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CWI

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CENTER

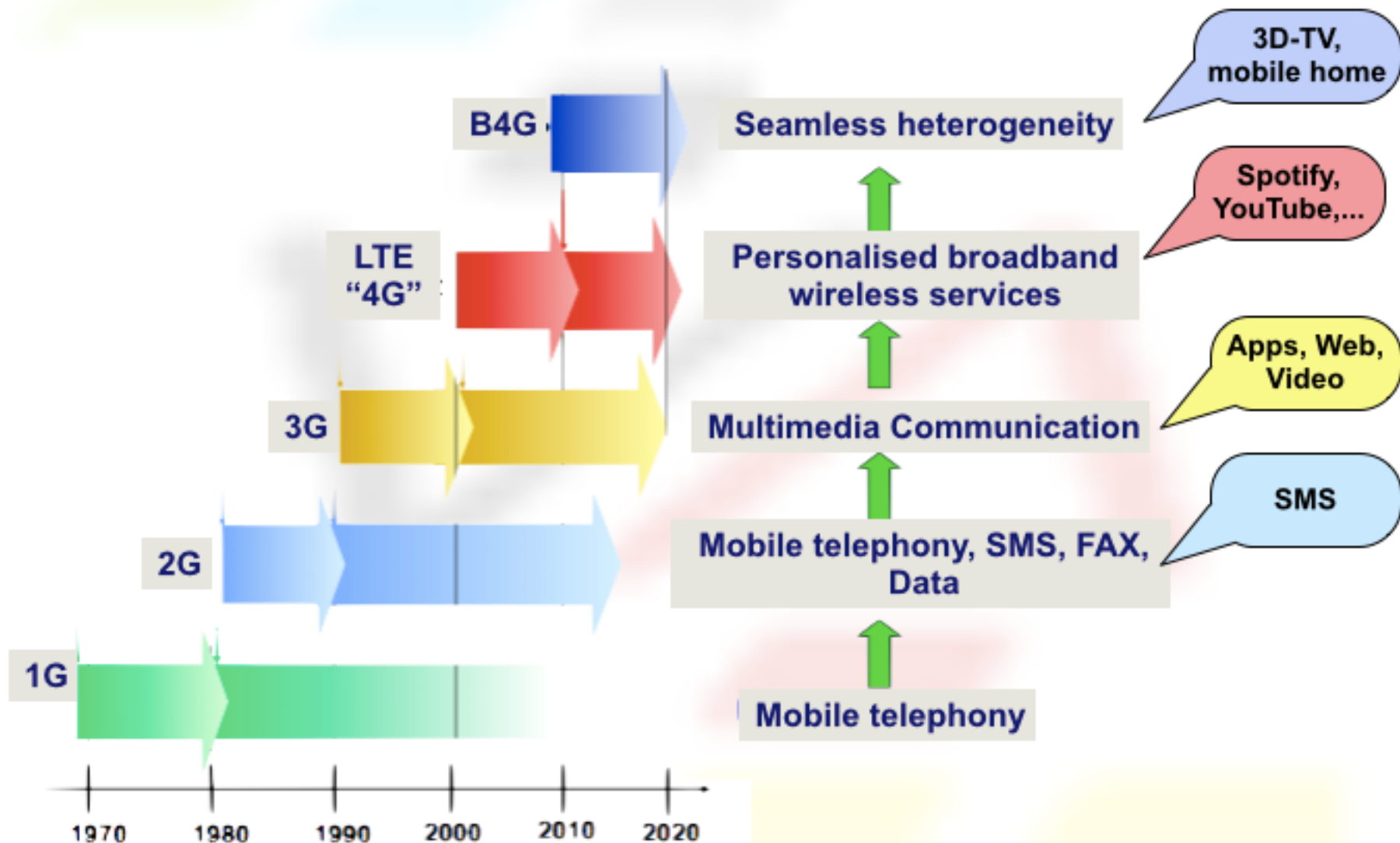
MOBILITY 2013

November 17 - 22, 2013 - Lisbon

Mobility 2020? Change of Paradigm

Josef Noll,
IARIA fellow,
Professor, University of Oslo/UNIK
Head of Research, Movation AS
josef@unik.no

Is this the Mobility Research we need?



"It is all about service delivery"

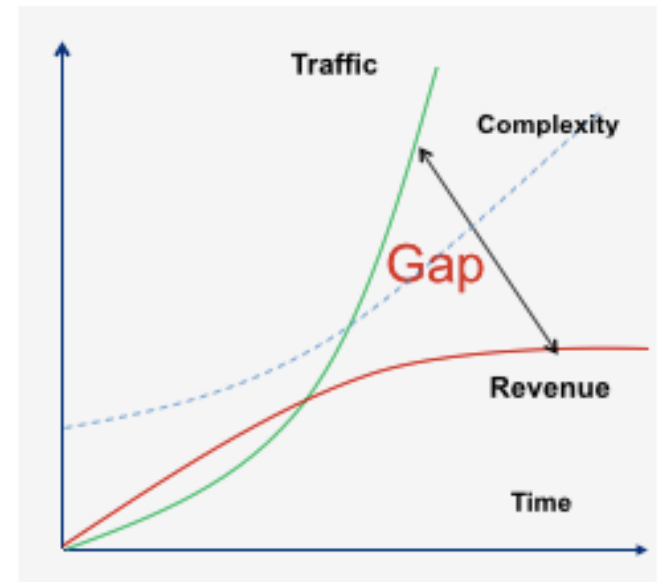
Diverged Traffic & Revenue Growth

- ✓ From Kilo (10^3) bytes to Tera (10^{12}) and Zeta (10^{21}) bytes
- ✓ Global ubiquitous Internet-based solution with hyper Connectivity
- ✓ Hundred-fold increase in network flow brought by mass terminals and mass digital content, and the thousand-fold, increase in traffic flow on mobile networks

