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Enhancing synergies between higher education and research for climate change and smart cities - a practical experience

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The Importance of Climate Change in higher education

- The role of universities in climate change education (CCE) is of great importance if the scientific, social, environmental and political challenges the world faces are to be met.
- It is essential to understand the range of **CCE strategies** being taken globally by Higher Education Institutions (HEIs) and to explore and analyse the ways that HEIs could better address this challenge.
- There is **current consensus** that human population should aim for a global mean temperature rise of no more than 1.5°C from 1990 levels (IPCC, 2018) requiring action on two critical fronts: **mitigation and adaptation**.
- The implementation of **adaptation and mitigation strategies** needs capable policymakers and an informed public.
- **Educated people are more aware of the risks climate change poses** and are better equipped to make informed decisions about responses at local, national and international scales.
- While climate change education is important at all levels, from primary schools to universities, **it is the higher education sector that is most in need of developing a systemic approach**.

How universities can shape a new wave of smart cities

- Cities and towns need to upgrade universities from advisory roles to actively shaping and implementing projects that can help tackling their challenges.
- Universities need to align themselves with the priorities of the city, to be proactive in building partnerships, and to make sometimes difficult internal changes to better meet local needs.
- Universities are also under financial strain, and often juggle teaching and research with the mantle of being civic institutions.
- Universities are being called to seek tighter integration with their environment, to form stronger bonds with local communities and to produce more effective projects with longer-term impact while developing national and international networks, all within a complex political arena.
- There is an emergence of a new wave of smart cities, placing universities at the heart of a more inclusive, people-focused movement to build better places and societies.

