

ICT and Higher Education
analysis of foresight
HE in ICT age

Victor van Rij

Januari 2015

This presentation

- The quick scan report of Foresight and Forward Looks and Higher Education in the ICT age
- The trends pre- survey
- Foresight and what we would like to do tomorrow

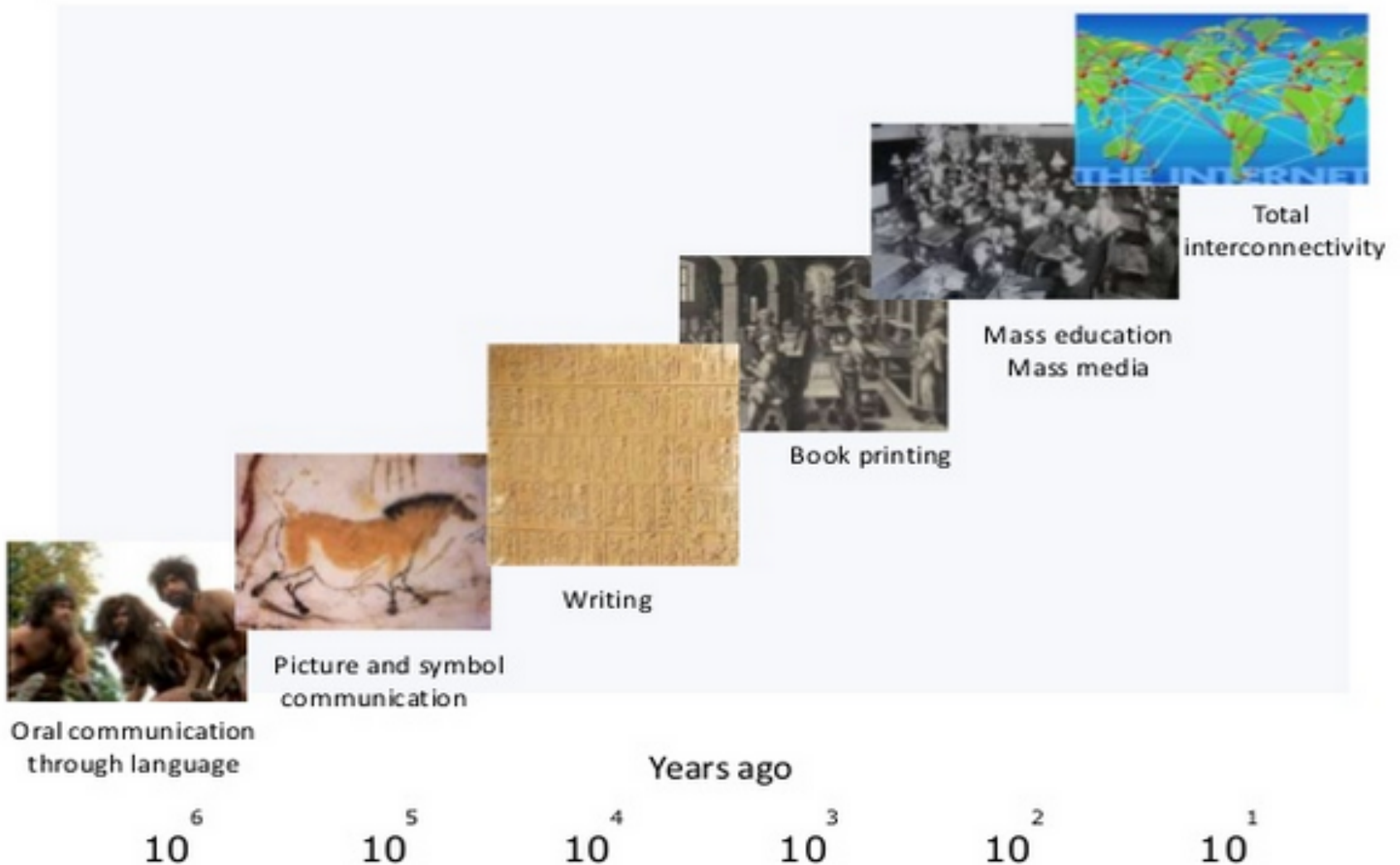
Objective of the report

- Analysis of main perspectives (discussion lines) from future oriented studies and foresight on the relationship of ICT and HE
- Raise material and questions for a Light HL foresight exercise on the future relationship of ICT and HE which should produce added value for policy makers

