Magazine for Construction Management and Engineering

!NTERVISIE

June 2015 | Number 23 | Volume 12

SMART URBANISM

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EDITORIAL

Colophon

General
!ntervisie is a publication of of CoUrsE!, the study association of the master track Construction Management & Engineering (CME) at the Technical University of Eindhoven.

Edition
The magazine is published twice a year in an edition of 600 copies.

Subscription
Yearly subscription costs €9,95 for two editions. Free for CME Students. Subscribe via: Info@ofcoursecme.com

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Contact
of CoUrsE! Study Association CME, TU/e

Vertigo vloer 8
Postbus 513
5600 MB Eindhoven

Telephone +316 189 720 81
Website www.ofcoursecme.com
Email info@ofcoursecme.com

Dear members and relations,

We are very pleased to present to you the 23rd edition of the !ntervisiE magazine. Again we have an edition full of interesting articles. In this edition all the common topics are present, including testimonies from CME students and alumni, the CME Annual Conference, the International Exchange, companies' articles, and much more. This year, CME students were able to travel to Boston and New York. It was a 10 days trip to the USA which embraced both knowledge exchange and leisure activities in another continent, a detailed description of this amazing trip is available in this magazine.

The subject of this !ntervisiE is 'Smart Urbanism' which is just a fraction of the 'Smart Cities' philosophy that is becoming more and more popular in The Netherlands and Europe. 'Smart Urbanism' targets the sectors of Smart Planning and Management & Smart infrastructure. As you will see, the articles from the different companies were picked to be in line with the theme of the magazine. A very interesting interview was held with a planner and BIM coordinator, a development manager, and an application developer at Hurks. Brinkgroep gives an overview of the performance of Dutch Municipalities on sustainability. DPI/ Gappless explains their state of the art software. This and much more is for you to read in this amazing magazine.

At last we want to thank everyone who contributed to the creation of this edition of the !ntervisie. For all readers: we wish you enjoy reading this magazine!

Kind Regards,

The !ntervisiE committee

Chief Editor !ntervisie | **Alberto Perez Martinez (left)**
Editor !ntervisie | **Claudia van der Graaf (right)**

Hurks bouwt en oogst lof

In toenemende mate legt Hurks zich toe op renovatie- transformatie- en binnenstedelijke (her)ontwikkelings- projecten. En terwijl dat fraaie en degelijke projecten oplevert, blijft het ook de jury's in het land niet onopgemerkt. Zo werd het Ketelhuis Ceres van de TU/e BNA-gebouw van het jaar 2013. Het ketelhuis werd getransformeerd tot een representatief kantoor voor onderzoeksinstituut ICMS. Hurks verzorgde de bouwtechnische uitvoering.

Met het Metaforum van de TU/e in Eindhoven wonnen we de Gulden Feniks in de categorie Transformatie. De jury betrok criteria als duurzaamheid, sublimatie, economie, innovatie en maatschappelijke meerwaarde. De Gulden Feniks is de enige prijs exclusief voor de bestaande gebouwde omgeving. Ook het Apollohouse in Amsterdam dat wij verbouwden, werd bekroond met een nominatie in de categorie Renovatie.

De lat leggen we hoog. Bij alle projecten waar we aan werken. Hoe hoog leg jij de lat?

www.hurks.nl

hurks

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NEWS AND ANNOUNCEMENTS

Of CoUrsE! is an active study association and regularly organizes activities for the CME students. On this page you can read about the activities of last semester. You can read about the upcoming events on our website and Facebookpage. You can also come and visit us at the Of CoUrsE! corner in Vertigo floor 5.

BAM project visit

February 4th, 2015

On Wednesday February 4th a delegation of 'of CoUrsE-ers' visited a BAM construction site in the middle of Utrecht's city center. BAM is responsible for the construction of a five layer underground car parking garage with shops and dwellings at the surface. The construction site is surrounded by the central train station, the newly build music building, and numerous busy roads. During the project visit CMErs witnessed the complex logistics involved to manage and operate a construction site in such a heavily urbanized environment. Some of the construction techniques used are: underwater concrete and soil injection.

Beer-Tasting & Celebrating DIES

February 23th, 2015

The first social activity from 'of CoUrsE!' was the Beer-Tasting activity. During this activity CME students had the chance to taste some special beers and get smarter about their history. At the same time, we celebrated also the study association's 12th birthday! This activity took place in the 'Bierprofessor' located in Eindhoven's city center, and all attendees had a very pleasant evening among friends.

2nd General Members Meeting (GMM)

March 24th, 2015

This day we had our second General Members Meeting (ALV for its Dutch initials – Algemene Leden Vergadering). During this meeting a review of activities, budget, and responsibilities of the 12th board of 'of CoUrsE!' took place. We were lucky to have active members present, all their doubts were answered and their opinion heard. After the meeting we had some drinks + dinner + laser gaming activity.

Laser Game

March 24th, 2015

After our second GMM, a group of approximately 20 CME students got together in the city center for playing some rounds of a very fun game: Laser Quest! And, of course, having a drink together. This activity brought a new tradition and a New Trophy. Our current Champion is Melvin van Melzen! Who will be the next year's champion??

LinkedIn workshop - Heijmans

March 26th, 2015

During this activity students got personalized advice about how to make their LinkedIn page and how to keep it up to date. This workshop was done in collaboration with Heijmans. Students tuned their LinkedIn webpage for an entire morning, and now are ready for reaching companies using this media!

CV workshop – Enginear

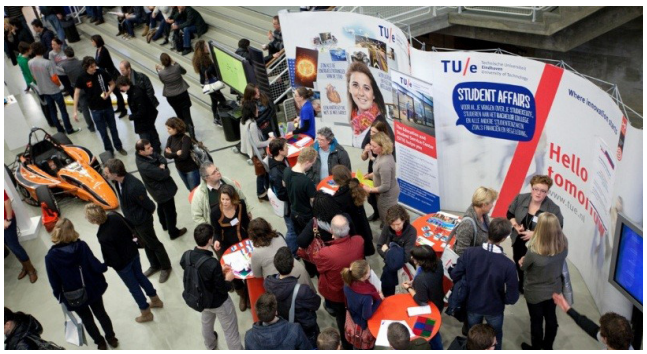
March 31th, 2015

During this workshop students got their CV's checked and obtained feedback by Enginear. This activity was only for an hour during the break, where lunch was provided, and it allowed students to prepare and improve their CVs for our Company Orientation Day!

Master event

April 20th, 2015

In this event the MSc CME and the study association 'of CoUrsE!' are introduced to Bachelor students for increasing our Master's popularity among TU/e students.



After exam drink

April 21th, 2015

At the end of the 3rd quartile CMEs, had the chance to enjoy the sun and celebrate the end of the exams by having a drink, a snack, a chat, and a dance outside the Vertigo building. Together with the good weather, this activity gave all attendees renovated energies for the start of the new quartile.

Company Orientation Day (C.O.D.)

April 23th, 2015

On Thursday 23 April the annual Company Orientation Day (C.O.D.) of the study association Of CoUrsE! took place. During this C.O.D, three different companies (Heijmans, Tracé, and Hevo) got the opportunity to present themselves and to show students what kind of possibilities they have inside their specific company.

Read more about this in our C.O.D. article on page 19.

Heijmans Excursion

April 30th, 2015

On this project visit, the company Heijmans gave the CME students a presentation and tour of the project "Eindhoven Central Station". This project is an extension of the current train station in Eindhoven and includes: new and wider tunnels (underneath the railways) for passengers' mobility, more shops, etc. The project is being developed with state of the art construction technology.

CME Conference

May 29th, 2015

The theme of this year's conference was "Energy in the built environment by 2020". Energy in the built environment is a topic of high interest nowadays; cities account for 60 to 80% of our energy consumption and a similar share of global CO2 emissions. The conference included interesting speakers that presented their ideas about the topic, and useful workshops that allowed students to actively participate in the event.

Read more about this in our CME Conference article on page 20.

BBQ 2015

June 19th, 2015

On Friday June 19th, 2015, our biggest annual event for CME students, professors, and alumni will take place. In this event you will be able to have a cozy and nice evening together with CME students, professors, and alumni colleagues. This year this event will be just after an Alumni Career Event which is organized by CME students following the Career Development course.

Stay alert for the subscription from that will be available via our website, and to the up-coming Facebook event.

New Board 2015-2016

The vacancies for the 13th board of the student association of CoUrsE! are still open!

If you are interested in joining a great board experience, earn ECT's improving your CV, organizational skills, get in contact with companies, then this is the chance you were waiting for! If you want more information, contact us via:

- E-mail info@ofcoursecme.com
- Facebook https://www.facebook.com/ofcourse.cme
- Website www.ofcoursecme.com or
- Come and visit us on the 5th floor of Vertigo.

CME ABROAD
STUDYING IN ...

Dagmar Dhont

South Africa

South Africa | Dagmar Dhont

African Vibes

Last semester I went on a foreign exchange program to The Rainbow Nation a.k.a. South Africa. When I started this master I never imagined myself doing something like this. But the idea of having a break from "normal" life and going somewhere completely different, where nobody knows you and where the climate is a bit better, sounded too exciting and could not miss the opportunity. I chose South Africa because it is by far one of the more interesting countries in the world. I imagined wild life, interesting huts to live in, cold showers, and food which would consist of chicken heads and couscous. Although, of course this was not what I admitted to my friends and family, I told them that it was a quite developed country with every luxury we have in the Netherlands. However, to be quite honest, the image described before was stuck in the back of my mind when I stepped on the plane on 15th of July.

The impression when I got off the plane was that everything was brown and barren. Of course I arrived in midwinter, when Pretoria has its dry season. Upon arrival at my residence I was quite put down to find that three of my seven housemates where Dutch, it was a normal house and the grocery store had normal food. We lived in a closed community for international students called Tuksdorp. There where people from all continents, but Europe and Africa where the best represented. In my first week the biggest difference between South Africa and the Netherlands became quite clear to me. The unbelievable slow pace in which people walked, ate, wrote, generally took action, and the incredible level of bureaucracy. When trying to get subscribed for my courses I was sent all over the campus from desk to desk, from person to person.

But if patience is indeed a virtue, South Africa made me a very virtuous woman. I soon learned why everything went so rusty in my opinion. Turns out that in South Africa, there is nothing more impolite than rushing someone. People will literally start working against you if you show them you are in a hurry. We as Europeans think the opposite: it is impolite to let people wait. I soon discovered, that even when standing in a grocery store, you HAVE to ask how your cashier is doing and if she is having a nice day. Well… It took me a while and a lot of frustration before discovering this cultural difference.

But once you start going with the flow and you let yourself go in the African vibe, you find that the country is both wonderful as it is interesting. It has a quite hard history considering colonisation and it is a developing country with a completely different spectrum of problems than the richer European countries know. Because of this last remark, the lectures are quite different than what we are used to in Europe. There, it is highly focussed on solving the third world problems they cope with. They have the sort of poverty that means no food every day, and no clean water. Our teachers made us aware of the immensity of the problem and the social responsibility we had to help these people. We were the lucky ones, we had food, shelter, and education, which is very rare for people in South Africa. I loved this way of being taught, it all seemed so much more relevant than what we do in the Netherlands.

Also the country was amazing, when I got over my initial feeling of barrenness and missing green Holland, I started to realise the brightness of the colours and the immensity of the night sky. The amazing sunsets every day. It rained for maybe 10 days while I was there. When I came back to wintery Holland there was a hole in my heart where South Africa had been. I think that in my 5 months of staying there I took 6 holidays in and around South Africa, I went to safaris, visited nature reserves and went to the beautiful city of Cape Town. Of course living costs are way cheaper than in Europe, and meeting all the international students was amazing, we had such a tight community and too many parties to count. A foreign experience as this one is impossible to put into words, I can only advise you to undertake one. I can say with absolute certainty that South Africa has not seen the last of me.

