

IEEE Conference on Network Softwarization, 24-28 June 2019 // Paris, France

Distinguished Expert Panel

Theme : **Barriers and Frontiers of Softwarization for the Network of 2030**



# *Towards Deep Programmable Slicing*

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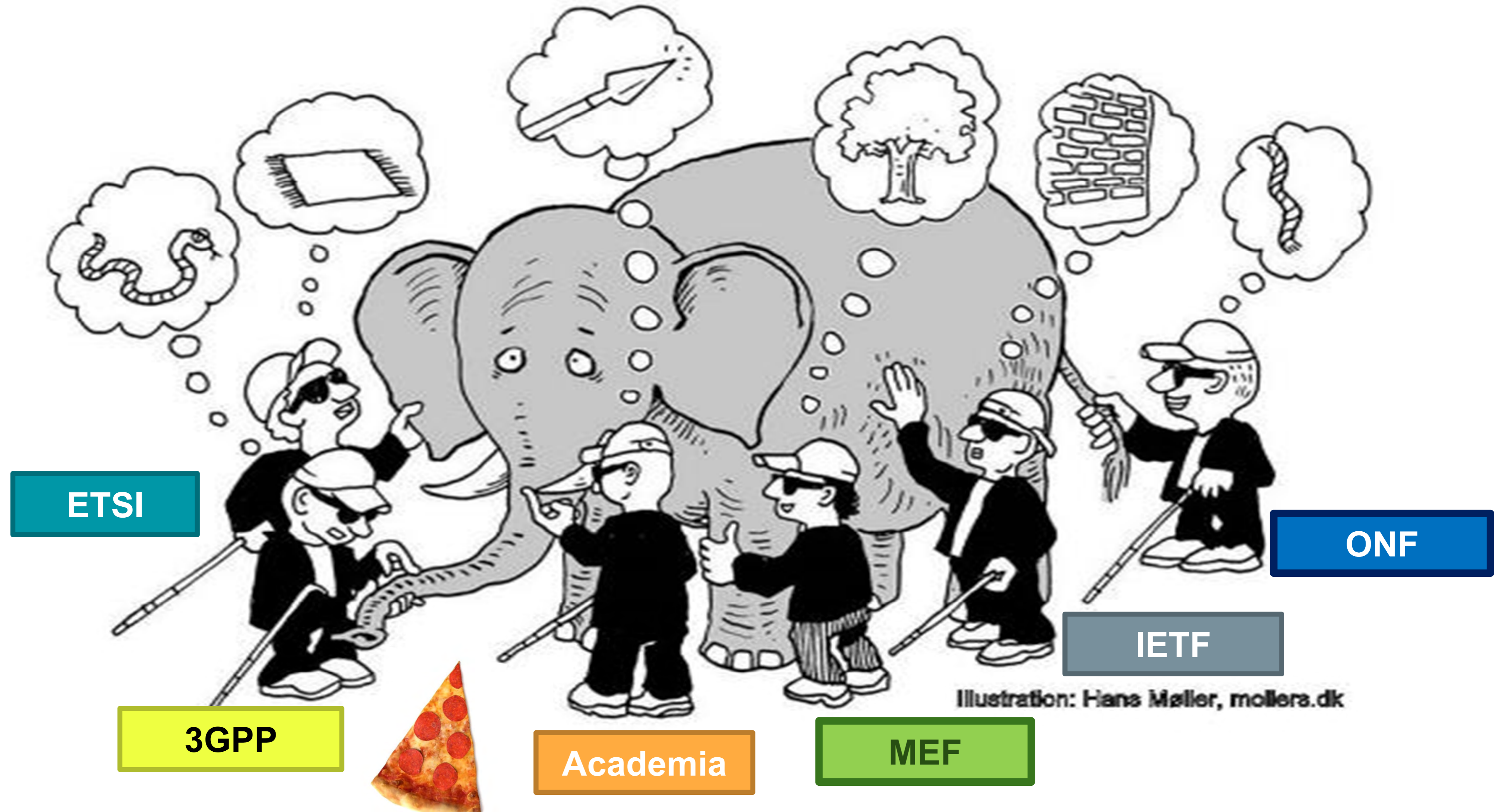
[chesteve@dca.fee.unicamp.br](mailto:chesteve@dca.fee.unicamp.br)

