THESES

FOR THE CONSTRUCTION AND REAL ESTATE SECTOR

IN THEYEAR 2030

DREES & SOMMER



THESIS 01

Al and Robotics – Artificial intelligence and the use of robot systems will be a normal part of our everyday lives. Intelligent machines will support all stages of our work, from financing and planning to the building site.

THESIS 02

Click and deliver – It will not only be possible to configure buildings individually and experience them in virtual form even during the planning phase, it will also be easy to order them online.

THESIS 03

Modular, climate-neutral and recyclable – Buildings will be constructed industrially according to the Cradle to Cradle design principle. New tools will enable the whole product lifecycle to be presented digitally.

THESIS 04

Multiple use and convertibility – Individual buildings, districts and whole towns and cities will be versatile and adaptable, which will lead to new digital business models. The sharing economy will also prevail in the construction and real estate sector.

THESIS 05

Open Source Building Cadastre – Buildings will have freely available digital files containing their data – which will put an end to wasted data.

THESIS 06

Self-Organized Property Management – In 2030 we will see the first buildings which manage themselves. On the basis of Blockchain technology, facility management and financial services can be organized decentrally and securely.

THESIS 07

Economy of Things and Smart City – Buildings, neighborhoods and infrastructure will communicate constantly with each other. Networked cities, self-controlling buildings and smart infrastructure will make up the City 4.o.

THESIS 08

Performance-as-a-Service contract – The agreed performance will be the crucial element in a rental contract. What counts is a sense of wellbeing, urban quality and sustainability on the basis of the ESG criteria. Monitoring will ensure full transparency and measurability.

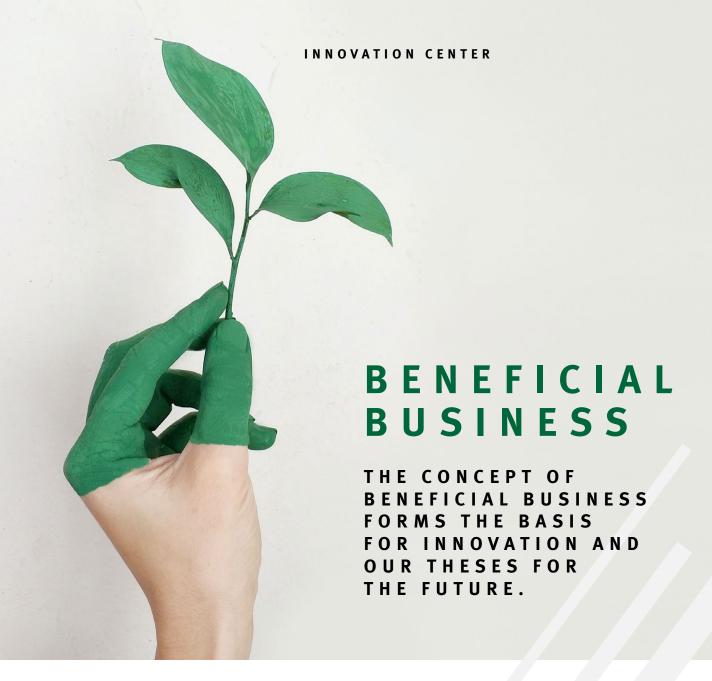
THESIS 09

IoT and Big Data – The Internet of Things (IoT) and digital technologies will create data-driven digital business models. In 2030, asset managers will be tech entrepreneurs.

THESIS 10

Everything remains different – Developments will arise which we cannot yet foresee, and to some extent they will still be unknown even in 2030.





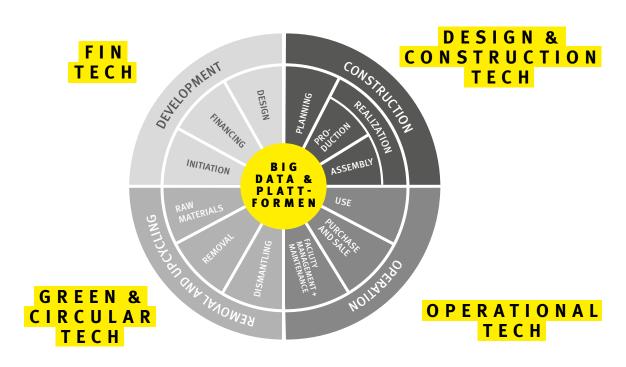
Planting trees and basing our work on sustainable development goals is only the beginning. Beneficial business goes a step further. A company which is beneficial has internalized the topic of sustainability — it does not merely talk about it, the company itself is sustainable.