Different Perspectives of Thinking

- Societal and economic (Knowledge Society and Economy – Networked , Information, Digital)
- Future of Learning
- Future Work and Skills
-
- Universities and Higher Education
- ICT for Higher Education

ICT is Revolutionizing Society on the long time scale



Education is about communication and information

- By Fundamental Change of Communication our societies and economies changes fundamentally and radically
- Because of this **ICT, will change the core of what we need to learn** in a relative short period of time (decades)
- At the same time it changes where, when and how we learn

Cycles (Perez)

- The concept of “knowledge society and knowledge economy” sets knowledge as core value and as factor of production. It is seen as a next phase of economic and societal development that follows after the “industrial (or manufacturing) economy”, which was preceded by “agricultural economy and society” that in its turn was preceded by “hunters/gatherers societies”.
- The major shift between the “industrial society” and the “knowledge society” is the disappearance of physical labour as the major production factor (due to automation of labour) and the upcoming importance of knowledge work which translated into an upcoming importance of knowledge related services.
- **The industrial age ended with the automation of Physical labour, ICT however is replacing knowledge labour by information and communicating machines**

Society and Economy

- ICT has developed its potential with an enormous speed and is connecting people all over the world and tremendously enhancing our cognitive skills with already visible huge changes in our societies and economy. This development is still ongoing and is leading to an increased interconnectivity not only between people, but also between people and sensory networks and machines (the Internet of Things and people) **the consequence of this is on one hand an enormous increase of productivity in almost every aspect of life and on the other hand an enormous variety of still unknown applications and activities that suddenly come within human reach (which we only could have dreamt of).**
- Also for **societies that are mainly dependent on their industrialized or agricultural economy this development is eminent but may evolve in another way**

Future of learning

- ICT and internet will change the “where, when and how” people learn but also the “what” is learnt in the societies that have sufficient access to ICT and especially internet. In the near future the answers on “who needs to learn what” will be strongly influenced by the increasing learning capacities of machines and what they will learn. The enormous learning space that is created by internet and ICT, including the Internet of Things asks for a different approach to education and to focus on the “learning to learn with the available and developing technologies” especially in the open spaces. ICT and the Internet of People and Things create an optimized environment for personalized learning. **The increasing speed of technological change should continuously be taken into account in curriculum development and by teachers as well as by learners.**
- A matter of concern therefore, is the way ICT and further automation will interfere to what we need to learn. **On one hand we need to learn to “master” and “control” the machines but on the other hand the machines will take away our need to memorize everything and to practice certain “intellectual” skills, which may cause humans to become completely dependent on the machines** and finally even to lose control on their own creation. Next to this the Internet of Things creates enormous potential but also enormous threats for privacy and security with which we should learn to cope.

Work and Skills

- The debates regarding the 21st century future skills lead to a variety of lists that stress the importance of critical thinking, entrepreneurship, creativity and other problem-solving skills with implicit or explicit reference to required ICT skills. Discussions around these skills show high aspirations towards future generations and education while at the same time the future of work and economic activity becomes less and less clear. **Recent developments in youth unemployment, in particular, for graduates of tertiary education institutions in the developed countries, show that the knowledge economy does not automatically create the expected knowledge working class by itself – by educating people to the tertiary level. Therefore we should be cautious with the high expectations that are connected to the concept of the Knowledge Economy and the Knowledge Society.**
- If no measures are taken the capital liberalization that has initialized its rise may hinder its further development by distracting too much of profit and result in unemployment. Solution may lay in a redistribution of income and a new balance of leisure to work with income, redistributing the work and the income generated amongst employed and unemployed, but also in **developing new activities that focus on “common” activities to deal with the grand challenges of our societies (as, for instance, stated in the [Millennium project](#)) based on democratic decisions and on the futuristic frontiers of our human existence (Kurzweil, 2005).**

Higher Education

- Universities in the developed countries are aware of the fact that the world is changing in a way that urges them to revise their position and function. One of the strongest drivers for this is the liberalization, which as a political and economic force presents a dilemma in ethical terms. This liberalization created the context for the rapid expansion of cross-border activities in higher education but it has also facilitated the conceptualization of HE as a tradable commodity and the consequential demand for further privatization of higher education. **This is consistent with governmental mandates when HE is only seen in instrumental terms but diminishes its conceptualization as a public good to create a “Knowledge Society” instead of solely a “Knowledge Economy”.**
- Another aspect that urges universities to revise their role and function is the fast changing technology that starts to create a kind of “automation” process for mass education and for research, which not only will reduce “production” costs but also allows many other players to come into the market, **which basically may undermine many of the stable pillars on which 19th and 20th century universities were built on (e.g. the monopoly on degrees, the recognition of the highest expertise, etc.).**

