

S-38.3215 Special Course on Networking Technology

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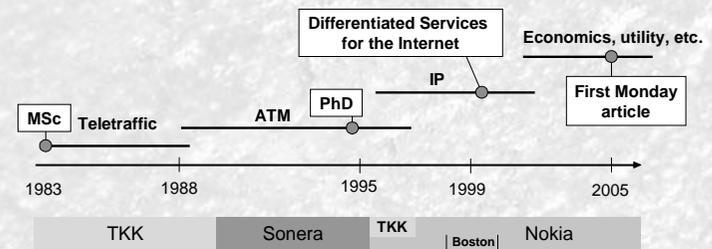
Critical thinking

Content today

- Background
- Practical issues
- Intro to the topic
- Very short summary of First Monday article
 - different perspectives
 - network evolution

Background

- Kalevi Kilkki



- Now on sabbatical leave, contact
 - kalevi.kilkki@luukku.com "freely available"

Objective

- Critical thinking, Google hits:
 - “Critical thinking”: 14 million
 - “Critical thinking about”: 174 000
 - “Critical thinking about technology”: 866
 - “Critical thinking about media”: 743
 - “Critical thinking about telecommunication”: 0
- Objective of this course:
 - To develop skills in critical thinking about communication networks and services

Course content

- Critical thinking = a skill (more than knowledge)
- Skill must be practiced
 - personal exercise: “critical assessment of a technology or service”
 - active discussion
- Lessons 2 * 3 hours
 - 9.11. Intro, some tools
 - 16.11. Examples
Selection of topics for personal / group work (preferably with your own interest – think beforehand)
 - 30.11. Presentations & discussion
 - 7.12. Presentations & conclusion
- Examination or “controlled exercise”

Other issues

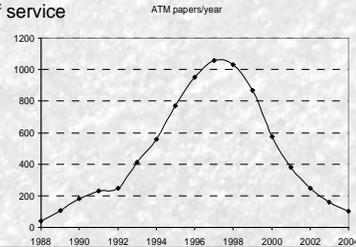
- Assistant / contact person = ?
- Participants
 - Background
 - Motivation
 - Willingness to do exercise
- ECTSs and grade depend on
 - Presentation (~60%)
 - min: slides
 - target: paper submission
 - Final examination (~40%)
 - Course activity (may improve by 1)
- Any other issue?

Material

- Possible readings
 - See course web-page
 - at least look at some of those, read what you think most interesting...
 - First Monday article could be considered compulsory
- Slides will be available
- but, once more, critical thinking is a skill

Motivation...

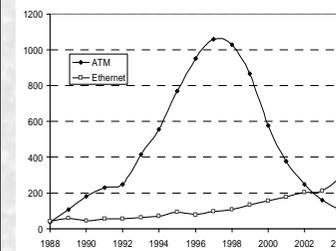
- What is the motivation of the authors (in addition to find the Truth)?
 - Get as many papers as possible published
 - Prove their cleverness or capabilities in a certain specific field
- ⇒ Most papers tend to
 - be uncritical with narrow scope,
 - repeat the old story of the great benefits and prospects of the technology of service
- Very few papers
 - critical toward the current hot topic, or
 - assessing any clear failure
- 100 000 papers can be wrong (ATM)



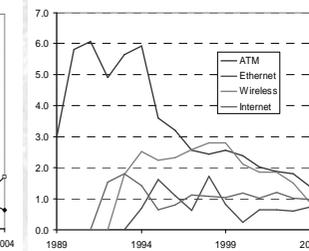
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9/32

More statistics



Papers per year with
ATM or Ethernet in abstract



Share of QoS papers
with the keyword
compared to
average share of QoS papers

(More on the 2nd lecture)

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10/32

“Sensible design principles for new networks and services”

<http://www.firstmonday.org>, January 2005

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11/32

“Sensible design principles for new networks and services”

