Magazine for Construction Management and Engineering

!NTERVISIE

July 2014 | Number 21 | Volume 11

REINVENTING

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EDITORIAL

Dear members and relations,

We are very pleased to present you the 21st edition of the !ntervisiE. Again we have an edition full of interesting stories and articles. All the common topics are present again; like CME abroad and Dutch Innovation, but also some new topics. Last year another CME conference was organized on TU Eindhoven about the future of Built Environment, an inspiring day full of presentations, workshops and of course there was time for students and companies to meet during the meet and mingle.

The subject of this !ntervisiE is 'Reinventing the city' also named as redesigning a city in such a way that it is sustainable and energy- neutral built and used. This topic becomes more valuable in fast growing cities nowadays. This year of CoUrsE! visited, Liverpool and Manchester, two industrialized cities in Great Britain. These subordinated cities are growing fast and become more and more important for their country. The students visited various engaging companies and have experienced the fascinating culture. You can read the whole story in this !ntervisiE.

At last, we would like to thank everyone who delivered a contribution to this edition of the !ntervisie and for all the interesting articles that we have received. For all readers: we hope you enjoy reading this magazine.

Kind Regards,

The !ntervisiE committee

Chief Editor !ntervisie | **Cecile van Amerongen (right)**
Editor !ntervisie| **Lotte Bekendam (left)**
Editor !ntervisie|**Tessa Voorwinden (middle)**

Colophon

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

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NEWS AND ANNOUNCEMENTS

Of CoUrsE! is an active association and organizes activities regularly for the CME students. On this page you can read about the activities of the last semester. You can read about the upcoming events on our website and facebook. You can also just walk over at the Of CoUrsE! corner in Vertigo.

New Year drink 14th of January

On the 14th of January Of CoUrsE! organised a drink for all students to meet again after the Christmas holidays. Even after the unhealthy holidays, the majority wanted to talk to each other while having some drinks.

Projectvisit Waddinxveen 25th of February

On Febuary 25th Of CoUrsE! had a project visit to the new Centre Plan of Waddinxveen which is built by consortium Hurks-Slokker. A beautiful project since the new centre is built from scratch. The group got a tour over the construction site with parking places for 1200 cars. On top of that they are building about 20.000m2 of shops and 1500 m2 of library. After the tour they offered us a lunch.

Company Orientation Day 11th of March

Tuesday 11th of March Of CoUrsE! organised the Bedrijven Oriëntatie Dag (Company Orientation Day). About 35 students attended this event and four companies (DVP, Movares, Brink Groep, Van Meijel) introduced their company to the students. Afterwards a lunch was provided that was combined with speed dating session. Hereby every student had the chance to meet their (hopefully) future employees. All together this day was a great success!

Of CoUrsE! Laser quest battle 11th of March

After the COD, Of CoUrsE! organised another activity. A group of 12 CME students had a Laser Quest Battle. In order to recover from the intense day, pizza was ordered pizza and some cold beers were consumed in Vertigo. Afterwards, the students had a Laser Quest battle to see who has other talents besides studying.

Easter drink 22nd of April

The Easter drink took place directly after the Easter holidays. On the 22nd of April it was time to paint eggs on floor 5 of vertigo while checking up after the Easter holiday. Some painted egg-masterpieces were created. Besides painting eggs, there was time for a beer and talk.

Pub crawl 24th of April

On Thursday night the 24th of April of CoUrsE! organized a pub-crawl together with study association Service (Real Estate). For only €15,- you got 18 drinks in 8 different kind of pubs. This obviously was a good deal which no student could resist. All together there were 50 students that attended!

Study associations party 7th of May

The study associations of our faculty of the built environment are celebrating their lustrum, and all together the study associations exist for 150 years already! Therefore, it was time for a party so it would not go by unnoticed. On Wednesday the 7th of May there was a big party in Café Costa, the entrance was free and beers and soda were sold for a reduced price. More than 70 people attended the party.

CME conference 2014 9th of May

The biggest event of the year was the CME conference on the 9th of May. The theme 'The future of built environment' is a hot topic nowadays. The day was full of interesting presentations, workshops and of course there was time for networking. Various companies joined this day like Arcadis, Stedin and Siemens. They told about their vision and techniques of the future.

TalKIT Conference 13th – 15th of May

After being invited by the Talkit Organisation, the board of Of CoUrsE! went to the TalKIT conference at the Karlsruhe Institute of Technology with the subject 'Urban Challenges Mastered by Technology'. The board was very enthusiastic about this truly inspiring event full of workshops and lectures by key people.

Studytrip 22- 29 of May

The study trip this year went to the industrial cities Liverpool and Manchester. From 22nd till 29th of May the tour visited ten companies, one horse- race and had two city tours. It was a great success; a lot of new information is gained from the companies. The cities are investigated and the England culture is gained (while enjoying some pints). In this edition there is an extensive report and a few photographs about this trip.

Board Information Meeting 11th of June

A lot of people showed interest in being in the 12th board of Of CoUrsE! This is why there was decided to have a meeting where questions could be asked about being a board member. After this meeting more people got interested, in fact there were so many interested candidates that the 11th board decided to have job interviews with all the candidates.

Lunch Lecture Accenture 13th of June

During lunch hours Accenture gave an interesting lecture about Smart Grids. They also told the audience a little bit more about their company and what role they play in the built environment. Study associations Of Course, SUPport, and Service organized this event together.

Australia vs. Netherlands 18th of June

The World Championship is for everyone an exciting event. Organised together with a few other study associations, the match between The Netherlands and Australia could be watched on the 18th of June on Vertigo floor 5. About 25 students cheered for the Netherlands in Vertigo.

CME BBQ 20th of June

According to the BBQ tradition, there was a BBQ organized on the 20th of June for all CME students and alumni. There were enough sausages, salads and drinks for everyone. The weather was nice and when the night fell there were some fire pits and torches. Around 45 people joined this event, half of which were alumni. We want to thank everyone present and hope to see you next year.

Join one of our Of CoUrsE! committees

Are you looking for something extra besides studying? Are you a person who likes to learn and organize events? Then Of CoUrsE! is looking for you! You can join one of our committees like the study trip, 3TU conference, or you can contribute to the next edition for the !ntervisie. New and better ideas for events or committees are more than welcome as well. Please contact us by email or visit us in Vertigo.

Website and Facebook

If you want to keep up to date for the new activities next year or just want to gain some information you can like us on Facebook or check out our website www.ofcoursecme.com.

CME ABROAD STUDYING IN...

Eindhoven

The Netherlands | Kairi Sulla

My Dutch adventure

On 5th of August 2013 I put my foot on the Dutch ground for the first time. I flew from Riga (capital of Latvia, not my home country) straight to Eindhoven and was greeted by a nice sunny weather and some weird agricultural smell. I had a cozy room waiting for me in a student house in Tongelresestraat (still can't pronounce this name normally) which I managed to get through Kamernet. I had been talking to one of my housemates, Filips, beforehand on Facebook. He informed me that one other of our housemate, Pieter, wi ll be on the same flight as me and sent me a link to his Facebook profile. At the airport I managed to identify him quickly and introduced myself: „Hi, I'm Kairi, I will be your new housemate. " Apparently I caught Pieter totally off guard and to this day he is still laughing about it being the weirdest first acquaintance. I must agree.

As you can imagine, I had no issues getting on the right bus or finding my new house. Pieter even helped me to carry my suitcase which was so heavy that before making it to our place, both of the wheels came off.
After a small tour of the house and meeting with the other housemates, I was finally alone in my room. I sat on my bed and the first idea I had was „What have I done?" I had a perfectly good life back home with amazing friends and a great part-time job besides my studies. I could have easily pursued my degree at Tallinn University of Technology and have a normal hassle-free life. But that was not what I wanted. As once before, during high school when I did an exchange year in Houston, Texas, I now felt that I need to do my Master's degree abroad. Therefore, I was exactly where I needed to be.

I discovered the Construction Management and Engineering program quite accidentally. I was first looking at study programs in Scandinavian countries and since I didn't find anything really interesting I started widening my search to other parts of Europe. I did not want to go to UK nor to the any of the southern European countries. I would have liked Germany or France, but you cannot get very far there with only knowing English (and Estonian). A lot of the universities do not even have an English webpage, not to mention Master programs.

So I had pretty much narrowed myself down to the Netherlands (where I had never been before) and Belgium (I had been to Rock Werchter). I stumbled upon CME program, liked it right away and here I am.

Back to August now. I started with an intensive 3 week language course offered by TU/e which was really nice. I got to know some great international people from other study programs and also met with Alberto from CME with whom I have now been doing a lot of projects together. The course was a good way to get the basics of the language and thanks to that I can now understand quite some stuff. Talking is another thing as most of my daily conversations in Dutch consist of answering either "Nee, dank je" or "Ja, alstublieft" to the "Wilt u de bon?" question at Albert Heijn..

In general, I think I am making baby steps in turning into a Dutch person: I do not consider a sink in a bedroom a weird thing anymore, sandwiches seem like a quite reasonable lunch and I do not even notice how much hair product the guys use daily. I love my omafiets and I know how to repair its tires (I probably need to take it with me when I leave). I also love taking trains everywhere.

Oh, and stroopwafels are amazing. I have gotten my family hooked on them, too. When I go home, ¼ of my luggage is usually stroopwafels. To also give some constructive criticism then I think that Eindhoven could definitely use more canals and Dutch people should listen to better music (honesty is a virtue, right?).

If there is anything else you want to know about me, which I forgot to mention here, then feel free to stop me at Vertigo or wherever else you see me and I will gladly answer. I would also like to say that I had a great studytrip to England with you guys!

Cheers,

Your coursemate Kairi from Estonia (or as most of you know it: Estland)

South Africa | Malco van den Eijnde

Was I before responsible for the entire magazine, am I this time only responsible for this short article, because I decided to study for a semester -20 weeks- in Pretoria, South Africa. South Africa is a beautiful and unique country, and Pretoria -serving as the administrative capital- is one of South Africa's three capitals. Pretoria itself is not very nice (quite ugly actually), but it is in South Africa, which means good weather, wildlife, beaches and beautiful landscapes.

Study

The University of Pretoria is a quite big and "modern" university. It houses around 55.000 students in all kinds of disciplines. The level of education is certainly not below that from Eindhoven. The campus is big and looks very nice with lots of green space and eateries. Although I did not have much choice, I decided to study on the department of Town and Regional Planning where if follow three courses:

1) Metropolitan and Urban Area-based Interventions;
2) Sustainable Settlement Planning and Design;
3) An Overview of Planning Theory and Practice.

All courses are related to urban planning, more specifically planning of cities and city regions in South Africa, and this is where it becomes most interesting. South Africa faces some unique challenges and has very high aspirations. Post-apartheid issues, corruption, informal settlements, poverty and unemployment are just some of the challenges South Africa is facing while restructuring cities. Still, they want to be competitive on a global scale, want to incorporate sustainable principles, and aim towards a modern networked society. Although South Africa has still a long way to go, it is interesting to see the big aspirations and strategic plans of the governments. On my department, we look from a theoretical perspective for how to plan, adjust and remake South African cities. The differences between western countries, like the Netherlands, and South Africa are very noticeable and interesting to see. Especially the differences in the severity of problems modern western countries and African countries are facing is interesting to see. When telling classmates what the problems are that we face in the Netherlands, they laugh, but nice discussions follow. For all three the courses, I am in the same class with the same people. English is one of the official languages in South Africa which is very convenient for navigating and communicating. Everybody speaks English, but you can only understand half of the people. It gets easier after a while, but I gave up to listen to student's presentations in class, because I just cannot understand what they are talking about. The average age of this class is around 30 years old. Almost every student already works on a planning department for national, provincial or municipal governments from all over Africa. For this reason, the classes are in, so called, block weeks. Meaning I have two times 1,5 week of classes from 8:30 to 17:00 (2.5 days for each course).