ICT and Higher education

- **It is clear that many technologies will enable higher education teachers to improve and enrich their teaching method, and to track the performance of students, but also that the technologies will enable learners to learn autonomously from the increasing variety of sources the internet and cloud providers.**
- Next to this teachers will be enabled to offer their courses to a much wider audience than ever before by placing them in open sources either on complete open media as YouTube or on more qualified media as MOOCs transcending the borders of their institutions and countries. It is however also clear that curricula have to learn students to use ICT and the internet in their future work either as entrepreneur, researcher or professional and always as citizens with higher-education degree, which means **that higher education students have “to learn to learn” from the internet (of people and of things) with ever expanding technological possibilities, and that this is one of the most important objectives of Higher Education.** In order to make this feasible all parties involved, including policy-makers and education practitioners should thoroughly rethink the role of ICT in education and not just the ICT-assisted improvement of the educational process.

Main lines of relevant future discussion

1. The revolutionary role of the ICT in human evolution
2. The thoughts about ICT in Higher Education Foresight (primarily as learning objective and than as wonderful tool)
3. The relation of ICT with future Knowledge Society and Economy (unemployment as well as work of the future??)
4. The position of ICT in the discussion on 21st century skills (explicitation of ICT HL skills in curricula)
5. From ICT as outside cognitive enhancer to integrated cognitive enhancement

Discussion

- ICT as learning tool to learn with better quality and more efficient
- Values: Equity, access and quality, cost of education, public and/or private
- The widening gap? Poor and Rich, connected and not connected (countries)
- HE professions need a very high proficiency of ICT skills , but what about the others?
- Fast development of ICT requires continuous keeping track and (re)learning – agile continuous learning
- Machines and humans are learning together (learning (expert) systems)
- Core objective of HE is: Learning to learn with help of dynamically evolving ICT possibilities

Questions

- Will there be a need for formal life long learning or will proficient ICT skills provide the solid basis for self organized life long learning?
- Will we need a system of certification of learning activities. Who will set the standards if new ICT distance learning institutions pop up?
- Competition strategies HE institutions in the developed world?
- Position of HE institutions in the developing parts of the world?

Questions

- Main challenges HE institutions
- What will be Role and function of HE in the Future
 - delivering scientists, professionals, entrepreneurs
 - delivering intelligent citizens with aroused curiosity
 - securing quality
- Future of work?
- If people learned to be “self learning with ICT “will there still be need for “Life Long Learning Institutions”
- Will there still be need for degrees or only certificates

Questions Policymakers

- Which ICT developments will influence HE the most with what kind of impact?
- Does the HE education respond well enough to the developing new demands of skills from the ICT revolutionized society and economy (to answer with focus on ICT skills)? If not how to improve? What are the bottlenecks?
- Does HE education use the revolutionary potential (opportunities) of ICT enough, to improve efficiency, quality, accessibility and equity of HE? How should they do this? Good practice? Which ICT developments will influence HE the most with what kind of impact?

trends

How to interpret the meaning of SD with a small sample		Hypothetical score distribution																
																average	SD	
Complete opposite Controverse (two groups with opposite ideas)		4	4	4	4	4	4	4	0	0	0	0	0	0	0	2	2,0	2,0
Confusion - or controverse (very spread ideas)		4	4	4	3	3	3	2	2	2	1	1	1	0	0	0	2,0	1,2
Complete Consensus (very similar ideas)		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2,0	0,0
Average scores and spread		IMPACT (n=16)				CERTAINTY (n=16)												
		average		SD		average		SD										
Societal trends		29,8	4,1	29,3	4,9													
1.1	World population growth	2,7	1,1	3,2	0,8	Impact: Confusion - or controverse												
1.2	Developed countries ageing, developing countries becoming younger	2,8	0,8	3,0	0,8													
1.3	Rising demand for higher education: regional differences	3,1	0,7	3,2	0,6													
1.4	Intensification of international mobility of students	2,9	0,7	2,7	0,8													
1.5	Younger learn differently	3,4	0,6	2,8	0,9													
1.6	The new balance between leisure and work	2,4	0,8	2,4	0,6													
1.7	Long-distance interconnectivity and collaboration	3,3	0,8	3,4	0,7													
1.8	New balance of virtual and real life	2,9	0,8	2,8	0,9													
1.9	Creating the personal "cloud"	2,3	0,7	2,3	0,9													
1.10	Machines as colleagues	2,2	1,0	1,9	0,9	Impact: Confusion - or controverse												
Technological trends		30,1	5,8	30,4	5,8													
2.1	Fast unpredictable change of technologies	3,1	0,8	3,3	0,8													
2.2	Increased access to internet worldwide but digital divide remains	3,1	0,5	3,2	0,7	Impact: Consensus												
2.3	Increased role of open distance learning in growing economies and less populated areas	3,1	0,8	3,1	0,8													
2.4	Massive Open Online Course (MOOCs) increasing in numbers	2,8	0,9	2,9	0,7													
2.5	The law of Moore	2,6	0,9	2,6	0,7													
2.6	Big data and the cloud: exponential increase of all ICT-enabled opportunities	3,1	0,6	3,0	0,6													
2.7	Visualization , augmented reality simulation and gamification	2,8	0,8	2,9	0,7													
2.8	Cognitive enhancement 4.0: fusing humans and machines	2,6	0,9	1,9	0,8													
2.9	The Internet of Things	2,8	0,5	3,1	0,7													
2.10	The cloud as source of new capabilities	2,7	0,6	2,8	0,8													

