OPEN ROOM 02

PERSPECTIVES ON

TECHNOLOGY IS THE *ANSWER*, BUT WHAT WAS THE *QUESTION?*

EDITOR: Walter Unterrainer and Anne Mette Boye

COLLECTED FROM:
Walter Unterrainer
Harald Ginzky
Peter Diamandis
&
35 participants

ARKITEKTSKOLEN AARHUS

OPEN ROOM

Will wireless networks and virtual worlds make us placeless, will robots destroy craftsmanship, can we solve climate change with more technology, have we become strangers in our own cities, and will exporting welfare architecture challenge our ethical position?

Although it is tempting to answer yes to these questions, it seems like we still need places, that robot technology could be a way to reinvent craftsmanship, that technology alone cannot solve climate change, that co-creation is gaining ground in urban development and that our welfare architecture might be capable of adapting to other cultures. The changes and trends seems ambiguous and they affect our built environment. From an architectural perspective the question is: how do we interact with these changes and how can we build in the future?

The Open Room seminars at Aarhus School of Architecture focus on selected current topics in society and provide interdisciplinary perspectives on the relation between trends and the role of architecture. The aim is to share knowledge, open up for new understandings and thereby obtain qualified and nuanced discussions and answers. It is a physical and mental open room where researchers and practicing architects and related disciplines meet and present their perspectives on a given topic. Involving a group of people with a broad range of professional backgrounds - philosophers, engineers, lawyers, organizational analysts, professors of pedagogy - the Open Room seminars create new approaches and a broader understanding of the selected topics. The seminars are always open to participants from outside the school. Together we listen, debate and reflect.

The book you are holding brings together contributions from the seminar on the relation between sustainability, technology and culture. It is for everyone who have an interest in the topic: builders, researchers, practicing architects, politicians, policy-makers or citizens in general who are interested in different perspectives on sustainability.

Anne Mette Boye
Editor OPEN ROOM

Editor OPEN ROOM:
Anne Mette Boye
Editor Technology is the answer, but what was the question:
Walter Unterrainer
Tryk: Arkitektskolens Trykkeri.

Layout: Oddfischlein and Aarhus School of Architecture
Publisher: Arkitektskolens Forlag
ISBN: 978-87-90979-56-0

dreyersfond

ARKITEKTSKOLEN AARHUS

CONTENT

TECHNOLOGY IS THE *ANSWER*, BUT WHAT WAS THE *QUESTION?*

Introduction: This publication documents an Open Room seminar held at Aarhus School of Architecture on 26 May 2015. The theme of the event was: Technology is the answer, but what was the question? The intention was to discuss the subject from different angles on very different scales.

The first contribution was the projected TED Talk "Abundance is our future" by Peter Diamandis. It addressed many global issues and with great optimism it proclaimed new technologies as the solution for the problems of mankind. In his lecture ´Climate engineering – effective climate protection or megalomania?´, Harald Ginzky, researcher at the Environmental Agency of Germany, discussed potential large-scale technological interventions in the climate system aimed at reducing global warming. Walter Unterrainer reflected on the contextual aspects of all technologies, criticizing technocentric as well as technophobe approaches, and called for wide ownership of technologies such as flood prevention technologies and technologies for providing sanitation in informal settlements.

The lectures are printed in shortened versions in this publication which also includes a summary of the vital discussion of the audience that took place after the presentations.

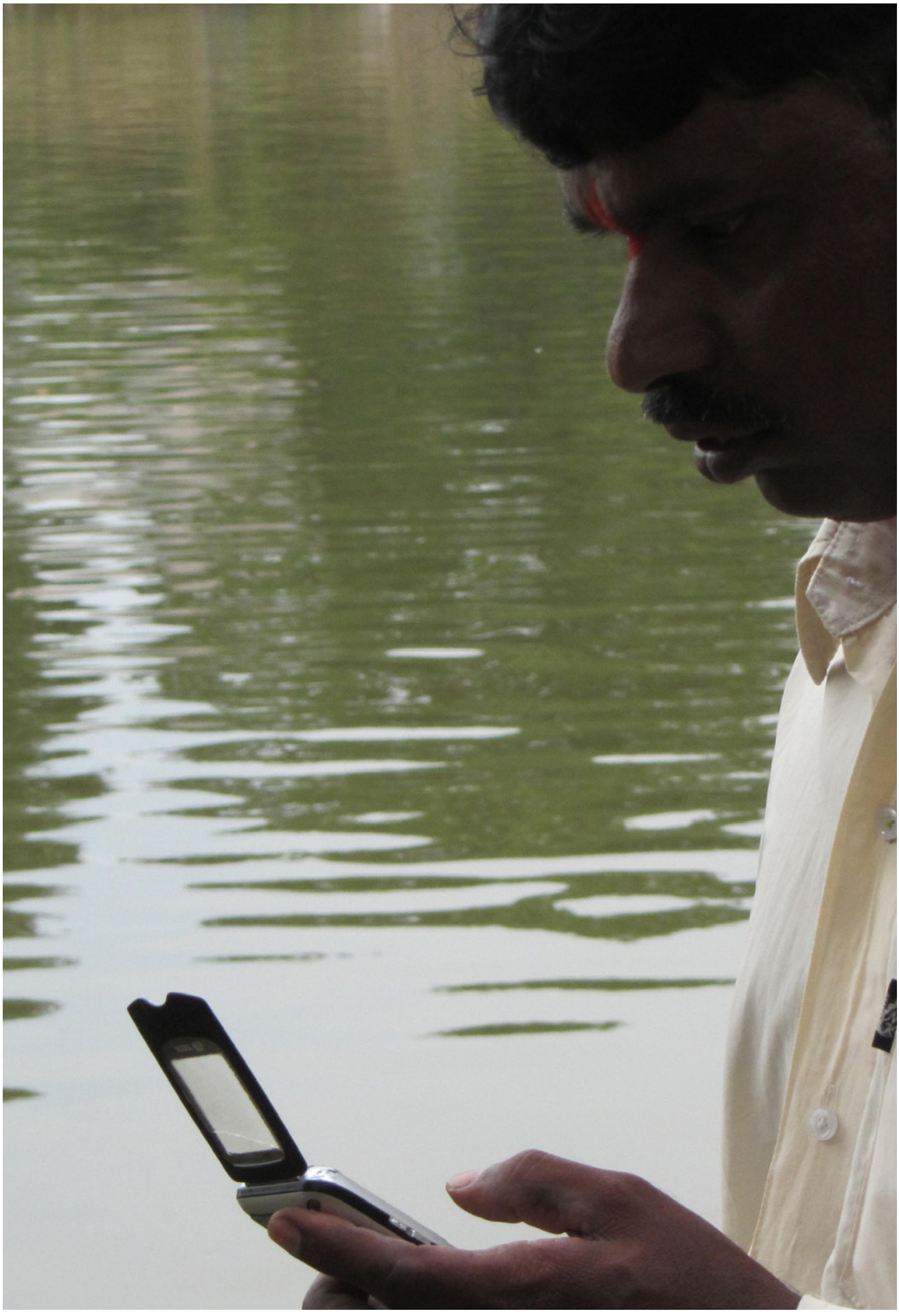
Walter Unterrainer
Professor in sustainable architecture at Aarhus School of Architecture and organizing the present Open Room seminar

