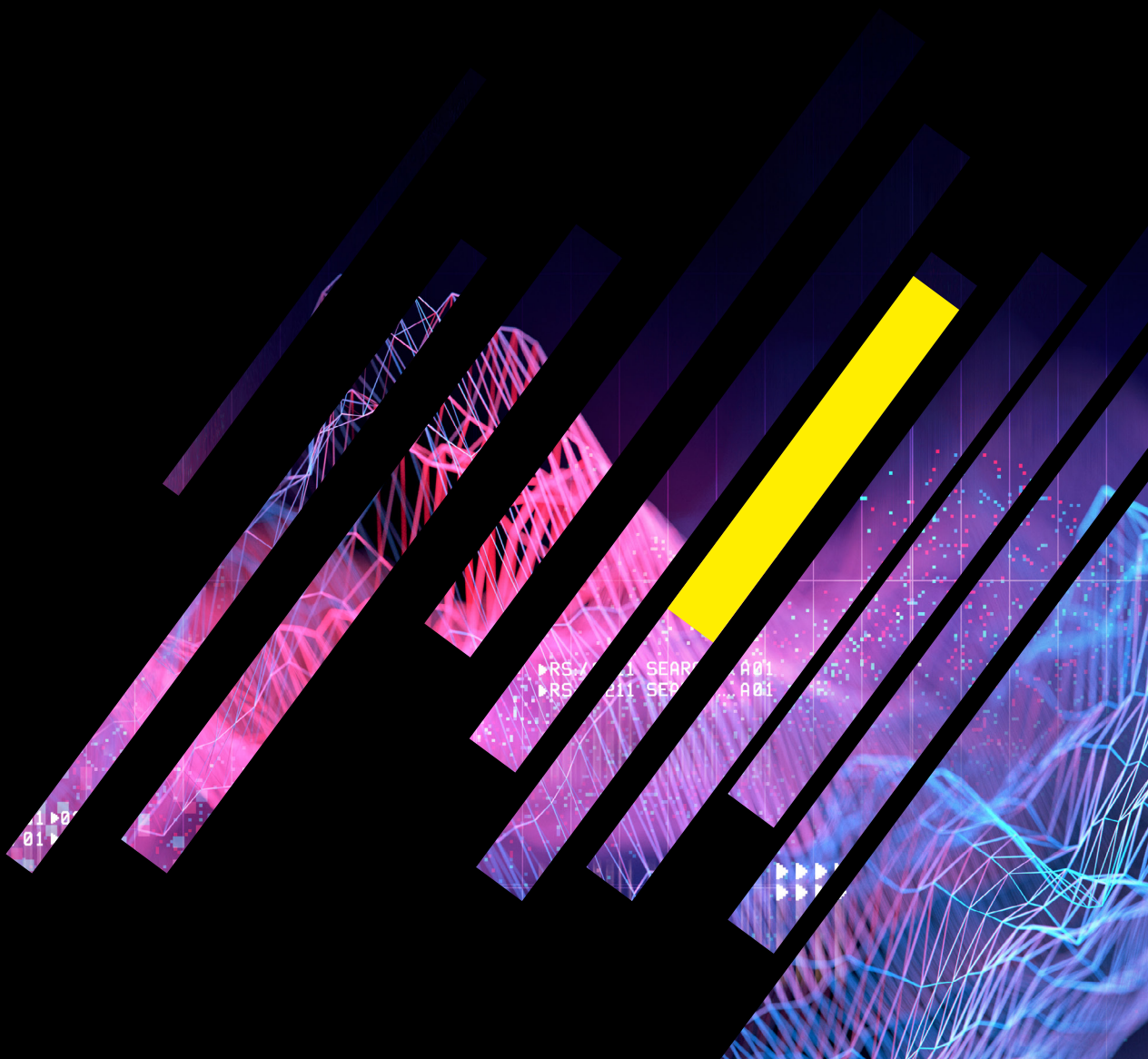
DREES & SOMMER

INNOVATION SCOUTING

REPORT 2022



The second edition of the Innovation Scouting Report deals with construction and real estate use cases related to the technology trends most relevant to the sector. Use cases are material evidence from the field, and demonstrate specific areas of use for the technology trends. They form the focus of the report, illustrated by specific solutions from the property technology (PropTech) and construction technology (ConTech) scene.

