CATELLA

Catella Research

BIG DATA IN THE REAL ESTATE SECTOR
A BIG OPPORTUNITY OR A BIG THREAT?

About Catella

Catella is a leading financial advisor and asset manager in Europe, active in the property, fixed income and equity areas. Our extensive geographic reach, with offices in twelve different countries and around 500 employees, forms the basis for our market success.

Catella has been a name in the German real estate sector since 1990 and today, Catella Property GmbH, Catella Project Management and Catella Real Estate AG employ some 80 people at five different locations. Our offices in Düsseldorf, Hamburg, Berlin, Frankfurt and Munich offer a portfolio of services relating to every aspect of real estate, putting us in a position to offer excellent consultancy services to investors during every phase of the investment cycle and to companies requiring tailored solutions.

This portfolio comprises research and valuation, investment and letting, product management and development, capital markets, equity and debt advisory services. In 2007, our subsidiary Catella Real Estate AG opened its doors in Munich, where it develops fund products for institutional investors and affluent private clients. Each individual fund concentrates on a separate field, both with regard to geographic region and asset class.

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1 Introduction

According to certain predictions, big data represents an issue comparable with the oil rush at the end of the 19th century. One particular comment even makes the parallels explicit: "Data is the oil of the 21st century." It's a snappy line that captures the dynamism of the debate, but it is, ultimately, inaccurate. Previously more or less unknown, crude oil was discovered to be concentrated in specific regions and countries. In contrast, data in the 21st century is present around the globe. In other words, this new raw material, or commodity, is available in unlimited quantities everywhere. The question is this: how can we process it and integrate it into business processes with an eye to profitability? When it comes to handling data, many companies, and not merely those in the real estate sector, can be grouped into one of three categories. The first group views data as a short-lived, fluid phenomenon: their day-to-day business generates data, but that's all the contact they have with it. The second category is aware of the potential value of data and has created a simple system for storing it and then applying certain routines to make use of it. Then there is the third group. These companies base their business models on algorithms and have virtually disconnected themselves from the process of "physically" producing results. Discussions about this group often feature terms such as disruptive technology, design thinking, location cloud and, of course, the mother of all buzzwords: digitalisation.

In other words, data is a raw material that is freely available, but which has to be integrated with business models in a structured, productive way. This is always done in a single step that combines innovative progress and structural transformation – at least that is according to the theory of economic evolution. Or, put simply, there are winners and losers. We can tell that we are in the middle of this structural transformation simply by looking at the projects and plans that media companies, automotive corporations and banks have been working on for the last few years. All of their efforts focus specifically on taking traditional business models, applying digitalisation, and producing something that customers are willing to pay for. If customers see a gain in terms of monetary or time efficiency, they will make use of it. This model operates via the use of apps to acquire astronomical quantities of data and customise contacts.

If applied to the real estate sector, the possibilities afforded by these innovations are also tremendous. We all need to realise that data provides the key to long-term economic success. Trust between people means that we continue to take one-on-one discussions seriously, no matter the business segment, but consumers also know that services have become more transparent and that there is now far greater readiness in the business world to provide customised solutions, and that at prices that are almost completely transparent. If location remains the immovable coordinate when buying property and a key factor influencing its value, then surely most companies in the field must be working with digital maps or even "dark maps", shouldn't they? All those mantra-like statements praising the virtues of smart city concepts – surely lots of companies must have taken heed of them? Who really sees the real estate sector as a software developer? These are notions that should inspire, not prompt companies into a flurry of short-term, panicked activity. Right now, it's more important to facilitate a readiness to gather data in a structured manner. While too many companies still, alas, view this data as fleeting, it is precisely what will become a key influence on the services they deliver. The more data they have, the more precise their information. It seems obvious that real estate firms will become "software producers" as never before, even though they have been the purveyors of the ultimate in "hardware" since time immemorial. Until now, the sector's structure has been almost exclusively analogue, but the dramatic transformation into a digitalised world will be triggered by a globalised business mindset, matching databases and software expertise – not stand-alone solutions – and completely transparent business processes that incorporate every aspect of feedback from users, i.e. tenants. Real estate must become fully digitalised, customer-focused and adaptable. The standard software currently in use might set, well, standards, but it is incapable of triggering any innovations in its current form.

This report was not compiled by androids but by analysts from the species homo sapiens Catella Research. But in the era of robo-advice, artificial intelligence, algorithms and augmented reality, it is merely a question of time before this process takes root here too. Pipe dreams and a threat at the same time? That's how timid people might well view it. For the forward-minded, however, it is an invitation to find out about the current state of affairs and draw their own conclusions. When IT firms look at a building, they don't see bricks and mortar – they see a source of digital information. And new, digitally aware real estate companies are precisely the market players that will force the old guard to the wall, so to speak. The Terminator was preceded by Rambo, who was in turn preceded by Frankenstein. This should serve as a warning and motivation in one.

Dr. Thomas Beyerle
Group Head of Research

2 Big data – looking at the term

Developing a definition

Following on from the broad overview given above of structures, elements and interconnected effects, we should probably start by clarifying what is meant by the term "big data".

When we use the phrase **big data** in connection with the property sector, we understand it to mean gigantic quantities of data that normally display the three following characteristics.

- **Size:** Exabytes and zettabytes are used to measure volumes
- **Complexity:** The data comes in scores of different formats from a host of different sources
- **Speed:** The data changes very quickly

"Big data" also covers the technology and methodology used for the linked-up evaluation of huge datasets with different **typological origins,** e.g. based on customers or macroeconomic reports, **in real time** and with the aim of identifying potential trends, developments and forecasts. **Automated algorithms and statistical models** often supply the basic material for these analyses.

Structure of the study

As a result of digitalisation, this development is already well underway in many other business sectors, for example in finance, where algorithms analyse data in real time so the findings can be used in automated stock market trading. Other big data applications are marketing and customised advertising, things we are all probably very familiar with. Almost without our noticing it, companies can develop a full customer profile for each of us, complete with preferences and patterns of consumption. These transparent versions of ourselves are stitched together from our surfing and consumer habits online, when we click the like button and when we order something from the internet.

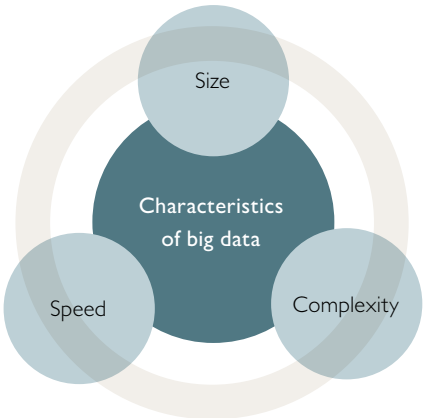
Though the application of big data processes is still in its infancy in the real estate sector, it offers tremendous potential that has not yet been properly exploited. **Digitalisation** might have recently made its mark on the segment, but big data is the key element in the current evolutionary process that real estate firms must harness. Hard facts on this issue are few and far between, so our report focuses on **the findings of a survey that comprised approximately 450 real estate companies from around Europe.**

The **report starts** by describing the current standing of big data in the sector. Here, the main questions concentrate on current data availability levels, and on the business units and subsections of the sector which generate the most data. This section also looks at the most urgent problems regarding market transparency.

The **second section of the study** focuses on how big data is applied in the real estate business. It analyses the level of awareness people in the sector have regarding big data and investigates if this data is part of the decision-making process. Other topics include barriers to and the key requirements for exploiting big data at real estate companies, and we also take a look at the overall potential that can be generated by this approach

The **final section** explores the impact that big data could potentially have on the real estate sector, with particular attention being paid to its implications for research activities. **The study concludes** by considering the all-important questions of whether or not big data can enhance transparency, and if big data

Fig. 1: Characteristics of big data



Source: Catella Research

analysis tools can be used to spot trends as they develop or predict what issues will be important in the future. If so, does this necessarily apply to the real estate sector?