<https://intrig.dca.fee.unicamp.br/christian>



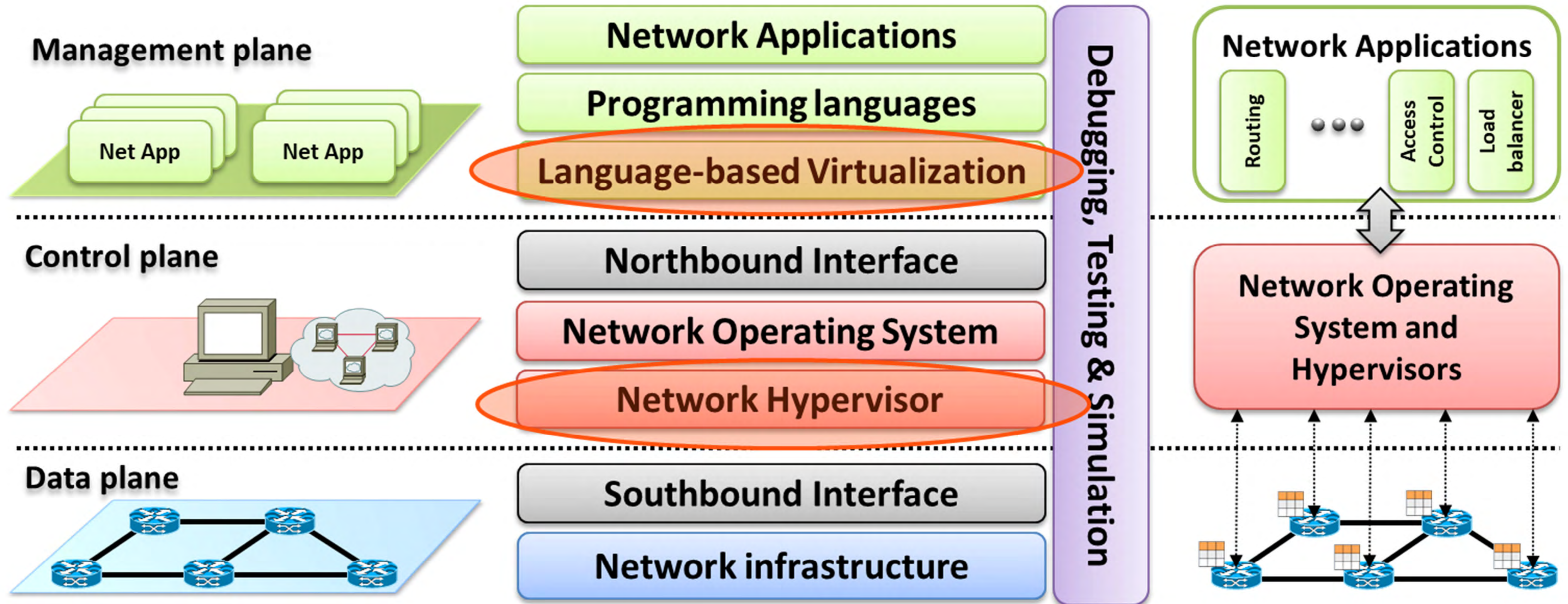


# What is a **Slice**?





