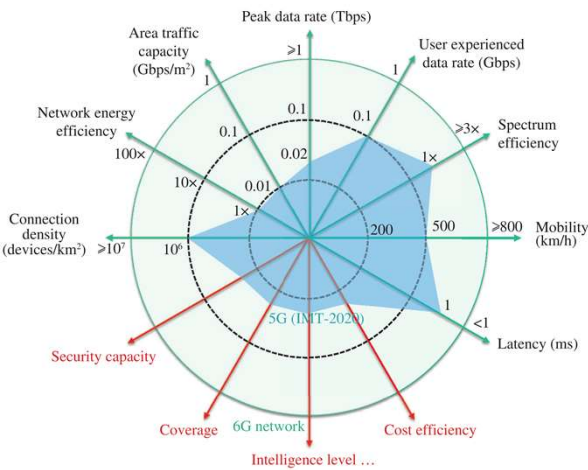


How fast can we go?

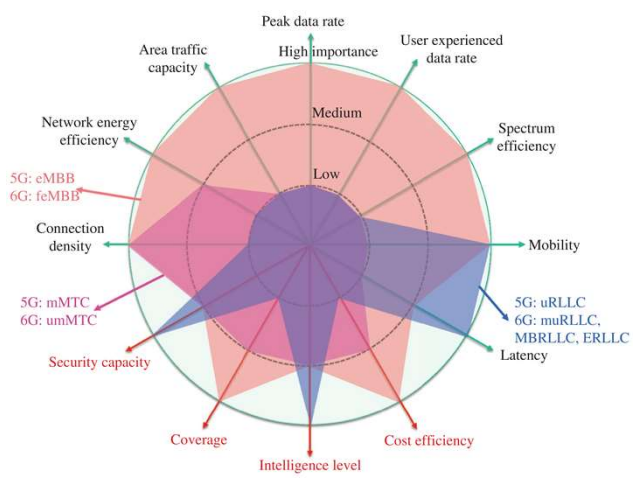
And how fast is too fast?

David Palma (david.palma@ntnu.no)

5G and beyond

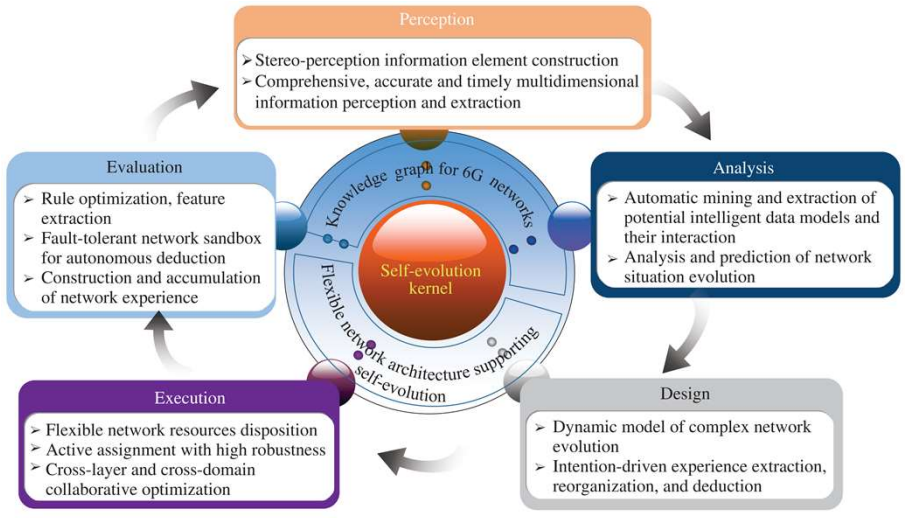


5G and beyond



D. Palma IJK, NGINO'22

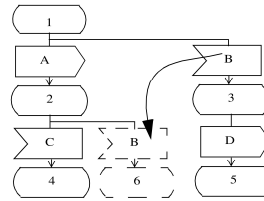
5G and beyond



D. Palma IJK, NGINO'22

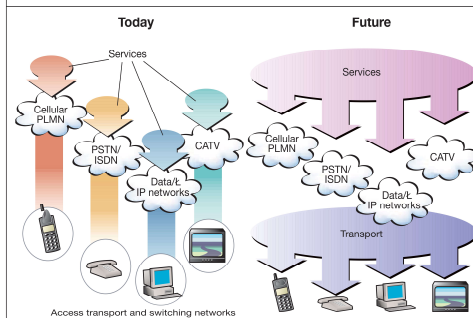
The old way

- Design
- Modelling
- Specification
- Implementation
- Measure and Test
- Validation
- Deployment



J. Floch, R. Bræk, Towards PaP Services: Design and Validation Issues (2002)

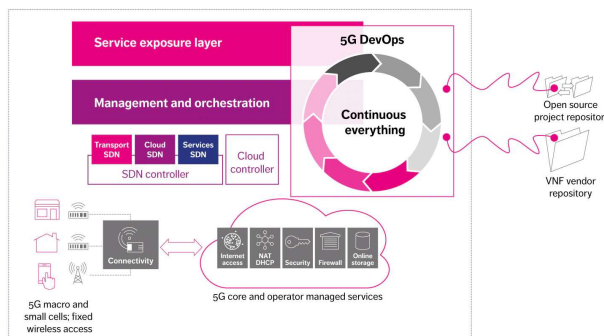
Figure 1
The shift from a vertically integrated to a horizontally layered service environment.