South Africa

Next to the study, I try to see as much of the country and continent as possible. Seen the fact that I have only 3 weeks of real classes, it is not a problem to make some nice trips. Recently, I made a 19 days trip through eastern South Africa, Lesotho and Swaziland, and I just came back from a 10 days trip with two 4x4 vehicles through Botswana and Zimbabwe. In the weekends there is plenty to do, and upcoming is a two weeks trip to Cape Town. As I like photography, South Africa really is the place to be with its beautiful landscapes, coastlines and wildlife. South Africa is a huge producer of wine and South Africans love to Braai (barbeque), so if you like meat and wine -and I do both- you're good. Typical about South Africa is the apartheid legacy which you see everywhere. There is an extreme dividedness between poor and rich and black/coloured and white. In the bigger cities, you see a lot of expensive cars driving past even more homeless people. When you go to the townships and rural areas, you really see how most people live in South Africa. The dividedness between black and white feels very surreal. It is not very strange that the dividedness between black and white is still present, as the Apartheid politics only ended 20 years ago. A couple of generations are still needed to fix this.

All in all, South Africa is an awesome and great country for this big vacation which I am having here, but could I live here? I guess not. Criminality, mentality of people, dividedness and overall facilities (e.g. fast internet) make it not a very attractive country to stick around for a long time.

SIMON LUBACH

Smart Grids on Industrial Areas

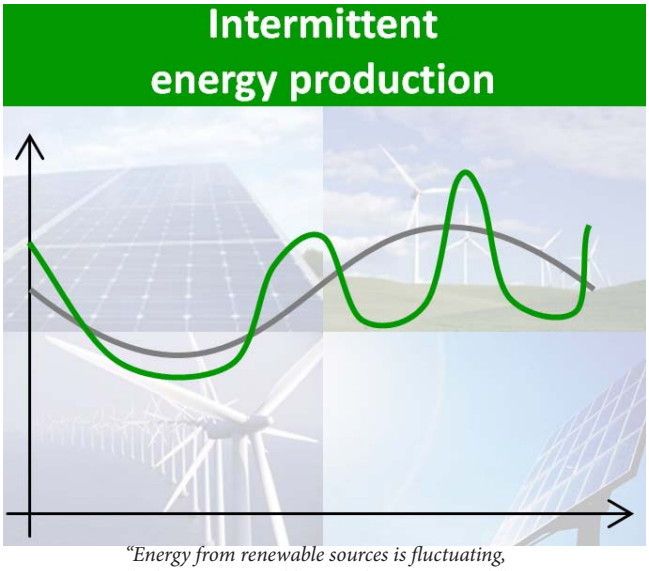
Energy is the source of life for cities and powers the economy. Within two centuries, fossil fuels have obtained a dominant position, and the economic system became depending on these resources. Unfortunately, the use of fossil fuels has negative environmental consequences, such as global warming. Moreover, gaining these fossil fuels has been a major cause for conflicts in history: Instable regions hold vast shares of fuel resources and our cravings for energy results in undesirable dependencies and warfare. Taking this in mind, a shift to a sustainable energy supply is a necessary and responsible step.

The use of energy from renewable sources is growing, and a transition in the energy supply is taking place. The energy use from renewable sources has shown impressive growth rates in the past decade. Deployment of renewables started marginal, yet the installed capacity has doubled year after year and is growing exponentially. Not only is the status quo 'surprised' by this transition, the energy system itself faces difficulties to deal with the uncontrollable nature of renewable energy. As wind and sun are the main sources of renewable energy, the production is highly intermitting and uncontrollable. This causes problems, since the power grid can only function when supply and demand are in perfect balance at all times. It faces difficulties to cope with peaks and dips of renewable energy, which is fed into the system. To enable a large-scale implementation of clean energy, this challenge has to be tackled.

Technologies to store electricity on a large scale are costly and inefficient, as it copes with significant losses. However, a solution can be found by adjusting the demand for energy to match the supply, rather than storing energy. This concept is knows as a Smart Grid; an electricity grid that is adapted to integrate renewable energy. Smart grids can provide flexibility to integrate the fluctuating output of renewable energy and will play a vital role in the energy transition.

Intelligent systems can help to maintain the reliability in the energy infrastructure. With smart grids, renewable energy can be rolled out on a large scale, while costs of the grid are kept in hand. Yet to achieve this, new ways to deal with energy are required.

During my graduation research, I've studied the application of smart grids on industrial areas. The industrial sector is responsible for about 41% of the electricity use globally. Energy costs play an important role for companies and ways to reduce costs are an important measure to stay competitive in the global market. When companies are able to purchase energy at times of the day that it is cheaper, they can have great



"Energy from renewable sources is fluctuating, which can cause problems in the energy supply"

benefits and consequently contribute to the implementation of renewable energy. To some extend, the industrial sector already plays a role in maintaining balance in the power grid. Hence, a great potential for smart grids can be found in this sector. To implement smart grids on industrial areas, it is important to find out which processes are flexible in energy use and to seek for business models which suits smart grid applications.

The goal of smart grids is to intelligently manage energy use without disturbing the primary process. Although there are many manufacturing processes taking place in the industry, these can be classified in a few universal processes. Some of them offer a source of flexibility, which can be exploited in smart grids.
This flexible energy consumption can be characterized by two determinants: the amount of flexible loads and the flexibility over time, which can reach from minutes to hours, or in some cases even days. Flexibility in energy consumption can be found, for example in thermal processes; products or

Simon Lubach

spaces have a certain range in which the temperature must remain. Without exceeding the acceptable limits, energy use can be optimized. Cold storages can make clever use of this principle: When there is abundant energy from solar and wind sources, the temperature in the cold storage can be set a few degrees lower. As energy get scarce, the refrigerators can be switched off for hours without affecting the stored goods. In this way, the cold store can adapt to the intermitting energy supply. In a similar way, many production processes can be optimised to work in a smart grid.

Parts of production processes, which have a storage capacity for produced goods and does not run continuously can offer a source of flexibility. Examples can be found in cement industry, sewage water processing, paper production, food preparation, etc. Drainage pumps, which control the water levels often have a high capacity and run only for a limited time. Such a system has a great potential to be 'smartened up'.

So, technically a great potential can be found in the industrial sector, but what about the benefits for the customers? To apply smart grids on a large scale, a suitable business model should be found. In this study, I've investigated a few.
A general principle is that supply and demand of energy can be matched by a market mechanism. Whenever the supply of energy is high, prices will drop and energy can be used at a lower cost. If energy supply is lower, the price shall increase and demand will decrease. There are four business models proposed: Contract Optimization is a universally applicable way to reduce energy costs.

By using variable rates, such as day / night tariffs or hourly prices, the customer can respond to the changing supply. Another business model is to trade on the balancing market. This is a special market platform for large users, which are flexible to switch loads on or off for a short period of time. Smart microgrids are local, private electricity networks, which can be lucrative for companies who have a source of energy nearby, such as a wind turbine. The most advanced business model is a Virtual Power Plant; this is a cluster formed by (renewable) energy producers and consumers with a flexible demand for energy. The intermitting energy from sun and wind can be offered as a more stable and reliable source of energy to the market, by exploiting the flexibility of a pool of consumers. Perhaps, more business models will arise in the future, and it can be expected that such models will be more lucrative over time, as the amount of renewable energy will increase.

To see what can be achieved by realising a smart grid, I've performed a case study. The municipality of Zaanstad, which was a partner in my graduation research, came up with the Although it seemed difficult to find a solution for a smart grid here, it turned out to have a great potential. At the site, a few wind turbines where projected. One of the options for the district heat network was to use electric powered heat pumps.

This combination of wind turbines and a collective heat pump provides an interesting option for a smart grid: Production of heat has some flexibility, which could be used to respond to the fluctuating output of the wind turbine. The generated heat could be stored easily in the mass of buildings and in heat storage tanks. Creating a smart micro grid seems as a promising scenario for this situation. The wind turbine and the heat pump can be placed in a micro grid, and share the same connection to the public grid. The heat pump uses its flexibility to optimise the share of wind energy: the production of heat is matched to the availability of wind energy. Besides the benefits of the better integration of wind energy in the electricity grid, there is a financial benefit. The rate for power supplied by the wind turbine is lower than the rates which are offered by energy suppliers, hence an incentive to use wind energy emerges.

To assess the financial benefits and the improvement of integration of wind energy in this smart grid, an agent based simulation model has been developed to test the various scenarios. The agents in this model represent the wind turbine, the heat consumption of buildings, the heat pump, and the heat buffer.

With the developed simulation model, a number of scenarios where tested. The most beneficial scenario resulted in a cost saving of 23%. With this optimisation, the heat pump can be supplied for 82% by wind energy, which is 14% more than in the base case scenario. Moreover, the cost savings for the heat pump is so significant, that the heating network can be operated profitably.

To make a transition towards an economy that is based on renewable energy, solutions have to be found to deal with the uncontrollable and intermitting supply of renewable energy sources. Industrial processes have flexibility in energy demand that can be used to match this intermitting supply. Although the industrial sector makes a range of different products, flexibility can be exploited based on similar concepts.
It became clear that the technology is not the problem here, much potential can be found and most technical applications already exist. In many situations, a positive business case can be found as well. The challenge is to find new way to collaborate and to reinvent the way we deal with energy.

ROB VAN DEN BERG

Towards a circular economy in the built environment

During my master thesis of the master Construction Management and Engineering (CME) at the Eindhoven University of Technology (TU/e), I focused on the influence of legislation on the behaviour of participants in the energy neutral urban redevelopment process. The thesis was focused on the actions and responses of stakeholders (e.g. landowners, municipalities and project developers) on previous decisions of participants in urban redevelopment processes. In the article I gave insight in the behaviour of participants in the redevelopment process, although the society may have a greater influence than regarded in my thesis. This article describes a theme closely related to the changing influence of the society with a possible great impact on the built environment and companies related to the construction industry, namely circular economy.

Linear economy versus circular economy

In the twentieth century, because of both industrial and technological developments economic growth and human welfare has been achieved. According to the United Nations (UNFPA), the world population was seven billion people in 2011. That's a billion more than in 1999. The UN predicts that this explosive growth continues. In 2025, the world population will grow till eight billion and will be nine billion by 2050 [1] (an increase of an eight-fold between 2011 and 2050). Due to the increasing world population and human welfare the consumption of products will rise substantially. By 2050, global resource use is expected to have tripled [2].

