e-Learning ,current status and future, teaching Mathematics On-line

EQIBELT

Project Consortium 25.9.2008

Heikki Hallantie, TKK

1. TKK

Vision

Helsinki University of Technology is an internationally renowned university of technology, known for its high standards in research and teaching, its social impact and ability to change with the times.

Helsinki University of Technology is a pioneer in facilitating co-operation with leading universities and innovative enterprises.

The researchers, teachers, and students who seek to work or study at Helsinki University of Technology rank among the best in their countries.

Values

Helsinki University of Technology

- ➢ fosters freedom of research, art and teaching

- ➢ values creativity and critical thinking

- ➢ requires an honest, responsible and ethically sustainable approach in all its activities

- ➢ respects individuality and the special characteristics of all cultures

- ➢ provides challenges in work and co-operation

- ➢ promotes the well-being of staff and students

Resources 2005

Financing total
205 003 000 EUR

External financing 43%

From national budget 57%
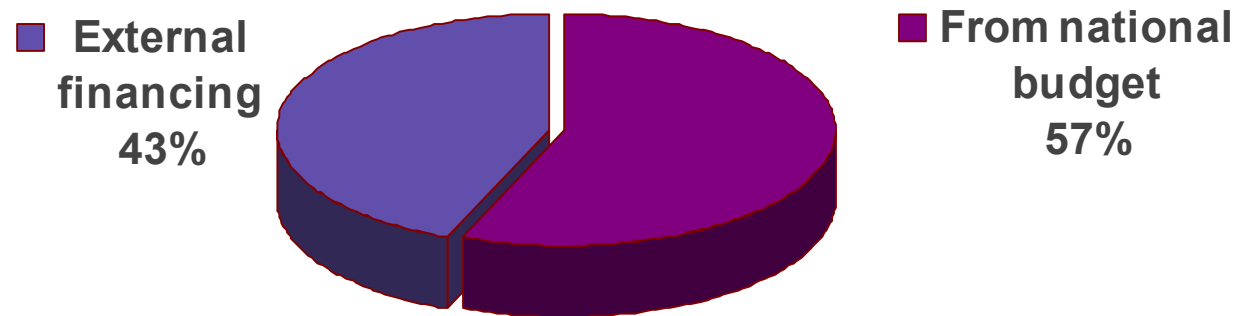
3258 FTE Staff

Results 2005

1 253	**Number of degrees**
1 017	Master's degrees (female 26.6%, foreigners 6.9%)
86	Licentiate degrees
150	Doctor´s degrees (female 30.7%, foreigners 9.3%)

15 166	**Number of students**
12 381	Undergraduates (female 19.9%, foreigners 3.7%)
10 880	M.Sc
1 501	B.Sc
2 785	Graduates (female 27.6%, foreigners 10.5%)
93	**Statistical full-time students at the open university**
13 328	**Adult students**

2. e-learning in Nordic countries

E-learning Nordic 2006

- First inter-Nordic study concentrating on the impact of ICT in primary education
- Carried out in Finland, Sweden, Norway and Denmark
- 8000+ people have participated in 224 Nordic schools
- ICT has positive impact on learning
- ICT is not fully utilized

Impact of ICT on pupil performance

- Strongest on subject –related matters
- Learning basic things like reading and writing
- Tool to support differentiation
- Avoiding exclusion is still an issue
- Computers are used more at home than at school

