SIEMENS

WIRELESS WORLD RESEARCH FORUM

A MANAGEMENT AUTOMATION FRAMEWORK FOR MOBILE NETWORKS

Holger Kasinger, University of Augsburg
kasinger@informatik.uni-augsburg.de
Bernhard Bauer, University of Augsburg
Henning Sanneck, Siemens COM
Christoph Schmelz, Siemens COM

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Outline

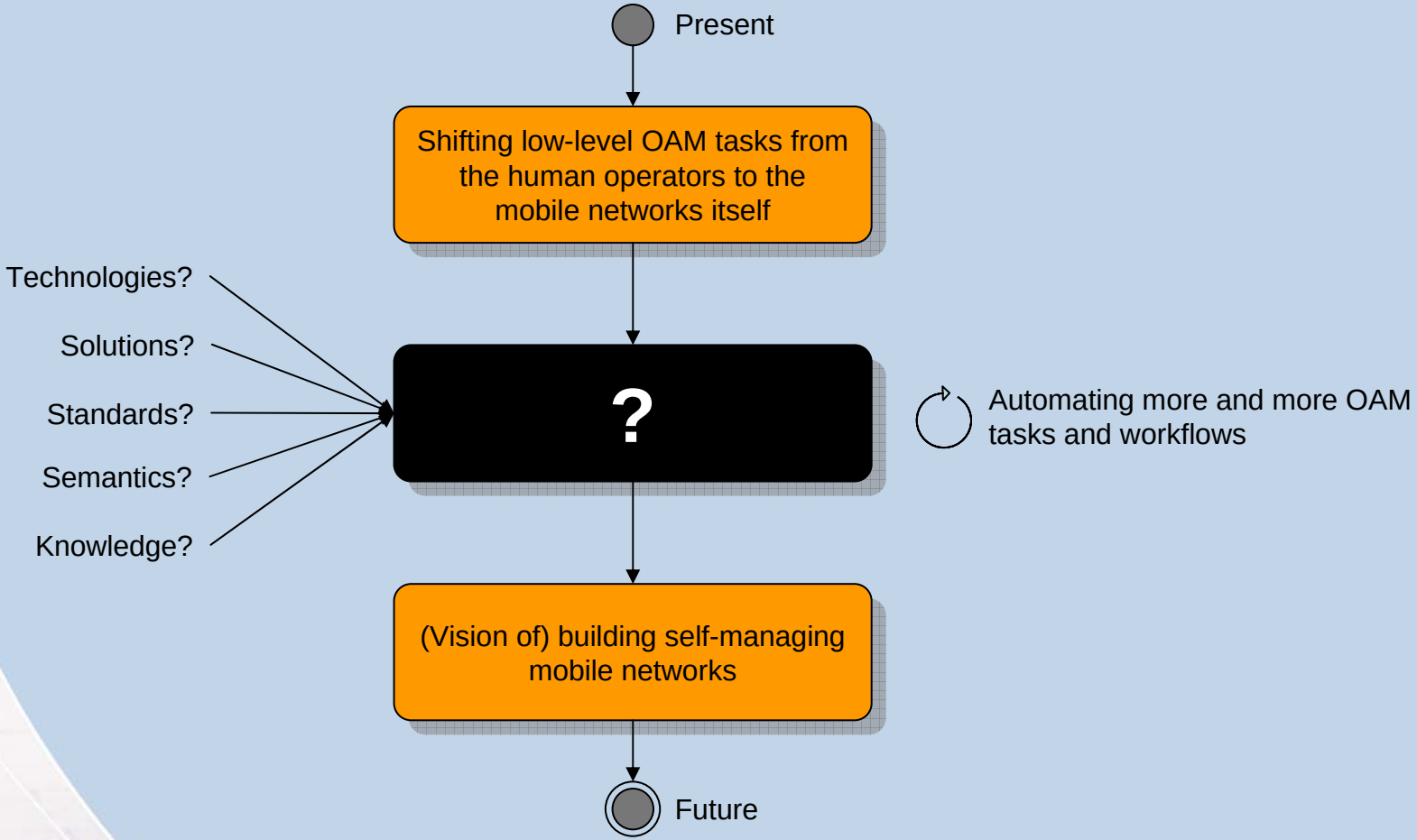
- Introduction and Motivation
- Human challenges for management automation
- Management Automation Framework
- Conclusions