L. Boman, Ericsson's Service Network: a "melting pot" for creating and delivering mobile Internet service (2001)

The new way

- Agile Development
- DevOps
- Continuous everything



TransContinuum Initiative (TCI): our vision (2020)

October 6, 2021
2:49 AM GMT+2
Last Updated 5 months ago

Technology

<https://blog.cloudflare.com/october-2021-facebook-outage/>

Maintenance error caused Facebook's 6-hour outage, company says

By Sheila Dang

2 minute read

Register now for
FREE unlimited
access to
Reuters.com

Register

Oct 5 (Reuters) - An error during routine maintenance on Facebook's network of data centers caused Monday's collapse of its global system for more than six hours, leading to a torrent of problems that delayed the repairs, the company said on Tuesday.

The outage was the largest that Downdetector, a web monitoring firm, said it had ever seen. It blocked access to apps for billions of users of Facebook (FB.O), Instagram and WhatsApp, further intensifying weeks of scrutiny for the nearly \$1 trillion company.

Twitter Facebook LinkedIn Link Email Bookmark

REUTERS®

12

Future (Trustworthy) Systems

- Larger and more complex system
- Logically distributed data, processing and control
- Critical man-machine control systems
- Diverse system quality demands
- Increased flexibility in autonomous control systems

- Design requirements
 - New structures and analytical methods (design and analysis must adapt to the new system (hw/sw) structure)
 - System integration (of autonomous and man-machine control systems)
 - Flexibility and Optimality (changing goals -> intelligent problem solving (AI)*)

Slide credit: Poul Heegaard, IIK

NEW PROBLEMS IN FAULT-TOLERANT COMPUTING

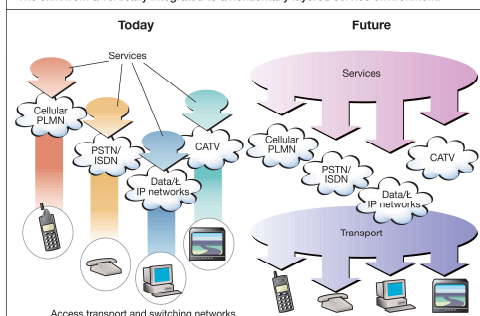
Jack Goldberg
Stanford Research Institute
Menlo Park, California

1975 International Symposium on Fault-Tolerant Computing

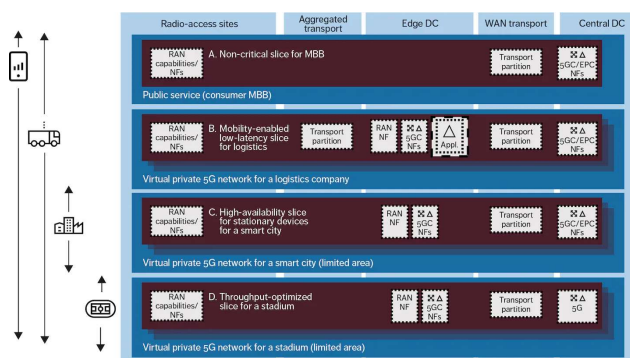
*The author first heard this suggestion from C. Srinivasan at the 1965 Workshop on Fault-Tolerant Computing (Pacific Palisades). The relevance of artificial intelligence to fault-tolerant computing was suggested by W. Dove, NASA-Langley Research Center, in 1973, in a private discussion. The author does not know of any published work on this problem.

[1] Goldberg, Jack. "New problems in fault-tolerant computing." Proceedings of the 1975 International Symposium on Fault-Tolerant Computing. 1975.

Figure 1
The shift from a vertically integrated to a horizontally layered service environment.



L. Boman, Ericsson's Service Network: a "melting pot" for creating and delivering mobile Internet service (2001)



H. Basilier, et al., Applied network slicing scenarios in 5G (2021)

The right way?

- Be mindful of the evolution process
- Keep in mind the impact of evolution
 - On societal and sustainable development
 - Human-centric perspective
- Human-centric
 - Design
 - Management
 - Maintenance
 - Usage

Related research at IIK

- PhD activities
 - Human-centric Internet of Things
 - Ontology-based Next-generation Networks*
- Projects and proposals
 - Teraflow
 - ProDig
 - NORCICS
 - one6G
 - ...

Thank you

david.palma@ntnu.no