Impact of ICT on teaching and learning processes

- Pupils would like to use computers more
- New technologies like digital cameras, mobile phones and chat have entered the schools
- New technologies support teachers in differentiating their teaching
- Possibilities are expected to be great, not much is realized
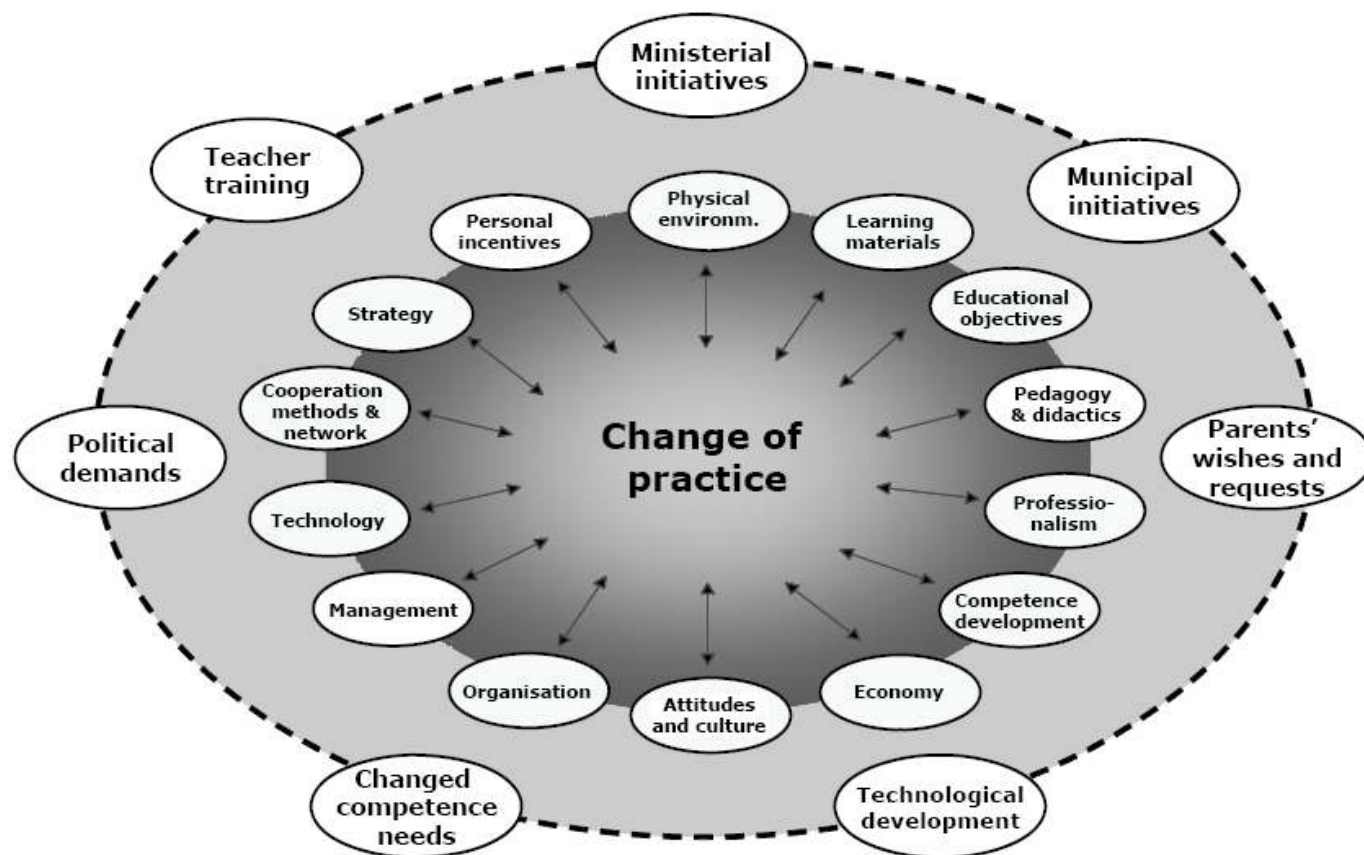
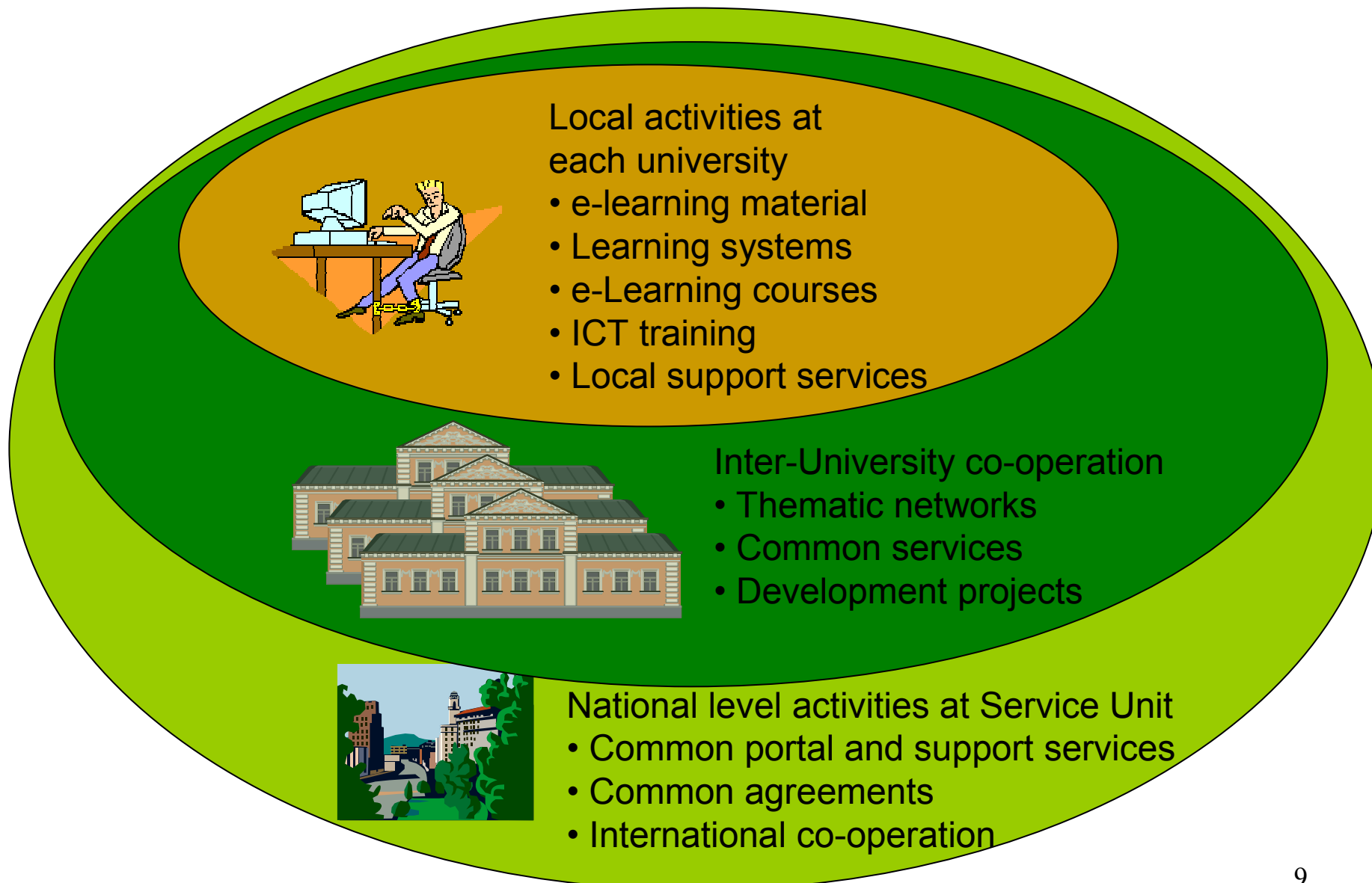Drivers and barriers for the change of practice at schools

E-learning Nordic

3. e-learning in Finnish Universities

ICT's in Finnish University Education

- ## The Finnish University System
  - 21 State Universities

- ## Autonomy of Universities

- ## Finnish Virtual University
  - eLearning hype
  - good and bad experiences

- ## Towards Portals and MLE's

Finnish Virtual University activities

Local activities at
each university
• e-learning material
• Learning systems
• e-Learning courses
• ICT training
• Local support services