Should you ever consider a study period abroad, do it! It may sound a bit cliché, but it is worth it, and you may not get another chance after your studies. I hope you enjoyed this article about my semester in Africa and that it might inspire you to do the same.

Cheers.

Esper Ashkar

Eindhoven

The Netherlands | Esper Ashkar

From Greece to Eindhoven

Deciding to continue your studies is never an easy choice, especially when you have been working for a few years. It looked like most graduates were studying their master's to get a job, why was I going in the other direction? It took me a while to sum up the courage to resign from my job with no plan B except for my education plan. What made it more difficult was that I was only interested in the CME program at TU/e, which for me, is a great educational program. Eindhoven is considered the technological hub of the Netherlands, with a lot of innovation and start-ups taking place in this particular city. I knew that TU/e would allow me to expand my contact network, which is important for an exciting career. The responsiveness and positive replies of the administration to my questions really made me feel that TU/e is an individual based-organization rather than an institution. I consider myself lucky to be accepted, especially since it was the only university I applied to! (I know it wasn't the smartest approach).

I visited the Netherlands (Amsterdam) for a week, before I joined TU/e. I have to admit that I had the impression that all Dutch cities were more or less like Amsterdam, and how wrong was I! It turns out that my first experience in Amsterdam as a tourist was not really a "Dutch" experience at all: besides the architecture, the whole atmosphere was different. I enjoy the more quiet and modern atmosphere in Eindhoven. When I arrived, I was really impressed with the smooth integration process that the university had prepared for international students. All the details that would make internationals uncomfortable were already thought through and dealt with. After the first week of classes started, I knew I had made a great choice. The courses and projects are related to the practical knowledge that is needed in the real business world, which differentiates the CME program in TU/e with other Dutch and international universities that provide the same program.

Something that worried me was going back to university on the wrong side of my twenties, but I couldn't have wished for a better group of classmates. I found students who were my age, both international and Dutch, which made the 'fitting in' process much easier. The program has an appeal for young professionals of different educational backgrounds, as well as, bachelor students continuing their studies.

Dutch people are very easy to approach and talk to, especially since almost everyone I've met in Eindhoven speaks fluent English. It was interesting to get used to the 'direct' approach that Dutch people have: it was very strange for me since in my country people are very indirect when they talk to each other. After living for 6 months here, I am getting used to it but I can't say that I have become that direct myself, but on the other hand I have become more time conscious and punctual: the Holy Grail for Dutch professionals & students.

Living here for some months, make me miss a lot of things though. Although there are some good Greek restaurants, it is not quite the same experience. One thing I really appreciate in the Netherlands is the people's love for coffee, which I share: especially with a hot 'stroopwafel'. Like most internationals, the weather is something that I never think I will be able to adapt to! Especially when the winters rarely go to single digit degrees in my country. Biking is also something that I had to get used to; it's not a popular every-day mode of transportation in my country, but now I feel like I'm stranded without it!

All in all, joining TU/e was the right decision: I have met a lot of wonderful people from all over the world, the program is interesting with a wide range of elective courses to choose from, and the city has a very cozy atmosphere with a very vibrant nightlife. TU/e is definitely the university to choose if you're planning to study the CME program, if you don't mind the rainy weather and biking of course!

Adio sas.

GRADUATION THESIS

HANNELY HORTENSIUS

Potential use of public transport in the context of air polution reduction

Development of a tool to determine and localize potential bus users

Since the air pollution situation in Europe is getting worse, some measures should be taken. More than a fifth of the greenhouse gas emissions is due to traffic-consumption and therefore this research will make an attempt to optimize the transport effectiveness by supporting public transport. This will be done by developing a model which determines and localizes potential bus users. To make this tool a model is estimated with the use of personal, trip, and areal characteristics. The tool could be used by public transport agencies or traffic engineering consultancies to optimize the existing bus network or implement the model by creating future networks in new neighborhoods.

Subject Choice

The 14th of May 2014 the following news item was stated in the 'Nederlands Dagblad':

"Due to air pollution, the sky in Paris is not clear blue, but rather pulpous yellow. To combat the smog, public transport will be free over the next three days, in Paris and two other cities."

Paris tried to fight the smog in the city by encouraging people to use the public transport. The air pollution in the Netherlands is not yet as bad as in France, Belgium and Germany, however, if no action will be taken we will certainly follow their footsteps. Especially, since cities continue to grow and with this also the demand for transport is increasing.

In this case, the public transport is provided for free, unfortunately this isn't a realistic measure in the long term. Can the stimulation of public transport lead to an improvement of the air quality in the Netherlands?

With this subject I went to Peter van der Waerden and together we designed my final research project. Peter already did research towards potential public transport in Nuenen, and from this research a questionnaire was available. This way I did not had to make my own questionnaire, which takes almost all the time for graduation and ends with a dataset which can barely be analyzed due a lack of time. I could now dive into the matter directly, and that is what I did.

Process Experience

When my research topic was clear, I went looking for a company which could support me with the practical issues during the research. This company was *'BonoTraffics bv'*, a traffic engineering consultancy in Kampen. Because of the long travel from Eindhoven to Kampen, I choose to only work at the office once a week. Many graduates work more days a week at their graduation company, however, this arrangement was appropriate for me. Most of my research was about theoretical models, and for this I needed more support from the University than from my company. However, once a week I had my trip to Kampen, and then got out of the working flow and I started brainstorm with Joris, my supervisor from BonoTraffics.

Because of the second hand dataset and the fact that I had to start with the models from the beginning I had many appointments with my supervisor from the University. I saw him at least every two weeks, this seems a lot, but I needed it for the models in SPSS. If you need the help don't be afraid to get it! Otherwise you can get stuck and demotivated and nothing good will come from that. As mentioned before I got a lot of help, but in the end I also got a great result for my process, because I did not give up and kept looking for other options.

Research Summary

So, what did I do? As the subtitle already states, I tried to develop a tool to determine and localize potential bus users. The idea was to model potential bus users by combining the personal and areal characteristics from my dataset, which came from the enquiry and an open dataset like CBS. When personal characteristic can be linked to a certain area, the model can estimate how many potential bus users are stated in this area. For example when a municipality wants to expand a city, they could use the model to estimate where are located most of the potential bus users, and this way know where the bus facilities should be placed.

The methodology to develop the tool of interest, includes a model which regards the switching-behavior of travelers. This switching behavior can be extracted from personal variables, and areal variables are needed to link the potential to their location. Because the variable 'Bus Potential' was defined as a categorical variable, multinomial logistic regression models were used. The final multinomial logistic regression model used three independent variables regarding: family size, public transport subscription, and present transport mode. It can be concluded that these variables are significant

for the estimation of the dependent variable 'Bus Potential'. However, the aim of the model for combining personal and areal characteristics was not accomplished; probably because the dataset used in this research was not fitting the multinomial regression model.

As encountered very early in the modelling process the four position ZIP code scale was too gross and could not lead to a significant model for the bus-potential. A smaller scale should be used, in this research the six position ZIP code areas were used. However none of the bus related characteristics did initially have a significant effect on the model. This could be because when using the six position ZIP code, very few areas have bus stops; for this reason, perhaps medium scales for the areal variables could be examined, e.g. neighborhoods.

Besides the scale of the areal characteristics, their usage in the same level as personal behavior was doubted. To solve this, a hierarchical model could be used, however due to time constraints and lack of tools such a model was not made during this research. The lack of tools refers to the software availability via the university. Statistical models are usually done in IBM SPSS Statistical, but this is not an ideal program for hierarchic models. HLM is a better fitting program, but could not be learned and applied in the short amount of time available. However, the hierarchic regression model could still be a good solution to create a fitting model for both areal and p-ersonal variables. The warnings about missing data will be solved this way because, hierarchic regression models can estimate parameters by the use of the available data.

Altogether, the research did show signs which were previously detected by Waerden et al. (2009) in his research for 'Regionaal Openbaar Vervoer Bereikbaarheid Consumentgericht (ROVBECO)' ('Regional Public Transport Accessibility Consumer Oriented'). This research also attempts to realize a planning tool for bus potential. The model made by ROVBECO also contained only three significant variables.

Further Research

The research is carried out because of an important social problem: air pollution. Therefore, the target to reduce private-car usage by the stimulation of public transport seems important enough to continue the research to develop a tool for bus potential. Maybe the air quality problem will, in the future, not be as stressing as it is nowadays, this because all transport continuously becomes more sustainable and maybe green transportation is achieved by the use of alternative fuels or electric driving. Moreover, the stimulation of public transport can have multiple other positive effects on society, for example: solutions for congestions, parking problems, and livability of residential areas.

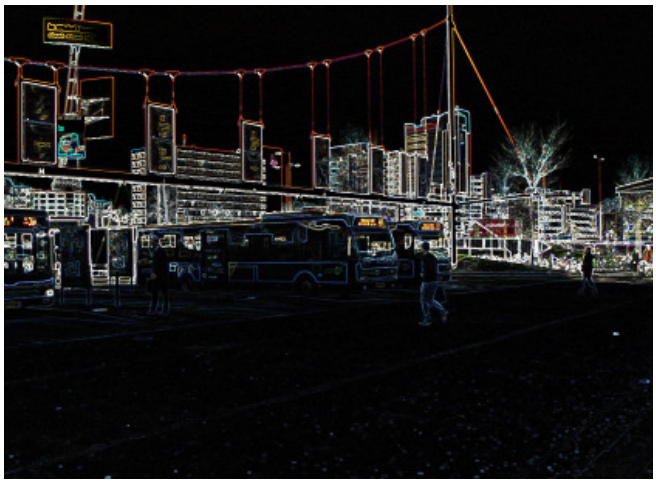
Finally can be concluded that this research did explore one path to make a bus potential model: the multinomial regression model. However, many paths are still out there ready to be discovered.

Finishing University

My final presentation was on the 25th of February 2015. I can honestly say that I had never been so nervous for anything before in my live, although I already got my green light and failing was not an option! What helped during this day were all my family members, friends, and study mates, who were there to support me! And the lesson learned was not to doubt about myself when I did the best I could, this was clear by the 8.5 I got for my graduation research.

One of the great things of my BSc Build Environment was that, since it was a very broad study where I learned about all aspects regarding the building process, I never had to specialize in a certain subject. My Master program, Construction Management and Engineering, still included many subjects, so I could develop myself very broadly. However, this broad curriculum caused in me a very wide interest in job opportunities and I yet don't know what type of job I would like to work in. Therefore, I am applying for traineeships at the moment, in this way I can look around in the labor market, and hopefully know which function I want to perform in the end. For this quest my knowledge about different companies, which I obtained by attending excursions and all sort of company activities organized by different study associations, is very useful. So, I guess my main advice is to join activities and start working on your career during your study!

Hannely Hortensius MSc.



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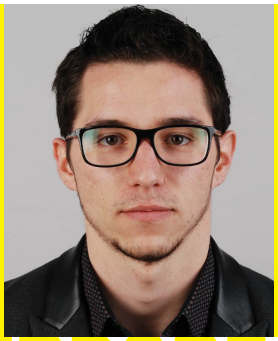


JIM OBERDORF

From becoming an architect to being a community engagement manager

After finishing secondary school in 2006 and with the knowledge of being good at science and interested in architecture I subscribed for a Bachelor Architecture, Building and Planning at the Eindhoven University. One year and many glue-stained architectural models later I found out that it was not creating new buildings that had my interest but understanding and managing the process of building things. My second and third year I therefore studied Management & Urbanism and successfully graduated in 2010. Despite a lack of general publicity (hopefully this is better now) I started my Master Construction Management and Engineering and learned the basics of project and process management together with making a business model and writing my thesis on affordable housing.

