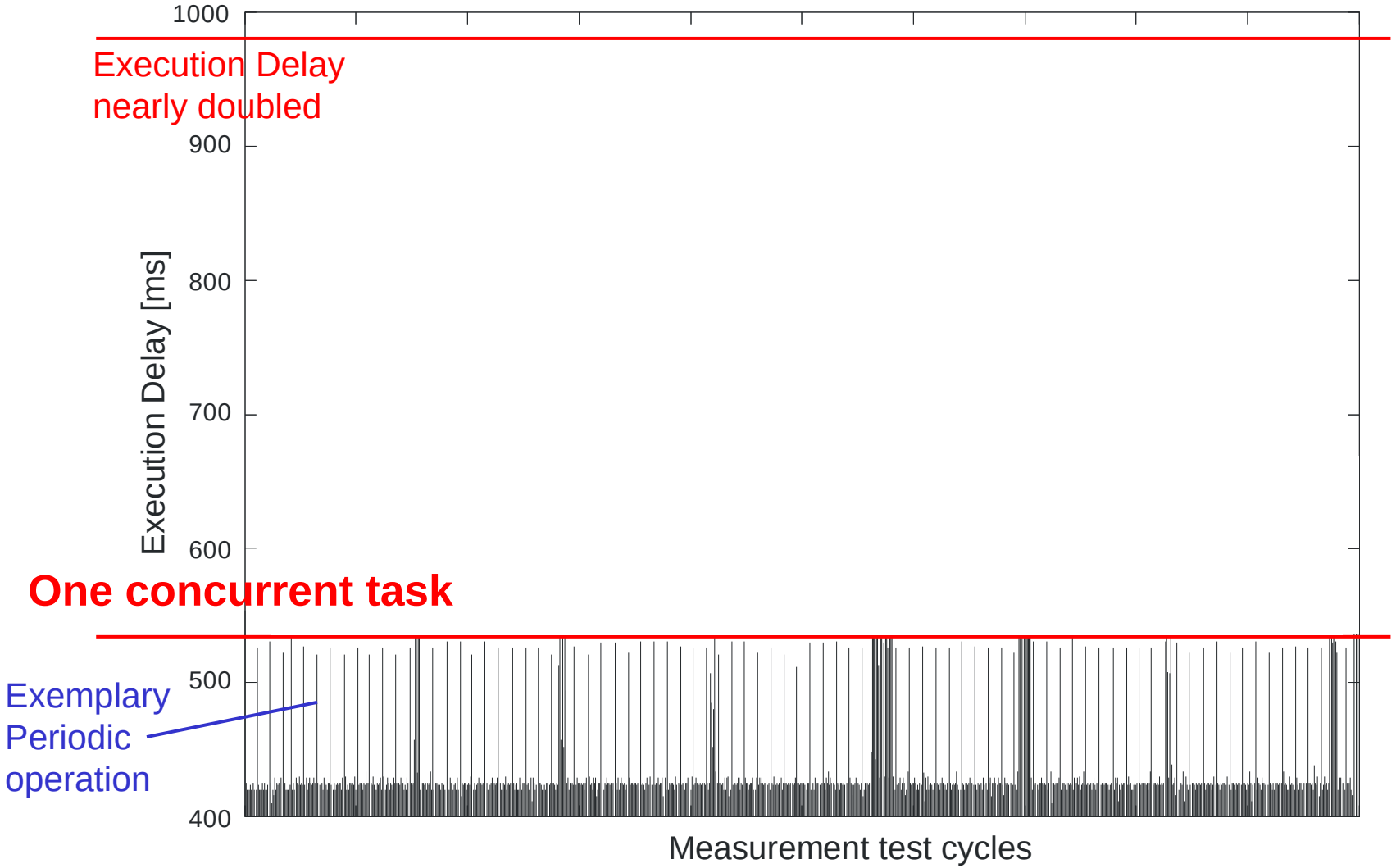
Example Sensor Node:



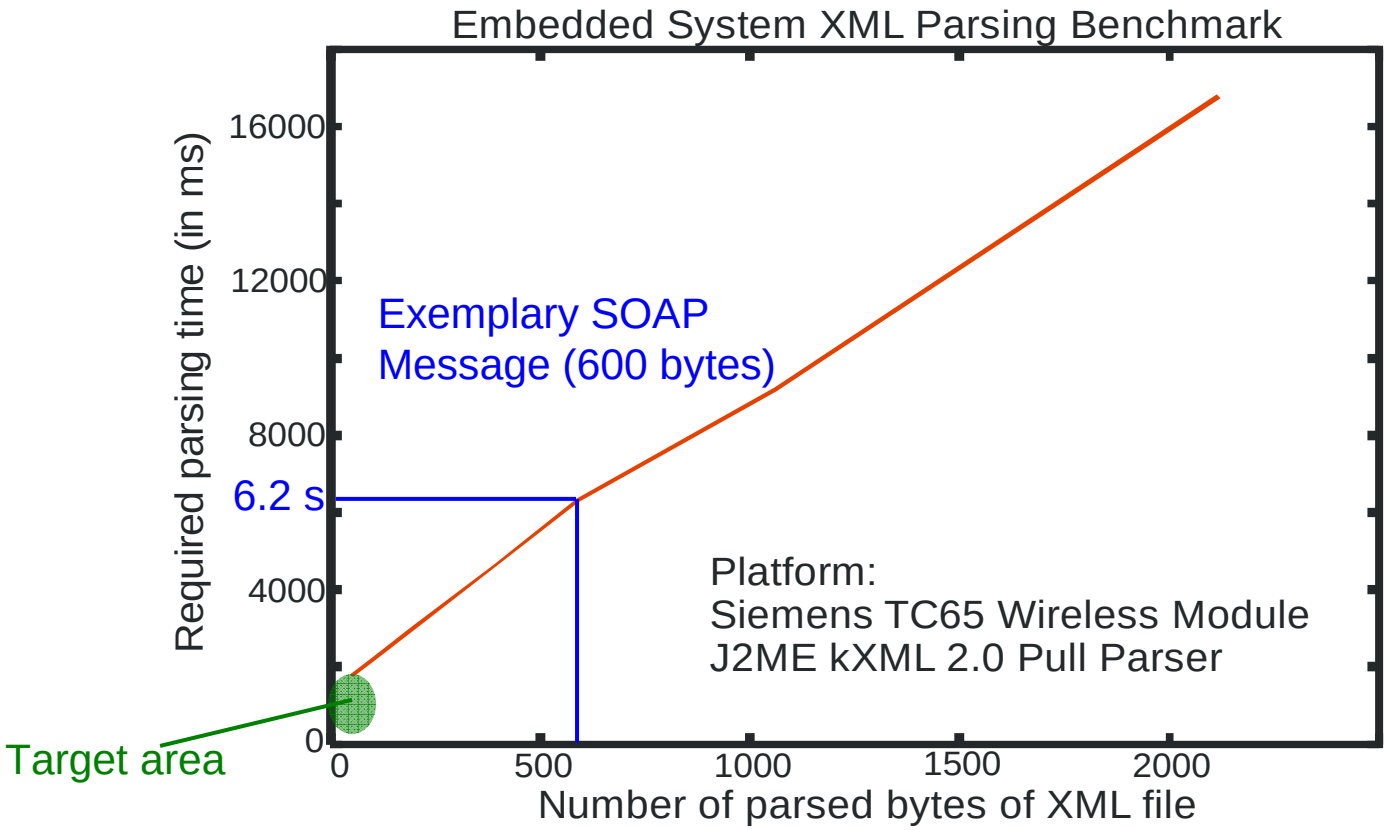
- Wireless Module TC65
  - Technical Specifications
    - ARM7TDMI (8MHz)
    - 8x ADC Inputs
    - 2x DAC interfaces
    - USB 2.0 full speed
    - Memory: 100KB (RAM) and 4MB (Flash)
    - Wireless Technologies
      - 250kbps 2.4GHz IEEE 802.15.4 Chipcon Wireless Transceiver (CC2420)



Measurement of the impact of running simultaneous tasks on a Embedded System (TC65)