Inter-University co-operation
• Thematic networks
• Common services
• Development projects

National level activities at Service Unit
• Common portal and support services
• Common agreements
• International co-operation

ICT's in TKK's Education

- Early adoption in pilot courses
- Student database in 90's
- Web-based course registration system in 90's
- Finnish Virtual University initiative 1999
- Common Learning (Optima) platform in 2004
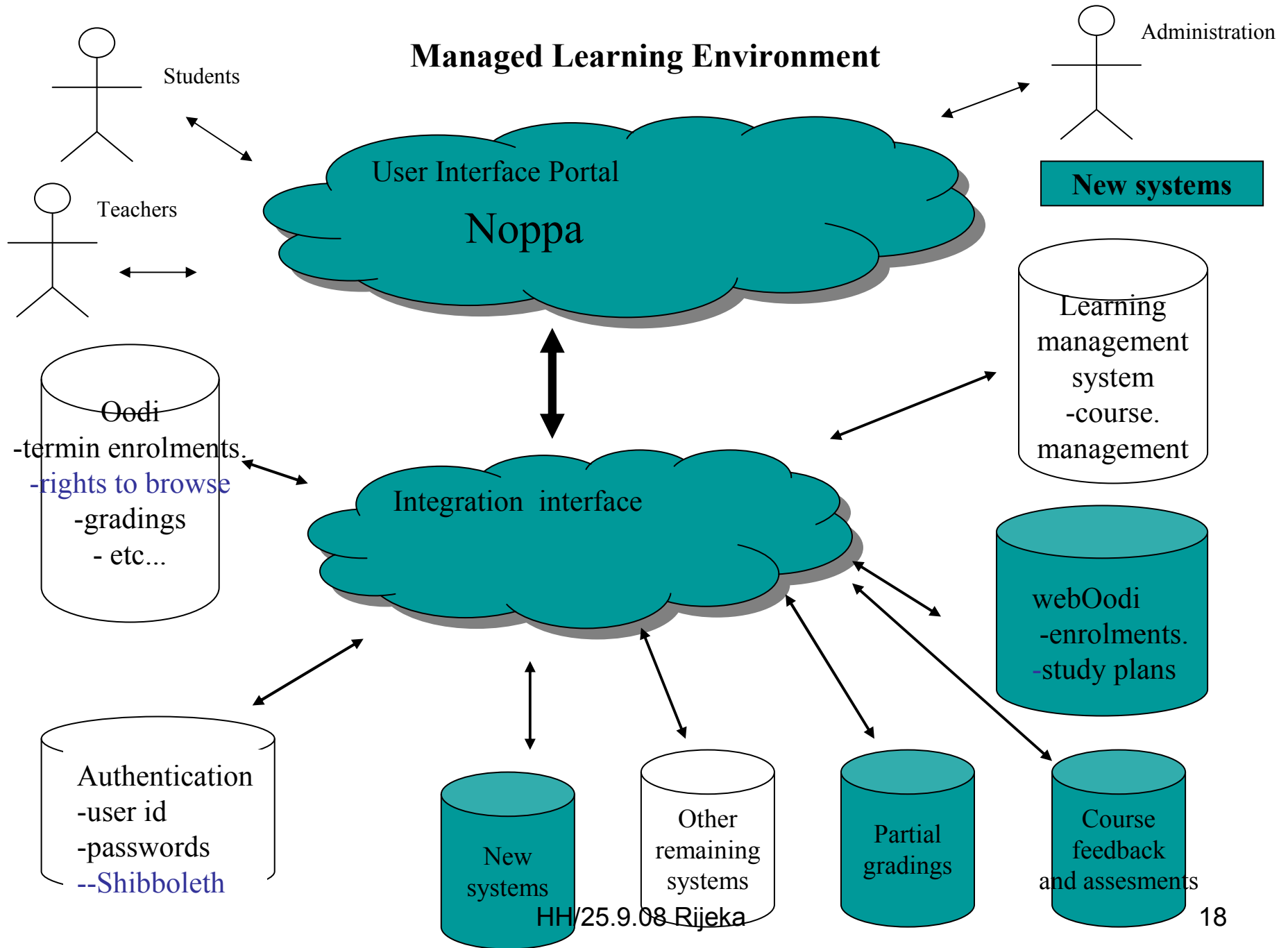- eTKK- project in 2005

Contents of eTKK

- eTKK consists of five projects
  - Content Management System for web publishing
  - Noppa-portal & Managed Learning Environment
  - Project management system for researchers and administration
  - eAGE: electronically Administrated Generic Environment
  - Publishing platform for university wide quality system

Reasoning behind eTKK

- ## To survive in the global and local competition
  - We need more effective processes
  - We need to ICT systems to support these processes
  - These ICT systems must be usable and designed user centeredly

- ## ICT will NOT solve the challenges by itself but it's necessary tool in today's digitalizing environment
  - Remember that ICT is only one part of organizations socio-technical environment

Integrating systems to support user's processes

- Noppa-portal
  - Personalized front page for students and teachers + course home pages
  - Focus is on supporting the daily processes
- Oodi
  - Main student and course register
  - Study planning
  - Course enrollments
- Optima
  - e-learning
  - Groupware
- Single Sign-On with Shibboleth