After pursuing multiple traineeships and running corresponding application procedures in 2012 I got a job at a multi-company traineeship called Jelmer. Jelmer is a company in Vinkeveen that provides young and ambitious people a platform to get to know civil engineering and several different companies and organisations that operate in that line of field. This traineeship really helped me develop myself personally as well as professionally and provided a well-prepared jump into civil engineering. I highly recommend this type of traineeships since it is a smooth transition from student to young professional and gives you the opportunity to really invest in your personal development program.

During this traineeship I had the opportunity to work on a large infrastructural project in my home province Limburg: a canal, 34 kilometres in length, had to be upgraded to accommodate bigger ships (project *Verruimen Julianakanaal)*. I was also involved in tender writing for the DEME Group in Antwerp (Belgium). After two years of traineeship I decided to stay at this interesting project and accepted a job at de Vries & van de Wiel.

de Vries & van de Wiel
de Vries & van de Wiel, part of the DEME Group since 2000, is a nationally operating contracting company carrying out highly complex works in a professional, socially responsible and sustainable manner. Its four core activities are environmental technology, civil engineering and soil remediation, dredging and waterbed remediation, and sand exploitation.

DEME Group
DEME, the Belgian dredging, hydraulic engineering and environmental solutions group's core business of dredging and land reclamation is supplemented by diversified activities that address different strategic drivers: hydraulic projects at sea, services to oil and gas firms, the installation of offshore wind farms, environmental activities such as soil remediation and sediment recycling, revalidation of brownfield sites and wreck clearance. Its multi-disciplinary know-how and experience have allowed the DEME Group to grow into a global solutions provider. The Group owns one of the most modern, high-tech and versatile fleets for dredging and hydraulic engineering activities. Active since 1852, the Group employs 4,600 people worldwide and realised a turnover of EUR 2.58 billion in 2014.

Project *Verruimen Julianakanaal* in short
- Client: Rijkswaterstaat Maaswerken
- Contract: Design & Construct
- Contract sum: € 38 million
- Planning: 2013 - 2018
- 26 kilometres of maintenance dredging
- 4 kilometres of steel sheet-piling
- 2.5 kilometres of dike relocation
- 1.5 kilometres of draught enlargement

Short history
Due to the unnavigable meandering Meuse (Maas) river the Julianakanaal was built between 1925 and 1935 and opened by the former Dutch Princess Juliana. This new canal provided a reliable waterway for ships transporting goods between the Port of Rotterdam and the Liège mining district.

Project *Verruimen Julianakanaal*
Transportation of goods by water is an efficient and sustainable alternative for the more and more congested Dutch highways. In the case of the Julianakanaal, the waterway is already in use and as part of the *Maasroute* and European *Blue Road* it links the Netherlands to the important German, Belgian and French industrial areas.

To keep up with the growing demand of transportation, bigger barges will navigate through Dutch waterways. To facilitate these bigger ships (up to 190 meters in length, 11.4 meters wide and 3.5 meters draught) the Julianakanaal has to be enlarged. To do so Rijkswaterstaat Maaswerken put out the project to tender in a Design & Construct contract. In a D&C contract the chosen contractor is responsible for both designing and constructing the project and requirements are specified functionally, instead of technically (as is usual in traditional contracts). Example of a technical requirement: the waterway has to be constructed with a passage width of 36 meters / Example of a functional requirement: the waterway has to be constructed for the *Vb* shipping class. Hereby, the contractor can come up with his own solutions and optimisations in both designing and constructing the project.

In February 2013 de Vries & van de Wiel came up on top and was awarded to realise the project commissioned by Rijkswaterstaat Maaswerken. A project team started designing and preparing the construction of enlarging the Julianakanaal. The project team consists of five management roles, the so-called Integrated Project Management (IPM) roles: project manager, technical manager, contract manager, community engagement manager and a manager project control.

My role as a community engagement manager
As a community engagement manager (my best possible translation for *omgevingsmanager*) I am responsible for a good relationship with the direct and indirect environment and stakeholders of the project. To do so I chart stakeholders and their interests and try my best to gain trust and consensus for the project by listening to them and taking their interests into account. I strive for a situation where all parties benefit. On the one hand I translate agreements made with stakeholders to requirements for the project team and on the other hand I translate the project interest to the stakeholders. This can be a one-on-one 'kitchen table conversation' with a resident of a neighbouring apartment building, a presentation for a municipal council committee or even an interview with a local newspaper for example.

Some of my responsibilities and activities
- Stakeholder management
- Permit management
- Communication management
- Complaint management
- Represent ecological values
- Coordination of relocating utility company properties

Since all these activities require communication with stakeholders I organise and attend numerous recurring and occasional meetings with, inter alia, permit authorities, waterway management, third party organisations and utility companies. For various subjects I can call in the expertise of ecologists and permit managers.

From theory to practice
Working with a variety of people in an integrated project management model makes me think of *collaborative design and engineering*, where multidisciplinary teams are put together and disciplinary interests have to be defended and promoted and an integral project has to be achieved. Defending your interests in a team and reaching consensus are essential for having a successful project or product. Collaborative design and engineering can be a very good and helpful course for developing these skills.

Legal and Governance and *Public construction law* offered me a base in law and more importantly a base in legal aspects and jurisdiction and simply how to read and interpret legal texts.

Because more and more infrastructural projects are realised as integrated contracts (such as E&C, D&C, DBF, DBFM, DBFMO) the process behind designing, engineering and constructing projects has become increasingly important and enables contractors and clients to control the project and deliver in time and within budget. *Process Management in Urban planning & development* provides a good introduction on process management.

The other CME courses and projects are equally significant, but I chose to highlight the courses above because these have a clear link to my job as a community engagement manager right now.

After two and a half years of work experience I can honestly state that CME provides good basic knowledge of project and process management that can be used in a variety of business sectors and on various levels. On several occasions and in both projects I was involved in, I met CME alumni who work in project and process management positions. And it is always nice to meet fellow alumni and chat about work, studies and memories of *'of CoUrsE!'* activities!

More information
For more information on the project please visit our project website www.julianakanaal.nl and take a look at www.deme-group.com for more information on the DEME group and de Vries & van de Wiel.

INTERNATIONAL EXCHANGE

BOSTON & NEW YORK

Of CoUrsE! International Exchange 2015 review

The International Exchange 2015 of the study association 'of CoUrsE!' went to the United States of America and was simply a great success from start till end. The 'of CoUrsE! Tour 2015' organized this 10 days exchange which embraced both knowledge exchange and leisure activities. Fifteen participants and one professor have taken note of all formal and informal visits. On the 3rd of May the tour started by travelling to Boston and thereafter we moved towards New York City, Brooklyn area. Afterwards all students, voluntarily, stayed 5 days longer in the United States. Therefore, all students travelled back on the 17th of May 2015. During these 10 days we visited a lot of companies, universities, governmental bodies, and consortiums which were related to our International Exchange topic: Smart Cities. Due to the magnitude of the topic, the focus was on Water Management, Energy Management and Urban (Re)development. And alright we are also students, the nightlife of Boston and New York was amazing.

The preparation

In September 2014 the preparations started with setting up the 'of CoUrsE! Tour 2015' committee. When the committee was complete, different functions were assigned to each member. Simultaneously the destination and subject were part of discussion. Due to the development within the Construction Management and Engineering field, notoriety of the concept Smart Cities is growing really fast. It's a broad concept, but together with the committee we were able to specify our subject more by looking at current global problems. Therefore it was nice to find out that two large cities, within an acceptable radius, where both focusing on current problems related to Smart Cities. Boston and New York became our destinations with the focus on Water Management, Energy Management and Urban (Re)development. Both cities are aware of the need that something has to be done and therefore also appointed there best universities to start new research. Boston has an incredibly smart and innovative population, boasting more than 70 universities and leading North America in both patents per capita and venture capital investments per capita. Boston's former mayor Thomas Menino was a big driver in the innovation agenda. New York partnered with IBM in 2009 to launch the IBM Business Analytics Solution Center to address "the growing demand for the complex capabilities needed to build smarter cities and help clients optimize all manner of business processes and business decisions". New York has pioneered the adoption of electric vehicles, embraced green and smart urban regeneration, and fostered a strong entrepreneurial ecosystem. It was clear that the universities had an enormous volume of knowledge, companies were available and innovation was running in both cities. Therefore it was an easy decision to choose for the United States of America (U.S.A.). We as a committee kept the destination as a secret until the moment was there to reveal it. Students were very pleased about the destination. Subscriptions were the result and the committee went further with organizing the tour.

The International Exchange

On Sunday 3rd May, all the participants gathered by at Schiphol Airport a 'hard to miss' meeting point. Regardless the strong regulations of U.S.A. border checks, we (almost) didn't have any problems getting in. The only lesson we've learned is that a passport number never contain an O, this only can be a 0 and therefore an ESTA can be rejected. After a long flight via Zurich we finally put our feet on U.S.A. soil. A transfer brought us to the Constitution Inn Hotel at the Navy Yards of Boston.

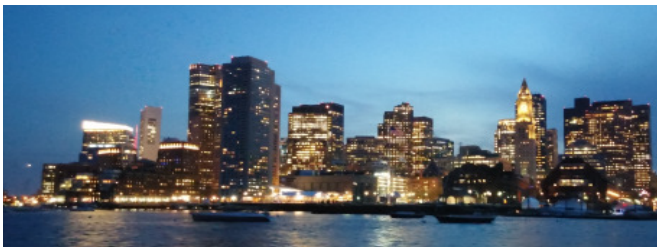
The first morning we met in front of the hotel for our first activity: Massachusetts Institute of Technology (MIT). The CME International Exchange 2015 had officially began. It started with a short presentation from the chief of International Affairs who gave an insight about the available study programs at MIT and how they manage their student applications and tuition fees. Some interesting MIT facts: 81 persons within the current or former community of MIT are Nobel Laureates and the annual study costs at MIT for the year 2014-2015 were in total $57,944 USD. So it is really expensive, but you know you are at a smart university. After his presentation, we went to the Senseable City Lab, one of many labs from MIT. Senseable City Lab aims to investigate and anticipate on how digital technologies are

changing the way people live and their implications at urban scale. They showed us their approach on different projects such as Current City, Trash Track, and New York City Taxi. We continued the MIT activity with a guided tour all around MIT. In the hall of the main building, a lovely young lady was waiting for us to show us the campus. It was nice to see the differences between MIT and our own university and share both knowledge and impressions.

Between the Freedom Trail and MIT we continued with a short lunch, whereupon we took the metro to get to our guide. She showed us the most beautiful places of Boston by walking part of the Freedom Trail. The Freedom Trail is a historical path with all historical buildings beside that route. From neoclassic until jugendstil and from structuralism until gothic, all these architecture is interwoven in the Boston city center. Some buildings were brand new, but next to a new building a very old building is still resisting. In the evening we went to a restaurant called Boston Beer Works where we reviewed, in the enjoyment of three different kind of beers, our first day with many impressions and feelings.