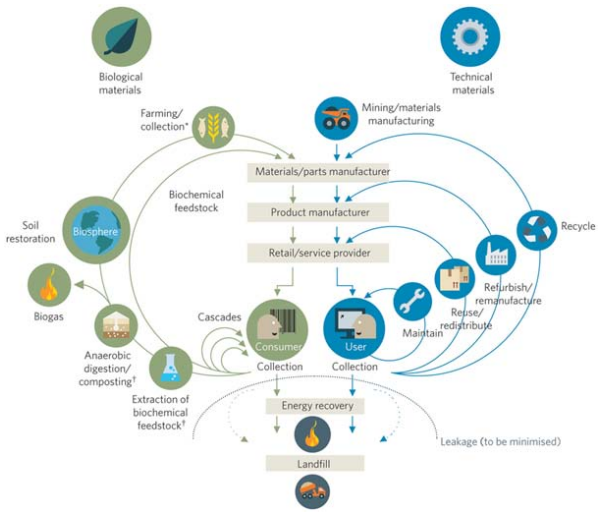
The dominant business case behind this economic growth is characterized by a linear process (take – make - dispose), also known as a linear economy. In this traditional process, raw materials are mined and made into products, which eventually evolve into waste. Nowadays it becomes harder to mine raw materials and the prices of these materials are rising. If the consumption of products and thereby the global resource use will grow as fast as predicted then it results in an unsustainable excessive use of raw materials and higher price levels of products. Thereby, political tensions will rise, because countries with fewer natural resources will be more and more depend on countries which have natural resources. This linear process also has a downturn on the biodiversity, because natural resources will be exhausted and the produced waste will have a negative influence on the soil-, air- and water-conditions. These externalities, which will not be countable to the developers of the products, the miners of the raw materials, and in a lesser extent to the users of the products, will be charged on the public domain, nature and the society.

Linear and circular economy in the built environment

Generally, a linear process is recognizable in the built environment. The developer focuses on the process of

This linear process is no natural movement and eventually leads to a destruction of the world, because of the growing amount of non-useable waste.This starts on the design table: in a circular economy a product will be constructed in such a way that, at the end of the product's life, the materials would biodegrade in a safe way or could be easily separated for reuse. Two types of circles, a biological loop and a technological loop are recognizable. In the biological loop, biomass returns into the biosphere after product use (this is the recognizable natural circular process). It forms nutrients in the end-of-life phase e.g. for the soil without adding to environmental pressures.

The technological loop contains inorganic products and materials such as metals and plastics. These materials should stay in closed loops to ensure circular use of non-renewable resources and to prevent potential pollution. In the enclosed figure a schematic overview of the circular economy is given (with on the left the biological loop and on the right the technological loop) [3].



Schematic overview of circular economy (Ellen MacArthur Foundation) [3].

Rob van den Berg

building and selling property. In the design phase the property is developed to exist for 40, 50 or even 100 years. In a circular economy this should not be the starting point of designing a product or property. The starting point, looking at a circular process, should be on how to create value for the user and develop it in such a way that the product could be reusable through the biological loop or the technological loop [3]. In the current supply chain in the built environment are small steps recognizable in which the circular thoughts are taken into account, for example the recycling of used carpet (DESSO Take BackTM & Refinity ©)and the development of modular furniture, to reuse components (by Ahrend).

When these principles are implemented even more, business models of companies active in the built environment will change. These business models will change from developing and building products towards provisioning services. This rethinking of business models will have a great impact on the current built environment. The project developer will provide housing services instead of developing property. A construction company will assembly and disassembly property, maintain and reuse or remanufacture buildings instead of being a contractor, with just a small part in the housing service.

When this circular economy will gain market in the built environment the total financing of property will be reset. Users will buy property service instead of property itself. Thereby innovation will be elicited, because companies will be responsible for providing a service in a certain period instead of developing a product. An example of these innovations is 'paying per lux' (a project of RAU architects and Philips Lighting). In this concept, both the product and the energy will be paid by the product developer (owner of the product). The user pays the used amount of lux. This allows the user to make optimal use of new innovations to further reduce the energy consumption of the product. At the end of the contract period, the product developer will take back the product and recycles the used materials. In this case no unnecessary waste will be produced and recycling will be optimized. The example of paying per used lux is just a small example in the built environment. When this principle will be extended towards buildings or even areas innovative solutions will be developed. Innovative solutions in for example construction technology, use of space and especially financing.

Barriers to take

However the knowledge and necessity about circular economy is growing, not many practical examples are implemented. Below are mentioned some major obstacles that need to be taken away to ensure the shift from a linear to a circular economy in the built environment.

Limited attention for development focused on circular use

In the current linear economy we buy products that are designed with the idea that they end their lives as waste. For example, property isn't designed with the thought that all used materials will be reused when the building is demolished. In a circular economy, the design phase is started with a strong link to reuse or recycle used parts or products. Therefore, designers need to rethink their design process. An example of an architect whom focuses on circular use is Superuse Studios. Their strategy is that used materials and products offer an added value to new products and building [4].

Resistance from powerful stakeholders

Large and powerful stakeholders are present within each branch, which may hinder the transition towards a circular development process. In the building environment large suppliers of raw materials will not stimulate the transition towards a circular economy, because it will hinder their business case. Examples of these large powerful stakeholders are energy suppliers or the cement industry.

Recycled materials are often more expensive than new materials

Recycled materials often have higher cost price than new raw materials, due to the costs of collection and the low recyclable quality of these products. Thereby, as mentioned before, designers are not yet focused on designing products which exist out of recycled material.

Higher up-front investments

Several analysts expect that circular business models will gain hundreds of billions euros. However, this still has to be translated into concrete value propositions before they can be turned into return on investment. If direct cost savings from circular processes aren't established, then investors will hold on to their experience of avoiding risk in linear processes. Thereby, service systems models require more investment in front, than the traditional transaction model (direct sale). Therefore new investment models have to be developed. A circular economy in the built environment sounds like a simple and innovative solution for our waste production and the developing scarcity of raw materials. Thereby, delivering a positive impact on the environment and society is an extra stimulant. However, redeveloping a linear economy towards a circular economy is not easy. There are many barriers to take, for example rethinking the value for investors and users, redeveloping current linear design processes, rethinking government policies and redesigning business models. Especially in a controversial environment such as the built environment, still major steps have to be taken.

Used resources: [1] NCDO – Factsheet world population - www.ncdo.nl/sites/default/files/Factsheet%20bevolkingsgroei.pdf [2]The circle economy – Unleashing the power of circular economy - www.circle-economy.com [3] Ellen MacArthur Foundation (EMF) - www.ellenmacarthurfoundation.org [4] Superuse Studios – www.superuse-studios.com

STUDYTRIP

LIVERPOOL & MANCHESTER

Early October the first attempt was made to gather some people to get started to organize the of CoUrsE! Study Tour 2014. However, every beginning is difficult. It wasn't before November that the first meeting with a complete committee was held. Despites these startup problems, in the end a great trip was organized

The first meetings were all about the destination, naturally the most important aspect of a trip. The possibilities were a little bit limited because the trip could only be in Europe, but there is plenty to do in Europe! Istanbul, Helsinki/Tallinn and the UK were the options that had our first attention. The motivation behind the choice of destination for the committee was that it would not be a very obvious choice, we did not want to go to somewhere everybody would probably go to anyway sometime in their lives. It was for this reason that the first destination, Istanbul, did not make it. Unfortunately Helsinki was very expensive, so also the second destination was depreciated. The UK was the last option, but of course this still is a very big scope. London did not fit in our picture, because everybody will go to London once in a lifetime or has already been there. Then the cities of Liverpool and Manchester came to mind. Both big cities which had a centre role in the industrial revolution, but have kind of collapsed after this and are now trying to reinvent themselves and bring their selves back on the map.

The 16th of January a first presentation was given where the committee contributed some information about the Tour. From then on the subscription to the tour was open until the 5th of February and about 15 people subscribed to join the tour. Meanwhile to the subscription an arrangement with Mr. Schaefer was made to combine the of CoUrsE! Study Tour with the KenWiB trip that is also organized each year (with some exceptions that prove the rule). Now also all KenWiB students would join the Tour to Manchester en most of them also joined the group to Liverpool. In the end 18 students went to Liverpool and three more students joined in Manchester. Brano Glumac would come along as supervisor in Liverpool and Wim Schaefer, Paul Masselink, Bauke de Vries and Bart van Weenen were the supervisors in Manchester. Unfortunately Brano's visa was not received on time and therefore no supervisor was there to control the students in Liverpool. Luckily all students were nice and sweet and the committee did not have a hard time to keep the group in control.

Pier Head, Liverpool

Albert Dock, Liverpool

A second presentation from the Tour Committee was given during a pizza-meeting on the 24th of April, approximately a month before the departure. Here the program for the trip was presented and the case study was explained. This case should be done by students who want to obtain the 2 ECTS for the study tour or by KenWiB graduates to fulfil the requirements for their KenWiB project. The case involved a report on one of the companies that would be visited during the trip. Because the KenWiB participants were also involved with the program filling of Manchester, all these students have to write this report on the company they contacted. The rest of the students were divided in pairs and were assigned companies which the committee arranged, these companies were mostly in Liverpool.

Prior to the tour the students should analyse the companies by the use of the internet, questions should be prepared that could be asked during the actual visit and after the trip the how, what, why should be finalized at home. Next to this an interesting aspect of the report will be how the projects of the company could be implemented in the Netherlands, especially for Noord-Brabant.

A week before the departure all participants could pick up a booklet about the tour with all last minute information about the program and of course a packing list. And the 22nd of May the date was finally there, at 5.00 am all travellers from Eindhoven gathered at the station at platform 5 to begin the journey by getting to Amsterdam Schiphol. A few went to Schiphol by themselves and would be met there. At about 9.10 am the airplane left the Dutch ground and around 9.30 am all students set foot on the UK in Liverpool. The flight was not really 20 minutes, but the time difference between the Netherlands and the UK leaves you with this illusion. Unfortunately this also makes the return flight 2,5 hours long. The first thing to do in Liverpool was to get cash, take a bus and go to our hostel; the International Inn.

Once Arrived at the hostel the long process of checking in began, but after a while everything was arranged and the rooms could be checked and the beds could be "dibsed". Everybody could get lunch at bars or shops in the neighbourhood of the hostel and some even started their trip in the UK with an authentic dish of fish & chips. That afternoon already a company visit was scheduled and the group walked through the city and along the harbour to the Local Enterprise Partnership (LEP) of Liverpool.