NOPPA-PORTAL

> Webmail > Oodi > Optima

HOME   COURSES   HELP   YLLÄPITO   ADMIN MODE   MY SETTINGS

Logged in:
Heikki Hallantie
> Log out

TKK

COURSES I ATTEND | COURSES I ADMINISTRATE | ALL MY COURSES

News

Show: 10 items

Print news

Posted	Title	Source
10 Dec 07	Muista ilmoittautua joulukuun tenttiin	TU-22.1202 Logistiikka
07 Dec 07	Kertaus Ke 12.12.	Tfy-3.1242 Fysiikka IB
07 Dec 07	Tenttiin ilmoittautuminen	Tfy-3.1242 Fysiikka IB
30 Nov 07	Ei opetusta 6.12.	Tfy-3.1242 Fysiikka IB
27 Nov 07	5.11. Luentokalvoissa virhe	TU-22.1202 Logistiikka
27 Nov 07	Vierailu RFID-Labissa 10.12. klo 14-16	TU-22.1202 Logistiikka
22 Nov 07	Prolonged maintenance in data communications on Monday Nov 26th starting at 5 pm	General news
22 Nov 07	Pitkä huoltotyö tietoliikenteessä maanantaina 26.11. klo 17 alkaen	General news
20 Nov 07	Laskuharjoituspisteet	Tfy-3.1242 Fysiikka IB
14 Nov 07	Opetusmoniste saatavilla Editasta	TU-22.1202 Logistiikka

1 2 3 > >|

Events

Show: 1 weeks

Export to external calendar (iCal)   Print events

Week	Date	Time	Event	Course
51	Tue 18 Dec 07	9-12	Tentit	TU-91.2005 Strategic Management of Technology and Innovation P
51	Wed 19 Dec 07	13-16	Tentit	Tfy-3.1242 Fysiikka IB
51	Wed 19 Dec 07	17-20	Tentit	TU-22.1202 Logistiikka

Courses I attend (Edit)

TU-91.2005
Strategic Management of Technology and Innovation P

Tfy-3.1242
Fysiikka IB

TU-22.1202
Logistiikka

Old courses

Courses I administrate

TU-91.2005
Strategic Management of Technology and Innovation P

Tfy-3.1242
Fysiikka IB

TU-22.1202
Logistiikka

My links (Edit)

General links

➡ Helsinki University of Technology
➡ Units
➡ International Student Services
➡ Library
➡ Passwords at TKK

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Helsinki University of Technology study portal Noppa

Protection of privacy | Service description

Standardized course pages (1)

- All courses should have the following pages in Noppa
  - Course brochure
  - Course news
  - Timetable
  - Course results
  - Exercises and course material

Standardized course pages (2)

- To help teachers create the content
  - there are custom made templates and easy-to-use tools
  - the tools are designed to support different kinds of processes
    - i.e. there might be two ways to do the same thing
    - Both ways lead to the same result

Present situation

- Usage of central learning platform is increasing rapidly (8500 user accounts)

- MLE- portal is in production use from 1.1.2008

- Lots of integration needs

- Single sign-On and Web services as solution

4. Teaching mathematics On-line

Background factors

- Massification of teaching
- Starting level of new students is getting lower
- Teaching of undergraduate level mathematics is mostly similar everywhere
- Need for new technologies
- Lack of international standards
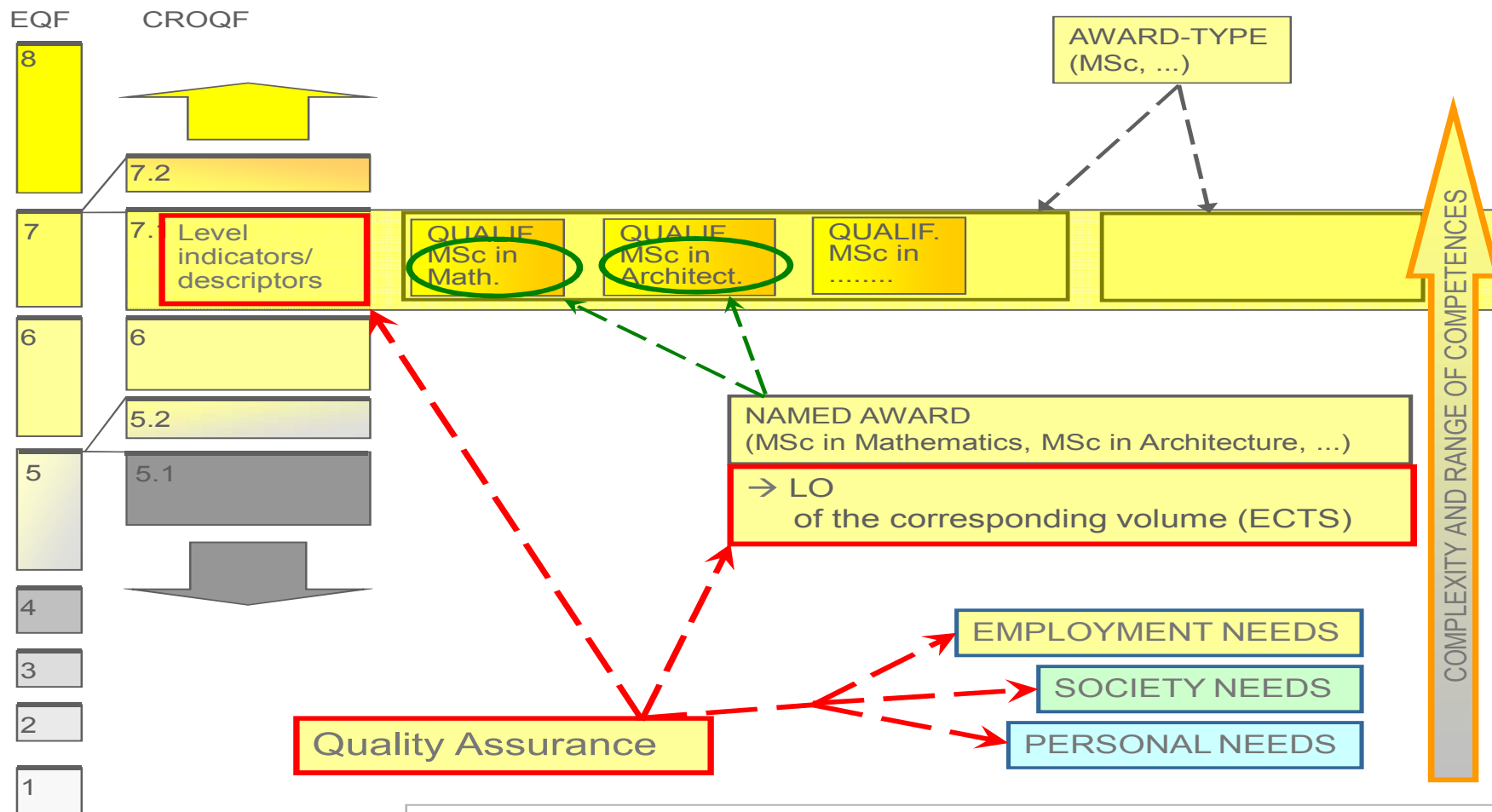- Experimeltal projects