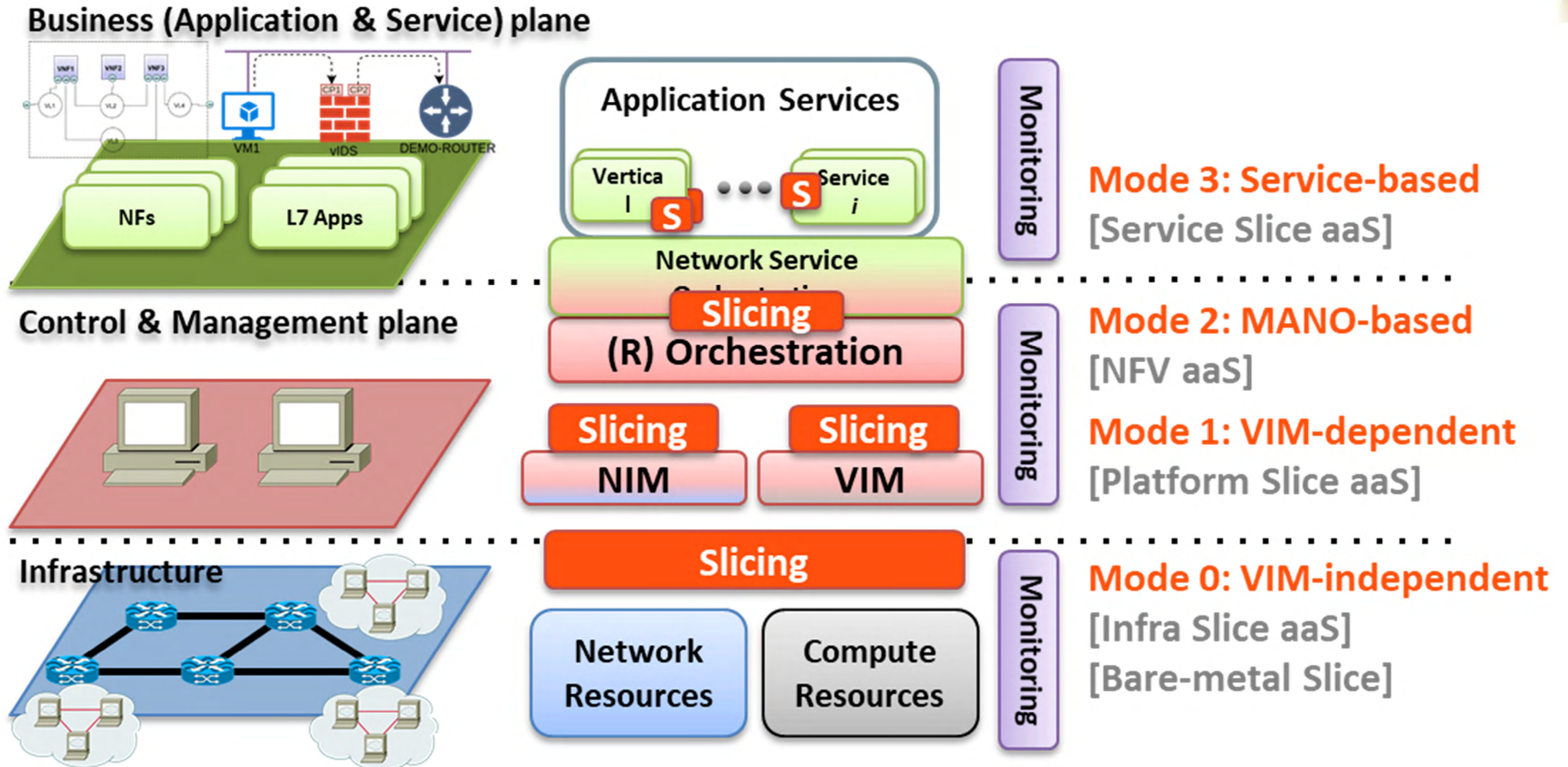
# SDN & Virtualization vs Slicing





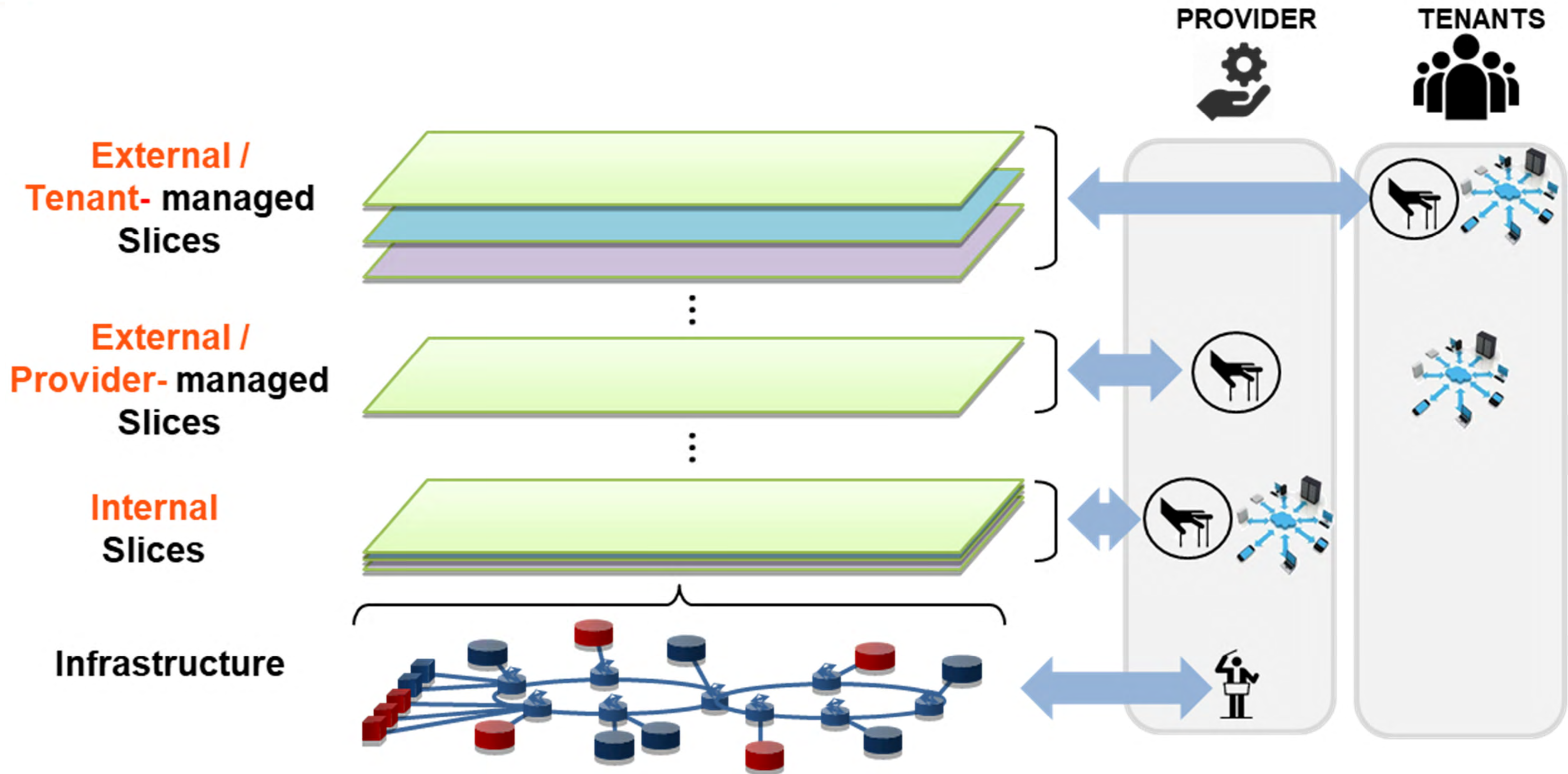


