



## Autonomic Communication Forum

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## ***Self-optimizing Protocol Stack for AutoComm***

The Forum for a new  
Communication Paradigm



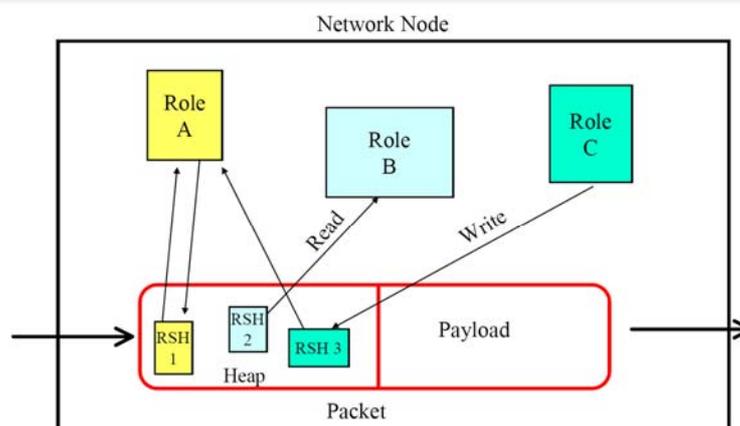
### Motivation

Autonomic Communication Forum

- ▶ The crisis of Internet management
- ▶ Better support for middle-box communications
- ▶ Compromise for layering violations
- ▶ Optimal performance of the Mobile Internet
- ▶ New needs in self-organizing networks

- ▶ Related work
- ▶ Defining self-optimizing AC stack
- ▶ The proposal
- ▶ Conclusions and future directions

## Related Work: Protocol Heap &amp; RBA



- ▶ **Pros:** functional modulization, flexibility, extensibility, in-band signaling, auditability/security, portability, re-modulization, etc.
- ▶ **Cons:** compatibility, efficiency of processing, possible increased complexity and confusion.

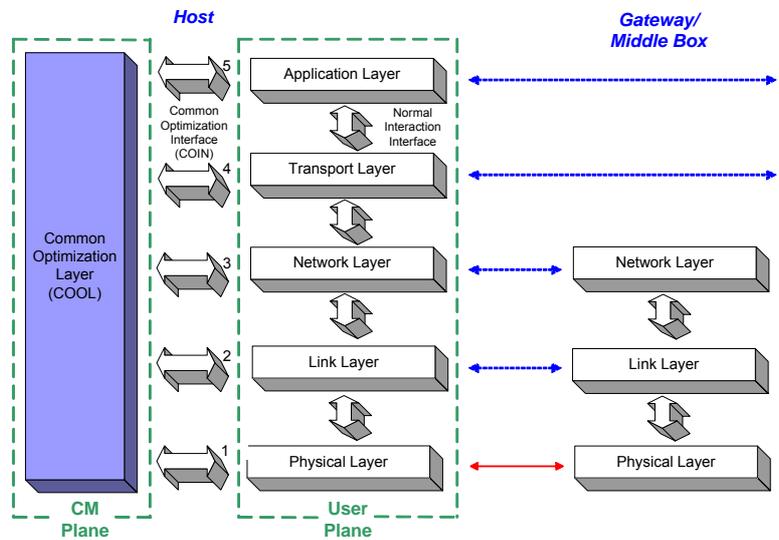
- ▶ Direct inter-layer interactions and shortcuts
- ▶ Can create loops: → hazard to system stability
- ▶ Loosely-controlled interactions → “Spaghetti Code”
- ▶ Non-systematic approach
- ▶ Break layering: hard to design protocols in isolation
- ▶ Stifle further innovation and proliferation

- ▶ Protocol stack promotes self-management
- ▶ For efficiency, resilience, immunity and evolvability in complex communication infrastructure
- ▶ Policy-based management for network autonomy
- ▶ Proactive monitoring and control