New teaching tools at TKK

- Learning outcomes come into picture
- Co-operation with Bavarian Virtual University and Finnish Virtual University
- Standardized course material available on the web
- Animations, automatically personalized and corrected assignments
- Open source licencing

EQF   CROQF

8

7.2

7   7. Level indicators/ descriptors

6   6

5.2

5   5.1

4

3

2

1

AWARD-TYPE (MSc, …)

QUALIF. MSc in Math.

QUALIF. MSc in Architect.

QUALIF. MSc in ……..

COMPLEXITY AND RANGE OF COMPETENCES

NAMED AWARD (MSc in Mathematics, MSc in Architecture, …)

→ LO of the corresponding volume (ECTS)

EMPLOYMENT NEEDS

SOCIETY NEEDS

PERSONAL NEEDS

Quality Assurance

Mile Dželalija & Slodoban Uzelac: Development of the Croatian Qualifications Framework, Nov 2007

EQF applied to Engineering Mathematics
A working group by SEFI 2002
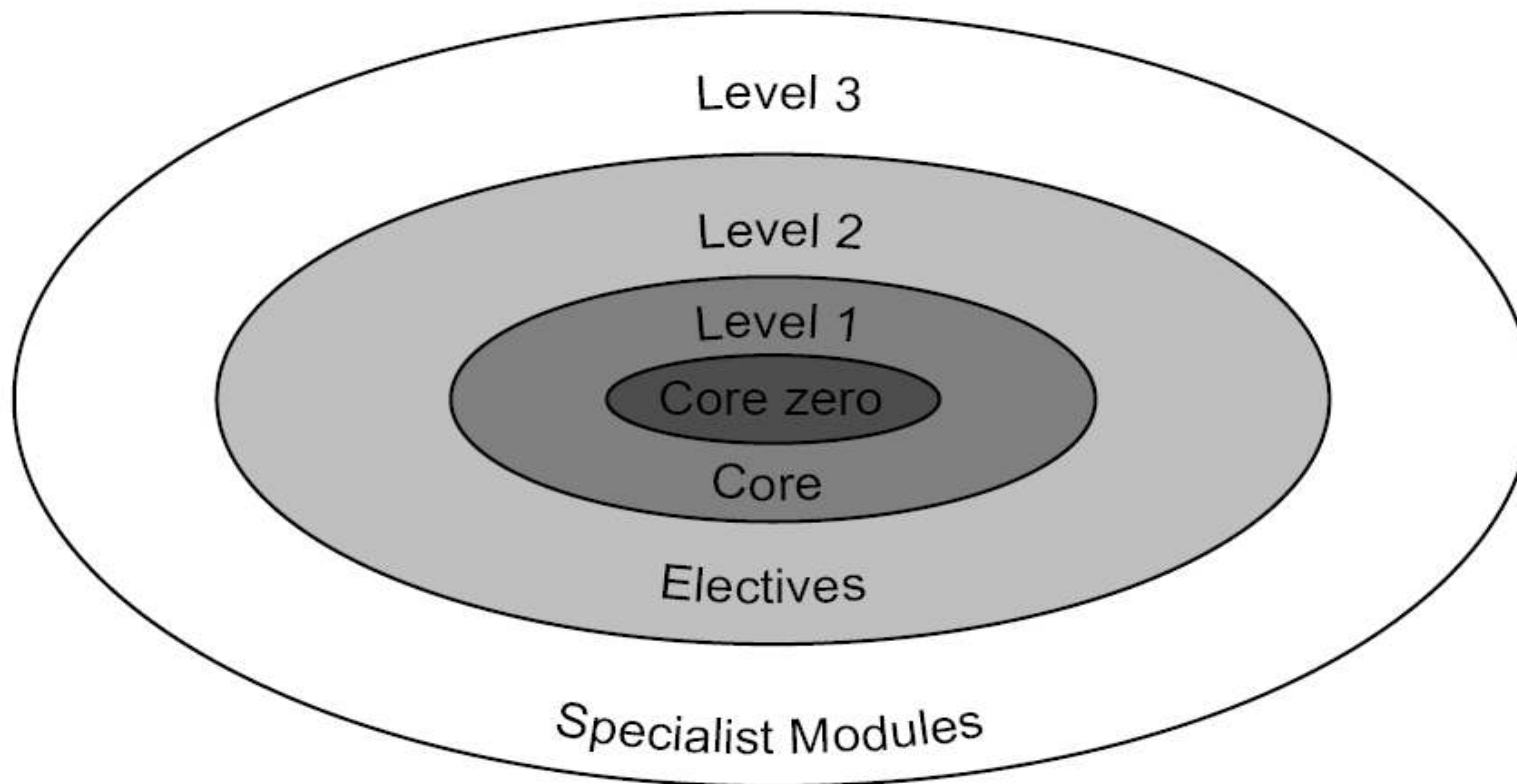
Example of Learning Outcomes

Knowledge

Definitions:

Limit of a function p.61
Continuity p.61
Fixed -point iteration p.68
Arc length p. 69
Rectifiable curve p.69
Trigonometric functions p. 71
Derivative p.73
Maximum and Minimum values p.77
The natural logarithm p.65
Hyberbolic functions p.84