# Different Slicing Models & Approaches





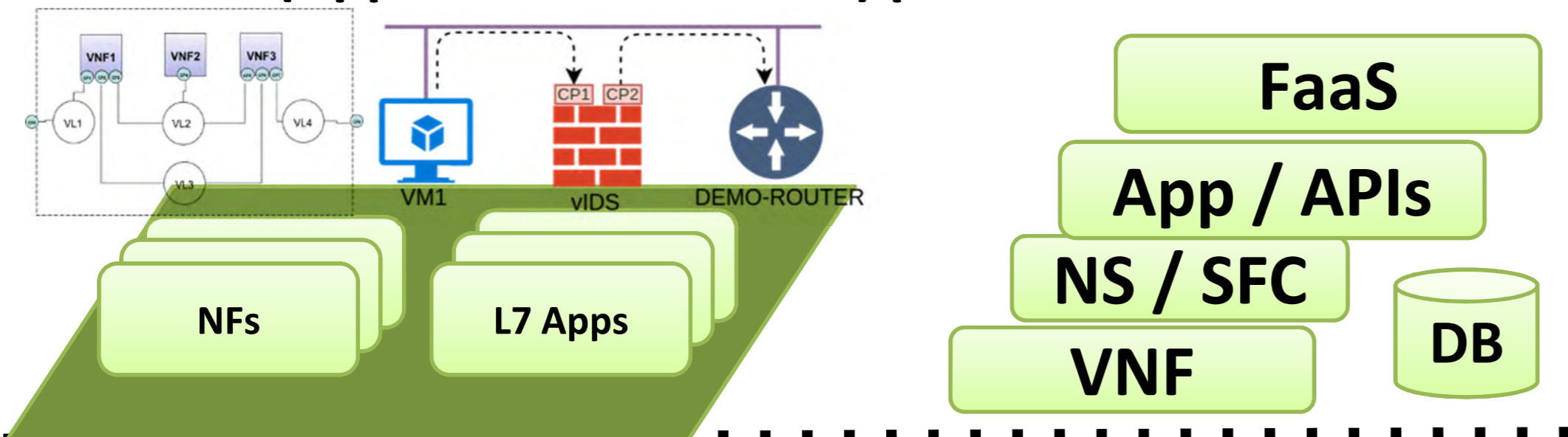
# Types of Slices and Control Responsibilities