- ✓ Users are spending more time on the phone & internet
- ✓ Average household spending on communication falls
- ✓ Consumer pay less while getting better value -> they pay ~30% less than 5 years ago

- ✓ Significant growth in traffic while slow in revenue
- ✓ User experience at risk

- ✓ What do we do with a surging traffic
 - Limit/control it?
 - Turn it to revenue?
 - Bring the cost of it down?

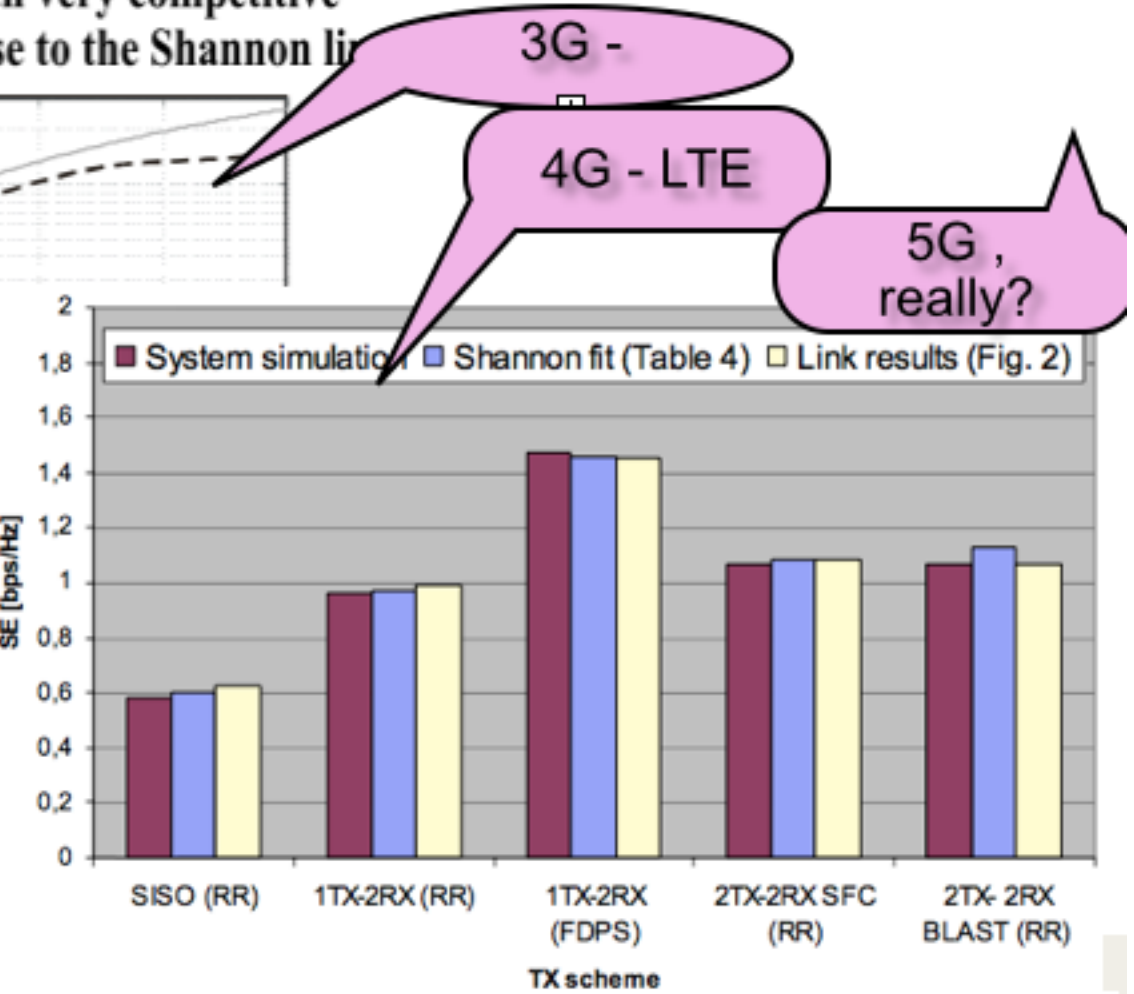
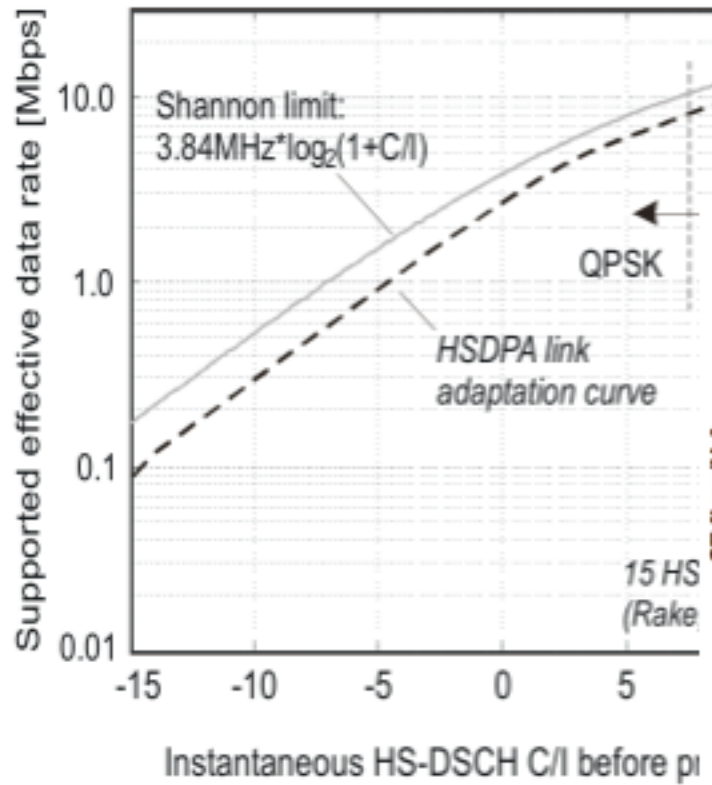