Comprehension

Proofs:
Continuity of combined continuing
functions p.62
Mean -Value Theorem p. 65
Existence of Minimum and Maximum p.
67

Definitions:
Formal definition of limit p.63

Examples:
Rectifiable functions p. 70
Trigonometric functions p.71
Differentiable functions p.73
Exponentials and Logarithms p. 80-83
Hyberbolic functions p.84

Application

Theorems:
Limits of a) function multiplied by constant
               b) sums of functions
               c) multiplication of functions
               d) division of functions p.62
Convergence of Fixed-point iteration p.68
Chain rule of Derivative p.85
Derivative of inverse function p.87

Rules and formulas:
Sum rule of trigonometric functions: p.72
Properties of Derivative p.74-79
-Multiplication by scalar
-Derivative of product function
-Derivative of Polynomial
-Derivative of Quotient
-Derivative of Trigonometric functions
Exponentials and Logarithms p.80-83

Mathematics course in Noppa

https://noppa.tkk.fi/noppa/kurssi/mat-1.1610/etusivu

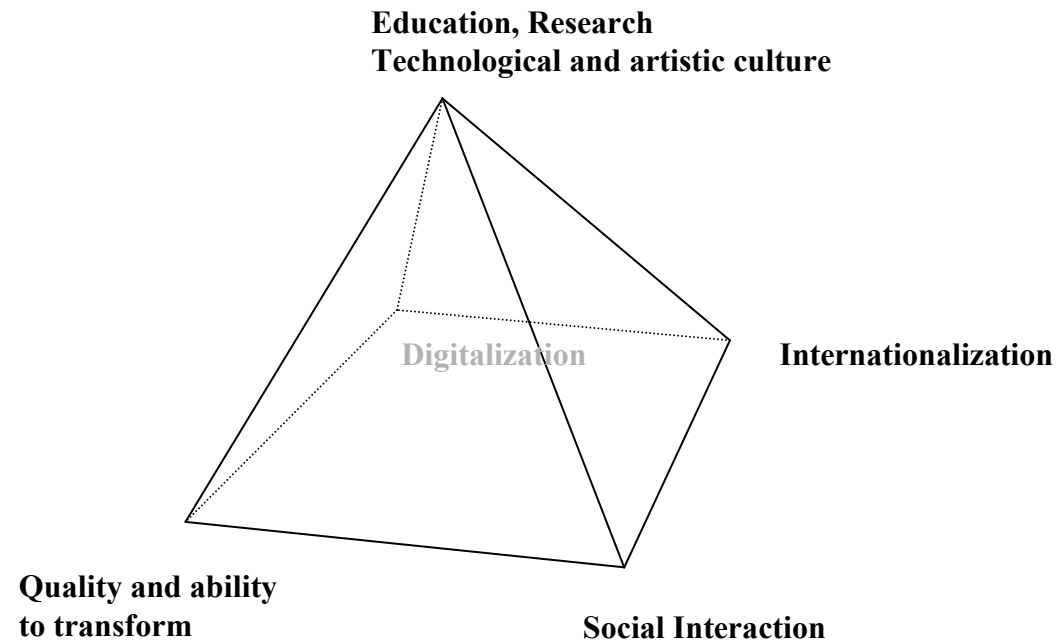https://optima.tkk.fi

5. Challenges of the Future

Roadmap to the future

- New strategic thinking
- University in Global environment
- University as an institute of Information society
- From formal hierarchies to open networks
- Global competition and co-operation of Universities
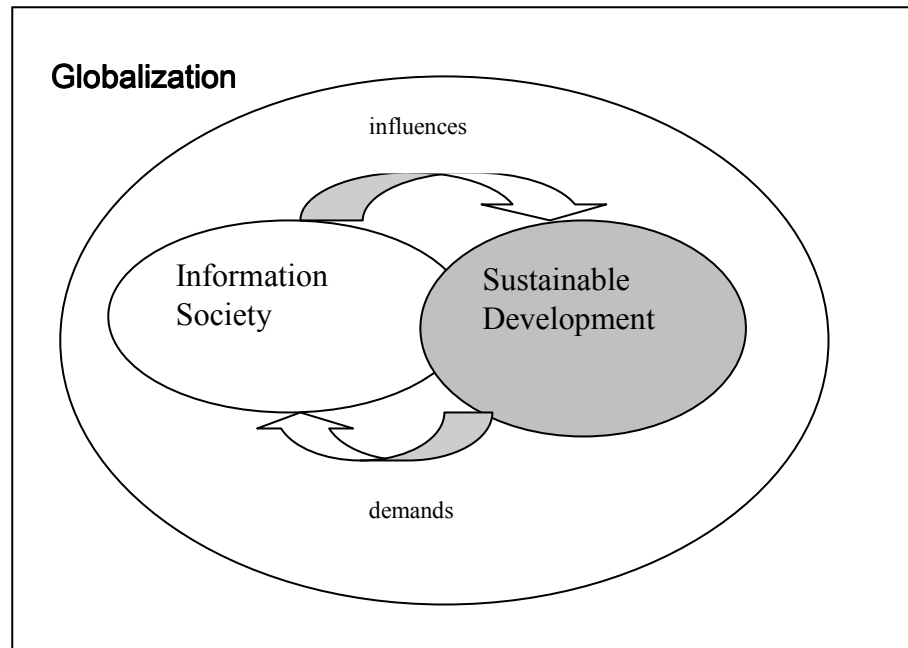- University as a regional player