Trends (2)

Economic trends	30,1	5,2	32,6	5,5	
3.1 The increasing capital misbalance in the world	2,4	1,1	3,1	0,5	Impact: Confusion - or controverse /Certainty: consensus
3.2 Youth unemployment on the rise, including young adults with higher education degrees	2,9	0,8	3,3	0,6	Certainty: consensus
3.3 New HE providers offering sharp prices, or for free	2,5	0,8	2,6	0,9	
3.4 New business models for HE providers	2,8	0,6	3,0	0,5	
3.5 New specializations and new alliances of HE players	2,8	0,6	2,8	0,5	Certainty: consensus
3.6 Increasing future need for high-level ICT skills for knowledge work	3,1	0,7	3,3	0,7	
3.7 The decline of the "knowledge economy" as a utopian future	2,3	0,8	2,5	0,8	
3.8 Privatization and increased private share of costs	2,7	0,7	2,8	0,8	
3.9 Rising costs of higher education	2,8	1,0	2,9	0,7	Impact: Confusion - or controverse
3.10 Decreasing delivery costs in education	2,9	0,6	2,9	1,0	Certainty : Confusion - or controverse
3.11 Decrease of production costs for data, data processing, analysis and synthesis	2,6	0,7	3,3	0,8	
Environmental trends	41,6	7,5	43,0	8,8	
4.1 Grand global and local challenges that require intelligent answers	3,2	0,5	3,4	0,5	Certainty and Impact:Consensus
4.2 Broadband as a physical health threat	1,8	1,1	1,8	1,0	Impact controversial
4.3 ICT as a psychological health threat	1,9	0,8	2,1	0,8	
4.4 Threat of physical disturbance of the internet	1,9	0,6	2,1	0,9	Certainty : Confusion - or controverse
Policy trends	18,6	4,7	18,8	5,5	
5.1 Privatization of higher education, world market increasing fees, HE for the wealthy	2,8	1,2	2,8	0,9	Certainty and Impact: Confusion - or controverse
5.2 Increasing student loan debts in Anglo-Saxon countries and declining economic prospect	2,5	0,9	2,9	0,9	Certainty : Confusion - or controverse
5.3 Efforts to increase higher education enrollment in upcoming economies	3,3	0,7	3,1	0,8	
5.4 Gradual acceptance of ICT literacy as one of the basic enabling literacies	3,1	0,7	3,6	0,6	
5.5 Weakening of institutional boundaries	2,4	0,9	2,3	0,7	
5.6 Internet of People and Things is threatening our rights	2,0	0,4	1,9	0,8	Impact: Consensus
5.7 ICT dependency as security risk	2,7	0,7	2,8	0,9	

Additional trends/issues

New Issues/trends brought forward

Societal trends

- Cha change of roles for teachers and students in HE: from **Teacher-centered to student-centered**
- Cha increasing **collaboration between industry and HE**
- Cha change of role of most part of HE in society **becoming applied science** by nature and **career-oriented for high level human resource**
- downie **Rise of social networking**
- downie Demand **for new para academic roles** in HE
- cornu Development of **collective intelligence and collective competencies**
More and more, digital tools enhance the capacity for collective intelligence, collective learning, collective memory, collective memory, collective competencies. Networks make people cooperate and develop new collective capacities. Jobs now require collective intelligence and competencies.
- cornu **Democratization and massification of knowledge and education**
Knowledge is more and more accessible to everyone around the world. This generalization changes the nature of knowledge..
ICT makes knowledge accessible everywhere.
Higher Education has to play a major role in this democratization and massification
- knyaz **Labour-market** demands should **be monitored and impact ICT integration policy**
- akh Combination of **academic knowledge and professional skills as main factor of employability**
- rodvik **Integration of HE, learning and work (blended)**