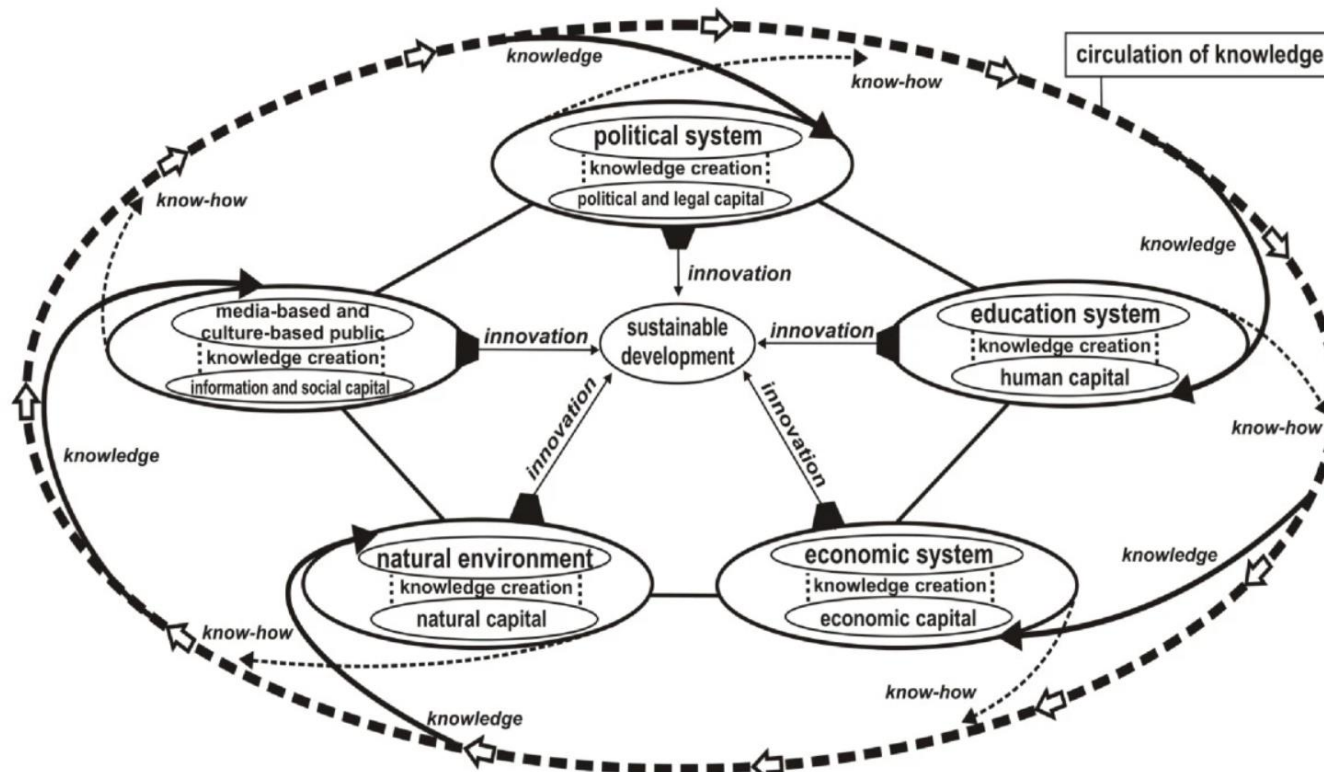
British Council report, 2019

How universities can shape a new wave of smart cities

- ▶ **Three important steps for an effective cooperation between universities and city halls/town halls:**
- ▶ **1. Leading project, conduct research :**
 - Limited resources and the complexity of urban challenges - concentrate their efforts on those activities and in those places where they can add most value.
- ▶ **2. Build deep links:**
 - The act of responding to competitions (for funding or other rewards) can be particularly effective in building and maintaining relations between different organisations.
 - Mapping university research on urban problems and developing links with the city can spur new activity.
 - Formal and informal structures, such as physical hubs for collaboration or forums for universities to present their research, help build deeper links.
- ▶ **3. Inclusive projects in smart cities:**
 - a focus on all people in society and the challenges they face.
 - Staff should build effective community engagement into projects, and be mindful to avoid accidentally excluding intended beneficiaries.
 - Effective communication is critical



Quintuple Helix for innovation and its interactions



Source: The Quintuple Helix model and its function (functions). Modified from Etzkowitz and Leydesdorff ([2000]), on Carayannis and Campbell ([2006, 2009, 2010]), and on Barth ([2011a]).



The EU Missions of Horizon Programme



- EU Missions are a new way to bring concrete solutions to some of our greatest challenges. They have ambitious goals and **will deliver concrete results by 2030**.
- They will deliver impact by putting **research and innovation** into a new role, combined with new forms of governance and collaboration, as well as by engaging citizens.
- EU Missions are a novelty of the Horizon Europe research and innovation programme for the years **2021-2027**.

Developing an integrated framework for
cooperation in higher education and research
on Climate Change and Smart Cities
A practical example of CTU Prague and the
University of Stavanger

Three projects undertaken since 2020

1. *Czech-Norwegian Alliance for Research Cooperation towards resilient, smart and sustainable cities*

Website: <https://aresc.fd.cvut.cz/index.htm> - acronym “ARESC”

- Started in 2020 and concluded in August 2022.
- An initiative funded by the Bilateral Fund of the Environment, Ecosystems and Climate Change Programme supported from Norway Grants 2014-2021.
- A bilateral initiative between the Faculty of Transportation Sciences of the Czech Technical University in Prague (FTS CTU), the Faculty of Science and Technology of the University of Stavanger (FST UiS) and other relevant entities in the Czech Republic and in Norway, including civic associations, enterprises and municipalities.
- **Two outputs of the project:**
 - Analysis and report of opportunities and challenges for research cooperation between FTS CTU and FST UoS.
 - A memorandum of understanding of research cooperation between FTS CTU and FST UiS.



It sets up a pathway of concrete ideas for future research cooperation aligned to their local demands from stakeholders.



Three projects undertaken since 2020

2. *Building resilience through education for Sustainable, Collaborative and Smart Cities*

Website: <https://www.resicities.eu/> - acronym “RESICITIES”

- Started in December 2020 and will be concluded in November 2023.
- An initiative funded by the Erasmus Strategic Partnership Programme in the Czech Republic and lead by FTS CTU in cooperation with the UiS, Porto Business School and IPAG Business School Paris.
- **Intellectual outputs:**
- **Six blended (online + mobility Week) courses targeted at the higher education students** of different levels to foster knowledge and skills for future proactive involvement in the solution of urban and regional issues in the context of sustainable and smart cities.
- **Three courses with workshops targeted at the staff of universities** for building skills and capacity for a more proactive engagement in joint European efforts towards sustainable and smart cities.



It explores new educational content that are increasingly relevant for HE students and staff without the burden of accreditation process.