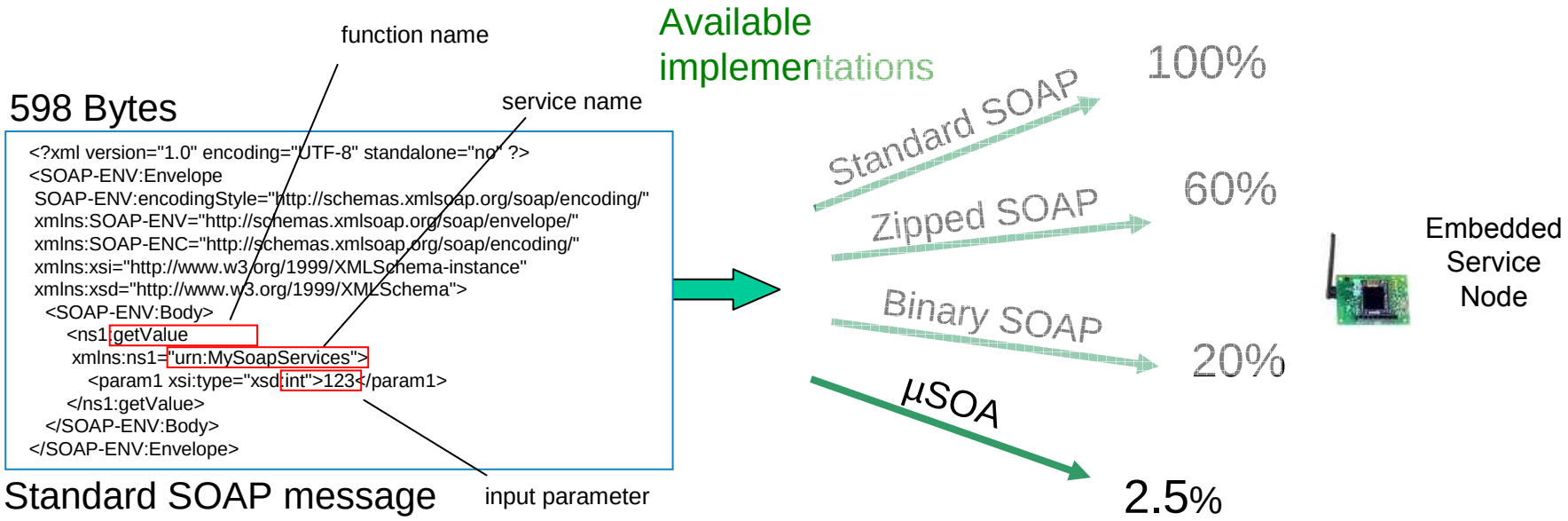


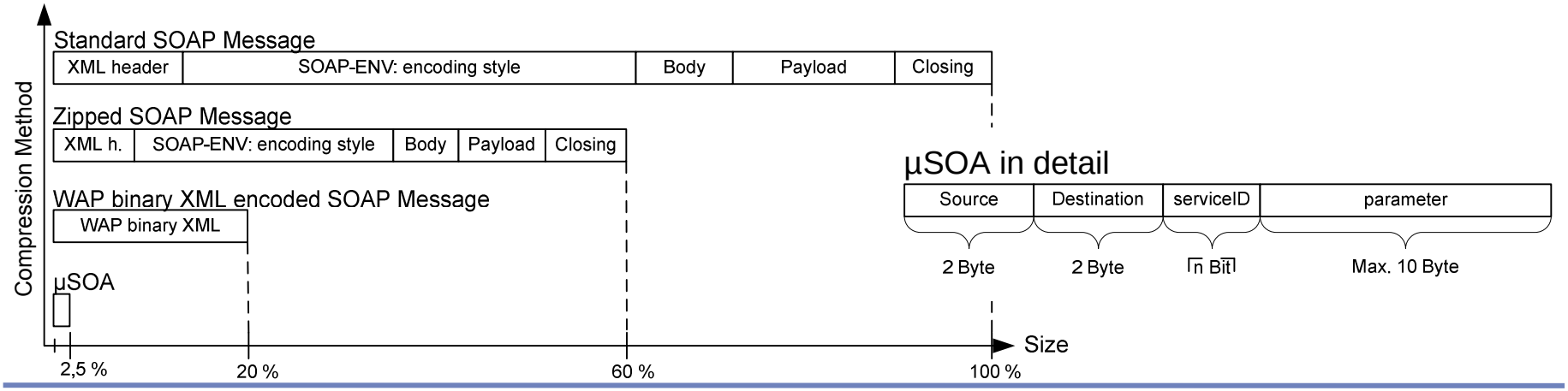
Processing standard SOAP leads to unacceptable delays & energy consumption