The LEP is a non-profit organisation which is mostly financed by (local) enterprises. Due to the financial input of these local parties the LEP is able to stimulate Liverpool's economy; focussing on the key sectors: knowledge economy,


International Inn (hostel) , Liverpool

Museum of Liverpool, Liverpool


Local Entreprise Partnership, Liverpool

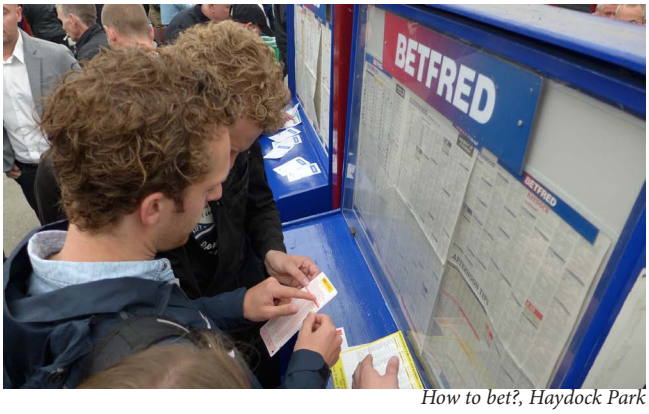

Peelports, Liverpool

Central Library, Liverpool

City Tour, Liverpool

University visit, Liverpool

Horse Race, Haydock Park



How to bet?, Haydock Park

low carbon economy, SuperPort and visitors economy. On behalf of the LEP, Mr. Alan Welby (executive director at LEP) gave a presentation about LEPs' goals and activities. He gave insights on how a local enterprise partnership works and why (local) partners are willing to contribute to this initiative. After this visit some went for shopping in the Liverpool1 and others enjoyed their first (and probably last) Guinness in a local sports bar. The group gathered at the hostel to prepare for a joined dinner in the evening. The diner was enjoyed at Uncle Sam's bar, were all participants chickened out for the big challenge the first time the song 'the eye of the tiger' was played. After dining the first glance was cast at the nightlife of Liverpool, which started and ended in the most famous 'Cavern Club'. All kind of stories goes around about it: 'The Beatles' had their first performance here, they got discovered here or the Carvern Club is just fake. But all we know is that it had something to do with the Beatles and a Beatles cover band was playing that evening.

The second day started at the University of Liverpool were Prof. David Shaw told about the Urban planning master program, the developments of the Liverpool area and the UK in overall, the green deal that was come up with by the government and other kinds of sustainability solutions. After this the Metropolitan Cathedral was visited which looks quite like a gigantic concrete tipi. A minivan and two luxurious cars with private drivers picked everybody up next to the cathedral to go to the Peelports Liverpool2 project visit. The Peel Group is an investment company, whose business activities are spread amongst real estate, leisure, media, energy & environment, retail and transport & infrastructure sectors in the United Kingdom with a focus on North West England. The project that was visited, the Liverpool2, is an expansion project of the Port of Liverpool with an aim to increase its container capacity.

In the Netherlands the same kind of project is undergoing in Rotterdam, called the "Tweede Maasvlakte". First speakers of the Peelports Group and Van Oord (Ms. Lyndsey Maloney from the Peelport Group; Mr. Luuk de Boer and Mr. Mark Schoonheim) gave some presentations about the project and after everybody was dressed up properly (safety boots, safety jacket, life jacket, earplugs, safety goggles, safety gloves and last but not least their helmet) the construction site could be visited. The evening of the second day was free to spend however people want. Most of the group discovered the nightlife of Liverpool, this time looking for some clubs with younger public than was found at the 'Cavern Club'.

The weekend began and the Saturday was dedicated to the horse races. Our enclosure had no dress code, but when getting on the bus with some fancy dressed misters and ladies

Medieval Pubs, Manchester

some people could maybe feel a bit underdressed. But when we arrived at our enclosure, this feeling flew away faster than some horses could ran. This day was profitable for some and others were maybe a little bit more cranky then they would be otherwise during the evening, but overall it was a nice experience. The Champions League final was played this evening and everybody went to pubs and bars to watch the game.

The Sunday was a day without any scheduled visits and a city tour was given by our very own city guide: Daan Stoop. The only thing he missed was a pink umbrella, but all ins and outs of the city facts were present. The afternoon was free to go wherever you wanted, some went to the Anfield stadium, others to the free national museums, some just went to a pub and the least fortunate went to a little authentic village called 'Port Sunlight'. At eight o'clock the group departed from Liverpool to Manchester and a KenWiB delegation joined the group. A first drink to celebrate the whole group being together was arranged at the Old Nags Head, a pub with many pictures and quotes from football legend George Best.

The first morning in Manchester a professional city guide was hired to show the group around in the city. At first glance the city already looked more developed than the city of Liverpool. This because the streets look less grey and dull and more green is exposed. After the city tour a visit was planned to URBED, but because the office is too small for 25 people the gathering was arranged at a pub nearby Charlie Baker's house. Charlie Baker told all about URBED, his ideas for the changing of the world and the sustainable house fitting he is working at. His home is the prototype of the changes and because it was close by everyone got a tour through his home. Afterwards a discussing was started about this house fitting and other subjects like urban farming and electric cars. Not everybody seemed convinced with his manner of approach, but only time will show whether the ideas are realistic or not. A group dinner was scheduled for the evening and after this some of the group went to two little medieval pubs that were shown during the city tour that morning.

The sixth day of the tour was by far the busiest day of the trip. The day began with presentations at the Hexagon Tower in the Northern part of Manchester. Mr. Robin Lawler, Chief Executive of Northwards Housing welcomed the group with a short introduction and after this Michael O'Doherty from the Low Carbon Hub started the morning with a short presentation to explain the idea from the Low Carbon Hub. After this Mr. Elliot Simm from Northwards Housing, Home improvement Services Manager, told more about the real implementation of this idea in the world. Northwards Housing is a housing association which deals with the energy


City Tour, Manchester

Urbed, Manchester


Adult Playground, Whitebeck Court


Town Hall Library, Manchester

awareness of their renters. Unfortunately the time was a little short and Mr. Dave Carter had to rush through his presentation about the Digital Strategies in Manchester. After the presentations taxis drove everybody to the White Beck court, which appeared to be a home for elderly people which was entirely renovated. The Tour through the Whitebeck Court was given, inter alia, by Mr. Greig Lees, Head of Regeneration from Northwards Housing. From here the day continued with a little rush to the Town Hall. which also being transformed, the library already is completely renovated and a linking passage between the main building and the Library is built at the moment. Because of the shortage of time we did not get to hear the presentation about the BIM usage in the project, but everybody will be able to read about this in the case report after the summer.

After this nice tour the day still was not ending, first the group walked with a fast pace to the university of Manchester to hear from Mr. Andrew Karvonen whether city warming will be the solution for the warming of the earth. We finished the day together with him in a local student pub.

The before last day in the UK the group travelled to the airport, not because the trip was so dull everybody wanted to go home early, but to visit CBRE which is working on a business centre at the airport called 'Manchester Airport City.' Mr. Alex Russell and Mr. John McHugh presented the project mostly on basis of the scale model. Airport City is a £800m landmark property development, which is set to become a globally connected business destination located at Manchester Airport. A vibrant economic hub with connectivity at its heart, the first Airport City in the UK will be an influential business environment where organisations work, meet and collaborate with others. After the presentations the supervisors from KenWiB stayed at the airport to go home and all students enjoyed a nice free afternoon and evening.

After these busy, sometimes long, cloudy, educational and enjoyable days the day had come to return home. But first a last company visit was made to the BAM Football Academy. The project was first shortly presented to us by Ms. Julie Bratt, Community Engagement Co-ordinator. After this one of the construction managers showed us around. The academy will be a landmark project for the Manchester City football Club and will provide a centre for up to 400 young players as well as housing the first team training base.

At the end of this morning everybody was tired, had sore feet and possibly still a little hangover, but this was all worth it because of the unforgettable memories that were created during the trip!

Airport City, Manchester

Wannabe Beatles, Manchester

Stretford Stadium, Manchester United

BAM Football Academy, Manchester

COMPANY ORIENTATION DAY

COD

On 11th of March Of CoUrsE! organized their annual company orientation day (COD). During the COD four companies got the opportunity to present themselves and to show to the students what they can expect after graduation. This year the concept of the day was renewed. The Company presentations where a bit shortened. In this manner, there was time at the end of the morning for students to have a personal conversation with the speakers of the invited companies.

Every year study association of CoUrsE! organises a Company Orientation Day. At the COD of CoUrsE! invites companies from different sectors. This year the following companies were present:

DVP	*Main sponsor of of CoUrsE! and is inter alia in construction management;*
Movares	*Consulting and Engineering;*
Brink Groep	*Management and Consulting;*
Van Meijel	*Software & IT solutions for the construction sector;*

Next to representatives from the companies there were approximately 35 students present to meet the companies and to orientate themselves on the future. Around 9.15 Chairman Erik Vijverberg welcomed the companies and the students and Movares was invited to start with the first presentation, after which Dennis Bakker from DVP continued.

After a short coffee break the morning was continued with presentations from Brink Groep and Van Meijel. After these presentations the second part of the BOD started.

During the Second part of the morning all attendants where invited for a lunch and the speeddating session with the representatives from the companies. Students were invited to attend a speeddating session with the representatives from the companies. The representatives took place at bar tables, after which students were guided in pairs along the companies. Here there was an opportunity for the students to get to know the companies better in personal conversations of five minutes each. At 13.15 hours the company orientation day ended and the students had a change to meet different people of different organizations out of different sectors in a relatively short time. The Board of of CoUrsE! and the companies present look back at a successful company orientation day and want to thank all people present. We hope to see you again next year.

BRINK Management & Advies

Movares adviseurs & ingenieurs

DVP Diepenhorst de Vos en Partners

VanMeijel

The Future of Built Environment

You could ask yourself 'Why this theme?' For years, we are warned for e.g. climate change, energy and liveability problems. At some point in time we need to say to each other that we want to tackle these problems in order to make the world 'future-proof'.

To make a good and effective start, we could start with the cities. Why? Because it is expected that almost 75% of the world population will live in cities by 2050. As these cities proliferate, they promote global economic growth and prosperity but they also threaten our climate. Cities account for almost 66% of our energy consumption and produce 70% of all greenhouse gasses. The foregoing means that there are severe problems ahead of us.

It all started about one year ago when five enthusiastic students started with the idea to organise the conference again. Since of CoUrsE! had its lustrum last year it was already two years ago since this event took place. From the beginning the purpose of the conference had been to introduce a relevant CME theme to the attendees. After watching a lot of TED-movies, discussing with teachers and talking with students, the committee finally found a suitable theme: 'The future of built environment'.

With the aforementioned in mind, we started to wonder which speakers could deliver a contribution to this theme. From a list of possible speakers we finally selected: Siemens, Arcadis, Stedin, BAM Techniek and Jan Cardol. In the next paragraphs we want to give you a brief wrap up of the workshop and lectures.

9th of May

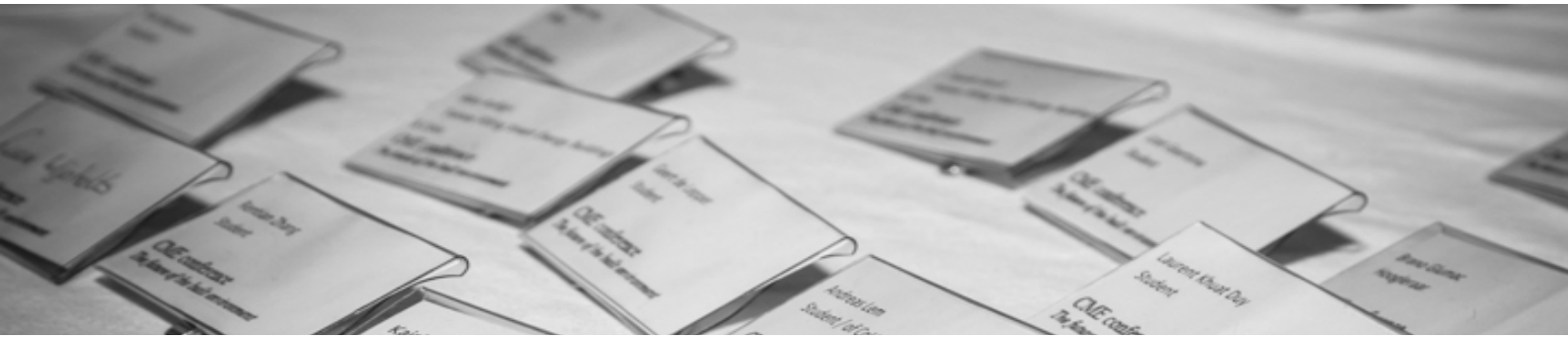
Finally, the day had come and the CME Conference 2014 was there. It all happened at the 9th of May in the Auditorium at the TU/e campus. At 9.30am the first participants to trickled in, to start with a nice cup of coffee or tea. A half hour later the Voorhof was packed with about 70 participant (most students, but also staff and alumni). After the opening by the daychairs it was time to kick off with two parallel workshop by Siemens and Arcadis.