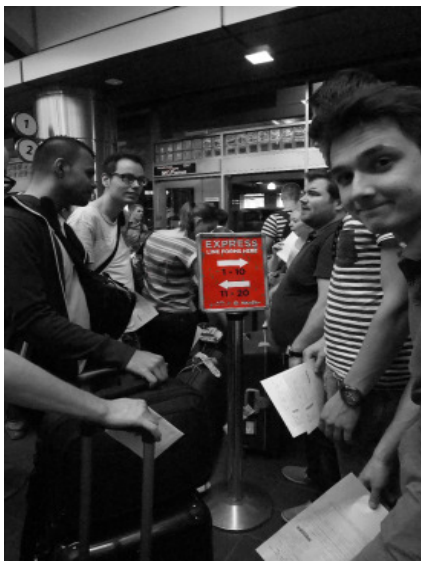
On the 5th of May, our day started with singing for Rens' birthday. Using the ferry, metro, and bus, we went down to Massport company. This company is responsible for the total development and maintenance of all ports, airfields and public transportation services in Boston. To see their work in practice, Massport showed us around at the Boston Logan International Airfield. It was interesting to see how they develop new buildings with the first floor empty to let the water come in and no damage will be caused. It's a strategy which is a different approach than we have in the Netherlands. After the tour we had lunch in the city and we moved to DCAMM (Division of Capital Asset Management and Maintenance). This company is responsible for major public building construction and real estate services. We got a presentation from Liz Minnis who is the Deputy Commissioner. She explained that DCAMM is an office of managing, planning, design, and construction. They are concerned with different things like comprehensive master planning to guide capital investment decisions, capital repairs and improvements in collaboration with state agencies, manage State Office Buildings, and renovations. After the presentation we had a tour through the State House.

We came down in several halls and they took us to places where no normal tour would go. The building consists of many different beautiful rooms with large American flags inside of it. The final presentation of the day by DCAMM was from Hope Davis. She is the director at Commonwealth of Massachusetts and talked about the energy program of DCAMM. For example, they use solar panels and lightning improvements to improve the efficiency of buildings. Therefore, a budget was set in 500 million dollars which had to cover all 500/700 governmental buildings. After this impressive day, all the participants, including the professor, went back to the hotel and went out to enjoy the evening together.



The next day we started with a visit to Harvard. Since this was part of the day was regarded as free time, not everyone was present, but most of the group attended. It was very nice to see the famous buildings as seen in movies and series. In the afternoon the official program continued at MWRA on Deer Island, a peninsula east of Boston. MWRA stands for Massachusetts Water Resources Authority and it is a public authority in the Commonwealth of Massachusetts that provides wholesale drinking water and sewage services to certain municipalities and industrial users in the state, primarily in the Boston area. Their facility on Deer Island is a Wastewater Treatment Plant, abbreviated to DITP. It treats an average of 365 million gallons (1381 million liters) of wastewater each day. It was really interesting to see the awareness and development of secondary resources flows. MWRA is also one of the largest electricity users in the Northeast of the United States. Currently they self-generate 25% of their electricity needs and over half of the plant's energy demand is provided by on-site, renewable generation. This is a big win for them, as their energy costs account for about 20% of their operating budget. So the mission of MWRA was not only to make their process sustainable, but also the value of environmental and global development was part of their discoveries.

Thursday the 7th of May was, unfortunately, already our last day in Boston. We packed our bags very early in the morning, because we had an appointment with the architect and project distance between the activities, in the afternoon Shawmut Design & Construction (construction company) and Sasaki (architects), the committee made the decision to go by car to drive through Boston with two vans and, due to the driver, one awesome Mustang. At the municipal building, we met the famous Dutch architect Francine Houben, who had many influences in the design of the building. After this interesting tour, we went to the office of Shawmut (the contractor), to talk and brainstorm about the implementation of BIM in the design of the building, while enjoying probably the best lunch of the whole trip. It included a large sandwich, pasta, drinks, chips, brownie, and chocolate. At the modern Sasaki building, we listened to a presentation of Jason Hellendrung, who was specialized in sea change & increased storm-related flooding. He said that the concept of designing with water is the strategy of allowing defined areas to flood or contain water in order to prevent damage to other areas (Concept of Design to Build). From this part it was the start of a long journey from the head office of Sasaki all the way down to New York City Brooklyn. With cars, ferries, metros, busses, shuttles, and legs we arrived an hour late at our dorm due to traffic jam, bus delay, and construction works in the metro. After some struggle at night everyone fell down to sleep, only for a couple of hours.

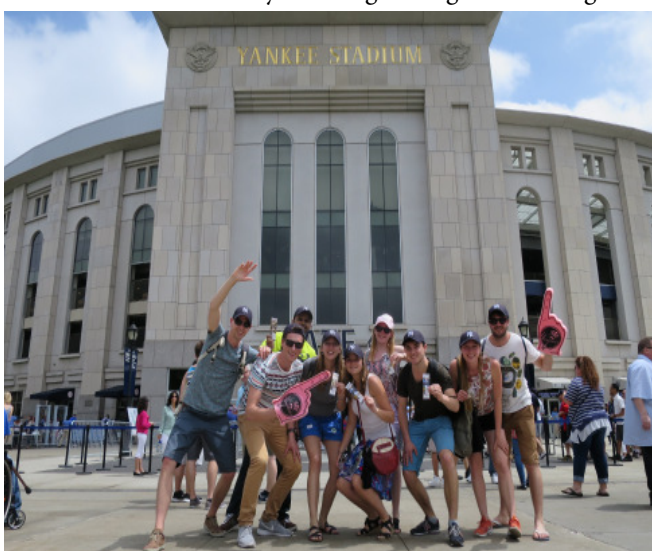


The first full day in New York started with a nice walk to the building of Arcadis. An important keyword during the presentation of Arcadis was 'resiliency', the ability to recover after a flooding or other kind of disaster. Arcadis participates in several water related resiliency programs in the area of New York, but one of the most relevant projects is the Big-U project. This green barrier at the waterside helps to protect a part of Manhattan from storms and flooding. After Arcadis we visited the New York University, on our road to the university we had a very healthy lunch at our favorite

restaurant 'Subway'. At the University we had a presentation from a professor who explained what kind of research they do. They developed a decision support system for cities based on sensorial data. They could analyze people's behavior related to urban challenges. After a hot day, we enjoyed a nice dinner at an authentic Mexican restaurant called 'Tacombi Fonda Nolita'.

Saturday 9th of May, after five full busy days visiting companies and travelling, the participants needed rest and relaxation, which wasn't part of the day schedule, but seemed to be like this because no company visits were planned. We organized a cultural tour which started with the most famous statue in America: the Statue of Liberty. We took the free Staten Island Ferry to see the Statue of Liberty. The ferry brought us from Manhattan over the waterway Upper New York Bay to Staten Island. Even though the weather wasn't optimal, we did have a clear view of the Statue of Liberty. Our tour continued through the southern Battery Park, Wall Street, 9/11 memorial in combination with the Freedom Tower, American Museum of National History, Grand Central Station, Brooklyn Bridge, Central Park, and finally Trump Towers. It was a full day of cultural activities, we had dinner at the Little Italy neighborhood and enjoyed the nightlife to finish such an impressive day.

Sunday was the day of the Yankees game! With everyone present, we started to head to the Bronx where the Yankee Stadium is located. Sunday was Mother's day so everyone in the stadium was wishing women a happy Mother's day, and also the players were portraying their gratefulness towards their mothers in the pregame show. The game resulted in a Yankees win (Go Yanks!) because the pitcher of the Yankees was having a great game with 16 "strike-outs" (which we heard was a good thing). We didn't really understood the game because of lack of knowledge about the game, but it was really exciting to see the American way of living during a baseball game.



After that, we went to Bryant Park where everyone enjoyed the sun and Starbucks coffee. It didn't take long before the perfect time arrived to ascend the currently fourth-tallest completed skyscraper in the U.S.A. We have seen New York both by day and night because it became dark after waiting an hour on top of the skyscraper. Finally we ended up at a fast-food restaurant called Wendy's, it gave us a non-healthy meal with a lot of calories.

The 11th of May, the final day of the 'official program' of the International Exchange 2015 started with the NYSSG in Manhattan which is New York's Smart Grid consortium. Andrea Ruotolo started with a presentation in which she explained what are the goals and current activities of the consortium. The consortium consist of different companies with the common goal of implementing smart grids. An international collaboration exists as well: GRID4EU. We can conclude that smart grids are pretty well developed in the USA, multiple practical examples in various states especially in California exist. After a quick lunch we travelled to the office of IBM. After introduction from Joan T. Meltzer, the Executive Leader Smarter City Solutions started her talk about how IBM approaches Smarter Cities and what IBM´s role is. We can conclude that they are an essential player in the development of Smart Cities due to their great knowledge about sensors, chips and computers in general. After a short coffee break George H. Kreitler, Software Solutions specialist of the IBM Watson Group, gave an overview of the development, application and work of IBMs' supercomputer Watson. Watson is a self-learning computer which is gaining

knowledge and combining all big data with each other. Making this computer smarter and smarter, with a large amount of algorithms, the computer can solve everything in the world.

As mentioned earlier in this article, all students stayed until the 17th of May, but the professor went back on the 11th of May. In the upcoming days participants enjoyed the city of New York and also some students travelled to Washington where they visited the White House, Pentagon, Arlington Graveyard, Needle, and Capitol. After a wonderful last dinner, we all ended up homewards with a flight at night on Saturday and arriving on Sunday due to the time differences.

Hereby, we want to thank all participants for their overwhelming enthusiasm and their professionalism during all participated presentations. All companies complimented our CME group for our pro-active attitude. For us it was an unforgettable trip with a lot of amazing memories included with informative, cultural, but also leisure activities. Next year there will be again an International Exchange so be there!

For more information about the International Exchange you can visit our 'of CoUrsE!' website: www.ofcoursecme.com where we uploaded our daily reports. The case studies of all participants have been combined and a booklet is going to be created.

'of CoUrsE! Tour 2015' committee:
Jeroen Verberne, Ritesh Brispat, Dennis Boterman,
Lotte Bekendam & Laura de Swart.

COD

On Thursday 23 April the annual Company Orientation Day (C.O.D.) of the study association Of CoUrsE! took place. During this C.O.D, three different companies got the opportunity to present themselves and show to CME students what kind of possibilities they have inside their company.

This year the C.O.D. had a different approach than years before. This year the companies got some time to pitch themselves and explain shortly what they do and what they can offer. After the pitches there was time for a delicious lunch which was followed by speed date sessions between the companies and students. In addition, the students had the chance to get a personal conversation with one or more companies; for this last part of the C.O.D, students could send their CV to the companies in advance and the companies made the selection of who they want to speak with. To give everyone the same opportunity, prior to this event, 'of CoUrsE!' organized both a LinkedIn and CV-check workshop.

Every year 'of CoUrsE!' tries to pick a wide range of companies to get to know more about the different sectors where CME students can work in. The attending companies where the following:

Heijmans	*Real estate & dwellings, infra & civil engineering and utilities*
Tracé	*Employment agency in technique and focusses on personal development*
Hevo	*Housing advice and project management*

Around 11 o'clock the companies and students were given a warm welcome and the start of this day was opened with some coffee and tea. The day started with a pitch of Dick Bouman from HEVO, went further with a pitch of Nicole Arts from Tracé, and finished with a pitch of Marein Verkerk of Heijmans. After the lunch the speed date was started.

Students were divided in groups of two and guided to the tables. These students had the opportunity to get a five minutes conversation with the companies to get a better insight in these companies and improve their networking skills. These speed date sessions took an hour, and after this, the official part of this day had come to an end. However, the day was not over, the personal conversations were just starting. Both students and companies could give their preferences in advance who they like to speak with, matches were made and 15 minutes private conversations were available for eight students per company. During this part of the day students could ask about graduation projects, traineeships, or other questions.