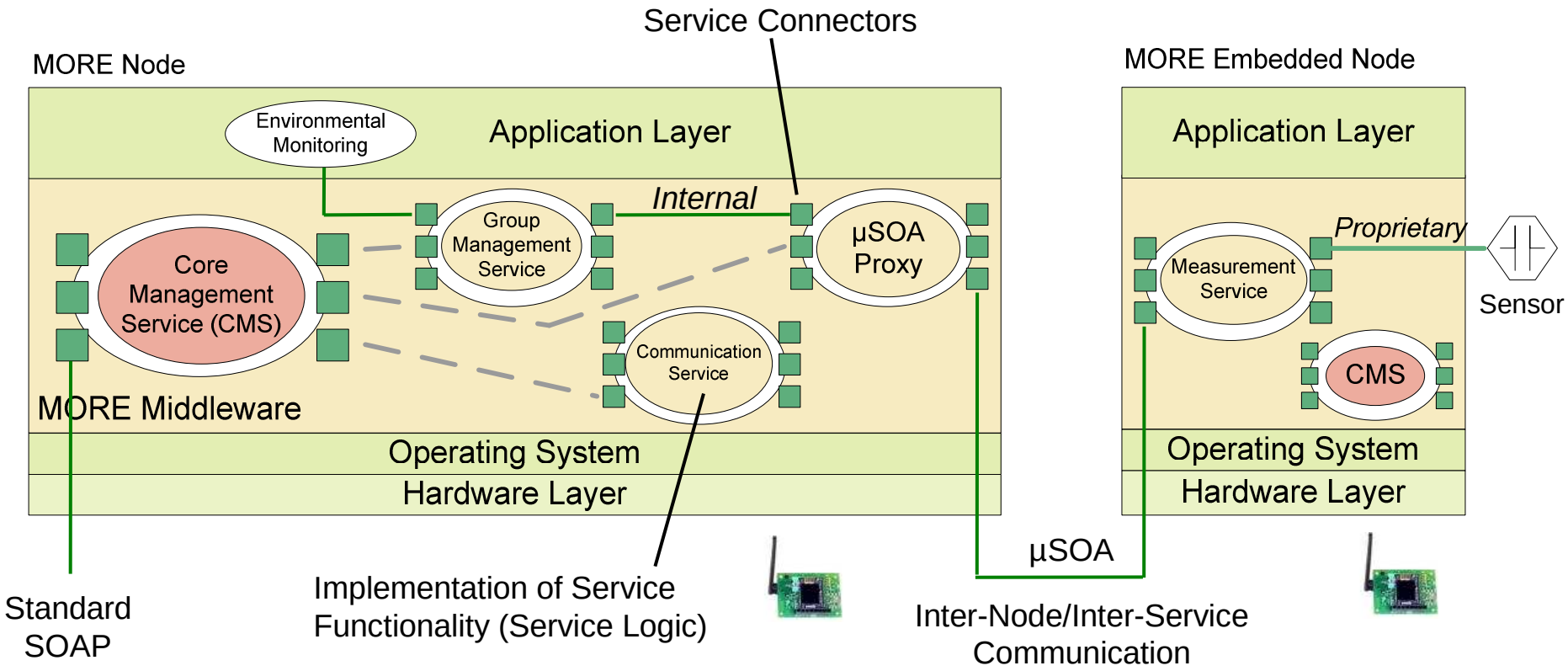
- High Energy consumption due to long parsing times
- Reduced real-time capabilities

