



**SCIENTIFIC RESEARCH-REQUIREMENT
FOR INNOVATION SUCCESS**

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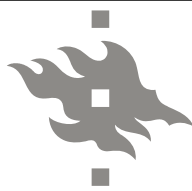


**THE ROLE OF SCIENCE AND
RESEARCH GROWING**

- Knowledge society needs knowledge creation
- Universities and research institutes key actors
- Engineering essential for development
- Science based innovations for breakthroughs
- Grand challenges require deep understanding

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RESEARCH AND INNOVATION POLICIES IN CORE POLICIES

- Europe 2020, R&D in its hearth
Economic growth on the creation of knowledge
- European Higher Education Area
Essential to make Innovation Union real

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EVALUATION OF NATIONAL INNOVATION SYSTEMS

- Investments in R&D
- Patents
- Scientific publications, outcome
- New product innovations
- Cooperation in innovation work
- Amount of researchers
- Exams in Natural Sciences and Engineering
- Workforce in Science and Technology professions

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STRENGTHS IN FINLAND

- -Good basic education (PISA)
- -High investments in R&D (3,9% GDP in 2011)
- -Amount of researchers/ workforce
- -HEI-industry cooperation
- -Availability of engineers
- -High quality of government institutions
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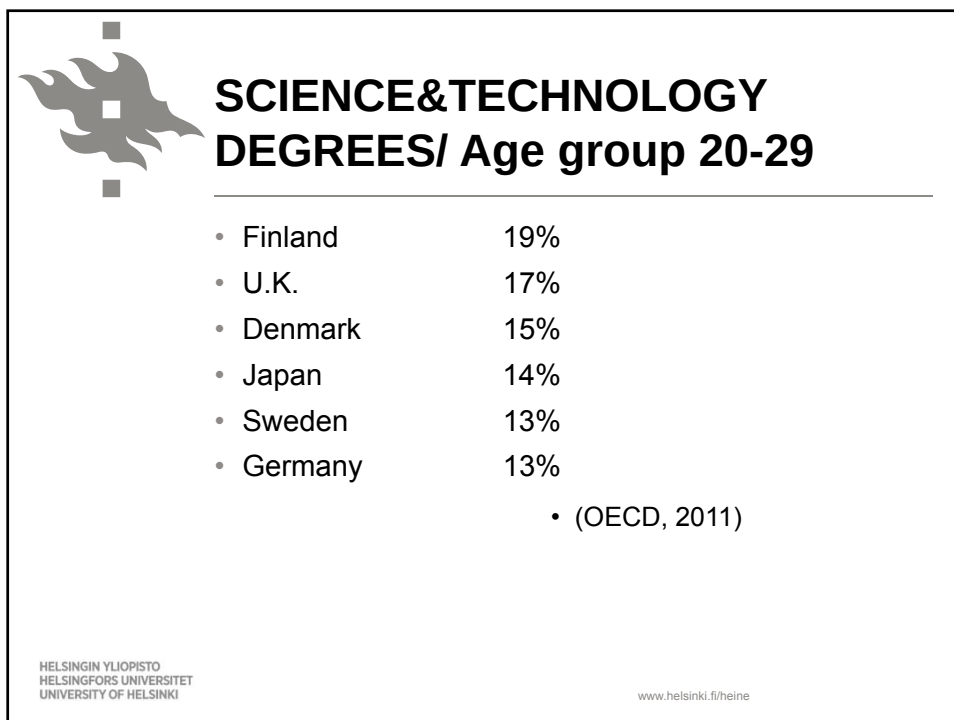
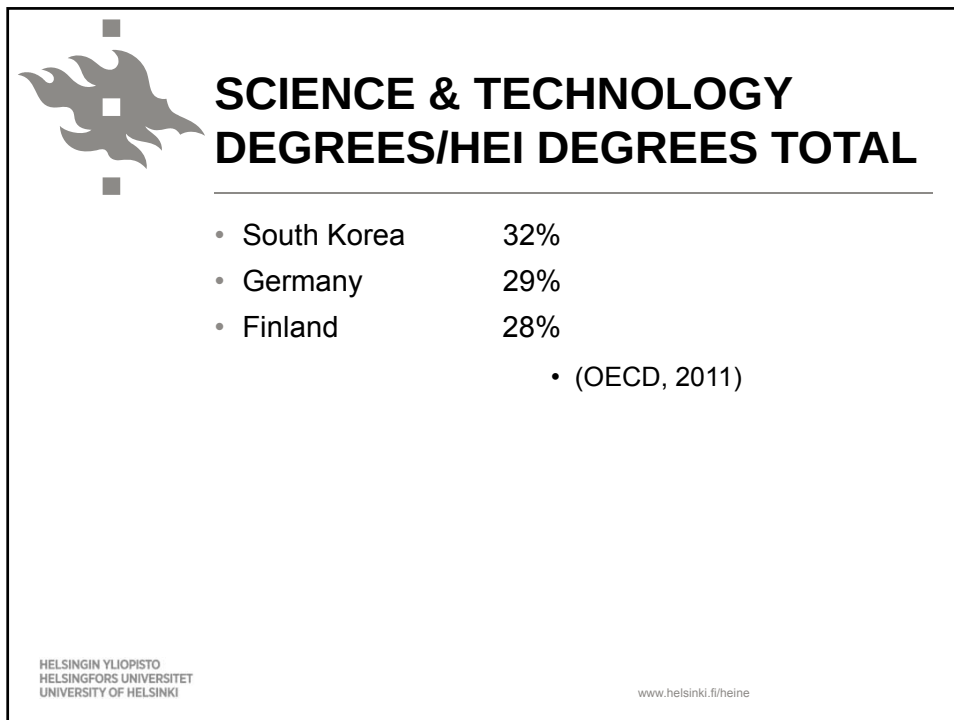
PROPORTION OF HEI EXAMS/ POPULATION %