Mission and strategic areas of TKK

Education, Research
Technological and artistic culture

Digitalization

Internationalization

Quality and ability
to transform

Social Interaction

Globalization, Information Society and Sustainable development

Source: Heinonen, S., Hietanen, O., Kiiskilä, K. & Koskinen, L. 2002, *Kestääkö tietoyhteiskunta ?*, Turku School of Economics, Turku
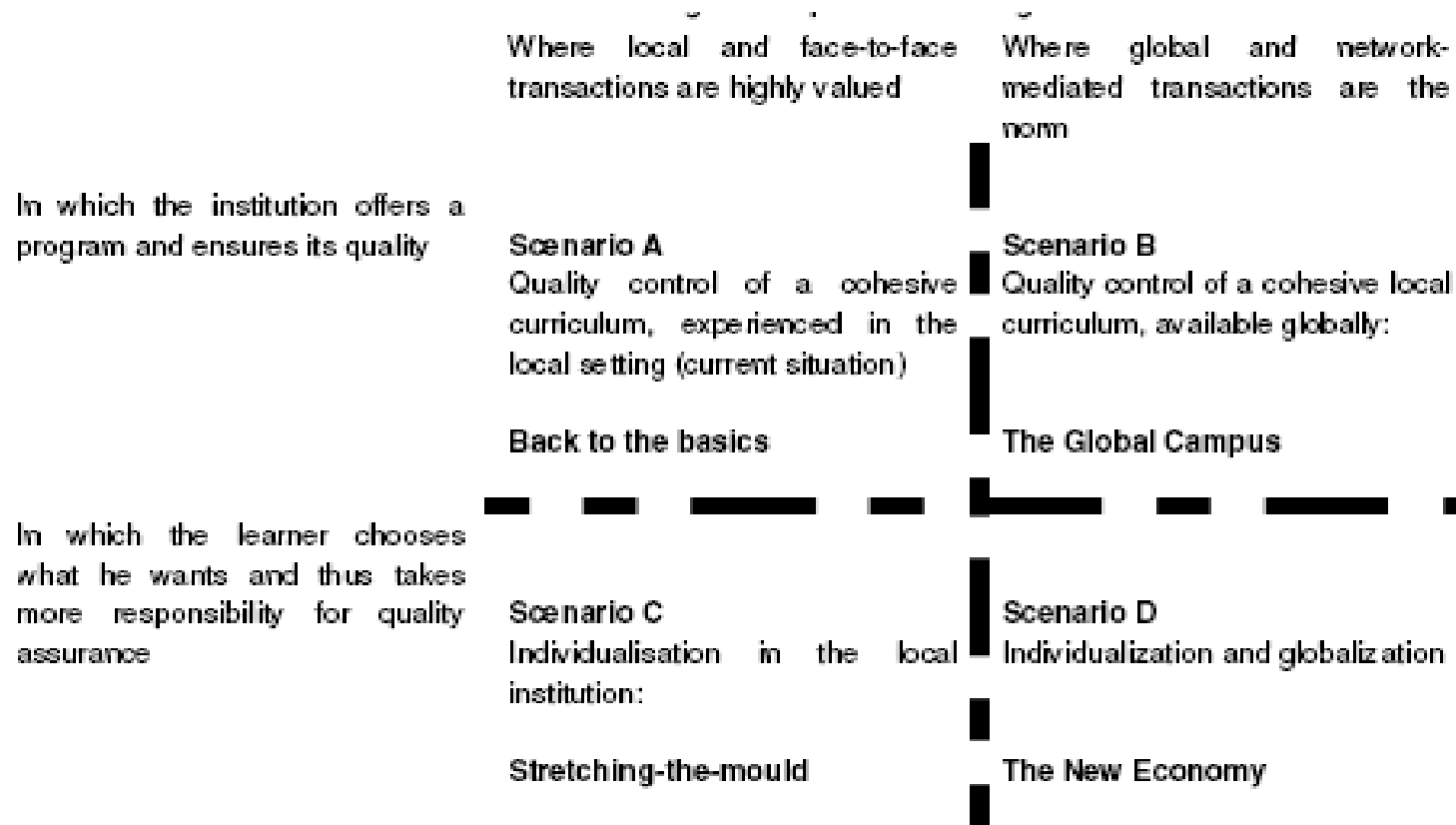
- ICT considered as social communication system instead of technology

- focus on systemic level from individualistic teacher-learner centric approach

- ICT will be an essential part of new education system

- e in e-learning should be read "enhanced"

- source: Dr. Jyrki Pulkkinen/Dissertation 2003

	Where local and face-to-face transactions are highly valued	Where global and network-mediated transactions are the norm
In which the institution offers a program and ensures its quality	**Scenario A** Quality control of a cohesive curriculum, experienced in the local setting (current situation) Back to the basics	**Scenario B** Quality control of a cohesive local curriculum, available globally: The Global Campus
In which the learner chooses what he wants and thus takes more responsibility for quality assurance	**Scenario C** Individualisation in the local institution: Stretching-the-mould	**Scenario D** Individualization and globalization The New Economy

