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A Perspective into the Future Internet

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Outline

- The positioning of R&D.
- Learning from experience.
- Perspectives into the Future Internet.
- Regulation and Policy.

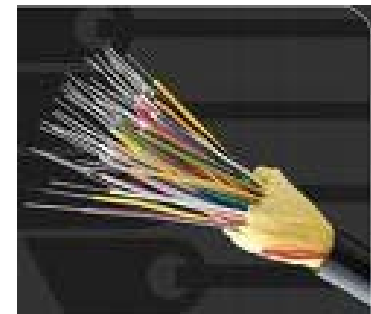


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Which kind of R&D? (1)

- Industry has become very conservative on the approaches to be taken in R&D, due to the impact of the stock market.
- We need to keep the technology-centric approach, or else, we'll endanger the progress of telecommunications: fibre optics started as a pure theoretical approach, without a hint of its application.
- Basic R&D should be performed without barriers.



(HomeTheater, 2008)



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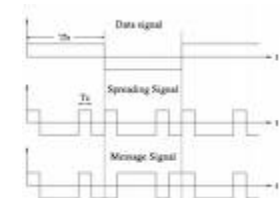


Which kind of R&D? (2)

- One could have objective oriented R&D (e.g., “I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon”).
- There is the need to perform applied R&D as well.
- In industry, R&D moved essentially from operators to vendors. What is the impact?



(YouTube, 2008)



(McGill, 2004)





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Which objectives?

- The Olympic Games motto applied to current systems (i.e., more of the same, but just better), is a too shortfall goal.
- In order for Europe to keep playing a major role in mobile & wireless, one should have a disruptive view of the future.
- eMobility's SET concept has to be taken into consideration!



~~*Citius*
Altius
Fortius
(Faster
Higher
Stronger)~~

 eMobility
Simplicity,
Efficiency
Trust



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Learning from PCs (1)

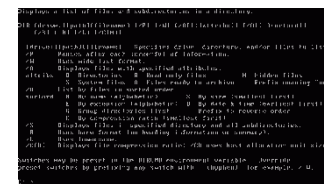
- Mainframes dominated, until PCs took over when computers were extended to the mass market.
- An operating system based on windows had a crucial importance in the spread of PCs.
- Easiness of use is essential for the mass market.



(IBM, 1972)



(Apple, 1986)



(Wikipedia, 1972)



(Microsoft, 2007)



(PhotosCom, 2008)



(Nokia, 2007)



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Learning from PCs (2)

- Initially, PCs had performance metrics that were orders of magnitude below the current ones (ZX Spectrum, 1982, 3.5MHz, 16kB, 0GB).
- There will be a race in wireless systems between services made available to users and data rates made available by phones/networks.



(Sinclair, 1982)



(Nadine Meade, 2000)



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Today's Technology (1)



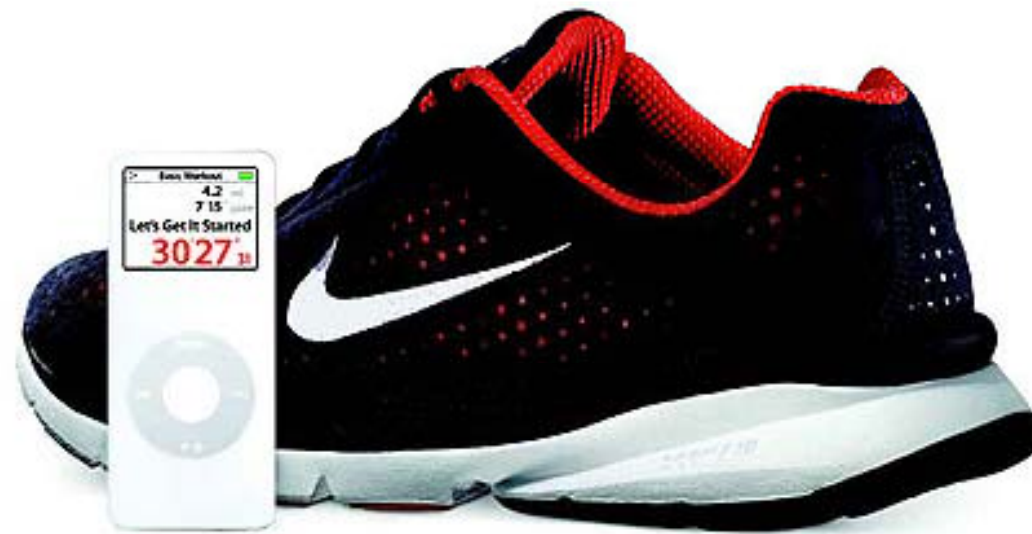
(Burton/Motorola, 2006)



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Today's Technology (2)



(Nike/Apple, 2006)



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Today's Technology (3)



(Voltaic Systems, 2006)



