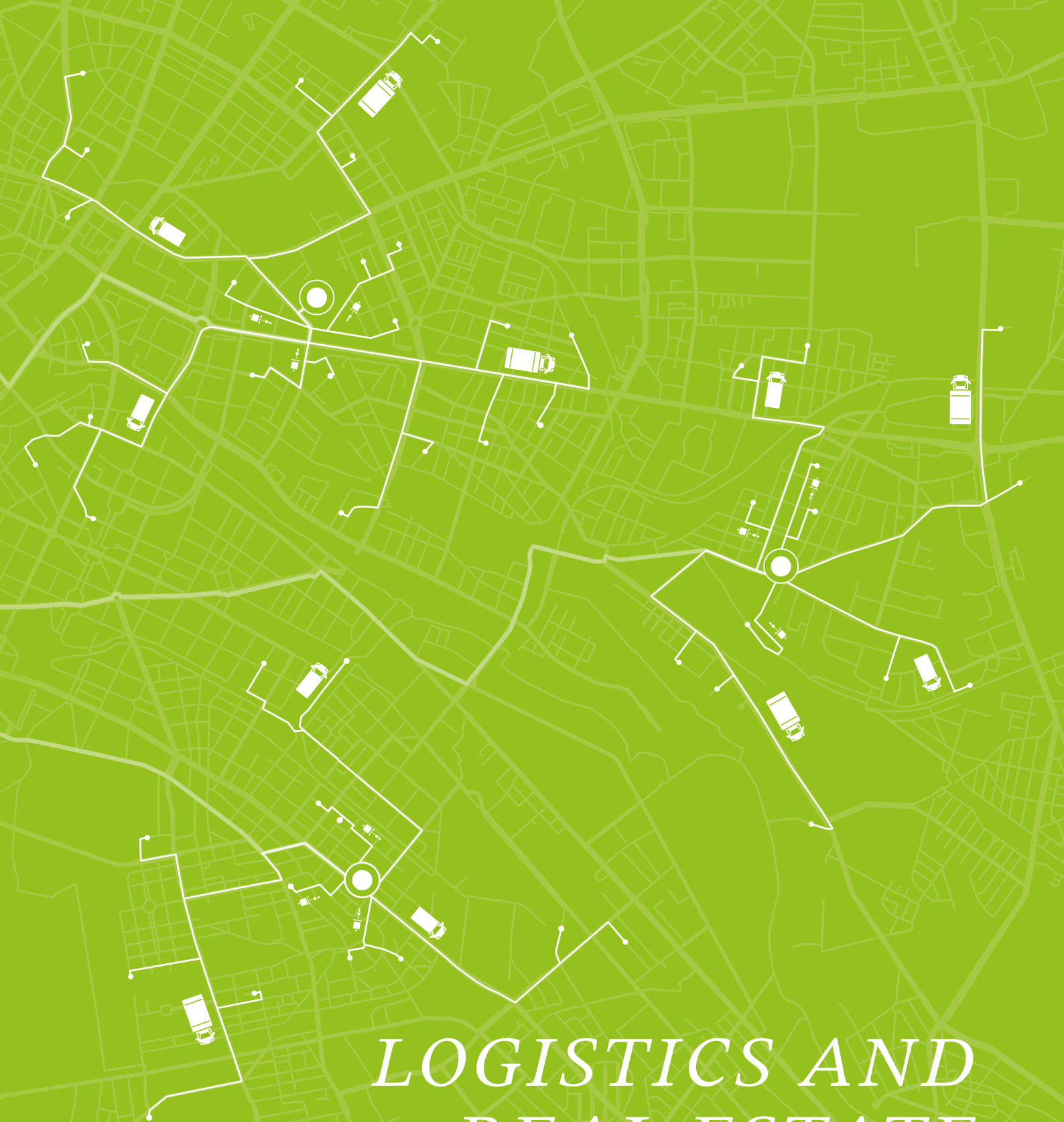

LOGISTICS AND REAL ESTATE 2017

CITY LOGISTICS. WITH NEW IDEAS IN THE CITY.

A syndicated survey of

Berlin Hyp

BREMER

bulwiengesa

Goodman

savills

LOGISTICS AND REAL ESTATE 2017

CITY LOGISTICS. WITH NEW IDEAS IN THE CITY.

LIDL LOGISTICS CENTRE HILDESHEIM
(Source: BREMER)


BITO
STORAGE SOLUTIONS

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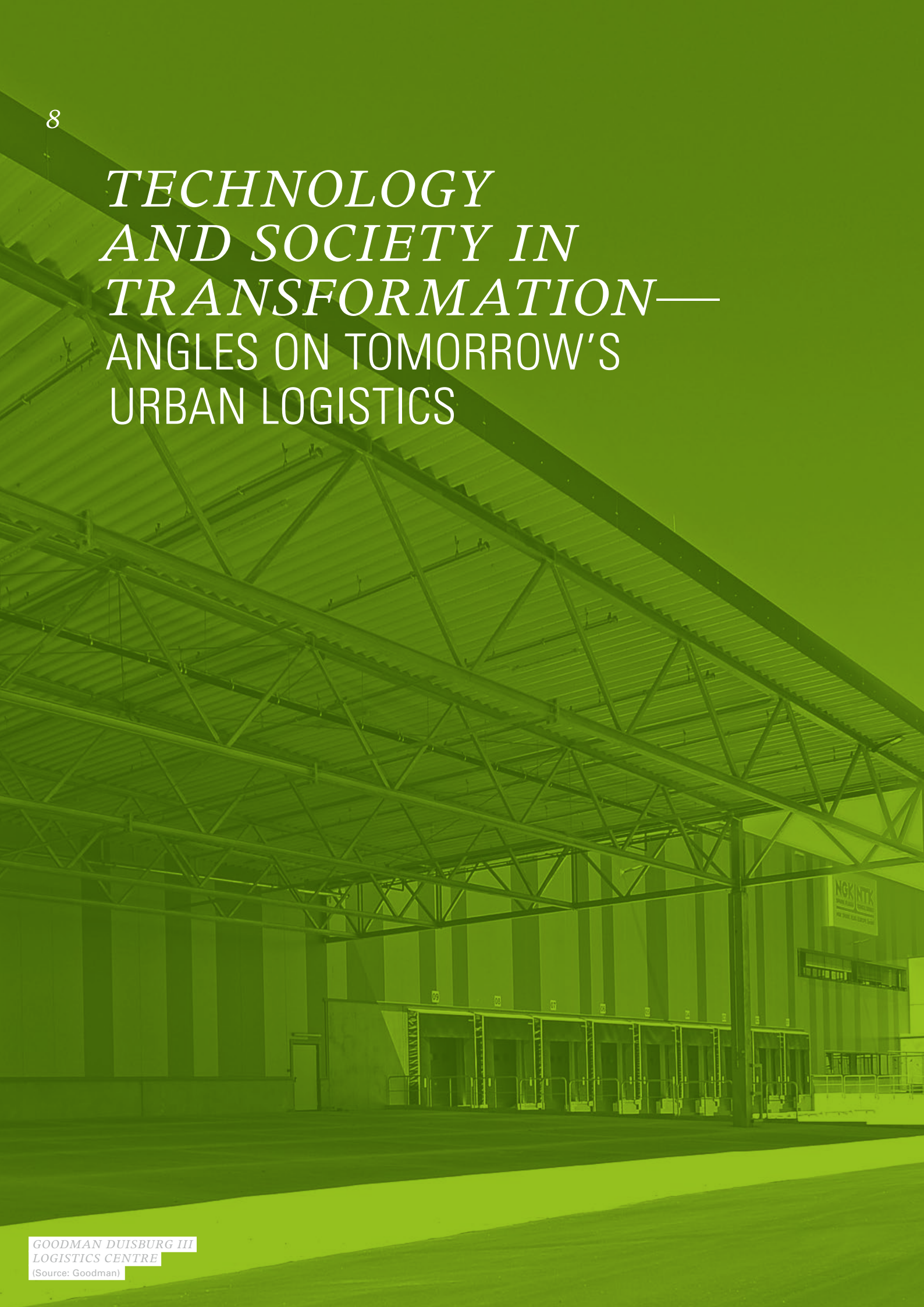
TECHNOLOGY AND SOCIETY IN TRANSFORMATION— ANGLES ON TOMORROW'S URBAN LOGISTICS



GOODMAN DUISBURG III LOGISTICS CENTRE
(Source: Goodman)

The Competence Centre for Logistics and Real Estate just published the third consecutive edition of its survey, which has already evolved into a reference work for this market segment. It provides comprehensive data and trends in the areas of development, investment and financing, and thereby makes it possible to position this important industrial sector, which continues to experience a persistently strong demand as a property asset class. At this time, the sector across its various logistics regions is subject to a brisk dynamic, and so another purpose of the survey is to venture an outlook for it. In addition to a comprehensive analysis and round-up of the conventional logistics sector, this survey also takes a closer look at city logistics.

Conventional logistics and city logistics interact in a closely networked collaboration. However, city logistics differ considerably from conventional logistics in their requirements and applications. They require massive manpower, facilities that have a notably smaller footprint while being located in urban locations as central as possible, and extreme flexibility to satisfy the desiderata of end consumers in an environment subject to relentless market pressure.

But cities with their high demand-driven parcel volumes happen to be locations with low land availability. City logistics compete with residential, office and retail real estate. In their present testing ground, city logistics operators are looking at a variety of creative solutions for coping with the space issue. As a result, properties whose rehabilitation used to be considered difficult are increasingly converted to new use. A variety of diverse and surprising solution approaches are on the table that duly take investor interests into account.

At the same time, city logistics finds itself in the stress field between classic town-planning and a massive technological shift—especially in the transport sector and in the context of emerging opportunities of big data analysis. City logistics real estate has to meet certain delivery- and workflow-specific needs as well as planning-law requirements while also having to combine these aspects with the effort of integrating into their local neighbourhood—especially in central locations. At the same time, each city logistics sector calls for a differentiated approach. Options and challenges differ considerably depending on whether you are dealing with fresh food items, textiles or high-tech products.

What sort of conclusions are experts and practitioners currently deriving for city logistics? Which testing grounds are on the minds of all practitioners? And which properties and collaboration solutions satisfy the requirements of city logistics?

Aside from discussing the latest trends in conventional logistics, this survey focuses on the complex subject area of city logistics, which urgently requires market-ready answers and requires them soon.

10

SURVERY PARTNERS

The partners of this survey series are major players in real estate financing, in the developer business, in project development, in investment consultancy, and in strategic analysis and advisory in the "logistics and real estate" sector. Within the framework of this third "Logistics and Real Estate" survey, they provide an in-depth overview of the latest trends and contexts in this field. By doing so, they open a holistic perspective on the subject for companies, industry associations and the body politic to help them make forward-looking and strategically balanced decisions.

We are looking forward to fresh insights—the focus of this issue being on city logistics—and to an animated dialogue.

Berlin Hyp

Berlin Hyp is a mortgage bank specialising in large scale real estate financing for professional investors and housing companies. For its clients, Berlin Hyp develops bespoke financing solutions in the asset classes residential, office, logistics and retail. As a company associated with Germany's savings banks, Berlin Hyp moreover has access to a comprehensive spectrum of products and services. Its clear-cut focus, its nearly 150 years of experience in the field, and its affiliation with the Sparkassen finance group make Berlin Hyp one of Germany's leading real estate and mortgage credit banks.

BERLINHYP.DE

SEIFERT LOGISTICS CENTRE IN MALSCH
(Source: Goodman)

GLASS FRONT OF THE MÖMAX LOGISTICS CENTRE BERLIN
(Source: BREMER)

BREMER

For almost 70 years, BREMER has raised buildings within every kind of performance envelope, from shell-and-core construction all the way to turnkey solutions. BREMER is a mid-market company based in Paderborn and operating six branch offices in the German cities of Stuttgart, Ingolstadt, Leipzig, Hamburg, Bochum, and Krakow in Poland. In addition to logistics buildings, its spectrum of deliverables includes office schemes, home furnishing stores, refrigerated warehouses, light industrial buildings, stadiums and hypermarkets. Since 2006, BREMER has completed around 6 million square metres in logistics facilities for more than 100 renowned logistics companies.

BREMERBAU.DE

EXAMPLE OF A MULTI STORY LOGISTICS BUILDING IN HONGKONG
(Source: Goodman)

Goodman

Based in Australia, Goodman Limited is an integrated real estate group that owns, develops and manages logistics and commercial facilities in Continental Europe, the United Kingdom, the Asia-Pacific region, North America and Brazil. It invests in industrial zones, warehouses and distribution facilities, and has more than 23.8 billion euros in assets under management today. For Goodman, Germany represents the largest logistics property market in Europe. Goodman entered the German market in 2004, and has developed around 3.4 million square metres of commercial floor area since. The German real estate experts of Goodman operate out of their two branch offices in Düsseldorf and Hamburg.

GOODMAN.COM

savills

Based and listed in London, Savills is one the leading, globally active real estate service providers domiciled and listed in London. In Germany, Savills employs a staff of around 200 professionals at seven offices in the country's leading real estate locations these being Berlin, Cologne, Düsseldorf, Frankfurt, Hamburg, Munich and Stuttgart. The company's Industrial team, headed by Bertrand Ehm, is the market leader in the areas of letting, sales and investment consultancy for occupiers, developers, owners and buyers of industrial and logistics real estate. Clients include mid-market manufacturing companies as well as globally operating logistics service providers.