Business success in 'beneficial companies' does not come at the expense of the environment, it benefits the environment. 'Beneficial companies' do not achieve profitability in spite of their sustainability policies. They are profitable because of them.

Digital, climate-positive and socially involved: these factors form the basis for the following ten theses for the construction and real estate sector in the year 2030.

COMPANY TECH

CITY TECH





BIG DATA AND PLATFORMS ADD NEW TECHNOLOGICAL CONCEPTS TO EXTEND THE TRADITIONAL LIFECYCLE OF BUILDINGS WITH THE PHASES OF DEVELOPMENT, CONSTRUCTION, OPERATION AND REMOVAL/UPCYCLING. THIS WILL GIVE RISE TO INNOVATIVE CLUSTERS WHICH CAN ALREADY BE RECOGNIZED.

IT ALSO MEANS THAT IN 2030 WE WILL BE FACED WITH COMPLETELY NEW CHALLENGES AND REQUIRE-MENTS IN THE CONSTRUCTION AND REAL ESTATE WORLD - AND THIS WILL ALSO AFFECT THE NATURE OF WORK AND THE TASKS WHICH MUST BE UNDERTAKEN.



AI AND ROBOTICS - ARTIFICIAL INTELLIGENCE AND THE USE OF ROBOT SYSTEMS WILL BE A NORMAL PART OF OUR EVERYDAY LIVES. INTELLIGENT MACHINES WILL SUPPORT ALL STAGES OF OUR WORK, FROM FINANCING AND PLANNING TO THE BUILDING SITE.

This will also make the construction and real estate sector significantly more productive, irrespective of whether the buildings are high-tech or low-tech. Even in 2030, we humans will still make our own decisions. However, intelligent data processing systems will support us in various processes – from financing and planning through to the building site. Al will learn from existing plans and revolutionize the planning process. Calculating the ideal shape and volume of a building for an empty city center plot, or the perfect ventilation or sprinkler grid for a building – these are examples of where Al will carry out planning tasks for us in the future. The human contribution will change. We will still develop new ideas, and even do so to a greater

THE PROGRESS IN
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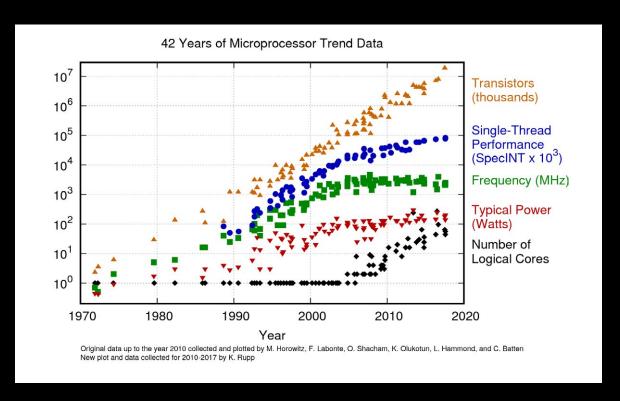
extent, and we will improve computer planning further — in what could be called human-aided computer design. Real robots will support the workers on the building site by performing specific activities for them.

Everyday work will change drastically. People will focus on new fields of work, whereas AI technologies and robots will support them by carrying out conventional tasks.



IS AI REALLY COMING?

According to Moore's Law, the number of transistors on a microchip doubles about every two years. This means that it grows exponentially.



THE TOP 15 EMERGING JOBS OF THE YEAR 2020 (ACCORDING TO LINKEDIN):

- 1. ARTIFICIAL INTELLIGENCE (AI) SPECIALIST
- 2. SITE RELIABILITY ENGINEER
- 3. CUSTOMER SUCCESS SPECIALIST
- 4. DATA PROTECTION OFFICER
- 5. HUMAN RESOURCES PARTNER
- 6. DATA CONSULTANT
- 7. DATA ENGINEER
- 8. DATA SCIENTIST

- 9. CYBERSECURITY SPECIALIST
- 10. DEVOPS ENGINEER
- 11. CHIEF DIGITAL OFFICER
- 12. UNITY DEVELOPER
- 13. PRODUCT MANAGER DIGITAL
- 14. AGILE COACH
- 15. SALESFORCE CONSULTANT

Most of the jobs on the 2020 list of trend jobs have a strong digital connection. In fact, AI specialist is at the top of the list. But when will Artificial Intelligence really arrive? What does it involve? The technical conditions are already fulfilled. Now, AI especially needs one thing: data.