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Today's Technology (4)



(iTech, 2005)



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Today's Technology (5)



(gadgetcraver, 2008)



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Today's Technology (6)



(Rimax, 2007)



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Learning from today's networks (1)

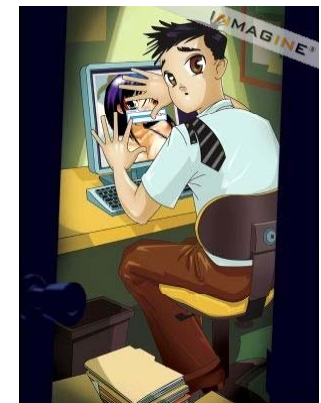
- Security is a key issue for the development of new services that make use of payments.
- Privacy has been introduced in GSM, in order to avoid eavesdropping.
- New developments may constitute a breach into consumers privacy (e.g., location, use of services, and origin of payments). A barrier?



(Artfile, 2007)



(MIT, 2005)



(Imagine, 2007)



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Learning from today's networks (2)

- The airline industry has faced in the last years the “low cost” concept. Will this be extrapolated into telecom networks?
- Currently, there are MVNOs (Mobile Virtual Network Operators). Will there be other concepts extrapolated from this one in the Future Internet?



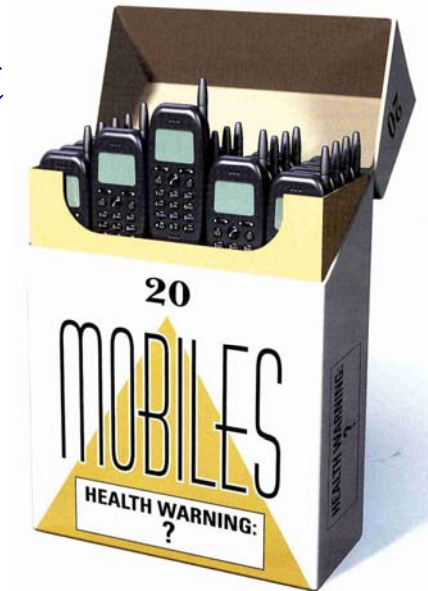


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Learning from today's networks (3)

- Possible radiation hazards have been a more or less acute problem.
- Will there be unforeseen problems that will endanger system developments?
- Risk acknowledgement and communication should be accepted as part of the introduction of new technologies.
- What about environmental issues?



(MobileCom, 2001)



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Perspectives into the Future Internet (1)

- Today's approach to selling PETs (Personal Enhanced Terminals), i.e., phones, may be changed in the future. You may:

- buy a phone just to use for a few times, and then throw it away;
- go to a shop and order the “construction” of a terminal according to your wishes.



(Kodak, 2008)



(ComputerDepot, 2008)



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Perspectives into the Future Internet (2)

- The terminal of tomorrow may be spectacles:
 - everyone will use one, like a wrist watch today;
 - they will carry your personal RF SIM, which will enable to use other devices, appropriate to other uses (in car, at home, in the air plane, at the office, etc.)



(Mobilemag, 2003)



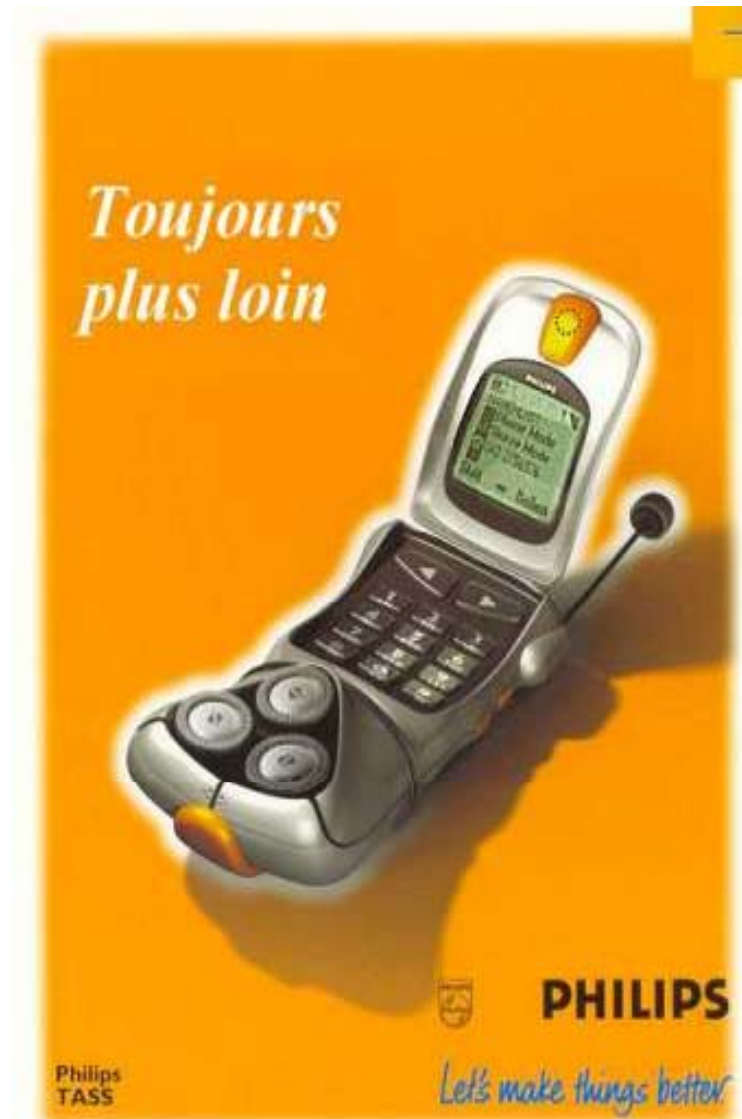
(Minority Report, 2002)