Cost reduction is a very critical aspect of the future networks.
Telecom seems to be the only sector delivering price decrease



5G radio - System benefits for approaching Shannon?

WCDMA/HSDPA with 5 MHz bandwidth very competitive technology, as performance is rather close to the Shannon limit

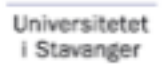


[source: WCDMA for UMTS, 3rd edition]

[source: Preben Mogensen, et al., 2007]



PA KJELLER

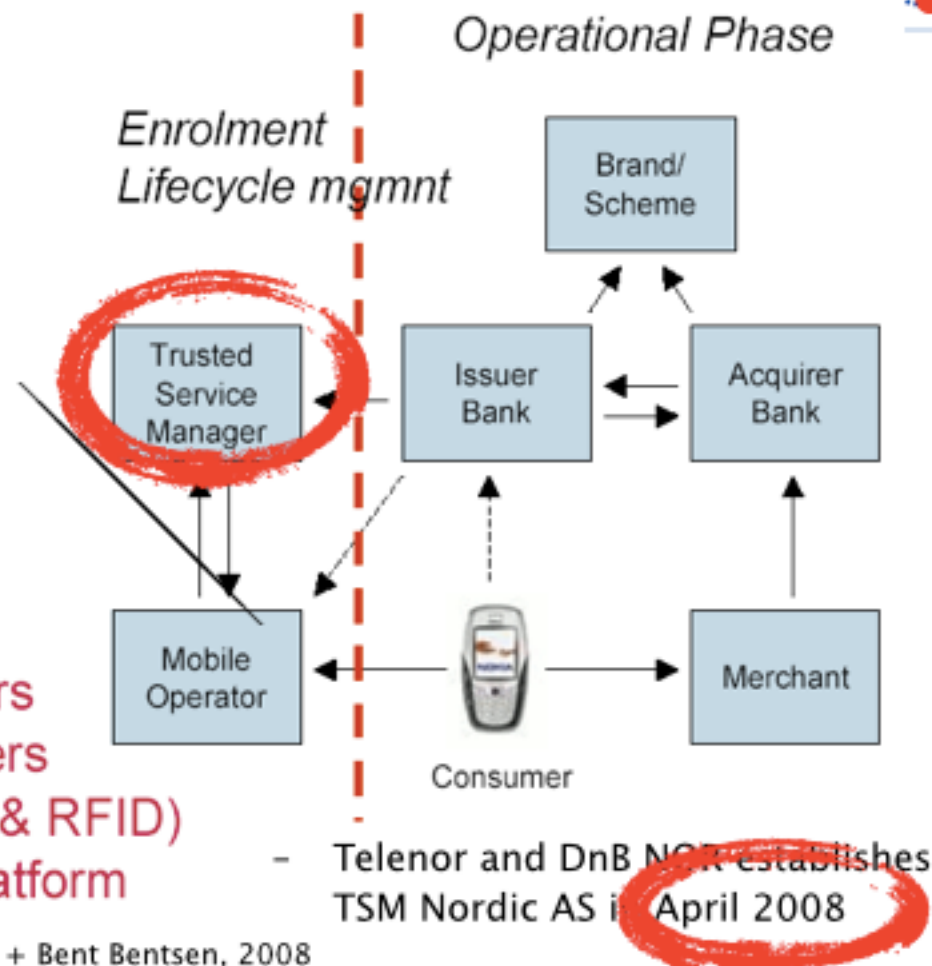


Ecosystem: for NFC

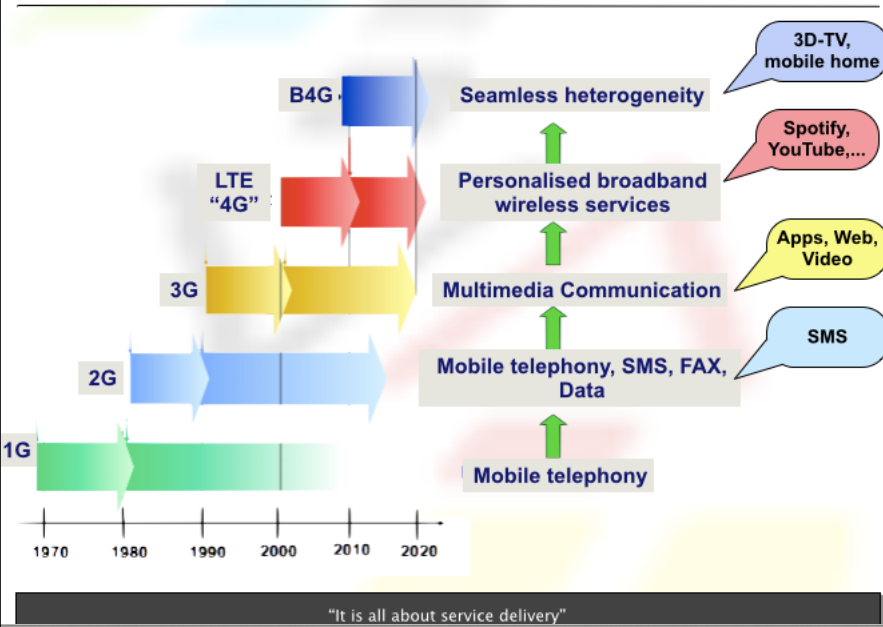
The collaborative business model



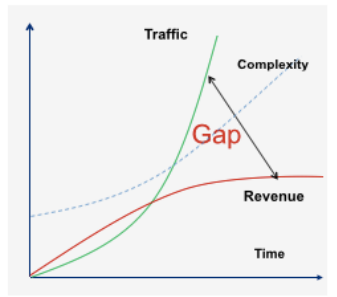
- Principle Stakeholder
 - Consumer
 - Key Stakeholders
 - Banks
 - Mobile Operators
 - Merchants
 - Supporting Stakeholders
 - Card Associations
 - Transaction Service Providers
 - Mobile Handset Manufacturers
 - Technology Providers (NFC & RFID)
 - Third Parties (Application/Platform Providers)
- Source : Mobey Forum Ltd. + Bent Bentsen, 2008