THESIS 02

CLICK AND DELIVERIT WILL NOT ONLY
BE POSSIBLE TO CONFIGURE BUILDINGS
INDIVIDUALLY AND
EXPERIENCE THEM IN
VIRTUAL FORM EVEN
DURING THE PLANNING
PHASE, IT WILL ALSO
BE EASY TO ORDER
THEM ONLINE.

Just a few clicks, and the new building will be configured and ordered online. What is already an established practice when ordering cars or sneakers will also be possible in 2030 in the construction and real estate sector.

This not only applies to terraced houses or simple module buildings, even schools or whole urban districts for residential or mixed use can then be completely and flexibly designed and individually configured online. The focus will be on the needs and requirements of the people involved. So the building will be determined by its users — and not the other way round.

Users can call up a tailor-made library of prefabricated high quality modules to compile the exact building that they want. It is also possible to begin with free planning of the building and later transform it into modules. Modular planning can be supplemented by individually planned and completely customized areas. The present limitations of possible modules and configurations will no longer apply. Visually, the configured building will impress with its architectural elegance instead of the visible modules. The quality will be far superior to conventional buildings. A virtual viewing of the planned building — according to the 2030 standard — will round off the service.

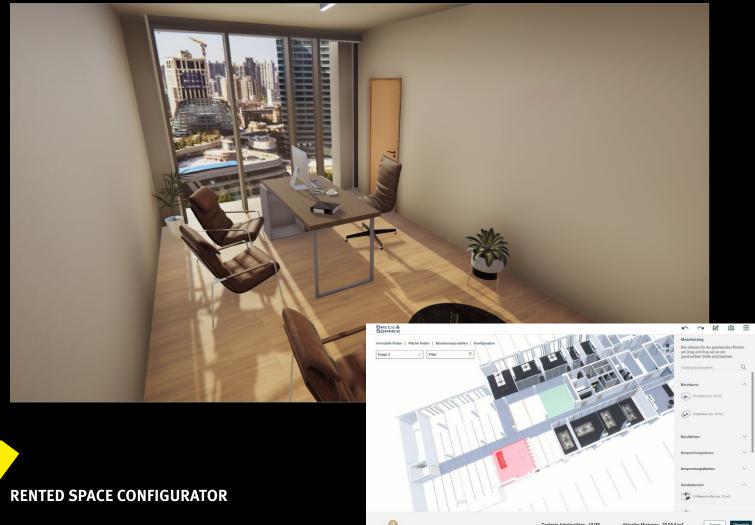
What today is a complicated, expensive and time-consuming process can be easily carried out online in 2030. The planning will be of a high quality with an efficient use of time, closely based on the users' requirements and their wishes.

Individuality and flexibility will apply where necessary, and standard forms and modules will be used where they are sensible: modularization therefore offers the best of both worlds.

This will also affect the work involved. In future, architects and planners will focus more on Artificial Intelligence and integrate it into their work.

WHAT YOU SEE IS WHAT YOU GET. THE USE OF ARTIFICIAL INTELLIGENCE AND CONFIGURATORS IS A FORWARD-LOOKING PROCESS INNOVATION.





This goal, which is still very much in the future for buildings or whole districts, is (almost) an established practice in the design of rented areas.

The individual fit-out wishes of tenants sometimes make the letting of office space into a very complicated, expensive and time-consuming process. This requires both a high level of planning and cost certainty and fast and efficient processing.

Landlords will be able to present their premises to their clients attractively and in three dimensions in a virtual viewing. The potential tenants can then actively configure and design their new rented premises.

Rooms, walls and other fittings can be directly taken from a pre-defined library and positioned in the rented premises by drag and drop. The system will immediately check whether this position of the relevant element is technically possible and

what effect it will have on the rental price. In addition to the rental price, the tool will also monitor other relevant figures – for example the number of workplaces.

The goal of the rented space configurator is to improve the process by which lettings are prepared, and to make it faster and easier for all parties involved. It provides an agile marketing tool and simplifies communication with potential tenants. A faster conclusion of rental contracts and shorter vacancy and alteration times therefore become achievable. In the first phase the implementation team will develop the application in the form of a MVP, i.e. with the most important functions so that they can then be tested in an initial project.