Additional trends/Issues (2)

Technological trends

- downie Personalized, **adaptive learning** using technology
- longo **adaptive learning software**
- knyaz Proliferation of **blended learning and new learning spaces**
- knyaz **Adaptive Learning Platforms**

- akh **Mobile technologies and BYOD for creation of personal/collaborative learning environments**
- akh Increasing role of **Social media and professional communities of practice**
- akh **Virtual labs and remote practices as tools for efficient practical learning**

Economic trends

- downie **Cost of labour in developing countries**

Environmental trends

- downie **Mobile use becoming the new trend worldwide**

Policy trends

- Cha reformation of most universities/colleges into **applied science-oriented and professional career-oriented professional education**
- Cha increasing investments in **technical and vocational education and training for all levels of professional talents in human resource market**
- downie Policies for emerging changes **eg badging, curating, credentialling**
- akh Motivative/administrative measures to **improve level of digital competency of HE staff**
- akh **Cybersecurity affects more and more on education and social areas**

Planning tomorrow

9:30 – 11:00	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Objectives and scope of the exercise, Target group, Expertise and whom to consult
	Values norms to focus on
11:00 – 11:30	Coffee-break
11:30 – 13:00	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Driving trends, trends/issues to take in/ impact/certainty/changeability
13:00 – 14:00	Lunch (UNESCO Cafeteria, 7 th floor)
14:00 - 15:30	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Cross impacts, complexity
15:30 – 16:00	Coffee-break
16:00 -17:30	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	What is next: survey/scenario's/ national activities
	Revising objectives and scope /whom to approach which experts /stakeholders
17:30 – 18:00	Conclusions and wrap up

Foresight

Is not about predicting or forecasting it is about:

Thinking, debating and shaping the futures:

- Explorative aspects ; what do we know for sure what do we guess the future will be, Estimated Impact and Certainty
- Desirability (Normative aspects) ; what and how do we want the future to be
- Changeability ; what can we do taking into account the explorative findings to get to “common” normative aspects

ISSUES and ACTORS

A. Issues are **Storylines** about the future in the shape of:

- Trends with predictive statements (also hypes)
- Events with future consequences
- Ideas wht may be a solution
- (Unknown) Wild Cards (sometimes with early indicators)

Plausible, convincing (by evidence or other mechanisms)

B. Actors

How will actors with different roles and powers deal with
A

Many ways and methods

2 pragmatic ways

1. Horizonscanning

2. Scenario building

Deskwork and participative processes bringing in wide variety of expertise and stakeholders

In addition

- Use of ICT tool to draw in more “expertise” and stakeholders



Horizon scanning

Horizon scanning is an instrument to shape the future to **(common) desires, needs** after participative thinking and debating

Horizon scanning

Systematic Search for Issues with Potential high (Future) Impact on what **we** consider to be important

Issues are statements about the future, based on outcomes of research, trend analysis, scenario studies, weak or faint signal analysis but also on our imagination

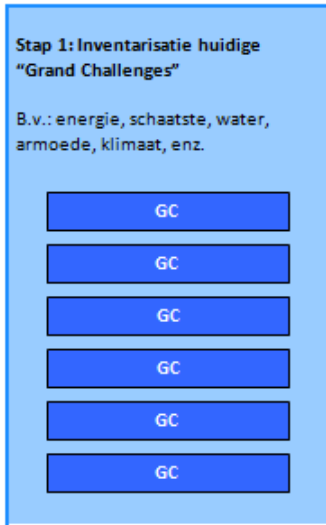
Issues are therefore based on a mix of scientific knowledge and tacit knowledge including our imagination

