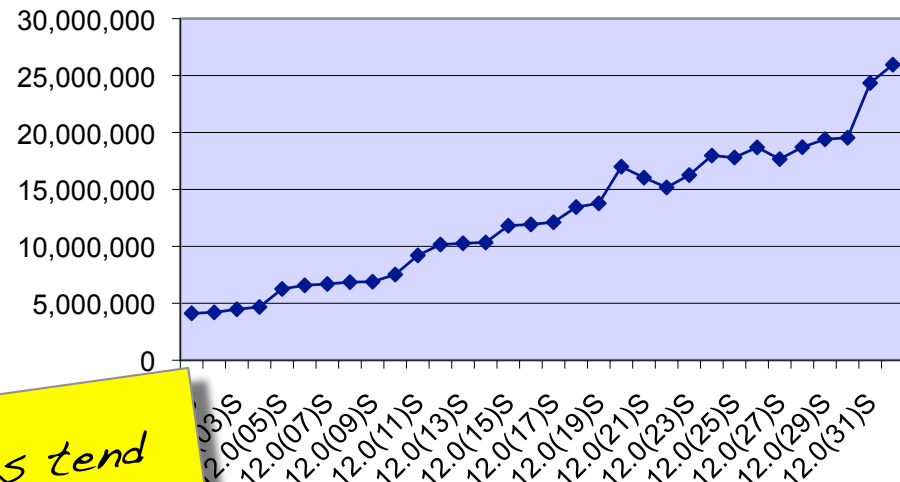
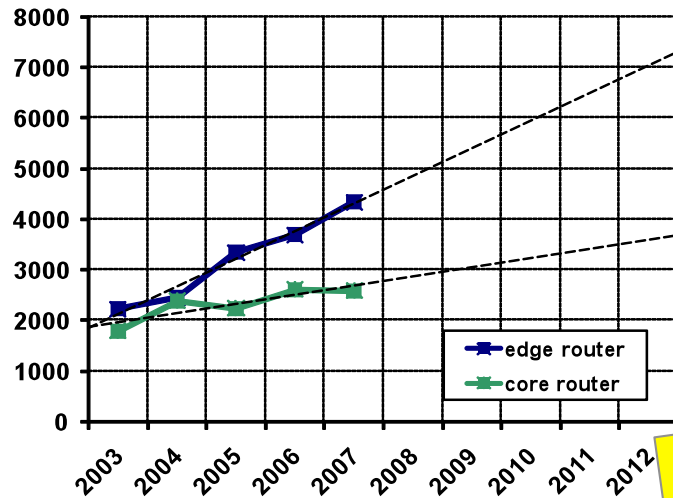


Classifying Network Complexity

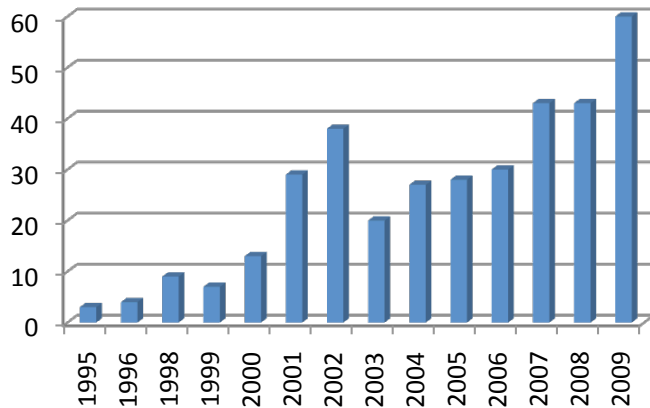
Michael H. Behringer
Cisco Systems

ACM ReArch'09 Workshop, 1 Dec 2009, Rome

Intuitively, Network Complexity is Increasing ...