MODULAR, CLIMATE-NEUTRAL
AND RECYCLABLE - BUILDINGS
WILL BE CONSTRUCTED INDUSTRIALLY ACCORDING TO THE
CRADLE TO CRADLE DESIGN
PRINCIPLE. NEW TOOLS WILL
ENABLE THE WHOLE PRODUCT
LIFECYCLE TO BE PRESENTED
DIGITALLY.

A large proportion of buildings in 2030 will consist of industrially produced modules with recyclable components. The prefabricated modules will be delivered and fitted together on site so that they can easily be dismantled again and the raw materials can then be reused.

The requirements for buildings and their desired functions form the basis of their planning and development. The new digital tools are being developed to help make the planning process fit for Industry 4.o. The focus is not on the individual process steps but on digital product lifecycle management which will allow us to see the whole of the product lifecycle. All phases, from construction and use to the demolition of buildings, will use the same interconnected data.

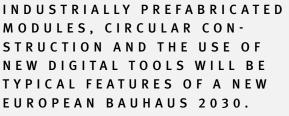
The planning and development of the modules is being carried out with partners and with industrial manufacturers of innovative solutions. Flexible standard components will be used which can be parameterized and which are optimized for the Cradle to Cradle design principle. The systems and products used in the building can therefore easily be separated again so that the building will act as a repository of raw materials.

In 2030, the focus will be on the building as an all-round entity which consists of healthy building products and industrially prefabricated systems and is integrated into a completely digital

process cycle. Moreover, it will also act as a power station which generates its own sustainable energy.

The advantages at the micro and macro level are self-evident: Buildings in 2030 will be characterized by a high level of energy efficiency – ideally they will be climate-positive, or at least they should have reduced emissions of CO2. They will be repositories of raw materials consisting of

recyclable modules, and this will increase their efficiency throughout the product lifecycle due to the completely transparent planning and production and the efficient processes with short development, production and construction times.







THE NEW EUROPEAN BAUHAUS FOR THE 21ST CENTURY

'The Green Deal must also be a new cultural project for Europe! Every movement has its own appearance and its own attraction. We must bring design and sustainability into harmony with each other.' The President of the European Commission, Ursula von der Leyen, explained this in a newspaper article and demanded a new European Bauhaus.

The 'first' Bauhaus just over 100 years ago is rightly associated with the transition to the industrial age.

The new European Bauhaus 2.0 offers us the opportunity to communicate the idea of the European Green Deal. The message should be that a contemporary and attractive lifestyle can bring together three ideals. It can be convenient, digital, and sustainable.

The Bauhaus of 1919 was considered to be elitist. A new Bauhaus movement should not have this character. Instead, it must stand for the compatibility of construction and nature. Sustainable economy, reuse of materials, renewable energy, preservation of species and a real circular economy – these are the crucial factors. With the C2C design principle we can fulfill these goals.

The European Bauhaus 2.0 needs to create completely climateneutral cities which are an attractive place to live, with efficient use of resources and reusability.

The goal is to develop a new aesthetic standard characterized by the Green Deal which can harmonize design and sustainability.

MULTIPLE USE AND CONVERTIBILITY -INDIVIDUAL BUILDINGS, DISTRICTS AND WHOLE TOWNS AND CITIES WILL BE VERSATILE AND ADAPT-ABLE, WHICH WILL LEAD TO NEW DIGITAL BUSINESS MODELS. THE SHARING ECONOMY WILL ALSO PREVAIL IN THE CONSTRUCTION AND REAL ESTATE SECTOR.

FLEXIBLE USE CONCEPTS, ADAPTABILITY AND SHARING MODELS WILL EXTEND THE RANGE OF POSSIBILITIES FOR INNOVATIVE DIGITAL BUSINESS MODELS.

Mixed use and multiple use buildings will become even more important. This type of building brings together different functions and areas of life under one roof. Even whole districts, towns and cities can benefit from this multiple use principle.

Extreme situations and pandemics clearly show us how dramatically the usage requirements and possibilities can change – sometimes very quickly. Buildings which are conceptually and structurally optimized for such exceptional situations can thus have a positive competitive edge.

In 2030, we will have created buildings which completely

Home is where your software is: although users change and become ever more mobile, they always take their individual software with them. This will enable the building to adapt to individual users and to cater for the different needs of the users. The building will increasingly become mobile. Instead of focusing on static buildings, we will concentrate more on the specific users in 2030.

