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5G Service Automation

Access Network Department – Antwerp, Belgium

May 2019

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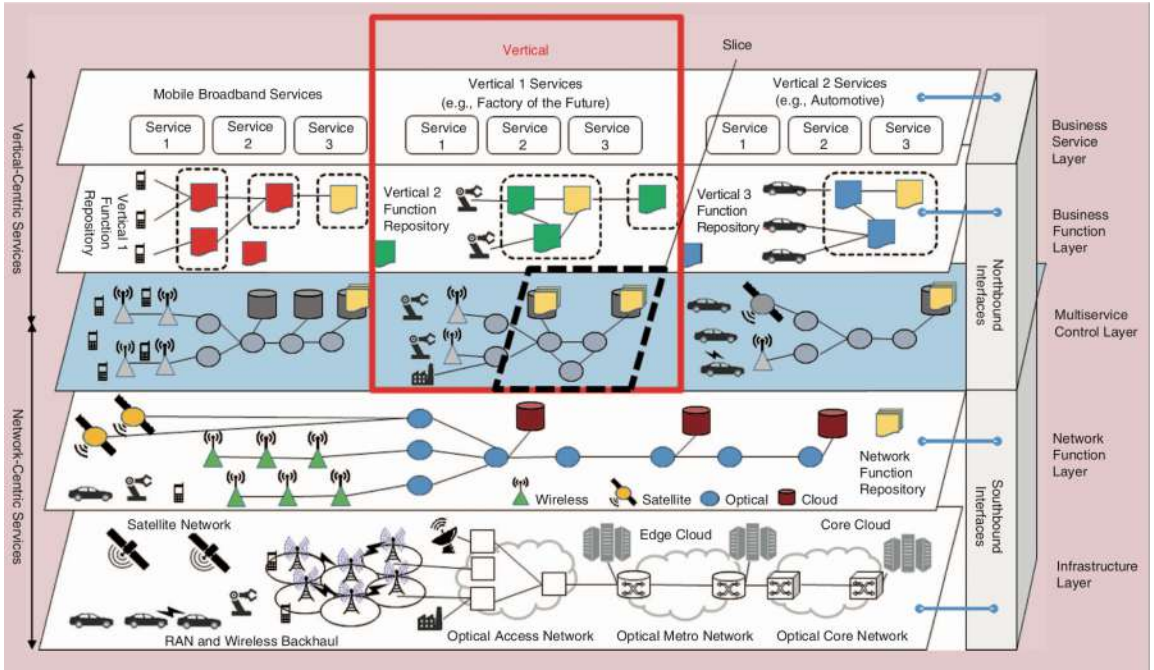
Network Slicing

Key ingredient in evolving networks

"5G slice is composed of a collection of 5G network functions and specific RAT settings that are combined together for the specific use case or business model"

Optimized service delivery for heterogenous use cases

Multiple independent instances on the same physical network



[Source: Wollschlaeger et al., 2017. The future of industrial communication: Automation networks in the era of the internet of things and industry 4.0. IEEE Industrial Electronics Magazine]

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Network Slicing for CPS

CPS Communication in 5G Cellular Network

Vertical Pilots (5Growth 5G-PPP ICT 19)

- **Industry 4.0**
  1. Connected Worker Remote Operation of Quality Equipment (eMBB / URLLC)
  2. Digital Twin Applications (eMBB / URLLC) …
- **Energy**
  3. Advanced critical signal and data exchange across wide smart metering and measurement infrastructures (mMTC / URLLC) …
- **Transportation**
  4. Non-Safety Critical Communications (eMBB / URLLC) …

[Source: https://www.i-scoop.eu/manufacturing-industry/]

Network Slicing
Requirements and Features

Support for diverse business models
Per slice customizability and optimization
Isolation / Multi-tenancy

Reduce service creation and activation times
Network agility
Full programmability