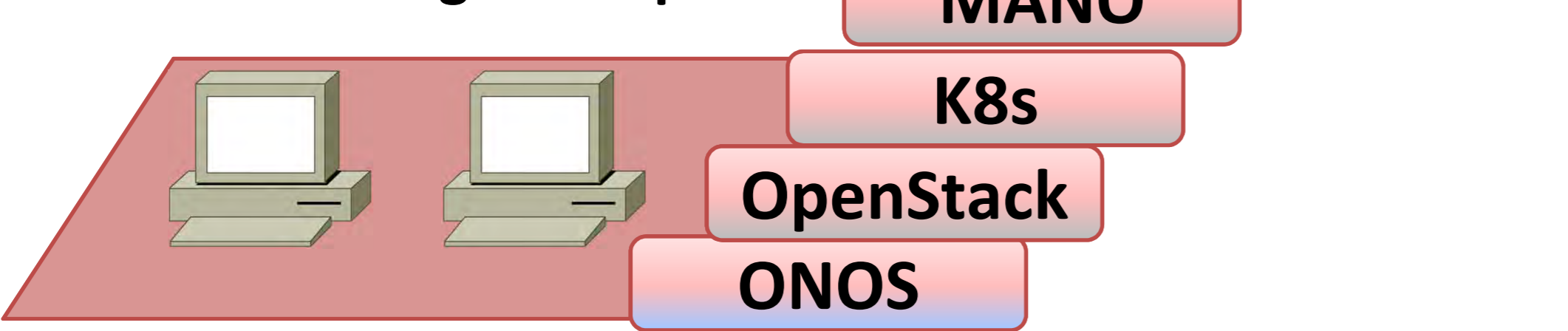


# Slicing under massive any resource multi-tenancy (gone wild) ... or when sharing economy meets cloud