TECHNOLOGY IS THE ANSWER
– BUT WHAT WAS THE QUESTION?

WALTER UNTERRAINER,
PROFESSOR MSO
IN SUSTAINABLE
ARCHITECTURE AT AARHUS
SCHOOL OF ARCHITECTURE

Whatever we do and wherever we are, we are surrounded by a multiplicity of technologies, and the last decades have seen an exponential application of new technologies. Who, for instance, would want to do without smartphones? It is a bizarre discrepancy: a slum dweller in India does not have access to proper sanitation and drinking water, but he has better communication tools than the president of the USA 20 years ago.

With one single tool we enjoy almost unlimited communication and direct access to the internet. We can locate every spot via GPS, take pictures and make movies with better and better cameras, and we profit from more and more features like medical checks or even life-saving devices. On the other hand, and without suffering from paranoia, the potential for permanent control of: our location, of who we are communicating with, what we write and say, of our shopping behaviour or of other lifestyle habits, need to be mentioned as well as the fact that our direct social contacts decreased in the decade of the smartphone. But are these only minor side effects which might be controllable, and advanced technologies are great and improve our life?



Indian farmer writing text message beside the polluted water of a lake

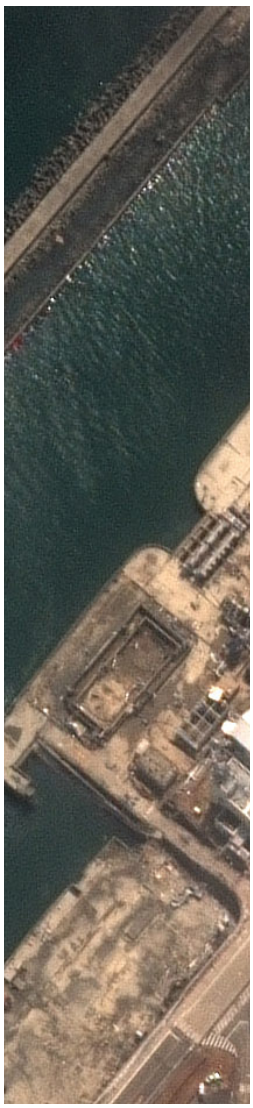
"ANYONE IN EUROPE WHO OPENS A SAUSAGE STAND ON A STREET NEEDS TO *PROVE CONTROL* OVER THE WHOLE PROCESS...IN LARGE INDUSTRIAL ´SEMI-TECHNOLOGIES´ MANY ASPECTS OF THE PROCESS ARE EITHER NOT SOLVED OR THE SOLUTIONS ARE AT LEAST *NOT TESTED* OVER A LONGER PERIOD OF TIME CONCERNING A MAXIMUM NUMBER OF POTENTIAL RISKS"

Without doubt, our generation will live longer than any generations before and medical technologies play an important role in this. It seems an even more bizarre irony that some technologies, like the GPS, which were originally developed by the military industrial complex for war and destruction, are helping to save lives in regions at peace. Does this mean that all technologies have the intrinsic potential ´to be good for everybody´?

The hammer as a tool is a technology developed over thousands of years and it is still being improved on by diversifying new shapes or combinations of shapes and by applying new materials to the head and the handle. With a hammer, we can both build a shelter and destroy it. In that sense, the technology is neutral; it is the user who decides. Every child knows how to use a hammer and understands what can be done with it and, in general, it will be educated to use the tool productively and not destructively.

That raises the question: how neutral are large industrial technologies such as nuclear, genetic or future potential climate engineering technologies? On one hand they all more or less plausibly promise a better life and the survival of more and more humans, on the other hand they are blamed for death, destruction and deprivation. So who to believe, the technophile scientist with his promises of a better world or the technophobe protester warning of doomsday in front of a laboratory?

If one definition of technology is ´the application of practical sciences to industry or commerce´, then it can be said that nuclear or genetic technologies are what I call ´semi-technologies´, meaning they are not developed to the end.



Anyone in Europe who opens a sausage stand on a street needs to prove control over the whole process, from location, safety, hygiene, to details of what happens with the garbage and the fat-containing wastewater. In sharp contrast, in large industrial ´semi-technologies´ many aspects of the process are either not solved or the solutions are at least not tested over a longer period of time concerning a maximum number of potential risks. To go back to the example with the hammer: it is only in fairy tales that a hammer can have a life of its own; in reality humans control hammers. In semi-technologies, there is neither full knowledge nor full control over the whole process and production cycle, meaning that unwanted processes can develop out of control with enormous destructive potentials. Knowing that the impact of any uncontrolled event in applying these large technologies is on a gigantic scale (and certainly higher than the destructive potential of all hammers on the planet) turns their technical implementation into an unacceptable risk for generations and therefore into an environmental crime, also in the legal sense.

Fukoshima reactor 3, still burning 8 months after the Tsunami

A short look at history will reveal important lessons of such a ´semi-technology´. In 1948 the chemist Paul Hermann Mueller received the Nobel Prize (in Medicine!) for the invention of DTT as an insecticide which was expected to eradicate diseases and hunger. Only 20 years later – between 1968 and 1972, DDT was banned in most European countries and in the USA for its devastating impact on biodiversity and its accumulation in human bodies and breast milk.