SAVILLS.DE

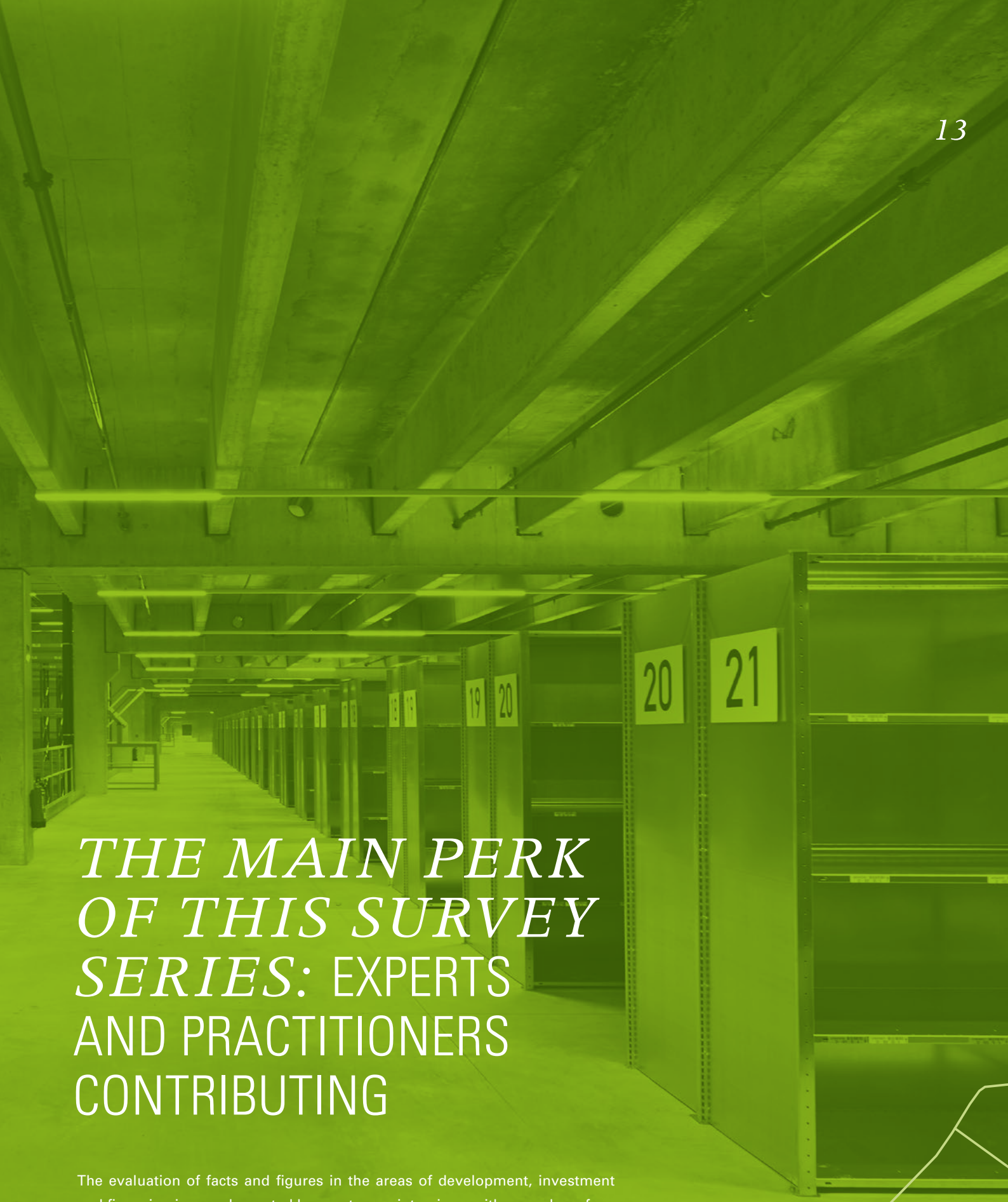
FIRE ESCAPE OF THE GREENFIELD LOGISTICS CENTRE ACHERN
(Source: BREMER)

bulwiengesa

bulwiengesa is one of the major independent analytics firms for the real estate industry in Continental Europe. For more than 30 years, bulwiengesa has supported its partners and clients in real estate industry issues as well as in location and market analyses, providing detailed data services, strategic consultancy and bespoke expert opinions. The company's RIWIS online information system delivers richly informative microdata, time series, forecasts and transaction data. The data of bulwiengesa are used by Deutsche Bundesbank for the European Central Bank (ECB), the Bank for International Settlements (BIS) and the OECD, among many other clients.

BULWIENGESA.DE

WAREHOUSE UNIT IN A DISTRIBUTION CENTRE
(Source: BREMER)



THE MAIN PERK OF THIS SURVEY SERIES: EXPERTS AND PRACTITIONERS CONTRIBUTING

The evaluation of facts and figures in the areas of development, investment and financing is complemented by one-to-one interviews with a number of experts and practitioners from corporates, municipalities and research institutes as well as by online panel surveys that provide fascinating insights. Ultimately, the idea is to arrive at an end-to-end analysis of the "logistics and real estate" subject complex.

EXPERT: *RAIMUND PAETZMANN*
AREAS OF EXPERTISE: *E-COMMERCE, CITY LOGISTICS, INNOVATIONS, AND DIGITISATION*

Raimund Paetzmann is an independent advisor with extensive experience in the areas of e-commerce and real estate. He has more than 25 years of experience in the field, defined mainly by his 14-year stint with Amazon Europe.

Raimund Paetzmann has been active in all sectors of the real estate industry during the two-and-a-half decades. He started his career in 1991 by initially managing the portfolios of smaller and mid-sized companies across asset classes, before taking a position with Union Investment for three years. In 2002, he played a key role in devising the expansion policy of Amazon Europe. As real estate director and member of the European senior executive level, Raimund Paetzmann was in charge of the design and the strategic network planning for the European fulfilment centres. He helped to mastermind the development of a new generation of logistics hubs. Paetzmann and his team were responsible for finding, acquiring and setting up 34 logistics centres plus 25 smaller hubs with a combined logistics space of 3 million sqm in Europe. Looking back on 14 years of Amazon experience, Raimund Paetzmann is currently taking a sabbatical. At the same time, he is advising municipalities, investors, developers and operators in regard to e-commerce and digitisation strategies.

EXPERT: *MARIO GLÖCKNER*
AREAS OF EXPERTISE: *E-COMMERCE, REAL ESTATE, RETAIL TRADE*

Mario Glöckner studied economics at schools in Germany and Australia, majoring in international business, before starting his career in the real estate industry where he has focused on the areas development, sales, and consultancy in various asset classes. In 2012, he joined the team of Zalando SE. Mario Glöckner has headed the portfolio management of Zalando Real Estate since July 2016. In this role, he is responsible for the entire real estate inventory, including the tasks of capacity planning and contract management. He and his team ensure that a sufficient supply of floor space is on hand to accommodate the rapid growth of Zalando.

Zalando is Europe's leading online apparel platform. The Zalando online shop gets more than 160 million visitors per month, and covers more than a dozen European markets, including Austria, Belgium and Denmark. Through its recent acquisition of Kickz, a leading multi-channel retailer in this sporting goods segment, the company took over an existing network of stores and effectively entered the brick-and-mortar retail business.

EXPERT: *RAINER KIEHL*
AREAS OF EXPERTISE: *CEP SERVICE PROVIDER, CITY LOGISTICS, MOBILITY*

Rainer Kiehl has been with UPS, one of the largest CEP (courier, express and parcel services) companies since 1986, currently as project manager for city logistics.

Rainer Kiehl started his career with UPS by learning the parcel delivery trade from the ground up, in keeping with UPS tradition. In 1988, he became operations manager at the UPS branch in Herne in the Ruhr, moving on to become the centre manager there a year later. During the years that followed, Rainer Kiehl passed through a number of departments before being appointed project manager for city logistics in 2015. He is responsible for providing support to UPS branches as well as cities and communities in the effort to accomplish an emissions-free city logistics operations. The set-up of a mini-depot system the company successfully introduced in Hamburg in 2012 has since become a recognised standard worldwide.

EXPERT: *JANINE DIETZE*
AREAS OF EXPERTISE: *BUILDING CONSTRUCTION, CONSTRUCTION LAW, INNOVATIONS, DIGITISATION*

Janine Dietze is a certified civil engineer with a degree from the Dresden University of Technology, and is currently responsible for the logistics sector at Drees & Sommer.

Janine Dietze completed her degree program in civil engineering with accolades, having majored in the academic disciplines of construction management and project management. She has been with the company Drees & Sommer since October 2010. Serving as project manager and project partner, Janine Dietze focuses mainly on projects for industrial and public-sector clients. She oversaw, for instance, plant conversions and strategic repositioning efforts for the OSRAM works in Regensburg and Malaysia, the construction of various manufacturing plants for forklift trucks of Jungheinrich AG, as well as a number of multi-project management construction projects for the city of Dresden. From the start, Janine Dietze sought to expand her expertise in the compilation of feasibility studies, project analyses and site planning, and has comprehensive knowledge and experience in cost, contrast, schedule and quality management. At Drees & Sommer, Janine Dietze is instrumental in setting up the consulting arm for the logistics industry. To this end, she commits specifically the expertise she gained through the development of numerous logistics real estate projects for industry players and by handling the "Flex-Hub (Im)mobilien" concept of BMW.

EXPERT: *DR. THOMAS STEINMÜLLER*
AREAS OF EXPERTISE: *INVESTMENT, CITY LOGISTICS, REAL ESTATE*

Dr. Thomas Steinmüller is member of the Executive Board of CapTen AG.

Having taken out a degree in industrial engineering with a focus on logistics from the University of Technology in Berlin, Dr. Thomas Steinmüller held various positions in logistics consulting firms. For many years, he was Head of International Logistics Financing at Aareal Bank AG, and currently serves as member of the board and Managing Director of CapTen AG. Dr. Steinmüller also chairs the committee of the Logistics Real Estate Platform at the ZIA German Property Federation.

CapTen AG is a consultancy firm that concentrates on the subject areas of logistics and real estate. One focus is on in-depth research in combination with predictions for the near future, as well as the analysis of wildcard effects.

EXPERT: *PROF. DR. TOBIAS JUST*
COVERING THE AREAS: *FINANZIERUNG, IMMOBILIEN*

Prof. Dr. Tobias Just is Academic Head of the International Real Estate Business School (IREBS) and professor for real estate economics at the University of Regensburg.

Having completed his vocational training as wholesale and foreign trade agent at the Otto mail-order company in Hamburg, Tobias Just read macroeconomics at the universities of Hamburg/Germany and Uppsala/Sweden. He obtained his doctorate on the subject of globalisation and ideology at the University of the Federal Armed Forces in Hamburg; his thesis actually won the university's science award in 2001. Between 2001 and October 2011, Tobias Just served as Senior Economist at Deutsche Bank Research, focusing on construction- and real-estate-related issues and on the development of industry analysis tools, before becoming Head of Industry and Real Estate Market Analysis in 2008. Tobias Just was Research Fellow at the American Institute of Contemporary German Studies at Johns Hopkins University in Washington DC. He obtained his venia legendi at the University of Technology in Berlin on the subject of "demography and real estate" in 2010. Since 2012, Tobias Just has been member of the management board of the Urban Land Institute Germany and President of the German Society of Property Researchers (gif). In 2013, Tobias Just was cited by leading real estate journalists as "Head of the Real Estate Industry."

EXECUTIVE SUMMARY

The logistics industry is booming like never before. There is a keen demand for logistics real estate, and market evidence suggests new record levels for the ongoing year 2017—in terms of both building activity and investments. One of the key drivers of this development is the steadily growing e-commerce sector. The thing is: The market still lacks adequate facilities that would satisfy the logistics requirements of the last and final mile.

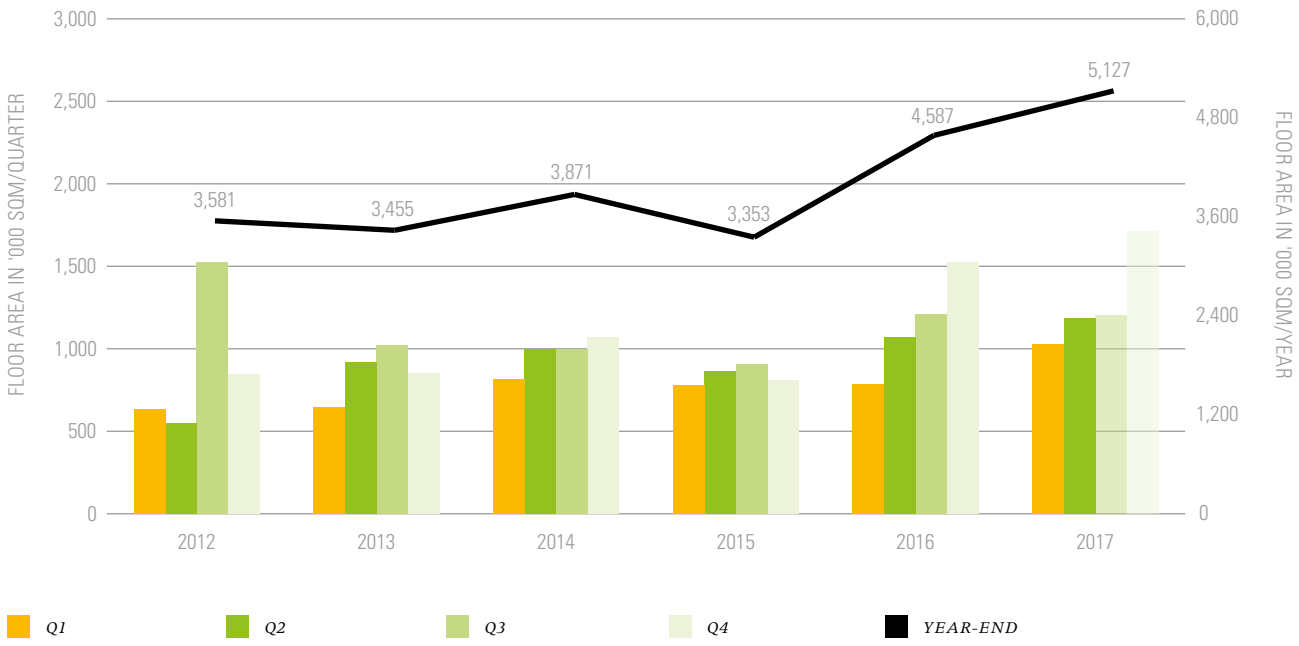
"The classic urban developers for mixed-use area or shopping centres lack the required logistics competency. While the asset classes mixing here are conventional ones, there are no market players who provide them yet."

RAIMUND PAETZMANN,
INDEPENDENT ADVISER

The increase in e-commerce in combination with ever shorter delivery times (same day/same hour) necessitates closer geographic proximity to the customers on the part of the logistics operators. As a result, online retailers hunting for suitable distribution centres (hubs) compete increasingly with brick-and-mortar retailers in Germany's inner cities. Solutions for the last and final mile—both in regard to the increasing goods delivery traffic and regarding the construction of smaller inner-city distribution stations—require a constructive interaction of all stakeholders, including the municipal body politic above all.