The pandemic has changed not only the way we work and live, but also the way we use real estate. Before the Covid-19 crisis, the real estate sector was thriving, and there was no driver of change. The situation altered when the pandemic started. However, what was lacking was the courage to be innovative, which was dampened by the uncertain economic situation.

At the beginning of the pandemic, investors became reluctant to put their money into startup companies. That changed in the course of the crisis. The volume of investments in startups in Germany has more than tripled in comparison with 2020 and is now around EUR 17 billion (source: 'Volume of investments in startups in Germany, from 2015 to 2021', statista). The PropTech and ConTech segment also recorded an increase in volumes in 2021. In the German speaking area (Germany, Austria and a part of Switzerland), EUR 270 million was invested in startup firms in the construction and real estate sector in 2020. By 2021, this figure had risen to EUR 666 million (source: PropTech Startup Report 2021/22, blackprint booster). The year 2022 already promises to set a new record; in the first two months, EUR 487 million in venture capital was collected. There has generally been a noticeable increase in demand for PropTech technologies and services, particularly in situations in which efficient collaboration between different stakeholders is crucial for success. Solutions for general communication and project management applications, as well as marketing and finance platforms, have been in particularly high demand.

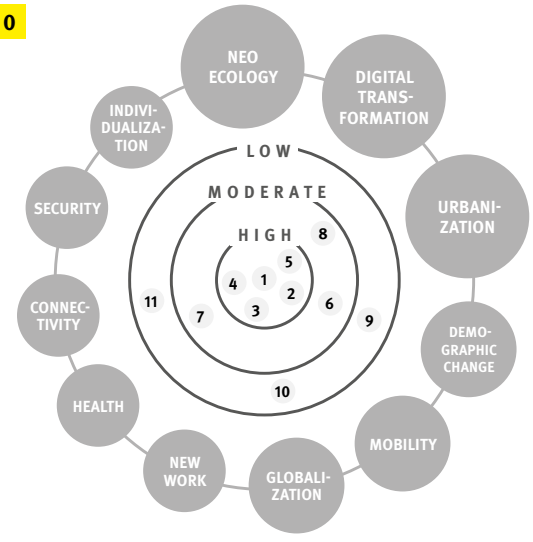
There is evidence of a slight shift in the relevance of the different technology trends between 2020 and 2021. The following graph shows the trend radar for 2020 compared with 2021.

It shows that the **INTERNET OF THINGS (IOT)** has increased in relevance as a technology trend, surpassing **AUGMENTED/VIRTUAL REALITY** this year. It now occupies third place after the most important trends, **BIG DATA ANALYTICS** and **ARTIFICIAL INTELLIGENCE (AI).**

This can be explained by the changed building operation requirements that emerged as a result of the pandemic. For instance, with the aid of connected sensors, maintenance and repairs can be carried out on buildings remotely. The technology enables sensor-based and optimized control of technical building systems when there is a change in the amount of use a building is getting. The technology can also help compliance with hygiene regulations – with room booking functions and the option of contactless operation of equipment.

This report presents general use cases related to the three most important technology trends, **BIG DATA ANALYTICS**, **ARTIFICIAL INTELLIGENCE (AI)** and **INTERNET OF THINGS (IOT).** In addition to the technology trends, five startup companies describe specific solutions. In addition to the technology and lifecycle phase emphasis highlighted in the report, these solutions overlap with the other technology trends and phases. This is because technologies are often closely connected with each other and frequently complement each other in many phases in the creation of added value.

