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SMART SUSTAINABLE
CITIES a community of practice
for collaborative learning

CREATING SUSTAINABLE AND HEALTHY URBAN LIVING ENVIRONMENTS

THE MINOR PROGRAM SMART SUSTAINABLE CITIES OFFERS AN INTERNATIONAL AND MULTIDISCIPLINARY APPROACH TO THE COMPLEX QUESTION OF HOW TO CREATE A SUSTAINABLE AND HEALTHY URBAN LIVING ENVIRONMENT. IN THE PROGRAM, STUDENTS FROM DIFFERENT BACKGROUNDS AND DIFFERENT COUNTRIES COLLABORATE ON REAL PROJECTS IN THE NETHERLANDS, THE EU AND SOUTH-EAST ASIA.

Urbanization poses challenges
Since the beginning of the 21st century, the majority of the world population lives in urban areas. This urbanization poses important challenges for cities of the future: how do we solve problems related to energy, mobility and waste? How do we ensure inclusiveness, participation and tolerance? And how can we solve that in a smart way, for example with the help of ICT?
These questions challenge us to develop integrated sustainable solutions for economic, social and environmental problems. The future of humankind depends to a great extent on whether we will be able to boost the sustainable development of cities. Are you concerned? Please join the minor program on Smart Sustainable Cities (30 ECTS – one semester) and become the smart sustainable city professional of the future.

International and multidisciplinary
Working on solutions for smart sustainable cities needs to take place in an international and multidisciplinary context. The minor has been developed within the ERASMUS+ project ESSENCE (European Sustainable Solutions for Existing and New City Environments) by the five Higher Education Institutes: TUAS (Turku, Finland), UPV (Valencia, Spain), MMU (Manchester, United Kingdom), HAW (Hamburg, Germany) and the HU (Utrecht, the Netherlands). This project now has a South-East Asian counterpart, SAUNAC (Sustainability Alliance of Urban Networks in Asian Cities). Both projects feature extensive collaborations with local municipalities and companies, providing real projects for students.

Jeroen Schuitema
Study: Facility Management
University of Applied Science
Utrecht
Netherlands

"I think sustainability is a major theme for the coming years. For a better understanding of sustainability, I wanted to look beyond the scope of a single building, which is the focus of facility management: what is the role of this building in the fabric of the city? During the first half of the program, we had a lot of interesting excursions and guest lectures. An important thing I learned in this minor is that sustainability is more than just a façade: it's a mindset that can be brought to any field, any activity. It can be applied to any primary process and it doesn't need to mean losing money at all. This will help me immensely in my career."

UPGRADING THE BUNNIK STATION AREA

Helen Kühn
Student participating in the Bunnik project

COFFEE AND WAFFLES

"Our group was charged with making a patch of grass in front of the station more attractive. In order to do that, we wanted to consult people living in the neighborhood and commuters passing through. Initially, residents were not very eager to cooperate. Then, me and a classmate had an idea: we would organise a community event on the field. In that way, the field would become more of a place of its own. And so it happened: we served coffee and waffles from a mobile stand and chatted with residents about their ideas and wishes for the area. The four other project groups also contributed to the questionnaire, so we were able to collect a lot of valuable data for the project as a whole. It was amazing to see how a few people with little means can accomplish a lot if you get support from others. Our little event can function as a blueprint for future events."

Birgitte Silvester
Project manager Bunnik municipality

FULL OF NEW IDEAS

"Working with students from this programme was great. All five groups brought a lot of quality and innovative ideas. At the same time, they are oriented toward practical solutions. They explored strategical questions about what and why, and then translated them to workable plans. But it's not just the results that are of value to us, it's also their approach. Me and my colleagues at the municipality have been around for a while, so we have developed certain ways of thinking about things. Students are young and full of new ideas. And new ideas are exactly what we were looking for in developing the station area. They applied their creativity and skills to tapping into the views and opinions of all stakeholders in the area: locals, companies in the area, and incoming and outgoing commuters, and people passing through on their way to Utrecht Science Park. When all stakeholders have a say in the development, the results will be the better for it. I'm enthusiastic about each group's contributions, and we are further developing all proposed solutions."

The municipality of Bunnik commissioned students to develop creative solutions for upgrading the train station area into a more attractive, healthy, and urban living environment. The task was split into five different topics: cycling infrastructure, parking facilities, densification, branding concepts, and placemaking.

