



Challenges on the Road from Measurements to Monitoring

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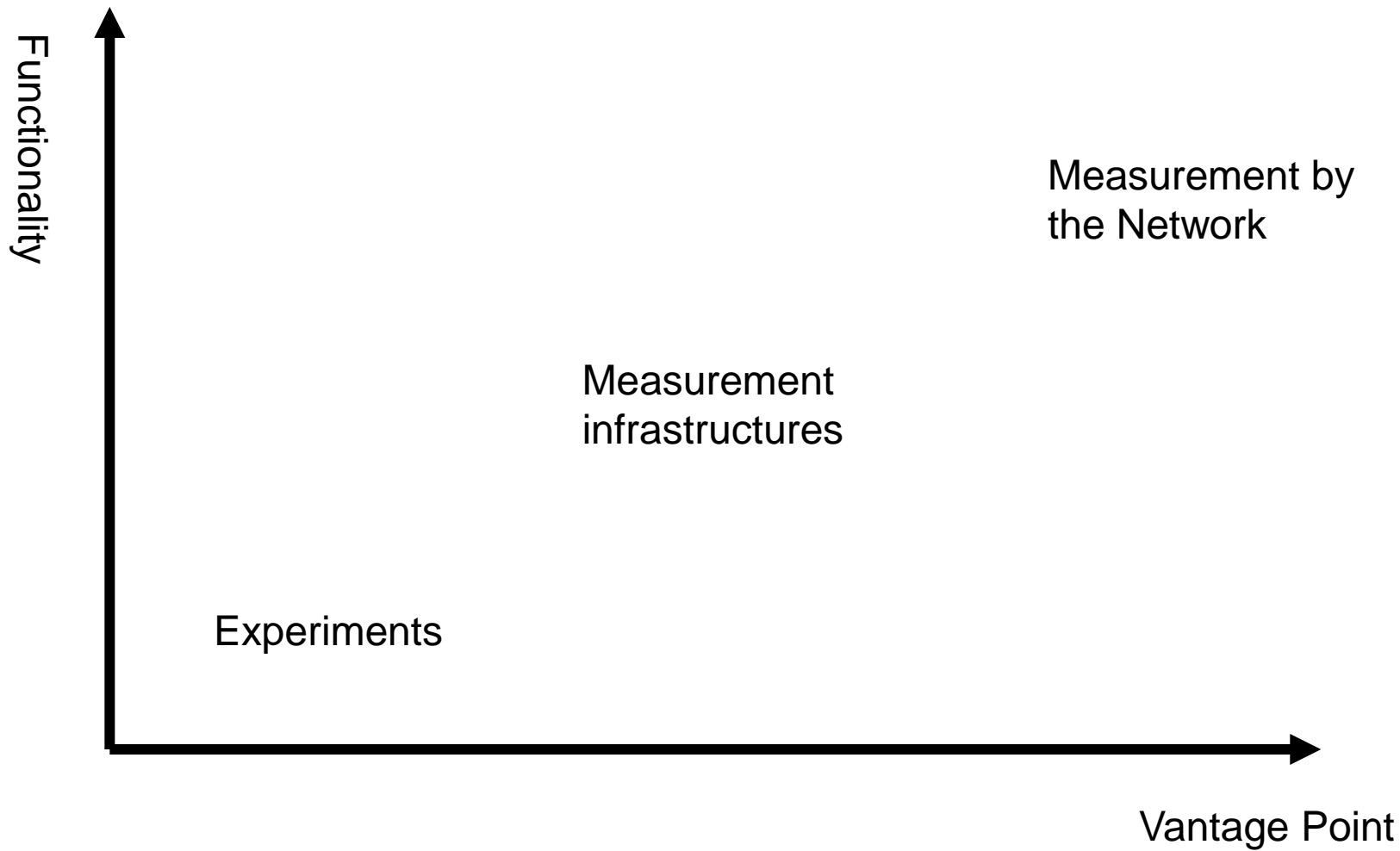
Measurement Role Evolution

- Early phase
 - sporadic (from one or a few locations)
 - Test some hypothesis, or collect some data
- Current phase
 - Measurements infrastructures
 - Large scale data collection (e.g., topologies) and experiments (PlaneLab)
- Future phase
 - Measurements everywhere
 - Monitoring, control