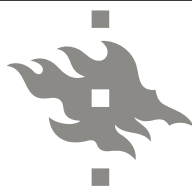
Canada	50
Israel	45
Japan	44
U.S.A	41
New Zealand	40
U.K.	37
Finland	37
Denmark	34

(OECD, 2011)

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INNOVATION COOPERATION/ ME`s with innovation activity

- Denmark 62%
- Netherlands 48%
- Finland 45%
- Sweden 45%
- (CIS, 2008)

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ENGINEERING EDUCATION CHARACTERISTICS

- Engineering Science:
 - -aim practical usability
 - -combination of scientific and social topics
 - -tied to natural sciences and technology
- (Korhonen-Yrjänheikki. 2011)

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MANY ROLES OF ENGINEERS

- Specialists
- Scientists
- Integrators
- Change agents
- Managers

CHALLENGE FOR VARIETY OF PROGRAMMES,
SPECIALIZATION AND CONTINUOUS EDUCATION

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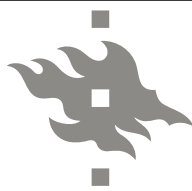


Orientations in curriculum

- Science
- Design
- Management
- Policy
- General

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CHANGING NEEDS FOR SKILLS AND COMPETENCES

- -Multidisciplinary team work
- -Open innovation
- -Progress of science
- (nano-,bio-, automation-,neuro science and ICT)
- -Service sector (knowledge intensive business)

(Korhonen- Yrjänheikki, 2011)



INNOVATION ECONOMY NOW

Innovation: A new beneficial idea or invention
which is implemented in use

Innovation: A solution to a problem

Innovation: there must be a need for new solutions

Grand challenges: urgent need for innovations!



NOT JUST FOR BENEFIT (Nussbaum, 2012)

- -Need to integrate art and humanities in engineering curriculum
- -Ability to think critical
- -Creativity enhancing
- -Well-rounded education in BA level,
 - including social sciences, arts and humanities
- Innovation needs creativity, open mindness and flexibility
- Global networking requires respect of diversity, knowledge of culture and history
- Global challenges: Need for engineering ethics

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GLOBAL INNOVATION COMPETITION

- Innovation competition is here
- Innovation networks are competitors in global economy
- More investments in R&D
- Human capital, creative and skillful people crucial
- Global knowledge networks through research cooperation
- International experience by engineers

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HEI`s IN INNOVATION ECONOMY

- Universities and HEI`s and research institutes core actors
- Education of experts by research to reach the deep understanding of the phenomena
- World class research needed to get something new worldwide
- University- Industry cooperation essential

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INTERNATIONAL INNOVATION COOPERATION

- SUITABLE PARTNERS GLOBALLY
- MORE PARTICIPATIONS IN RESEARCH PROGRAMMES AVAILABLE
- BILATERAL AND MULTILATERAL PROJECTS ON PRIORITY AREAS NEEDED
- REMOVAL OF ADMINISTRATIVE BARRIERS-

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SUCCESSFUL INNOVATION REQUIREMENTS

- -Creative individuals
- -Flow of new ideas
- -Capability to get ideas through networking and cooperation
- -Synthesis of multidisciplinary knowledge
- -New skills to manage innovation process
- -Human centred innovation environment

– (Hautamäki&Oksanen,2012)

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How to build innovation hubs?

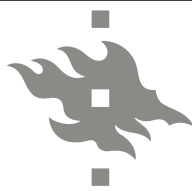
- -New knowledge creation -cutting edge research
- -World class knowledge and companies implementing it
- -Attractive for students, researchers, companies, investments
- -High quality innovation ecosystem and cultural environment
- -Companies with global network

– (Hautamäki&Oksanen,2012)

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THE ROLE OF HEI`s

- Core actors for new knowledge creation
- Education and training of new experts
- Poduction of new humal capital by amount of talents
- Building up social capital, human connections and interactions
- Affect the cultural life and enrich the quality of the city

(Hautamäki&Oksanen, 2012)