Issue and objectives

Anyone reading the statements and articles published in recent months could come away with the impression that digitalisation is already a core process at real estate companies. This is not the case. The sector has a lot of catching up to do regarding the issue of big data. While companies have been collecting data for many years now, they usually store it in an unstructured manner, or they only process and utilise it in bits and pieces. The main purpose served by this data is as a momentary item in a flow of information. This of itself reveals that companies are **failing to exploit the tremendous potential inherent in integrated analytical practices.** However, if a few "pioneers" developed big data strategies that made their business models more efficient, then the rest of the sector would be bound to seize upon the topic so they could remain competitive. Against this backdrop, we believe there is **massive potential for innovation and adaptation** within the real estate segment over the coming years.

Property markets are generally considered to be particularly opaque due to their heterogeneity, both in terms of regional differences and the sheer variety of building stock. At Catella Research, we are therefore interested in the question of how the survey respondents think big data will impact on the sector in structural terms, and whether or not this will lead to greater transparency.

Tab. 1: Overview of terms

Analytics	Systematic method for checking company data that focuses on statistical analyses. Used by companies that deploy data-based decision-making processes.
Behavioural economics	Economic field that studies how people actually behave in economic settings, in contrast to the rationalist approach that posits everyone as homo economicus.
Big data	Datasets of enormous complexity that are subjected to traditional evaluation methods.
Chief data officer	Managerial staff member in charge of data acquisition and processing within a company.
Data mining	Application of systematic statistical approaches to identify patterns in datasets.
In-memory databases	Database management system that uses main memory for storage.
Predictive analytics	Description of processes used for identifying repeating patterns in data and using specific algorithms to forecast their further development.
Sentiment analysis	Identifying and interpreting the mood of market participants for forecasting purposes, e.g. Ifo Business Climate Index.
Small data	In contrast to big data, small data is merely information generated by answers about small-scale issues, e.g. a household's energy consumption.

Source: Catella Research

The study asked the respondents to answer the following questions:

- What data is available in the real estate sector?
- What business units and activities generate the most data that can potentially be used for big data applications?
- What kind of added value can be achieved by applying a linked-up analysis to the existing data?
- What is the segment's understanding of big data, and is big data already in use as a basis for making decisions?
- What kind of potential does the application of big data offer, and what challenges does the sector still face?
- What fields in the real estate sector are most influenced by big data?
- How will the job of researchers change?
- Can big data be used to generate greater transparency, and can this enable companies to identify new trends faster?

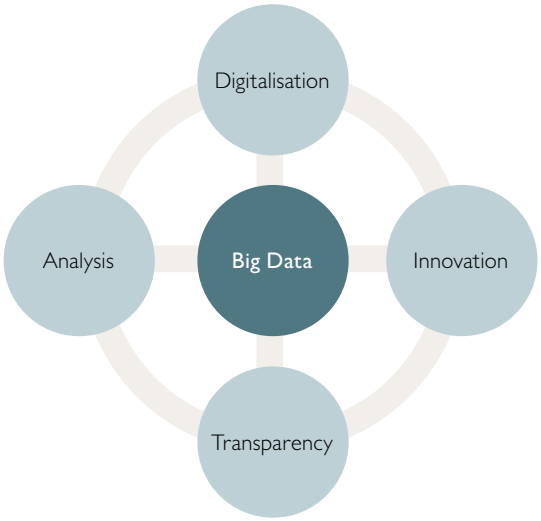
Analysing the potential of big data and its applications

According to a 2011 study by the International Data Corporation, the volume of data doubles globally every two years. Between now and 2020, the global volume of data is predicted to go from its current level of 4.4 zettabytes (4,400,000,000,000 gigabytes) to a total of 44 zettabytes. That's a tenfold increase. This growth will be driven largely by digitalisation and the associated storage and analysis of data. It will be no longer possible for humans to analyse and structure these immense quantities of data. New solutions will be necessary, and this is where big data comes in. As mentioned above, the term not only describes the huge datasets themselves, but also the new methods of analysing them. The major questions in the debate are how the data can be used correctly and how these huge quantities of information can be distilled to create smart data. Increasingly powerful computers can use automated and self-learning algorithms to sift through massive datasets to uncover trends and facts which had previously gone unnoticed. Predictive analytics is the term used for the discipline of using these massive datasets to make forecasts. Offering a host of advantages, big data solutions of this type are already well established in many economic fields. Enhanced efficiency in certain sectors also means that many observers describe data as a fourth element in the production process.

Data mining is the term given to systematic statistical methods that are applied in order to identify patterns and extract information from the seemingly endless supply of facts and figures.

These developments have given rise to many new professions, such as data scientists.

Fig. 2: Big data: powering potential



Source: Catella Research

Big data: the pros and cons

Tab. 2: Big data's pros and cons

Pros	Cons
■ More accurate forecasts/predictions	■ Big data does not have the same importance at all companies
■ Market transparency	■ More expensive to harness
■ Identifying previously unknown potential	■ Privacy and data protection: who is allowed to use the data?
■ Faster and more comprehensive analyses	■ Swarm stupidity? –> "Perceived connections"?
■ Faster reactions by management	
■ Improved customer service	

Source: Catella Research

The pros and cons of big data can be largely correlated to the potential and challenges connected with its usage. The advantages generally affect companies' efforts to optimise efficiency and processes, while the main problems are the challenges and problems of implementing and making efficient use of big data.

Greater forecast stability and accuracy are among the main benefits delivered by big data. By making it possible to analyse a cross-section of so many different kinds of data, users can obtain vital information about new trends and so make better forecasts. Used correctly, this new method of analysing data can therefore produce **more information** and, by extension, **enhance market transparency.** More information also puts big-data-using companies in a position to secure themselves a vital advantage over their competitors. For example, a firm can use real-time analyses to create dynamic pricing systems subdivided according to customer groups. Another advantage conferred by big data is its suitability for **performing fast and comprehensive analyses.** As big data lets companies simplify processes and reduce the time required for analyses, managers and decision-makers can respond faster to unexpected developments. Better **customer service** is another potential benefit of big data. Creating an extremely transparent profile of customers lets companies cater to their needs more efficiently.

Of course, big data also has its downsides. One is the relatively high **price tag** that comes with implementing the approach, meaning that some firms possibly cannot afford to take advantage of it. Furthermore, big data does not have the same importance at every company, as experience and personal contact still play a major role in certain markets and business sectors. **Privacy and data protection laws** are another hurdle to be cleared before big data solutions can be applied. Who owns the data and who can use it is an issue that resurfaces time and again. Data protection specialists and consumer rights watchdogs repeatedly call on companies to use the collected data in a transparent manner. Another potential problem is in big data's perceived benefits and how it is liable to **manipulation.** Recently, a falsified report about a bid for Twitter caused the share price of the short message service to surge by 8% due to automated trading systems responding to keywords. This kind of incident makes it obvious that we shouldn't just accept patterns on blind faith – we need to apply our critical faculties as well.

Potential/use cases/ applications

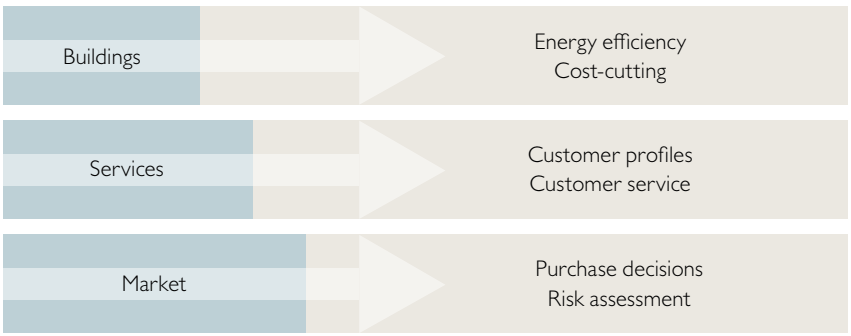
- **Medicine:** Big data analyses have enabled medical experts to identify parallels between different patients' symptoms, making it possible to diagnose more and more conditions by comparing symptoms.
- **Agriculture:** Climate change has often posed difficulties for farms when selecting the right time to sow crops, use fertilisers and start harvesting. These problems can be minimised by using climate data.
- **Finance:** The period of time between buying shares on the stock market and then selling them on again has contracted significantly over the past few decades, largely due to the application of big data.