Moreover, sharing is caring! In 2030, the sharing economy will have fully permeated the real estate industry. Residents will become users: the main focus will not be on permanent ownership but on a dynamic suitability for use. The user will want service and the benefits of use instead of ownership of a specific product. This development will unlock the potential for a number of sharing concepts and for innovative digital business models with exponential scalability.





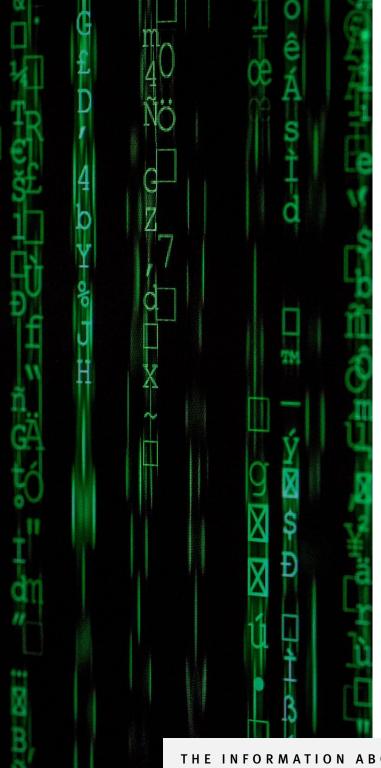
HEIDESTRASSE DISTRICT

A whole new urban district is arising in the Europacity, in the heart of Berlin. Drees and Sommer's contribution includes support for the largest coherent section of the project — the Heidestrasse district. The underlying statistics are impressive in their own right: about 175,000 square meters of gross external area will be available for industrial and retail premises along Heidestrasse. Added to which, there will be almost 1,000 residential apartments.

Apart from numerous other innovative topics, the Heidestrasse district also makes use of sharing concepts. Thomas Bergander, the manager of Taurecon Real Estate Consulting GmbH, comments: 'By using intelligent technology and systematic networking of all buildings, we will make it more attractive, charming and easy for all who live and work in them. This digital service system includes topics such as e-mobility and sharing models, and even a 'bring and take station', and an intelligent car park guidance system.'

A central element will be a district app — and car sharing companies will be able to integrate their services into the app. It will also contain other services offered by the district. A parking space management system will be organized via the app. It will take the location, parking time and other criteria into account and guide the user to the appropriate parking space. An automatic driverless e-bus will provide a shuttle service over the full length of the neighborhood.

www.quartier-heidestrasse.com



OPEN SOURCE BUILDING CADASTRE - BUILDINGS WILL HAVE FREELY AVAILABLE DIGITAL FILES CONTAINING THEIR DATA - WHICH WILL PUT AN END TOWASTED DATA.

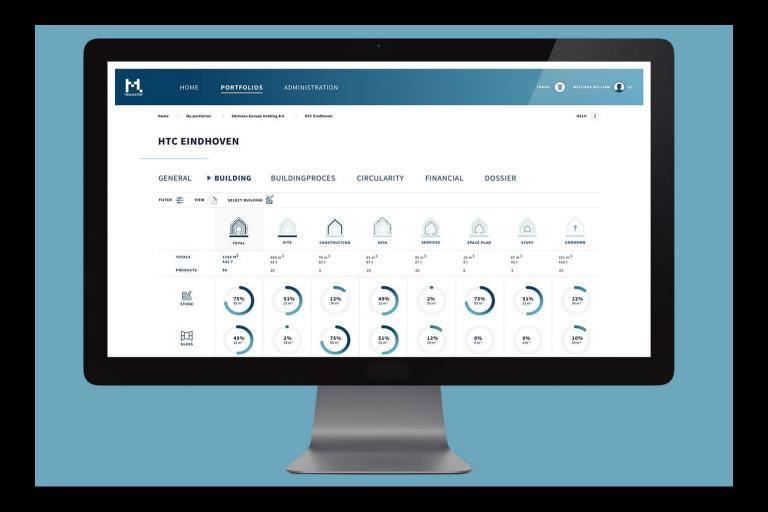
In 2030, the digital open source building cadastre will be the 'single source of truth' – digital and freely available to provide information about the size, location, use, land register entries, land tax and so on for each plot. Even data for due diligence processes, the status of the building, necessary maintenance work, energy consumption and rental income will be available in the Cloud.

Throughout the lifecycle, this open source software will guarantee complete and high quality data. The information will be permanently and automatically updated in a real estate cloud so that the updated data for every day can always be clicked on. This system will be based on Blockchain technology which will ensure the availability of the data. The existing databases and platforms will continue to communicate via secure interfaces.