- Value of a new application or service
- Concentrate on practical uses
 - likely to become everyday routines for majority of customers,
 - instead of seeking special cases with the utmost attractiveness.
- Be critical with methods that
 - are useful only with applications that are not used (almost) every day
 - are not important for majority of users
 - those applications shall affect the general design

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12/32

“Sensible design principles for new networks and services”

- Development of a new technology must be based on core principles
- Core principles must be able to limit the innate trend toward complexity
- Be cautious with technologies without defined core principles
 - those are often too complex anyway...
- Be particularly critical to methods that
 - are against the core principles of the network
 - particularly, get familiar with Internet principles

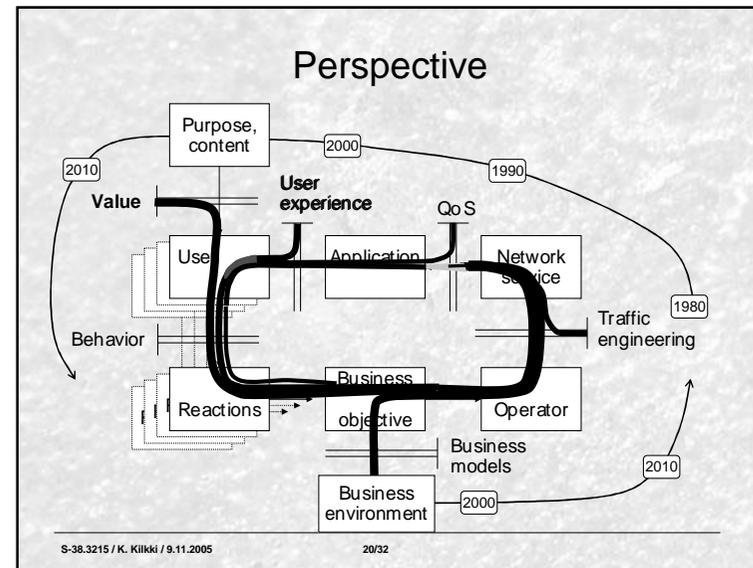
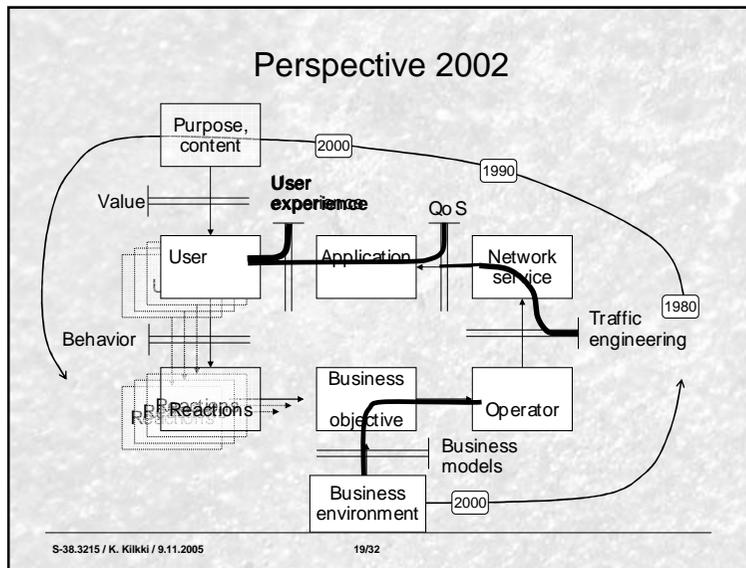
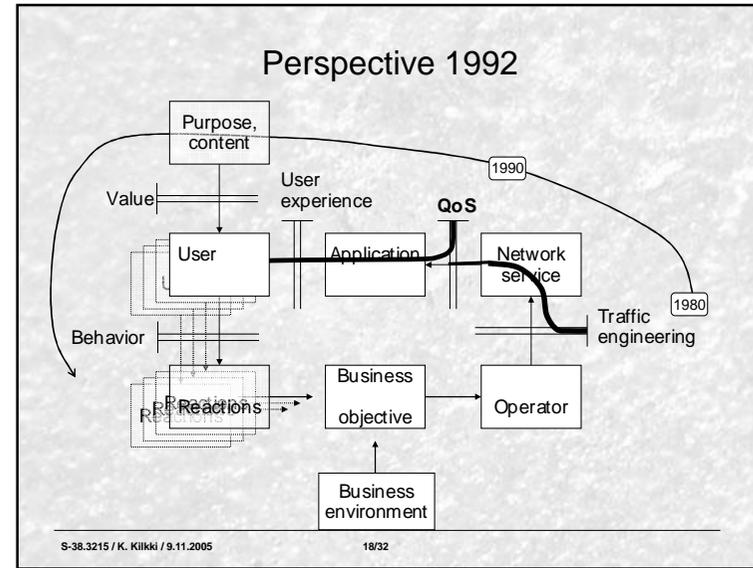
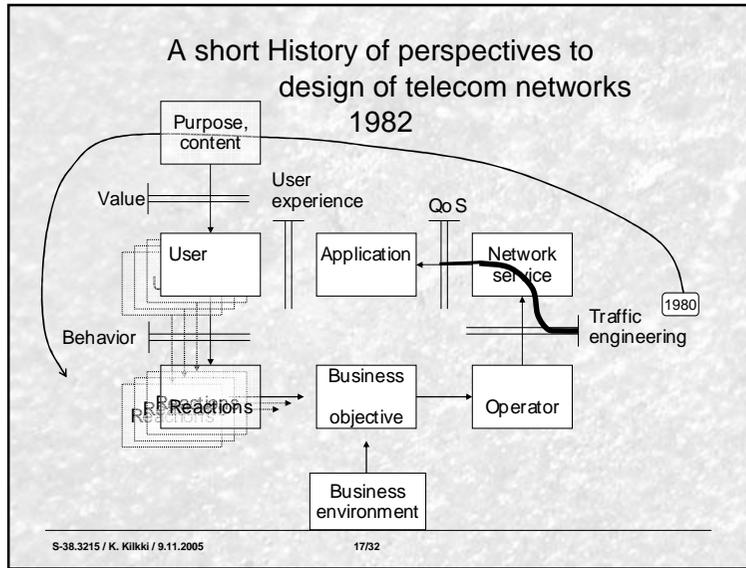
“Sensible design principles for new networks and services”