Introduction and Motivation

- Characteristics of future mobile networks
  - Distributed and decentralized network architectures
  - Large numbers of specialized network elements (NEs)
  - High diversity due to heterogeneous NEs
  - More frequent (re)-configurations of NEs
- Resulting challenges for MNOs
  - Requires specialized, real-time management solutions
  - Requires faster processing of more management data and tasks
  - Need for operational expenditures (OPEX) reduction
- Common course of action
  - Management automation

Introduction and Motivation

- Abstract management automation process model



Introduction and Motivation

- Proposed Management Automation Framework (MAF) …
  - is intended
    - to enable the classification of any management automation technology, solution, or standard, proposed to converge to the vision of self-managing mobile networks
    - to identify the contribution of a management automation technology or solution to this vision
  - helps
    - to detect a strategic way for coping with the human challenges constraining the operational integration of possibly new management automation technologies and solutions

Human challenges for management automation

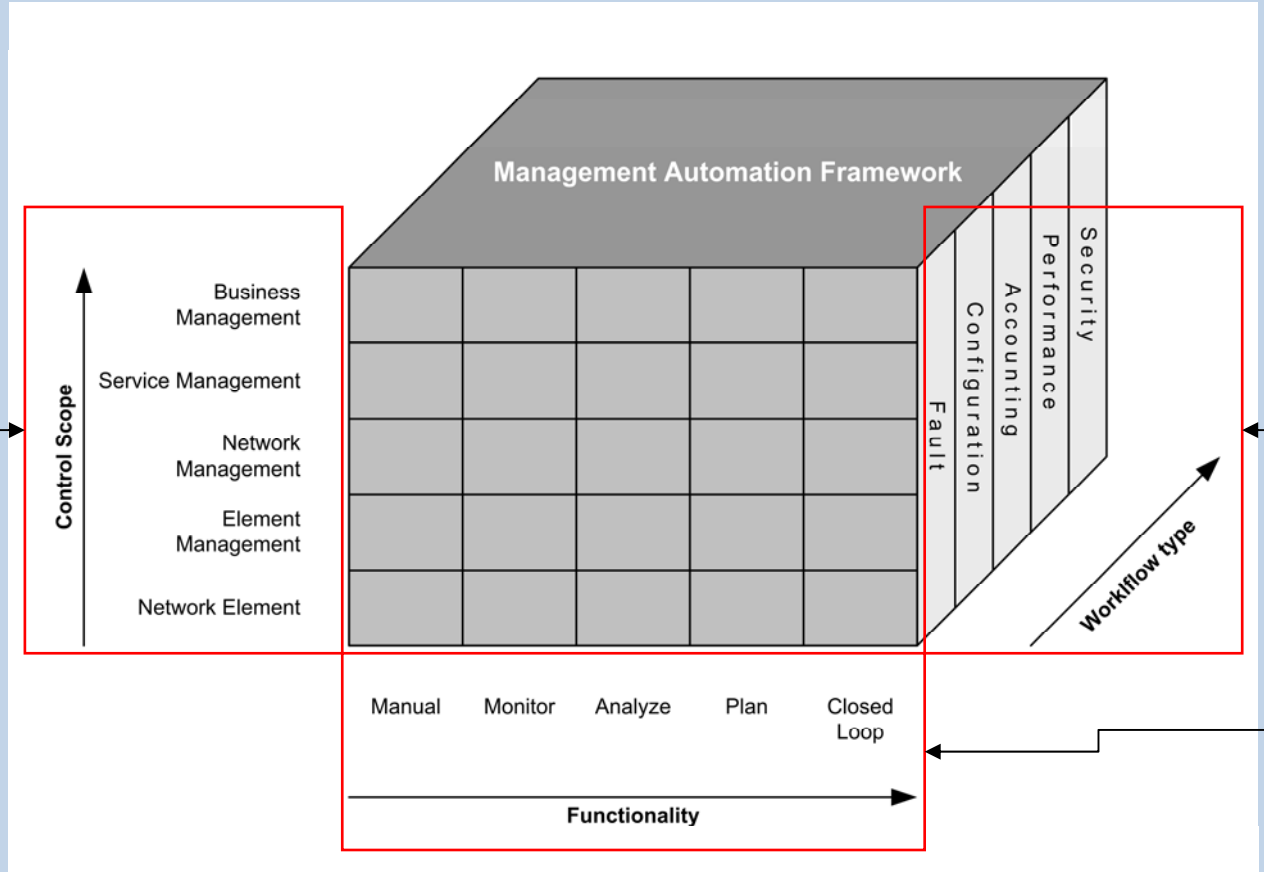
- Knowledge acquisition
  - Ways have to be found to acquire and capture OAM knowledge held by human operators instead of starting from scratch again
- Operator acceptance
  - Management automation is commonly considered as job killers rather than job shifters
- Ensuring of operator control
  - Human operators must have confidence in a self-managing network and have to be kept informed about the autonomous decisions
- Liability
  - Certain guarantees on the behavior of an autonomous system have to be delivered by hardware and software vendors