- Telenor and DnB NOR establishes TSM Nordic AS in April 2008

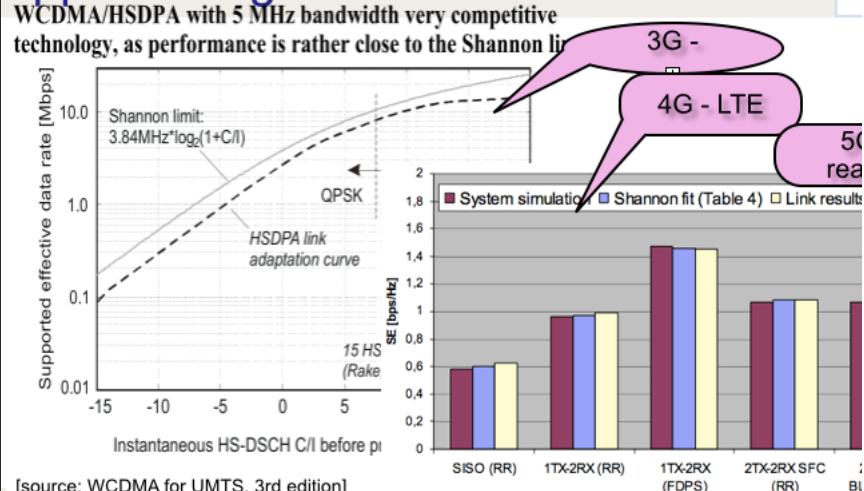


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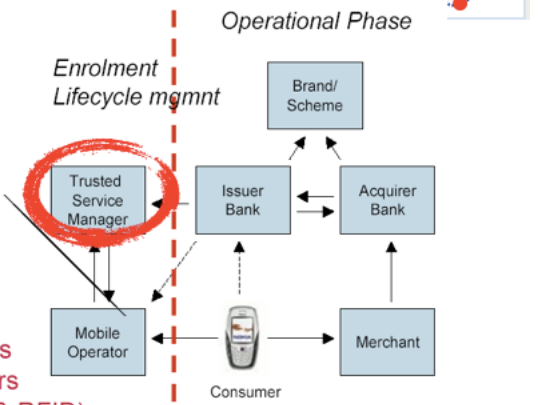
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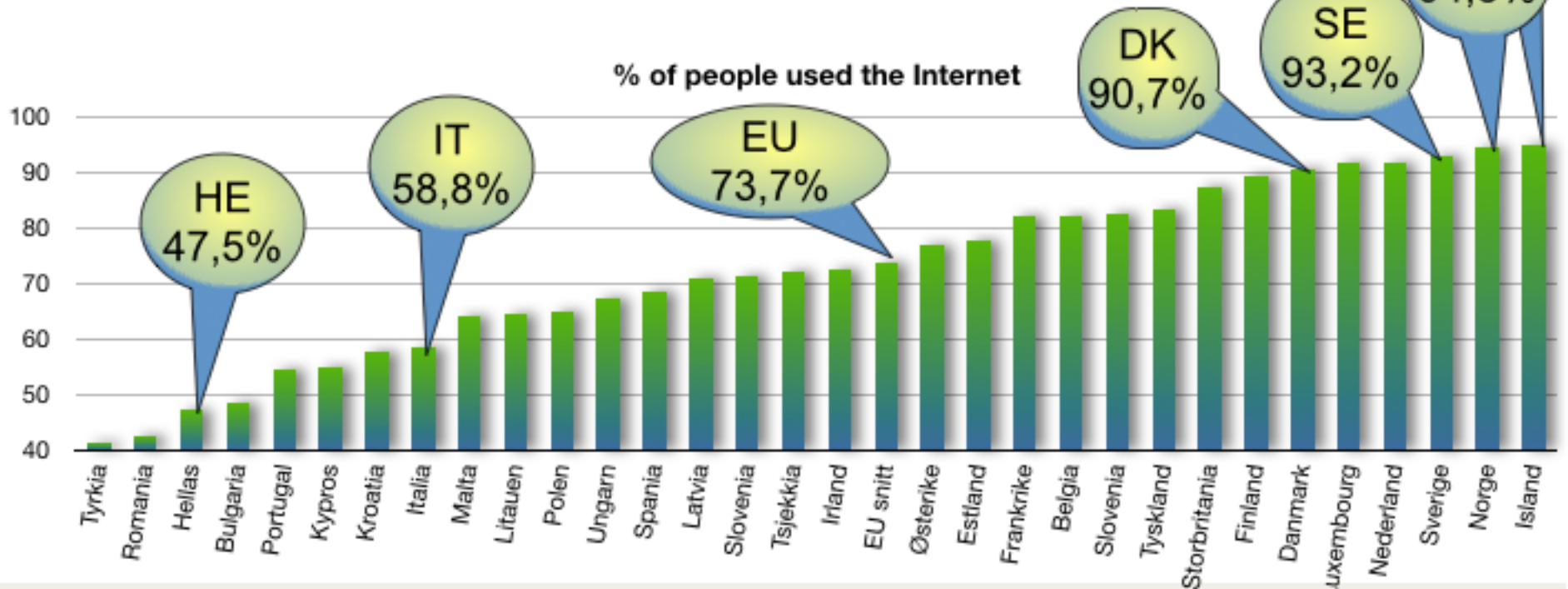
Or a Mobility Research that

Internet creates welfare

[Robert Madelin, Directorate-General for Information Society and Media, EU commission, Aug 2011]

- * "use of IT in a proper way can increase effectiveness with 30-40%"
- * "we are good in technology development. But access to venture capital is bad in Europe as compared to the USA".

[Aftenposten, 3. October 2011] gunhild@aftenposten.no



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Free access to Internet Information

for a world:
"Where everyone can open his browser and get free access to Internet"

No one should have to choose between access to the Internet and food or medicine



CONNECT



The Center for Wireless Innovation Norway - CWIN.no - Enabling Collaborative Research



Or a Mobility Research that

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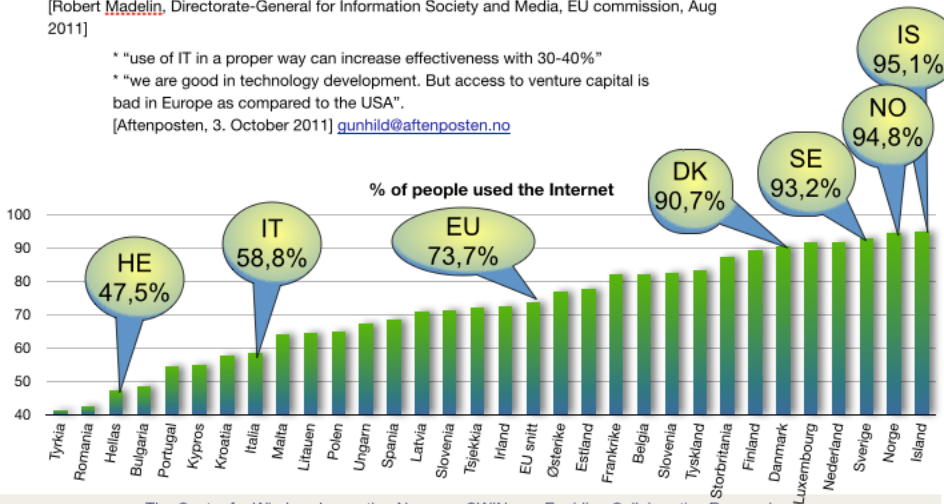
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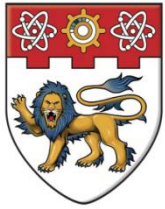
- Mobility for