Siemens

For a lot of people, Siemens is not known as a company that is engaged with the built environment. However, the reality is far from this. Siemens tries to implement their technological ideas into cities for a few years right now, which already resulted into among others a real 'smart city' called Masdar City.

On behalf of Siemens, Louis Bekker led the workshop. He directly started with the question 'How will a city look like in the future?'. We came to the conclusion that a city can be green or that it can look green. It can also look very technological like in science fiction movies or it can have a lot of high rise buildings. Or maybe our future cities will be floating cities, something that can be relevant for Dutch cities. Siemens is engaged with measuring aspects of a smart city (e.g. environmental governance, energy, air quality etc.). Their motto is: measuring provides insights for solutions. Louis Bekker put the attendees to work on this topic. They had to find a certain problem that could be measured. What would be the intervention regarding this problem when the measurement would show a large deviation.

Several interesting topics followed, such as the future office building and the resilience of a city. Together with Louis Bekker the students also discussed about these topics. After all it was a very interesting workshop since it is sometimes



nice to think outside the box instead of thinking according standardised patterns. Louis Bekker managed to take away these patterns which resulted in interesting and above all very creative solution regarding the future city.

Arcadis

The workshop of ARCADIS was given by Anne-Marie Spierings, the project manager of the Eurbanlab project. For this purpose Eurbanlab created a unique assessment tool that has the possibility to evaluate the impact of a project on different aspects of People, Planet, Profit and two additional P's that stand for process and propagation. In this way there can be evaluated if a certain project can be done on another European location. Next to this tool, the Eurbanlab project holds a library with urban innovations all over Europe as a source of inspiration and also offers members the opportunity to learn from each other and discuss urban innovations in the community that consists of different parties all over Europe. The Eurbanlab project is about to be transformed into a social enterprise and this workshop gave the participants a chance to enhance their pitching skills by coming up with an elevator pitch to highlight the Eurbanlab services. The participants were divided into five groups that all came up with different ideas on how they experience Eurbanlab. It was a challenging workshop, since the time to create a pitch was very limited. The creativity of the different groups and the natural presentation talents of the CME students made it a unique experience. The importance of a good pitch was clear and this inspiring workshop provided the students with a pitch guideline that can also be helpful in future projects.

During the afternoon there where some speakers who told about how their companies ar cooping with the future build environment.

Stedin

Peter Hermans presented a future vision about energy transition and built environment. No matter if referring to the energy transition as sector or as context, the main characteristic is "change". For the latter, this change is coming from outside the sector, namely the need to adapt to new challenges imposed by climate change and the increasing level of EU and national regulations to reduce the CO2 emissions and dependency on fossil fuels. Low carbon energy system 2050 and 202020 objectives are already on-going priorities. The sector is facing a disruptive business transformation ahead; after World War II the grid was built to accommodate unidirectional flow of energy, while today there is a need to adapt it to a bidirectional flow. This way renewable sources of energy can be integrated and a smart grid can be made. The role of consumer is empowered and a transformation will take place from consumer to prosumer - strongly engaged

in balancing the uncontrolled flow of energy. Utilizing smart meters, they are enabled to facilitate future gains for both sides (use energy when the price is cheaper – e.g. when the wind is blowing harder, leading to a decrease in the energy bill, while the electricity provider is flattering the curve of demand). What is more, in order to tackle the problem of congestion (more electricity is produced than it is actually consumed), a certain level has to be accepted and new ICT solutions should be implemented.

Jan Cardol

Jan Cardol presented the necessity of business case management. The main idea behind business case is the changing/(re)building, keeping the effective and efficient way of the project from the start (setup phase) until after the maturity phase. Managing the business case is about saving costs (the amount of money wasted in construction projects in last couple of years could have saved in improving the economic crisis!), integrate different stakeholders, triple constraints – time, cost and scope-, competing demands – value, quality, image/reputation-, environment, business and execution factors while keeping an eye on crucial factors . It is a quantitative (financial justification of business change), but integrates the qualitative (non-financial, benefits and concerns) approach, which makes it unique. Therefore it is

an added value for investors, as well as the society, an idea which dominates the nowadays built environment sector. Jan Cardol ended his presentation by giving us a valuable advice: "Tell the truth"!

BAM Techniek bv
In the final presentation, Kees Verspui from BAM Techniek, presented a relatively new American model called: 'Energy performance contracting' (EPC). 'How does EPC work'? A certain building will be upgraded with several energy saving solution. This means high investment costs in het beginning of a project. The contract (in this case BAM) guarantees the client a certain amount of energy saving over the total contract duration. In reality there already are a lot of project done on the basis of a EPC. Especially in America but also in The Netherlands this is the case. Some examples that Kees Verspui discussed were: Tongelreep Eindhoven, Artcourt Leeuwarden and in America: The Empire State Building.

Closure of the afternoon program
After three interesting and educational lectures by persons who have experience with practical situations it was time to get an insight on the theme from a scientific perspective. This insights was given by Prof. dr. ir. Schaefer, head of the CME and Urban Development department.

We felt that besides companies with fantastic speakers, the graduates of CME could also contribute to this fruitful day. This way the current CME students gain insight in the possibilities of their graduation and how graduates tackled the problem of the changes in a future city.

That is why we choose the finish the afternoon program with three best graduate presentations and with a small speech of the chairman from of CoUrsE! Erik Vijverberg.

Out of the graduates from previous years, the CME department chose three of the most excellent graduates from the last three years. Those graduates were Bob van Bronkhorst, Geert Lamers and Tong Wang. They all presented their research in front of the attendees. Within the total 30 minutes of presenting, the attendees were introduced to e.g. GIS, Agent Based Modelling and System Dynamics, which are all methods that can be used during your graduation. After three fantastic presentations the attendees got the power to vote for their best graduate. It was a close call and every graduate did a fantastic job, but unfortunately there can only be one 'winner'. So, the new CME Best graduates' name is Bob van Bronkhorst. On behalf of the committee we again want to congratulate all the nominees for their great contribution to CME and of course to our conference.

At the end to this wonderful day we can say that the CME Conference 2014 was a great success. There were nice speakers with interesting topics and insights about new techniques, methods and of course the future of cities. We want to thank all the speakers but we especially want to thank everybody who took the initiative to join us at this wonderful day.

Interested in organizing the next edition of the CME conference together with TU Delft and TU Twente?
For more information check the Of CoUrsE! website.

Hurks bouwt en oogst lof

In toenemende mate legt Hurks zich toe op renovatie- transformatie- en binnenstedelijke (her)ontwikkelingsprojecten. 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

HOW CAN WE REI

Working on sustainable, smart cities.

"The first cities, like we know them, during the time of the first city rights, were a priori militaire, guarded and surveillanced objects; secured for trade and goods and for protecting of the inhabitants. More than half of the world population is living in urban environment. The dependence of external energy sources and raw materials makes the city and the inhabitants vulnerable for their prosperity."

prof.dr.ir. W.F. Schaefer

NVENT THE CITY?

The Future of Built Environment

European partners work together at challenges for (re-) development from large urban areas. Think about energy use, logistics, use of raw materials and waste management. Next to this the composition of the population changes: more elderly are living in urban areas and there is an increase of singles and 'small' families. The urban areas need to be adjusted to new social and technical conditions. This is an enormous challenge for engineers and correspondingly employment, even outside the Dutch borders. Even administratively there is a profit to be made in 'smart' redevelopment. In the 18th and 19th century, the 'modern' city was developed, but mostly as administrative area with municipal borders and public services. It may be clear that actual municipal borders have insufficient foundations for integral technological and economical area management. For this purpose the city needs to be reinvented in terms of operational, functional and spatial factors.

Brabant-city 'smart city-la-lettre'

It is not easy to give a short definition of 'smart cities'. It is about coherent characteristics, like sustainability, local energy production, highly educated people, social cohesion, competitive economy, the quality of the living environment, qualitative transportation systems, smart-parking – smart charging, excellent data communication etc. In the core is the intended 'smart city' a sustainable sociological and technological system and this is in economical perspective competitive.

The citizen of the world needs to be seduced to settle in an urban area with high quality facilities and a variety of economic, entrepreneurial and social activities. You could also think about the Province of Noord Brabant in this way. In fact the province could be presented as an integral green city: 'Brabant-city'. A challenging mix of living, working and relaxing and cultural acitivities; and inbetween high quality mobility services. 'Brabant-city' is a collection of living areas, cq. Medium and small capsule-cities, agricultural centers, industrial centers and 'leisure-areas'. Therefore, perhaps is Brabant-city, as seen in this way, the smart city avant-la-lettre. Challenges for CME & Urban Development New technologies, developed by colleagues of our technological sister faculties is available for applicating in urban areas.

The education and research of the CME Master track aims to applicate these technologies in the complex reality of urban areas. For this purpose in short terms the activities are characterized for the interfacultary Master CME at the Technical University Eindhoven. In addition, in line of the excellent interactive collaboration between the two faculties 'Built Environment' and 'Industrial Engineering & Innovation Sciences', students are stimulated, next to their scientific education to be interested in business start-ups. We have ourselves, with education and research, explicitly scientifically profiled. Some parts are recognizable in a steady grow of scientific output and the group of concerned AIO's

KenW2iBrabant

We aim to work out the individual graduation projects by integrating technical- scientific and business knowledge and methods. Meanwhile there are since 2009 more than 70 graduation theses worked out by CME graduates at the TU/e, related toenergy management, sustainability and smart urban (re-) development issues.

For this purpose we work together with the business community and local governments and the graduaties in the KenWi2Brabant: 'Knowledge cluster Energy neutral living and Working in Brabant'. See all relevant studies and videopresentations: www.kenwib.nl. This graduation progam is funded by external sponsorships. This provides in fees for graduation, printing, symposia and studytrips. Interested companies and institutions are invited to share their thoughts with the CME staff about participation.

Sustainability: A workable model

Sustainability is a complex understanding and almost a personal puzzle. Sustainability almost an philisopical understanding and is belongs to the peoples world. As individual citizens, entrepreneurs, scientists, administrators are we giving meaning to the issues of scarcity and environmental pollution in different ways; for one person close and immediately and for the other person not.

For one person is a cyclus of recycling materials reuse with a turnaround time of 100 years is acceptable, for another person is even 100.000 years negotiable, while other people demand that cycles of materials and resources must be accomplished within a generation. I have my own views on sustainability .