Solution Approach: µSOA



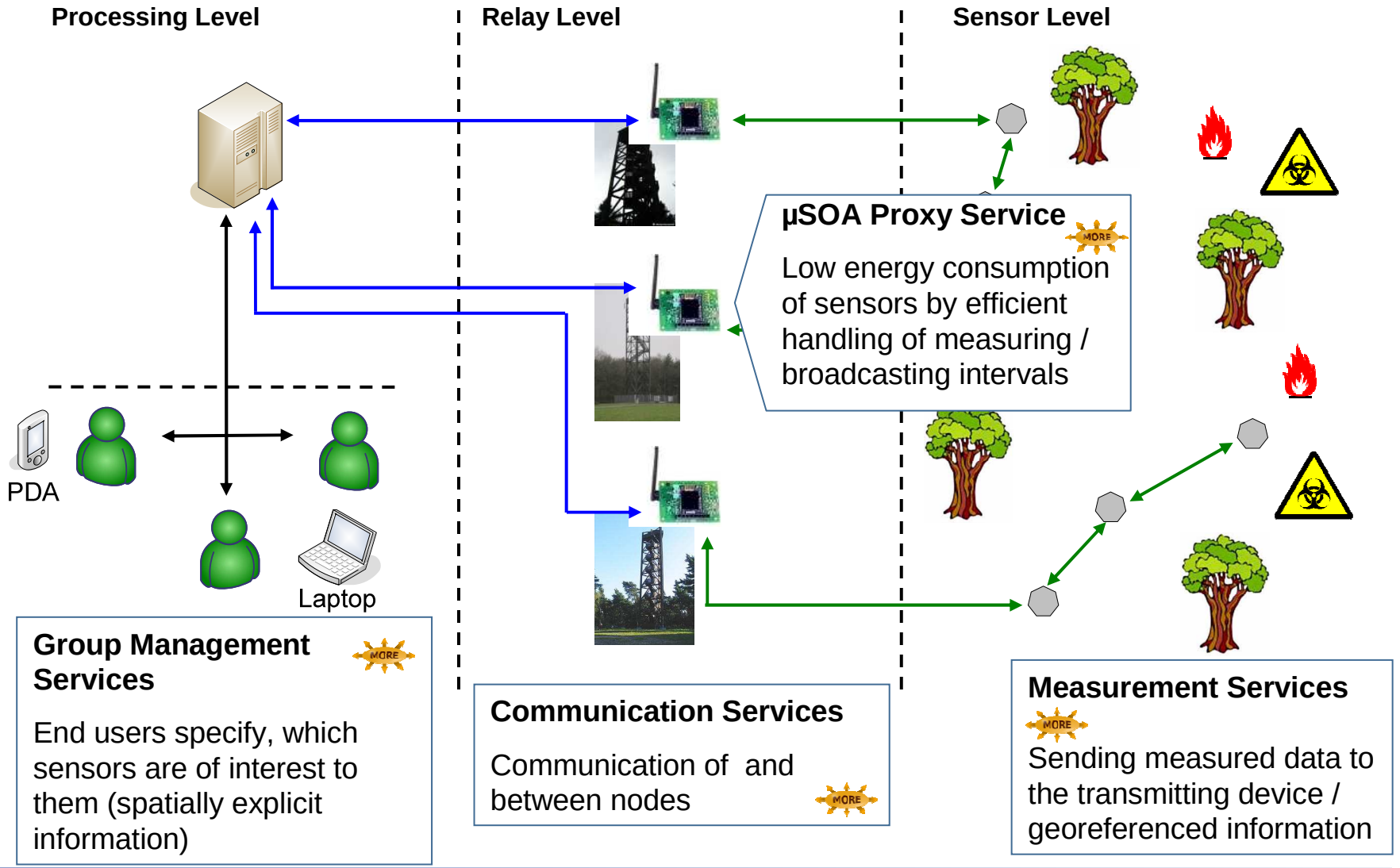


MORE Service Oriented Architecture



- Classical Layered View & Service Oriented View
- Core Management Service
- Different Service Connectors

MORE enabled deployment



Conclusion

- **MORE middleware: development and validation of new concepts to enable Web-Services for Embedded Systems**
- **Service-oriented Architecture and exemplary use case scenario of a mitigation management system:**
  - Fusion of sensors with Web-Services
  - Reduced deployment time and reuse of services
- **Outlook:**
  - Validation of experimental system by *real end users*
  - In-depth *performance evaluation*: focus on reliability and scalability

Thank you for your attention!