Big data in the real estate sector

As our above-mentioned examples reveal, using big data solutions offers tremendous potential and can increase efficiency within different economic sectors. But what implications do they have for the real estate sector, and what potential do they offer? First of all, one thing that must be reiterated is that the real estate sector is very varied, and, as a result, it offers many situations where applying big data approaches can be of benefit. The three most significant applications are shown in Figure 3.

Buildings: large volumes of technical data are already being gathered and analysed in real time. This, for example, permits owners to modify the buildings in question, such as undertaking extensive measures to enhance energy efficiency to reduce operating costs. **Services:** transparent customer profiles make it possible to develop higher-quality services that are a better fit for the clients' needs. **Market:** similarly to how they are used in the financial sector, big data strategies can produce financial, investment and market insights that help with assessing risks and making decisions.

Fig. 3: Uses of big data in the real estate sector

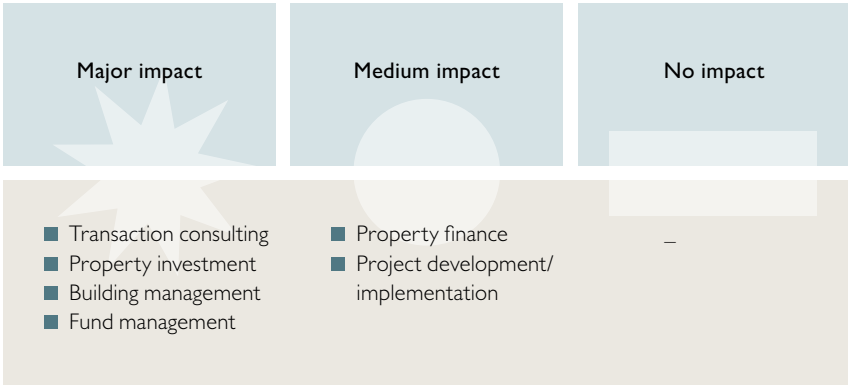


Source: Catella Research

It goes without saying that big data does not have the same impact on every field and business division in the real estate sector. Figure 4 grades different activities within the sector according to the intensity of this impact. A star signals that big data has a major effect, be it positive or negative. A circle means medium impact, while a minus sign signals that big data has negligible implications.

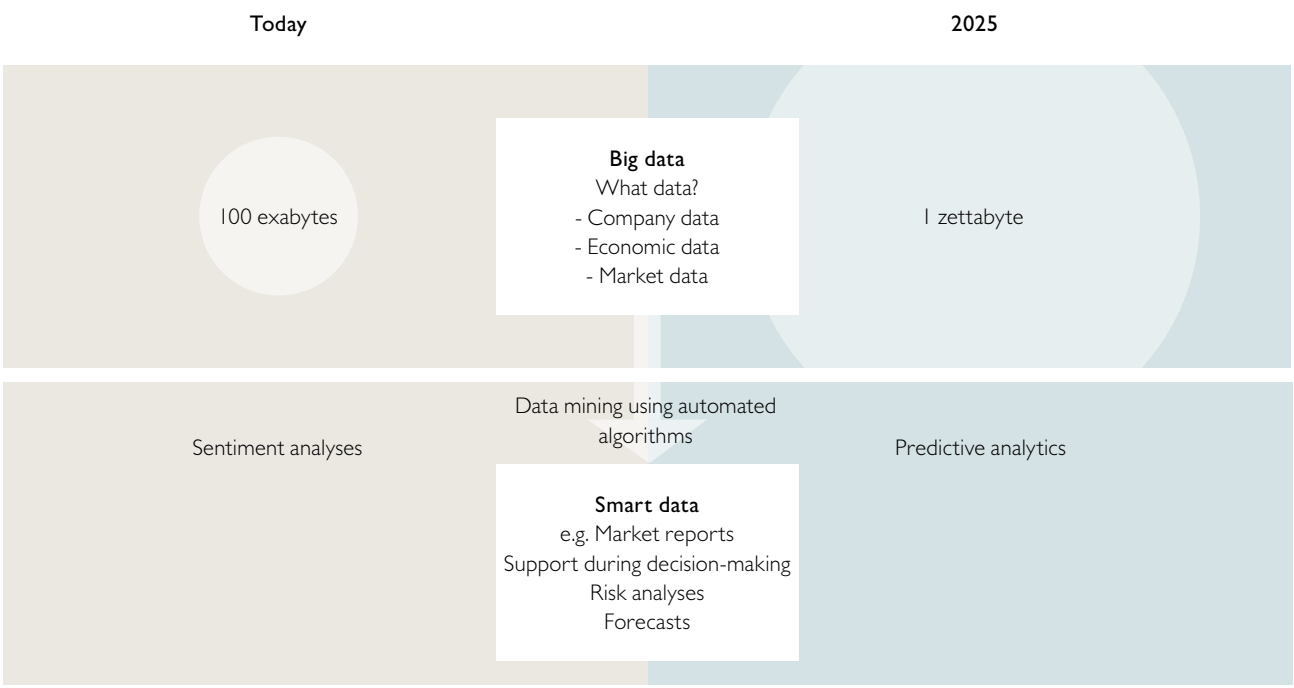
As described above, big data affects different levels in the real estate business in different ways, so its impact on these levels' different subsections also varies. At Catella Research, we therefore view it as having a marked influence on most activities.