Since the information is stored as an important 'resource' instead of wasting it, open source building cadastres are sustainable.

Whereas the purchase and sale of properties is a rather changeable and variable process, the basic data for the land and building as a matter of course remains constant. The use of digital data and services, as well as Big Data, will ensure that the sum of all data is included in the digital open source building cadastre.

THE INFORMATION ABOUT A PLOT OF LAND WILL BE CONSTANTLY AVAILABLE THROUGHOUT ITS LIFECYCLE: INFORMATION IS ALSO A RESOURCE WHICH NEEDS TO BE SUSTAINABLY USED AND NOT WASTED.



MADASTER - MORE THAN JUST GOOD INSIGHT

One step towards a 'single source of truth' is Madaster — the global online cadastre for products and materials. From the platform of the non-profit association, the owners and facility managers of buildings and infrastructure can arrange for a web-based material passport to be produced at any time for their buildings and all registered materials and products. The Madaster material passport gives an insight into the physical

assets of the registered properties and shows the current residual raw material value of the buildings.

In 2020, Drees and Sommer in Switzerland started a partnership with Madaster to promote the circular economy in Switzerland and strengthen the idea of using buildings as a repository of raw materials.

www.madaster.de



SELF-ORGANIZED PROPERTY MANAGEMENT IN 2030, WE WILL SEE THE FIRST BUILDINGS
WHICH MANAGE THEMSELVES. ON THE BASIS
OF BLOCKCHAIN TECHNOLOGY, FACILITY
MANAGEMENT AND FINANCIAL SERVICES CAN
BE ORGANIZED DECENTRALLY AND SECURELY.



It is already possible today for 'the brain' in buildings to organize the technical operation, communicate with the user and react to the user's needs. In 2030, using Blockchain technology, it will also be possible for some buildings to manage themselves almost completely on their own.

For example, a building will be able to detect technical defects, take precautions to prevent component failures and directly commission service technicians. Even invitations for tender for other facility management services can be handled by the building itself in 2030.

Pioneer districts can even control themselves. For example, if the system detects that there are impending tenant vacancies, it can take steps to remedy this itself. ING - IN 2030, THERE WILL BE BUILDINGS WHICH MANAGE THEMSELVES AUTOMATICALLY. THIS INCLUDES ANTICIPATORY MAINTENANCE AND SUCCESS-FUL LETTING: THE BUILDING WILL ORGANIZE EACH PRO-CESS ON ITS OWN.

These services are based on Blockchain technology, which will thus be established in the real estate sector in 2030. Distributed ledger technology will ensure consistency and confidence in this decentralized network. The use of an individual building ID, which is a separate IP address for the building, will make it possible for each building to be independent.



ECONOMY OF THINGS AND SMART CITY BUILDINGS, NEIGHBORHOODS AND INFRASTRUCTURE WILL COMMUNICATE CONSTANTLY WITH
EACH OTHER. NETWORKED CITIES, SELFCONTROLLING BUILDINGS AND SMART INFRASTRUCTURE WILL MAKE UP THE CITY 4.0.

Urbanization is continuing, the population is growing and this increases the demand for resources such as clean water, sustainable energy, healthy air, CO2 neutral mobility and — especially lately — hygiene concepts. All of this is a challenge for municipalities. Instead of trying to solve them alone, different areas are opening up and networking.

In 2030, we expect to see a networked and Smart City 4.0. Not only buildings, even whole districts, infrastructures and energy grids will communicate with each other. The Internet of Things and Industry 4.0 make this type of networking possible.

An exchange of data within the city about factors such as the flows of people, weather events, temperature, traffic, emergencies, infrastructure capacity utilization, energy demand and much more is possible in real time – the system can make predictions, detect events and automatically react to them. In the City 4.0 the 'things' can speak to each other.

Moreover, the energy grid in the City 4.0 will be completely bidirectional. This means that buildings and the infrastructure can supply each other with energy.





LET'S URBANIZE DIGITALIZATION!

The Smart City demonstrator is a platform for people and technology in the city which uses an all-round approach. It shows networked solutions for buildings, urban structures, mobility concepts and infrastructure systems. Developers, local communities or partner companies can receive information about the latest Smart City technologies. They can use the interactive demonstration options and participate in workshop and event formats. On the exhibition space, digital solutions and methods for the planning, equipping and operation of a Smart City can be presented in examples and demonstrated in specific projects. This can be systematically used to improve factors such as sustainability, amenity value or economic performance, as is shown by the first applications in Hamburg's Ottensen and Oberbillwerder districts.