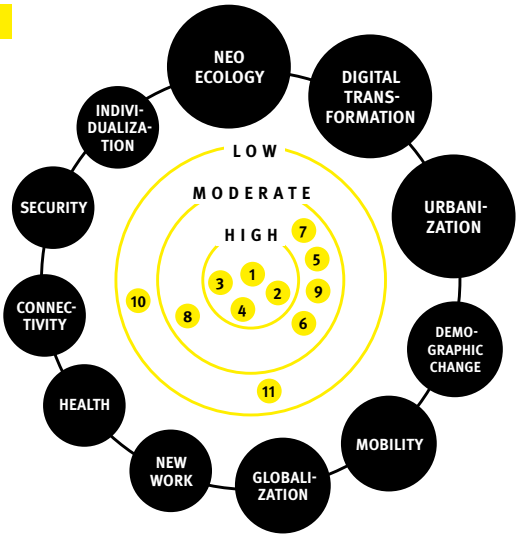
2020



TECHNOLOGY TREND AND RELEVANCE ASSESSMENT

1	Big data analytics	19,6 %	5	Cloud computing	10,3 %	9	3D Print	4,2 %
2	Artificial intelligence	14,4 %	6	Digital twin	9,1 %	10	5G frequency	3,8 %
3	Augmented/virtual reality	13,1 %	7	Sensors	6,3 %	11	Robotics	3,0 %
4	Internet of Things	11,8 %	8	Blockchain	4,3 %			

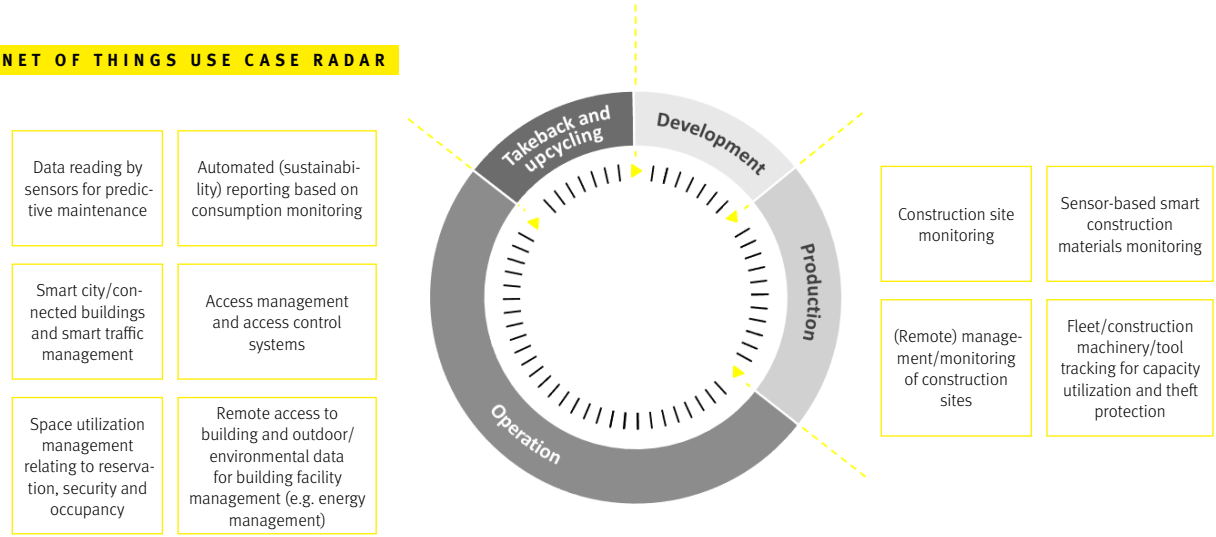
2021



1	**Big data analytics**	**16,0 %**	5	Cloud computing	9,0 %	9	3D Print	6,0 %
2	**Artificial intelligence**	**13,0 %**	6	Digital twin	9,0 %	10	Robotics	5,0 %
3	**Internet of Things**	**12,0 %**	7	Blockchain	8,0 %	11	5G frequency	5,0 %
4	Augmented/virtual reality	11,0 %	8	Sensors	6,0 %			

RANK 3: INTERNET OF THINGS

INTERNET OF THINGS USE CASE RADAR



The IoT is a combination of several technologies. Sensors, data transmission technologies, data processing methods and a user interface are used for data acquisition, exchange and processing.