- Health
- Education
- Quality of Life

- Free Information Access

- Remove Digital Divide

- Minimum of
 - Energy consumption
 - Electromagnetic radiation



NANYANG
TECHNOLOGICAL
UNIVERSITY

Proactive Heterogeneous Networks: A New Paradigm

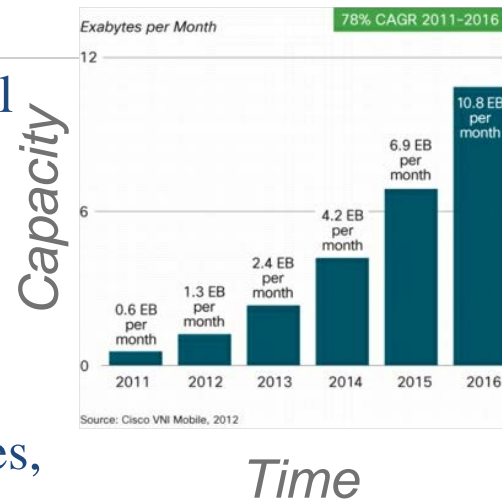
A. S. Madhukumar

*School of Computer Engineering,
Nanyang Technological University*

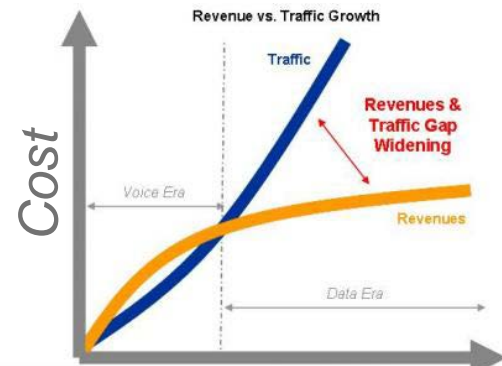
Towards Future Networks



- More services and applications, social networking, e-commerce, internet mobility
 - Bandwidth hungry applications
 - Video centric
- More connected devices, smart phones, PDAs, laptops & M2M
- Subscribers more demanding
 - User satisfaction more important



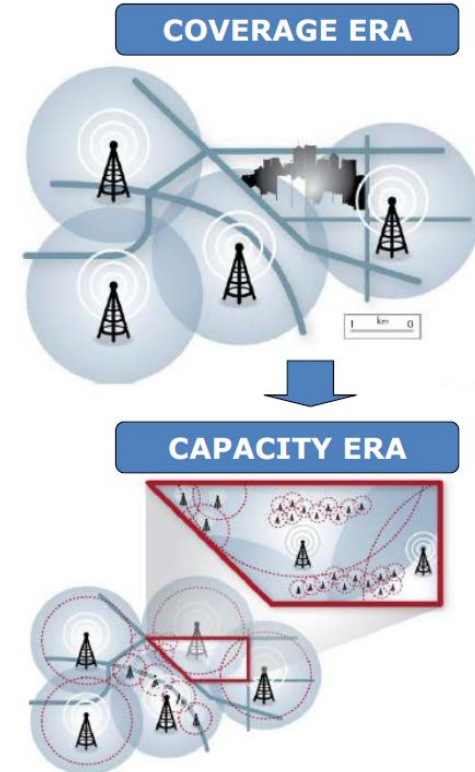
- More traffic likely to increase (1000 fold every 10 years)
- Revenue Flattens



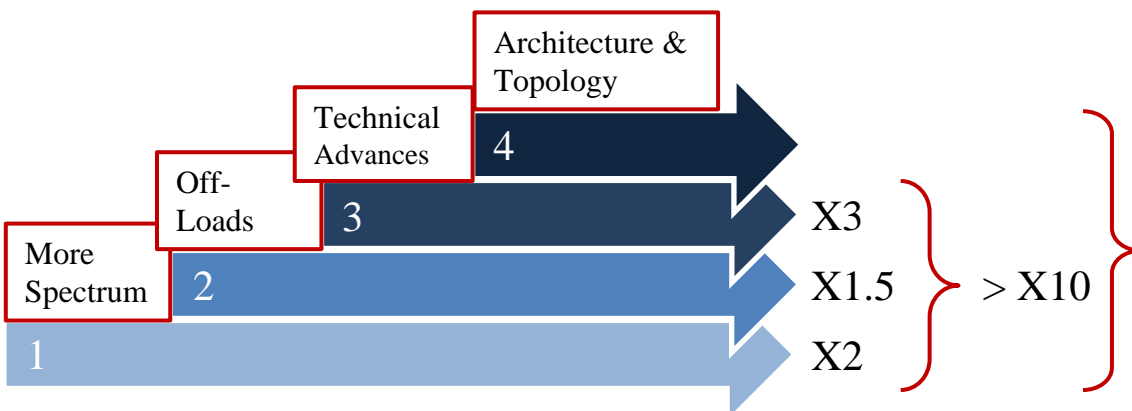
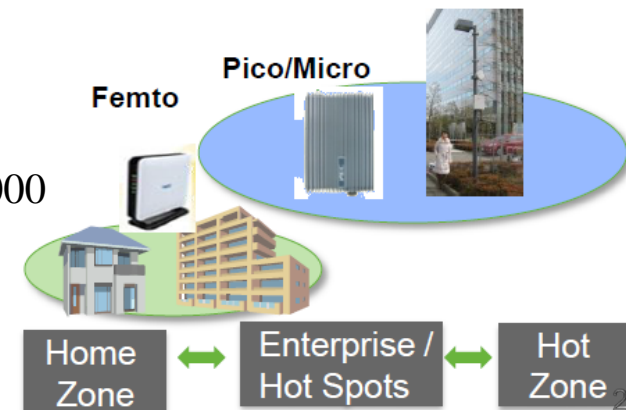
Rapid increase in mobile data activity has raised stakes on developing innovative new technologies and cellular topologies that can meet these demands in energy efficient ways