For the time being, the logistics industry still gravitates toward the development of large-scale logistics properties. These tend to be located on the periphery of metropolises or in the suburbs, and have convenient access to the nearest motorway, railway line or airport. Since 2012, the logistics real estate sector has been growing at an annual rate of 5.2%. Preliminary projections suggest that this year will far exceed the current year-end record, which was only set in 2016. Logistics space completions are expected to increase by 12% year on year in 2017. Even the speculative development of new logistics facilities is increasing, and it reflects the confidence within the industry and its optimistic market outlook.

*LOGISTICS FACILITY COMPLETIONS IN GERMANY, BY QUARTER AND YEAR, IN '000 SQM, 2012–2016, 2017**



* The evaluation includes all completions up to the key date of 31 July 2017 plus floor space still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)

Inner-city logistics require a new and smaller type of property. One solution approach could be to introduce new use formats into existing structures; purpose-built new buildings would presuppose a clear requirements profile to accommodate various occupiers, but so far none exist. Another factor that hampers the development of city logistics real estate is the high rent level in the inner cities—and the unwillingness among policymakers to proactively address this issue. But there are signs indicating that the mentality has begun to shift in regard to higher rents. Service providers are increasingly prepared to accept higher rents in order to be closer to their customers, and to have a footprint downtown.

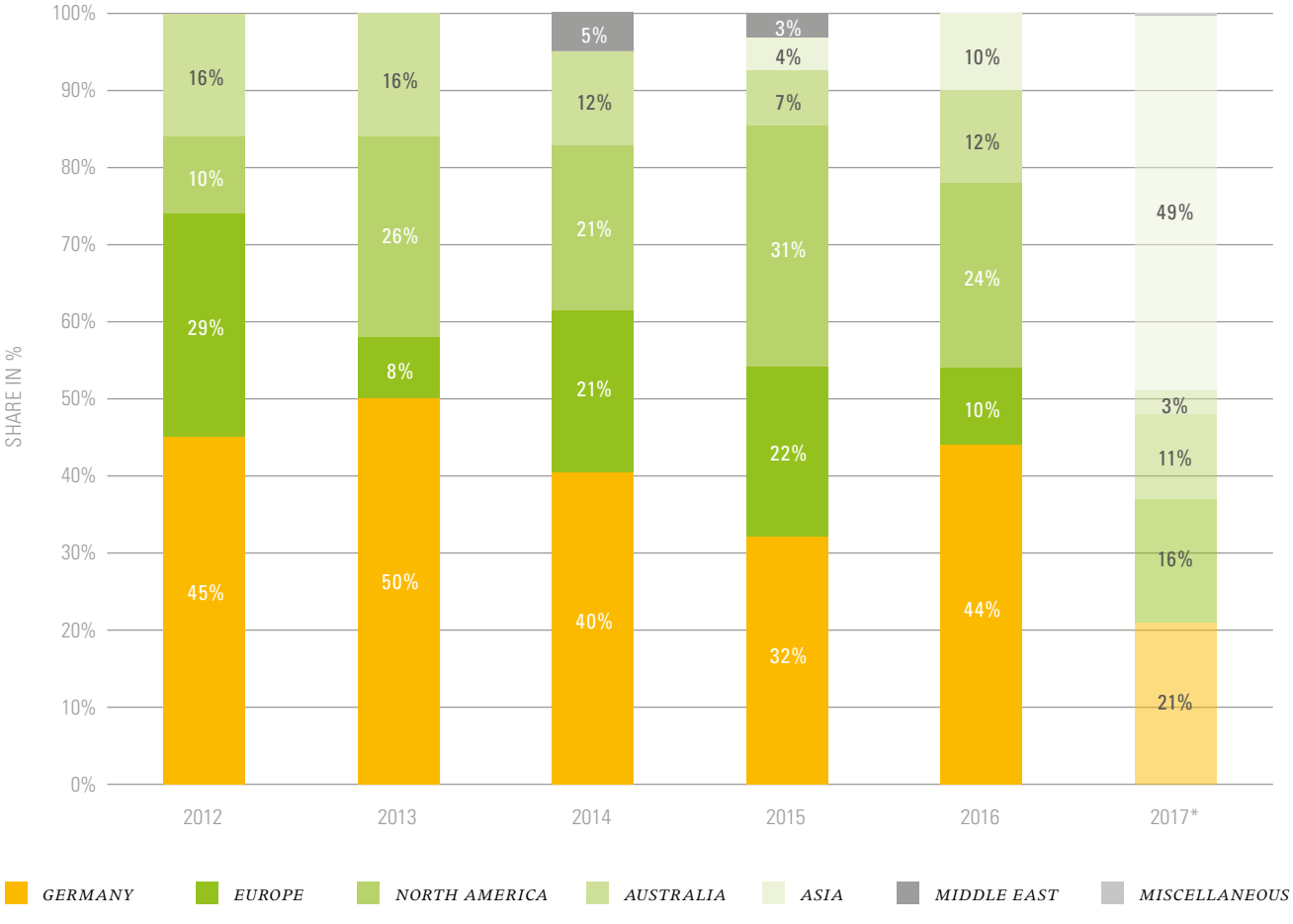
One solution approach in city logistics involves a cascading system: large central warehouses in integrated conurbations re-stock the supply warehouse on the urban periphery, which in turn re-supply small micro-depots in the inner cities.

The building-specific requirements in such inner-city logistics real estate are—for the time being—unclear; unit sizes could extend from 15 to 25 square metres for micro-depots, to a maximum of 3,000 square metres for micro-fulfilment centres, and all the way to 4,000 to 6,000 square metres for urban fulfilment centres located inside or on the edge of an urban district. Decisive here is a tightly knit distribution to maintain a wide-area presence close to the customer. To this end, multi-storey and underground car parks, lock-up retail units and offices could be converted; a comeback of urban business parks is already under way, and keywords like "vertical cities" and "intermodal stations" have become highly relevant for city logistics. Interim solutions currently include pop-up storage units in shipping containers and so-called flex hubs.

BOOMING INVESTMENTS—FOREIGN PLAYERS CLAIM NEARLY 80% OF THE MARKET ACTION

At the same time, the investment market for logistics real estate is booming. Both national and international investors are looking for sustainable investments. Market evidence points to a fast growth in investments from outside Germany in 2017. By the survey key date of 31 July 2017, an impressive 79% of all investments in the German logistics market had been committed by foreign market participants. Decisive for this figure were the portfolio transactions by Logicor (Blackstone/USA) and CIC (China Investment Corporation). Generally speaking, there is a demonstrable trend toward portfolio transactions. Having made up 40% of the total sales in 2015, their share of the market climbed to 51% in 2016, and accounts for 70% of the sales transacted in 2017 to date. Meanwhile, the trading intensity remains high, and certain properties and portfolios were already sold more than once in 2017. The enormous appeal of the German logistics market has caused yield rates to harden slightly, especially in the so-called "Big Seven" cities. Lately, investors have also started pushing beyond the Class A cities.

*INVESTMENTS BY ORIGIN OF BUYER AND YEAR, 2012-2016, 2017**



*The evaluation includes all transactions up to the key date of 31 July 2017

FOCUS ON GERMANY'S SEVEN TOP REGIONS

In the ranking of Germany's logistics regions, Munich and Berlin outperformed last year's industry leader, which was Hamburg. The region Rhine-Ruhr also made gains, as did Stuttgart and Lower Bavaria. In sync with the trend in the real estate segments residential and office, Germany's logistics real estate market manifests a general concentration on the seven top locations. This is unsurprising insofar as deliveries in the major metropolises are increasing—as developments in e-commerce and the growing significance of city logistics are coming full circle.

Implementing the outlined cascading system, which is ultimately the prerequisite of same-hour and same-day delivery, will probably be sensible only in Germany's densely populated A- and B-class cities. The model will be profitable in the medium term only if a high throughput is achieved, because otherwise the rent level of city logistics facilities will be unable to match the rack rents paid by competing types of use in the urban environment.

RANK 1: *MUNICH (↑1)*

RANK 2: *BERLIN (↑1)*

RANK 3: *HAMBURG (↓-2)*

RANK 4: *HALLE/LEIPZIG (↑2)*

RANK 5: *LOWER BAVARIA (↑7)*

HIDDEN CHAMPIONS:

RANK 6: *RHINE-RUHR (↑4)*
RANK 13: *MÜNSTER/OSNABRÜCK (↑9)*
RANK 5: *LOWER BAVARIA (↑7)*

OPPORTUNITIES OPENING FOR FINANCIERS EVEN IN CITY LOGISTICS

As keen as financiers are to invest and finance: At the moment, there is a lack of scalable concepts for inner-city logistics real estate, notwithstanding the record level building activity. Compared to other asset classes, the segment is exposed to comparatively high risks. No uniform risk-return profile exists for city logistics real estate, and the costly one-off examination of each case hampers the financing effort. As an asset class, logistics real estate is subject to a high degree of differentiation, one building being different from the next. Especially the subject of city logistics offers plenty of room for new ideas and creative concepts.

DO YOU AGREE? ENTIRELY NEW CITY HUBS WILL DEVELOP IN LOCATIONS CLOSE TO TOWN CENTRES (E.G. MOBILE DISTRIBUTION HUBS IN CONTAINERS, MIXING OF THE USE TYPES WAREHOUSE, OFFICE, RETAIL, ETC.)

0 = ABSOLUTELY NOT AGREE

100 = TOTALLY AGREE ABOUT

AVERAGE ASSESSMENT

SIGNIFICANCE ACROSS PANELS

GOODMAN LAHR LOGISTICS CENTRE DEVELOPED FOR ZALANDO
(Source: Goodman)

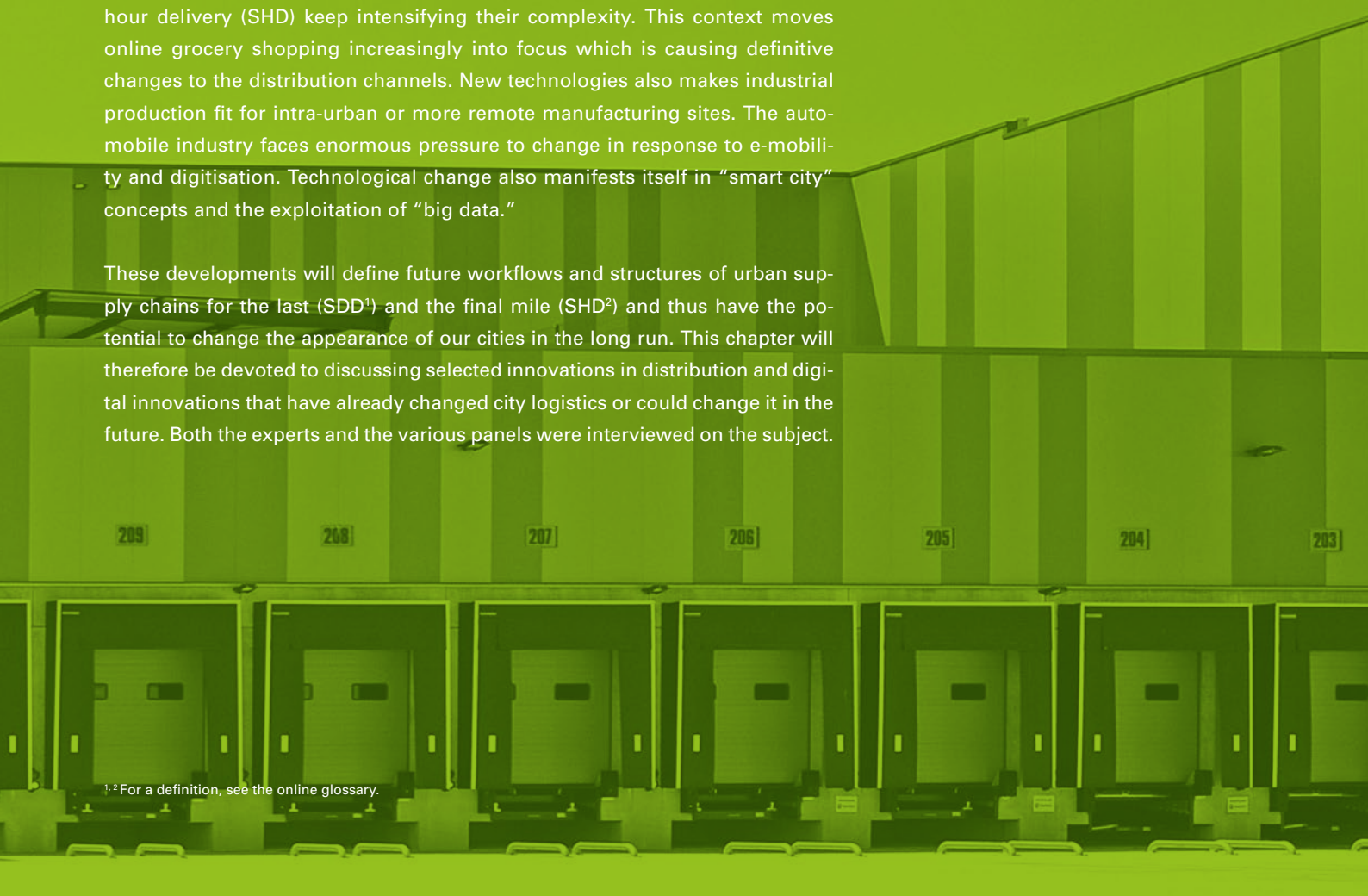
DIGITISED DISTRIBUTION— HOW INNOVATIONS INFLUENCE CITY LOGISTICS

The current economic environment is characterised by an extremely fast-paced development. The first edition of the survey series "Logistics and Real Estate" already touched upon the most important mega trends, including globalisation and Industry 4.0, among many others.

The progressing digitisation is having a steadily growing effect. The Internet of Things is entering private households as much as manufacturing and logistics businesses. Private individuals face changes whose ramifications they cannot yet fully comprehend, and the same is true for the administrative, political and industrial sectors. We are exposed to a technology that defines more and more of our day-to-day reality, our buildings and out cities.

Digitisation with all its possibilities changes the ways in which we manufacture, consume and distribute the goods between production and consumption. E-commerce is particularly instrumental in driving a fundamental shift in city logistics processes: options such as same-day delivery (SDD) and same-hour delivery (SHD) keep intensifying their complexity. This context moves online grocery shopping increasingly into focus which is causing definitive changes to the distribution channels. New technologies also makes industrial production fit for intra-urban or more remote manufacturing sites. The automobile industry faces enormous pressure to change in response to e-mobility and digitisation. Technological change also manifests itself in "smart city" concepts and the exploitation of "big data."