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Perspectives into the Future Internet (3)





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Perspectives into the Future Internet (4)

- Voice was the killer application for GSM, as expected.
- SMS is being a second killer application, but no one foresaw it.
- Will there be a killer application for future systems (e.g., who could guess mouse control back at the line command time in computers)?



(HighSpeedFX, 2008)



(Uberreview, 2008)



(IBM, 1972)



(Apple, 1986)



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Perspectives into the Future Internet (5)

- Location based services are being introduced these days, upon user demand.
- The opposite way may be introduced, i.e., the environment being aware that the user is present.
- Are we in danger of having a situation similar to spam or virus on mobile phones?



(Unwired, 2007)



(Minority Report, 2002)



(SpamSy, 2008)



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Perspectives into the Future Internet (6)

- Today's systems are based on a person being the end user.
- Future systems must consider machine-to-machine communications as being, potentially, more important.
- Sensor networks are emerging as one of the “killer” network structures of the future.



(Kenwood, 2007)



(DHD, 1998)



(SensorProd, 2007)



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Perspectives into the Future Internet (7)

- Today, the phone represents the whole system for the user, i.e., it is the visible component, being the communications interface.
- Future systems must deal with the easiness of use (networks complexity must be hidden from users) vs. giving users the power to establish their communication environment.



(Nokia, 2006)



(Jesse Stuart, 1948)

(Nokia, 2006)

(USP, 2008)



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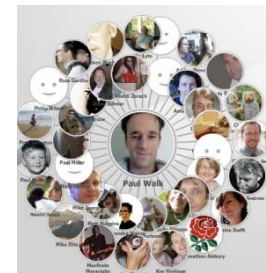


What services? (1)

- Mobile 3D Internet:
visualisation of 3D images from a terminal.
- Real-time ad hoc communities:
extending social networks into happenings on the spot.
- Prosumers:
users playing a decisive role as producers and consumers of contents.



(Builder AU, 2008)



(FutureLab, 2008)



(enriquedans, 2006)



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What services? (2)

- Context aware mobile web:
physical and social awareness of
users' experience.
- Interactive context aware games:
games adapted to the user's
physical environment.
- Augmented reality:
combination of virtual with real life
objects.



(DanceInternational, 2005)



(UniversalStudios, 2007)



(Spectrum, 2008)



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What technologies?

- Some ideas can be put forward:
 - objects and ideas based information: instead of using text to make searches;
 - parallel transmission: using all available networks simultaneously to transport data
 - resilient connectivity: always connected, regardless of network.



(worldpress, 2008)



(pictjug, 20048)