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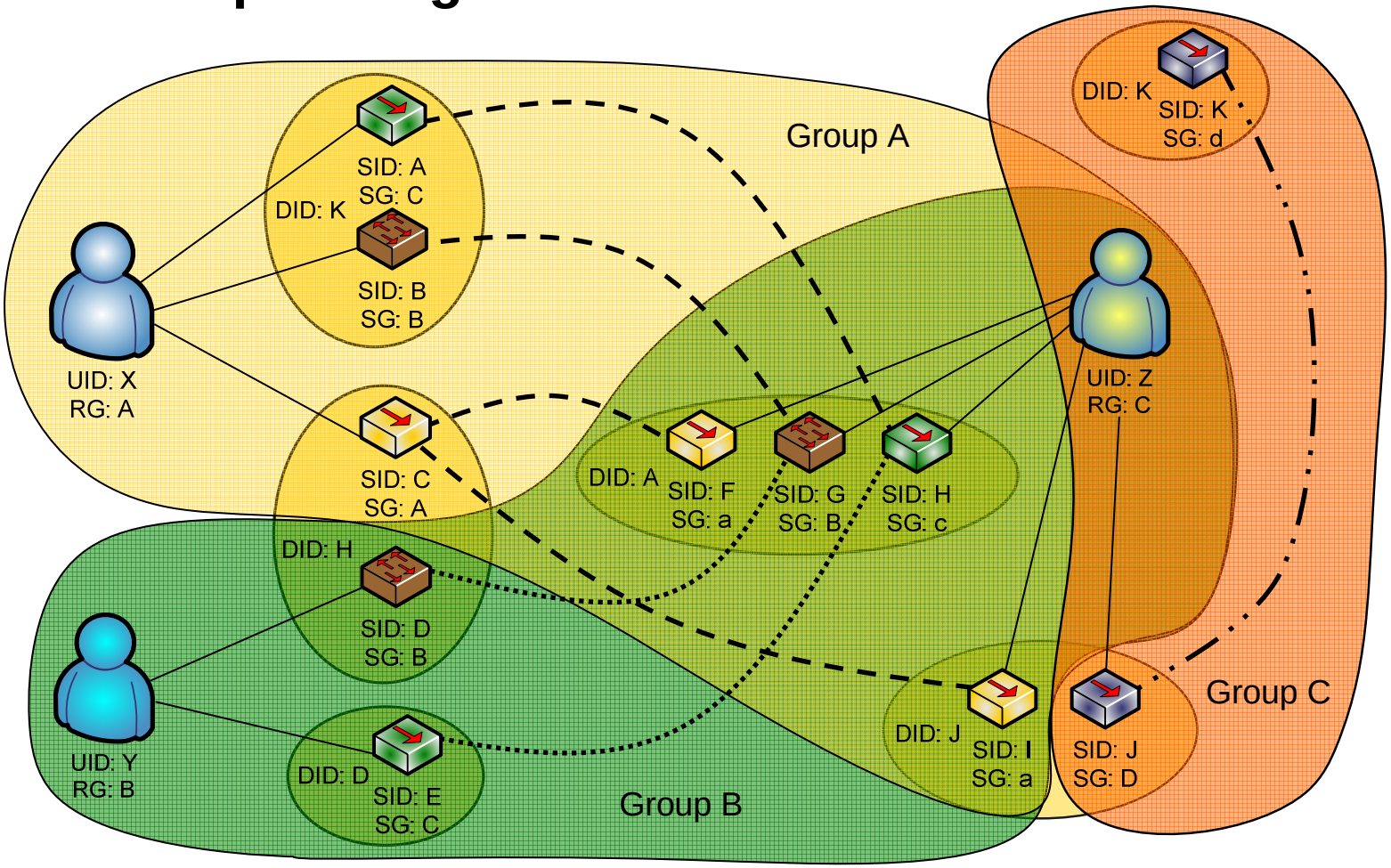
www.ist-more.org

Backup: MORE Acronym

Network-centric Middleware for Group communication and Resource Sharing across Heterogeneous Embedded Systems

MORE Group Management Service



- **Control of dynamic groups in MORE**
- **Policy based Group Management**
- **Policies enable a higher reliability and in combination with group communication cost effective efficiency gains**