These developments will define future workflows and structures of urban supply chains for the last (SDD[1]) and the final mile (SHD[2]) and thus have the potential to change the appearance of our cities in the long run. This chapter will therefore be devoted to discussing selected innovations in distribution and digital innovations that have already changed city logistics or could change it in the future. Both the experts and the various panels were interviewed on the subject.



[1, 2] For a definition, see the online glossary.

INNOVATIONS IN DISTRIBUTION

The mega trends now emerging in German society manifest themselves in an increased delivery volume, on the one hand, and in a fast-growing environmental awareness plus a corresponding political agenda, on the other hand. This has created challenges in city logistics that call for innovative solutions. Many companies, but also cities and municipalities, are already conducting pilot or research projects aimed at structuring or restructuring urban distribution. Which trends are particularly relevant in this context?

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"The massive shift in shopping behaviour toward online buying and the increased significance of omni-/multi-channel distribution with the objective to deliver within the next hour forces online retailers to move much closer to their customers. So you have what used to be pure online retailers who are increasingly entering into competition with classic brick-and-mortar retailing."

ELECTRIC MOBILITY

NO WAY AROUND E-MOBILITY

Electric mobility will inevitably gain in significance in the context of solving the issues of city logistics. For one thing, electric vehicles can be used to bypass access restrictions for conventional diesel-powered delivery vehicles in inner cities. Deliveries using electric vehicles may principally take place at night even, because they meet the permissible sound levels. Particularly CEP service providers have taken a proactive approach in their deployment of electric vehicles in city logistics.

MAKE OR BUY—CEP SERVICE PROVIDERS TRY THEIR HANDS AT AUTOMOTIVE ENGINEERING

CEP service providers play a key role in the handling of city logistics processes. The search for solutions that would permit converting vehicle fleets to sustainable modes of propulsion has been going on for years. Since the required kind of vehicle is not available from conventional carmakers, CEP service providers like DHL and UPS hunted for alternative solutions, and were intrigued by the products of start-up companies like Urban Cargo or StreetScooter. But despite such innovative approaches, it will take some time yet before the industry has fully converted to environmentally friendly vehicles because the existing spectrum of electric vehicles lacks the technical maturity to make them a fully qualified substitute for conventionally powered vehicles. This concerns both range and cargo capacity. Nonetheless, CEP service providers have already stepped up their use of electric vehicles in many cities. The ongoing political scandals surrounding conventional fuel-powered drive systems could actually boost demand for, and speed up development of, electric delivery vehicles even if their general fitness for purpose remains subject to doubt at this time. Another auspicious alternative that is being tested for urban B2C express deliveries are e-cargo bikes, such as the Cargo Cruiser by UPS. While the major CEP services take a comparatively progressive approach, some newcomers in the city logistics services business are counterproductive, driven by the margin pressure. They outsource more often and more extensively to sub-contractors whose vehicle fleets tend to consist exclusively of vehicles driven by obsolete combustion engines.

RAINER KIEHL, UPS:

"For the time being, the vehicle models on the market do not yet meet all the requirements, so we are still fitting diesel-powered vehicles with electric motors. From a traffic engineering point of view, it still hardly matters whether I make deliveries in a diesel-powered or an electric vehicle. The emissions impact is primarily generated by the traffic backing up behind the delivery vehicle. This represents a much graver issue, and should be addressed. We see a lot of potential in the cargo bicycle, simply because it causes no congestion. Sad to say, not everyone is seeing things in context yet."

Fig. 1 *EXAMPLES OF ALTERNATIVE MEANS OF TRANSPORT IN CITY LOGISTICS*

THE UPS CARGO BIKE "CARGO CRUISER" IN FRONT OF A MICRO-DEPOT CONSISTING OF CONTAINERS
(Source: UPS)

DHL STREETSCOOTER
(Source: DHL Deutsche Post Group)

DRONE DELIVERY

AIRBORNE DRONES CANNOT SOLVE THE ISSUES OF CITY LOGISTICS …

Drone towers and flying warehouses from which whole swarms of drones resupply the population with goods—speculative patent applications or media-savvy pilot projects by Amazon, Google and others made headlines in the recent past. Since drone technology has made enormous advances in recent years, the question presents itself whether or not they could indeed be a potential solution for the last-mile and very-last-mile logistics.

In the context of logistics drones, you need to make a basic distinction between

- aerial drones,
- ground drones and
- hybrids likes the Bin:Go prototype built by Fraunhofer IML.

Drones are developed as autonomous means of transport or as component operated in combination with conventional vehicle-bound deliveries. In the United States, for instance, UPS is field-testing a combination delivery using drones that depart from the roof of a delivery vehicle. Drones could enable CEP services to make deliveries to or from places that are hard or impossible to access for conventional delivery vehicles due to statutory regulations or physical obstacles. Test environments have included mountain regions or islands.

Tightened regulations for the use of unmanned aerial vehicles (UAV) that Germany ratified in January 2017 put limits on their operation in terms of maximum flight altitude and flight paths. The obligation to substantiate knowledge of how to operate UAVs weighing 2 kg or more and the requirement to obtain a flight permit from the state aviation authorities for UAVs weighing 5 kg or more have drastically raised the organisational effort for aerial drone deliveries.

It is probably for this reason that the interviewed panel of experts rate both the influence and the implementability of aerial drones in city logistics as rather low after all. Lenders and occupiers are the groups most inclined to recognise the potential of this option. The lasting significance of aerial drones is rated highest by lenders. Inversely, the most conservative assessment came from the municipalities, although it trails the property developers and investors by only a narrow margin.

PROF. TOBIAS JUST,
IREBS REAL ESTATE BUSINESS SCHOOL:
"To me, the power imagination seems to get the better of considerations of viability for mass consumption, not least because so many legal issues concerning the deployment of drones and autonomous vehicles have yet to be resolved. So it is too early to rate these means of transport as the only sensible alternative—least of all as a prospect for the next five to ten years."

… AUTONOMOUS CARS HAVE A GREATER POTENTIAL

Unmanned ground vehicles may use the existing infrastructure. The six-wheel drone made by Starship Technologies, which is battery-powered and travels at walking speed (about 6 km/h) is capable of dodging pedestrians and of asking pedestrians to press traffic light buttons for it. One staff member can supervise up to 100 drones simultaneously. The Starship robot vehicle has a payload of about 15 kg and is meant to deliver grocery purchases to end customers who are notified of the impending delivery via an app. Hermes has field-tested the use of Starship robotic cars for deliveries in London and Hamburg, among other places.

The image of unmanned ground vehicle systems resembles the one outlined for aerial ones. It is defined by scepticism, even if influence and implementability get slightly higher ratings. Once again, the tenants/occupiers are mainly responsible for the deviation in assessment, as they can imagine an even higher number of options. Especially Amazon and the CEP service providers are devoting intense research to their usability. For instance, UPS is currently working with the start-up business Nüwiel to take the development of a smart, electrically powered bicycle trailer to the next level that would make it a largely autonomous transport assistance for delivery staff. In its final development stage, the trailers are supposed to follow the delivery staff autonomously like a drone.

So far, none of the unmanned ground vehicle models have become established broad-based solutions in city logistics. Even the deployment of land-based autonomous vehicles is fraught with legal uncertainties, albeit less profound ones than those involving aerial drones. On the whole, ground drones are expected to have only a minimal impact on city logistics. Here, the lender panel is more or less as sceptical as the other panels.

None of the interviewed experts consider aerial drones a viable solution for city logistics issues. Self-driving vehicles, by contrast, are seen by several of the respondent experts as an auspicious approach considerable potential. Some argue that they could potentially bring about fundamental changes in inner-city distribution.

Fig. 2 *HOW SIGNIFICANT WILL UNMANNED AERIAL VEHICLES HAVE AS AUTONOMOUS MEANS OF TRANSPORT FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*

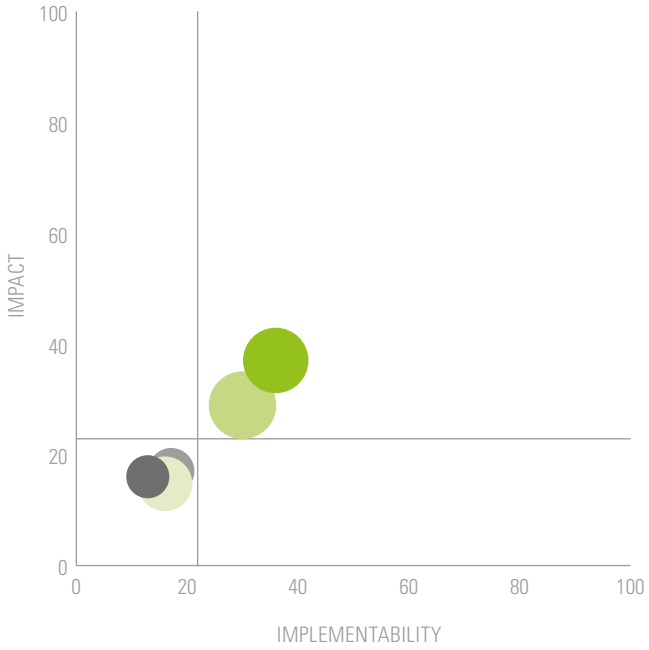
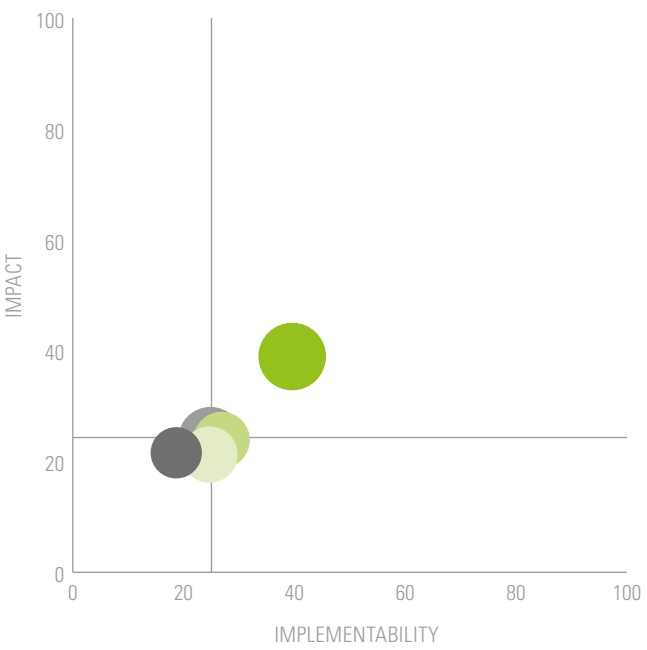


Fig. 3 *HOW SIGNIFICANT WILL UNMANNED GROUND VEHICLES HAVE AS AUTONOMOUS MEANS OF TRANSPORT FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*



RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"Autonomous driving will initiate the biggest and most far-reaching change of the next five years, assuming that traffic control systems are optimised, and will cause and accelerate massive changes in city logistics processes."

In this context, it is assumed that e-mobility vehicles of a capacity of 14 to 16 cubic metres will be operated autonomously. Unmanned ground vehicles are considered a minor add-on option only.

However, the practical feasibility of an urban distribution system using land-based robots is also met with scepticism. Instead, the exploitation of existing resources for city logistics purposes are seen as the real challenge and as having greater leverage for inner-city distribution.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"Personally, I cannot imagine that drones will deliver goods—neither in the air nor on the ground. [...] From my point of view, it is much closer to reality to take advantage of capacities and movements that are already in place. You see, there are plenty of cab drivers and parcel service providers doing empty runs."

DR. THOMAS STEINMÜLLER, CAPTEN AG:

"In most cases, the 'final mile' can only be covered by cargo bikes and drones, assuming we are talking about land-based drones that depart from (disused) underground car parks (in the future). I don't believe in airborne drones in an urban environment."

Fig. 4 *EXAMPLES FOR PARCEL DRONES IN SERVICE*

UPS COMBINATION DELIVERY USING VAN AND DRONE
(Source: UPS)

STARSHIP ROBOT IN HAMBURG
(Source: Starship Technologies)

- *MUNICIPALITIES*
- *INVESTORS*
- *TENANTS/OCCUPIERS*
- *LENDERS*
- *PROPERTY DEVELOPERS*

Interpretation aid:
Each of the colours refers to a different panel of experts interviewed. The position along the x axis shows how implementable a given innovation is estimated to be. The position on the y axis shows how high the influence on city logistics is expected to be. The diameter refers to the estimated sustainability/persistence of the technology. The intersection of straight lines reflects the average of influence and implementability as benchmark figure across all panels.

Live Testing Ground: Experimenting with Existing Infrastructure in the City Logistics Lab

The concepts presented so far aim definitively at the deployment of novel technologies to solve the problem of the last and final mile. On top of that, however, the use of existing infrastructure or the exploitation of traffic flows that take place anyway could present a possible solution:

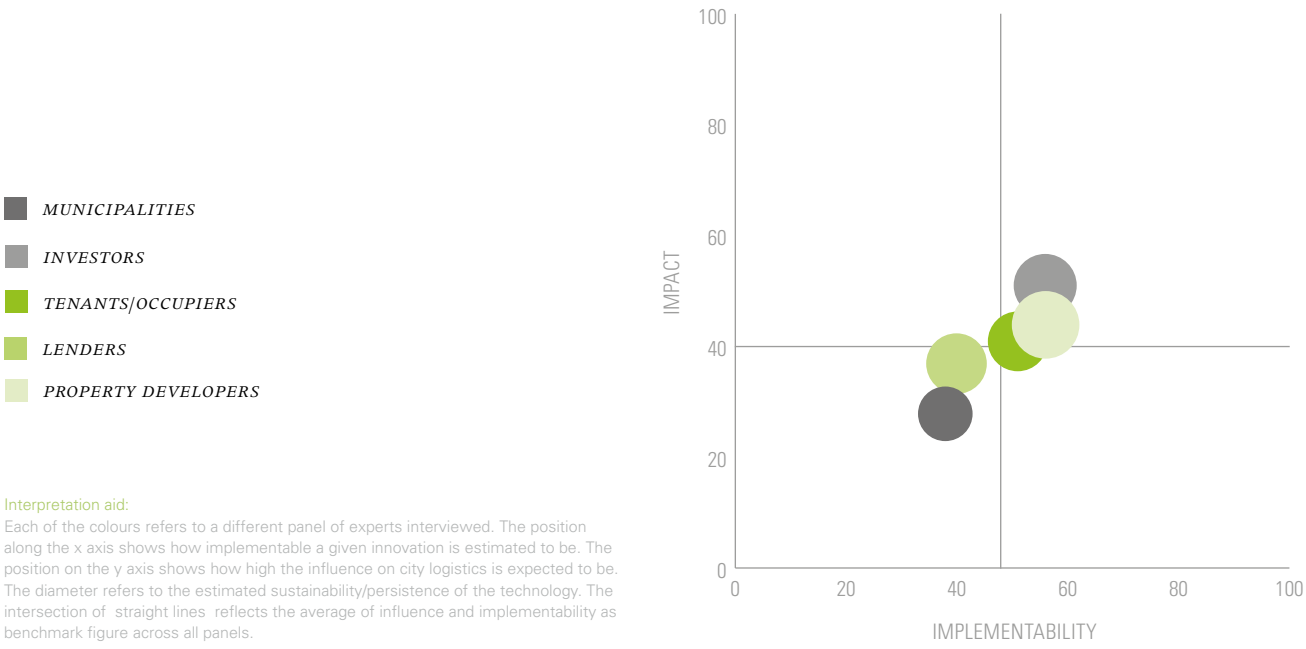
Various concepts are currently under development or in testing that try to integrate city logistics into existing systems and traffic flows.