Approach

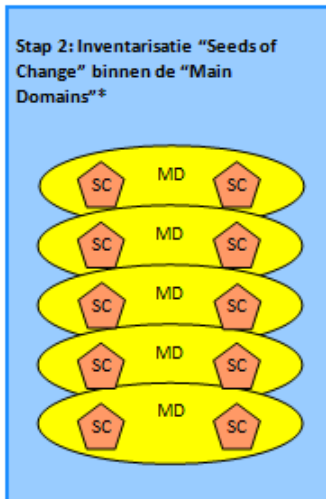
Stichting
Toekomstbeeld
der Techniek



1. Values

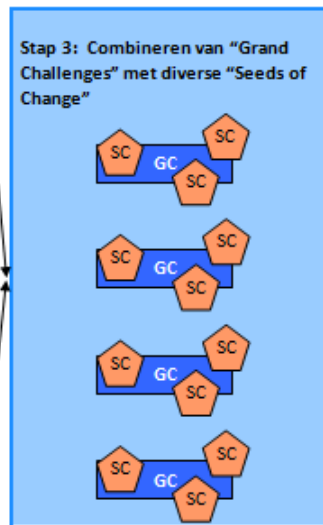


Desk work +
electronic
voting



2. Issues/trends
from STEEP
domains

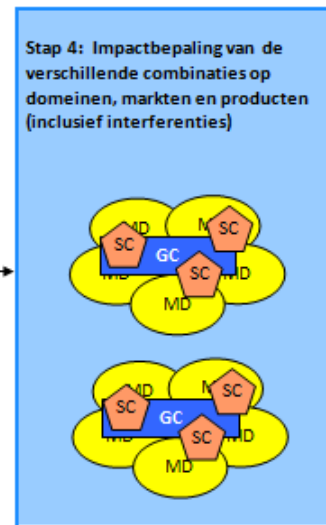
3. Combine



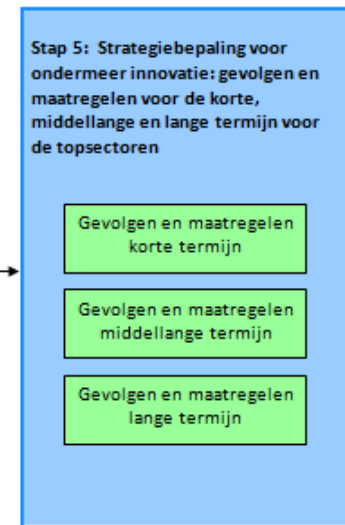
* Main Domains volgens het STEEP-model:

- Society & values (includes demography)
- Technology & Science
- Economy (incl. finance-business-tax etc)
- Ecology (physical and bio environment)

4. Analyse – New Story



5. Integration What Strategy?



Participative Processes /Voting
Deskwork

Issues

Opportunities/solutions from :

Human action/brainpower

Science & Technology

Education

Social system

Political, Government, legal,
economy, finance

Other Systems (infrastructures,
production, transport, ICT, energy,
industry, healthcare, agriculture)

Physical environment

Natural resources from

(Outer) Space, Sun

Space

Sea and waters

Earth and soil

Atmosphere Climate

Living world

With expected large
impact on
society:

COMMON

LONG TERM

DESIRES

& VALUES

Human:

Survival , Health

Welfare, wealth

Wellbeing

Democracy, law

Self-realization

Culture, ethics

And Ecology,

Ecosystem

Biodiversity

Threats/problems from:

Human action/environment

Science, technology

Education

Social system

Political, Government, legal

Economy, finance

Systems (infrastructures, production,
transport, ICT, energy, industry, health care,
agriculture)

Physical environment

Shortage/destruction/

(Outer) Space

Space

Sea and waters

Earth and soil

Atmosphere climate

Living world

Actors/Stakeholders in present proposed foresight exercise

Stakeholders:

- Students / Graduates /Citizens
- Teachers
- Other professionals involved in (ICT)and teaching
- HE Institutions (Universities/Colleges/Open Distance learning organisers)
- Policy makers
- Companies producing soft and hardware
- Future employers

Values in present proposed foresight exercise

- Equity
- Quality
- Accessibility



Issue dimensions

IMPACT : Issues that may have great or less great impact on what **we** see as important (seize of impact)

CERTAINTY :mix of PROBABILITY & PLAUSIBILITY : Issues that are certain or less certain but still plausible (probability and plausibility)