The conversations were finished about half past three and with this new approach of the company orientation day every student and company got the opportunity to have quality time with each other and broaden their networks.

'of CoUrsE!' would like to thank everyone for their presence and hope to see everyone next year again!

TRACÉ heijmans HEVO

Energy 2020, in the built environment

The Construction Management and Engineering (CME) annual conference with theme of 'Energy in 2020 in the Built Environment' took place on the 29th of May 2015. In the conference students, alumni and professors of the master program CME participated in workshops and lectures regarding this theme. In the morning, speakers from TNO, Alliander and the municipality of Venlo gave participants an idea about the challenges regarding energy in the build environment. In the afternoon, participants could put their knowledge into practice in workshops of TNO, Municipality of Den Bosch, Heijmans and Royal HaskoningDHV. Each workshop delivered one participant to pitch the learning points of the workshops. The conference ended with a drink in the Skybar Underground.

Lectures

The first lecture of the conference was presented by Dr. Erich, researcher of TNO on the topic of future energy systems for housing. First the energy visions and goals toward 2050 were stated, namely: 1) lower energy use, decrease losses; 2) more renewable energy; 3) more efficient use of fossil energy. Then, different ways of using solar energy as an energy source were explained in order to search for the most efficient path of solar energy conversion. The most efficient approach is converting solar energy to heat storage with more than 80% efficiency. TNO found its solution toward responding the energy demand in an efficient and sustainable manner. 50% of the solar energy is not in the visible part of the spectrum and current developments focus on reflecting solar energy for cooling purposes. So the solution of TNO proposes to collect NIR and implement the system in façade panel to collect the solar energy and use it as thermal and PCM source. This project has been followed by a successful production of a prototype by a large consortium.

Bert Heerbaart from Alliander spoke about a pioneering smart grid concept, and his experience with the implementation of this concept in Amsterdam. Key benefits of this smart grid concept are: the ability for bidirectional currents, the flexible grid structure, an intelligent electricity network through computer and sensor technology. The lecture described the future structure and capabilities of the energy network. The lesson learned is illustrated by introducing the smart grid for Amsterdam, Alliander applied an integrated smart grid by implementing a bidirectional grid that is monitored and operated by computers and sensors.

Fred Jonker of the municipality of Venlo spoke about energy policies and projects in the city of Venlo. Currently, their new city hall is build according to Cradle to Cradle (C2C) principles, this project reflects the great ambition the municipality has. For this project, prior to the architects' selection a training session was held to transfer the C2C vision and principles. In addition, all stakeholders were engaged in an early stage of the building process. While designing, sustainable improvements were done which increased the total building costs. These extra costs were justified by making a long term financial planning. We can conclude that the transition to a more sustainable and energy efficient built environment will need a mindset change, to focus on a small set of goals and an elaborated financial plan.

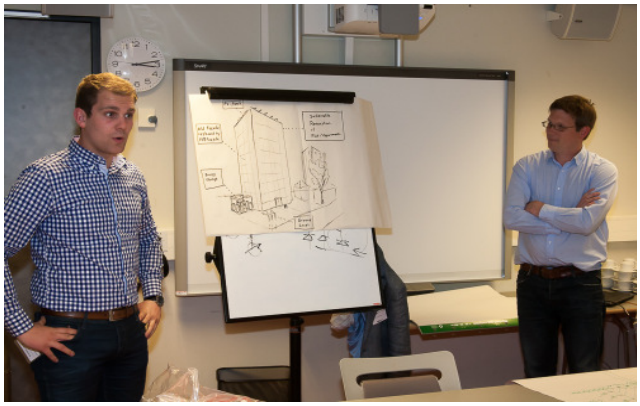
Workshops

Wim Maassen and Susanne Rolaff of Royal HaskoningDHV held a workshop on identifying sustainable building and area performance requirements and stakeholders' interest in making the built environment energy neutral. First, introduced the case 'Merwevierhavengebied' in Rotterdam. Different groups started working on the assignment; making the presented area in Rotterdam energy neutral. Participants brainstormed about technical solutions on different scales to make this area energy neutral. The second assignment was about realizing the goal together from the perspective of different stakeholders. By mapping interests, connections, and values of each stakeholder a good insight was gained. Participants used information obtained by the morning lectures in their solutions to both of the assignments. The workshop provided a good opportunity to share thoughts and think of new solutions to energy challenges of the built environment.

Theo Smits of Heijmans focused on sustainable energy storage in his workshop. In residential areas storing energy is not yet a real issue, mainly because storage is too expensive. In the near future this will change. Technically there are challenges, but the main challenges will be related to the implementation. This was the focus of the workshop presented by Theo Smits. The scale of energy storage should be organized, the value of energy, and the impact of storage on energy prices were discussed. With the help of the discussion, the students had the opportunity to share their views and ideas. The questions ensured a good discussion where the students had to think of the different impacts their idea had on each topic. Overall new thoughts were shared and new ideas were formed on the approach towards sustainable energy storage and its implementation.

Leendert Odijk of the municipality of 's-Hertogenbosch focused on money and processes related to this in the development of urban areas. Participants were divided into groups. Subsequently, each group developed a vision on the client's perspective of the development process of a project in the urban environment through brainstorming. Ultimately, each group had to present their vision which led to a discussion. The major learning point is that a financial incentive is always required before starting any building project. Different approaches exist to acquire capital, it is key to reduce the project risks and satisfy the investor's needs. In most cases governmental institutions are involved and bare the risks and benefits of the investor.

At the workshop of TNO, Dr. Cuypers joined Dr. Erich to elaborate more on thermochemical batteries, heat storage facades and using underground heat. The aim of the workshop was to find an efficient way for the systems in order to be implemented integrally to existing houses and buildings. Students worked in groups after getting introduced to mechanism, quality of provided heat and other features of systems. The students faced challenges in implementing systems in buildings, such as: provision of required space for the facilities, implementation cost, satisfying different needs for heat, etc. Each group presented their idea to bring some solutions to the challenges and ease the implementation of the systems. As a result, innovative heat storage systems got one step closer to be connected to their future use area, built environment.



Closure

After the workshops everyone gathered in the theatre hall of the Zwarte Doos. The best group of each workshop pitched their idea and major learning points. Subsequently, all participating companies and the chairman of the day, Charles Smeets, where thanked for their participation. The CME Conference 2015 ended with a drink in the Skybar Underground.

GRADUATE SCHOOL

Melvin van Melzen

Introduction

As commissioner of education I am closely following the changes in the education program as well as monitoring its quality and handling complaints or questions from both CME students and CME program directors. This article will elaborate the process of implementing Graduate School (GS) in the CME program, with all the difficulties it represent. Maybe this article can provide a frame of reference to assist future educational changes, or some anecdotal material when we look back on how the process went. This process, from my point of view, was a semi-structured last minute implementation of GS that resulted in an improved program for prospecting students. We will have to see how things are when the program is implemented, and hopefully my successor will be watchful to contribute to the quality improvement of our master program.

Three perspectives

The first and most important channel for communication and feedback on the program are the regular visits to professors Schaefer, de Vries and Qi which are (or were) directing the CME master program. Secondly I am part of the O-verleg, a committee of CHEOPS (study association of the bachelor program) in which the commissioners of education, from all six master programs and one from the certificates, get together to help each other with educational functions. The third perspective is provided by joining the educational committee of the department of Built Environment (Onderwijs Commissie Bouwkunde, OCB) formed by the Bachelor program, the CME, BPS and AUDE master programs. The OCB is represented by one student member per program, one teacher per program, and a Chairman and Secretary. The OCB advices the faculty on matters that are mostly related to quality of education.

Graduate School (GS)

The first O-verleg meeting in September was the first moment that we, the education commissioners, first learned about GS. A closer investigation showed that GS wasn't going to affect the CME program due to complications with its 3TU collaboration, but as late as January I discovered that this changed, our program was going to be fitted into the GS philosophy after all. Graduate School embodies the principle of a more flexible master program which consist of:

- A maximum of 30 ECTS compulsory courses
- A maximum of 30 ECTS elective courses (out of a predetermined list)
- A minimum of 15 ECTS free electives which can be chosen from any department at the TU/e
- 30 or 45 ECTS for graduation
- A minimum of 15 ECTS international experience which consists of courses from the (free) electives or graduation

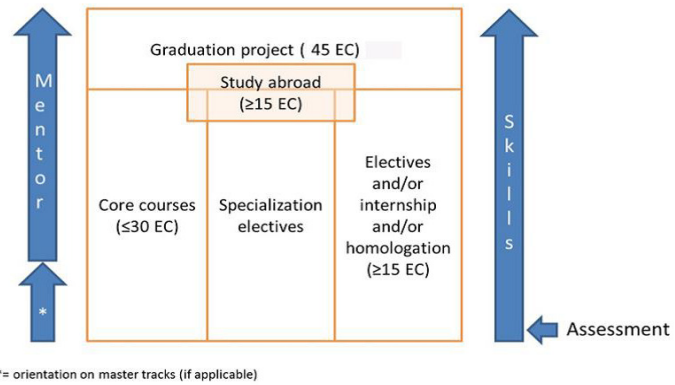
This clearly offers more flexibility to future CME students than the current 10 ECTS from the Integration & Orientation (I&O) package. The corner stones from CME are used to fill the compulsory courses and the rest of the old program is mostly going to the elective course list, which means that GS students can still choose to follow the old program, if the courses are chosen properly. This way the choice of courses has a big influence on the potential of your master program, and students will have to exert great caution in selecting their courses. To help students there will be coaches which will provide assistance to compose a coherent courses package.

Transition to GS

All of the flexibility should be beneficial for students, but there is a little amount of time available to work on finalizing the program. Added to the time pressure, there is the requirement that all courses size should be 5 ECTS, with the possibility of a few courses which can be 2.5 ECTS. This basically means that, with only a few exceptions, all the courses in the whole faculty will have to be rearranged and reorganized to fit these requirements (CME courses are now between 3 and 14 ECTS). The OCB was asked to advice on the quality of the redeveloped courses and it was clear that there was not enough time available to reach the settled deadline in order to achieve a satisfactory level of quality. We don't need to worry too much though, rethinking a course isn't that much trouble as starting a new one and our teachers are getting used to having to adjust their courses, which seems to always end well.

Conclusion

There is no way to know what the new program will bring. It has the potential to be a more flexible and therefore appealing program. Only time will tell if it will prove to be an improvement after a somewhat suboptimal transitional process in which our graduates could have helped a bit in streamlining. All in all we can rest assured that the development of the GS program is in capable hands.



*= orientation on master tracks (if applicable)

WERKEN AAN UITDAGENDE PROJECTEN ÉN JEZELF ONTWIKKELEN

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Chair of the Design Systems group of

th SMART technologies

Smart Urbanism are very favorable, ver come by themselves."

. B. de Vries
the Faculty of Building and Architecture

BUILT ENVIRONMENT WITH SMART TECHNOLOGIES

The world around us becomes increasingly smarter. Traditionally, technology development was primarily focused at systems and devices, but recently the built environment is discovered as an interesting application domain. Technological knowledge as well as knowledge from the built environment is necessary to make successful implementations. New technologies that will impact the built environment are numerous, such as: batteries for energy storage, building integrated PV, sensor networks, smart street lighting, smart parking, electric vehicles, etc. The built environment on the other hand faces environmental challenges such as climate change, urbanization and fossil fuel depletion. New technologies in the Built Environment can help to diminish environmental threads.