"...ON THE SMALLER SCALE OF THE BUILDING INDUSTRY, EVERY EXPERIENCED ARCHITECT CAN GIVE EXAMPLES OF BUILDING MATERIALS OR BUILDING TECHNOLOGIES WHICH WERE INTRODUCED TO THE MARKET WITH HIGH PROMISES BUT FAILED AFTER ONLY A SHORT PERIOD OF TIME, INCLUDING SOME SO-CALLED ´GREEN TECHNOLOGIES´ "

On the smaller scale of the building industry, every experienced architect can give examples of building materials or building technologies which were introduced to the market with high promises but failed after only a short period of time, including some so-called ´green technologies´. Failures that resulted in considerable damage. In contrast, there are plenty of examples of technological inventions in the construction sector which offered new possibilities for architecture and reduced harm to the environment or even started to repair environmental damages.

Any discussions between technophile beliefs in an uninterrupted and ideal technological progress on one hand and technophobe rejection of technology as the work of the devil (considering scientists in general to be corrupted) are not productive because they are missing essential questions as: In what context are scientific knowledge and technological solutions applied? How were their risks assessed and tested, with what consequences - and what strategies exist to mitigate these risks to a minimum? Who has ownership and control over the technologies? Who is responsible for the whole circle of application, who is liable? Finally: What does all this mean for research and education?

Illustrations

- Page 7: Photo Water Unterrainer
- Page 9: WWF: http://www.wwf.de/

ABUNDANCE IS OUR FUTURE!

TED TALK
BY
PETER DIAMANDIS
SUMMARY
BY WALTER UNTERRAINER

According to Peter Diamandis, every day the world is getting a better place to live due to exponential technological progress. The combination and connection of most advanced technologies with the capital of techno-philantropists like Bill Gates or Mark Zuckerberg would solve tremendous challenges such as water scarcity or clean energy. Despite a pile of encouraging data and Peter Diamandis´s personal positive charisma, the audience approached his messages about the ´resource liberating´ forces of technologies with strong scepticism.

He is a successful author and he is involved in countless activities for the promotion of private space tourism. In March 2014, Diamandis co-founded Human Longevity Inc., a genomics and cell therapy-based diagnostic and therapeutic company focused on extending the healthy human lifespan.

Peter Diamandis starts his lecture with a point very worthwhile to reflect on: by presenting examples of prevailing negative TV news and how our minds pay attention to bad news and catastrophes, he shows that this focus is an inherent mechanism to survival. But being confronted with a flood of negative information "it is no wonder that we are pessimistic and it´s no wonder that people think that the world is getting worse."

Showing many examples of progress by positive forces over the last century, which according to Diamandis are accelerating, he questions this perception of a negative downward spiral and predicts the potential of a world of abundance in the next three decades. ´Average life span has doubled, average income tripled, childhood mortality decreased by factor 10. Cost of food, electricity, transportation and communication has dropped ten to thousand fold´…´ Global literacy has gone up from 25% to over 80% over the last 130 years´… The poverty line is constantly changing: in the US most people under the poverty line still have toilets, refrigerators, TV and mobile phones´ – luxuries that former emperors could not have dreamt of.

"ABUNDANCE MEANS TAKING WHAT IS SCARCE AND MAKING IT ABUNDANT. SCARCITY IS CONTEXTUAL AND "TECHNOLOGY IS A RESOURCE-LIBERATING FORCE"

Much of this is "underpinned by exponential growth of technology". The curve of technological development constantly and smoothly went upwards with infinite computing, robotics, 3D printing, synthetic biology, digital medicine, etc. Abundance means creating a life of possibilities - a bunch of students starting up technology firms can have an impact on billions of people. Abundance means taking what is scarce and making it abundant. Scarcity is contextual and "technology is a resource-liberating force".

One example given is aluminium. From being a scarcer and more valuable metal than gold in the 19th century, we now use it with throwaway mentality – a result of the technologies of extraction. When we think about energy scarcity: we live on a planet based on 5,000 times more energy than we use in a year, "it is not about being scarce,

it about accessibility" and this changes, according to Peter Diamandis, with the falling costs of PV cells. "And if we have abundant energy, we also have abundant water": right now, "Slingshot´ technology in the size of a refrigerator is able to produce 1000 litres of clear drinking water a day out of literally any source: saltwater, polluted water, sewage - at less than 2 cents a litre". Coca Cola is testing hundreds of units over the world "and if it works out, Coca Cola will deploy it globally to 206 countries around the planet." We have seen this development with the cellphone penetration of 70% in the developing world. Technologies like GPS, HDV video, libraries of books and music,

medical diagnostic technology, dematerializing and demonetizing into our cell phones. In the near future the diagnosing abilities of our cellphones will be better than a team of doctors, revolutionizing health care in developing countries with little access to doctors.

The biggest force for a world of abundance: By 2020 there will be 3 billion more internet users on the planet that today. "3 billion new minds are connecting to the global conversation" using infinite computing, 3D-printing for being more productive than ever and therefore injecting trillions of dollars into the global economy. "These voices who never have been heard, which are oppressed can act for the first time ever."

"What gives me tremendous confidence in the future is the fact that we now are more empowered as individuals to take on the

great challenges of this planet, we have the tools with these exponential technologies, we have the passion of the DRY innovators, we have the capital of the techno-philanthropists, and we have 3 billion new minds coming up online to work with us, to solve the grand challenges and to do what we must do. We are in for an extraordinary decade."

"WHAT GIVES ME TREMENDOUS CONFIDENCE IN THE FUTURE IS THE FACT THAT WE NOW ARE MORE EMPOWERED AS INDIVIDUALS TO TAKE ON THE GREAT CHALLENGES OF THIS PLANET, WE HAVE THE TOOLS WITH THESE EXPONENTIAL TECHNOLOGIES, WE HAVE THE PASSION OF THE DIYO INNOVATORS, WE HAVE THE CAPITAL OF THE TECHNO-PHILANTHROPISTS"

Peter Diamandis seems to be the most optimistic person on our planet, certainly pointing out relevant opportunities. He simply seems to forget who is in control of these opportunities and who takes advantage of them. Including, for instance, censoring and simply switching off the internet when it was in favour of organizing positive change for people in many countries. He blurs who makes most profit out of technical inventions; often even by blocking their introduction, despite it being to the advantage of large groups of people. Why does technological progress turn countless millions of people to unemployment, when according to Peter Diamandis it should empower them and provide a brighter future? Why is the conflict between technological possibilities and environmental decline growing instead of diminishing? Coca Cola - a philanthropic saviour of global water scarcity?