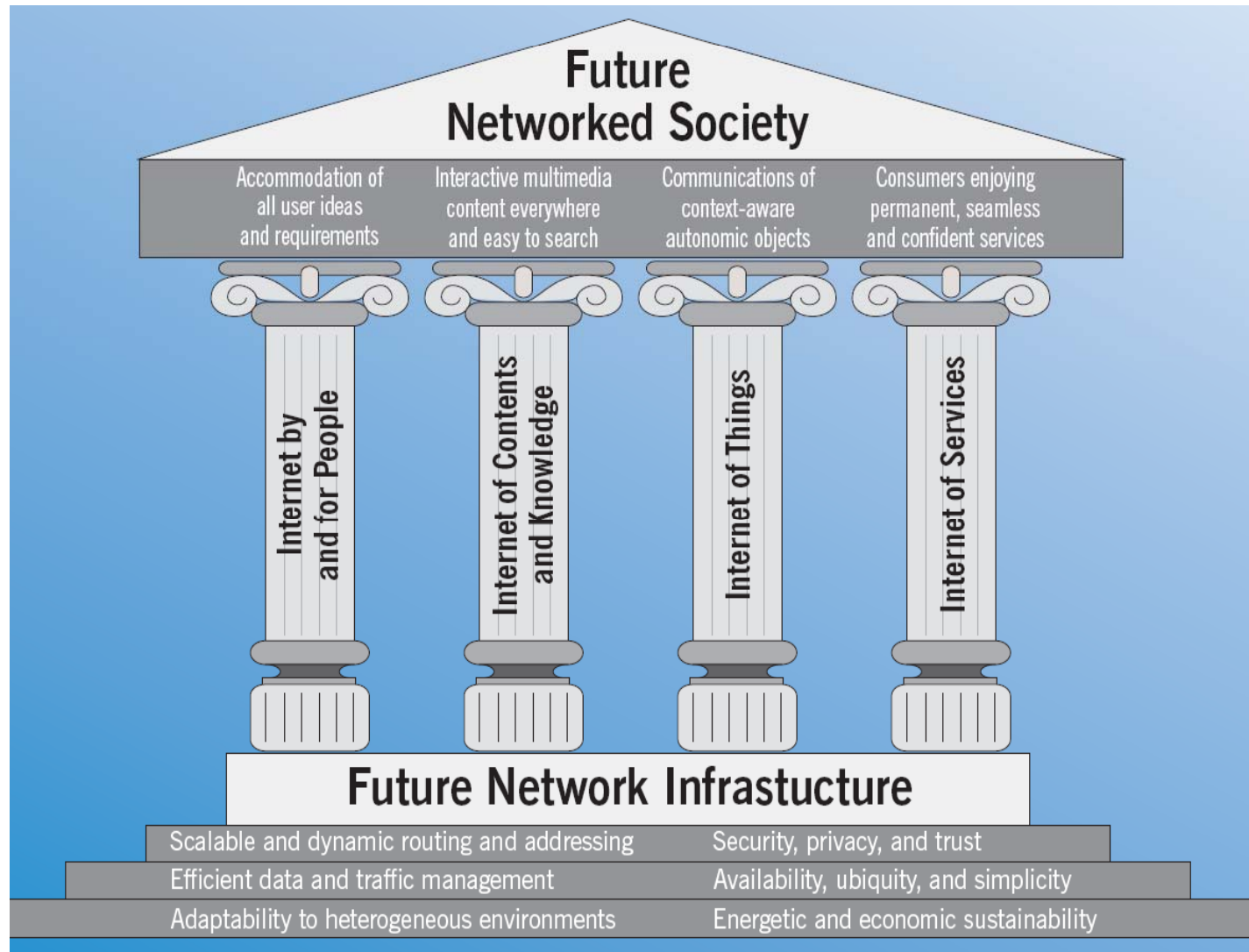
(picasaweb, 2006)



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Joint ETP Vision





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Regulation & Standardisation (1)

- Traditionally, Europe has had an approach to standardisation/regulation different from the US one.
- Concerning the Future Internet, which bodies should be addressed?
- Standardisation does not influence basic R&D, but it definitely guides its results.





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Regulation & Standardisation (2)

- Some of the ideas being developed for the Future Internet (*3D Internet*, *Information based networks*) are for the mass market, which means that standardisation/regulation will play a key role.
- Other ideas are for the industry (*Virtualisation*, *In-Network management*), where standardisation also plays a key role.



I E T F®



中国通信标准化协会

China Communications Standards Association

ARIB



3RD GENERATION
PARTNERSHIP
PROJECT 2
"3GPP2"

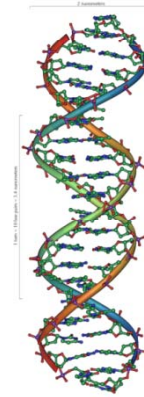


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Policy (1)

- Research on the Future Internet needs to interact with other areas (biology, sociology, psychology, construction, cars, ...).
- This interaction will increase the complexity concerning regulation and policy.
- Will there be ethical barriers, like those existing today in biology/medicine?



(Wikipedia, 2008)



(RICS, 2008)



(PBASE, 2008)



(Amazon, 2008)





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Policy (2)

- Whether we like it, or not, some policy aspects do need to be taken into consideration, e.g., the possibility of Governments having access to data.
- How to comply with the interests of so many players (telecom operators and vendors, service and content providers, banks, goods distribution, ...), with different development cycles?



(Tecnotrekos, 2008)



(Swissbank, 2008)



(GeeAyBee, 2007)



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The End

- *“I think there is a world market for maybe 5 computers”*, Thomas Watson (IBM), 1943.
- *“There is no reason anyone would want a computer in their home”*, Keneth Olsen (DEC), 1977.
- *“The best way to predict the future is to invent it”*, Alan Kay (UCLA), 1971.
- *“Shakespeare in love”* can be an inspiration:
 - *“It’s the dawn of a new day, my lady”*
 - *“No. It’s the dawn of a new world”*.