Source: Collis, B.A., & Gommer, E.M. (2001). Stretching the mold, or a new economy?
Scenarios for the university in 2005. Educational Technology XXX(3), 5-18
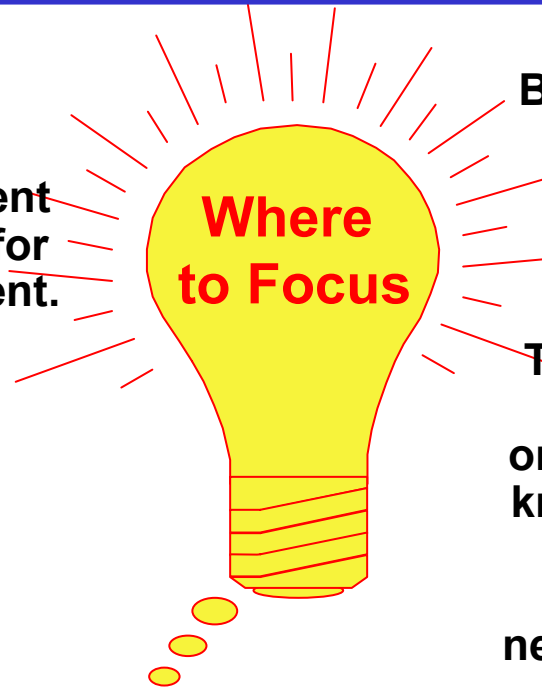
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Management systems levels
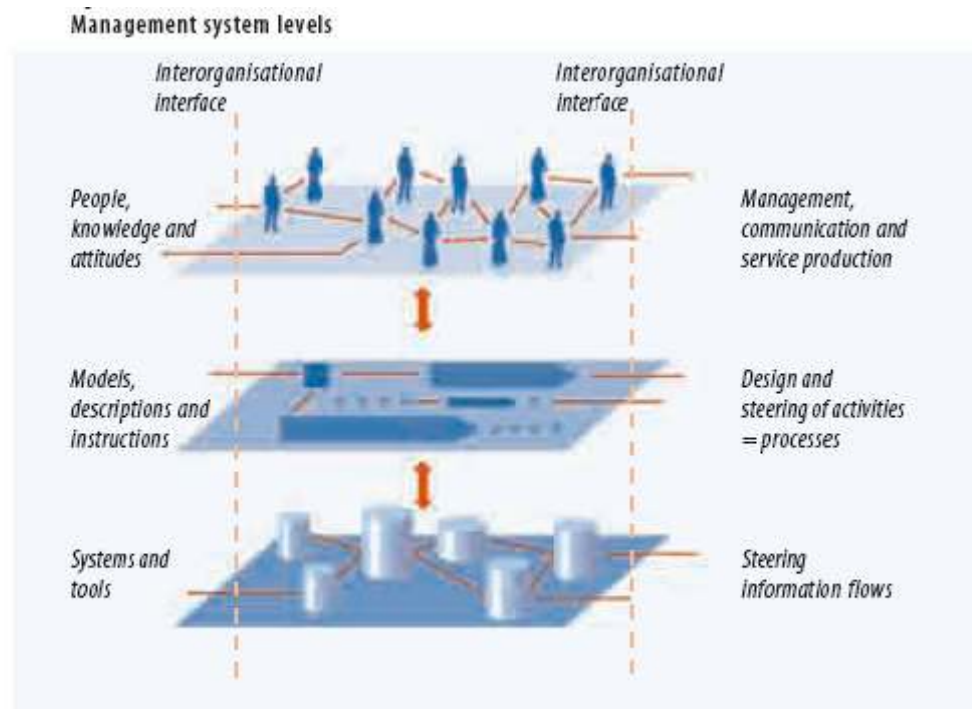
Management system levels

Enormous human potential exists. Networking and knowledge management are the cornerstones for the desired development.

Where to Focus

Besides technological innovations, we need social innovations.

Computers and multimedia are changing the whole educational system from teaching to active learning.

The desired future can be achieved only by focusing on knowledge creation competencies and by creating new value networks.

The desired future can be invented by creating and implementing an effective knowledge and process management based on systems thinking.

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(CC) Teemu Arina, Dicole Oy · 12
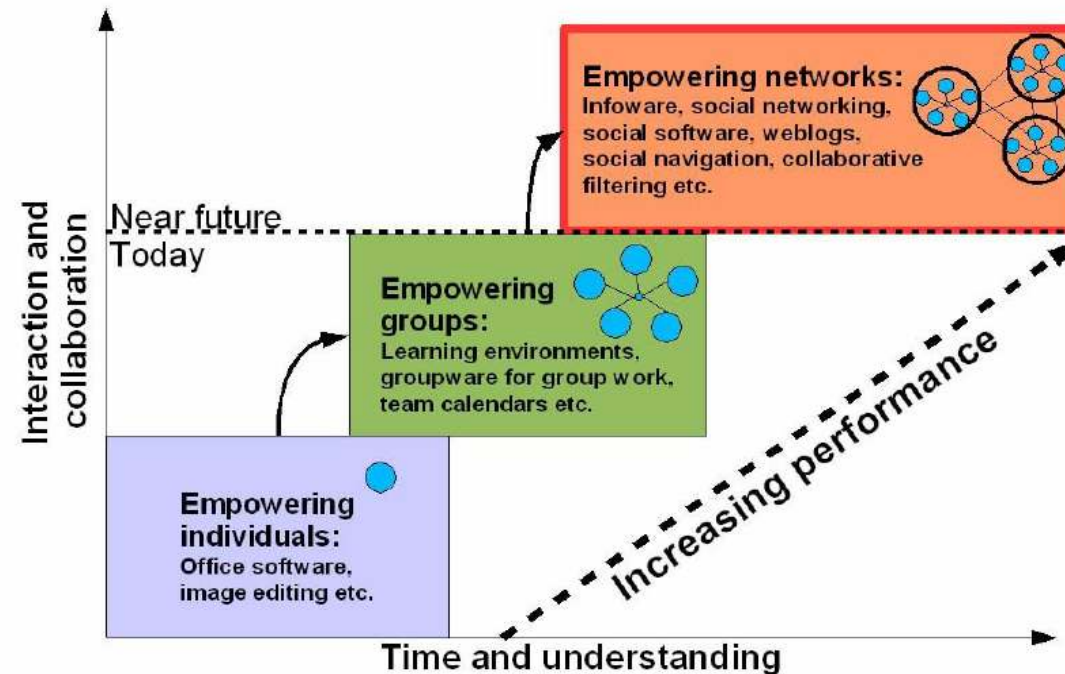
About Otaniemi

- leading technology hub in the Nordic countries

- community of over 31,000 people includes 15,000 students of TKK

- 16,000 technology professionals, of which 6,000 are employed by research organizations and 10,000 by technology companies

TKK = Helsinki University of Technology = Highway of Knowledge

Otaniemi Campus =
Innovation Core of Helsinki Metropolitan Area

Southern Part of Otaniemi Campus

Liite 8   1(15)

HARTELA KEILARANTA 9

Some of the buildings are under construction

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10.08.2006

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