Crowd Logistics/Sharing Economy

So called "crowd logistics" concepts that are part of a "sharing economy" (C2C) seek to exploit existing but unused transport capacities, the business model essentially relying on the goods delivery to end customers by private individuals. Crowd logistics start-ups in Germany include e.g. ÜberBringer, Packator and CoCarrier.

There appears to be a consensus across panels that crowd logistics concepts are definitely a realistic option in the context of urban distribution. Although they are not expected to bring radical changes, the various panels—especially investors and property developers—are convinced that this innovation will be both influential and persistent.

Fig. 5 *HOW SIGNIFICANT WILL THE SHARING ECONOMY BE FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*



Interpretation aid:
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Transports using Public Transportation Infrastructure

Volkswagen relies on the use not of existing traffic but of existing public transport infrastructure for deliveries to its Dresden car plant, where the public transport services operate the CarGo tram for the purpose, financed by VW. Hypothetically speaking, the idea could be introduced in any city that operates a relevant infrastructure network (rapid transit, underground, tram or even bus systems).

Yet the panels collectively reject the use of public transportation, e.g. in the form of a tram or as separate rapid transit/underground carriage within the framework of city logistics distribution. The only panel that sort of warmed to the idea was the one of the property developers, but even their assessment of this proposal seems muted, comparatively speaking. Lender and municipalities are least convinced of the concept's sustained implementability or its impact on city logistics.

Private Cars as Drop-off Station

The "Smart ready to drop" concept that was presented by DHL in collaboration with the maker of the Smart microcar in 2015 proposed to install certain technological components in the boots of participating cars that would turn them into parcel lockers. The recipient uses an app to generate a code, and parks his or her car close to the stated delivery address. Doing so will authorise a delivery person to access the boot of the car once to deposit a parcel. While the idea of delivering parcels and goods to private vehicles via third-party access to the boot has not been welcomed with open arms, it is deemed comparatively realistic by some respondents. Especially tenants and occupiers of logistics real estate, including CEP service providers, can easily imagine that this add-on option could have a major influence on city logistics and become an established standard in the long run. Lenders and municipalities are much warier of the concept. Property developers and investors cover the middle ground, as they differ in their assessments.

Fig. 6 *HOW SIGNIFICANT WILL PUBLIC MASS TRANSIT SYSTEMS (PUBLIC TRANSPORTATION) BE FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*

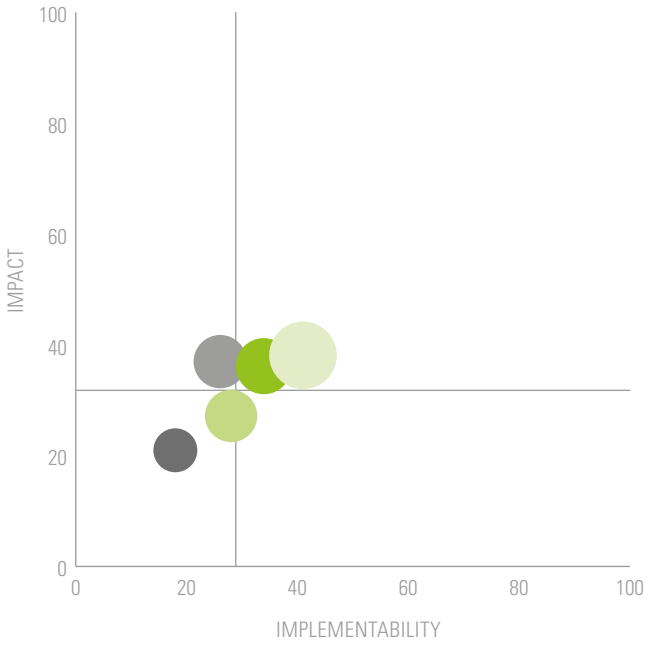
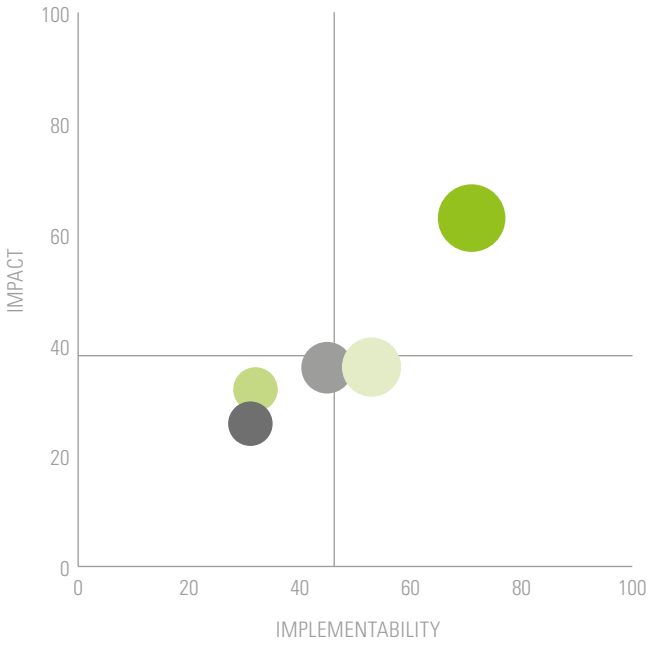


Fig. 7 *HOW SIGNIFICANT WILL DELIVERIES TO THE RECIPIENT'S PRIVATE VEHICLE VIA ONE-TIME CEP PROVIDER ACCESS BE FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*



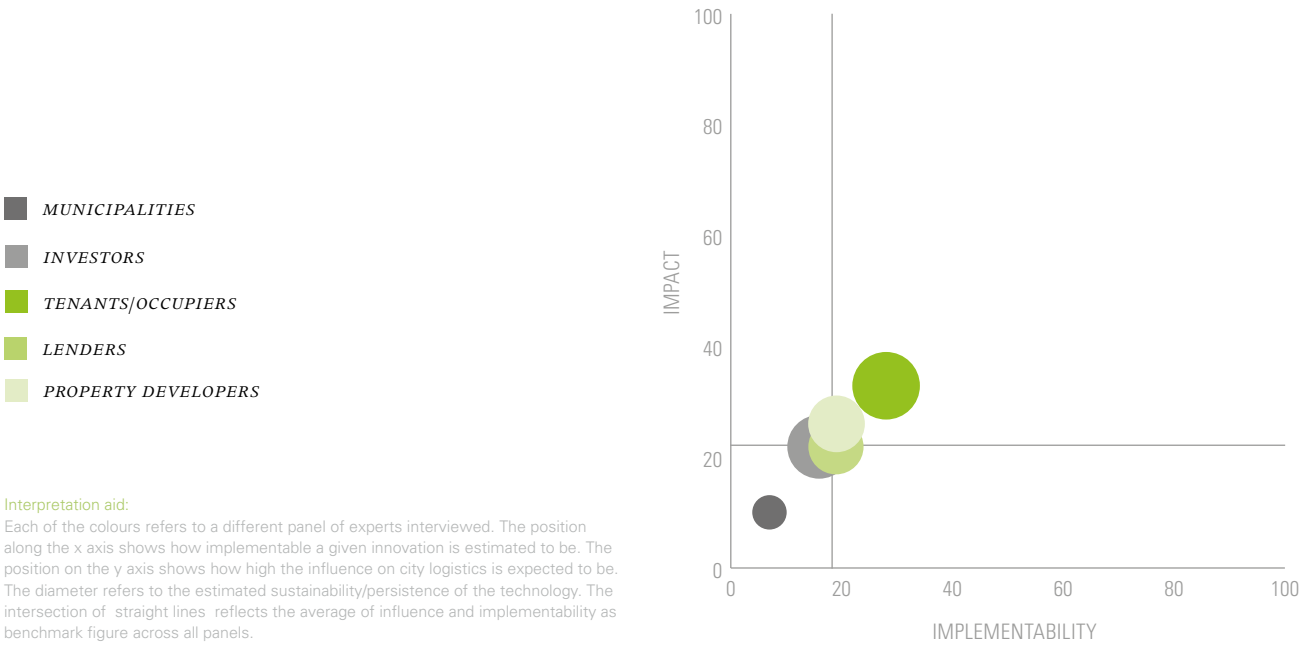
28

Rethinking City Logistics: Underground Goods Transport

Most concepts take a pinpoint approach and seek to relieve city logistics with small-scale measures or to reconfigure certain aspects of it. An alternative approach is taken by "Cargo sous terrain" or CargoCap. These introduce an entirely new transport medium. Even if there are differences between the two aforesaid concepts, they share the definitive idea of moving goods transportation underground. The advantages are quite obvious: Surface traffic is relieved, while emissions from delivery vehicles (noise, exhaust fumes) are eliminated. A higher average speed would even accelerate the transportation process compared to conventional modes of transport. The subterranean system envisions goods haulage from large logistics centres to automated distribution facilities in inner cities and on the urban periphery. Goods movement inside the tunnel would involve—depending on the concept—two or three palettes in electrically powered and, where needed, refrigerated vehicles whose control is fully automatic. The goods hauled to the urban periphery would be collected in operator-independent consolidation centres and reorganised. Inversely, the inner-city transport would rely on autonomous electric vehicles onto which the palettes are loaded at the distribution stations.

The principles of the two concepts resemble each other and sound fascinating. But the interviewed panels of experts are currently not convinced, and returned sceptical assessments. The most optimistic ones among them were tenants and occupiers, but even their ratings were on the lower end of the scale. Their scepticism is basically plausible considering the fate of previous projects developed below ground. They tend to be costly, protracted and very risky—because the ground is not always well mapped, and drilling operations have to navigate a maze of pipes and cables.

Fig. 8 *HOW SIGNIFICANT WILL THE UNDERGROUND GOODS DISTRIBUTION BE FOR CITY LOGISTICS IN THE COMING 5 TO 10 YEARS?*



Interpretation aid:
Each of the colours refers to a different panel of experts interviewed. The position along the x axis shows how implementable a given innovation is estimated to be. The position on the y axis shows how high the influence on city logistics is expected to be. The diameter refers to the estimated sustainability/persistence of the technology. The intersection of straight lines reflects the average of influence and implementability as benchmark figure across all panels.

Alternative Shipping Service Providers

CERTAIN START-UPS INTEND TO REVOLUTIONISE CITY LOGISTICS: MANAGED WITHOUT A PARCEL SERVICE, USING THE WORKPLACE AS ALTERNATIVE DELIVERY SITE FOR B2C SHIPMENTS …

A number of start-up businesses are trying to revolutionise the ways and means of inner-city distribution. An approach that differs from that of crowd logistics, for instance, is the corporate start-up pakadoo by logistics service provider LGI. It offers companies the work-life service option to have parcels delivered to their employees at the workplace independent of the original delivery service. Participating companies need to define a pick-up spot for the parcels and assign a staff member plus a smartphone for the acceptance of parcels as well as for the management of possible returns.

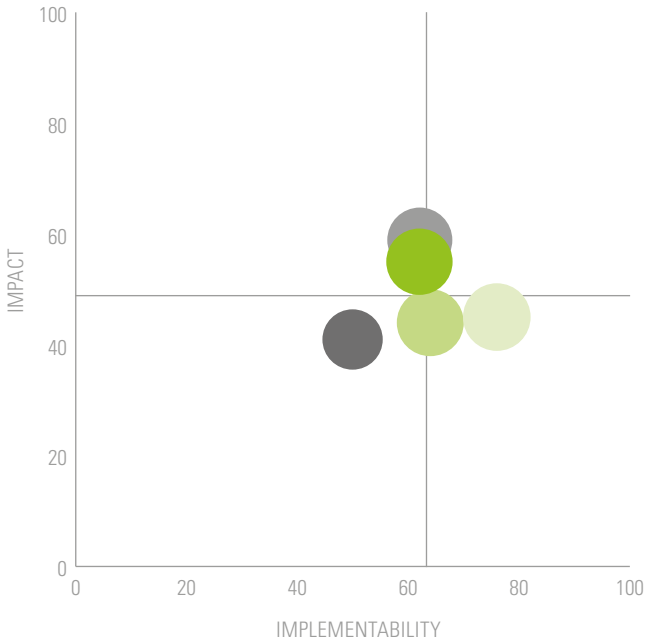
This approach met with the most favourable response among the expert panels in this year's survey. The implementability and sustainability are actually rated as slightly higher than the actual influence the concept is likely to have on city logistics. All things considered, the panels appear to rate the chances that this service will establish itself as rather realistic.

… OR B2B SHIPMENTS

The shipping service provider shipcloud offers a unified interface to Germany's major mail-order service providers for the purpose of integrating the shipping processes of shops and merchandise management systems. The idea here is to save time and money, and simultaneously to maintain the clients' autonomy vis-à-vis the various service providers.

The start-up companies presented here are based on digital services. In a wider sense, these providers would act as "exchanges" or coordination agents. In other words, they are not involved in the physical goods haulage; there are virtually no start-ups for that. This means that the material part of city logistics would remain in the hands of the established CEP service providers, unless new players enter the market. Exceptions include companies like Amazon whose market dominance has motivated them to build up their own delivery services. In the initial stage, they are largely outsourced to sub-contractors. Due to the narrow margins these companies earn, however, the innovative momentum in regard to the transport process is rather limited.