The Open Room seminar audience wished it could share Peter Diamandis´s optimism.

Illustrations

- Page 14: http://diamandis.com/about

References

- www. https://www.ted.com/talks/peter_diamandis_abundance_is_our_future?language=da Recorded Feb 2012. Downloaded June 2015.

CLIMATE ENGINEERING
– EFFECTIVE CLIMATE PROTECTION OR MEGALOMANIA?

DR. HARALD GINZKY,
ENVIRONMENTAL AGENCY OF GERMANY
SUMMARY
BY WALTER UNTERRAINER

What is climate engineering and what are the pros and cons we need to consider? What are the discussions in the fields of science and politics on climate engineering, what are the laws, regulations and international governance concerning the contested subject?

Climate engineering is defined as ´large scale technical interventions in the climate system in order to limit climate change´. We may distinguish between two general categories of climate engineering:
The first is so-called solar radiation management. The basic idea behind this is to reduce or reflect incoming sunlight, thereby lowering the surface temperature of our planet

The second category is all about the idea of removing CO2 from the atmosphere in order to lower existing and future CO2 concentrations. As a greenhouse gas, CO2 leads to a rise in temperatures resulting in rising sea levels, melting glaciers and reduction of polar ice, high frequencies of climate extremes, including their effect on the biosphere as well as on the human environment.

Both proposals are theoretical and highly hypothetical. Their effects, risks, required economic efforts, etc. are not proven by intensive experiments. So far, none of them were deployed.

There are four different approaches to solar radiation management:
1. To modify the surface albedo, i.e. to increase reflection from the earth, for example by painting roofs white; by placing reflectors in the deserts or by growing crops with higher reflectivity (for instance certain types of corn). To achieve any effect we would be required to paint white huge surfaces on more or less all roofs. The risks are low, it is even a reversible intervention, but the costs, practicalities and effects are highly questionable.
2. To release aerosols into the stratosphere, i.e. to bring particles like sulphur etc. up to heights between 8km and 50km above the Earth's surface, thereby producing a reflecting cloud to reduce the amount of sunlight entering the atmosphere.
3. To increase the albedo/reflectivity of clouds by imbedding chemical dust directly into clouds.
4. By means of science fiction-like installations to reflect sunlight, consisting of many and enormous mirrors in outer space.

Could anyone imagine the costs, the resources needed (including energy) and the risks, especially from irreversible interventions?

In contrast to solar radiation management, terrestrial carbon dioxide capture aims at extracting CO2 from the atmosphere and storing it in closed and sealed underground cavities. This was strongly disputed in relation to the CO2 output of power stations, but the strategy is not feasible, at least in Germany, because of strong local resistance.

Another theoretical approach is to create ´negative emissions´. A combination of biomass production and carbon capture and storage. Crops are grown to sequestrate CO2 and subsequently burnt. The CO2 released by this combustion should be captured in a sealed underground cavity.

There are several theories about possible marine carbon dioxide removal techniques. The most discussed theories are ocean fertilization and liming of oceans. Both have in common that they add chemical substances to sea water in the hope that, due to the additional nutrients or lime, the sea will uptake and store more CO2. On this subject, certain experiments have been conducted – ocean fertilization is considered the ´most advanced´ technique of climate engineering. Nevertheless, there are large risks and lack of knowledge, mainly about ´side effects´ like the impact on marine life.

Another scenario is to grow crops and dump them on the bottom of the sea. No direct fertilizing mechanism affects the sea, the deep sea is considered as a storage space.

Ocean fertilization means adding nutrients to the water and consequently increasing the growth of algae that bind CO2. When the algae die, they sink to the bottom of the sea and store the CO2 there. Deploying this technology requires continuous fertilization of the oceans. Theoretically one gigaton of CO2 could be sequestrated per year, which is about 10% of the CO2 output, to give an indication of the relation between effectivity and risk.

In sharp contrast to geo-engineering, traditional strategies against climate change are mitigation and adaptation. Mitigation reduces CO2 emissions; adaptation means preparedness, for instance by increasing dikes to protect against sea level rises and building more resilient human environments. Climate engineering is a new idea and does not reduce pollution but responds by direct intervention into the climate. Therefore it is often called an ´end of pipe strategy´.

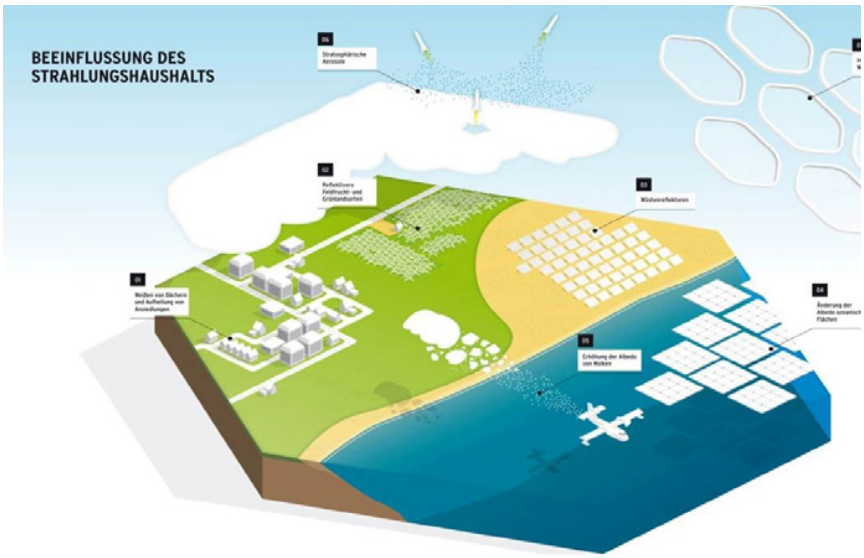
There are different dimensions of risks, but in general they are gigantic. The proarguments of the proponents:

- It is an alternative to traditional climate change policy.
- It might be cheaper and easier to carry out.
- It is possible to implement it unilaterally, one state could decide to take action, assuming that no international agreements are needed.

