Extending Intelligent Network Management Beyond Software and Logical Boundaries

Introducing Advanced AI, Exploiting Multiple Agents

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Why boundaries must be crossed?

- **Management** operations are limited by the ability of administrators, management solutions, and other objects to implement **coordinated actions**:
  - Administrators are **not** omni-*... they are not gods.
  - Supporting management solutions are **confined** to a particular domain:
    - They cannot control all aspects of the system they manage.
  - Actions have <u>disparate natures</u>: Virtual, logical, and physical.

- Even **autonomic network devices** must be somehow physically managed, which requires the ability of some physical actuator, **human** or **robot**:
  - They provide the **"hands"** of the <u>management plane</u> of the network.

- All **objects** are **intelligent** to some extent:
  - Resolving management problems can be done in a distributed way as every object concentrates on its part of the problem.

What are the requirements?

- **Standardized protocols** are essential for objects to **interact freely**:
  - Objects from different vendors must be able to interoperate.
  - Richer outcomes can be expected from the resulting bigger opportunities to cooperate.

- **Homogeneous interfaces** (ontologies and semantics) will facilitate object **integration**:
  - Using adapters weakens the distributed system and reduces its performance.

Insight...

- The implementation of distributed intelligence, **reasoning**, and <u>unfamiliar problem resolution</u> enhances the network:
  - Empowering the DIKW pyramid:
    - data => information => knowledge => wisdom
  - Step out of the <u>single point of failure</u> of centralized management.

- <u>**Network optimization**</u> becomes a **cooperative** task:
  - All objects, being physical, virtual, or even human <u>cooperate</u> to evolve the network towards its objective.
  - Analysis and recognition of traffic patterns is enhanced by the distributed intelligence.

- The ability of **evolution** is increased:
  - More objects but less complexity.

- **Self-healing** can become a widespread reality...

Thanks for Your Attention

Questions?

– EOF –