Fig. 4: Strength of big data's impact



Source: Catella Research

Fig. 5: From big data to smart data: data mining and algorithms



Source: Catella Research

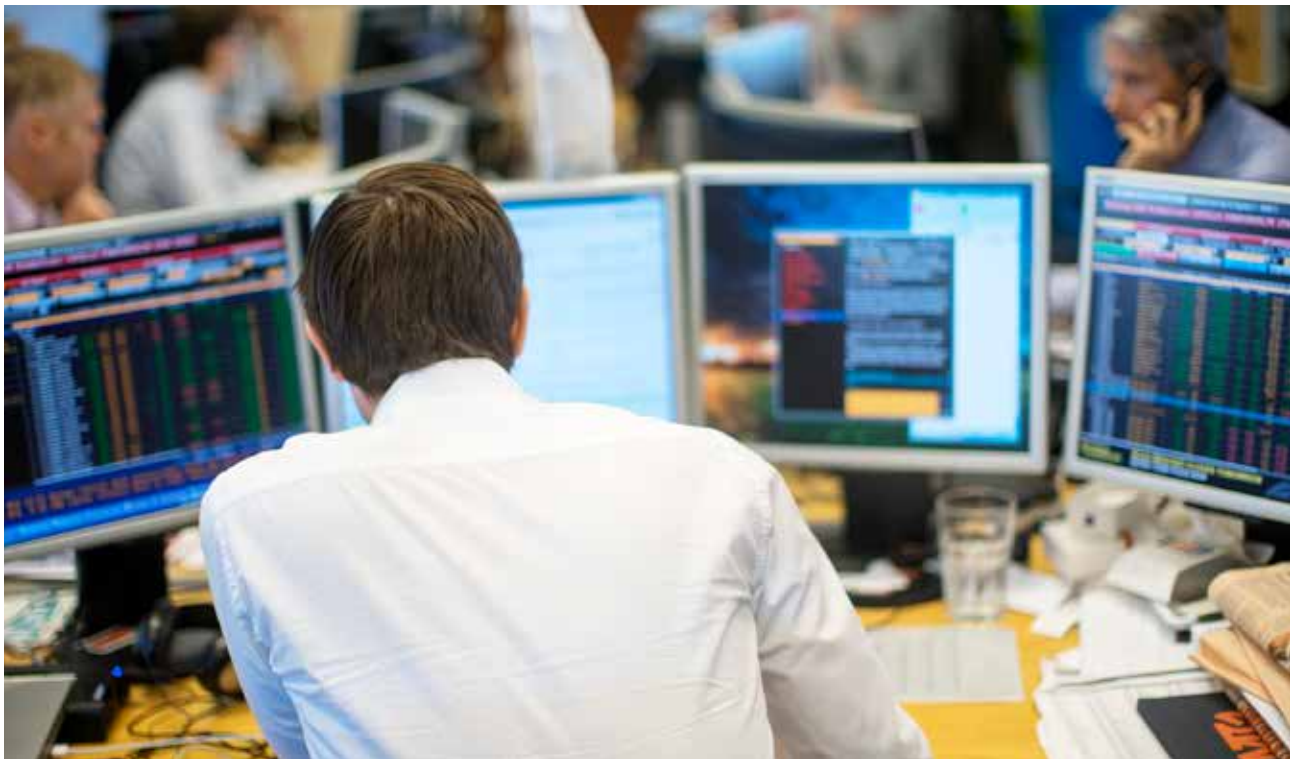
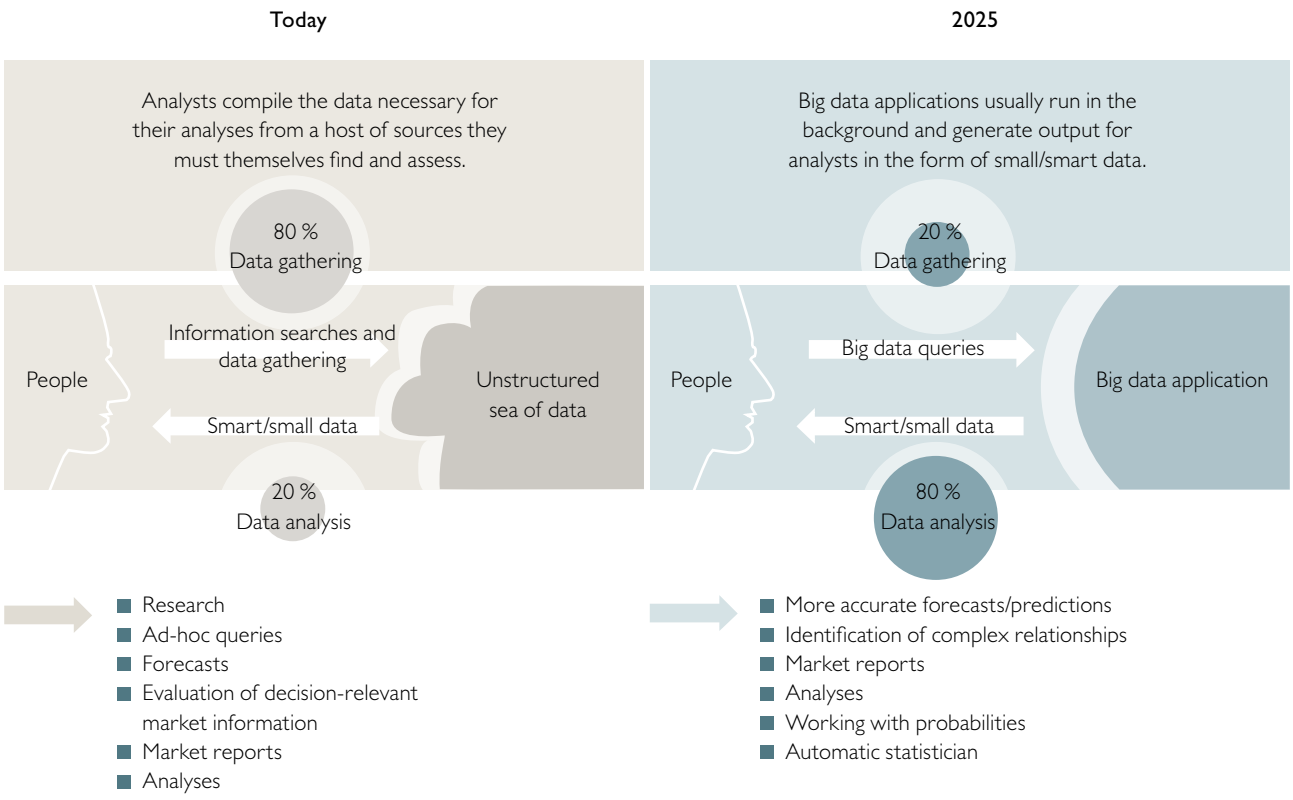


Fig. 6: From big data to smart data: changes in analysts' work between now and 2025



Source: Catella Research

3 Catella's big data survey

Methodology and participant structure

At Catella Research, we believe that the best way to assess the role of big data in today's real estate sector is to conduct a quantitative survey in the form of a questionnaire. We drafted a catalogue of questions regarding the current situation, the application of big data in the real estate sector and future trends. This enabled us to investigate how things stand at present in the sector, what challenges companies are tackling, what the necessary prerequisites are for using big data, and what its potential is. We uploaded our questionnaire to the online survey portal surveymonkey.com in July and August of this year and sent selected companies the link to the survey.

The sample group comprised major real estate firms throughout Germany (250). We used NREV and EPRA members (excluding academic institutions) to conduct a spot check of international firms, and we contacted a total of 468 European companies. Our contacts at these companies included managing directors, investor relations staff and specialists from PR, IR communication and research units. Within Germany, we contacted the most important and/or largest companies active in the fields of project development, investment, listed real estate companies, pension fund managers, transaction consultants, real estate financiers and property management companies. Again, the people we contacted included managing directors and experts in IR, communications and research.

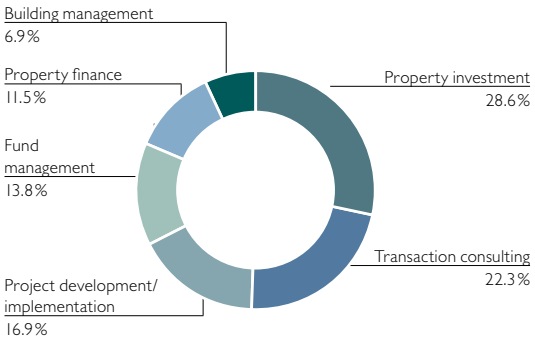
A total of 132 companies completed the questionnaire, corresponding to 28 % of the number contacted. Due to the size of the spot check pool, the survey is not a representative study and should therefore be viewed merely as a mood indicator.

The largest share of participants came from the field of real estate investment, 28.5 %, followed by around a quarter (22.3 %) from transaction consulting. A further 16.9 % came from the field of project development/implementation.

Regarding company size, firms with 100-500 employees formed the largest cohort at 23.5 %, though there were no decisive differences between the different size groupings. Only companies with 51-100 employees are under-represented, accounting for 11.4 % of the respondents. All in all, it can be said that the survey results are relatively evenly drawn from companies of all different sizes.

What real estate sector is the main focus of your company's activities?

in %



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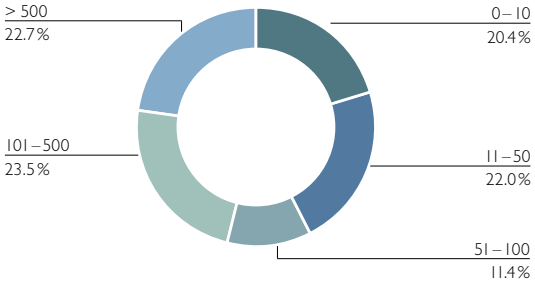
How many people work at your company?

in %



Source: Catella Research

n=132

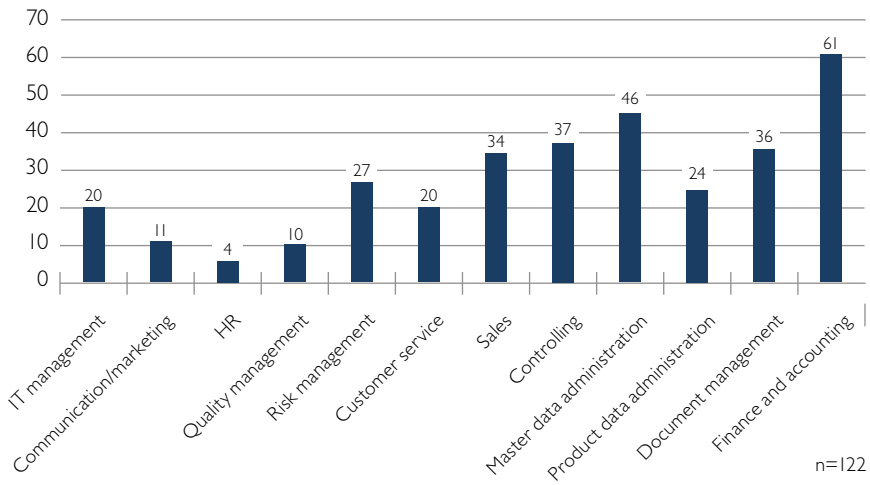
4 Results of the analysis

Big data in the real estate sector – the current situation

We wanted to ascertain the current role of big data within the real estate sector, so we asked the respondents to tell us **what divisions and activities at their companies generated, as far as they knew, the most data.** This information can reveal companies' main sources of internal and external real estate data which has the potential to be used for big data applications. For these questions, the respondents were asked to choose three options from the list.