network slicing

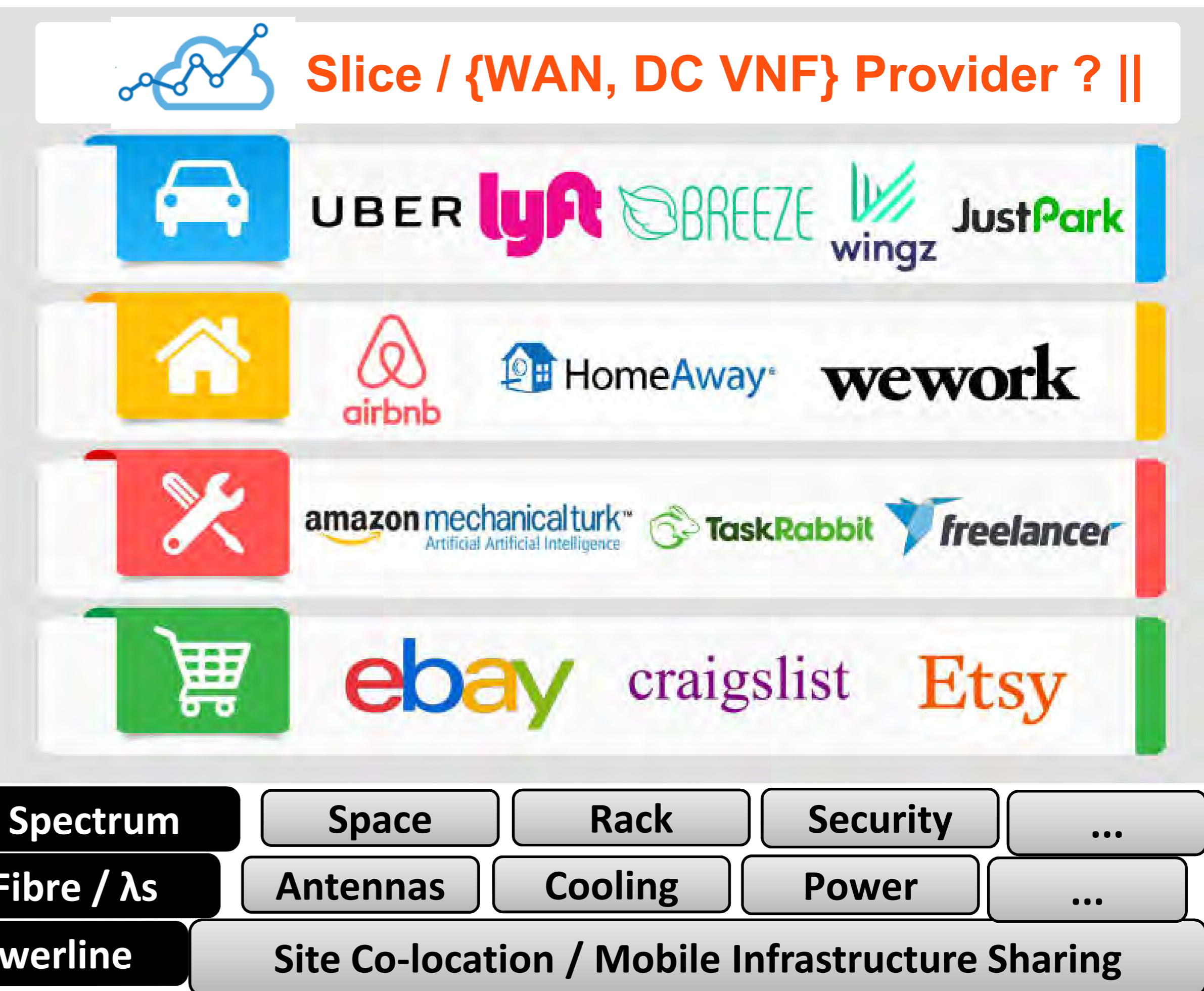
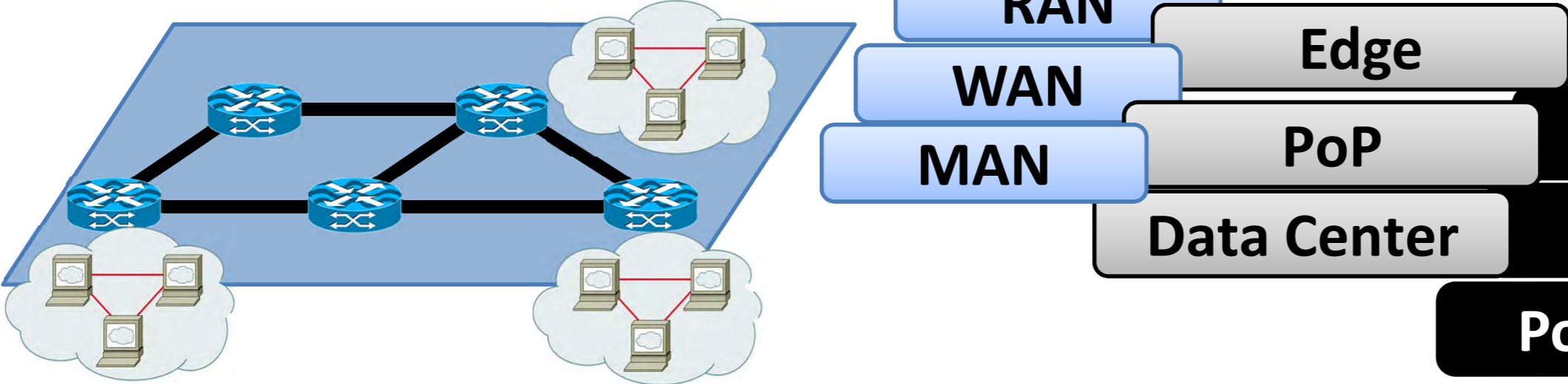
## Business (Application & Service) plane