The main international conflicts, again every day, depend to a significant extent on the availability and the distribution of raw materials and energy supplies. Setting up a regional, sustainable economy that in the outline not - .. or less dependable is of use of raw materials and fossile fuels, will directly, now and here, and elsewhere, contribute to realization of peace and safety issues. As scientist I find this a very workable model.

prof.dr.ir. W.F. (Wim) Schaefer
Chair Construction Management &
Urban Development
Program coordinator CME@TU/e

HOW TO DEAL WITH CHANGING CITY'S

HANS DIEPENHORST & RICHARD REULINK

For this article, we asked ourselves; 'What is Reinventing the City?' To answer this question, we interviewed Hans Diepenhorst and Richard Reulink from Diepenhorst de Vos en Partners (DVP). DVP is currently our main sponsor. It is an ambitious company with multiple areas of expertise such as: Project Management, Real Estate Consultancy, Real Estate Development, Facility Management and Construction Cost Consultancy.

DVP is particular strong in managing complex Real Estate projects. Recent projects of DVP are the New Hilton Hotel at Schiphol Airport, the inner-city shopping project 'Amadeus' in Den Haag and The National Militairy Museum in Soesterberg.

The company DVP

At the different departments of DVP they are looking at reinventing the city, among others at the Development department. The departments Real Estate Development, Real Estate Consultancy, and Construction Cost Consultancy are closely connected. When focusing on the construction development process these three departments are in the preliminary phase, and are dealing with topics such as development and facility management. These departments are supporting the next step in the process. DVP thinks that we could reinvent the city in many ways, but when making a new plan or forming a vision, the costs will be an important factor. By providing consultancy and support in the development process, DVP is in close contact with representatives from municipalities. The municipalities want to be assisted with creating their new visions and/or making new plans. However, the main focus points of DVP are: Real Estate Consultancy, Real Estate Development and Construction Cost Consultancy. In the development department the consultants are working together with their clients to create a new plan and at the real estate department portfolios are reviewed. The Construction Cost Department is a facilitator, by providing a financial plan and to calculate the total cost of ownership. During this process it is not all about profit, it is also important to look what the gain would be from the sustainable solution, and underpin this with figures and numbers.

Sustainability

Richard: 'In my opinion you always have to keep sustainability in mind because it is such an important factor. The first time that people started speaking about sustainability, people did not notice it. But the development trend did not pass of unnoticed. Everybody is concerned with sustainability, the building owner, the user and the public opinion also haves a big influence. But the main question remains, 'what will the costs be?' It is a puzzle, however integrated in the right way there does not have to be high additional costs. It is important to integrate the plans in an early phase, for instance during the design of a vision or in the concept phase. DVP refers to sustainability to its clients from the start of a project.'

Hans: 'I am convinced that when you take sustainability measures within the plan development, you not only have a sustainable building but also a more comfortable building. It could be a slightly higher investment from the start but you get lower exploitation costs. When there is a shortage and you expect a decrease of 100.000m2 office space, still this space can be sold because of the quality and comfort. The buyers can determine the supply when they become more critical, due to the scale of the market they can choose for projects which offer the facilities that they want.'

Reinventing

Reinventing is close to redeveloping. Reinventing is renewing of, for example a city. During reinvention of a project a small part is mostly redeveloping but this remains only a small part. DVP wants to reinvent a city in such a way that the city becomes sustainable and could be used in an energy neutral way, regarding e.g. transport. Hans: 'Many cities want to achieve this but they are still miles away from reaching this. Reinventing a city could take place in different sizes, many huge trendy cities are busy with reinventing themselves but compared to the rest of the world the Netherlands is only a small country with no mega cities. Despite of the difference in scale, different cities in the Netherlands, are Reinventing the City. This shows that is also possible on a smaller scale.'

Basically, redevelopment is always sustainable. However, it becomes really sustainable if a project adds something to a city or district. If a project does not add anything it eventually will be stopped and fails because no one wants to have a project that does not add anything. When a project has added value it can add value to the surrounding area. But it can also contain value for the developer or the user, moreover this means that there is a demand from this user for this particular project. Therefore, redevelopment can be sustainable but just redeveloping without any other intentions is not sustainable at all. The aforementioned could be called demand driven project development. In many cases the construction sector used to build supply driven because they were used to do this for 20 years. We used to

ask for a number of square meters and these used to be built, or we asked for a function to be realized and this used to be realized. But this remains supply driven. If you redevelop with a demand-driven market you are developing for a special need from someone. This need has to be researched in advanced.

Reprogramming
The Real Estate Consultancy could be really simple, I have a problem and you have the solution. This could take place at an area, building or problem level. There has been a lot of talking about reinventing, and redeveloping but we could call this reprogramming of a city. By doing so you could easily connect the Real Estate Consultancy to a strategic area. In the preliminary process, this is about the use of space, or the use of buildings. This could be reuse, however maybe a different function is needed, this is called trendy 'redeveloping' but it is mainly reprogramming. With reprogramming a consequence could be that the building needs to be adjusted. However, when looking at the canal houses in Amsterdam, you could see that these houses are not adjusted whether there is a dentist, an office, a shop or a house inside. The buildings are reprogrammed and reused, this is ultimate sustainability. The reprogramming and re-using is what a city does continuously. This is best shown in the city centre. In monotone living or office areas redevelopment is more difficult, because there is either living or working in one area and in the centre of a city the functions are combined. In Eindhoven Strijp is a nice example, the formal industrial site becomes a trendy place, and according to Richard: 'monofunctional use becomes multifunctional use and therefore diversity arises and reprogramming has taken place.'

Research
Richard: 'If you live in a city you know a lot about the city itself. What is going on in the and what works and what not. When living in Amsterdam, and you need to develop a project in Rotterdam than this is impossible to do from your office, you could read a lot about a city, but if you have enough information by then it is an easy research. But when you actually are in Rotterdam you get to see many different things, and this is broadens your view. You need to experience and broaden your view to be able to create something from which you know there is a demand. And if it is supply driven and there is a demand which consists of no locational preferences, then it does not matter if they are located in the city centre or in suburb of the city. When people start thinking from scarcity (and price) they will move outwards from the city centre. Than it will be accepted what the supply is. When the demand becomes less the supply needs to fit the current demands. For example, in Eindhoven is student housing a logical development, but student housing is in fact youth housing. But in many cases you see that people want to build youth housing and they confuse this with student housing. In housing there is an essential difference between youth and students when talking about housing, this is to be seen in small differences. And this is demand driven.'

"You can no longer escape from sustainability"

Project: Nationaal militair museum
The project of the National Military Museum in Soesterberg is one of the projects of DVP. This project has a Public-Private-collaboration. And the project was procured with a DBFMO (Design, Build, Finance, Maintain and Operate) contract. The project covers 45 acres and contains the architecture, construction and interior of the Museum and the development of the surrounding landscape, including an event location and a silence and memorial garden. The construction, financing, maintenance and exploitation has to be done for a period of 25 year.

DVP supervised the project and guides the client. The ministery of Defence stated that the project needs to be sustainable and is going to be exploited for 25 years. This is a PPS project and with the DBFMO contract the builder needs to keep in mind the costs in the exploitation phase as well when planning for the materials for the construction of the project. If the investment of the materials where cheap in the beginning but they need a lot of maintenance in the exploitation phase the client will be punished for 25 years because there is going to be looked at the costs In the construction phase but in the maintenance and exploitation phase as well.

Hans Diepenhorst (left)
Managing Director
Advisor DVP

Richard Reulink (right)
Managing director
Partner DVP Development

THE CONCEPT OF ENERGY GRID SERVICES

Erik Blokhuis

This paper addresses the need for service orientation in the future energy system. Energy grid services are introduced, and we argue that Distribution System Operators (DSO's) can and should shift focus from managing assets to delivering energy grid services. It is shown how demand response mechanisms, aiming to engage customers and to influence their behavior, effectively can be synchronized with grid operations, and how this can result in benefits for all participants of the future energy system.

Service Orientation

We live in a world which is service oriented: we consume services, we produce services. Our physical world is really getting augmented and even controlled by an information world. So we increasingly think in terms of services and the question is how this will affect the utilities sector in the coming years. With implementing smart grids, we will start to change the energy system as a whole to facilitate the energy transition. This by enabling the integration of the prosumers (storage, Electric Vehicles (EV), distributed generation (DG)) into the energy system. When the flexibility to control electricity at the supply side will decrease (because we are unable to control energy from sun and wind), we will be forced to increase flexibility on the demand side. Only then we will be able to effectively balance the grid in order to guarantee security of supply and system integrity.

The role of the customer is changing: from a passive user, simply using energy from the energy system towards an active participant in the energy system, reacting to pricing signals in the market and also delivering energy services to the grid and market parties. Also in international standardization this is recognized and we see early attempts to define flexibility services and demand response services; these are all service based interactions between prosumers, market parties and DSO's. So it is more than logical and essential that the "rules" of how the energy system of the future will work will be defined by "who will deliver what services to whom". These service interactions can be derived from roles and responsibilities in market models as they are being defined, and should be regarded as the basis for (information exchange) standards on interface points between prosumer, market parties and DSO's (see figure 1).

Impact for DSO's

In this respect it is necessary that all actors in the energy system, including DSO's, start to think in terms of services, reflect on what value or services they bring into the value chain, and how they will interact with the other actors. For DSO's, the exercise of defining its services is independent of the discussion on future role and responsibilities of a DSO, and has to be executed in all cases, since an energy system without service interactions with the DSO will simply not work. The specific outcome of the DSO-services however is of course dependent of the role and responsibility of the DSO. Similarly as happened in the transformation of the telecom industry in the last 2 decades, the DSO should define its value add from an "outside-in" perspective (consumer or market party), leading to the conclusion that its added value lies clearly not in "managing assets" but in "transporting energy" (telecoms also moved in focus away from managing network assets to delivering services).

The services portfolio of a DSO

The DSO's should start to focus on what services they

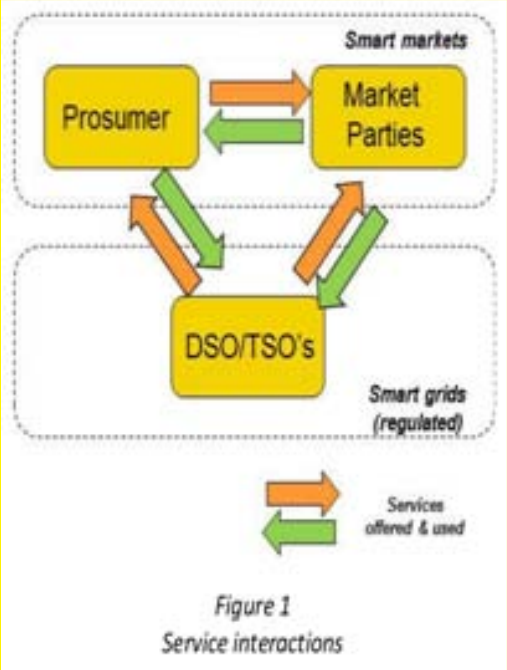


Figure 1
Service interactions

deliver, within the boundaries that exist for DSO's, as they are regulated and not active in commercial market processes but only facilitate these (although their end-responsibility for security of supply and system integrity might lead in specific situations to interventions in market processes). Analysis of today's DSO operations leads to 4 categories of services:

1. Connection & access services
2. Market facilitation services
3. System operator / ancillary services
4. Energy grid services

Erik Blokhuis

Thinking in terms of a service portfolio in general, and the energy grid services in particular, is relatively new for DSO's. However if we really want to develop smart grids and smart market concepts with the customer at its very heart ("outside-in approach"), it is essential that we start to do so.