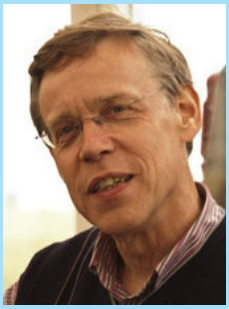
Not surprisingly the European Union and the Dutch national Science foundation (NWO) have launched several programs to promote research and development in the field of Smart Cities and Nature based Cities. The TU/e at large but the department of the Built Environment is very successful in acquiring grants for these projects. The success can be explained from the fact that these projects require collaboration between research institutes (such as the TU/e), governmental institutes, industries and citizens. Moreover, expertise on architecture and urbanism is inevitable to investigate the potential of these technologies and to research people's responses to their introduction. To strengthen the position of the department even more, the Smart Cities & Brainport region initiative recently started at the TU/e, to give exposure to on-going projects and engage more parties.

Early this year the Triangulum project started in Eindhoven. This 12 M euro project is funded by the EU as a so-called Lighthouse project that will serve as an example to other cities in Europe. The three leading cities are Eindhoven, Manchester and Stavanger. At every city the consortium consists of the municipality of the city, local SME's, the university of the city and citizens' platforms. In Eindhoven two districts were selected for smart technologies implementation, namely Strijp-S and Eckart/Vaartbroek. In Strijp-S new technologies will be implemented such as: intelligent workplace lighting/heating, renewable energy based heating/cooling for office and industry buildings, smart charging and parking managements system for e-vehicles. In Eckart/Vaartbroek 200 houses will be retrofitted with web-based users assistance, PV and wind turbines are installed and a local energy cooperative will be started.

Smart Cities and Communities

The municipality will host a platform for distribution of open data that is collected from the implemented technologies and from the citizens. The department of Built Environment is responsible for monitoring the progress during the project. Therefore data will be used generated by the smart technologies and from the citizens' surveys in order to analyze amongst others the impact with regard to: energy consumption reduction, improved mobility, new services, increase in safety and comfort. Last but not least the TU/e Innovation Lab will support the start-up of new businesses that emerge from these new technologies and cooperation between parties. The Triangulum project is an example; other on-going projects will be published soon through the Smart Cities & Brainport portal.

Although the circumstances for Smart Urbanism are very favorable, innovations hardly ever come by themselves. Young entrepreneurs are needed to develop new concepts for new businesses. CME students can play a very important role here. I am looking forward for many new innovative projects and business start-ups arising from CME graduates.



Prof. dr. ir. B. (Bauke) de Vries
Chair of the Design Systems group
of the Faculty of Building and Architecture
@TU/e

BIM, A WAY OF WORKING

Stefan Kauffeld

Hurks is a family business company which strives to accomplish the ambitions of its clients. For nearly 100 years, it develops, builds and maintains spaces where people can live comfortably, operate, repair, shop and recreate. These kind of complex environments that require specialized knowledge, skills and experience. Therefore, Hurks includes all disciplines; from real estate developer and builder to supplier and business company.
Hurks belongs to the top of the Dutch construction and property market. They are active throughout the country and increasingly in the UK. It is a financially solid company with whom clients and partners do business, because they know what the name Hurks stands for: decisiveness, with a clear vision.

Stefan Kauffeld and Hurks building 's-Hertogenbosch
Second half 2009 Stefan came in touch with Hurks van der Linden during an internship at the construction project Jeroen Bosch Hospital. On August 24, 2012 Stefan graduated from the program Building Technology of the section Architecture, Building and Planning at the Technical University of Eindhoven. After completing his education he worked for Hurks van der Linden in St. Michielsgestel since 24 September 2012. That company name had changed to Hurks building 's-Hertogenbosch and Stefan works here now over 2,5 years. Hurks gave him the opportunity to follow a trainee program. After an educational period in the departments business office, calculation and commercial affairs, he was placed at the new project TNW South. He is working here in the planning department while being also a BIM manager.

HURKS and BIM, a way of working
Nowadays, the application of BIM (Building Information Modelling) in the construction industry is very common. But what is BIM and how far can the possibilities be stretched? Stefan Kauffeld, planner and BIM coordinator at Hurks building 's-Hertogenbosch, illustrated how his company recently applied BIM using two practical examples of large construction projects. He told that especially these projects gave him new insights into the potential of BIM.

Successful chain integration assumes that all parties have access to the accurate and updated information and data. That's also the reason why Hurks works with BIM: because it is a useful tool, in which integrates all kind of information regarding the design, construction and management process. This way of working has been acquired by the company during the years working in the construction industry.

BIM project Radboud UMC Nijmegen
For the renovation of the Radboud UMC Nijmegen the construction of the existing building was completely measured with Point Clouds in 3D. This is a method in which a laser scanner surveyed the building and process it into useful information automatically. Because these data is integrated into the design of the architect, deviations from the expected structure have been transparent. Positions of columns and deflection of concrete beams were leading for the connection and integration of the facade, and the installations. Problems such as not fitting steel window frames under the structural beams were previously displayed. The pragmatic approach of the building information has resulted in an accurate way of designing and constructing while taking into account the actual condition of the existing structure.

BIM new project TNW South
The new project TNW South revolves around the new building for the Faculty of Applied Sciences at TU Delft. During this work Hurks strived for a high level of BIM ambition. The usage of high-quality BIM techniques and the fact that soon the maintenance and management are incorporated within the BIM-model, makes this project unique in the Netherlands! Hurks realizes it in a consortium with Kuijpers Central Projects, ULC group and Waldner Benelux. Under the name of Bouwcombinatie Hurks - Kuijpers vof, a DO+ design was developed and the consortium was selected on the basis of price and quality. The contract stipulated that the installations by the contractor had to be worked out in BIM / Revit. In addition, there is a contractual obligation for a performance model LOD500 upon completion of the design. The company had to take several hurdles in order to complete this BIM project. For instance, it appeared that the installation design was worked too detailed during the modelling. Therefore the requested output contained too much information. In order to fix this problem, the installer finally decided to adjust gradually his design.

New construction TNW South
Commissioned by the Technical University of Delft Hurks is building the new building for the Faculty TNW. An imposing complex of about 30,000m2 Gross Floor Area (GFA) with state-of-the-art laboratories. There are high constructional and installation technical requirements for the building which

Stefan Kauffeld

makes innovative research and quality education possible. In order to not disturb the ultrasensitive test setups, for example, it is being built on a low-vibration foundation due to the nearby traffic roads.

Source: Ector Hoogstad Architects

TNW South as product and process

During the preparatory and implementation work, Hurks has applied the design model of the structural engineer and architect in several aspects. The entire construction of floors, walls, concrete ornamental facade and steel structure are elaborated in 3D by the subcontractors of Hurks. This 3D information is intuitively managed, allows Hurks to speak about BIM. The 3D models were used during the checking of the technical drawings. This caused interrelationships of the building components faster and more transparent, so that a high quality of product and process was realized. BIM has also proved to be a success in coordinating installation recesses in the structural building components. In collaboration with the engineer, a workable process is invented, tested and applied. The required installation, technical openings in beams, floors and walls are adapted from the BIM-model with the help of specific software (Provision for Voids of Progman OY).

Revit-groups

One of the BIM-innovations Hurks uses for this project is the provision of digital recesses, based on the shape of the elements of the building. This information includes Revit Groups with Excel frames where unique recess numbers and coordinates are included. Hurks processed this information together with subcontractors within the coordination model. It appears to be quite a challenge, since each party was working in a different package. Each process step is verified in advance with each party, so that the information flows are coordinated in order to enhance the overall effect. Using the correct conversion of the recess task, complemented by clear agreements and clear communication, the recesses could be processed efficiently. So BIM was here used optimally and based on this digital coordination the drawings were approved easily.

BIM future at Hurks

As mentioned earlier, Hurks prefabbeton and Hurks delphi engineering have been working with BIM for years. For Hurks building 's-Hertogenbosch new project South TNW, is the first project where BIM is used on this large scale. As seen from the above, it was during this project more than clear how powerful BIM as a tool can actually be. It is clear that BIM will play an increasing role in the construction chain. Initially BIM included only 3D design; now, we make structural use of it during the preparation and implementation of projects. Through the developments in contracts the contractor connects increasingly earlier in the design process and becomes increasingly the main bearer of risks. Building-related information is increasingly available in different types and this will be of value in BIM development, construction, management and maintenance. Knowledge about (im)possibilities of software and hardware in BIM processes is essential. As long as the purpose is specified and the application of BIM in this pragmatic approach, it is a wonderful tool in the construction process and are the chances for the building contractor legion.

Tekla Global BIM Award 2014

Hurks prefabbeton and Hurks delphi engineering are working with BIM since 2007. The advantage that these companies want to get out of this, lies in its own processes. The 3D model and especially the data in the model can be used by anyone in the process. The models will be shared with partners so that communication and implementation can also be improved. In this way, the model provides an insight into complex terminals, but also a graphic representation of the production planning and assembly sequence. Also, all the reinforcement is modelled in detail. In fact, this reinforcement is largely automatically produced by a braid robot. The geometric information that drives the robot comes directly from the model. Therefore, the model must be designed precisely, such as the reinforcement must be produced in the end product. In 2014, this high level of detail, led to winning the Tekla Global BIM Award in the category concrete for the third time. Hurks won this prize also in 2010 and 2012. This competition is held annually by Tekla to the users of Tekla Structures. Each user can submit his or her model, and these models are judged by a jury of leading BIM experts. The models of Hurks delphi engineering are praised by their level of detail and complexity of the models.

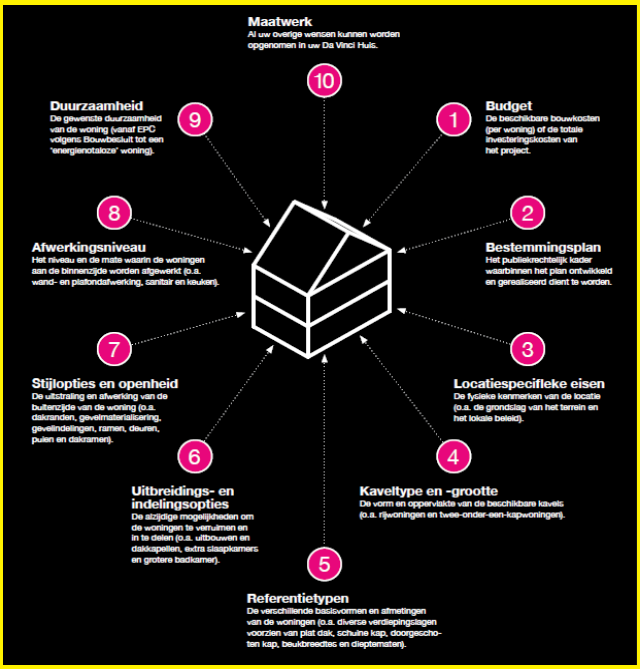
Robbert Sterk
Application Developer at HURKS prefabbeton

Da Vinci House, an innovation of Hurks

The Da Vinci House is a unique method to develop and implement housing projects quickly and efficiently. This method revolves around the freedom of choices of the client. The housing concept uses innovative processes and technologies, including three-dimensional BIM models, Lean Construction methodologies, chain cooperation and prefabrication. The result of the Da Vinci House is a unique residential concept that can be adapted to the specific needs of the client.

The configurator

The Da Vinci House makes use of an advanced three-dimensional data model (also called 'configurator') on the basis of Woonconnect. With this configurator the ideal property, residential or housing block can be made up with ten different angles (see image below). In addition, there is choice for many options and customization.



Ten perspectives of the Da Vinci House from which you can build the ideal property.