Dynamic (re)configuration
Massive elasticity
Real time adaptability

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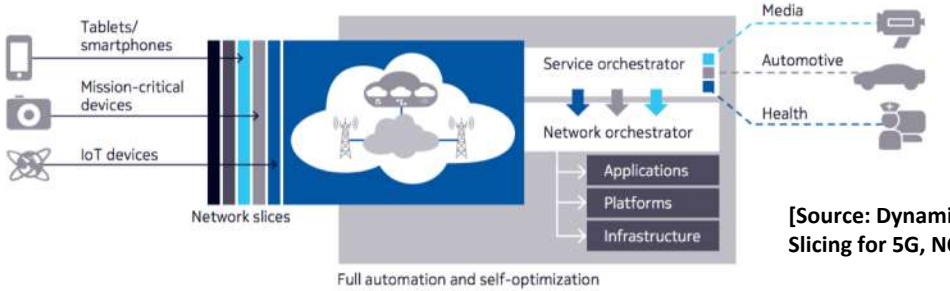
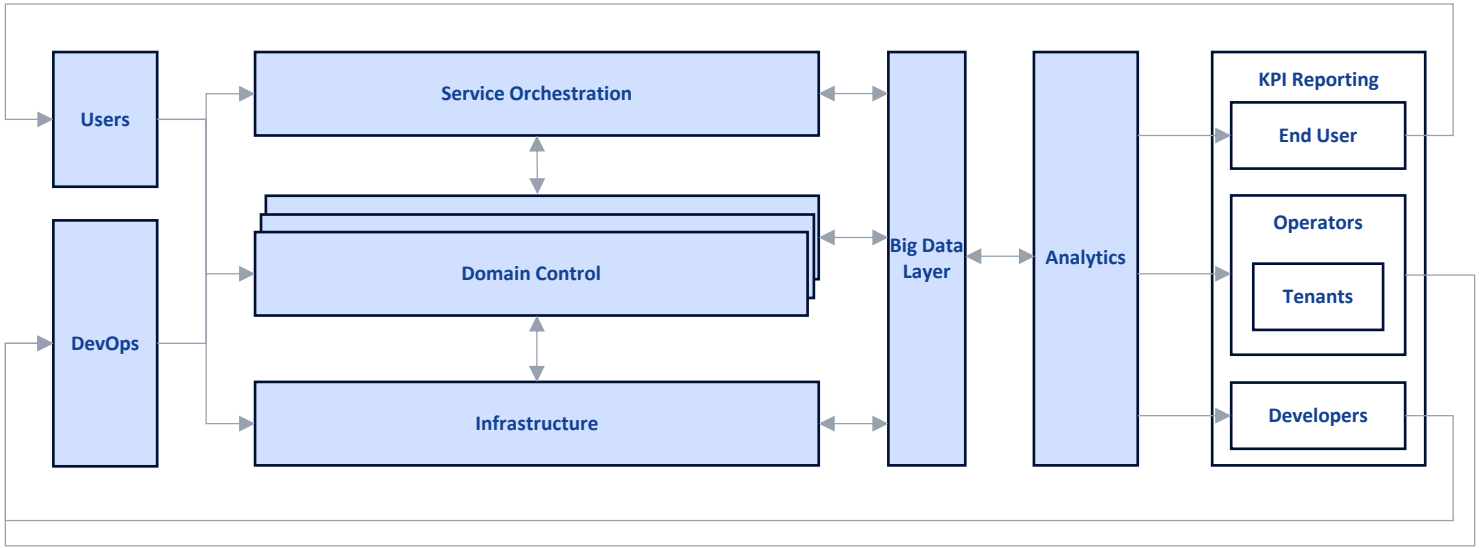


[Source: Dynamic Network Slicing for 5G, NOKIA 2016]