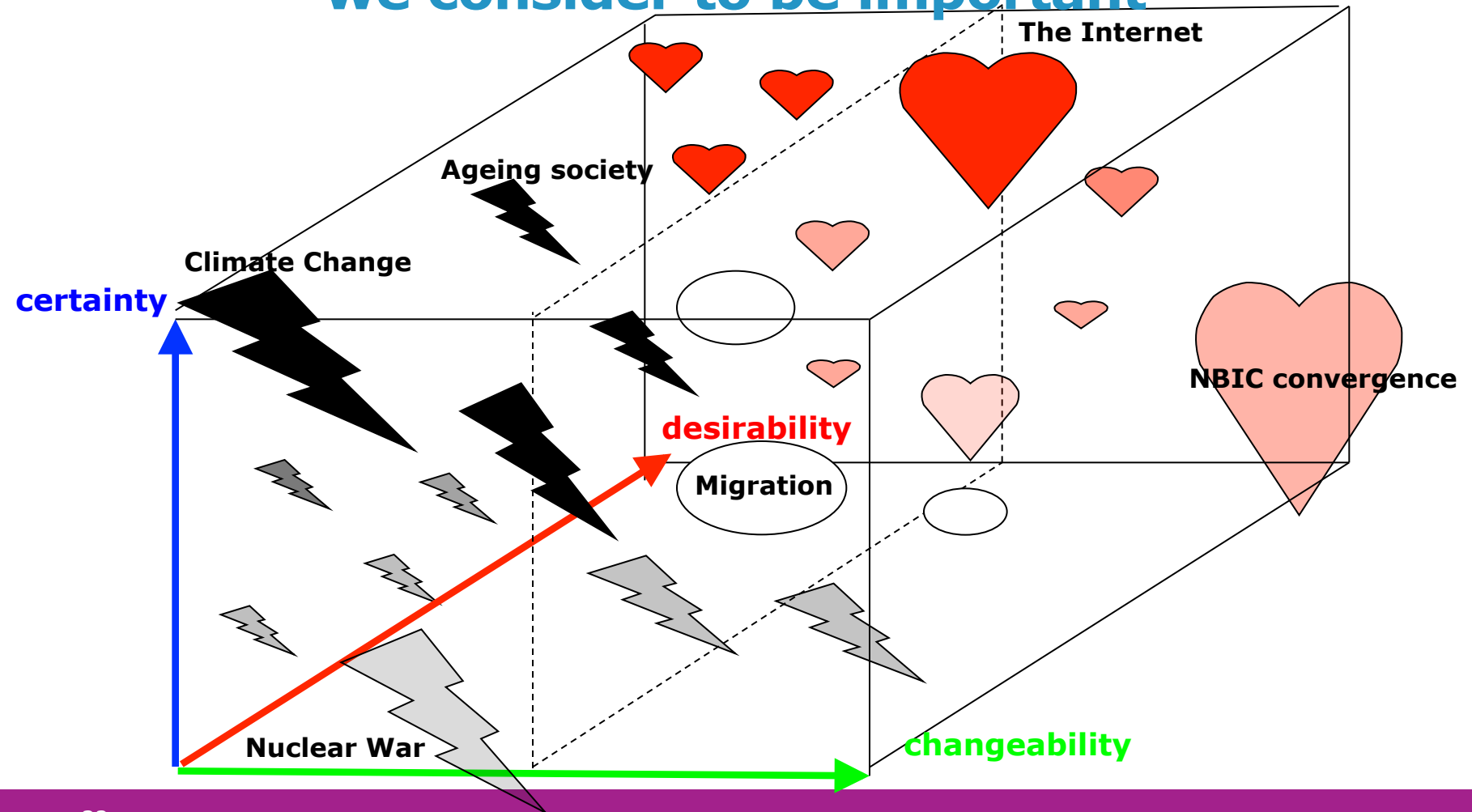
DESIRABILITY : Issues that are desirable or not desirable for **society** (desirability, common or opposed values)

CHANGEABILITY : Issues that are not changeable or changeable by human action (changeability)