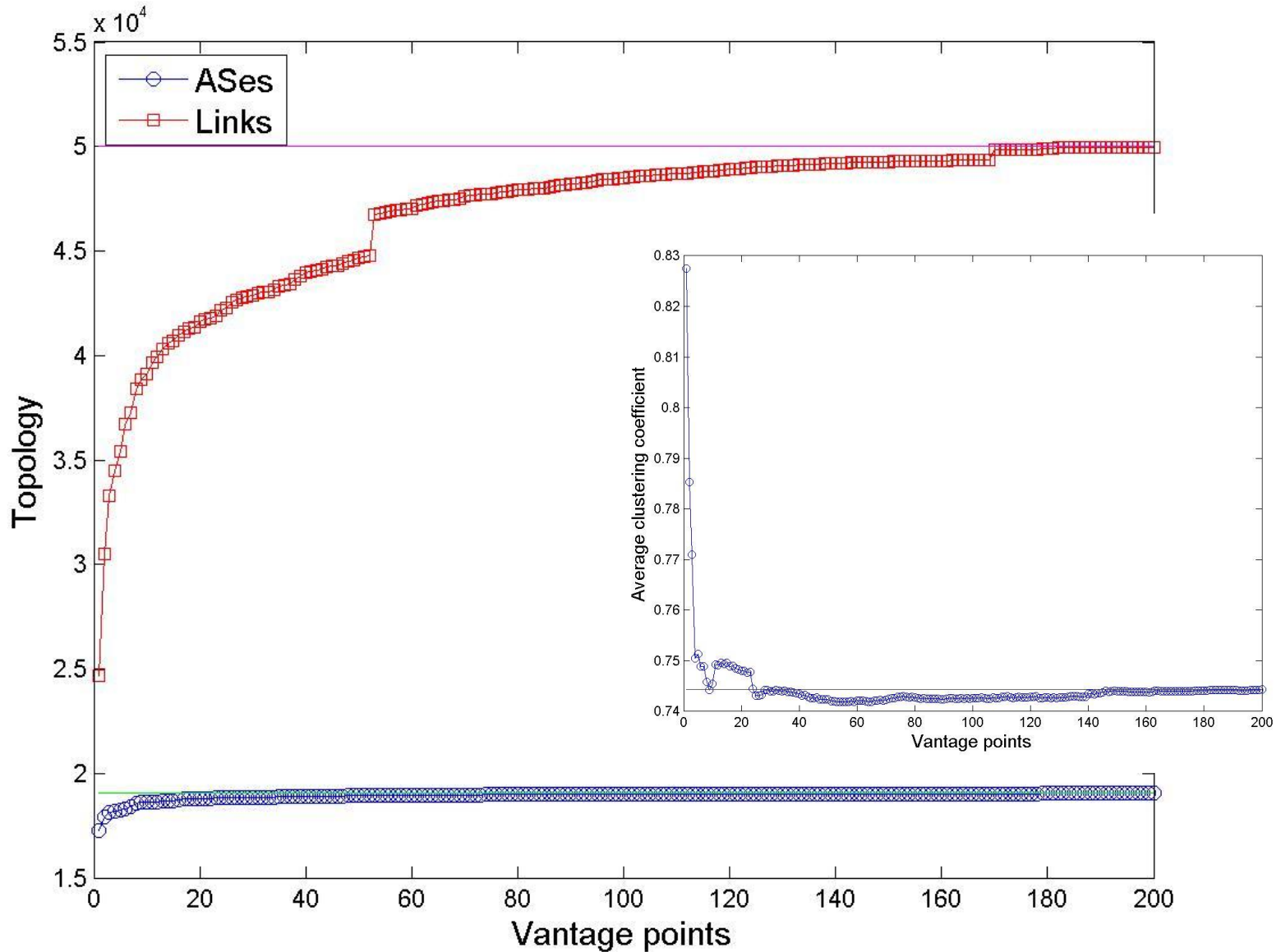
Example: Topologies

- Mid 90s:
 - RouteViews: collected BGP from **1** and later a few networks.
 - Skitter: perform traceroute from **~30** locations
- Mid 00s:
 - DIMES: perform traceroute from **100s** of locations using volunteer community.
 - iPlane: perform traceroute from **100s** of PlanetLab boxes
- Mid 10s:
 - Grow current measurement infrastructures AND
 - Make the FUTURE INTERNET measure itself





Why Distribution Matters?



The Future Network

- Measures itself
 - every device has a measurement module
- Processes the data
- Reacts to changes

A Network that optimizes itself

Challenges

- How to concert the measurements?
 - Fully distributed
 - hierarchically
- How to aggregate measurements?
 - Process and forward
- How to analyze them is a hierarchical fashion?
- How to react?
 - Remember the ping-pong effect..