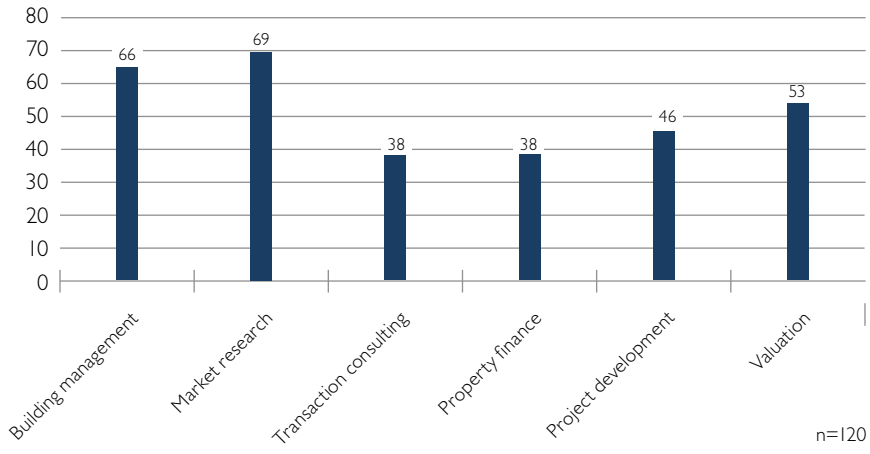
In your opinion, what business units in the real estate sector generate the most data? [Please select three]

Number



In your opinion, what three activities in the real estate sector generate the most data? [Please select three]

Number



Source: Catella Research

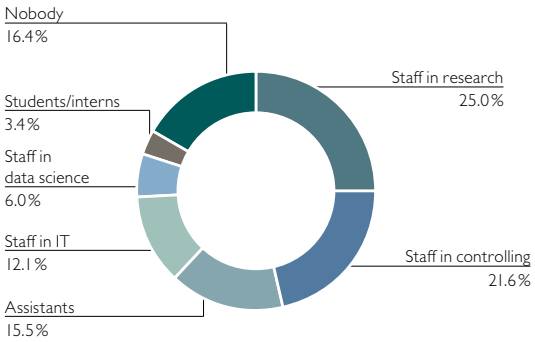
61 (50 %) of them stated that they believed that finance and accounting activities generated the most data. In second place was master data administration, named by a total of 46 respondents. Not far behind was controlling, which 37 (~30 %) of respondents believed generated the most data.

When asked to name **the fields in the real estate sector which generated the most data,** over half of respondents (57.5 %) selected market research. This is hardly remarkable as at many companies, people in this field are tasked with collecting specific data about buildings, such as floorspace and investment volume, so it can be published in the form of market reports or be forwarded to other divisions for their use. In second place after research is building management, named by 66 respondents. Again, this corresponds to over half of the total number (55 %). Here, the reason is linked to the technical data gathered by building management processes, some of which is analysed in real time. Valuation is the unit that gets the third-largest number of mentions. Assessing the value of a building factors in a wide range of different parameters, such as comparable transactions, vacancy levels and specific fixtures and fittings. As a rule, this information is stored in digital form and supplies the basis for a valuation.

Another question attempted to find out **who is in charge of collecting and processing data in each of the companies.** We believe that this question is essential for assessing the current status of the issue as new kinds of specialists are necessary to make more extensive and in-depth use of the data. One quarter of the respondents named researchers in their answers. This chimes with the answer to the previous question, which revealed that research is the field generating the most data. 21.6 % of respondents believed that their controlling experts were in charge of collecting and processing data. "Data scientist" is a new job profile that is gaining ground as data processing increases in importance, and 6 % (7) of companies answered that this profession was the one responsible for collecting and processing data. A total of six companies revealed that their data scientist was the person responsible for data: three of them are active in real estate investment, and the other three are involved in fund management. Two very finance-heavy fields, in other words. All in all, it seems that data usage is gaining ground, which signals that companies are rethinking the situation and undergoing a structural shift. Nevertheless, we should be cautious with this claim. Almost a fifth of respondents state that they employ students and interns to collect and process data – or nobody at all.

At your company, who is in charge of collecting and processing data?

in %



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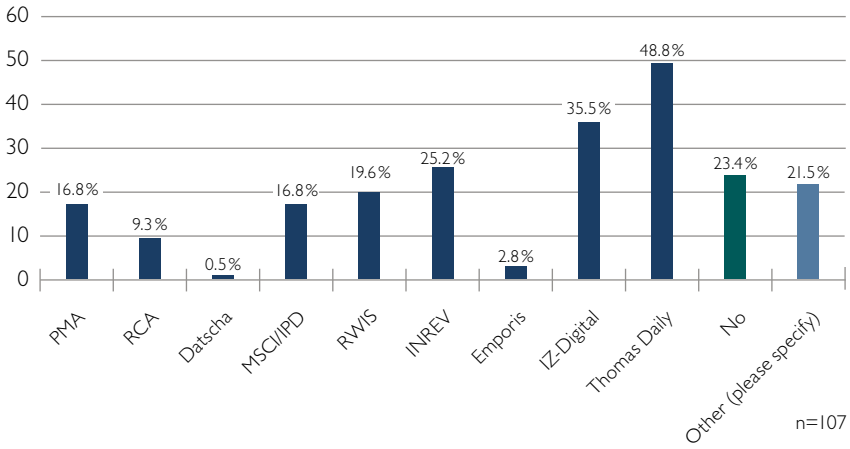
Does your company make use of fee-charging real estate databases? If yes, which ones? [Multiple answers possible]

in %



n=107

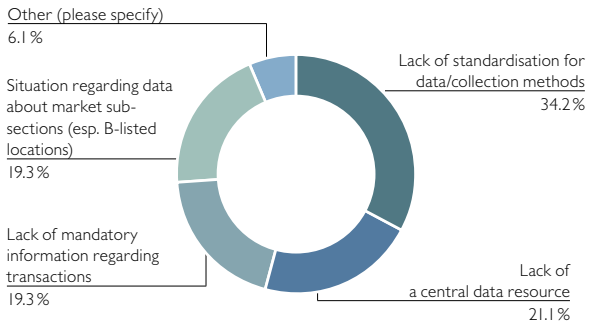
Source: Catella Research

Another important indicator for data usage within the real estate sector is **access to fee-charging databases.** Even small companies that do not have the resources to collect large quantities of data by themselves can use these services to source extensive information for use in market analyses and decision-making processes. Almost half (48.6 %) of respondents stated that they used Thomas Daily as a database, though this was mostly restricted to the German market. IZ-Digital came in second at 35.5 %. Covering all of Europe, INREV's database was named by almost a quarter of companies, putting it in third place. Respondents could use the field labelled "Other" to include databases we had not explicitly included. Table 3 shows some of the details. The Office Rank database is of particular interest given the subject of our survey, as it is an automated ranking system of buildings which analyses huge quantities of data about markets and buildings, making it a good example of how big data can be deployed in the real estate sector. Be that as it may, however, about a quarter (23.4 %) of respondents said they did not use any property databases. Still, care should be taken when interpreting this figure as companies can collect and utilise their own data, so this answer is not necessarily a sign that the firms in question make no use of data whatsoever.