Roadmap to Meeting Demands

- Existing cellular architecture unable to cope with demand for high capacity & high bandwidth requirements of future systems
 - Licensed spectrum is not sufficient
 - Inefficient re-use of spectrum
- Densification of the network with small cell deployments is seen as a major solution
- Such heterogeneous networks takes benefit of LTE pico, femto and micro cells but of course also of Wi-Fi hotspots
 - Small cells increase spectral reuse and increase data-rates by getting closer to the user
 - Wi-Fi enables to make use of unlicensed spectrum



Small Cells Solutions - Femto to Micro



Proactive HetNets

- HetNets exploit information from several dimensions – smartphone features, geo-location, and social networks
 - Largely predictive nature of human behavior
 - Discernible patterns in file distributions, users' request, and other characteristics of wireless services
 - Density of HetNets where small cells service well-defined regions with frequent, well-known users
- Proactive designs – track, learn and then establish predictive user model
- HetNet can define more precise QoS targets, better prioritize requests, and better manage its overall resources over various dimensions (time, frequency, and space) using the built predictive user models
- Optimized exploration of available information and exploitation of available resources

Example:

- Proactive caching ~ 30-40% savings (source: Intel)

Ultimately maximize the long term performance



CIRRELT The Science of Networks
La science des réseaux

MOBILITY: The user as the missing link A paradigm shift?

Yan CIMON

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Quebec City (Canada)

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MOBILITY 2013

Lisbon – November 19th, 2013

SOME INESCAPABLE TRENDS...

Environment-related

An explosion of information and knowledge:

- “Traffic from wireless and mobile devices will exceed traffic from wired devices [...]. [T]he gigabyte equivalent of all movies ever made will cross the global Internet every 3 minutes.” (Cisco, 2013).

Broadband access is far from perfect (even in richer countries)

User-related

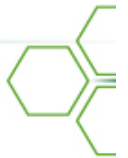
A significant number of users face literacy challenges that need to be considered for mobile device design (Cimon, Barrane & Poulin, 2011)

Users are subject to decision capability breakdowns under circumstances of task overload (Veronneau & Cimon, 2007). Such situations may be caused by information overload.