Service Automation Architecture

Fast On-Demand E2E Provisioning



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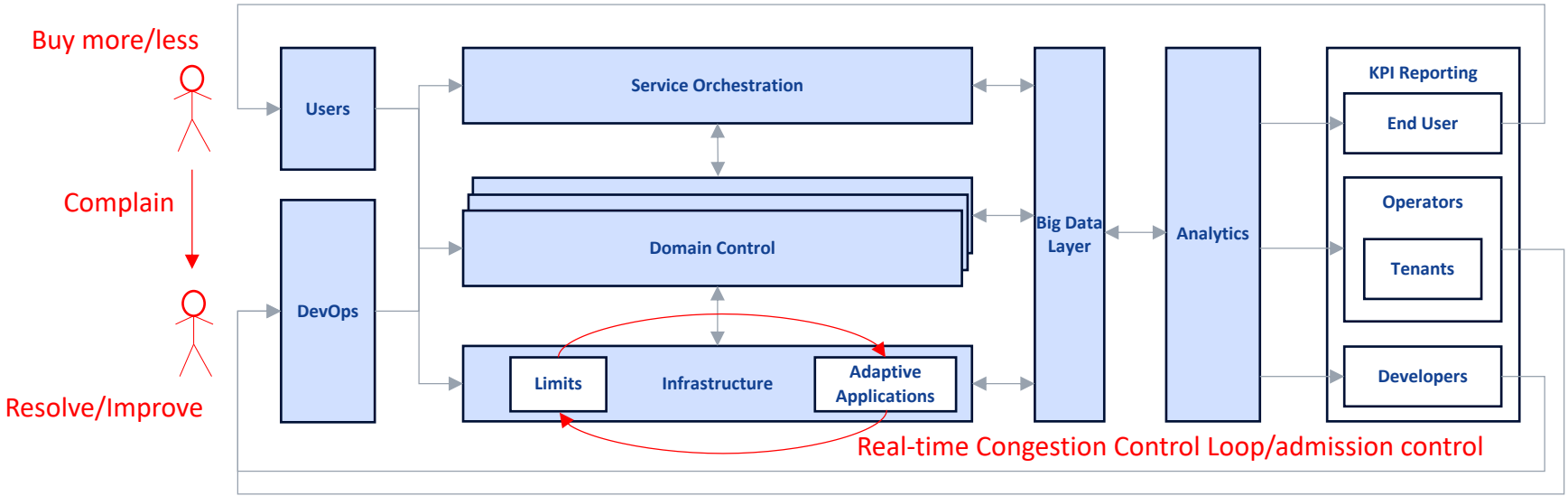
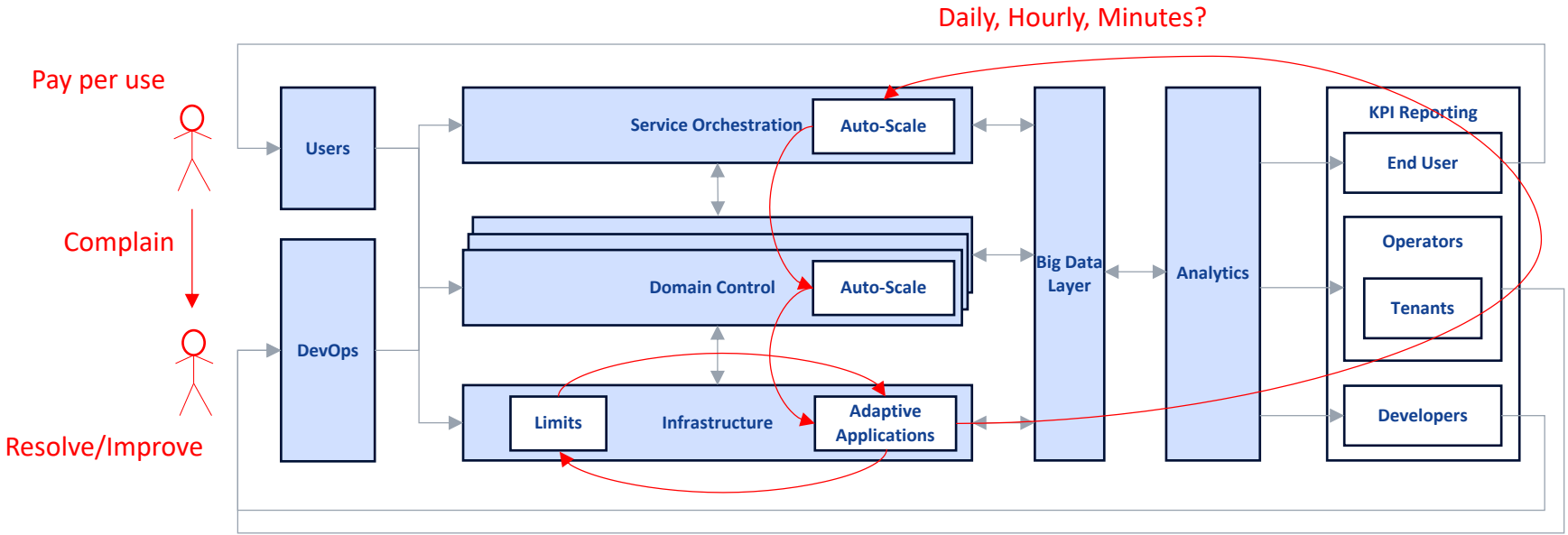
Hard Isolation Service Automation