Another question looked at the inescapable **issues of transparency in the property market.** As mentioned above, many observers consider real estate markets to be extremely opaque due to their variety and regional/geographic differences. We wanted to hear if companies perceived shortfalls in transparency that they would have to address, so we asked them to identify the worst transparency-related problems that they encountered in their everyday work. Just over a third (34.2 %) complained that data and data collection methods were not standardised. The sector uses a range of different collection methods and standards, undermining companies' ability to draw comparisons between market and property data. While efforts to define collection processes and KPIs are being made in Germany (by gif e.V.), and the system of International Property Measurement Standards (IMPS) is also in place for the international market, the sector's companies are not putting these measures into practice across the board. The international market in particular suffers from divergent market- and property-related data and the lack of standardisation makes comparisons very difficult.

What problems regarding transparency in the real estate sector do you encounter on a daily basis?

in %



Source: Catella Research

n=114

21.1 % of respondents claimed that the second most widespread problem is the fact that there is no central resource for supplying data. This is in part due to the lack of standardisation. Each company gathers its own data, so this information is structurally very heterogeneous. Though fee-charging databases serve as a source of standardised information, each database is again different from its peers.

Information about market subsections and the lack of mandatory disclosure when transactions are completed came in joint third, each being selected by 19.3 % of the respondents. A further 6.1 % used the "Other" field to name a different transparency-related problem (see Table 4).

Taken together, it is obvious that all of the complaints are linked to a lack of data, a shortage of information. This is exactly where big data comes in, as its real-time analyses and automated data generation process can ameliorate the situation of inadequate transparency.

Tab. 3

Other fee-charging real estate databases	
■ REMO	■ Locatus
■ BVI	■ Office Rank
■ MB Research	■ empirica-systeme
■ Bloomberg	■ IDN Immodaten
■ Thomson Reuters	■ Imabis
■ IBB	■ Own statistics/Own Dataroom for DD/Transaction
■ EGi	■ Immobilienscout 24
■ FMINIT	■ Green Street Advisors
■ BIIS	

Source: Catella Research

Tab. 4

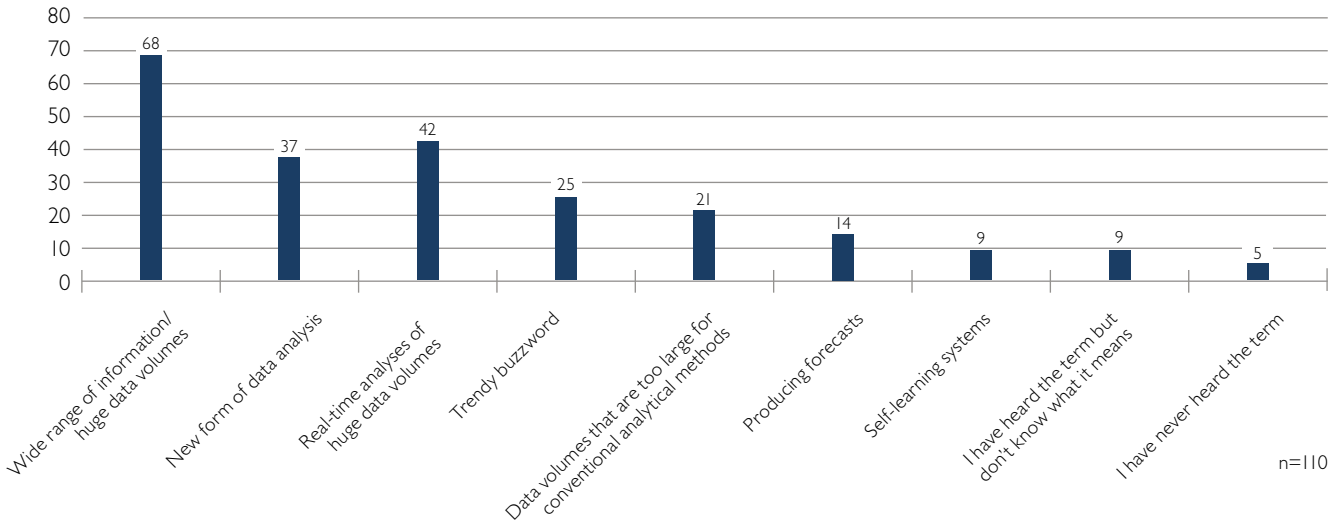
Transparency problems mentioned in "Other" (excerpt)

- Incomplete information
- Closed markets
- Variety of building stock
- Lack of cross sector data within building management and porftolio management
- Difficulty in gathering, storing and analysing data on tenants and properties

Source: Catella Research

Deploying big data in the real estate sector

What do you associate with the term "big data"? [Please select three]
Number



Source: Catella Research

We wanted to find out what (if anything) companies in the real estate sector knew about big data, so we asked the respondents to tell us **what they associated with the term.** We were amazed to see that just five of them said they had never heard the term "big data" before. Another nine (8.2 %) said they had heard it but had no idea what it meant. This led us to conclude that big data is actually more familiar to the sector's companies than we had initially believed.

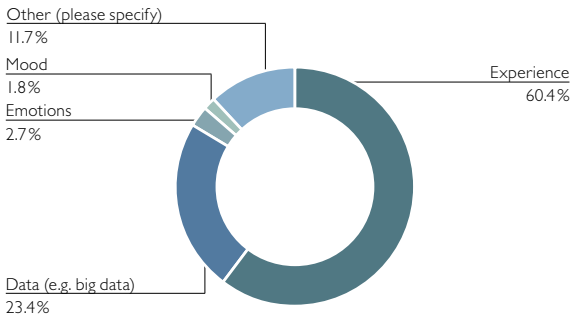
A wide range of information and huge data volumes was the most widespread association with the term (68 respondents, 61.8 %). It was followed by real-time analyses of huge data volumes (42 respondents, 38.2 %). A new form of data analysis was in third place. These responses are in line with our definition and can therefore be viewed as the majority opinion. While there were 25 (22.7 %) respondents that **dismissed big data as a trendy buzzword,** undermining the importance of the issue, we can say that the real estate sector as a whole is well aware of the topic. Be that as it may, our statistics do not permit us to make any statements about how the companies actually deploy big data.

We therefore asked them in the next point to indicate **what they base their decisions on.** 60.4 % of respondents said that they normally went with their experience. Almost a quarter (23.4 %) stated that they made largely data-based decisions, something that encompasses big data. In the "Other" field (11.7 %), most respondents mentioned a combination of the four answers on offer, with data and experience being the most commonly named combination. This question reveals that many companies are already using data as a basis for their decisions, but experience remains the most important factor in the decision-making process.

The next question asked the participants to choose from a range of **possible ways that big data could be used in the real estate sector,** and we gave them a few options. The "Other" field also gave them the **opportunity to describe their own ideas.** The majority of respondents, 77 (71.3 %) said they felt big data could be used to support and improve decision-making processes. As revealed in the previous point, many companies already use data as a factor in their decisions,

What do you normally base your business decisions on?

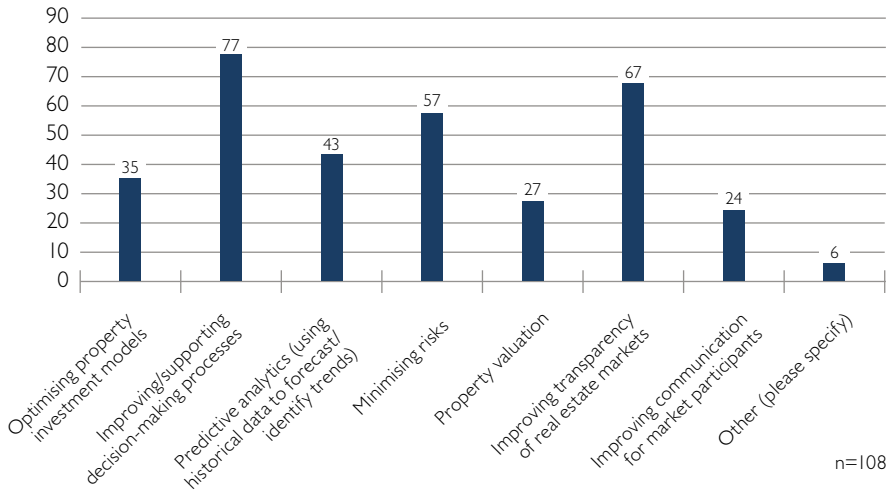
in %



n=111

In your opinion, what potential does the use of big data in the real estate sector offer? [Multiple answers possible]

Number



n=108

Source: Catella Research

and the respondents indicate that this is where the greatest potential lies. A further 67 companies stated that big data can serve to enhance transparency on the real estate market. Linking up the analyses applied to the sector's data would reduce the level of transparency-related problems and so generally enhance markets' transparency. Another frequently mentioned point was that the respondents believed that big data can help to counteract risks. This fits together neatly with market transparency and improved decision-making thanks to data deployment.