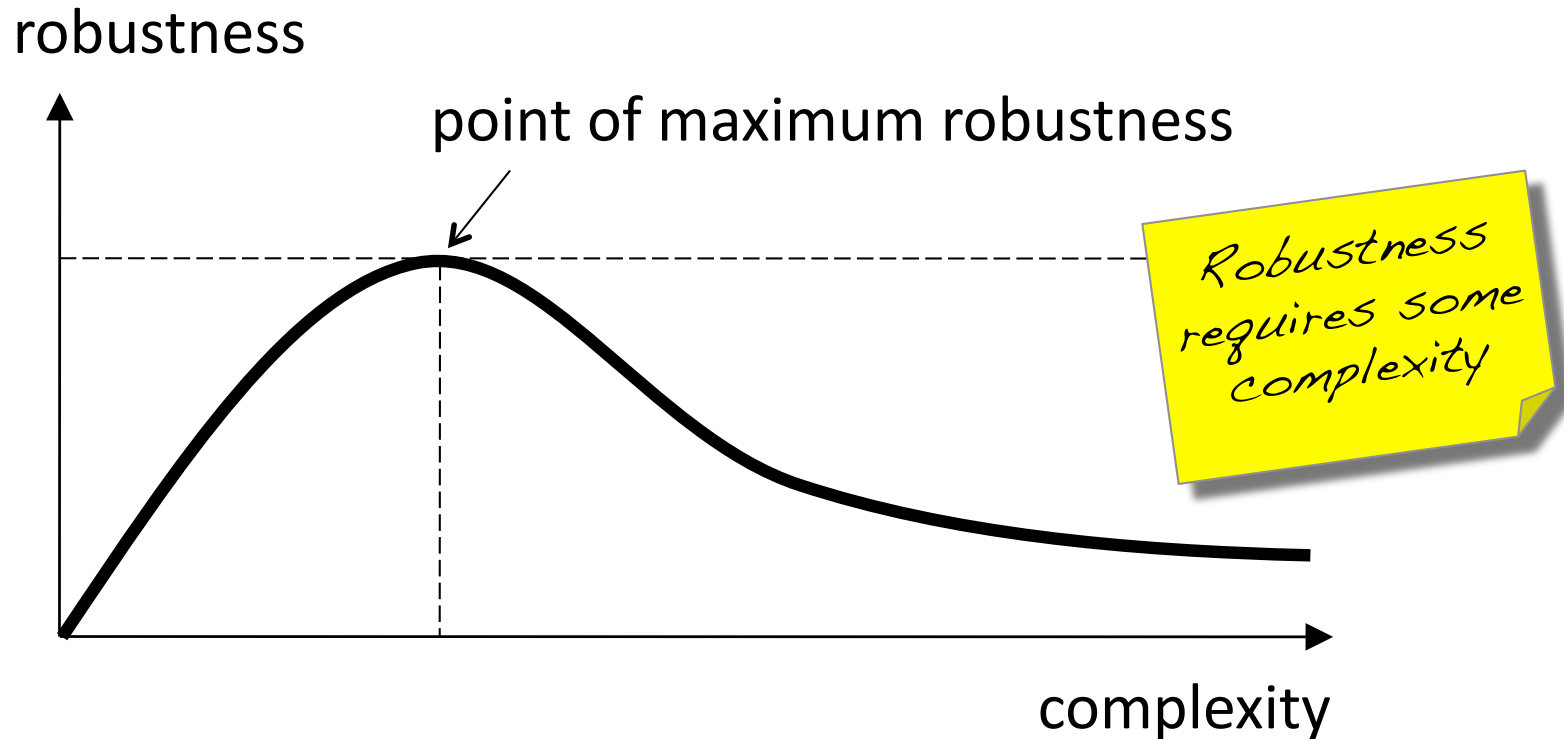


Things tend to grow



... but, what is “Network Complexity”?

You Need Complexity (at least some)