## Control & Management plane



## Infrastructure

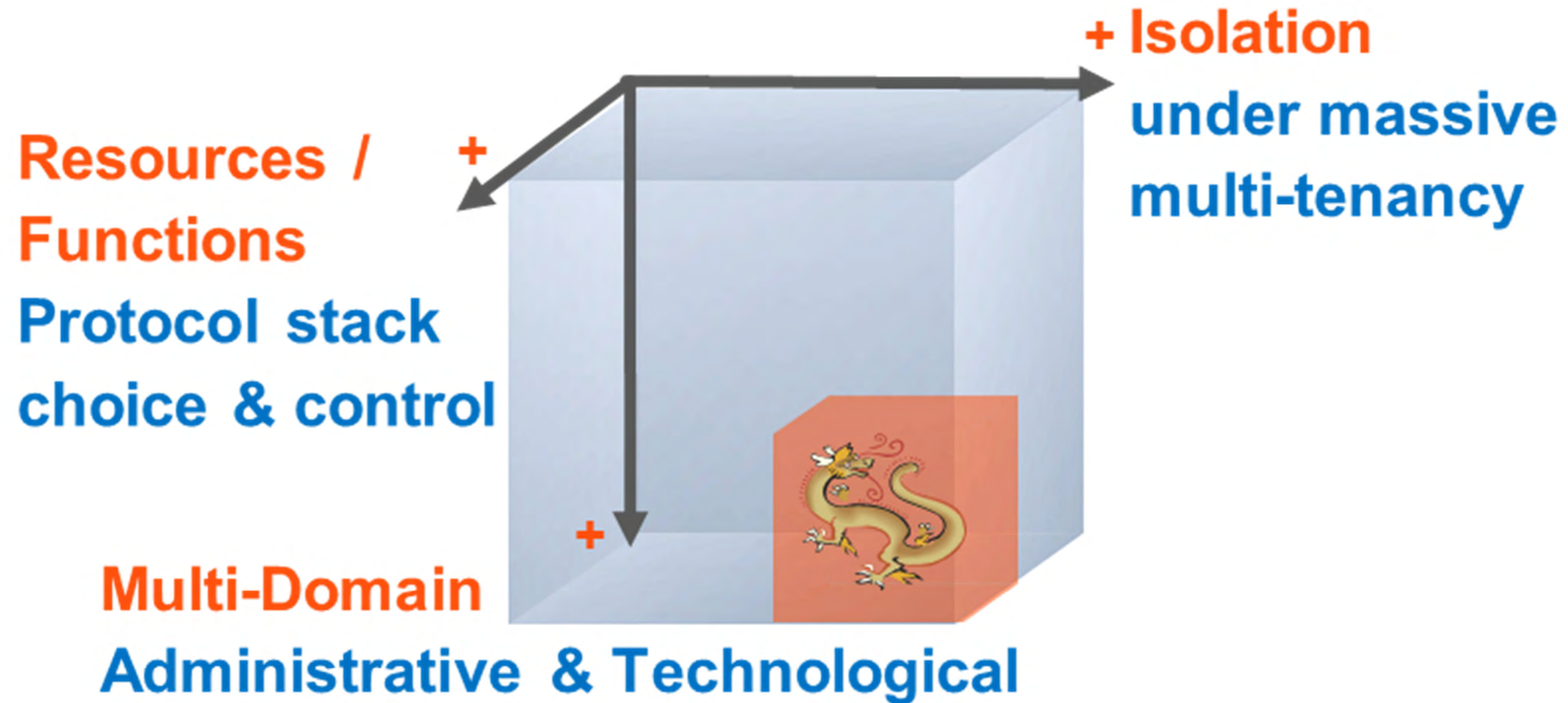


Source: <http://www.h2020-necos.eu/>

Source (image "sharing economy"): <https://www.kreezalid.com/blog/78403-what-is-sharing-economy>



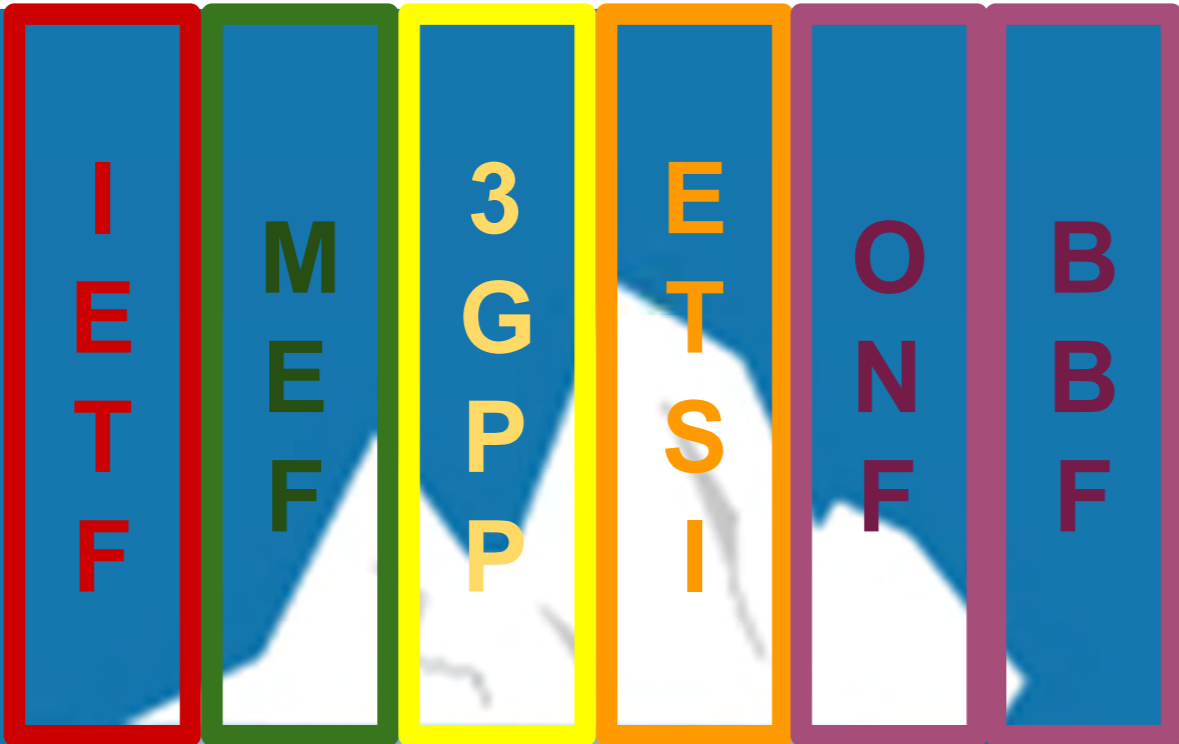
# Deep Slicing: Concept and Challenging Trade-offs



Source: Inspired by the author (C. Rothenberg) **P**<sup>3</sup> trade-offs: **P**rogrammability, **P**erformance, **P**ortability.