The first topic dealt with the question how commuting by bike between Bunnik train station and Utrecht Science Park (as an alternative for the route via Utrecht CS) could be stimulated. Students came up with creative ideas for raising awareness among commuters like organizing a pizza stunt; a social media campaign; and, finally, the placement of directional signs to and from the station. The second topic dealt with the parking problems around Bunnik train station. Promising concepts that could release the parking pressure include valet parking and a smart mobility app for car sharing among employees of nearby companies. The third topic investigated how a more inclusive environment for residents, employees and travelers could be created around the train station area. A new concept for currently vacant buildings was drafted, including a wide variety of functions for various target groups. The fourth topic dealt with further detailing of an earlier proposed branding concept Mijlpaal 42. New ideas included marking the border of the Roman Empire, a Roman-styled playground, an Amphitheatre and a sun clock. Finally, students organized a so-called 'placemaking' event, where stakeholders were invited to participate in concepting ideas for making the grass field in front of the train station more attractive. Ideas included planting a multifunctional tree, creating a secluded area, placing a multi-use container and placing a solar charging station.

ELECTRIFYING THE BUS NETWORK

The municipality of Turku (Finland) aims to be carbon neutral in 2029. Zero-emission public transport is one of the key strategies to reach this goal. Turku University of Applied Sciences (TUAS) commissioned a student project group to research the electrification of the Turku bus network.

The Turku bus network consists of 132 lines, serviced by diesel powered buses. Students were asked to come up with a cost-effective plan to reduce carbon emissions. "The client wanted a holistic approach", says Jelle Benders, a student who participated in the project. "All options were on the table: various zero-emission technologies and modes of transport. We considered hydrogen buses, trams and super buses," says Benders.

8 lines make the difference
The province of Utrecht provided the group with an advanced model for calculating total cost of ownership (TCO)

for electrification of bus lines. "The model considers a wide array of investments, beyond buying or leasing the vehicles", says Benders. It showed that complete electrification would drive costs out of control in the short run. But significant gains could be made by using electric buses on a select number of lines. "We found that eight lines are responsible for 47% of passenger throughput", says Benders. "By replacing the 79 diesel buses that operate on these eight lines by e-buses, almost half of all passengers will be transported without local emissions."
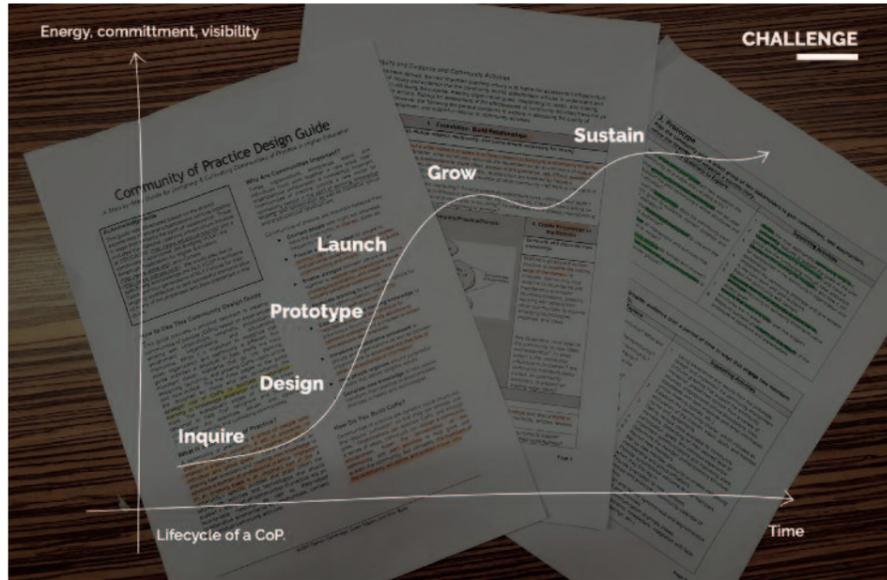
The group signaled that this reduction in local emissions did not mean a reduction of net emissions. "Fossil fuels are still a major part in Finland's energy mix", says Benders. "Further reducing emissions for public transport in Turku hinges on generating electricity from renewable sources." Turku municipality is currently conducting tests with e-buses and has indicated great interest in the proposed approach.

**Jelle Benders
Study: Environmental Science
University of Applied Science Van Hall Larenstein Leeuwarden Netherlands**

"In my major, I'm specializing on energy management and climate. Focus areas are renewable sources, reducing consumption and sustainability. I was looking for a minor in which I would work in an advising role on sustainable mobility. Smart Sustainable Cities is fairly broad, which provided an interesting context for the theme, while at the same time a lot of in-depth knowledge about sustainabiliy was offered. I greatly enjoyed working in projects with people from all kind of different backgrounds and cultures, so we could approach a problem from many different angles. It has greatly expanded my knowledge."