Three projects undertaken since 2020

3. *Academic Development through bilateral peer-learning activities on mission-oriented innovation for Climate Neutral and Smart Cities*

Website: <https://smarteducg.fd.cvut.cz/> - acronym “SMARTEDUCG”

- Started in August 2021 and will be concluded in July 2023.
- A initiative between CTU Prague and UiS funded by the Institutional Cooperation Programme of the EEA & Norway Grants in the Czech Republic.
- **Two intellectual outputs planned:**
- **IO1: Guidelines and principles for challenge-based education and mission-oriented research approaches**
- **IO2: Guidelines on innovative methodologies and digital tools for online education in the field of smart and sustainable cities**



It proposes to introduce new topics (e.g. climate change) into existing subjects of academic curricula through innovative teaching approach

How these projects are interconnected

ADESC

It builds the trust and mutual understanding among the academic staff of CTU and UiS for cooperation in the commonly identified areas of interest within European grants with other relevant stakeholders.

RESICITIES

It builds the knowledge background necessary for developing skills among HE students and staff towards a proactive involvement towards SSRC through innovative and relevant educational content.

SMARTEDUCG

It builds expertise in innovation for teaching and research methodologies oriented to the urban challenges and mission goals of the European Union.

It helps building capacity for educational cooperation through research

Inspired teaching methodologies for RESICITIES

New educational content created



How the interconnected projects can evolve into others



Main challenges perceived in current projects

1. Lack of understanding on how climate change can be addressed into the existing subjects of academic curricula of universities

- **How to tackle this issue:** online webinars, peer-learning activities and documents shared among academic staff with concrete examples of addressing climate change in their respective subjects through research on their subjects on the latest scientific publications. Individual consultations with project coordinator and CG experts also welcomed.

2. Lack of understanding on how their current teaching methodology can be improved

- **How to tackle this issue:** online webinars, peer-learning activities and references (e.g. youtube videos with tutorials) that presents a clear understanding on how to adopt innovative teaching methods in their subjects to enhance learning outcomes and create inquiry mindset for problem-solving among students such as challenge-based method, research informed teaching approaches, case studies, etc.

3. Lack of motivation due to lack of understanding on how academic staff can cooperate with external stakeholders within more ambitious European grant schemes (centralized actions)

- **How to tackle this issue:** workshops, online webinars, peer-learning activities that presents best opportunities from European funding schemes and best cases of European networks for cooperation in the identified fields and programmes to inspire the academic staff.

Main challenges perceived for cooperation in centralized actions of EU

1. Very tight available schedule for setting up consortium and defining responsibilities and co-financing when needed (this issue is particularly relevant when it involves cooperation with city/town halls and regional government entities).

- **How to tackle this issue:** better communication (several months in advance) between European agencies and the universities related to the planned calls for proposals within Horizon Europe programme and EEA & Norway Grants that are oriented to city/town halls and regional government authorities in which universities can play a relevant role as a partner.
- Better clarification by European Agencies regarding how universities can cooperate in their upcoming calls for proposals through their online own webinars specifically designed to address this issue.

2. Different expectations perceived among a varied array of partners to be involved

- **How to tackle this issue:** online meetings, and workshops to clarify the main expected goals and outcomes of selected calls for cooperation. Good articulators of the consortium who understand well and share good relations with all partners involved are needed in these meetings and workshops to lead.
- Design of outcome-based roadmap of activities with clear definition of how each partner entity can contribute and can be benefited from the joint initiatives.

Final comments

- Building synergies between education, research and innovation across disciplines is crucial to tackling the major challenges our societies face.
- The European universities need to work close and on regular basis with their local external stakeholders such as enterprises, civic associations, NGOs and the local/regional government in order to ensure that their educational and research goals are aligned with the local context and demands.
- When universities attempt to involve other external stakeholders in initiatives that are not yet related to centralized actions of European funding schemes, they tend to keep a regular communication and cooperation with those relevant entities; **thus building trust and preparedness for cooperation in advance for more ambitious goals.**
- Think globally, act locally is also a recommended approach by universities in their educational and research activities.
- Regular internal meetings, webinars and workshops among academic staff members and invited representatives of local relevant organizations should be pursued for understanding better the potential of the human resources available for cooperation and avoid fragmented initiatives in parallel that individually deliver less significant outcomes.

Thank you for your attention!

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