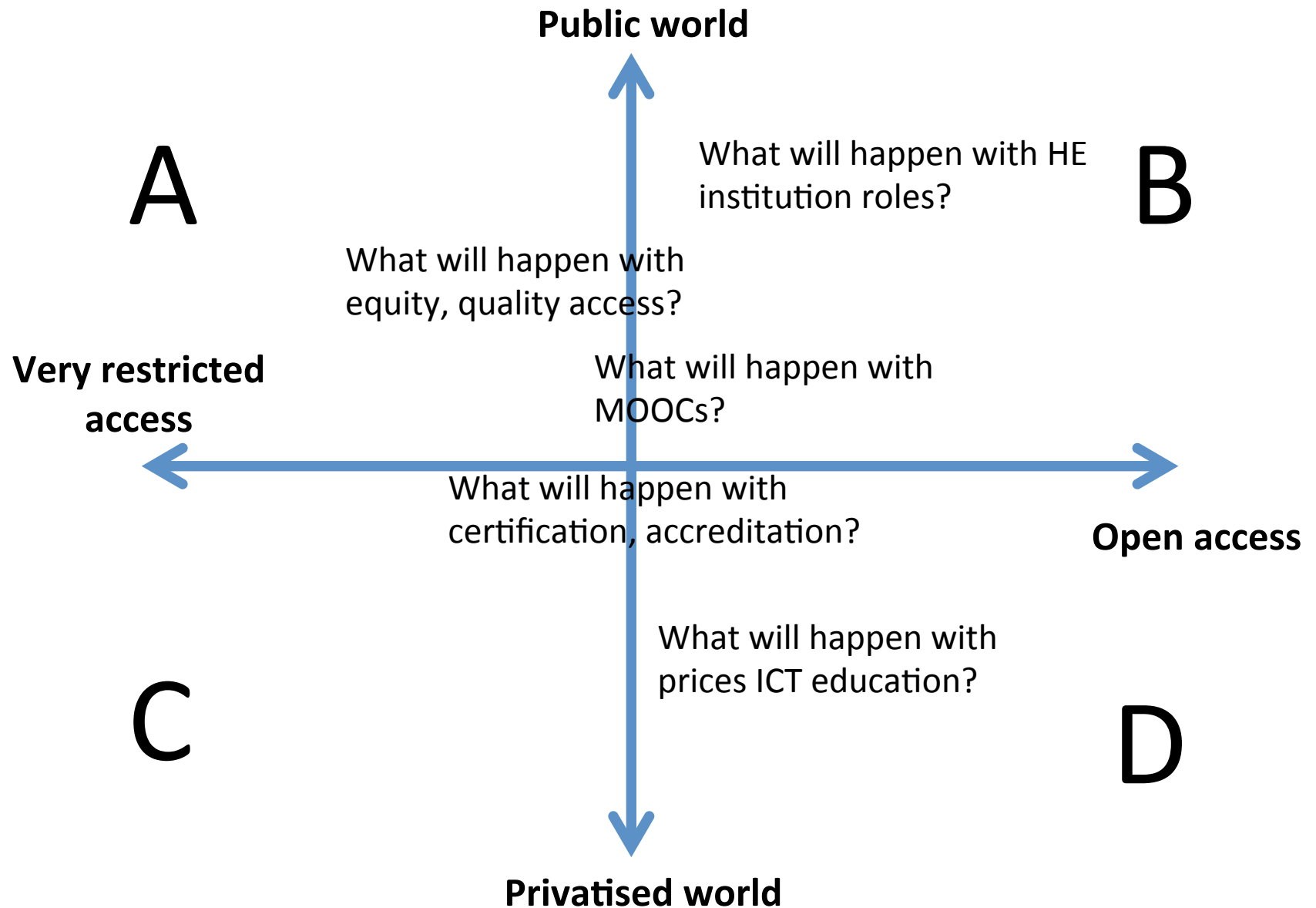
TIME : moment of observation , interaction, dynamics



Issues with Potential high Impact on what we consider to be important



4 SCENARIOS – new STORYLINES COMBINING ISSUES



planning

- Quick scan
- Meeting with HL experts (now)
- Purpose: Widening activity (preparation of survey/delphi- testing opinions and ideas on outcome, enriching the foresight with practical experience and different disciplinary views)
- Reporting feedback from HL experts
- Desk work – storylines – possible recommendations
- Reporting feedback from experts
- Workshop with policymakers
- Possibly national activities parallel

Tomorrow

9:30 – 11:00	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Objectives and scope of the exercise, Target group, Expertise and whom to consult
	Values norms to focus on QEA? Than split up in 4 groups
	Trends/issues take in. Especially High impact low certainty and controversials
11:00 – 11:30	Coffee-break
11:30 – 13:00	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Driving trends, trends/issues to take in/ impact/certainty/changeability/desirability
13:00 – 14:00	Lunch (UNESCO Cafeteria, 7 th floor)
14:00 - 15:30	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Cross impacts, complexity / scenario axes or Burning Questions to bring in
15:30 – 16:00	Coffee-break
16:00 -17:30	Foresight exercise. Facilitator: Victor van RIJ, Netherlands
	Reporting
	What is next: survey/scenario's/ national activities
	Revising objectives and scope /whom to approach which experts /stakeholders
17:30 – 18:00	Conclusions and wrap up