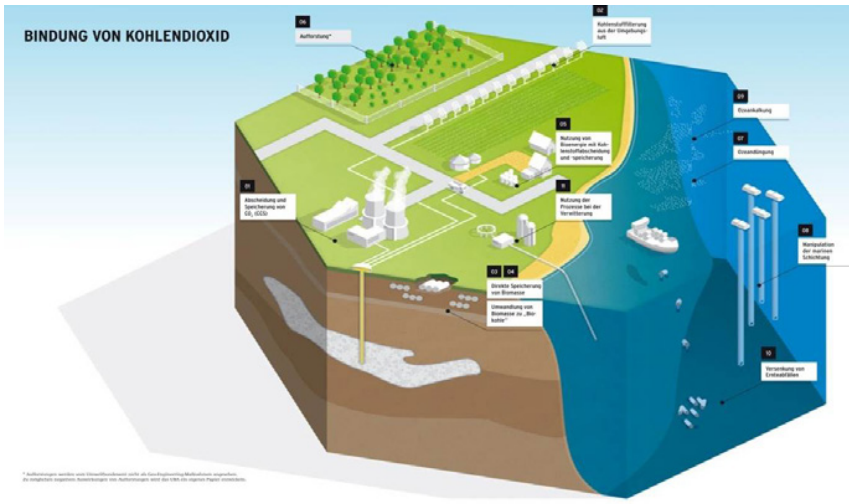
And there is the ´Plan B argument´ assuming that everything else fails, when no agreement or activities of effective climate change policies are implemented and there is no sufficient CO2 mitigation. It would be an ultimate escape. Some scientists insinuate that we would need solar radiation management in any case, because we have already raised the level of CO2 too much and are endangering countless settlements by rises in sea levels. The conarguments of the opponents:

- The effectivity of all these measures has not been proven and there are two dimensions of risks: we create new climates, which is extremely complex, because we create new regional climates. Some regions might experience more draughts and even desertification, which is dramatic for people and countries. Conflicts and wars would be inevitable as a result of unilateral deployment.
- No one can predict the possible detrimental effects to surroun-

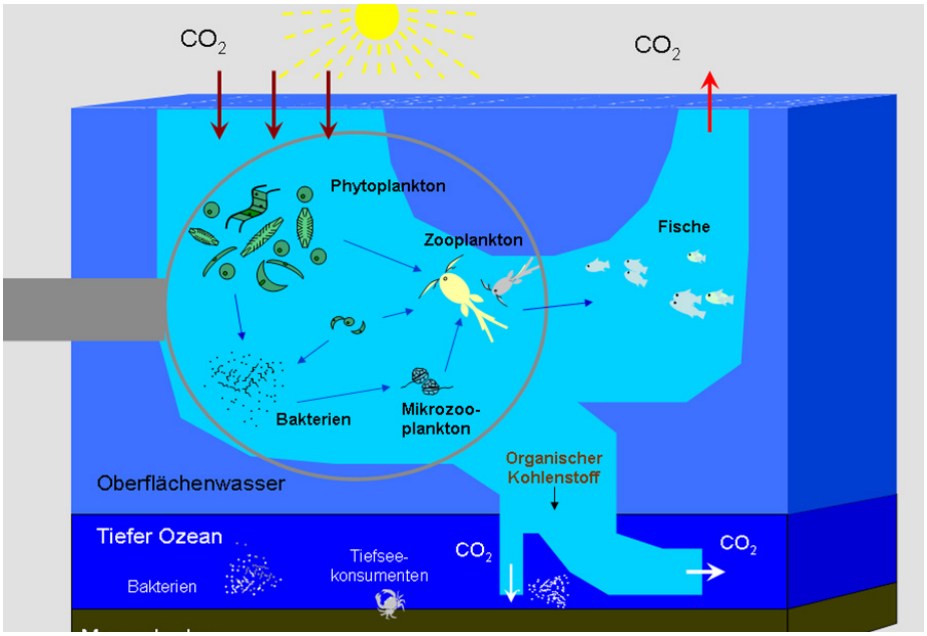
Solar radiation management



Carbon dioxide removal



Ocean fertilization



ding environments, and complex side effects could even be caused by field experiments. Another negative effect of solar radiation management is that the amount of emitted CO2 would not be reduced, only the incoming sunlight. That means less radiation but more and more CO2, which, in consequence, means solar radiation management must go on forever

- A major counterargument against starting to think about climate engineering: it would make it seem a ´realistic´ option not to mitigate CO2 or to start adapting to the effects of climate change
- And there is the ´slippery slope argument´: if large-scale research in climate engineering is allowed, this might create a situation where research slips into deployment.

What happens in the field of science?

Several comprehensive studies in the UK and Germany were undertaken and, in August 2014, a conference was organized by the Institute of Advanced Sustainability Studies, IASS, in Potsdam.

Up to now, field experiments were limited to ocean fertilization. In the UK, the so called SPICE project on solar radiation management failed because there was a conflict concerning the patterns of methodology.

What are the political discussions?

- The position of Germany is clearly in favour of mitigation and adaptation and it opposes any deployment of climate engineering measures, whereas in the US and in the UK some openness towards large scale technical solutions can be seen.
- The report of IPCC (International Panel for Climate Change) mentions climate engineering but does not produce a clear statement. There are considerations on the ´negative emission approach´.
- Climate engineering is not a topic at this year´s upcoming climate conference in Paris.
- Background document of German Federal Environmental Agency 2011
- The German Federal Environmental Agency (UBA) has 1300 employees (meteorologists, mathematicians, lawyers, economists, philosophers, etc.) and works interdisciplinarily. It is located in Dessau. The agency has two main tasks: to provide science-based advice to the Ministry of Environment and to inform the public.

- UBA makes a strict recommendation to focus on CO2 mitigation and climate adaptation and it opposes a shift in international climate change politics.
- Deployment of climate engineering must be prohibited according UBA because of insufficient knowledge and the gigantic risks.
- Research in climate engineering is acceptable for two reasons: the fundamental and constitutional right of freedom of research and the ´Plan B argument´, but all research must be regulated and controlled to avoid negative effects on the environment.