Respondents used "Other" mainly for comments about improving customer information and sales activities. Just one company stated that using big data in the sector conferred no benefits (Table 5).

Tab. 5

Big data's potential mentioned in "Other" (excerpt)

- Much greater ability to tailor our offering (residential) to the needs of our tenants
- Better reaction to customers = tenants (users)
- Advantage for those that will use it well
- Increase efficiency of target research
- Difficulty in gathering, storing and analysing data on tenants and properties
- Supporting sales activities
- I see no advantages

Source: Catella Research

Alongside its potential advantages, another aspect to the implementation of big data in the real estate sector is associated with **challenges and preconditions, two factors that the sector needs to address.** Some three quarters (~75 %) consider the accessibility and availability of data to be a hurdle. We mentioned above that largely unstructured data storage systems, divergent collection methods and the resulting heterogeneity of data can initially make it difficult to apply big data strategies. The last-mentioned of these problems also contributes to the inadequate or even lack of standards for the sector's business. This was pointed out by 44 companies, putting it in third

place after privacy and data protection. In other words, the main task facing the sector is to concentrate on standardisation and reducing variation between its datasets if it wants to make use of big data. At Catella Research, however, we believe that the inverse argument can also be made, that big data can contribute to standardisation in the sector. This might sound merely contrarian, but we believe that it is possible to have a standardised, real-time KPI data collection system with clearly structured, widely accessible databases. Companies should not compete with each other here – they need to work together.

Inadequate support from management was the response that got the least "votes" (18). It would seem that big data is already a topic being debated by management at most companies, creating an awareness that the sector needs to change its approach. This makes sense when we consider the preceding question (view of big data's potential/added value).

We mentioned above the impression of increased standardisation, and this partially confirmed by our **question about big data's impact on the sector.** 55 answers (51.4 %) indicated that big data contributes to standardisation in the real estate sector. The frequently named points under the heading "potential" also signal its impact: greater transparency (72), risk minimisation (64), and support during decision-making (53 and 52).

Merely six respondents stated that they saw big data having no impact on the sector. It seems that the "human factor" will maintain its importance even after companies start using big data, as just 6.5 % of respondents said its deployment would constrain managers' decision-making autonomy.

The companies used the "Other" category to indicate additional potential effects (see Table 6), such as further professionalisation within the real estate sector, new job profiles and greater competitive advantages. A boost in transaction activity and faster decisions were other outcomes they named. One respondent's response in "Other" was negative/neutral. They stated that automatic interconnectedness didn't really exist and that it was just something that people blindly believed in.

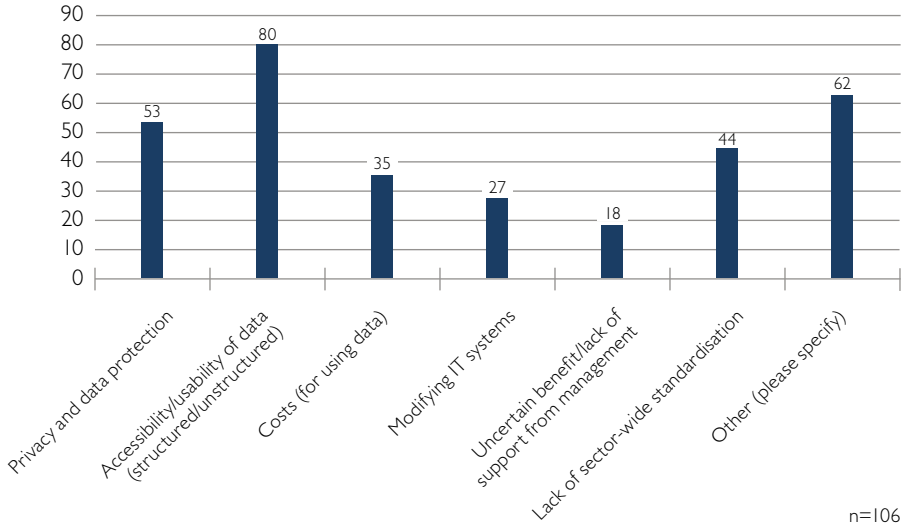
Tab. 6

Challenges mentioned in "Other" (excerpt)

- Competitive advantage
- Further professionalisation
- New job profiles
- Market participants display uniform behaviour
- Blind faith in automatically generated interconnectedness that doesn't really exist
- Better adaptation of product & service to user needs

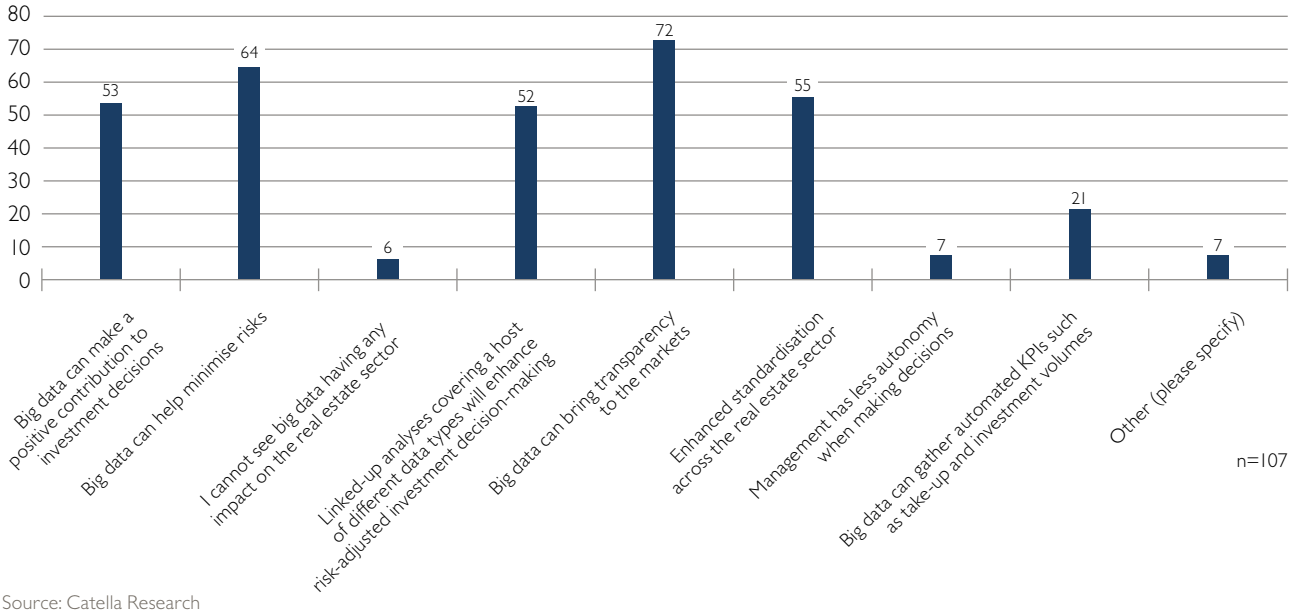
Source: Catella Research

With regard to applying big data strategies to the real estate sector, what do you believe the challenges/necessary prerequisites are at present? [Multiple answers possible]
Number



Source: Catella Research

In your opinion, what impact can big data have on the real estate sector?
[Multiple answers possible]
Number



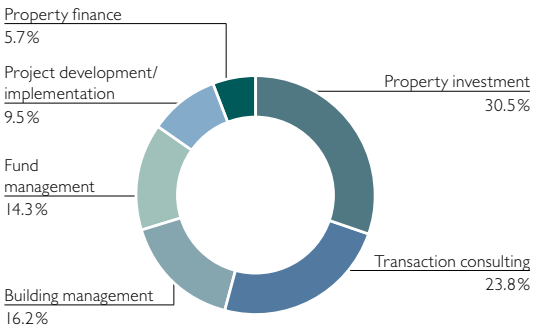
n=107

Source: Catella Research

The respondents believe that changes will be at their most marked in the fields of property investment (30.5 %) and transaction consulting (23.8 %). A further 16.2 % think that big data will cause the greatest changes in building management.