Fig. 9 *HOW SIGNIFICANT WILL THE CONSOLIDATED DELIVERY BY A CITY LOGISTICS SERVICE PROVIDER BE IN THE COMING 5 TO 10 YEARS?*



30 INNOVATION DRIVEN BY DIGITISATION AND BIG DATA

The public debate on the subject of city logistics often foregrounds the transport aspects, including traffic movements and the emissions impact associable with them. Discussions of this sort focus on traffic engineering and subsequently on urban-planning issues. As said above, autonomous vehicles that are operated or at least assisted by artificial intelligence currently represent an auspicious option for mastering the macro-societal shift toward a modern logistics for the 21st century. The previous section already touched upon the subject of innovations that influence urban distribution. These are to a large extent based on digital technologies, which in turn rely on data handling.

What are the options that the new digital logistics have in store for us? In what ways could the supply chain processes be more efficiently structured? A brief snapshot introduces the possible drivers of the process, and outlines the ramifications that they could have for city logistics.

BIG DATA IS THE RAW MATERIAL OF LOGISTICS 4.0

The developments in the area of digital logistics are entirely based on the advanced availability of data—be they data for optimising the itineraries in road-bound transport or data for the evaluation of internal business processes.

Aggregating large quantities of data should not present any serious challenges. Data can be captured via sensors, obtained from sources freely accessible to the public or derived by analysing the value chain parameters. Depending on the type and purpose of a given enterprise, the data enter into specific decision-making solutions. The derivative of this process may be referred to as smart data. Smart data enables the involved stakeholder to make fact-based decisions, and is therefore one of the big key words of Logistics 4.0.

PREDICTIVE ANALYTICS— REINTERPRETING OLD THOUGHT PATTERNS

E-commerce and data go hand-in-glove, and relate to more than one dimension:

- The sales and distribution process for end customers is supposed to proceed as conveniently and swiftly as possible. Same-hour-delivery would not be possible without big data.
- Things like customer account and customer card are used to tie end customers who use the various platforms as closely to the respective online retailers as possible.
- The customer should be as familiar as possible, because knowing all customers and markets makes it possible to make highly accurate predictions about ordering patterns.

To ensure these objectives are achieved, the data mined should be as personalised as possible. The effort yields massive amounts of data across individuals and markets, and these are in turn synchronised with other data, e.g. data obtained through market research. Big data analyses help to derive forecasts regarding future buying patterns.

Basically, this is hardly new. Even in the 1950s, store owners took a similar approach—except that they used their cash ledgers and heads rather than cloud computing and predictive analysis.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"In the 1950s, you had the mom-and-pop stores which intuitively stocked the things that their customers needed because they knew their customers first hand—a data collection in the human mind, if you will. These retailers used to buy their goods at the wholesaler's and knew that customer Jones, for instance, would want to buy chocolates for Christmas, and so they would order them ahead of time from the wholesaler. Naturally, the latter had no way to respond quickly to the latest fashion trends. But that was hardly necessary in the 1950s anyway.

The whole e-commerce business, with Amazon in the lead, works exactly the other way round. They offer a vast spectrum of merchandise without having it physically in stock, and deliver to their customers whatever they want. The only way this can work is via big-data analysis."

The internet giants are not the only ones wrestling with the issue. There are a number of examples that show the ways in which complex logistics business can be predicted from the present-day perspective. Germany is home to numerous start-ups that would like to establish themselves in the stress field of digital logistics. Smart data is one of the key issues in this context. Here are a few selected examples:

- Conbee is developing active automated ID/RFID sensor technology that makes it possible to uniquely identify and locate all products involved in the logistics process. As a result, any product can become part of the Internet of Things ("IoT"). This could in turn enhance supply chain efficiency.
- The Hamburg-based start-up business Evertracker picked up on this idea and put an artificial intelligence (AI) product for the logistics industry on the market. Items are fitted with GPS trackers so that they can communicate with the Evertracker platform. The AI in turn is capable of learning and understanding processes in order to execute them automatically and predictively in the future.
- Another start-up business in the "logistics gone smart" category is the company Synfioo. This company taps into large quantities of external and internal data sources in order to predict for transport planners whether certain incidents are likely to cause transport delays. It calculates the prospective time of arrival, warns all stakeholders that disturbances have occurred, and proposes alternatives. To this end, the information is integrated into existing transport management systems.

PURELY DIGITAL DOCUMENTS MANAGEMENT VIA BLOCK CHAIN A BUSINESS REALITY BY 2020

The term block chain refers to a data storage technology. Block chain databases became well known in conjunction with cryptocurrencies. But they are also used as basis for numerous applications. There are countless development options, but they are all in their infancy still.

Essential elements of an ideal block chain include:

- A ledger of transactions between operators
- The data sets are located in a decentralised network that is copied multiple times.
- The ledger is impervious to manipulation.

Block chains will become important in the future for "smart contracts," for instance. They will permit real-time tracking of the delivery status and any delivery information that was saved on a given shipment. Long waiting periods at customs, which still account for a large part of the overall delivery time of a sea cargo container, will become a thing of the past. The technology permits the quick and cheap exchange of information across the globe. In addition to the Emirate of Dubai, for instance, the shipping company Maersk, the port of Rotterdam and the retail group Walmart rely increasingly on block chain technology. It has the potential to speed up global supply chains considerably.

WHAT DOES THE TECHNICAL DEVELOPMENT IMPLY FOR LAST-MILE LOGISTICS?

No matter what product you look at, it already comes with a logistics log extending across the globe by the time it arrives at the end customer's doorstep. The optimisation effort addresses every part of this logistics process. A drilldown to the level of city logistics suggests a variety of potential digitisation effects. A prominent example would be the future "smart city."

CITIES ARE DEVELOPED INTO SMART CITIES USING SMART TECHNOLOGY.

JANINE DIETZE, DREES & SOMMER:

"Traffic areas, squares and buildings are increasingly networked. Traffic and navigation do not end at the front door, but continue seamlessly inside the building. Knowing the proper itinerary makes it possible to deliver parcels and shipments more efficiently and more precisely even within large building structures, e.g. in hospitals, universities and also in large corporate branch offices."

Not just the time factor but also the location is the subject of technological advancement. For some market players, the focus is not on the fastest possible delivery but on the end customer. Customers are supposed to be able to say when, where and how they want the delivery. This is to be made possible by weaving a tightly knit local delivery network.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"We set up our hubs not in greenfield locations but in residential areas where people live. This makes it all the more important to avoid generating extra traffic and instead to make smart use of existing traffic movements."

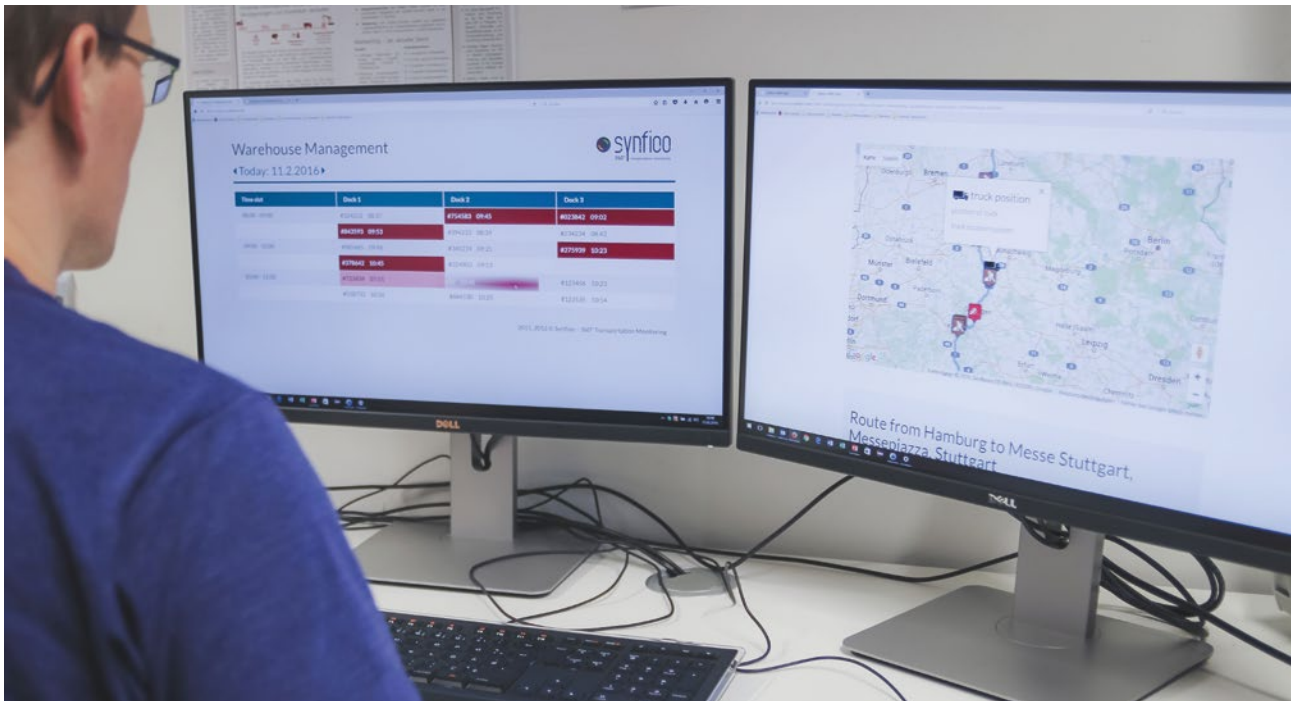
Knowing the location of the end customer also factors in such deliberations.

JANINE DIETZE, DREES & SOMMER:

"In the field, the ramifications of this could be that CEP service providers know at any time where their customer is, e.g. by tracking their mobile phone. One could picture it in a way like the 'marauder's map' of Harry Potter that tells you where everybody is located at any given time. The same principle could also be applied to the real world. Parcels would be delivered wherever the calendar entry or the tracking says the customer is or is likely to be located. Of course, this option presupposes the customer's consent."

Networking the data of different sources can create numerous new fields of application, as outlined above. But many regulatory hurdles will have to be cleared yet before this develops into a generally available option.

Fig. 10 *SYNFIOO TRANSPORT PLANNER AT WORK*



(Source: Synfioo)

FLOOR SPACE REQUIREMENTS FOR TOMORROW'S CITY LOGISTICS BEING ADJUSTED

As a result of the dialectic of societal developments and technological innovations, city logistics are undergoing a fundamental shift. Innovation is strongly driven by the need to cut carbon dioxide emissions and traffic, and simultaneously to cope with a massive increase in delivery volumes, especially in the B2C sector where SDD and SHD are quickly gaining in significance. Moreover, retailers have to accommodate ever more differentiated customer requests.

In order to get on top of SHD in city logistics, the aforementioned technologies will have to attain maturity first. What matters is the proper networking of the diverse technologies and players in the industry to find optimal solutions. At the moment, these structure are still being set up. Only if all stakeholders interact can the "problem of the last and final mile" be solved.

In addition to the development of new means of transport and digital solutions, the focus is also on the efficient use of existing traffic flows and infrastructure to generate value-added for inner-city distribution. Meanwhile, start-ups have become important players in all of the discussed areas, either contributing decisive developments under their own steam or forcing the industry giants to come up with innovations of their own.

One of the most important levers for addressing the logistics of the last and final mile is the avoidance of traffic. Here, it is important to operate as close to the customer as possible. The ways in which the planning and operating of city logistics have changed translate into altered requirements in logistics real estate. The specifications of premises and logistics properties that retailers and CEP service providers will need to perform tomorrow's city logistics operations will be outlined in the following sections, featuring interviews with experts and polls. Other questions that present themselves are whether these logistics facilities are already under development on a major scale, or whether they are available in the built-up cityscape, or whether a lack of available land will hamper further development.

ZALANDO LOGISTICS CENTRE LAHR
(Source: Goodman)

DOCKING GATES AT A DISTRIBUTION CENTRE
(Source: BREMER)

THE DEVELOPMENT MARKET FOR LOGISTICS REAL ESTATE

As in previous years, the market for logistics real estate is paced by extremely high occupier demand this year. The floor space stock is unable to meet demand not least because a large part of the property stock is obsolete or fails to meet current requirements. As a result, construction of new schemes is under way on a major scale. But just how voluminous is the building activity? Where is it happening, and, above all, who is behind the developments? These are the question to be answered in this chapter. It will moreover provide an outlook on prospective developments. Are there manifest signs of shifting trends? Against the background of the key subject of city logistics, this year's survey will also analyse whether any large-scale building activity in this segment is already apparent.

The analysis drew on the bulwiengesa real estate database, which lists all building activities in the logistics real estate segment that were identified through our research efforts. We also matched our data closely with the data of market operators whose developments account for the bulk of warehouse construction in Germany. We looked only at pure storage and logistics warehouses. Conversely, we ignored light industrial and other commercial real estate such as business parks or similar, which are covered by the market report on multi-use and multi-let commercial real estate by Initiative Unternehmensimmobilien, and which are not part of the logistics market.

Our analysis had the use of a data pool of 1,340 assets built between 2012 and 2017, plus 415 specific pipeline assets (projects either under construction or in an advanced planning stage). "Land banks" and "ghost projects" were deliberately ignored by the evaluation. The obtained figures are therefore not distorted by such anomalies. Key date for the evaluation was 31 July 2017.