What matters are at stake within research?
Harald Ginzky gave an overview of the complexity of legal matters and intergovernmental control mechanisms by internationally accepted institutions are very complex:

- One relevant issue was how to distinguish research from deployment.
- Accepted research must generate added knowledge, apply suitable scientific methods and must be peer reviewed. The project design must not be influenced by economic interests, and research requires a commitment to publish its results.

These criteria for research were agreed by international law. It became obvious, that further international agreements are difficult and take, at best, a long time to achieve.

Illustrations

· Page 19: Environmental Agency of Germany

´OWNERSHIP´ VERSUS ´SMARTNESS´ OF TECHNOLOGIES

THREE EXAMPLES OF INTEGRATIVE VERSUS TECHNOCRATIC APPROACHES TO A SPATIAL CHALLENGE

WALTER UNTERRAINER,
MSO PROFESSOR IN SUSTAINABILITY
AARHUS SCHOOL OF ARCHITECTURE

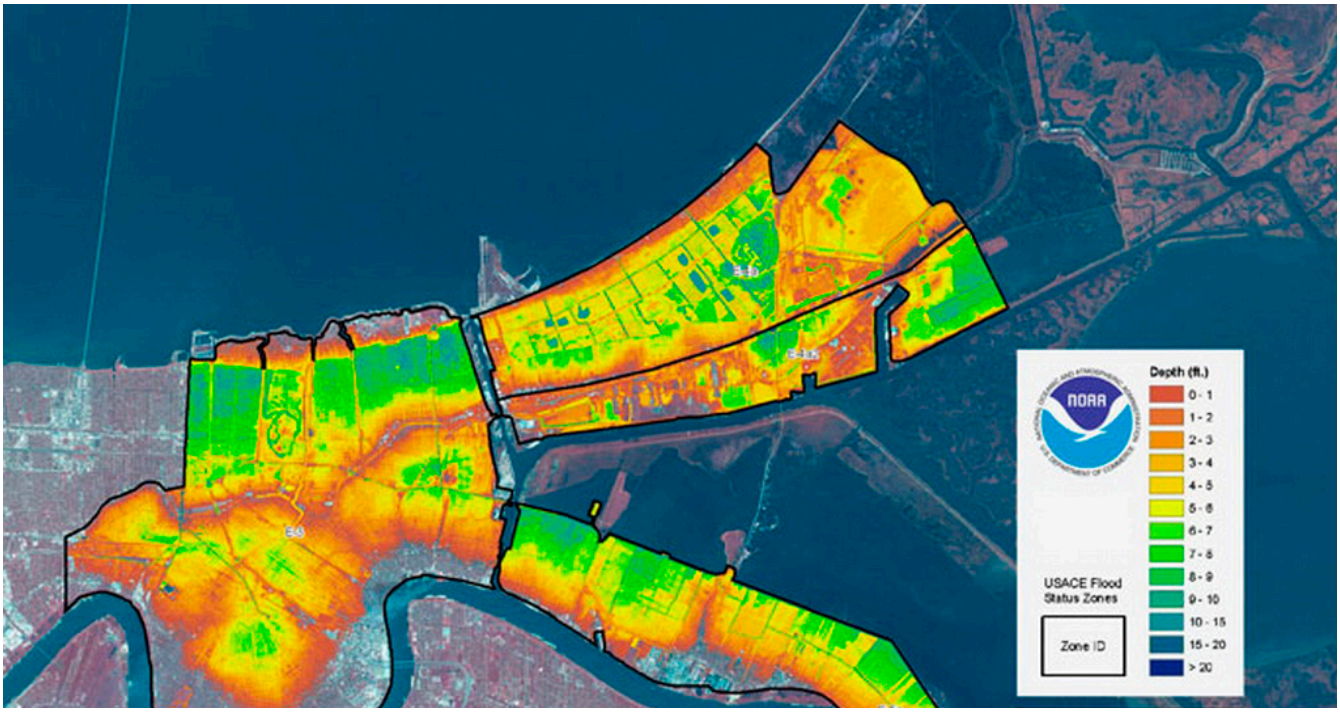
What have the dam failures in New Orleans with hurricane Katrina, abandoned public toilets in Mumbai and the (mis-)use of Le Corbusier´s concrete sun shadings in Chandigarh as shelfs for air conditioning machines in common? What could be the role of collective intelligence based on historic experience to solve spatial problems?

New Orleans after Katrina, an extreme storm, a ´monster storm´: US Universities have simulated that even if Katrina had only had half its strength it would have resulted in the same area of flooding. After 1960, people were building settlements in areas in which, over 150 years, it had been considered crazy to live - relying only on dams which were built up to four meters high.

When the dams were built it was not taken into account that the ground of the swampy coastline is sinking between 6 to 35 mm every year. So when Katrina happened, the dams were effectively up to one meter shorter in relation to the sea level, compared to when they were built. The dams were built using the most ´advanced´ technology from

Concrete dam in New Orleans

high tech concrete, developed and constructed in collaboration with the US army. And this generated another serious problem: all building materials corrode and all buildings need maintenance. Special technologies can only be maintained by specialists, and this is expensive, so there is a general tendency to postpone maintenance again



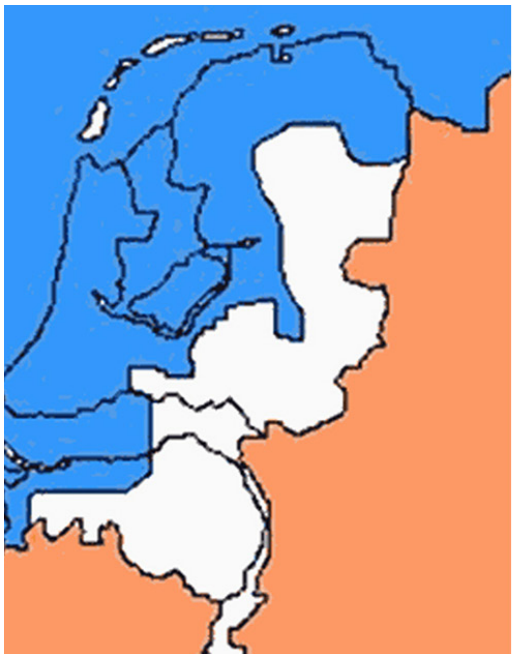
Map of New Orleans. The green, yellow and orange areas were not settled before the 1960s.