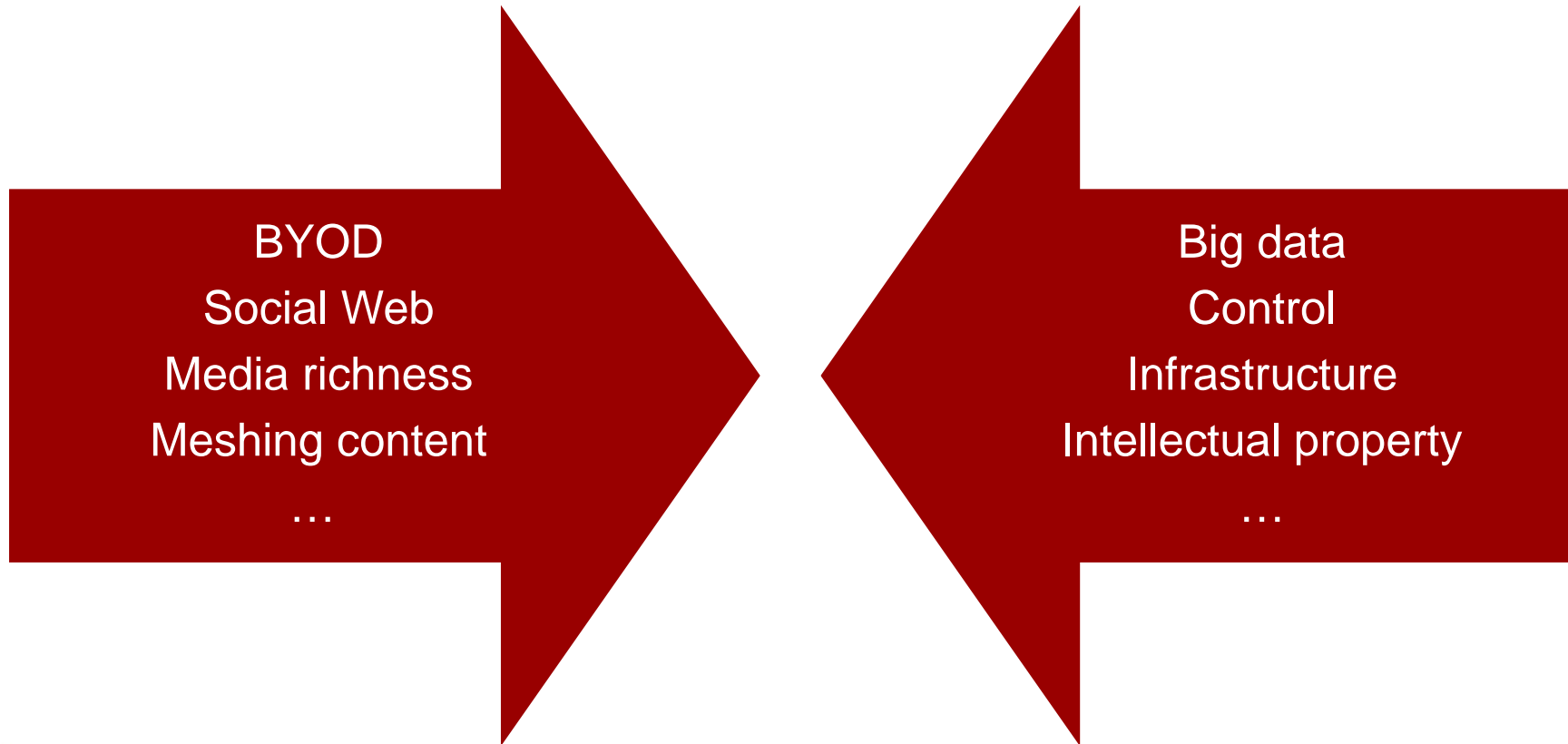


... AND SOME DESIGN CONSIDERATIONS...

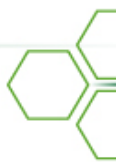
- Careful consideration of the elements underpinning human-systems interaction is paramount (e.g. Veronneau & Cimon, 2007)
 - The dominance of hierarchical menus demonstrates that we are a long way from truly revolutionary user-centric design.
- Radical innovation in design will come from “[divorcing] usability from familiarity with technology” (Cimon, Barrane & Poulin, 2011) so that users won’t need to learn how to use devices and adapt before becoming familiar with their interface