Energy Grid Services

By implementing energy grid services, independently from energy infrastructure, (see figure 2), we are able to decouple managing energy grid services from asset (life cycle) management. In this way a DSO will be able to interact with the other actors in the system, as the interaction is related to energy grid services (the value add) and not coupled to the complex underlying (often legacy) energy infrastructure. This creates significant benefits for the customer / prosumer, the market and the DSO.

So if we are able to define (a few different) standardized energy grid services, closely related to end customer energy needs and behavior, then we will enable market development and also be able to manage the future dynamics in the grid more effectively and efficiently.

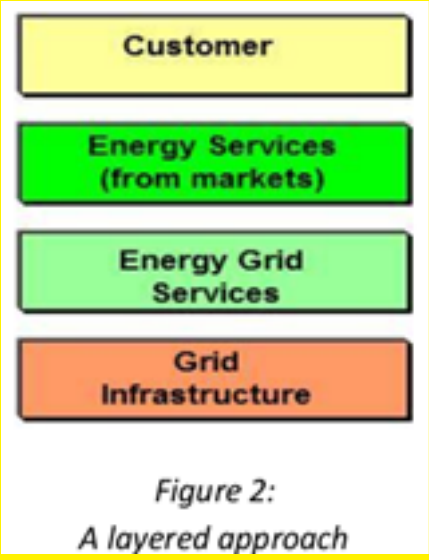


Figure 2:
A layered approach

Interaction with market parties and prosumers

In a future energy system, customers' behavior can be modeled. Market parties will interact with these classes of behavior via demand side management or demand response programs. When infinite grid capacity is available, this will not lead to any interaction with the DSO's. However, with higher peaks in load due to massive integration of DG and EV, and the strategy of DSO's to avoid / defer significant grid investments via ICT based mitigations (load shedding, curtailment, etc.), infinite grid capacity is not available. Initial descriptions in which the interaction between the commodity market and distribution capacity market is defined are already available (traffic light concept). When this interaction with DSO's is based on well-defined and separately manageable energy grid services, then prosumer behavior, market party responses and grid load can be aligned and synchronized in a consistent and manageable way: operationally, commercially and regulatory. This is shown in figure 3.

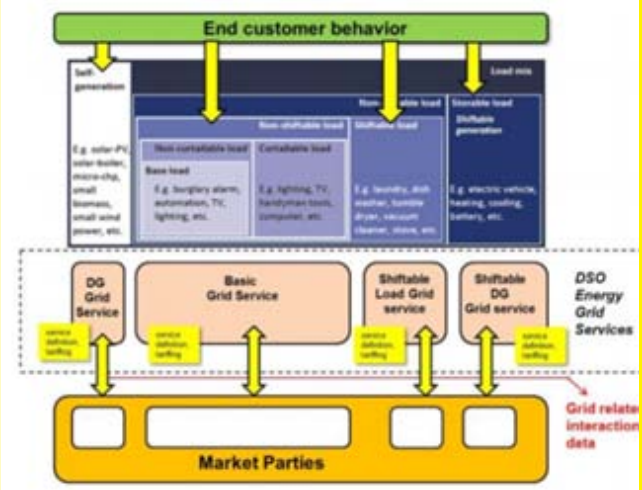


Figure 3
Relation to " customer classes of behavior"

Examples of Energy Grid Services

The "basic energy grid service" is the existing energy transport. Next to this basic service, two new energy grid services could be envisaged: one related to decentralized feed-in of electricity to accommodate the large-scale integration of DG in the grid, and one specific related to charging of EV's. Defining these additional energy grid services means that these energy grid services should be managed independently from the "basic energy grid service", without influencing our existing consumer household energy usage. Different energy grid services will have different service specifications (tariff structures, guaranteed or best effort, description of DSO intervention in service delivery, etc.). As this makes the energy grid services transparent to market parties and the end customer, this leads to a higher customer satisfaction. The introduction of the concept of energy grid services will fuel new business models and business propositions. It could also act as an additional instrument for future differentiated regulation / legislation, for specific defined types of energy grid services. Finally it will also enable the discussion on synergies with the ICT / telecom sector since "service oriented" thinking is already for many years in their mindset. For achieving results on realizing synergy it is essential that both sectors work together; a necessary prerequisite for building smart grids and smart markets.

COLUMN

BERT VAN EEKELEN

No reinventing the city without reinventing Governance

When re-inventing the city, it is important to know why, and who's in charge. Otherwise, we could make great plans forever. It is important to know "in which movie you are playing" and also what the roles of the other participants are.

In most time successful developments of cities are reflecting on natural resources, the specific location of the city, a step-by-step development and growth during centuries is needed. Attempts to create cities "out of nothing" rarely bring satisfying results. The important thing that often is missing is the heart and soul of such a city.
Cities appreciated nowadays are those - without exception - cities with a wide mix of functions. Those cities are located where people like to live, work, recreate, and to be entertained. Cities with just mono-functional offices like La Defense in Paris and Canary Wharf in London are successful during working hours, but otherwise those are deserted places. After a few decades those areas face the competition of more recent built areas; companies move and investors face stabilising or even decreasing rents. The decisions to re-invest in existing buildings are competing with the investments in new areas. There is a big chance that those areas get outdated and obsolete.
But there is another extreme: Cities containing just dwellings are not that successful either. We know the Dutch examples of Lelystad and parts of Almere, once profiled as being the new desired land were life was healthy and space available. Nowadays we conclude that suitable workplaces are lacking and the cities are abandoned during working hours. People seem willing to pay much more money for less land and houses in Amsterdam.

Role of Urban Planning
Former city-advisor of Amsterdam Dirk Frieling, the later Professor in Urban Planning at the University of Delft, already stated decades ago that Urban Planning is not organising the desired developments, but is facilitating them. However, if not, it might interfere with the desired developments. This is an important statement, especially looking at the present role of governments in re-inventing the city.
Before we try to re-invent the city, we have to understand why. It requires analysing the real successes of a city. Although a lot of education is about creating new buildings and infrastructure in a "green field" situation, we have to keep in mind that buildings and infrastructure are only the "hardware" of the city. In developing the neighbourhood the Bijlmer (Amsterdam, the Netherlands), urban planners did miss essential elements that create a vital city. Although many architects and urban planners from all over the world where visiting this new world-miracle, nobody had foreseen that only two decades later, it became a playground for criminal activities and social conflicts.
Nowadays, while we face the fact that millions of square meters of offices are vacant, we do realise that urban planning has failed again. While we knew that the introduction of flexible workspace reduces the demand for office space, we kept on building new offices without demolishing the existing ones. Although city governments try to convince us that investors and developers are the ones we have to blame; they did stimulate these developments and in several cases, they still do.

What did become clear is that even now, development of a city is more than just building apartments, offices and shopping malls, it is the activities that generate cash flows. It is not only the role of the government, also private initiatives are needed to create the cities that we desire. Since our economy is stabilising, it is about reroute cash flows in order to create more value out of the existing built environment.
Buildings and infrastructure require large investments, and cash flows to operate and maintain. In fact, the hardware of buildings and infrastructure only create value if they are supporting particular functions. The functions that are needed are; living, working, shopping, and entertaining. These activities are the main source of the funding. If there are limited activities, there hardly will be any reason to construct, since nobody can pay the bill.

Hardware, software, mindware
What makes a city attractive isn't the hardware or the architecture of apartment blocks, office buildings, shopping malls and the infrastructure. New developed cities in for example Abu Dhabi and Bahrein are impressive, but they miss the human scale and cosiness like Paris, London or Amsterdam.
We so invest in real estate and infrastructure, but this it is not a purpose on itself. Hardware is facilitating the "Software" the functions, processes and activities. It is what moves, connects, and lives. It is about people living, working, studying, traveling, etc. These functions, processes and activities generate the value by which our economy exists. It is the value to be earned in order to pay for the total set of functions and the investments made to facilitate them. This means: No value, no cash flows, and therefore no funding for buildings and infrastructure.

Bert van Eekelen

"Mindware" is the third and most important term. Although the word is rarely used (until now) it tells about us about "what drives us". If we ask ourselves why people go to school, we would answer "to get educated". If we ask why people have to be educated, the answer is, that this is necessary to drive and extend our economies and social well-being. This is why we are willing to pay for the costs of education. Therefore we need schools (the hardware) to facilitate the education given (the software), driven by the idea that educated people will provide our well-being.

Figure: Hardware, Software, Mindware

What manages the functions, processes and activities in our city? It is for sure about the constraints and policies we have to deal with, like legislation and urban planning. What ambitions do we have, what kind of activities have to be stimulated. What are the possibilities, given the local circumstances. What activities are not desired? What will be the best way in developing plans, but will never be successful or just competitive to developments nearby. And who is going to make the choices?
How democratic our Government may be, re-inventing the city is not only managed by Government alone or about giving the floor to commercial investors and developers. In growing influence, the inhabitants of the city help defining the mindware of the city. And this kind of participation is further developing.

It is again about what professor Frieling told us. The government is not organising the desired developments, but at the most facilitating them. But, if not facilitating, it might hinder the desired developments.

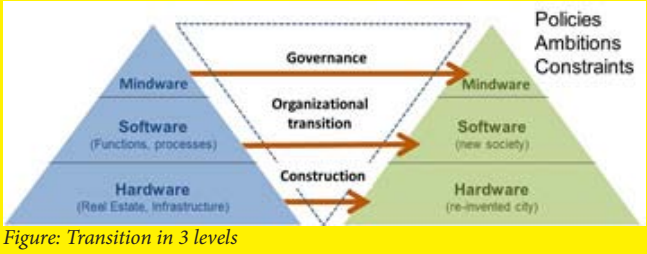


Figure: Transition in 3 levels

Re-inventing the city is not about trying to preserve our free land for agriculture, tourism or even storage of water. It is about understanding and exploring the values of the existing city. It makes a lot of difference to extend our society in new virgin land and bring there all infrastructure, transport, houses, schools, healthcare etc. by which we further weaken the economics in our stabilising society. Re-inventing the city is the opposite: strengthen the critical mass of our existing cities, their population and explore all the facilities that are already there. But even then it is not for free. We have to be willing to invest in the quality by which we combine functions and create multiple land use.
At least in the Netherlands, the about one million to be replaced existing houses in the next decades are not to be found in extension of our cities in still remaining green and agricultural areas, but in further intensifying our existing cities. Developments around railway stations in general and the Zuidas Amsterdam in particular are the evidence of the potential of an intensive city climate with, as soon as infrastructure is embedded, the real mix of city life can develop into a lively new city centres.
Since the Second World War we have rebuilt our country based on segmented policies and departments of Government to implement them. Since infrastructure and urban planning had a "Living Apart Together" relationship it was logical that mono-functional extensions were searched and found outside the existing cities.

