



5G-Infrastructure PPP Information Day

17th March 2016, Bologna

View point: 5G Networks are

- **“Faster, Stronger”** - An extremely flexible and highly programmable e2e compute & connect infrastructure which is application & service aware as well as time, location and context aware
- **“Higher Level Flexibility” in all segments of the network:** Radio-networks, Front / Back Haul Network & Access Network, Aggregation Network, Core networks & Software-defined clouds & Mobile edge computing → High / ever higher performant connectivity & compute environments
- **Natively leveraging Network Virtualisation / Slicing/ Network Function Virtualisation, Programmability and Softwarization technologies:**
- **Support on demand composition of network functions and capabilities**
- **Enforce required capability/capacity/security/elasticity/ adaptability/ flexibility “where and when needed”**
- **Management and Control are becoming part of the dynamic design of the software architecture**
- **Services are executed in one (or more) Slices (i.e. a slice is made of a set of VMs)**
- **Significant reduction in management complexity and in costs of operations (i.e. OPEX)**



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Some Competences and Interests

UCL is the top-rated university in the UK for research strength (REF2014).

UCL is ranked fourth in the world's top universities by the QS World University Rankings (2014) and number 21 in the Shanghai Ranking of World Universities (2014)

- New potential transmission standards based on Spectrally Efficient Frequency Division Multiplexing (SEFDM) where up to 40% bandwidth saving (relative to OFDM) may be achieved at the expense of receiver complexity.
- Large Scale Antenna Systems, topologies studies and efficient waveform and receiver design through analog-digital processing



TA2

- Spectral sensing systems for wireless energy and bandwidth efficiency
- Massive MIMO and MIMO systems
- Radio over Fibre systems (RoF) operating in the mm-wave region; system, sub-system and circuit level design.



**TA3, TA5
and TA9**

- mmWave communications, beamspace MIMO, antenna topologies



TA3

- From energy efficient to energy neutral networks through energy harvesting and balancing



TA4

- Data-aided waveform design for energy efficiency in the C-RAN



TA5

- Secure self-configurable and self-sustainable networks through energy neutrality