Management Automation Framework

- Framework is built up on two well accepted models of participating areas
  - Telecommunications area
    - Telecommunications Management Network (TMN) model
  - Information technology area
    - Autonomic Computing adoption model (ACAM)
      - Originally provides a methodology for IT-businesses to calibrate the degree of autonomic capability that their current infrastructure has
      - Helps to develop action plans to increase the autonomic potential of these infrastructures

Management Automation Framework

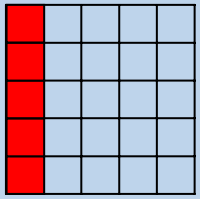
- Three-dimensional cube



Management Automation Framework

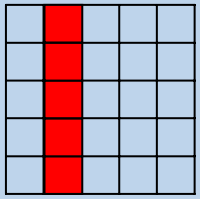
- Workflow type dimension
  - See TMN …
- Control scope dimension
  - See TMN …

Management Automation Framework



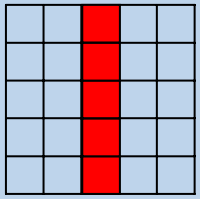
- Functionality dimension
  - *Manual level (Basic level)* characteristics
    - All parameters of every control scope layer changed and adjusted manually
    - Every management process and task initiated and executed by operators
    - Management automation may only take place by proprietary scripts selected by operators as the case arises
    - Network for itself has no intelligence at all
    - Evokes highest OPEX

Management Automation Framework



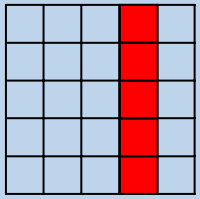
- Functionality dimension
  - *Monitor level (Managed level)*
    - Management technologies can be used to collect detailed data from the network
    - Reduces the time it takes human operators to collect, aggregate, and link information from one or multiple NEs or to recognize symptoms
    - Reduces OPEX as the network increases and becomes more complex

Management Automation Framework



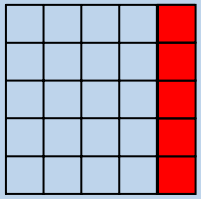
- Functionality dimension
  - *Analyze level (Predictive level)*
    - Further management technologies are introduced to provide correlation among the monitored data of several NEs
    - Management functions begin to preprocess data, correlate symptoms, and recognize patterns itself
    - Planning and execution of necessary actions remain in the hand of operators
    - OPEX reduction is achieved mainly by a useful data reduction

Management Automation Framework



- Functionality dimension
  - *Plan level (Adaptive level)*
    - Management functions predict the optimal configuration and offer advice about what course of action the operator should take
    - Decision of what action will be taken in reality remains to the operators
    - OPEX are reduced by the time it takes the operators to plan appropriate configurations and actions