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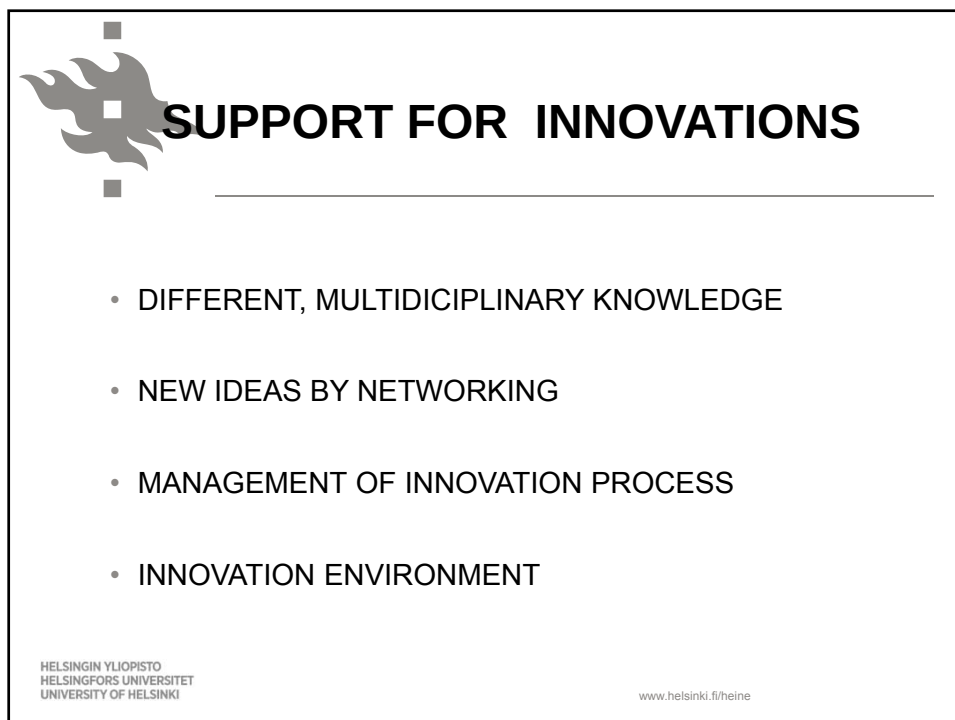
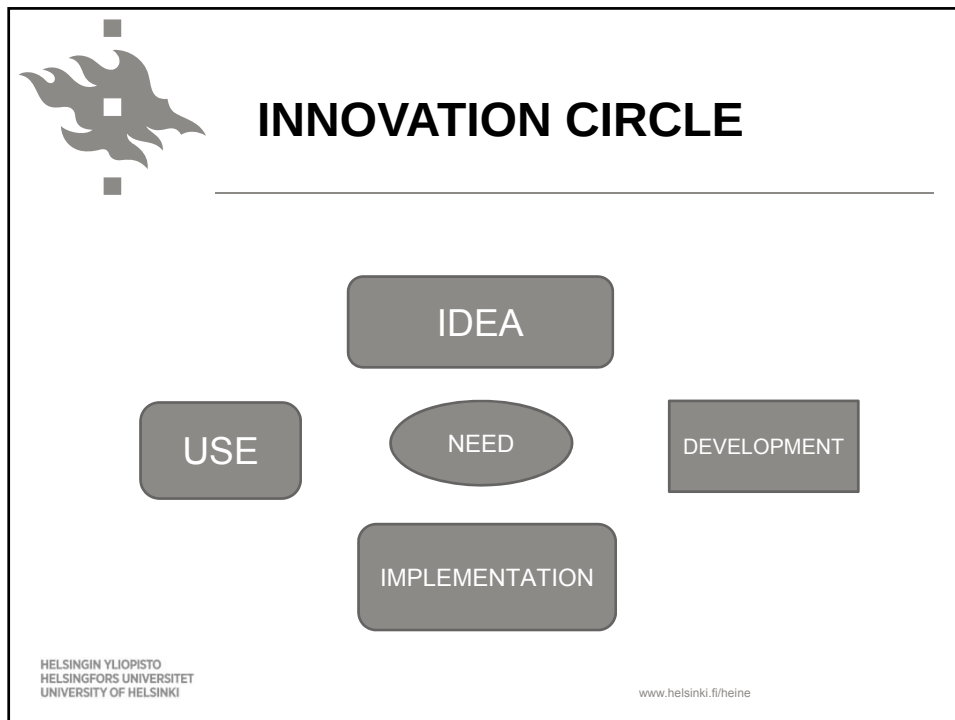


FUTURE OPTIONS

- ESTABLISHMENT OF LONG LASTING PARTNERSHIPS
- GRANT CHALLENGES AN URGENT NEED FOR INTERNATIONAL COOPERATION
- OPTIONS AVAILABKE MUST BE USED. LIKE BALTIN SEA RESEARCH AND BONUS, ERA-NET FUNDING
- BILATERAL PROJECTS AS A GATEWAY TO GLOBAL IMPACT

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IMPACT OF RESEARCH

- SOCIETAL CHALLENGES
- ECONOMIC GROWTH
- ENVIRONMENT
- HEALTH & WELLBEING

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