As this technology links physical and virtual objects via the internet to work together, it is not used until the development process of buildings in the construction phase, but is most often used in the operating phase. During construction, IoT facilitates different aspects of remote management in the building. With the aid of sensor technology and networked equipment the construction site can be supervised and monitored remotely, and the manpower, tools and building materials can be used safely and in the optimum way. **See introduction startup 1 #IOT**

Automated optimization of consumption and reporting is a common use for IoT in building operation, in addition to predictive maintenance based on data obtained by monitoring technical equipment. The technology can also be used for optimum control and to improve the level of comfort and safety for users. For optimum connection to local infrastructure, buildings can also be networked with other nearby buildings in addition to transport and parking management systems.

User comfort is also improved by monitoring and improving the indoor climate. **See introduction startup 2 #IOT**

STARTUP 1 #IOT

ABAUT is a software company established in Munich in 2017. It is developing a collaborative SaaS solution which can process common data formats from a large number of data sources in the construction industry, enabling it to supply information on construction progress and processes automatically.

AI-based cloud software allows information to be obtained on weaknesses in the construction process and the degree to which individual phases of construction have been completed. This enables efficient management of construction sites. Existing machine and image data of the construction site is used for the analysis or generated by abaut's intelligent sensors or selected partners. One use for abaut software is the mapping of construction site logistics, in which incoming materials supplies – for example deliveries of cement or sand – are detected by the analysis of images from stationary and mobile cameras.

abaut enables remote monitoring of construction sites. This means, the site manager can monitor several sites at the same time, eliminating the need for long journeys. Processes on the construction site are documented at the same time, and process weak points are highlighted for the site manager at an early stage.

STARTUP 2 #IOT

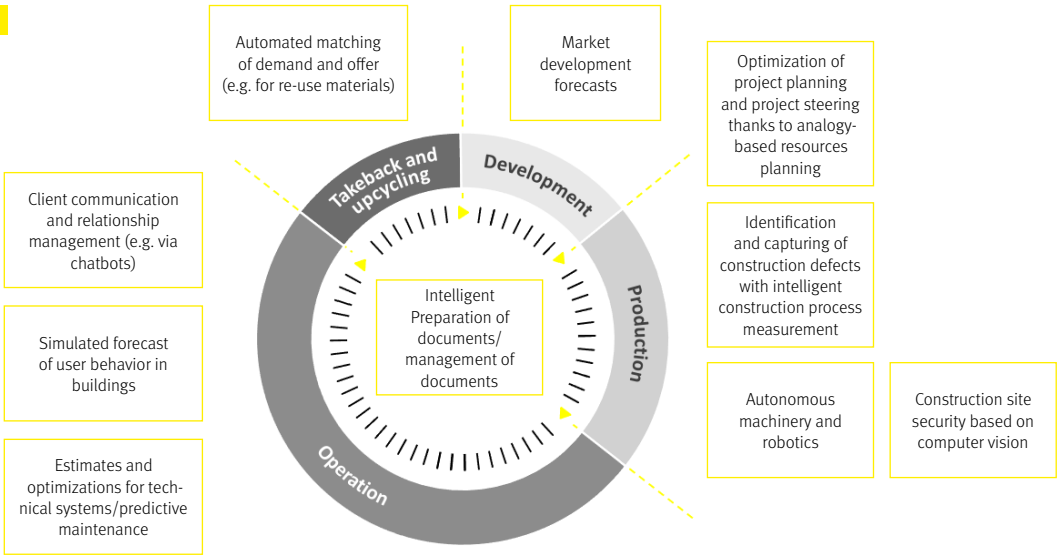
BREEZE TECHNOLOGIES is a leading provider of air quality sensors, data and analytics. The Hamburg-based startup was established in 2015 and has a workforce of 16 people now.

Air pollution is becoming an increasingly important issue in the real estate sector. **Breeze provides analysis and recommendations for improving the air quality in commercial properties** such as office buildings. It also offers monitoring of the impacts of emissions on and around construction sites. In the future, air quality data will be made available without the use of sensors, for instance to provide information on the average air quality in a property that is about to be sold or rented.