- We have a long way to go...



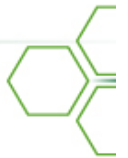
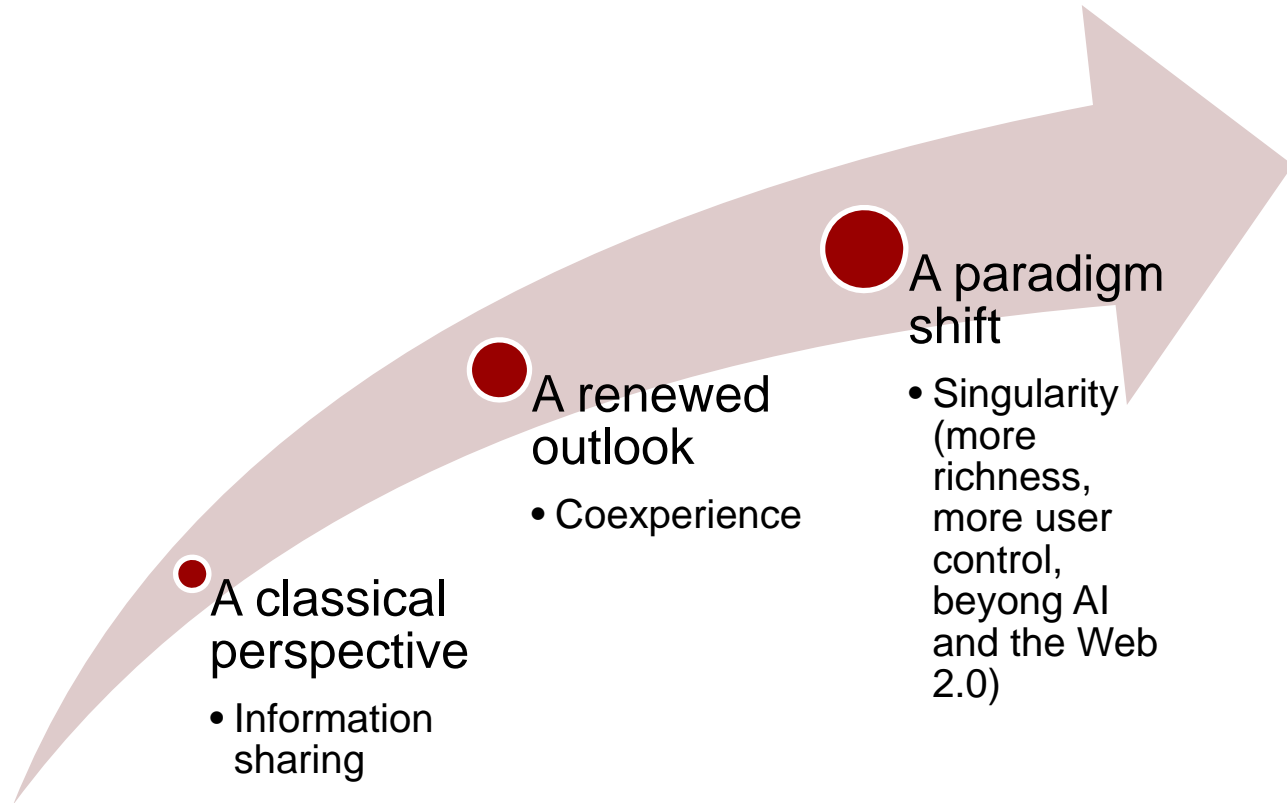
*... AS WE MAY BE ON A [SELF-INFLICTED]
COLLISION COURSE WITH HISTORY...*



... and more: Open source, Cloud computing, etc.

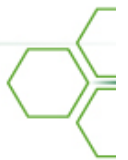


*... SO, ARE WE ABOUT TO WITNESS
A PARADIGM SHIFT?*



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Thank you!

Comments and suggestions are welcome

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