It is extremely difficult to balance the different interests of the governments and other stakeholders involved. Research at the Centre for Underground Construction in Gouda (Centrum Ondergronds Bouwen COB) proved that the decision making process about multifunctional land use and underground construction is extremely difficult. It is a matter of competitive cooperation. Stakeholders are dependent of each other, but all of them tries to make the others pay the bill. Even if stakeholders are just representatives of the different layers of government, or about the payment by tax money long debates can occur about the way the costs, eventual benefits are to be divided.
It is no longer a matter of making plans and/or trying to find investors to build. It is about the social and economic needs in the city and to identify the stakeholders involved. But re-inventing is about re-organising the governance and in order to facilitate the desired functions and activities, develop and adjust the required facilities.

Bert van Eekelen is senior consultant at ARCADIS. For more than eight years he was involved in the planning and decision making process of Zuidasdok Amsterdam. Currently Bert is involved in studies for the new development of the station at Amsterdam Airport Schiphol.

Further information about these issues is (in Dutch) available at the website of COBhttp://www.cob.nl/kennisbank/webshop/artikel/zeven-sleutels-voor-een-waardevolle-afweging.html

NEIL PATTIE

Reinventing the city with light

One hundred years ago, less than 10% of the world's population lived in cities. By the start of this century that figure had risen to over 50%, and by 2050 over two thirds of us will be living in cities. Urban growth on this scale presents tremendous challenges, especially in times of budget and resource constraints. And yet there is good news: energy-efficient intelligent lighting can help create urban environments that are safe, smart and vibrant – as well as economically and environmentally sustainable.

More light, energy-efficient light, digital light
We are seeing a rapid rise in the world's population and in new lighting applications. This is increasing the global demand for light. At the same time, with lighting accounting for 19% of global electricity consumption, the world really needs that light to be energy-efficient. And with the integration of LED technology, lighting controls and software opening up new functionality and services, the world also needs digital light. At the same time, however, towns and cities are keen to reduce their ecological footprint: conurbations currently consume over 70% of the world's energy supply, while also affecting the balance of nature through (light) pollution and waste.

Huge potential energy savings
Some 60% of the world's lighting-related electricity consumption is used for commercial and public buildings in cities, and around 15% for street lighting. Significant savings are possible – on average 40% – simply by switching to energy-efficient lighting technologies such as LED. On a global level the potential savings amount to €128 billion in reduced electricity cost and 670 million tonnes of CO2, equivalent to the emissions from of 642 medium-sized power plants. These savings can be significantly increased – to as much as 80% – by using LED solutions in conjunction with smart lighting controls.

Connected lighting – CityTouch
As lighting goes digital, Philips is incorporating innovative LED light sources, luminaires, smart lighting controls and software in fully integrated, intelligent solutions for cities. Connected lighting provides the right amount of light precisely where it is needed and when it is needed. This allows city authorities to save energy and maintenance costs and to reduce obtrusive light, while making urban spaces safer and more attractive.

Liveable cities require lighting that can adapt to the ebb and flow of urban activity. Philips' CityTouch outdoor lighting management system enables dynamic, intelligent and flexible control of lighting city-wide. Combined with LED-based fixtures and controls, it can save up to 70% on energy and maintenance costs compared to conventional lighting.

Philips CityTouch is an innovation designed around ease of use. It connects street lights into a networked grid and allows users to manage all the lighting systems for an entire city via a single online user interface. This makes for easy, streamlined maintenance and oversight, with real-time status reports for each individual light point. And, by making it possible to dim light points outside of peak hours, detect failures and provide smart lighting workflow support, the system slashes operating costs and energy usage – leading to lower energy bills, lower carbon emissions and less light pollution.

CityTouch also protects the city's infrastructure investment by adjusting to evolving needs and new technologies. As they expand, cities using CityTouch can simply add new streets to the existing network. New lighting functionalities can also be easily incorporated. CityTouch isn't tied to one hardware type or provider. This means that users have flexibility in selecting the products that best suit their city's requirements and budget – safe in the knowledge that their light points will work seamlessly with the CityTouch software.

Rotterdam was the first city in the world to install CityTouch as its city lighting management platform, in combination with Philips' Starsense Wireless system. "Every light point can be operated individually via radio frequency (RF) signals," explains Gerda Velthoen, consultant for Public Lighting and Outdoor Spaces. Small aerials are fitted on top of the luminaires to receive these signals. "Thanks to this system, we are able to dim the lamps more easily, and if there is a sudden need for more light, e.g. if a major incident occurs, we are able to provide it quickly and easily at the press of a button," Velthoen explains, "but it is already clear that this system has a lot of advantages and that over time it will give rise to savings. Soon we will no longer have to replace lamps as often, which means we will not need as many personnel."
Alexandra Van Huffelen, Alderman for Sustainable Development, Inner City and Public Spaces, Rotterdam also sees advantages: "This lighting management system enables

Neil Pattie

us to use the public lighting in Rotterdam efficiently and effectively at night, providing less light where possible and extra light where necessary. I expect we will install this in other areas as well in the future, starting with the stations and parts of the city where there is a lot of nightlife, although the flexibility this system offers could be useful in many other areas of the city too."

Other notable CityTouch applications include Buenos Aires in Argentina, where it is currently being deployed as part of a major 3-year project to renovate most of the city's 125,000 street lights.

At the Light+Building 2014 trade fair in Frankfurt, Germany, Philips launched CityTouch light wave, which allows streetlights to be instantly connected to the remote lighting management system over wireless GPRS networks. This eliminates the need to deploy local Radio Frequency (RF) networks, thus reducing installation costs. Philips also introduced CityTouch light point, an asset management system that enables cities to easily access information about the street lighting network and to receive real-time updates about lighting maintenance requirements. Among other features, the system provides map-based data visualizations of a city's lighting infrastructure, enabling a city to allocate budget for street lighting upgrades to those areas where it is needed most.

In reinventing the city, it's not just about saving energy – it's also about making cities more livable

White LED light for safer streets

Creating an environment in which people feel safe and secure is a primary requirement for a successful city. Lighting can make a decisive contribution in this respect. For example, over 80% of people feel safer with bright white light than with traditional street-lighting solutions. White light is the closest approximation to actual sunlight, and so it is widely experienced as being more comfortable. Also, its high levels of perceived brightness and superior colour rendering make it easier to distinguish objects, colours, shapes and other details. This is particularly important for the CCTV cameras that watch over our streets.

The report entitled 'Lighting the Clean Revolution: The rise of LEDs and what it means for cities' published at Rio+20 outlined the findings of LightSavers – an independent global pilot of LED lamps across 12 of the world's largest cities. These findings included the fact that a large majority of residents of pilot cities reported improved visibility and felt safer with LED-based white light.

Inspiring environments

As well as enhancing visibility and cutting energy bills, connected LED-based lighting solutions offer exceptional freedom in terms of controlled lighting effects – colour, dynamics – and design, as evidenced by the example below, the Dragon Bridge in Danang, Vietnam. This capability is driving a shift from 'quantitative' functional lighting towards 'qualitative' intelligent and emotive lighting which offers city residents and visitors spectacular and inspiring experiences that can revitalize urban environments.

City branding

In short, high-quality intelligent lighting helps make a city safer and more attractive, enhancing its brand identity – the distinctive signature that defines its appeal and sets it apart from other cities. This is important for civic pride, but also to attract new residents, new businesses and the inward investment that is needed to boost the retail sector, tourism and other drivers of economic growth and employment.

A good example of how lighting can strengthen city branding is provided by Philips' versatile Metronomis LED outdoor lighting range – winner of a Gold Award at the prestigious

2014 iF design awards. Metronomis LED offers a variety of design options and lighting effects that enable urban designers to play with light and shadow to customize outdoor environments and reinforce city identity.
In Næstved, Denmark, the Metronomis LED range has blended in seamlessly with the colourful character of the town and its historic high street – while delivering energy savings of 60% compared to the previous conventional street lighting.

Capabilities of lighting beyond illumination
Together with a range of strategic partners, Philips is constantly working on innovative, integrated lighting solutions to help build intelligent connected cities. Its collaboration with Ericsson to integrate 4G mobile cellular technology into LED street lighting poles is a case in point.

With city populations growing by 7,500 people per hour and mobile data traffic expected to grow tenfold by 2019, there is an increasing need for both sustainable lighting and enhanced mobile capacity and coverage in cities. The connected LED street lighting solution the company launched together with Ericsson addresses these requirements. It offers cities an innovative and affordable way to acquire next-generation energy-efficient LED lighting, thus helping them to provide safer, well-lit streets and achieve sustainability targets. At the same time it enables telecom network operators to offer improved city-wide mobile broadband and app coverage and to reduce urban clutter.

Pressing need for action
There are major challenges to be overcome, yet the prospect of safe, vibrant, eco-friendly cities is not beyond us. The intelligently connected, energy-efficient lighting solutions we need to help us reinvent the city are available, here and now – but we cannot afford to delay their implementation. The current rate of renovation of existing infrastructure based on outdated, inefficient technology is simply too slow.
Accelerating the market penetration of innovative new

technologies, products and services calls for, among other things, new business models that balance capital expenditure and operating expense. Increasingly, Philips is seeing city authorities turn to its 'Lighting as a Service' (LaaS) model. This can be structured in different ways, depending on a city's needs, but typically it involves Philips making the upfront investment in deploying the new street lighting infrastructure. The authority then pays a 'fee per light point per month' which is financed out of the savings in reduced energy and maintenance costs made possible by the CityTouch LED-based system. Think of it as 'pay-as-you-go' city street lighting. Typically at the end of the term, the city then owns the infrastructure outright.
Looking ahead

Philips was founded in Eindhoven in 1891 by Frederik and Gerard Philips – later joined by Gerard's brother Anton – to "manufacture incandescent lamps and other electrical products." For the 120-plus years since then, this Dutch-headquartered company has been enhancing people's lives with a steady flow of ground-breaking innovations. And it is determined to build upon this rich heritage by continuing to deliver the smart, energy-efficient lighting solutions that will help create the sustainable, liveable cities that future generations deserve.

Text: Neil Pattie, Head of External Communications, Philips Lighting

Bouwmanagement
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Onafhankelijk

Dankzij volledige onafhankelijkheid kan DVP haar opdrachtgevers zowel in het bedrijfsleven, als bij de overheid en in de zorgsector optimaal adviseren. Immers, zonder binding met andere belanghebbenden bij uw project worden conflicterende belangen vermeden.

Betrokken

Gemeende betrokkenheid is een absolute voorwaarde voor een goed gestructureerd en rendabel bouwproject. DVP biedt verschillende contractvormen, waarbij u de verantwoordelijkheid en aansprakelijkheid geheel of gedeeltelijk bij DVP kunt outsourcen.

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DVP beschikt over een brede ervaring, opgebouwd in tientallen jaren, op het gebied van bouwmanagement, vastgoedadvies, ontwikkelingsmanagement, huisvestingsmanagement en bouwkostenadvies.

Daadkrachtig

Het ondernemende karakter, ons doorzettingsvermogen en de aanwezigheid van professionele kennis zorgt ervoor dat onze adviseurs namens u daadkrachtig op zullen treden. Hierdoor weet u als opdrachtgever altijd waar u aan toe bent en wordt in samenwerking met u het proces bewaakt.

Kijk op www.dvp.nl of bel dhr. Diepenhorst 088 - 01 06 800