THE DEVELOPMENT VOLUME OF LOGISTICS REAL ESTATE IN GERMANY, 2012 THROUGH 2017

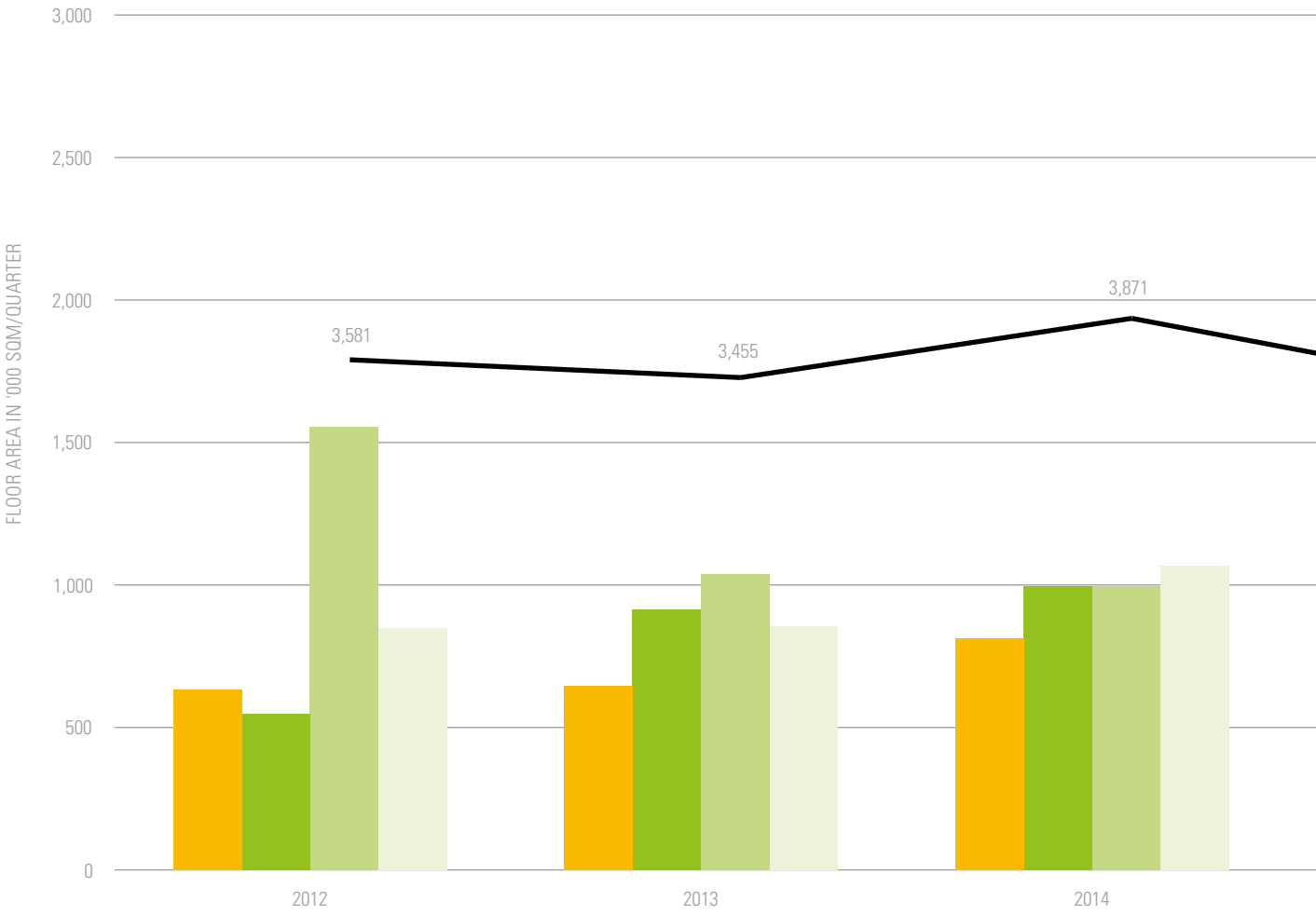
LOGISTICS REAL ESTATE COMPLETIONS REACHED ALL-TIME HIGH IN 2016

Demand for new completions in the logistics real estate segment remains high, and in Germany it is increasingly met by completed new schemes. The completions total of around 3.5 million sqm in 2012 was topped by nearly 4.6 million sqm in 2016, setting a new high-water mark for the period under review. The figure implies an annual growth rate of 5.1% for newly completed logistics facilities during the past five years. During the fourth quarter of 2016, more than 1.5 million sqm of completed logistics space were registered, which implies a new record in construction volume per quarter.

2017 LIKELY TO SET A NEW RECORD IN COMPLETIONS

The upward trend in floor space requirements in the logistics sector has continued in 2017. Especially the unchecked growth of the e-commerce sector is driving the demand for space and the building activity. If you take pipeline properties into account, over 5.1 million sqm in new completions will come on-stream in 2017—which would exceed the record volume of 2016 by nearly 12% in logistics space. It would also be substantially more than the medium volume of new construction for the time between 2012 and 2016, which was barely 3.8 million sqm. For the first time, the volume of new logistics space com-

Fig. 11 *LOGISTICS FACILITY COMPLETIONS IN GERMANY, BY QUARTER AND YEAR, IN '000 SQM, 2012–2016, 2017**

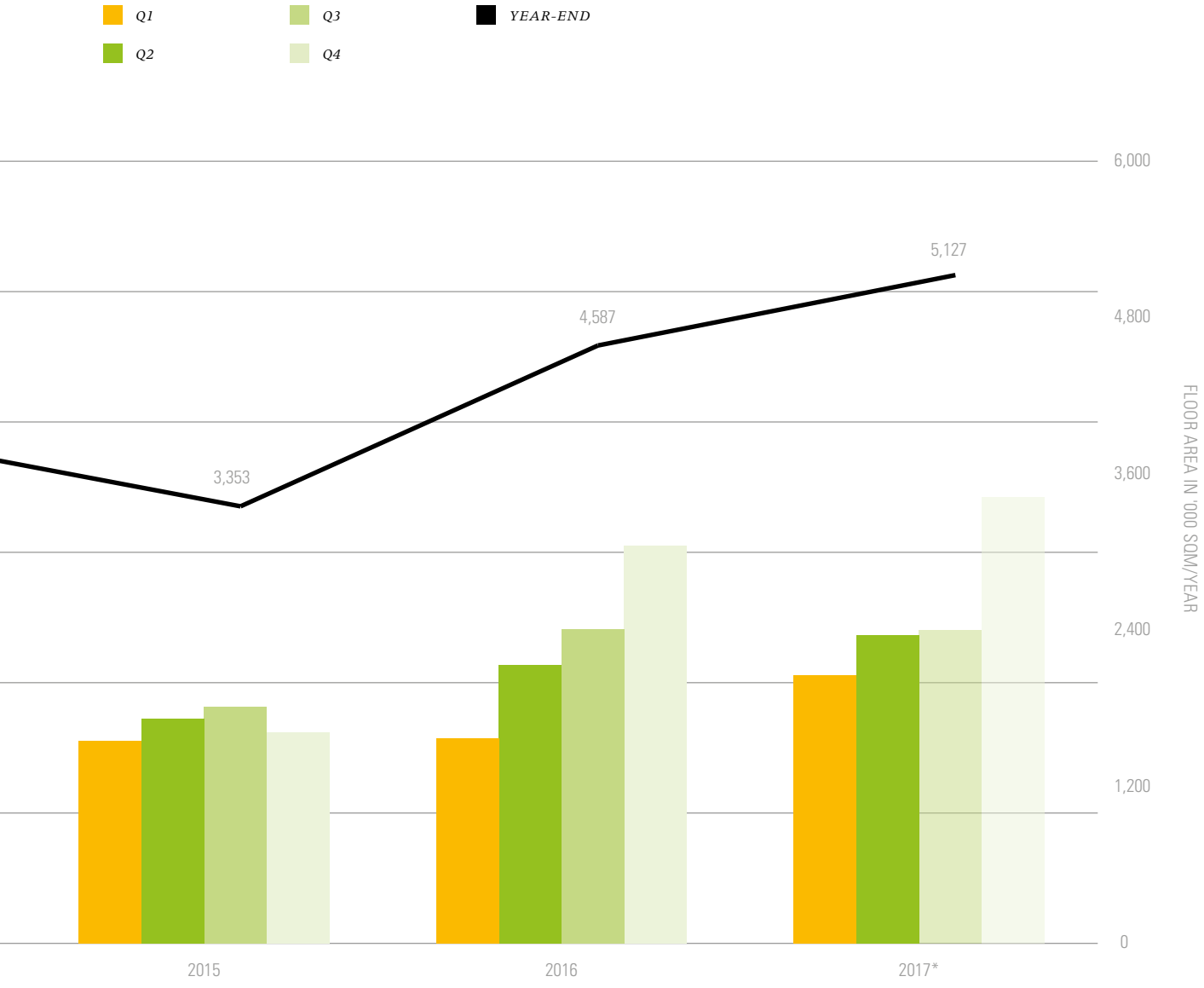


* The evaluation includes all completions up to the key date of 31 July 2017 plus floor space still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)

pleted in Germany per quarter would top the mark of 1 million sqm. The fourth quarter of 2017 stands out with a particularly high completions rate but it cannot be ruled out that some of the projects will not be completed on schedule and extend into 2018. The logistics space completed between 2012 and 2017, pipeline included, will thus add up to around 23.9 million sqm.

PLENTY OF PROJECTS IN THE PIPELINE FOR 2018

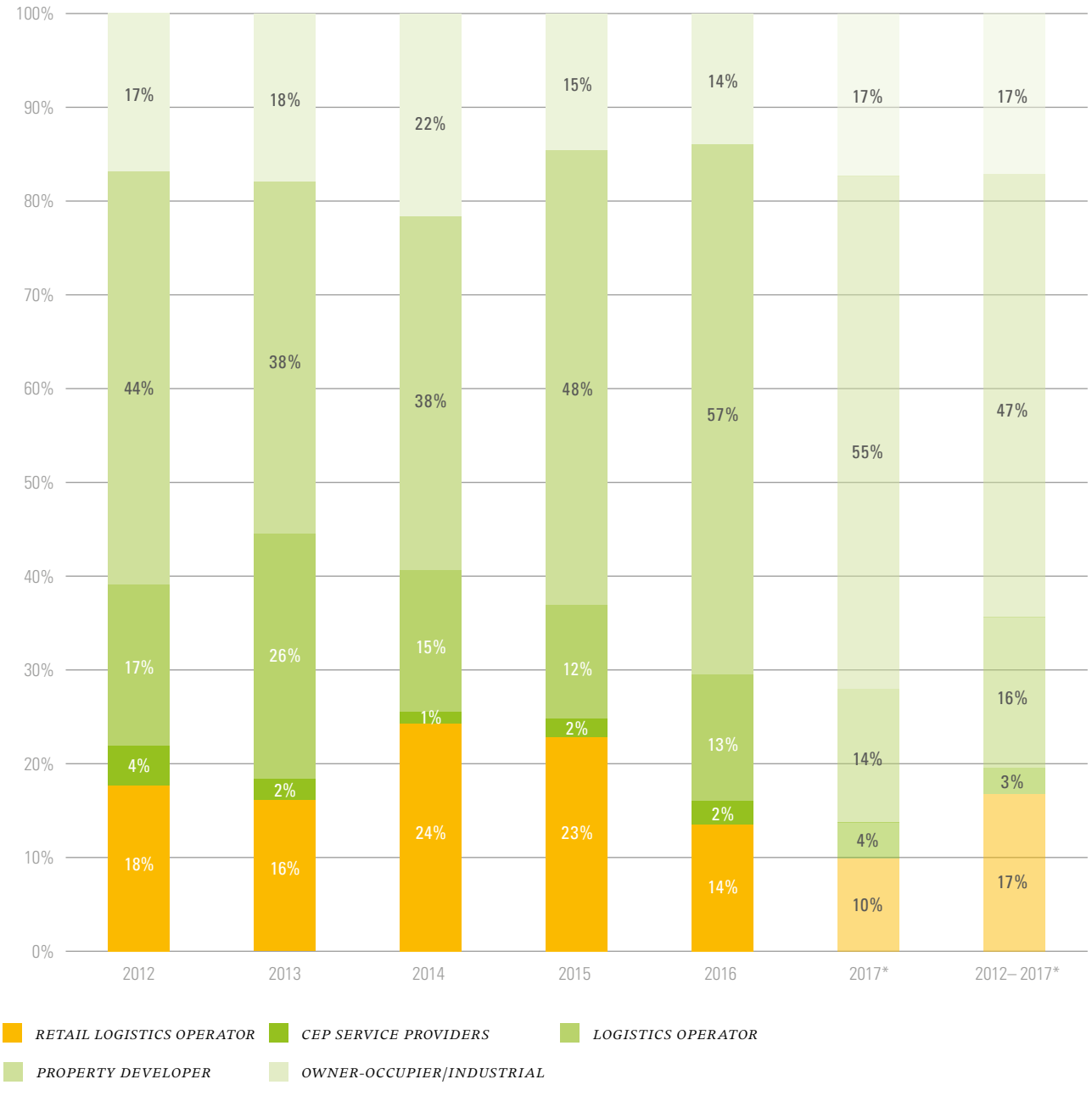
Meanwhile, there are plenty of development projects for new logistics schemes in Germany in the pipeline for 2018, too. Specific project planning that includes no so-called "land banks" and "ghost projects" already accounts for around 5.0 million sqm. Although the realisation of any announced project is fraught with uncertainties, many construction projects, like those that SME owner-occupiers intend to launch next year, remain unknown for the time being. All things considered, it is therefore safe to assume a high probability of occurrence.



OVERVIEW OF DEVELOPERS AND TYPES

The development activity in this market is defined by a wide variety of players: In addition to several major project developers active inside and outside Germany, there are numerous market participants limited to certain regions or to small-scale owner-occupied assets. Industrial and trading companies with a proprietary logistics arm build large-scale schemes, but do so for their own portfolios. While the building activity of the past few years was dominated by actual demand, there has lately been a rise in speculative building activity, pursued essentially by property developers of logistics schemes. This raises their significance among logistics property developers.

Fig. 12 *: LOGISTICS FACILITY COMPLETIONS IN GERMANY, BY DEVELOPER TYPE, 2012–2016, 2017**



* The evaluation includes all completions up to the key date of 31 July 2017 plus developments still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)

THE PROPERTY DEVELOPERS' SHARE IN BUILDING ACTIVITY RISES NOTICEABLY IN THE LONG-TERM PICTURE.

Out of the total completions in the logistics sector between 2012 and 2017, property developers will have completed around 11.3 million sqm by the end of the year. This equals a share of over 47% of the total volume of 23.9 million sqm. Retail logistics operators and industrial players, including owner-occupiers of small and medium-sized enterprises (SME), are next in line with a share of 17% each. Both of these groups often prefer to raise their own facilities. To some extent, this is also true for logistics firms, which claimed a share of around 16% during the period of 2012 through 2017. But it is just as obvious that their share is following a negative trend and that logistics operators rely increasingly on property developers.