More and more people are giving their attention to the issue of air pollution, the biggest environmental threat of our time. Using IoT technology and with the aid of a cloud solution in addition to artificial intelligence, Breeze Technologies offers the construction and real estate industry and other sectors the opportunity to improve air quality considerably, particularly in the operating phase.

RANK 2: ARTIFICIAL INTELLIGENCE

AI USE CASE RADAR



Artificial intelligence sorts and analyzes data on which automated processes are based. The technology can transfer human thinking and learning to computers so that they can learn from the data, plan and correct themselves.

AI can be used in a variety of ways in the construction and real estate sector. By analyzing and learning from historical real estate-related data, relevant information can be obtained automatically for the entire real estate lifecycle by means of pattern recognition. The findings can support or even simulate decision-making – for instance in project planning or portfolio management. This provides a basis for self-optimizing processes and self-regulating equipment, systems and buildings. AI can make communication easier or automate it by bringing together questions and answers and matching demand and supply.

The process of analyzing and learning from historical data includes the identification of future developments in relation to real estate value and location on the market, to enable data-based decisions to be made at an early stage. **See introduction startup 3 #AI**

STARTUP 3 #AI

GEOSPIN is a technology startup with headquarters in the sun-trenched city of Freiburg, Germany. The spin-off company of the University of Freiburg's 'Smart City' study group was founded in 2016.

Geospin's software is based on artificial intelligence and recognizes the complex surrounding structures that influence the value of the location of a property. The self-learning algorithms can reliably predict the rent for residential and commercial buildings of different sizes and standards of interior design.

The algorithms are scalable as required and can also be used in regions for which no real estate market data is available. There is also an interactive online portal in which users can request price forecasts in addition to information on population and infrastructure around an address at the touch of a button.

Employees in the real estate sector no longer need to spend hours searching for and evaluating information from a wide variety of sources. Furthermore they receive an objective basis for decision-making.

Intelligent document management can transfer a data set seamlessly, for instance from planning and construction to later phases such as the building operation or material return and upcycling phases. This enables relevant data to be selected and used in a way that adds value. **See introduction startup 4 #AI**

STARTUP 4 #AI

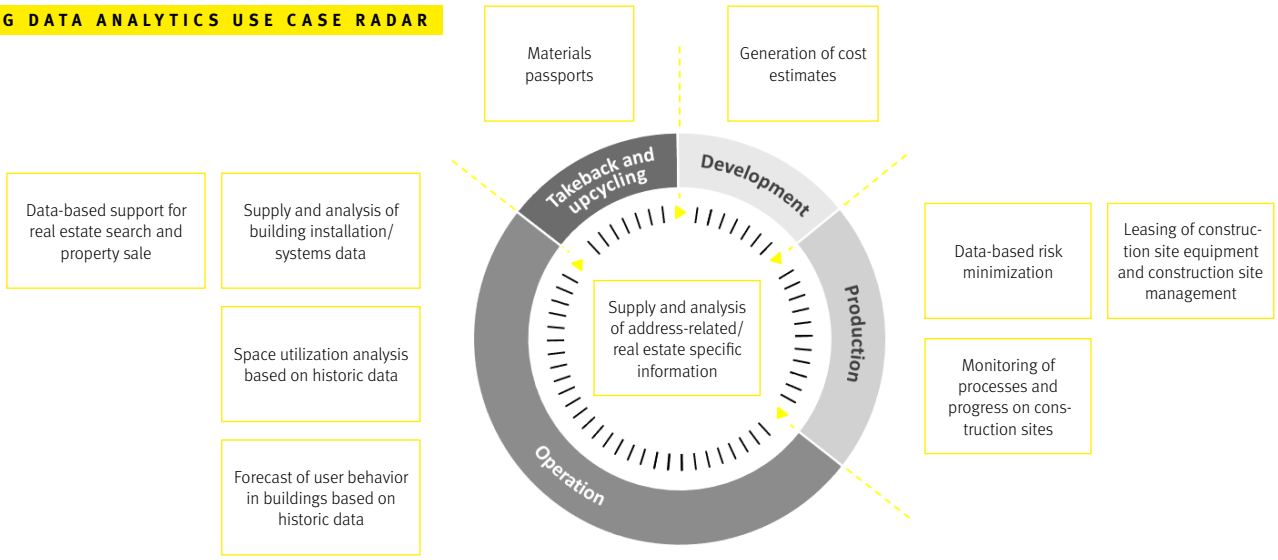
The Berlin PropTech company **ARCHITRAVE** was established by Maurice Grassau in 2013. Its mission is **to bring about a sustained increase in asset management transparency and efficiency using 100 percent digital documents, precisely extracted data and automated processes.**