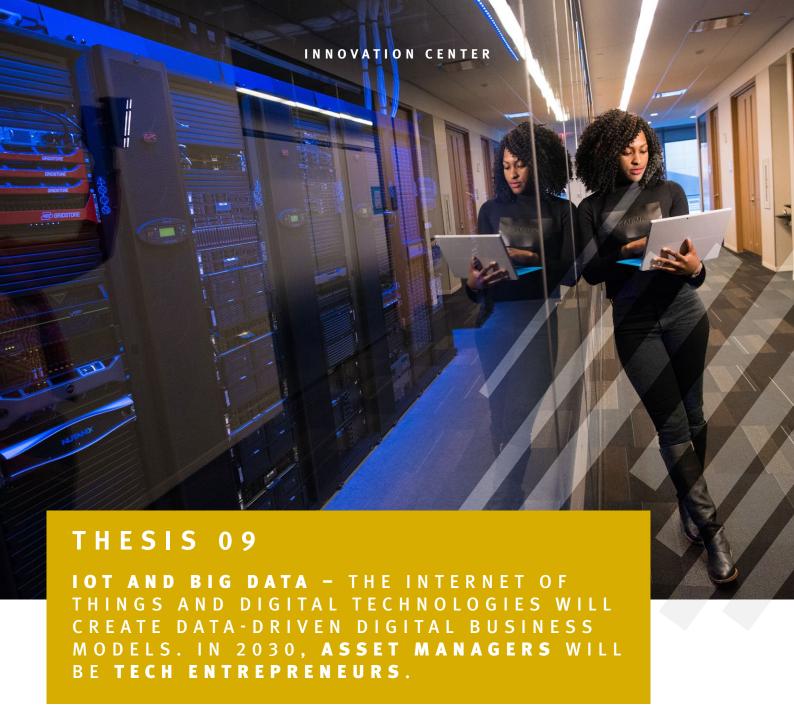
PERFORMANCE-AS-A-SERVICE
CONTRACT - THE AGREED PERFORMANCE WILL BE THE CRUCIAL
ELEMENT IN A RENTAL CONTRACT.
WHAT COUNTS IS A SENSE OF
WELL-BEING, URBAN QUALITY AND
SUSTAINABILITY ON THE BASIS OF
THE ESG CRITERIA. MONITORING
WILL ENSURE FULL TRANSPARENCY
AND MEASURABILITY.

Premises today are let on the basis of the floor space, but in 2030 the focus will be on the performance of the building – based on the specific requirements of the users and their companies. ESG and comfort monitoring will permit dynamic rental contracts. Science-based benchmarks and parameters for a pleasant indoor atmosphere will form the basis.

What is my favorite indoor climate? What type of 'feel-good rooms' has a company? How is energy used? Does this tenant act sustainably? What about the intensity of use? The answers to these and many other questions will define the performance level, and that in turn will form a solid factual basis on which the dynamic rental contract can be concluded. This means that monitoring the wellbeing or comfort factors and checking whether the ESG criteria are fulfilled can generate data and facts for the Performance-as-a-Service contract. This approach will ensure transparency and create a basis of trust for the user. The new rental contract will be perfectly geared to the user's needs, but it can be adapted just as dynamically to new users.

EVEN AT A HIGHER AND MORE GENERAL LEVEL, THIS CHANGE WILL HAVE POSITIVE CONSEQUENCES. WHERE LANDLORDS AND TENANTS FULFILL AND INTERNALIZE THE ESG CRITERIA, THIS INCREASES THE QUALITY OF URBAN LIFE TO THE BENEFIT OF PEOPLE.





The entrepreneur and tech investor Frank Thelen makes similar predictions. He bases them on Moore's Law, which states that computing power doubles every year and will grow exponentially. 'More efficient processes and automation will help save money in future. However, this means that an increasing number of jobs will be lost', the entrepreneur believes.

Specifically, innovative technologies such as IoT and Big Data will lead to the creation of new digital business models. Partial work tasks will be eliminated, but new and innovative jobs and careers will arise.

For the construction and real estate sector this means, for example, that asset management will change. Whereas asset managers are a normal part of the process today, in 2030, this function will be carried out by digital business managers or tech entrepreneurs.