and again. When Katrina came, it was too late and the dams broke and also collapsed due to undermining of their foundations. Large areas were flooded, resulting in 1836 deaths and enormous destruction.
This example might illustrate that it is a bad idea to rely on technology; this is not necessarily the case: in the Netherlands, without the technologies of dams and other water fortifications, two thirds of the country - including 12 million people - would be under water. But there are decisive differences to New Orleans: The Dutch have long experience building dams and they started reclaiming land from the sea in the Middle Ages, at the time using windmills for pumping water. Nevertheless, in February 1953, there was a catastrophic event when an extreme winter storm in rare combination with a spring tide resulted in an over-night water rise of 5.5 metres, with the effect of 1800 deaths and huge destruction. Shortly after that event, the so-called ´Delta Commission´ and the ´Delta Plan´ were installed and also new dams were built. The difference to the concrete walls of New Orleans was that they were built with the experience of centuries. And

THE PEOPLE HAVE OWNERSHIP OF THE TECHNOLOGIES AND PEOPLE ARE PART OF THE CONTROL AND NEVER-ENDING MAINTENANCE. THIS IS THE CRUCIAL DIFFERENCE TO TECHNOCRATIC PROTECTION SYSTEMS

they did not rely on dams alone, which are never 100% watertight; they connected dams with other topographic solutions and drainage systems. But most important: their dams were built with materials found on site, like sand and earth, by a local workforce.

Every farmer knows how to build a dam and every Dutch child learns to understand that the country depends on these constructions and how to observe them and to be aware of irregularities. The people have ownership of the technologies and people are part of the control and never-ending maintenance. This is the crucial difference to technocratic protection systems – in Holland agricultural productive land and beautiful landscapes for tourism are also created. It is well understandable why the Dutch have the saying that ´God created the earth but the Dutch created Holland´.



Map of the Netherlands Without dams and polderand dikes, the country would only cover the white surface

Agricultural landscape in Holland with dams and polder dikes

Making sanitation

A second example is the global problem of sanitation. According to WHO, 2.6 billion people live without proper sanitation. In India alone, this results in 800,000 fatalities from diarrhoea every year, most of the victims being below 5 years old. This is a humanitarian scandal.

There are historic similarities to the situation in European cities: big outbreaks of cholera in 1832 and 1854 lead to evidence by John Snow (a medical doctor in Soho) that the cause of the disease was polluted drinking water. It took more than 20 years and many thousands more dead people until the elites accepted Snow´s theory – maybe a parallel to how, nowadays, scientific evidence of environmental risks is handled by many politicians. Finally, the city started building sewage systems, removing faeces from the urban water fountains. The upcoming water closets were a technological and hygienic step forward, with the paradox that, for the sake of clean drinking water, drinking water was deliberately mixed with faeces in order to flush it into a distant river and much later into sewage treatment plants.

Due to the obvious lack of space and financial resources, individual toilets are not a short-term solution in countless informal settlements, where, like in Dharavi/Mumbai, an average of six persons share a space of 12-15 m2. Jockim Arputham, the UN representative of slum dwellers, started a lecture by saying "architects don´t know how to design a toilet." He proved his provocative statement by presenting non-usable communal toilets designed in a technocratic way, badly lit and badly ventilated, smelly, dirty and unhygienic places lacking water for cleaning. They were settled by stray dogs rather than being us-

Terrace of the apartment of the toilet responsible

A space in Dharavi/ Mumbai 2013

"COMMUNITY-DESIGNED TOILETS, WHICH WERE NOT ONLY LITERALLY THE CLEANEST AREAS IN THIS OVER-POPULATED URBAN HYBRID, BUT ALSO MEETING PLACES AND INFORMATION HUBS FOR DWELLERS"

Clean community-designed toilet in Dharavi

"THIS COULD BE AN ENCOURAGING EXAMPLE FOR US TO ´REINVENT´ SANITATION AND TO QUESTION HOW WE MIGHT TURN TABOOED ´HUMAN WASTE´ AND FAECES INTO A RESOURCE FOR GROWING FOOD AND ENERGY-PRODUCTION"

eful to humans. In contrast, the author of this article had joined study trips to community-designed toilets, which were not only literally the cleanest areas in this overpopulated urban hybrid, but also meeting places and information hubs for dwellers. The community collectively decided the location and the conditions of the toilets. Well ventilated with a lot of daylight, huge rainwater tanks for cleaning, separate toilets for men and women. But first and foremost: from a small monthly fee paid by all community members, a toilet cleaner is paid to live with his family on top of the toilet.

This family has a privileged and generous apartment, even with the luxury of a large terrace in this extremely dense settlement. The only access to this flat is from the inner courtyard of the toilet, meaning the family would never get any visitors and lose all social contacts if this access were dirty or the place were smelly because of lack of cleaning efforts. Building large tanks and water collecting technology was applied, but all this would not work without this spatial concept that leads to immediate responsibility and without the context of communal ownership.

This could be an encouraging example for us to ´reinvent´ sanitation and to question how we might turn tabooed ´human waste´ and faeces into a resource for growing food and energy production, establishing a new type of ´nutrient cycle´ without risking hygiene or endangering the quality of scarcer drinking water.

Cooling the air

Do we need machinery and air-condition for cooling or heating every room to provide thermal comfort? How come supposedly climate-responsive shading elements turned into caricatural shelfs for air conditioning in famous buildings such as Le Corbusier´s Chandigarh?

30 A common scene in many cities: Chandigarh Secretariat Building, each room has an AC machinery. Le Corbusier, 1953

Villa Rotonda, Vicenza

Cool air inlet for cross ventilation below external stairs with openings to counter heat accumulation. Andrea Palladio, 1592

IS IT A SMART AND SUSTAINABLE PERSPECTIVE TO GO FOR MORE AND MORE, MORE EXPENSIVE, MORE COMPLEX AND VULNERABLE TECHNOLOGIES? OR IS IT BETTER TO STRIVE FOR PASSIVE TECHNOLOGIES IN THE CONTEXT OF APPROPRIATE DESIGN WHICH IS UNDERSTOOD, WELL-LIKED, MANAGEABLE AND CONTROLLED BY ITS USERS?