At the center of the 'software as a service' (SaaS) solution is the real estate document management system, which is focused exclusively on the sector and is being developed and expanded in close collaboration with strategic partners. One of the core elements of the application is DELPHI, an AI-based service which performs all time-consuming routine tasks automatically. The highly-trained algorithms not only identify, label, classify and sort documents, but also extract the relevant data and make it available for analysis or (with the aid of open interfaces) for other systems.

The automation of these processes leaves asset managers with 30 percent more time and significantly reduces the time and effort involved in communication and coordination. Perfectly ordered real estate documentation, completed, classified and sorted in line with industry standards, ensures streamlined administration of portfolios and transaction readiness at the touch of a button. Extracted data and its analysis constitute the basis for sound management decisions and lay the foundations for dealing with future challenges relating to ESG issues.

RANK 1: BIG DATA ANALYTICS

BIG DATA ANALYTICS USE CASE RADAR



Big data analytics, which comes first in this relevance ranking of technology trends, is about the storage and processing of large quantities of unstructured data.

Data is an important raw material of the digital world. Big data uses are directly connected to IoT and AI uses. With the advent of the Internet of Things, increasing numbers of objects and devices connected to the internet are collecting data. At the same time, technologies such as AI require the availability of large quantities of data to create added value and meaning.

In the materials takeback and upcycling phase, information on the quality, origin and position of materials and products is needed to return them to the cycle without any loss of value. Materials passports contain information on the entire lifecycle of a building and make it available for the purpose of determining the circular value of a building and facilitating a materials flow. **See introduction startup 5 #Big Data Analytics**

STARTUP 5
#BIG DATA ANALYTICS

MADASTER was established as a foundation in the Netherlands in 2017. The company is currently present in Belgium, Germany, the Netherlands, Norway and Switzerland. The platform went live in Germany in 2021. The team includes three employees. Their office is located in the startup city of Berlin to ensure short ways to politics and associations.