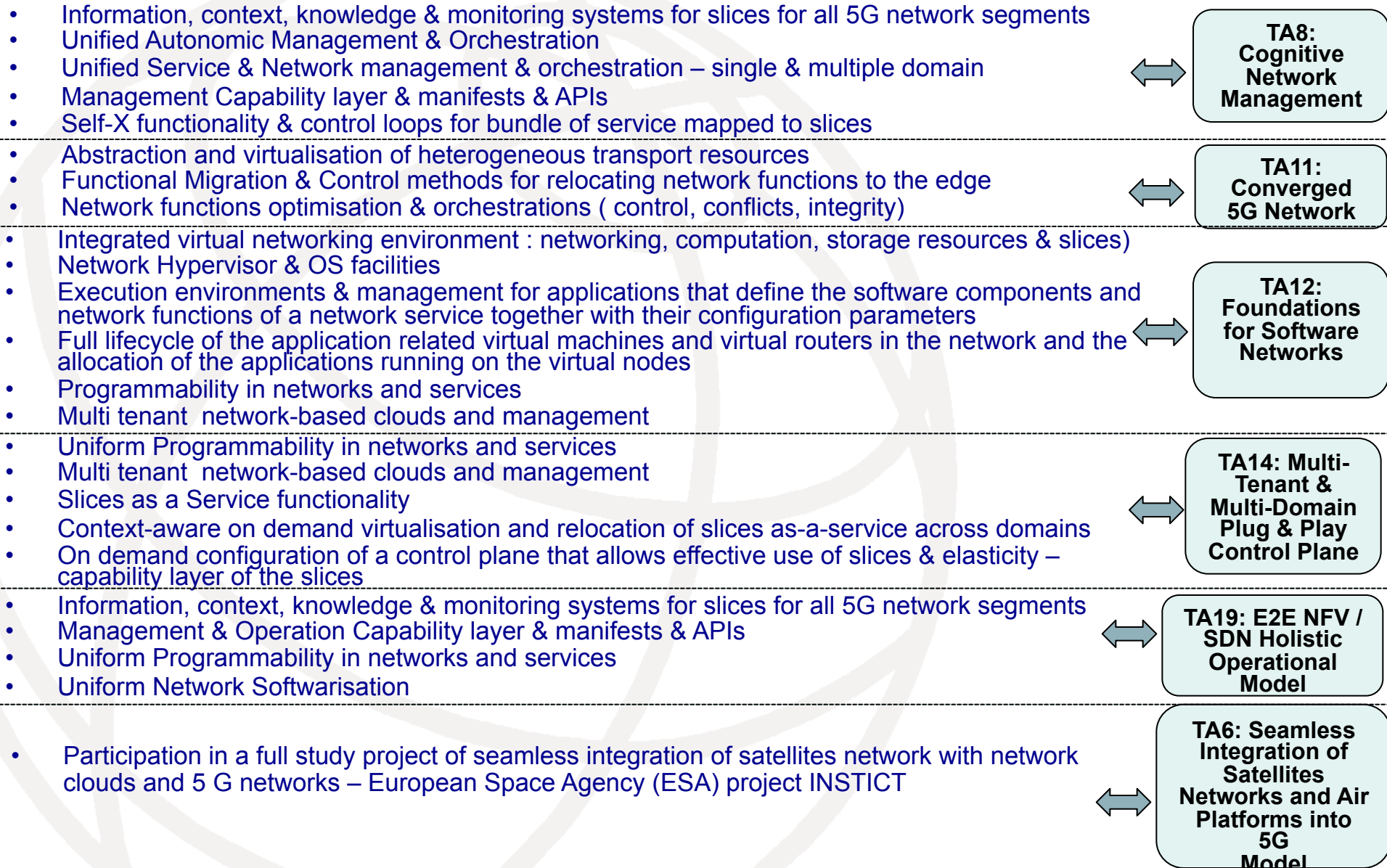


TA8, TA13

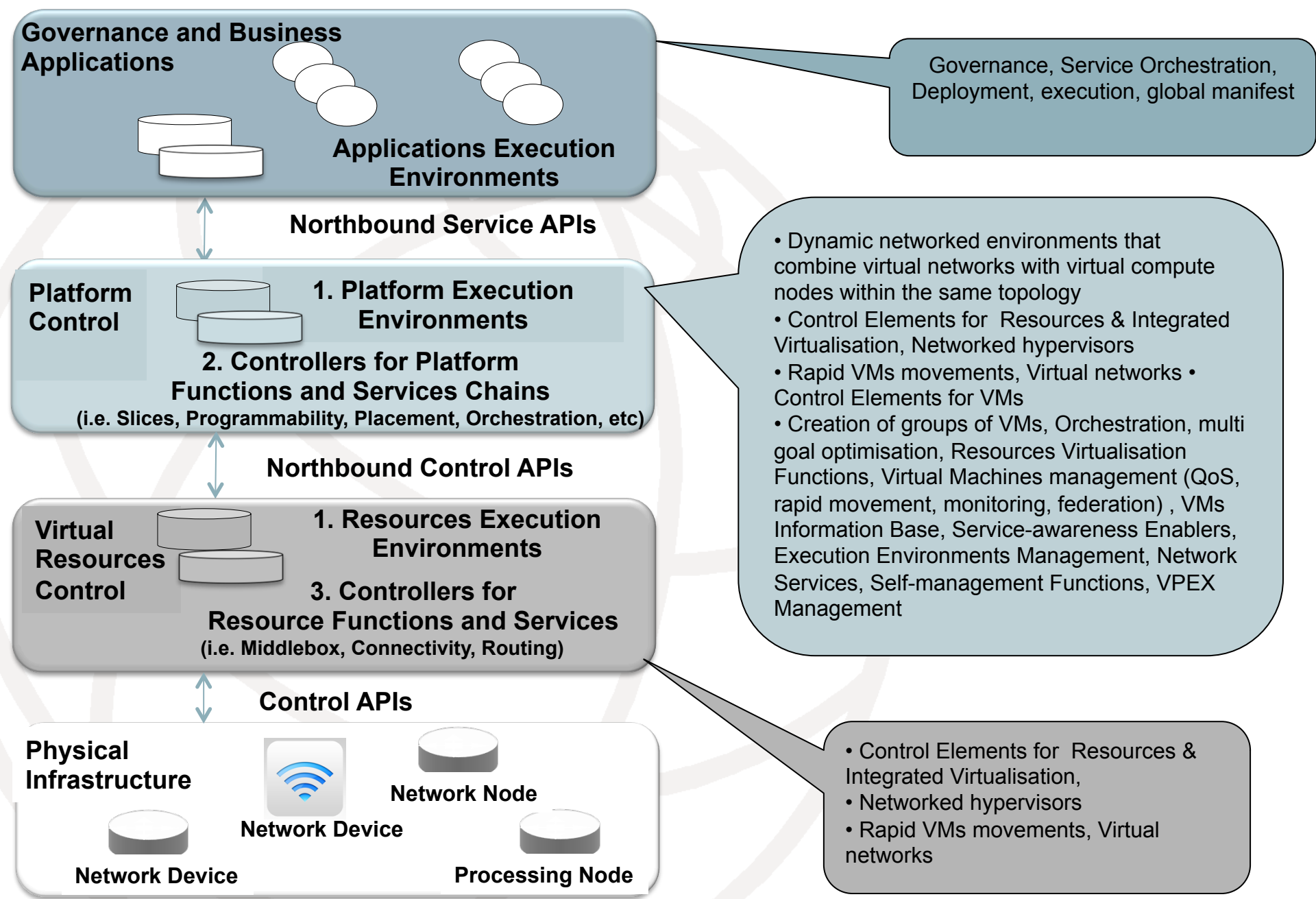
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5G Network Softwarisation Model (S/W stack model)



Concluding Remarks

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 - Management and Control are becoming part of the dynamic design of the software architecture
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- Significant reduction in management complexity and in costs of operations (i.e. OPEX)
- *“Software Networks”* → Softwarization and in particular (Self) Management and Control would represent nearly 99% of the new 5G Networks & Services functionality !!!
- *“Low Operational Costs”* → Significant reduction in management complexity and in costs of operations (i.e. OPEX)