LIGHTING AS A SERVICE

Signify, the former lighting division of Dutch electronics manufacturer Philips, aims at implementing Lighting-as-a-Service (LaaS) in the Vietnam business to business market. Students in the minor SSC advised the Vietnamese branch on internal restructuring to implement this new service.

Lighting-as-a-Service is a concept in which businesses pay a monthly fee to Signify for providing them with lighting solutions. The actual lamps remain property of Signify, while the company also takes care of maintenance and replacement. Vietnam is the first Asian market for Signify to enter. "In Europe, LaaS is increasingly common", says Balthazar Kiewiet de Jonge, student in the minor SSC. "Schiphol, the main airport of the Netherlands, is one example. A major advantage of LaaS is lower energy expenses, as Signify

regulates lighting intensity according to need. Another advantage is that Signify uses smart designs of the lamps. At the end of their life cycle, certain components can easily be removed and re-used, while others are recycled. This reduces the demand for raw materials. LaaS is a sustainable approach to lighting."

Networks
So Balthazar Kiewiet de Jonge, who studies Architecture at Amsterdam University of Applied Sciences (HvA), and two fellow minor students, travelled to Vietnam to help Signify implement the concept in its Vietnamese branch and local markets. "We had to start at zero and define our approach ourselves", says Balthazar. "We set out to approach companies in Vietnam to explore their needs and potential interest in LaaS. In the end, we conducted many company

interviews and received much more information through email contacts with other businesses. Several businesses were very enthusiastic, and ready to partner with Signify."

Opportunity
"For me, the whole experience was of immense value. I learned a lot about what doing business actually looks like, and how to use my network. Besides that, I learned about companies' working methods during a lunch meeting with a CEO of a company with 700 employees. I learned a lot about cultural differences, which are huge between the Netherlands and Vietnam. Aside from the project, the whole trip was an incredible experience. I spent part of my childhood in Asia, it was amazing to be back in the region. My fellow students and I grew really close. It's a phenomenal opportunity for anyone who would like to do a project like this in Asia."

Lifecycle of a CoP.

COLLABORATIVE LEARNING

When people work together, they learn from each other. Supported by a Comenius Teaching Fellowship, this fairly obvious fact was developed into an elaborate project of collaborative learning in the minor SSC. This project consists of three topics: building a Community of Practice, a system for peer feedback, and preserving knowledge gained in projects.

Community of Practice
A Community of Practice (CoP) is a dynamic social structure which facilitates collaboration to achieve individual and group goals. Strong relationships form the foundation for a CoP, making sustained, purposeful interaction a key component. While some CoPs may arise naturally, they can also be grown and cultivated. The Centre of Expertise Smart Sustainable Cities commissioned students from the HU minor program Co-Design to develop a CoP on the topic of smart urban mobility.

Madelyn Capozzi, an exchange student from Canada, was part of the team of students developing the CoP. "A Community of Practice consists of 'social infrastructure', or face-to-face meetings between members, and 'technical infrastructure,' such as a website or social media platform to help organize the community. It unites people across sectors to work together towards a common goal – in this case, the Centre of Expertise Smart Sustainable Cities, local and regional governments, and business in smart urban mobility." In the

CoP, each party can get access to the knowledge, funds, or infrastructure it lacks, in return for what it has to offer; in this way, projects around the theme can be developed smoothly.
"In the early stages, it is very important to come together and define a shared set of values," says Capozzi. "This is the foundation for long-term collaboration. To gain lasting commitment from participants, strong relationships between members is essential. Meeting outside formal contexts can be useful In this respect."
While developing the CoP Smart Mobility, Capozzi and her fellow students designed a process for community-building based on an established model by Etienne Wenger. They came up with the following list of do's and don'ts.

DO
- Cultivate an environment of mutual respect and trust
- Create opportunities for ongoing participation and collaboration
- Ensure members know how to participate
- Keep it simple
- Recognize and reward contributions of members

DON'T
- Have an uninvolved core team
- Lose focus on topic and values
- Have a complicated digital platform
- Assume anything (be evidence-based)
- Forget to celebrate success

LEARNING FROM YOUR PEERS

In professional life, projects take shape and are developed between peers. Professionals give each other feedback and grow from that, both individually and as a team. In order to better prepare students for their future as a professional, the minor SSC implemented a peer feedback system.

In traditional education, teachers give feedback on students' work. But when it comes to actual preparation for professional life, this model is not very helpful. It is essential that students learn to give proper and thorough feedback – and also to receive feedback from peers and learn from it. Through peer feedback, collaboration between students on projects intensifies.