# Performance-oriented Reference Model (POEM)

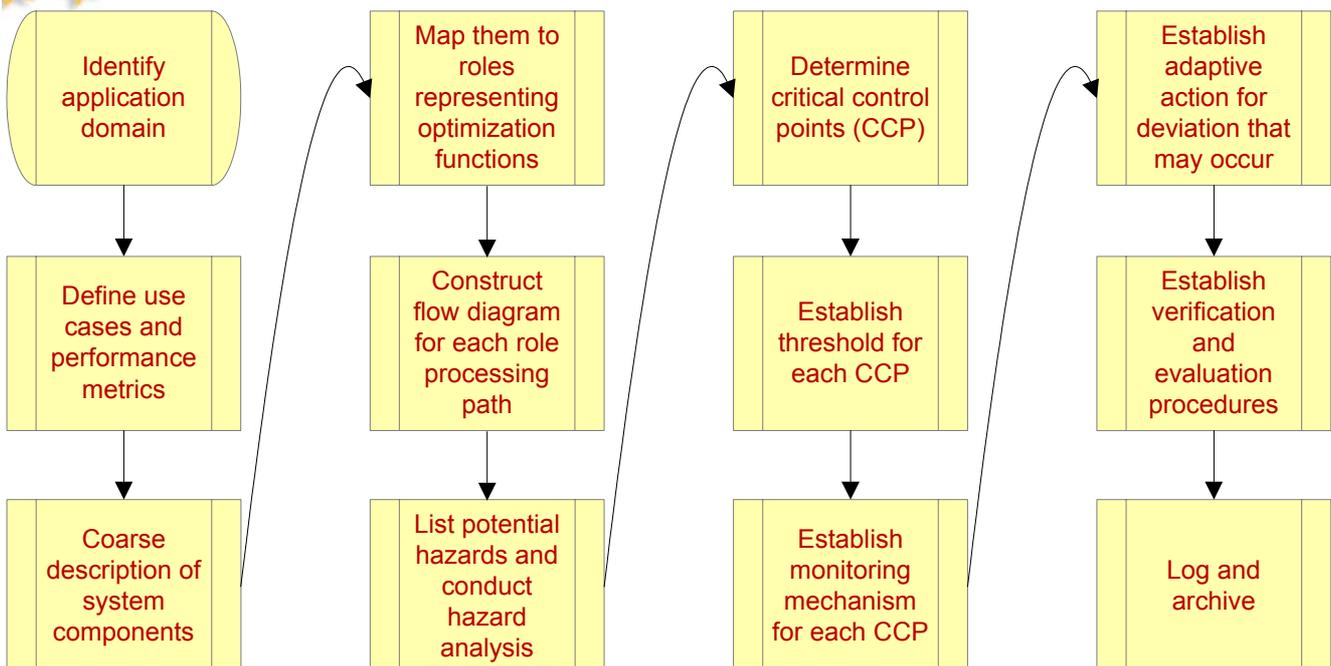
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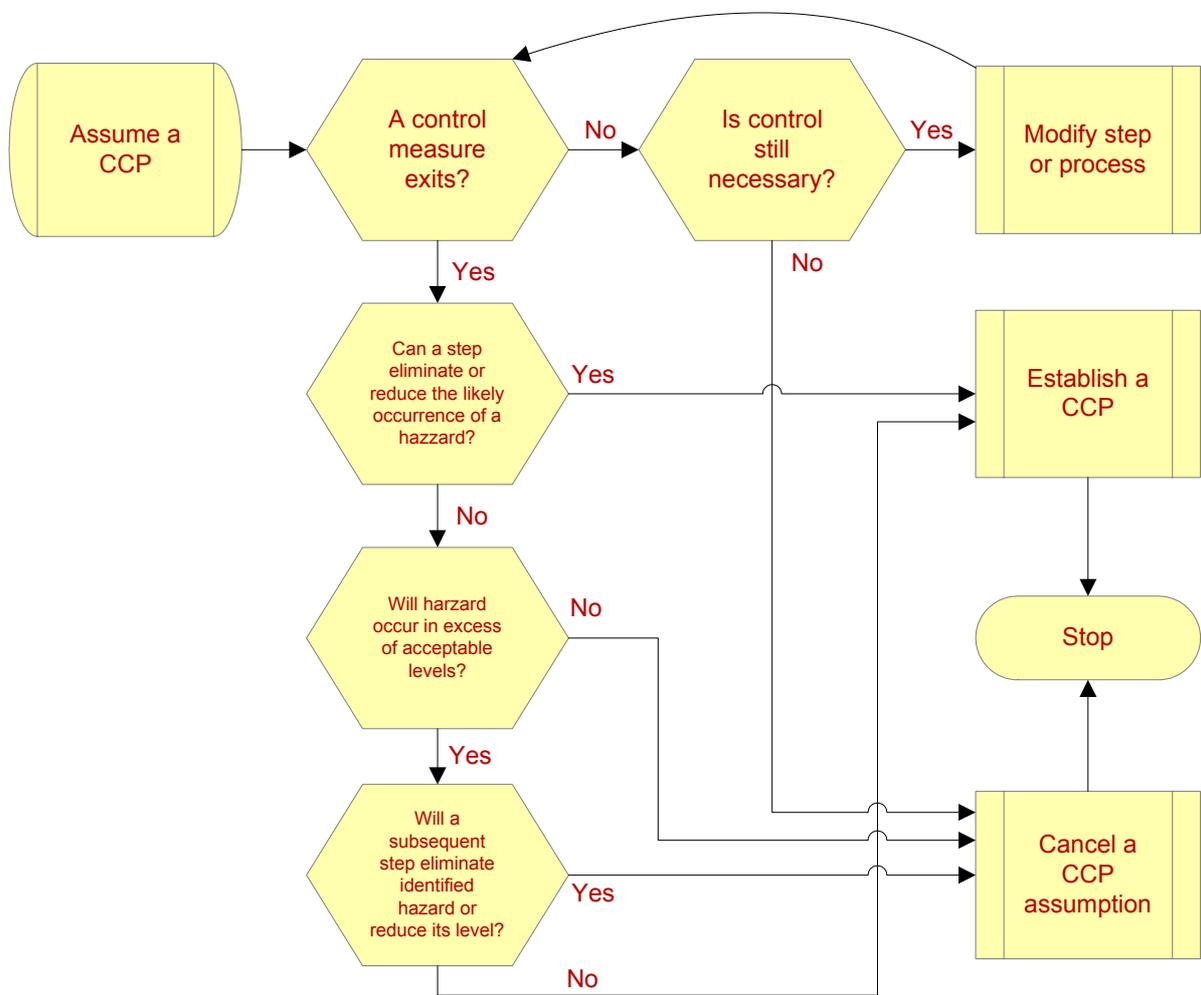
- ▶ Two conceptual planes: user plane + CM plane.
- ▶ Logical Common Optimization Layer (COOL).
- ▶ Offers Self-optimization Service (SOS).
- ▶ Implemented by Common Optimization Protocol (COP) via the Common Optimization Interface (COIN).
- ▶ Main concerns: easy to implement, upgrade, enhanced interaction efficiency, better utilization of resources, improved QoS.



# Autonomic Control

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## The Next Steps

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- ▶ Dynamic composition and decomposition of the CF.
- ▶ Processing regulation: authorization and scheduling
- ▶ Context awareness: directed diffusion, ACQUIRE, reinforced querying algorithm, non-linear optimization methods...
- ▶ Proactive control: adaptive control theory, natural principles etc.