Both questions have to do with ignorance of the lessons of historic architecture, which itself was based on understanding the comfort of vernacular buildings. In climate zones like Chandigarh, the shading of single glazed openings is needed, but it is not enough; it is also necessary to prevent the accumulation of hot air and heat radiation from outside the opening which is a result of the solar-heated thermal mass of the concrete elements.

In Palladian villas in renaissance Italy, the representative spatial effects of domes were connected with the comfort requirements of these rich villa owners. Sophisticated airstreams and cross-ventilation systems and controlled air entries were carefully designed down to detail so hot air could ´escape´, thus avoiding hotspots outside openings in hot warm climates. Palladio did not invent these principles; he was studying them in vernacular Italian architecture. Again, there is still a lot for us to learn from vernacular and historic architecture by simultaneously avoiding romantic or decontextualized banal copies of the past.

The question is: How ´smart´ are so called ´smart buildings´ in reality? Is it a smart and sustainable perspective to go for more and more, more expensive, more complex and vulnerable technologies? Or is it better to strive for passive technologies in the context of appropriate design which is understood, well-liked, manageable and controlled by its users?

Illustrations

- Page 23: Photo: Walter Unterrainer
- Page 24: Map New Orleans: http://www.noaanews.noaa.gov/stories2005/images/katrina-flood-depth-estimation-09-03-2005.jpg
- Page 25: Map Netherlands: http://www.ifh.uni-karlsruhe.de/events/nl-99/berichte/05/Holland_ohne_Deiche_gro%C3%9F.gif
- Page 27-29: Photos: Walter Unterrainer

SHORT SUMMARY OF THE DISCUSSION BY WALTER UNTERRAINER

The participants in the Open Room seminar engaged in a vivid discussion of the subject on two levels:

- How are architecture, technology and sustainability connected in a general way?

-What is the role of technology in architectural education?

One focus of the discussion was the role of aesthetics in the transformation to a lifestyle which is more in balance with the environment on the urban and on the building scale.

Over the last decades, technologies have reduced the energy consumption of apartments by 40% per m2, while the total energy consumption is still the same or has even increased as a result of the size of apartments, which has increased by 40% or more. So how can we convince or ´seduce´ people to ´be happy´ with less space? How can we raise the quality of spaces and the quality of life by simultaneously reducing the quantity of products and the quantity of non-renewable resources needed? Camilla Fabricius, a politician from Aarhus Municipality and Chairman of the Technical Committeel stated that Aarhus Municipality are making efforts to attract people to live in the citycenter. It is consequently very relevant to offer them good houses, good schools, green spaces, easy transport and local infrastructure for a more resource-conscious lifestyle compared to suburbia: “It is not that difficult to convince people to have smaller homes if it gives them liveability, when they have cheap and easy transport, when they don´t need a car,

when they have good schools. Then they will accept fewer square meters. You can see that at the Aarhus harbour area … ”

Another participant in the discussion talked about an experience of a study trip to Frankfurt, where his office visited two very different housing projects: one with a lot of green, old trees in the courtyard and green walls, where the inhabitants said they liked to stay in the apartment and enjoy the environment. And another estate with a lot of photovoltaics on roofs and walls but no recreational spaces, the electricity surplus produced on site was used for powering electric cars. So they lived in a ´technical´ environment separated from nature, but technology gave them the opportunity to go to nature using renewable energy.

During the discussion it became clear that developing positions on these subjects was more relevant for architects than focusing on sophisticated building technologies.

In this context, there were contributions about ethics, about what it means to be ´meaningful´ in design, on how to raise and support awareness, and on who decides, who evaluates, the consequences of technologies and ideas such as climate engineering.

Harald Ginzky underlined the importance of ´weighing arguments: “We looked at the knowledge we had and we, as an agency, decided the knowledge was not sufficient for deployment, not when it comes to efficiency or risks, so we made a clear recommendation against deploying. ´But we also said, research, yes, because maybe we need a Plan B…But this is about controlled research … ´ One key problem of climate engineering, apart from lack of knowledge and doubts about whether the scale of the technology can ever be controlled: it promises an escape-from climate change without a need for changing environmental behaviour.”

One participant demonstrated that the same lack of systemic thinking on a large scale, for instance introducing more CO2 into the ocean but not asking how this affects the fish, occurs on the building scale: “Engineers minimize energy consumption but ignore overheating and other aspects ... systemic thinking is difficult, but cannot be avoided, this is an important key.”

Several participants advocated ´ownership´ of technologies, “You cannot change current practice without people having ownership.” Another participant interposed that in smart buildings “a display stands between me and another person or an assignment, so I am not directly in connection with the surroundings and I feel we lose something ... this something is consciousness.” It was considered not good enough to come up with a good idea, such as garbage separation or the design of an appropriate system, a conscious strategy of implementation is needed, a strategy for convincing people, for removing their doubts. Implementation should be one aspect and it should be integral to the design – otherwise even the best ideas will never work.

The discussion on the role of technology, and particularly of IT, in architectural education was controversial but, nevertheless, contributed many relevant facets.

There was a consensus that students of architecture should obviously learn to understand the impact of their design on user comfort and on the environment, and that a stronger collaboration between architects and engineers is needed also on the educational level. The question was how much of the subject students of architecture need to understand, or are even capable of understanding when it comes to simulations and how deep they go into simulation tools. It was advocated that there is not only one type of architect and that, for the less artistic students, climate design might open up new fields of activities in architectural offices.

OPEN ROOM PUBLICATIONS

OPEN ROOM 01
MODERNE ARBEJDSRUM
– FRIHED VS. FRIKTION?

OPEN ROOM 02
TECHNOLOGY IS THE ANSWER,
BUT WHAT IS THE QUESTION

OPEN ROOM 03
DIGITAL FABRICATION I
FREMTIDENS ARKITEKTUR

OPEN ROOM 04
KAN BYGGET VELFÆRD
EKSPORTERES?

OPEN ROOM 05
SKAB BYEN SAMMEN

OPEN ROOM 02

The publication is a documentation of an Open Room seminar at the Aarhus School of Architecture. The seminar are discussing the relation between technology and architecture as reactions to improve sustainability life quality, but at the constant risk of the negative effects and effectively less sustainability.

ISBN: 978-87-90979-56-0

ARKITEKTSKOLENS FORLAG