85 PERCENT OF THE JOBS WHICH WILL EXIST IN 2030 HAVE NOT YET BEEN INVENTED. BY 2025, MACHINES WILL BE DOING MORE THAN HALF THE WORK.

(Institute of the Future and Dell, 2007; World Economic Forum 2018).





DIGITAL INTELLIGENCE IN THE CUBE BERLIN

A modern cube, enclosed in a glass façade, in the middle of Berlin: cube berlin was opened in February 2020. It was developed by CA Immo with the support of Drees and Sommer and the proptech Thing-it, and it is remarkable not only for its architecture. The building uses smart technology — in combination with the highest security standards. About 3,750 sensors and 750 beacons in the cube berlin collect various data which form the basis for smart building control.

A central control unit equipped with Artificial Intelligence (AI) technology connects many of the technical installations,

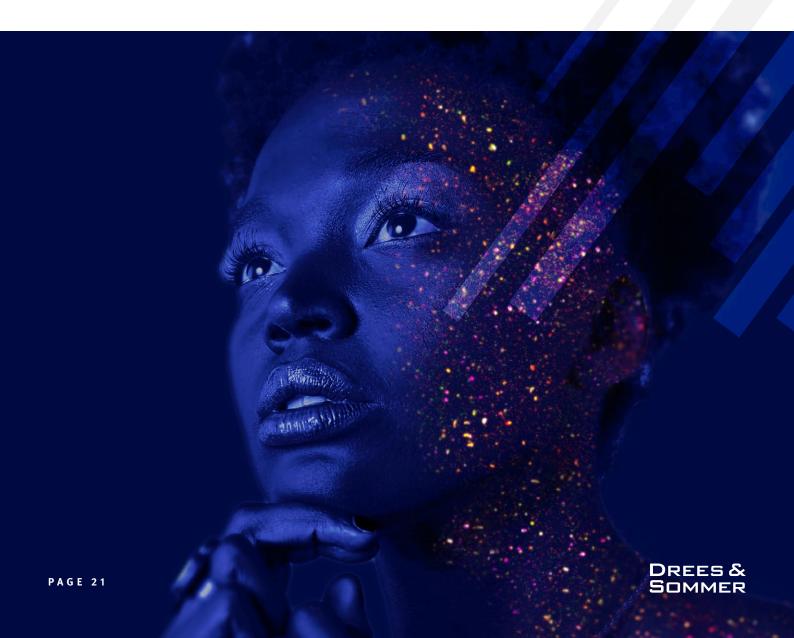
sensors and the planning, operational and user data. This 'brain' collects the information and data, analyzes and evaluates them and presents optimization suggestions for elements such as the operation of the building. For example, the system can identify unused areas of the building. If necessary, it can switch off systems such as the heating, ventilation, cooling or lighting in these areas. This helps to increase energy efficiency and improve the comfort for the users. As a result, the technology, architecture and atmosphere in the smart building work together to create a smart future for the users and the environment.

THESIS 10

EVERYTHING REMAINS DIFFERENT DEVELOPMENTS WILL ARISE WHICH
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BE UNKNOWN EVEN IN 2030.

For the construction and real estate sector in 2030 this means that new developments will arise in the future, although we do not yet know that they are in store for us. Even in 2030 there will again be many more innovations which will lead to innovative digital business models which have the potential to scale exponentially.

THE LAST FEW YEARS HAVE SHOWN THAT DIGITAL DISRUPTIVE INNOVATIONS AND BUSINESS MODELS NEED SEVEN YEARS BEFORE THEY BECOME ESTABLISHED.





WHAT IS YOUR PROPOSITION FOR THE FUTURE OF THE CONSTRUCTION AND REAL ESTATE SECTOR?

Are you interested in discussing the future of the real estate sector with us? You are welcome to contact us: innovation@dreso.com

Innovation cannot be successful as a solo venture — we must leave the silo mentality behind us. To analyze questions about the future together in an ecosystem and to work on innovations for the real estate sector, we have set up CREATORS.

Within our Innovation Center, our Scouting team focuses on trends for the future. At the same time we maintain contact with a number of relevant startup companies. By order scouting we arrange for startup technologies and know-how to become involved in our projects.

More information can be found in our current > scouting report

More information can be found under www.creators-ecosystem.de

LET'S INNOVATE REAL ESTATE

P U B L I S H E R :
Drees & Sommer Innovation Center

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