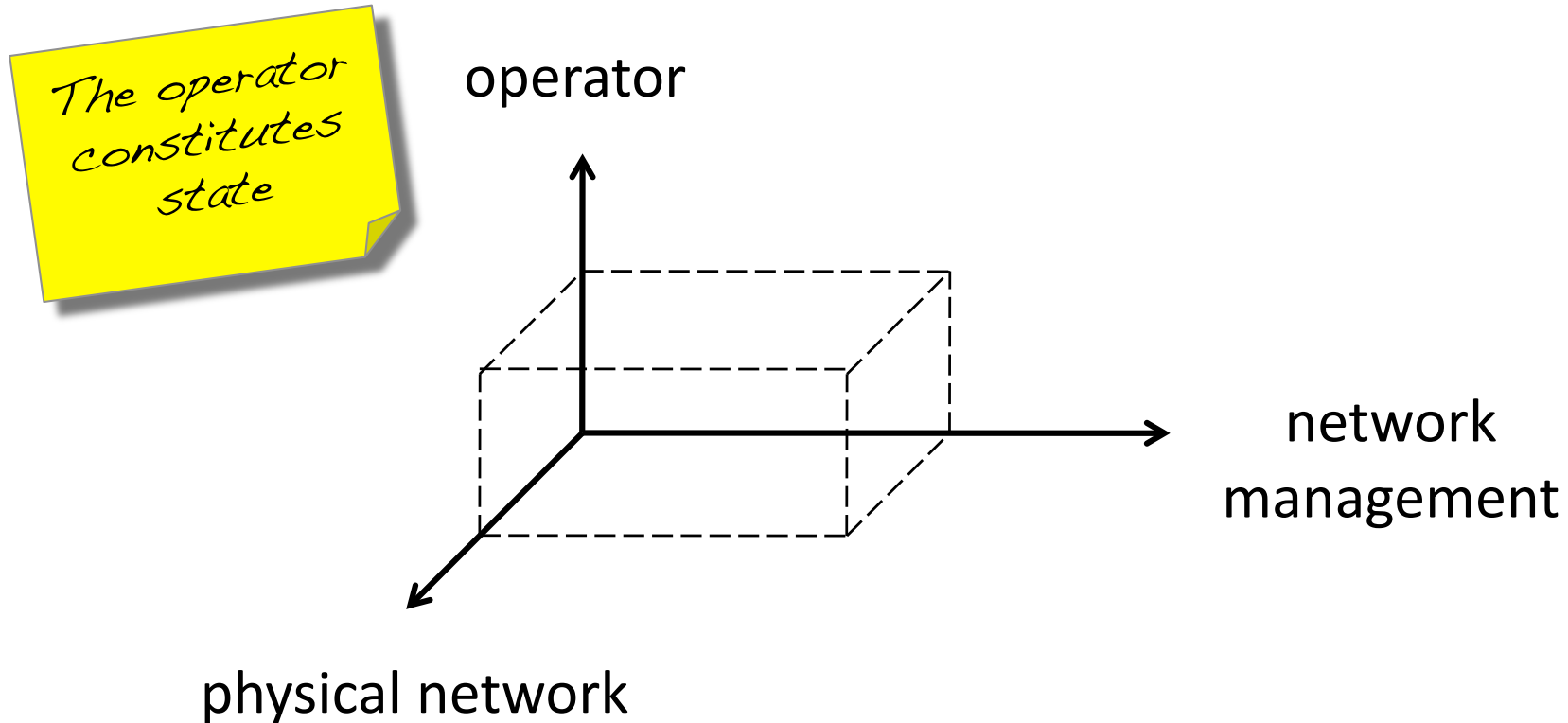
Dealing with Complexity

- Divide and conquer
 - Layering, object oriented approaches,
- Shifting complexity
 - E.g., away from the human
- Meta languages
 - CIM, NetConf
- Structural approaches
 - Reduce dependencies by design

*"classes"
matter, not
instantiations*

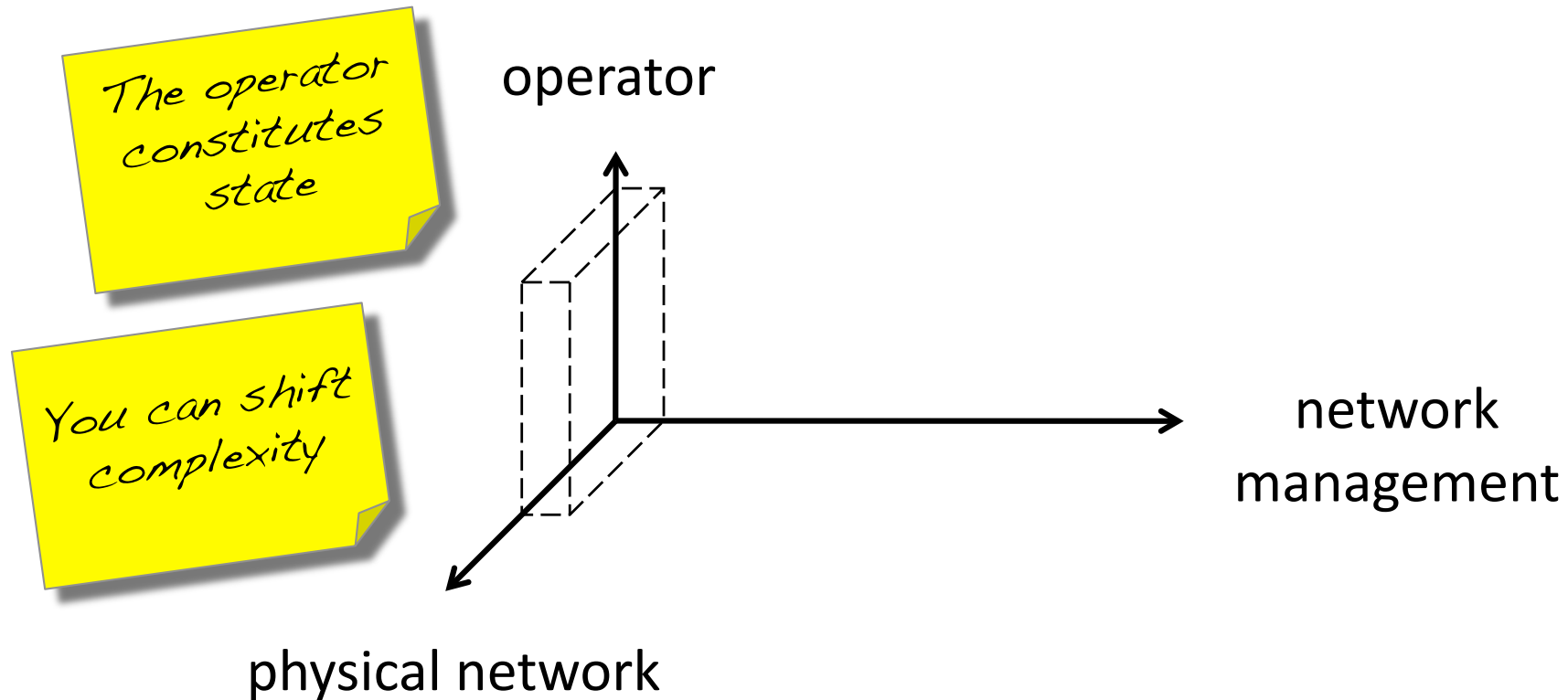
*Less human
intervention:
generally less
complexity*