The choices made during the assembly of the house will be directly visualized in three dimensions, calculated in price and fully tested against the Building Act requirements (Bouwbesluit-eisen) and the Buildings Energy Performance standard. The architectural drawings and documents required for setting permit are generated immediately. Through pre-engineering and automatic processing of the choices who are made in a BIM model, the process costs are reduced and the costs of failure are eliminated.

Buyers or tenants can select their ideal property through a project-specific consumer version of the configurator online, based on the options that are predefined. It has, for instance, choices of wall and floor plan layouts, facade and roof openings, expanding and (indoor) finishes. Also insight into the energy of the house expenses based on the actual energy consumption is provided, e.g. people can get insight if a possible choice for extra solar panels could be cost-effective.

In short, the Da Vinci House combines flexibility and choice with the highest possible efficiency through innovative technologies and techniques. This results in a guaranteed quality, rapid efficient development and realization, and a low price.

Edith Brinkman-Snijder and The Da Vinci House

After the training Building Economics at the HTS (High Technical School) Edith has realized 10 years of major risk education projects as a project manager.
For 7 years she has been working at Hurks real estate development and housing projects where she has realized the office of Hurks in 's-Hertogenbosch. Over the past 1.5 years she has worked as a development manager within the Da Vinci House team. She is responsible for the development, acquisition and construction of the Da Vinci House. She is the central contact person for Da Vinci House inside Hurks.

Edith Brinkman
Development manager
at Da Vinci Huis

Realizing local sustainable ambitions with new financial arrangements

Decentralized authorities are big influencers in reaching the objectives determined by The European Union climate and energy package. Research demonstrates that the majority of Municipalities doesn't translate the European energy and sustainability ambitions in their own policy and long term goals (sustainability). This article gives an overview of the current goals and performances of Dutch Municipalities on the energy and sustainability theme, crucial for achieving 'Smart Cities' objectives. Furthermore insight is given about organizing sustainable development focused on new financial arrangements and incentives.

In 2010 The European Union established the current climate and energy package on a European level. This climate and energy package is a set of binding legislations, which aim to ensure that The European Union meets its ambitious climate and energy targets for 2020. These targets, known as the '20-20-20' targets, set three key objectives for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.

The key objectives have been elaborated on every individual EU-country specific situation, taking the local and contextual opportunities into account. In The Netherlands these objectives are listed in the Energy Agreement for Sustainable Growth (in Dutch: Energieakkoord). In more detail the objectives are energy savings of 1,5% (average) and 14% sustainable power generation in 2020 (16% in 2023).

Decentralized authorities have a considerable contribution in reaching these climate objectives. The Government agreed on a proactive approach in realizing the national and European energy and climate objectives with all Municipalities, Provinces and Polder Boards. Nevertheless there are no preconditions and/or rules concerning the way in which parties can realize these objectives. Hereby the efforts of Municipalities and Provinces in reaching the objectives are strongly dependent on their own political ambitions.

Private consultancy companies did research on the sustainability ambitions of decentralized authorities. More specific the research focused on the way the European and national objectives have been implemented by Municipalities in their own policy. Additionally the correlation between the own policy (2014) and long term goals have been researched.

The definitions of the technical terms used to categorize Municipalities are given next:

- Energy Neutral: the energy consumption is fully sustainable and locally generated (no compensation possible)
- Climate Neutral: no net emissions of greenhouse gasses (CO2, CH4, NOx, CFC's) in approaching the complete energy demand (compensation CO2-emissions possible)
- CO2 Neutral: no net CO2-emission in approaching the complete energy demand (compensation CO2-emissions possible)
- Other tangible objectives: quantitative objectives concerning CO2-reduction, energy savings and/or sustainable power generation.

Sustainable ambitions of Municipalities

Sustainability is one of the main topics on the political agenda. Almost 95% of the Municipalities in the Netherlands implemented the topic sustainability in their Coalition Agreement. Nevertheless the European Climate and Energy objectives haven't been incorporated in their own local policy by formulating long term goals. Primarily the Municipalities focus on short term goals and projects, which positively influence the public opinion. Their end-goal and ambition is to become energy neutral, climate neutral, or CO2 neutral. Only 44% of the Municipalities has tangible goals on various themes like energy savings and consumption, water waste, material usage, etc. The rest of the Municipalities have policies that will only contribute to the European and national objectives. Most of the time one or more goals are originated from the '20-20-20' targets. For more detail see table 1.

Ambitions Municipalities	Amount
Tangible objectives	**180**
Energy Neutral	46
Climate Neutral	37
CO_2 Neutral	21
Other tangible objectives	76

Table 1: Type of sustainable ambitions Municipalities in the Netherlands [Source: Nowee, V (2015), Klimaatbeleid decentrale overheden, Brink Groep, Leidschendam]

Relationship between scale of Municipalities and their sustainable ambitions

Research shows that the largest Municipalities are front runners. Municipalities with more than 100.000 inhabitants have in 93% a tangible objectives, whereas this percentage is only 25% when looking at Municipalities with less than 25.000 inhabitants. Probably the cause of this can be simplified to a lack of financial opportunities. The largest 15 Municipalities in the Netherlands have ambitions which exceed the European '20-20-20' targets.

Jim Teunizen

Implementing sustainable measures
The desired policy objectives extend far beyond their own municipal real estate portfolio. The challenge is to achieve progress in the sustainability of real estate from SMEs and private individuals. To carry out this operation, it is necessary together with stakeholders (e.g. owners and operators of real estate, (semi-)government) to think about the financial feasibility and then financing sustainability. At various levels and for several parties, measures can be defined providing (financial) 'incentives' for undertaking this. Implementing sustainable measures is most effective when the approach is fully integrated at various levels and by supported solutions.

'Incentives' for sustainability
A municipality can participate in different ways. In general, causes a joint approach to the best result if the proposed measures are the correct 'incentives' generated by those involved. It is important to stimulate existing and future owners towards preservation by developing a coherent package of measures. This can be done by combining financial incentives on a variety of scales/levels. The possible measures are:

- Establishing of sustainable fund(s)
- Linking the level of sustainability to the Valuation of Real Estate Act (Dutch initials: WOZ) and/or ground rent (lease)
- Setting up a system of tradable quota and/or CO2 emission rights
- Developing innovative forms of financing for preservation

Financial incentives for sustainability
The government is seen as the main party which should stimulate the sustainability improvement of urban areas. The utilization of financial incentives accelerate and up-scale this process. In urban areas it is important not only to invest in sustainable measures, but also to involve the inhabitants, companies, and governmental organizations. Current and future real estate owners and users should be stimulated to be more sustainable.

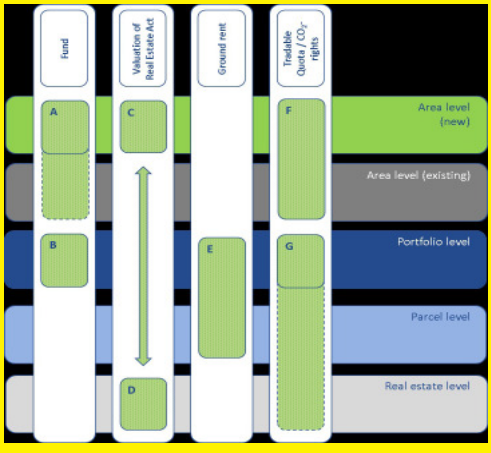


Figure 1: Financial arrangements on different levels

Sustainable funds
Sustainable funds make it possible to create liquidity to finance the integrated task. Owners with more buildings within a Municipality can create an individual private fund that is filled with contributions from sustainable and renewable energy measures. The Municipality can, together with other parties, inject the fund for greening the supply. Alternatively, the Municipality guaranties coverage from the fund.

Linking Valuation of Immovable Property (WOZ) or ground rent
When the ambition on sustainability for the total area is achieved or improved, a lower immovable property tax is charged based on a devalued Immovable Property-Value equal to the sustainable investments. The same system applies to the connection of ground rent. This means that there is a consideration on the Energy Service Company (ESCO's) level in the area. Owners who contribute positively to achieve the sustainable goals of the Municipality are rewarded by allocating a lower municipal contribution. Any "polluters", being owners who do net preserve their buildings, are sanctioned by being charged with a higher fee.

Quotas or tradable CO2 emission right
When allocating new land, the principle of 'green for red' has been applied, which stimulates sustainability of buildings within the Municipality. In the situation that a particular owner is in a difficult position to sustain, the decision has been made for organizing a trade in sustainable shares of CO2 emission rights on issuable or restructured land together with the other owners in the Municipality. Depending on their ability to apply measures, owners continue to stay below limits or exceed the limits. Any shares acquired for emissions, as a result of lower CO2 footprint than the fixed by law, are traded with other owners.

Finally
Linking sustainability at different levels of financial arrangements is the basis of a solid business case. The question remains whether the market dares to introduce such new cash flows. All in all, strategies for better sustainability and integration implementation in different Municipalities contribute for a Smart Urbanism development of The Netherlands.

ir. J. (Jim) Teunizen PDEng, senior consultant Brink Groep.

COLUMN

BERT VAN EEKELEN

Smart cities: sufficient innovations, difficult implementation

Before sharing some ideas about the implementation of innovations in what we call smart cities, is necessary to focus in a sector of this cities. I will focus on the built environment in the Netherlands.

Judging from the perspective of the large reconstruction plans for the Netherlands after the Second World War and the further growth of our economy in the last decades, our country is almost completed. A lot of buildings have been created; a lot of infrastructures for road, rail and waterworks have been constructed.
Our economy, no matter what scenario we take, will not grow that much like it did the last 70 years. The growth of the world economy will take place on other parts. At best we can maintain a certain level of economy and wealth.
In our built environment, we even face a large surplus of millions of square meters of offices and retail outlets because we changed the way we work and shop. In the next decades, it will be as much demolition of the existing infrastructure, as about new construction.

That does not mean that there is nothing more to be created. For the contrary, our challenge is bigger than ever. But we have to approach it in another way, we can no longer add more of the same like we have done for years until now. We have to find smarter solutions for the problems which we are facing. Smart cities are not about new smart buildings and infrastructure; smart cities are about smart use of our possibilities and existing assets.

The problems we are facing are huge. They are completely related to the climatic changes, the quality of our soil and water, the energy use, and the sustainability. We have to change our focus from bigger, more and faster into a new balance of different scales and location-specific solutions. This means a paradigm shift: we have to re-invent ourselves.

In this setting of new challenges, you would expect that innovations would have a perfect playing ground. This, since nobody can be against smarter solutions, better environment and sustainability. Only the opposite seems to be true, despite of the need for new innovative solutions for our actual problems, a lot of issues seem to hinder their implementation.

I will use public transport as an example. Different from the earlier generation, current generations have no real demand for car ownership. On one hand, the present networks of public transport do bring you almost anywhere you want, but on the other hand the taxi in the Netherlands is almost unaffordable. Nevertheless, since inefficient bus lines are stopped because of costs reduction, we have a growing need for individual transport, preferably on demand.
In that way, the Uber taxi could be seen as an innovation. This innovation allowed, at a low cost, people in the need of public transport to connect with car owners that have the available time to drive a passenger with them. An advantage is that our modern technology makes it possible to organise this process in an efficient way.

Seen from the client and providers point of view, it is strange to see innovations like Uber being frustrated by traditional taxi drivers and our government. However, the resistance from the existing taxi drivers who paid serious money for a permit that gives them the right to drive taxis, is logical as well. Therefore, these existing taxi drivers are protected against false competition by law. So, in order to change the taxi system, it is necessary to change the law, and possibly also to compensate for existing permits becoming worthless.