Open Control Loop



Hard Isolation Service Automation

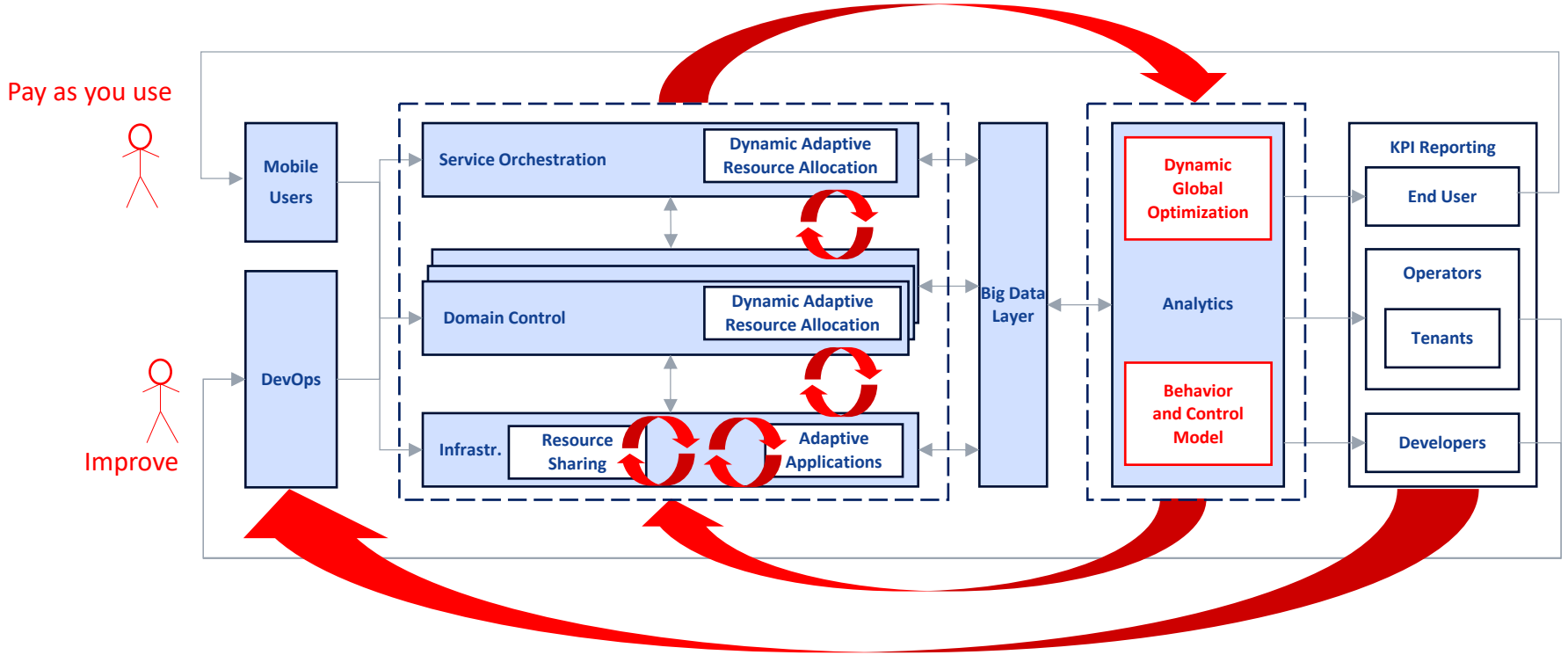
Auto-Scale Control Loop



Service Automation
Multiple Closed Control Loops

Intelligent Service Orchestration

Real Time Control



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Multi-Level Control Loops

Stability?

Will the Hyper Flexible NW become a Bumpy Application Ride?