What sector of the real estate industry will, do you think, undergo the greatest changes due to big data?

in %



Source: Catella Research

n=105

In light of our assumption that **market research** will generate the most data or be the field with the largest store of collected data, we included a question **focusing on the possible impact on this specific sector.** Here, it is possible to look at the issue from two standpoints. On the one hand, this market segment could be felt to be of lower importance as automated real-time analyses make it possible to generate KPIs, etc., and computers will therefore handle more and more of the researcher's workload. However, it can also be argued that research will become even more important, as better data will make it possible to produce more accurate forecasts and trend predictions.

The majority of respondents assumed that the latter outcome will be the case. None of them felt that research would become less important, and just one

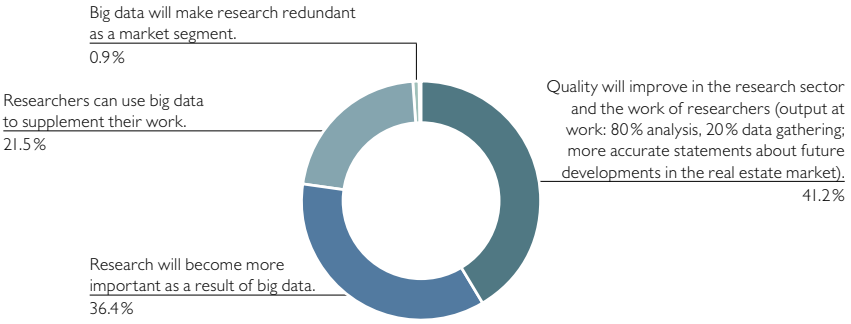
person thought that the field would become redundant as a result of big data's usage. In contrast, 42.2 % assume that big data will make research and the work of the researcher better in terms of quality. At Catella Research, we believe that the workload figures of 80 % for data gathering and 20 % for analysis could be reversed. Furthermore, having access to better data and analyses could make it possible to develop more accurate predictions of the real estate market's future development. About a third of companies believe that research will grow in importance, while approximately a fifth takes a neutral stance on the impact on research as a discipline, as these companies merely view big data as a supplementary tool for researchers.

Coming to the end of our survey, we wanted to pose a question to see if **enhanced transparency as a result of big data can lead to greater market stability.** Answering this question, 16 % of companies said they fully believed it would, while 49.1 % said it would, but had some reservations. This contrasts with some 30 % of respondents who did not agree with the question's statement and a further 3.8 % who disagree strongly with it.

Here, it is once again possible to look at the issue from two standpoints. Though an increase in information could lead to greater transparency, a development which would probably make coordinating supply and demand more efficient, it could just as easily be true that having access to the same information will decrease companies' competitiveness and so make markets less efficient. Given this paradox, we should bear in mind that market-based activities always have a minimum requirement to be transparent. The homo economicus has visibility of this, but his assumptions do not apply here.

In your opinion, what impact will the use of big data have on the field of research/market analyses?

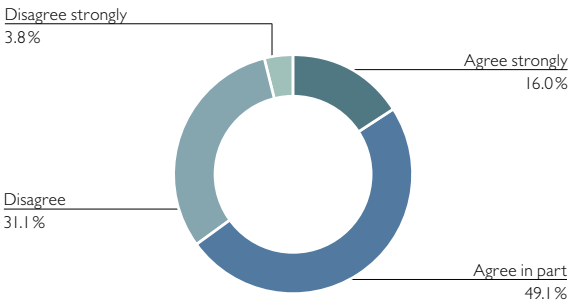
in %



n=107

Will more data lead to more stability on markets (it will be possible to coordinate supply and demand more efficiently)?

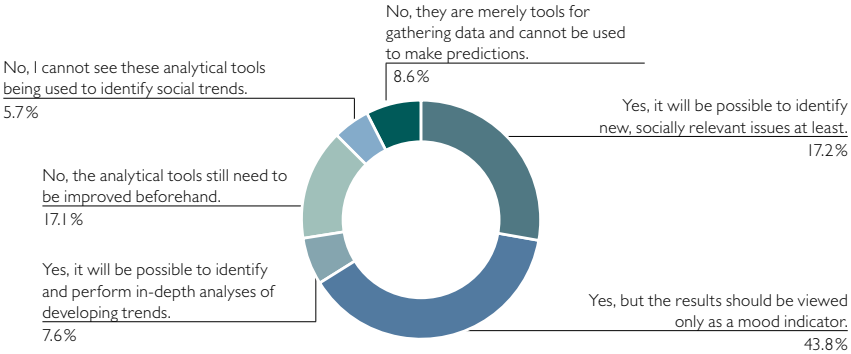
in %



n=106

Do you believe that analytical tools such as Google Trends and Google Analytics will make it possible to use automated algorithms for generating better forecasts/ predictions about potential trends?

in %



Source: Catella Research

n=105

We rounded off our questions with one that was not specifically about the real estate sector: **is it possible to make forecasts and predict potential trends using big data analysis tools such as Google Trends and Google Analytics?** About a third of respondents voiced their scepticism. 17.2 % claimed that these analytical tools needed further improvements before they could be used to make predictions. Another 8.6 % believed that Google Trends and Google Analytics were nothing more than tools for gathering data and had no predictive capacity at all. 5.7 % went even further, stating that they simply did not believe that the tools could provide insights into social trends, now or in the future.

The remaining cohort, i.e. about two thirds of respondents, thought that the tools could be of use to a greater or lesser extent. 7.6 % of them are certain that they can be used to make accurate forecasts about developing trends and analyse them in depth. A further 17.2 % think that the tools are at least able to identify social trends as they arise. The remaining 43.8 % gave a positive answer, but they added that the results should merely be viewed as a mood indicator.

5 Conclusion

While you were reading this study, some 460 new homepages were created, 38 new companies were established, and 65 terabytes of data were generated. Clearly, the sector is tremendously dynamic, so it is equally clear that any survey can provide no more than a brief snapshot of an environment that changes second by second. Every answer generates ten more questions. It is also clear that companies in the real estate sector view data as a fourth production factor due to its possibilities for enhancing efficiency levels. The sector is also aware that it has entered the world of real-time support for decision-making processes. Companies can make decisions faster if the decisions in turn make greater use of these datasets (real-time analyses). This will lead to changes in forecasting, with questions about outsourcing in the sector and make-or-buy options dominating the agenda. Companies focusing on property investment and transaction consulting will be particularly heavily exposed to significant structural changes over the coming years. We will not only see the rise of new professions, e.g. data scientists, but we can also already see the massive impact the issue will have on existing structures, such as predictive analytics, sales planning, dynamic pricing, automated trading, marketing, buyer behaviour analysis and customised property advertising. Customer-focused specialisation and transparent pricing will, we believe, force tremendous structural changes on the sector. Companies will also need to address the problem of data ownership: "If you have data, you possess information," is a succinct way of putting it. Looking further, we believe that the sector will see an oligopoly develop regarding data resources.

Despite the battery of new technology, the role of every participant, from analysts to CEOs, will also change. Working with probabilities will take centre stage, and experience in making decisions will therefore be a general competitive advantage. However, where is the dividing line between the famed swarm intelligence and swarm stupidity? The companies will need to look at this issue and start the evolutionary process. If all companies possess the same information, one of them can only secure its competitive advantages and additional value if is the one that has more information than its peers and can process this information faster. The general consensus in the sector is that big data is relevant, even revolutionary. It is not a threat to companies. Instead, it offers them an opportunity to successfully face future competition.

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Status: September 29, 2015

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