<https://www.slideshare.net/chesteve/ieee-hpsr-2017-keynote-softwarized-dataplanes-and-the-p3-tradeoffs-programmability-performance-portability>

# Towards Deep Slices



**Fragmented Standardization**

**Business & Technological challenges**  
From infrastructure sharing to any-layer any-resource sharing (from PHY to APP)

**Deep Slicing**



**Deep**  
End-to-End, Multi-Domain (tech + admin)  
Tenant Choice & Control  
Isolation  
Scalable

*any resource, any function anywhere*



# Network programmability? By who?

Technical Expertise + Single Throat to Choke

**Players** with sufficient  
SW Eng. + Network Eng.  
& in-house Devops (NoOps?)



Microsoft



NTT

Goglee



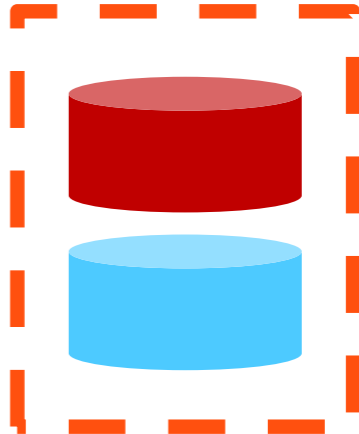
- Intent-based (languages + APIs)
- Design + Run-time (NS)DKs
- ML/AI assistance
- Automation of Test + Benchmarking (pre-deployment + + day0 & day-2 ops)

The **long tail** of players

(e.g. smaller SPs, ISPs, enterprises, campus, governments, etc.)

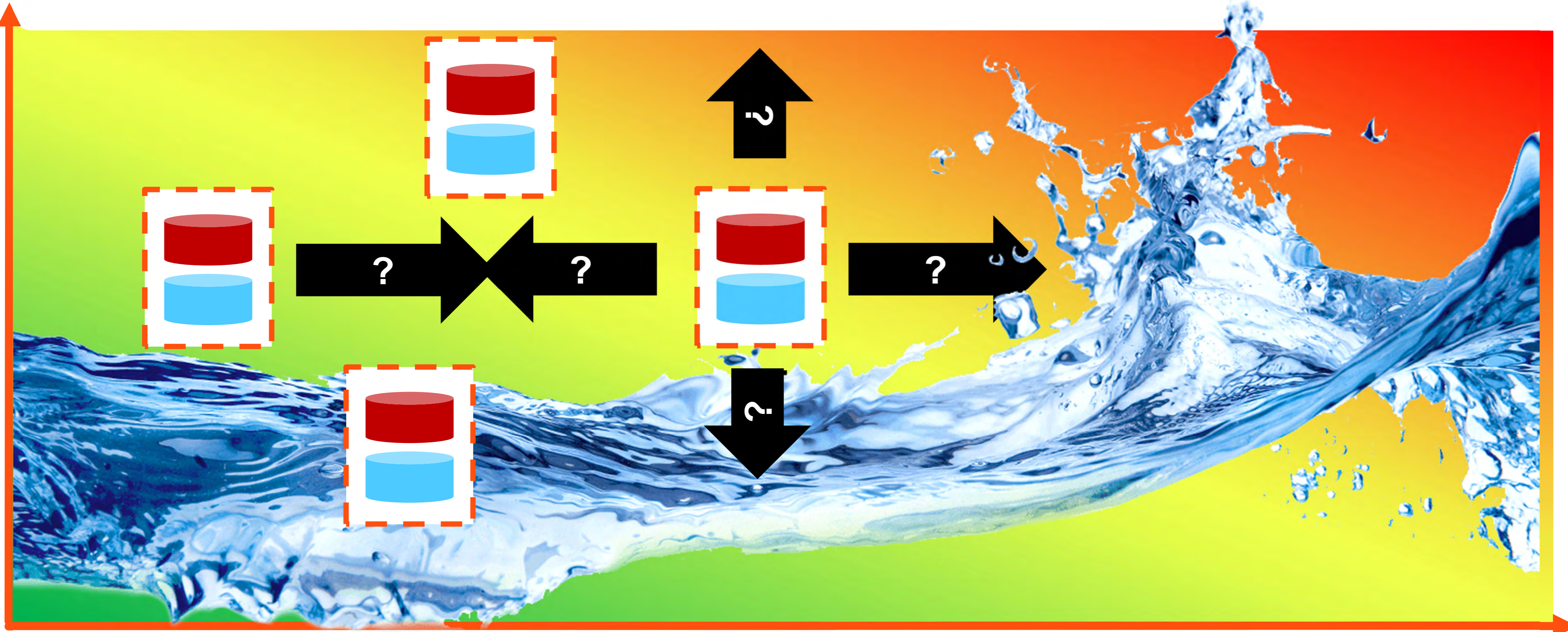


# Fluid Networking @ run-time



SW

HW



Customer  
Premises

BS MEC - Access Cloud - PoP DC  
Edge

Cloud DCs  
Core