Process
In the 2018 – 2019 program, students were asked to give each other feedback at several points in the course of their research projects: the structural backbone of their research plans, the finalized plans, and the research reports. The first two feedback rounds were organized within the online learning environment. Each student was randomly assigned another's proposal to give feedback on within a certain time frame. The final feedback round was a face-to-face session: students were gathered for three hours; each group studied the report of one other group, and provide extensive feedback on it; in return, they received extensive feedback on their own work.

Lessons learned
- In-class feedback sessions are much more effective than online sessions
- Have teachers support in-class sessions
- Provide a format with extensive guidelines for feedback
- Explain the concept of feedback culture: why, how, what?
- One-on-one feedback sessions are one way to engage 'free riders'
- Teacher feedback is valued higher than peer feedback, so the latter is only effective if no teacher feedback is provided

Results
The online feedback system had certain advantages. Students reported difficulties in formulating feedback; furthermore, typing comments on a screen was not very motivating for many. The face-to-face feedback session was much more productive. Most students were more engaged and in-depth discussions ensued exploring issues. Over all, students reported high quality feedback and stronger social coherence. Also, peer feedback increases responsibility, broadens expertise and stimulates self-evaluation in students.

Jelle Benders

"FEEDBACK FROM A TEACHER USUALLY IS QUITE STRAIGHTFORWARD: DO THIS, DO THAT, AND YOU'LL PASS. THE IN-CLASS PEER FEEDBACK SESSION WAS ALL DIFFERENT. IT WAS VERY PERSONAL: WE DISCUSSED OUR POINTS AND NEGOTIATED OUR DISAGREEMENTS. WE EFFECTIVELY GOT FIVE DIFFERENT TAKES ON OUR REPORT, WHICH WAS VERY USEFUL AND INSTRUCTIVE."

SMART SUSTAINABLE CITIES MINOR

Helen Kühn
Study: Architecture
University of Applied Science
Bochum
Germany

"Participating in the minor SSC was a very positive experience. I gained a lot of insight on different levels of the theme of sustainability. We had great excursions and very interesting guest lecturers. The atmosphere was wholly different from my university: very dynamic and creative. Here, people from all kinds of disciplines came together to work on a common goal of sustainability. I got a lot of input from many different fields, plus a lot of new friends. By the way: I find Dutch people incredibly friendly and open. They were always ready to help. In my experience, studying abroad helps you to grow personally."

The core of the minor program ESSENCE/Smart Sutainable Cities consists of real life, multidisciplinary projects, commissioned by municipalities and companies from the Netherlands, Europe and South-East Asia. In two courses you will acquire the knowledge, skills and attitude needed to work on projects creating smart sustainable cities. The total size of the program is 30 ECTS.

Course structure
In the introductory course on Smart Sustainable Cities (15 EC) you will learn about the ins and outs of Smart Sustainable Cities, about energy, mobility and circular economy in various workshops, and finally you will learn how to apply relevant methods and techniques for researching, designing and advising on Smart Sustainable Cities. The latter includes for example the building blocks for social design, business model canvas, entrepreneurial skills, co-design techniques and research skills. Excursions to best practices are also part of the program. During the Sustainability Challenge (15 EC), you will work independently in a team on behalf of a real commissioner. You will explore the sustainability challenge that they are facing, design smart, creative and innovative solutions for this challenge and advise how this can be converted into a viable commercial proposition. You are also responsible for the project management.

These assignments all have a multidisciplinary character. Every student can therefore contribute to the solution from his or her own discipline.

Entry requirements
This multidisciplinary minor is open to all students. Your previous education preferably has common ground with the themes people (inclusiveness, participation, policy), planet (energy, mobility, and circularity), profit (business models, marketing / communication) and smart (big data, ICT). The language of instruction is English.

Schedule and application deadline
The minor is scheduled in the fall semester (September – January). The application deadline every year is before the 1st of May.

More information
www.internationalhu.com/exchange-programmes/smart-sustainable-cities
Or contact the coordinators Dr. Martijn Rietbergen (martijn.rietbergen@hu.nl) or Dr. Rien van Stigt (rien.vanstigt@hu.nl).

Claire Pattison
Enterprise Fellow at Manchester Metropolitan University (UK)

"It was an absolute pleasure to teach in the minor program. I'm working across a series of programmes to support leadership, business growth, and entrepreneurship, both for business leaders and for people who manage teams. We work with start-up companies on their innovation process: taking ideas through to prototypes and successful products or services. In the minor program, I worked with students on the exact same thing, using Business Model Canvas. I really enjoyed working with them. Quite a few of them were highly engaged and came up with really good ideas. The level of effort most students put in their final presentations was simply amazing. Seeing all those nationalities work together on the same project and working really well together is truly inspiring. I hope we will be able to continue collaborating across borders despite Brexit."

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