Elements To Consider: “State”



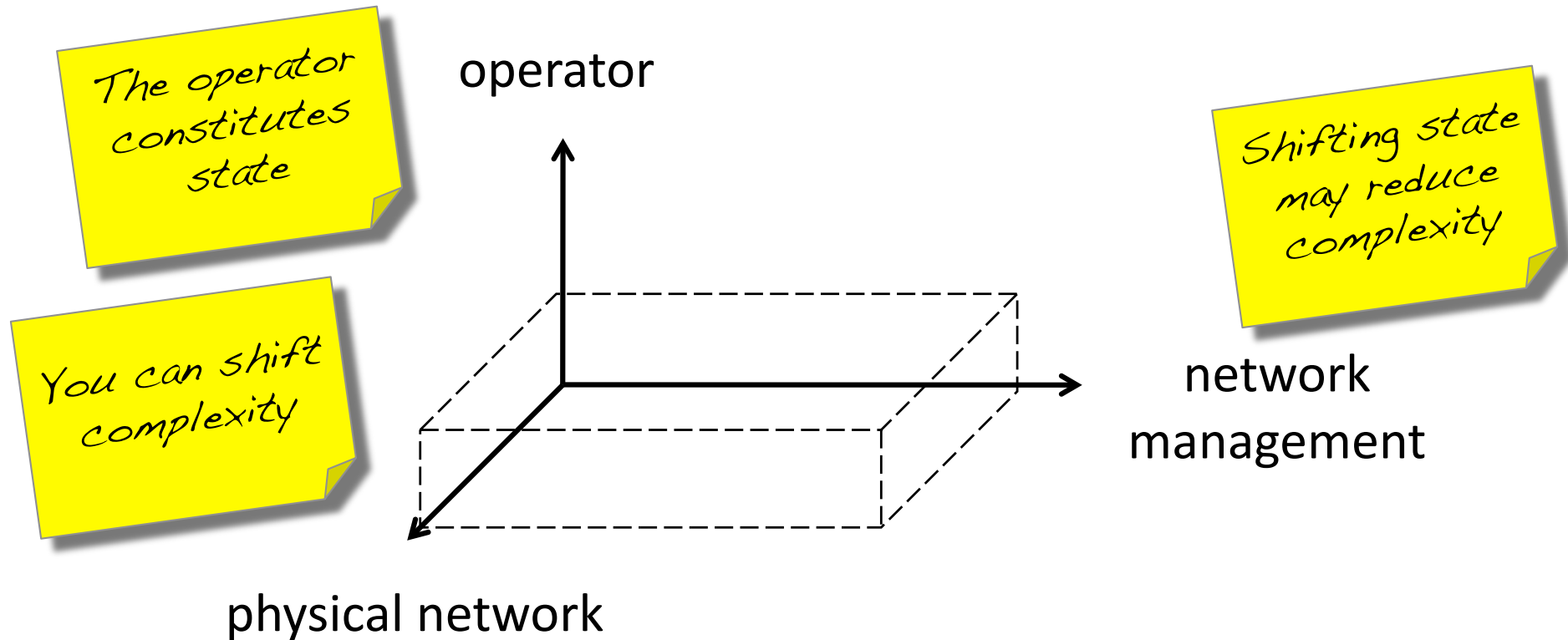
The “Complexity Cube”

Elements To Consider: “State”



The “Complexity Cube”

Elements To Consider: “State”



The “Complexity Cube”

Security and Complexity

- Complexity can impact predictability
- Security requires predictability



*More complex,
more likely to
have security
issues*

Summary

- Need to understand and control complexity
- Human factor = state = complexity
- Shifting complexity can reduce overall complexity

- Future work:
 - Quantitative metrics
 - Impact of the rate of change
 - Investigate human factors