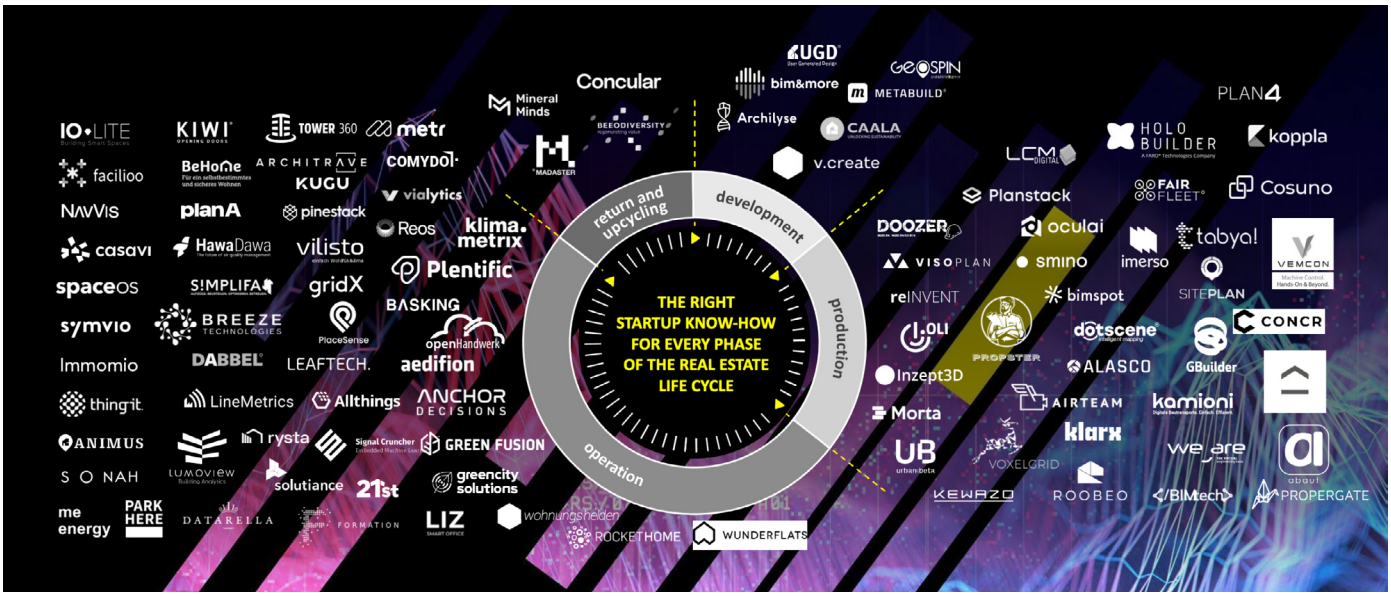
Building owners can upload their building on the Madaster platform, via an industry foundation class (IFC) interface or alternatively by means of an Excel template. The uploaded data is then automatically linked to ÖKOBAUDAT data, environmental product declarations (EPD); manufacturer details and prime materials markets with reference to the **origin of materials, recycling potential** or **prime materials values.** This enables analyses on the carbon footprint and circularity in buildings throughout the entire lifecycle of properties.

Digital capturing, and storage and use of data referring to individual buildings was not very common in the past. As a result, information was gathered several times, different versions were generated in parallel and certifications delayed. Smart linkage of different data points and the definition of a 'single source of truth' stored with the building speed up processes, enhance efficiency and improve target orientation. The availability of data is an added value for architectural firms, constructors, reporting on environmental, social, and governance (ESG) factors, as well as dismantling and recycling companies.

The exponential growth in the three emerging technologies for capturing, storing, structuring, analyzing and using data for profitable ends is changing our world – and by no means all the potential has been exploited. The future benefits that these and other emerging technologies could have for our sector are described in the **10 FUTURE THESES** for the construction and real estate sector in 2030.

Startups develop new technologies and disruptive business models, and are the drivers of digital transformation. Some sectors have already discovered how important it is to confront the issues of the future in good time. Very few companies manage this challenge on their own. This makes it all the more important to engage actively with innovative startups and a network of like-minded people.

Our scouting team identifies and appraises high-potential startups around the world, with the aim of supporting them and linking them to Drees & Sommer and its clients and partners (appropriate to their areas of business and situation) for discussions and far-reaching collaborations. Startup scouting is initiated on request, in response to specific market needs, and on the basis of technology areas and trends considered to be relevant.



DREES & SOMMER: YOUR INNOVATIVE PARTNER FOR CONSULTING, PLANNING, CONSTRUCTION AND OPERATION

As the leading European consulting, planning and project management enterprise, Drees & Sommer has worked with private and public clients from construction bodies to investors on all types of real estate and infrastructure projects – both analog and digital – for 50 years. With its pioneering and future-shaping consulting, the company offers solutions for successful buildings, high-return portfolios, powerful infrastructure and livable cities. 4,000 employees in interdisciplinary teams based at 46 locations worldwide support clients across a wide spectrum of sectors. All the services provided by the partner-run company take into consideration both economic and ecological concerns. Drees & Sommer calls this holistic approach *"the blue way"*.

Innovations are part of the Drees & Sommer DNA. The Innovation Center has set itself the task of promoting digital change in the real estate industry. The process of digital transformation in the market is changing the interests and needs of clients more quickly than ever before. Therefore, our goal is to increase the innovation speed of Drees & Sommer. Existing business areas are being subjected to digital transformation and new business models are being efficiently and systematically developed and brought to the market.

MASTHEAD

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