Implementation of innovations is not about the innovation itself, but about the consequences for each present and new stakeholder involved. Clients, present providers, future providers and legislation have to be taken into account, when looking at innovations in services.

Focus on stakeholders and their drivers

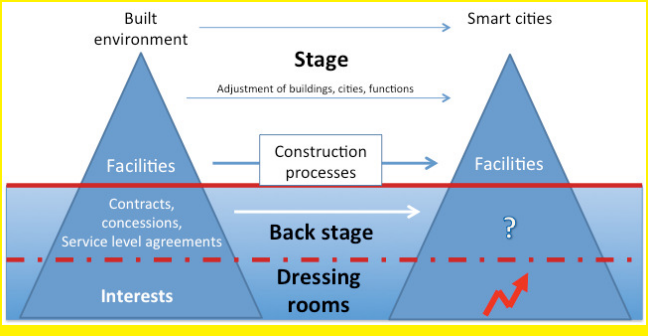


Image source: (de Ruiter, 2000) De multiculturele arena, oratie.

Bert van Eekelen

For understanding what the consequences of possible transitions are, especially in innovations, it is necessary to see more than just see the surface, "the stage". It requires understanding of what's happening in the "back stage" and in the "dressing rooms".

Consequences for education

More than ever, the implementation is part of the developing process of innovations. This is especially the case in relation to smart cities, since it is not just about doing things better, it is about doing things differently.

What is needed, is to extend the present use of stakeholder analyses. For each stakeholder involved, is it necessary to identify the consequences of the innovation related to their own interest, priorities and ambitions.

For education, we have to keep in mind that most engineers (urban, financial, technical and legal, all involved in spatial development and infrastructure) are educated in serving the traditional construction process. Their skills are based on the demand to identify the requirements of an already identified client and transform them -through feasibility studies and designs and calculations- into the specification of a building process.

Innovations require skills in order to facilitate transitions where not only the built environment is at stake ("the stage"), but also the transition of the "back stage", in relationship with the dressing rooms. This requires knowledge and capabilities of estimation of the feasibility in construction, costs, benefits and risks at another level than mostly presented.

The new generation of skilled staff that is involved in these processes of searching sustainable solutions in smart cities, should have a wide focus on the arenas of all stakeholders which are involved. They need to be capable of connecting the world of management and politics with the world of construction, cost, benefits and risks. Knowing about the "back stage" in dealing with the impact in changing operations is a minimum requirement. Understanding the dressing rooms is a key and really involved factor in supporting the implementation process. The social sciences need to be better connected to the technical and economical sciences.

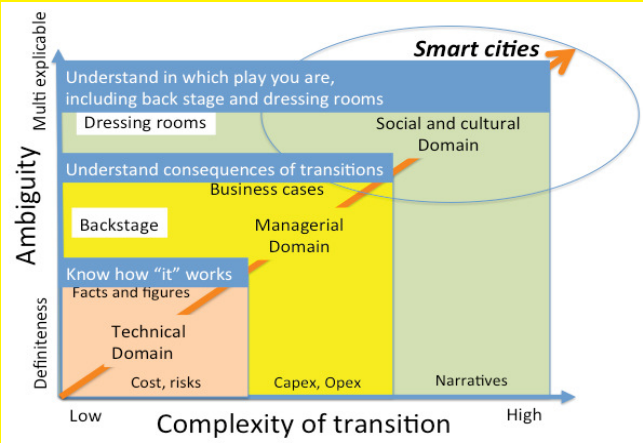


Image source: (de Ruiter, 2000) De multiculturele arena, oratie.

Connecting the different fields from the image above, is necessary in order to facilitate innovations and their implementation. Probably it will not satisfy the demanded acceleration, but it will certainly reduce disappointment of implementation.

Bert van Eekelen is consultant and process manager at ARCADIS for multi stakeholder developments in the area of infrastructure and urban planning. He was involved in the Zuidasdok development between 2005 and 2012.

At present Bert van Eekelen is involved in the feasibility studies for the extension of the Schiphol Airport railway station, Park 21 Leisure developments at Haarlemmermeer and in a PhD research at the Vrije Universiteit Amsterdam.

Gappless

Currently urbanization and digitization is a trend which can't be ignored in the Netherlands. The Government speaks of a digital revolution whereby the society is significantly affected by new digital infrastructures. Meanwhile, urbanization leads to new urban spatial tasks including: mobility, the environment, and housing. Technologies can contribute to a society that invent and apply smart solutions by itself. This can make a city more sustainable, more accessible, safer and more liveable.

Smart Cities are about the regulation of new smart solutions and technologies to create a more sustainable city, environment, etc. The smart city concept is implemented by some municipalities in the Netherlands, whereby the implementation of the concept differ from each other; from data transparency for citizens (such as noise measurements) to smart water management. However, these smart ideas can't start without the use of proper digital data. This is exactly what the software platform Gappless is dealing with.

Gappless

Gappless originates from the idea of making the verification of the contractor to the client better, easier and more reliable. Performance-related assignments are being worked on the basis of a V-model that basically comes from the *system engineering* concept (see figure 1). During the construction phase, the contractor had to cover responsibility for the performed work to the client at each submitted invoice. In the old workplace, this situation was mainly sorted with paper registration forms during the construction works. For the executor of this task, a big pile of paperwork was the data that had to be introduced in small boxes. The completed information was unclear, illegible, and therefore even unreliable. For a visual representation of the situation photos had to be added to the explanation. The software of Gappless ensures that all information can be entered in one digital system, therefore the resulting information is organized and reliable (figure 2).

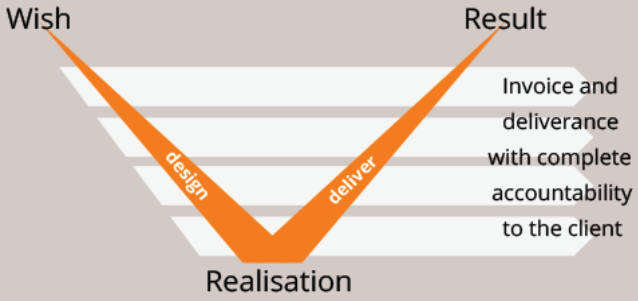


Figure 1: A simplified representation of the V-model.

Figure 2: The software of Gappless.

Gappless, besides process control of the implementation phase, is also engaged in the development of software that can be used during the design phase. The software must ensure that a holistic view is created during the design phase. In the old work situation existed the possibility that the designers of different parts, in spite of the joint interfaces, were not in communication with each other and working in crossed interests. The software Gappless ensures better coordination between the various designers, as users of the software can see what happened and by whom. By using this in the process early stage, the errors that can occur later in the process can be identified.

Smart City ideas

Smart City concepts can be about new technologies and smart building, however, knowledge is necessary to eventually achieve this. People have a lot of knowledge, but the human factor makes the retention of knowledge also uncertain. Employees leave because they get a new job, retirement, death, etc. Herewith a part of the knowledge of an organization disappears. After 10, 20 or 50 years, it is useful when people can look back at events during projects and understand why certain choices were made. Gappless can and wants to make this reliable and useful digital information usable and understandable. Knowledge is thus retained and shared with people who currently work with it.

An idea of Gappless is to better match its data with the GIS (Geographical Information System) data (see figure 3). This allows, for example, that objects can be constantly updated in the GIS data. An object could be a lamppost. The activity is that the lamppost must be maintained (figure 4).

Figure 3: Gappless and GIS.

The data on this object is transferred from Gappless to GIS automatically. Because the information stays up-to-date, a maintenance planning can be adapted to it. For example, the lamppost maintenance is five months later than planned due to certain circumstances. According to the schedule the lamppost would be maintained only one month later, but since the data is clearly displayed and up-to-date in GIS, a decision could be taken quickly and the schedule can be easily adjusted.

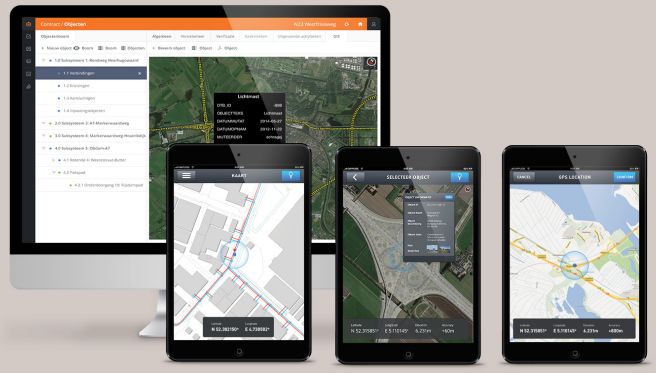


Figure 4: Example of the software for the lamppost maintenance.

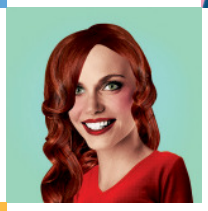
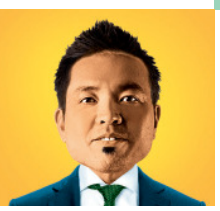
The software of Gappless provides more flexibility, quality, and efficiency. Moreover, by providing useful information of Gappless, this can contribute to the development of the existing GIS system. The following example is about the Smart Cities concept: the object, what is the current state of it, what is done with it in the past, and what do we want with it in the future? The concept is about the efficient use of information. The information is used and shared outside the standard framework. According to the Ministry of Infrastructure and Environment, Smart Cities are about knowing what happens where. Geo-information has thereby an important role: as a specification, as a basis, or as a result. Gappless is making a significant contribution to smart solutions.

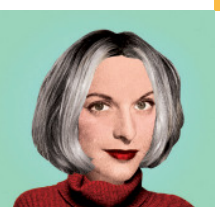
Despite the advantage of smart utilization of useful information, it is important that an organization has changed its mind set: a cultural change must occur. It is important that workers are not working activity-based (doing maintenance), but object-controlled (the state of the lamppost) and act according to that.

Finally

The purpose of Gappless is to make sure that a holistic view is obtained, in particular within the infrastructural projects. Because there are usually several people at the same time who realize the projects, there is fragmentation in the work, and this can also occur in the final result. Each contractor uses a different method and has its own perspective on the outcome. Gappless helps (e.g. in combination with Geo-information) in order to set a standard, this way in the future fragmentation could be reduced or prevented.

Elleke van de Weijer
Associate consultant at
DPI/Gappless



Let's connect?!

Wil jij zien op welke wijze Heijmans aan de ruimtelijke contouren van morgen bouwt? En ben jij nieuwsgierig welke spraakmakende en innovatieve concepten Heijmans ontwikkelt en realiseert?

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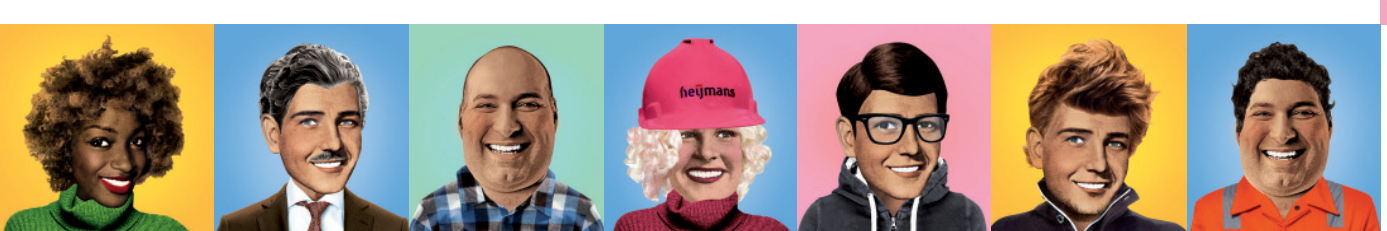
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