- When a current technology is developed further
 - Look for methods and mechanisms that
 - serve both the interest of key stakeholders,
 - and the common good
 - Be critical with methods without clear motivation for key players
 - pure common good is, unfortunately, not enough
- more about this later...

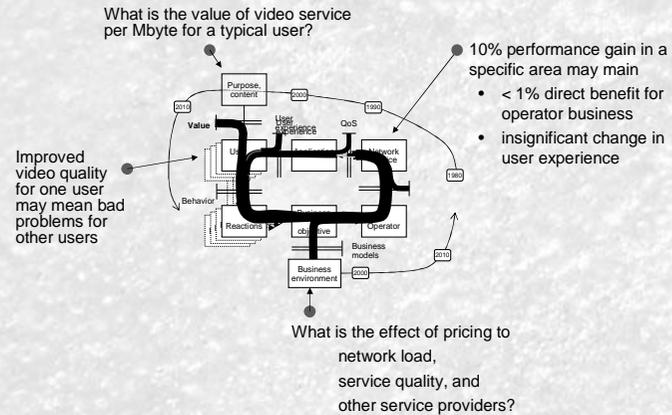
Summary: How to be more realistic?

- Think
 - Business benefits
 - Operator decisions are business decisions
 - Benefits must be significant compared to risks and additional costs
 - User benefits
 - Particularly related to everyday routines
 - Simple assessment is often easy (e.g. MMS)
 - Different perspectives
 - Network, application, user, business
 - Realistic network evolution
 - The size of gain is not the only issue (game theory)

Perspectives



No separate issues, no one right perspective



Lessons

- All issues shall be assessed as a part of the whole
 - hard to assess but absolute necessary
 - 10% performance gain is not a meaningful result for a service provider
 - rough guess: 95% of ATM papers had this defect
- At least consider
 - Realistic business effects,
 - both benefits and cost
 - Main effects on user experience, if any
 - not only for the target users, but all other users as well
- Use first your common sense – then some more formal analysis, if needed and possible

Evolution

Some basic rules...

- With any new method proposed for communication network
 - Necessary to identify the type of game to which the method leads the competing operators.
 - An analysis of common good (the sum of benefits in the last phase) does not provide a sufficient basis for predicting the success of a new method.
 - Analyze the gain obtainable from the first user of the method and the gains or harms of those operators that are introducing the method later (or never).
- How?

Methods and evolution

Methods that are beneficial

- 1a. only when all operators implement them, and the benefit is equal among all operators.
- 1b. only when all operators implement them, but the benefit varies considerably among operators.
- 2a. for an individual operator even when applied only by the operator, and all operators can achieve similar benefits by applying it later.
- 2b. for an individual operator even when applied only by the operator, but the benefit varies considerably among operators.
3. for an individual operator when applied only by the operator, and are harmful for other operators, if they are not using the same method.
4. for an individual operator even when applied only by the operator, but harmful for other operators, even when they are using the same method.

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25/32

Evolution type 1a

Phase Operator	1	2	3	4
C	o	o	o	+
B	o	o	-	+
A	o	-	-	+

- Beneficial only for an individual operator even when applied only by the operator, and all operators can achieve similar benefits by applying it later.
- Very problematic, but common!
 - many QoS systems
 - possible with strong common regulatory body, like ITU (earlier)
- Examples?

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26/32

Evolution type 1b

Phase Operator	1	2	3	4
C	o	o	o	o
B	o	o	-	+
A	o	-	-	+++

- Beneficial only when all operators implement them, and the benefit varies among all operators.
- Even if phase 4 were somehow reached, operator C has an incentive to return to phase 3 (due to competition)
 - practically impossible to reach phase 4, even with great gains for some operators

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27/32

Evolution type 2a

Phase Operator	1	2	3	4
C	o	o	o	+
B	o	o	+	+
A	o	+	+	+

- Beneficial for an individual operator even when applied only by the operator, and all operators can achieve similar benefits by applying it later.
- Temporary benefits during middle phases
 - still there is a business risk for early adopters (because the real outcome is difficult to predict)
 - strong motivation for patenting!

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28/32

Evolution type 2b

Phase Operator	1	2	3	4
C	o	o	o	o
B	o	o	+	+
A	o	+++	+++	+++

- Beneficial for an individual operator even when applied only by the operator, but the benefit varies considerably among operators.
- Due to large temporary benefits during middle phases, evolution will likely be rapid
 - but stops to some middle phase

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29/32

Evolution type 3

Phase Operator	1	2	3	4
C	o	-	--	+
B	o	-	+	+
A	o	+	+	+

- Beneficial for an individual operator when applied only by the operator, and are harmful for other operators, if they are not using the same method.
- Due to large temporary benefits during middle phases, evolution will likely be very rapid
 - even a small gain is sufficient
 - patenting very beneficial

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30/32

Evolution type 4

Phase Operator	1	2	3	4
C	o	-	--	-
B	o	-	o	-
A	o	+	o	-

- Beneficial for an individual operator even when applied only by the operator, but harmful for other operators, even when they are using the same method.
- Extremely problematic: evolution tend to lead to harmful result for everyone!
 - Note: every separate move of each operator is reasonable!
 - Need for common regulator!

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31/32

Lessons

- ?

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32/32