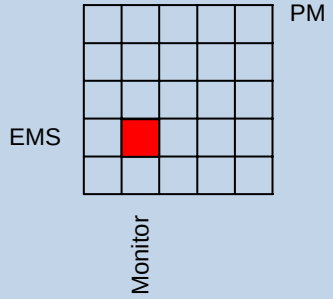
Management Automation Framework



- Functionality dimension
  - *Closed loop level (Autonomic level)*
    - Network and its elements can automatically take actions based on
      - the available information
      - the knowledge about what is happening in the environment
    - Policies and objectives govern network OAM
    - Operators interact with autonomic technology tools to monitor the processes, alter the objectives, or both
    - Yields the highest OPEX reduction as it reduces the time and effort spent by human operators for OAM at most

MAF - Semantics

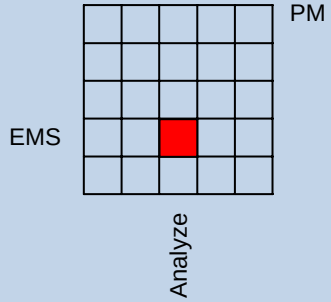
- Management automation solution “A”
  - Primarily intended for “traffic balancing” on a single NE
  - Supports/enables automatic monitoring of traffic data
- Classification of “A”
  - Workflow type: PM area
  - Control scope: EMS layer
  - Functionality: Monitor level / Managed level



MAF - Semantics

- Management automation solution “B”
  - Primarily intended for “traffic balancing” on a single NE
  - Already uses key performance indicators (KPIs) on the NEs and sends an alarm if the traffic on a NE exceeds a certain threshold

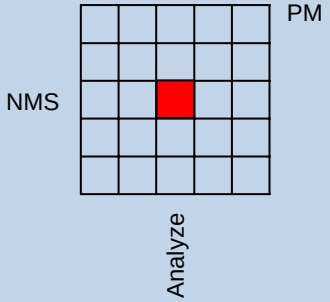
- Classification of “B”
  - Workflow type: PM area
  - Control scope: EMS layer
  - Functionality: Analyze level / Predictive level



MAF - Semantics

- Management automation solution “C”
  - Applies solution “B” to a group of NEs within a subnetwork
  - No further functionality improvement

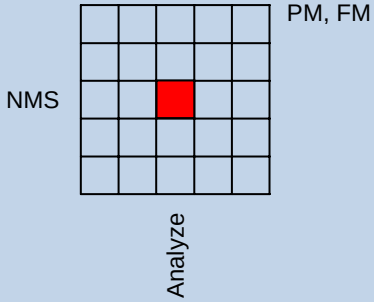
- Classification of “C”
  - Workflow type: PM area
  - Control scope: NMS layer
  - Functionality: Analyze level / Predictive level



MAF - Semantics

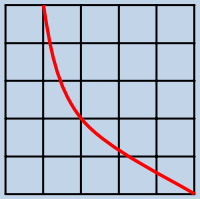
- Management automation solution “D”
  - Uses the solution “C” also for traffic backhauling on a group of NEs
  - No further functionality improvement

- Classification of “D”
  - Workflow type: PM, FM area
  - Control scope: NMS layer
  - Functionality: Analyze level / Predictive level



Conclusions

- The MAF enables the classification of any management automation technology or solution
  - Identifies the contribution of such an approach to the vision of self-managing mobile networks
  - Estimation of current management automation state



Workflow type priority: CM > PM > FM > SM

- The MAF enables the guidance of human operators to the vision of self-managing mobile networks
  - Tackles the human challenges for management automation

Conclusions

- Strategic way of integrating new management automation technologies and solutions
  - Important to integrate new solutions only stepwise
  - Every step should demonstrate the value added of a new solution
  - As soon as operators become more comfortable with them, the solutions can progress to the next level
  - Finally the solutions will converge to the “closed loop” level
- By the classification of a management automation solution it can be determined, if this or the prior classification level is already reached by previous integrated solutions
  - If not, it might be too early for the operational integration of a new management automation solution

The end

- Thank you for your attention!