In analogy to previous years, CEP service providers represent the developer type with the lowest percentage of new logistics facilities raised during the period under review. At around 657,000 sqm, the logistics floor space completed by them represents barely 3% of the total volume that came on-stream between 2012 and 2017. The reason is that CEP service providers often prefer to rent logistics facilities rather than develop their own. However, new transshipment properties keep being raised in order to stay abreast of the fast-growing parcel shipment volumes. The mean footprint of such facilities tends to be comparatively small at around 10,000 sqm.

The share of property developers in the volume of new construction continued to go up in 2016 despite the already high year-end total of the previous year as it climbed to 57%. The property developer share is expected to maintain its level of 55% in 2017 without ascending further. Retail logistics operators, in keeping with their 6-year mean, came in second, yet their share in the development volume plummeted from 23% in 2015 to 14%. The dip could be attributable to the fact that the initial adaptation phase which the logistics networks of the relevant companies went through by constructing regional distribution facilities could be concluded. They could conceivably engage with city logistics solutions in the short and medium term. The share of owner-occupiers kept dropping from its already comparatively low level of 2015 to 14% in 2016, which means that this group claimed the smallest share throughout the period under review. Then again, market evidence points to a slightly increased share of completions in 2017 at around 17%.

TOP PERFORMER GOODMAN RAISED 1.8 MILLION SQM OF LOGISTICS SPACE

Between 2012 and 2016, the Australian Goodman Group raised 1.8 million sqm in new logistics facilities. With 471,500 sqm of logistics space completed, 2016 turned out to be the most active year for Goodman yet. Large-volume projects completed in 2016 included the Zalando logistics centre in Lahr and a BMW distribution centre in Kleinaitigen with a combined floor area of around 200,000 sqm.

MAJOR GROCERY RETAIL LOGISTICS OPERATORS REMAIN IN THE LEAD FOR THE TIME BEING

Trailing the Goodman Group at considerable distance—unchanged since last year's comparison—as developers with the second- and third-largest construction volumes are the Schwarz Group (Kaufland, Lidl) and the EDEKA Group. The development volume of Schwarz Group equalled around 627,000 sqm between 2012 and 2016, compared to the 415,000 sqm in new floor space developed by EDEKA Group. The EDEKA Group completed only 24,000 sqm of floor area in 2016, which is only about 2,000 sqm more in new completions between 2012 and 2016 than the volume of Panattoni Europe, which now ranks fourth on the list. Last among the top 5 was VGP with a completions volume of more than 391,000 sqm over the past five years, the prominent ranking reflecting the completion of 190,000 sqm of new floor area in 2016. Conversely, SEGRO and Alpha Industrial dropped out of the top five ranking in logistics real estate development for the past five years. The developer with the second-largest completions volume in 2016 was Doblinger Group, which raised a BMW distribution centre and spare parts warehouse in Wallersdorf in Lower Bavaria with a combined floor area of nearly 220,000 sqm.

While EDEKA Group raised only a small volume of new logistics space in 2016, the completions total of Schwarz Group was comparatively high at almost 175,000 sqm. A look a the pipeline shows that neither the Schwarz Group nor the EDEKA Group are planning to raise big box assets with gross lettable areas of 100,000 sqm or more at the moment.

1. *GOODMAN GROUP (PROPERTY DEVELOPER):* 1,800,500 sqm
2. *SCHWARZ GROUP (RETAIL LOGISTICS OPERATOR):* 701,000 sqm
3. *EDEKA GROUP (RETAIL LOGISTICS OPERATOR):* 415,000 sqm
4. *PANATTONI EUROPE (PROPERTY DEVELOPER):* 413,000 sqm
5. *VGP (PROPERTY DEVELOPER):* 391,000 sqm
6. *PROLOGIS (PROPERTY DEVELOPER):* 353,000 sqm
7. *ALPHA INDUSTRIAL (PROPERTY DEVELOPER):* 308,000 sqm
8. *SEGRO (PROPERTY DEVELOPER):* 285,500 sqm
9. *DOBLINGER GROUP (PROPERTY DEVELOPER):* 270,000 sqm
10. *GARBE GROUP (PROPERTY DEVELOPER):* 259,500 sqm
11. *FIEGE GROUP (LOGISTICS OPERATOR/PROPERTY DEVELOPER):* 247,000 sqm
12. *DEUTSCHE POST DHL GROUP (LOGISTICS OPERATOR/CEP SERVICE PROVIDER):* 242,500 sqm
13. *IDI GAZELEY (PROPERTY DEVELOPER):* 235,500 sqm
14. *VOLKSWAGEN IMMOBILIEN (VWI) (OWNER-OCCUPIER/INDUSTRIAL):* 235,500 sqm
15. *GREENFIELD DEVELOPMENT (PROPERTY DEVELOPER):* 207,000 sqm
16. *HABACKER HOLDING (PROPERTY DEVELOPER):* 203,000 sqm
17. *IXOCON (PROPERTY DEVELOPER):* 195,500 sqm
18. *VERDION (PROPERTY DEVELOPER):* 192,500 sqm
19. *KOCH, NEFF & VOLCKMAR (KNV) (LOGISTICS OPERATOR):* 175,000 sqm
20. *DAIMLER (OWNER-OCCUPIER/INDUSTRIAL):* 174,000 sqm

Fig. 13 *TOP 20 DEVELOPERS OF LOGISTICS FACILITIES IN GERMANY, 2012–2016*

NO LOGISTICS OPERATORS AMONG TOP TEN DEVELOPERS

Apart from the retail logistics operators, followed by the Goodman Group, Panattoni and Prologis, there are other property developers who dominate the market—in proportion to the market significance of the developer type. Ranks 6 through 10 are claimed by companies whose primary activity is property development. The new completions in logistics real estate extend from 353,000 sqm (Prologis, rank 6) to 259,500 sqm (Garbe Industrial Real Estate, rank 10).

The top-performing logistics operator in this ranking is Fiege Group (rank 11) with 247,000 sqm of completed floor area. But Fiege Group is an ambiguous case, because it is also active a property developer. Next comes another logistics operator/CEP service provider, as Deutsche Post DHL Group ranks 12th with 242,500 sqm of new completions between 2012 and 2016. The biggest asset Deutsche Post DHL completed during the survey period is a distribution centre of 65,000 sqm in Hamburg, which was completed in 2015. In 2016, the development of a property of around 23,000 sqm in Mönchengladbach was concluded.

Rank 14 goes to Volkswagen Immobilien, making it the top-ranking owner-occupier. Only about 4,400 sqm in new floor area was completed in 2016. This implies a plunge by nine ranks for Volkswagen Immobilien since the Logistics Survey of 2016. The only other owner-occupier among the top twenty developers is Daimler with 174,000 sqm in new completions (rank 20). It reported no completions in 2016. Daimler's ranking reflects the completion of big-ticket projects in the years 2014 and 2015, when more than 160,000 sqm of floor area became ready for owner-occupancy. It is generally striking to note how active the automotive industry is in the development of logistics assets. They are the only industrial conglomerates that made the record with large-sized construction projects here.

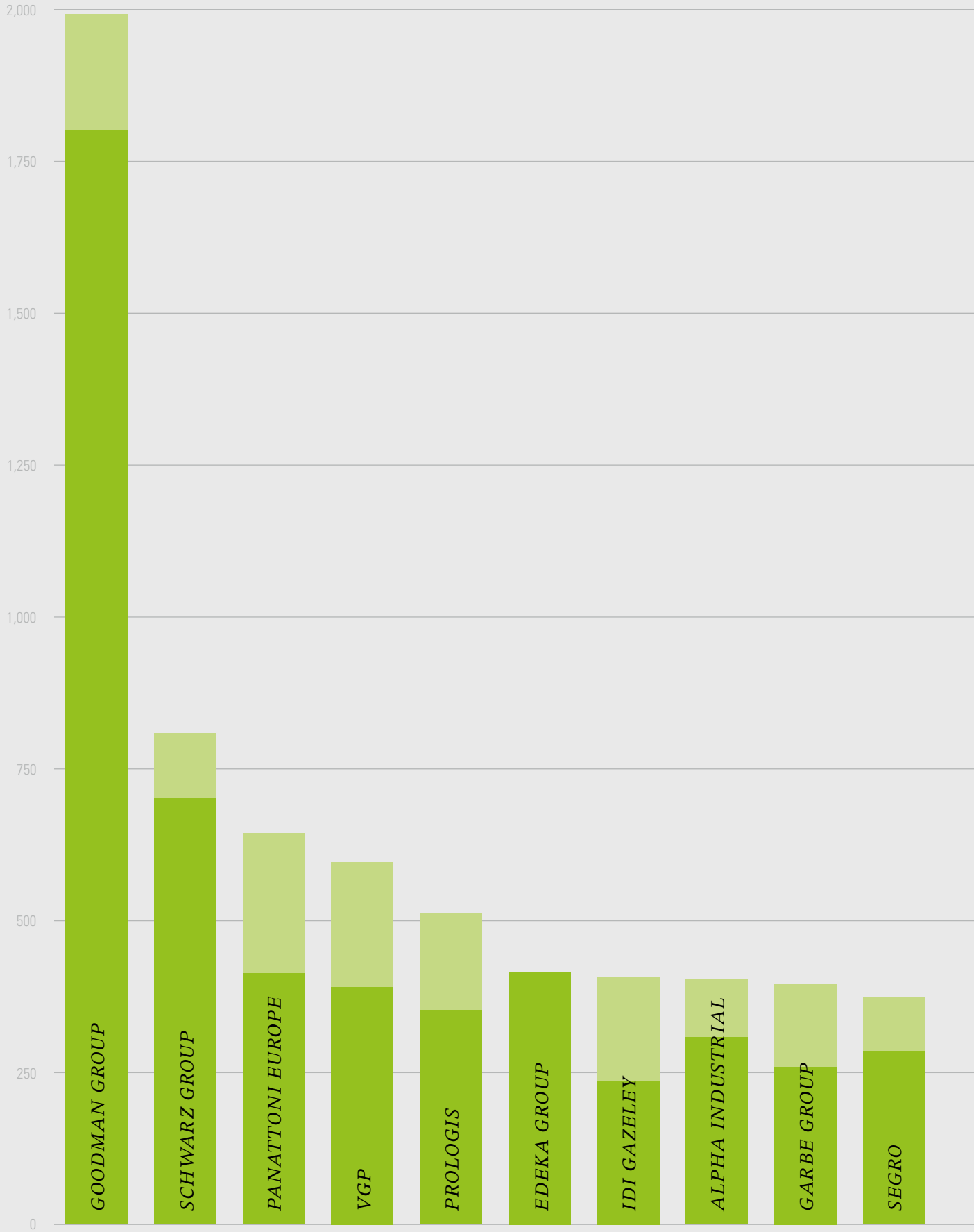
The top 20 list also includes another logistics operator in addition to Deutsche Post DHL Group and Fiege Group, this being Koch, Neff & Volckmar (KNV). New-build completions of 175,000 sqm and 166,000 sqm, respectively, got him into rank 19. KNV made the ranking only because of a single very large development, and is likely to vanish from the list in the long term.

NEW DEAL IN 2017: VGP AND PANATTONI RAMPING UP

A look at the latest developments shows that Goodman is unlikely to conclude 2017 as market leader in logistics real estate development. VGP and Panattoni are massively expanding their building activities—including some speculative projects. As a result, both are expected to end the ongoing year with a higher completions total than Goodman. Other market players such as Prologis or IDI Gazeley are also moving up into the league of top developers. Other companies like Fiege or Doblinger Group are rolling back their development activities compared to previous years.

When expanding the time frame to include the ongoing year, Daimler and KNV lose their ranks (19 and 20) from the above top 20 list of developers. New names added to the list were MP Holding and Gateway Real Estate. Conversely, the EDEKA Group dropped out of the top 5 of this ranking because it pursued no proprietary developments. Property developers have become even more dominant.

Fig. 14 *TOP 20 DEVELOPERS OF LOGISTICS FACILITIES IN GERMANY, BY '000 SQM OF FLOOR AREA, 2012–2016, 2017**



* The evaluation includes all completions up to the key date of 31 July 2017 plus floor space still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)

2012 – 2016
2017*
DEUTSCHE POST DHL GROUP
GREENFIELD DEVELOPMENT
FIEGE GROUP
VERDION
DOBLINGER GROUP
GATEWAY REAL ESTATE
HABACKER HOLDING
IXOCON
MP HOLDING
VOLKSWAGEN IMMOBILIEN (VWI)

WHERE ARE LOGISTICS ASSETS RAISED?—BUILDING ACTIVITY BY ESTABLISHED LOGISTICS REGIONS[3]

ESTABLISHED LOGISTICS REGIONS ACCOUNT FOR 78% OF THE COMPLETED FLOOR SPACE

The established logistics regions account for over 78% of the new logistics buildings that were completed between 2012 and 2016, which implies a minor dip compared to the period studied for the prior year survey (2011 through 2015: 81%). This means that the significance of peripheral locations with comparatively poor infrastructure fit-out has slightly increased during the latest survey period. Locations outside the logistics regions continue to see big-ticket developments by industrials and retail logistics operators, these being groups that do their own developments for intended owner-occupancy without necessarily factoring in their alternative use potential.

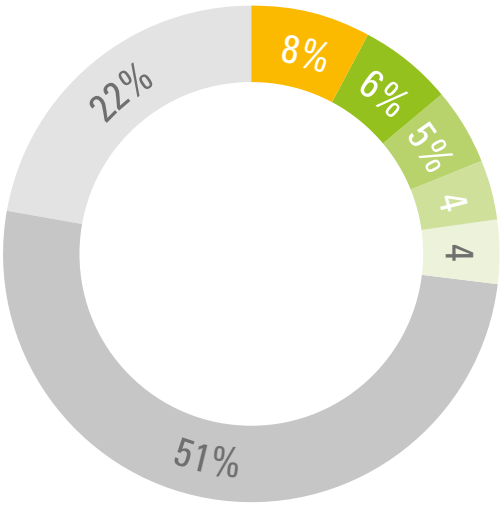


Fig. 15 *COMPLETED LOGISTICS FACILITIES BY LOGISTICS REGION, 2012–2016*

- *RHINE-MAIN/FRANKFURT*
- *DÜSSELDORF*
- *HAMBURG*
- *HANOVER/BRAUNSCHWEIG*
- *LOWER BAVARIA*
- *OTHER LOGISTICS REGIONS*
- *PERIPHERY*

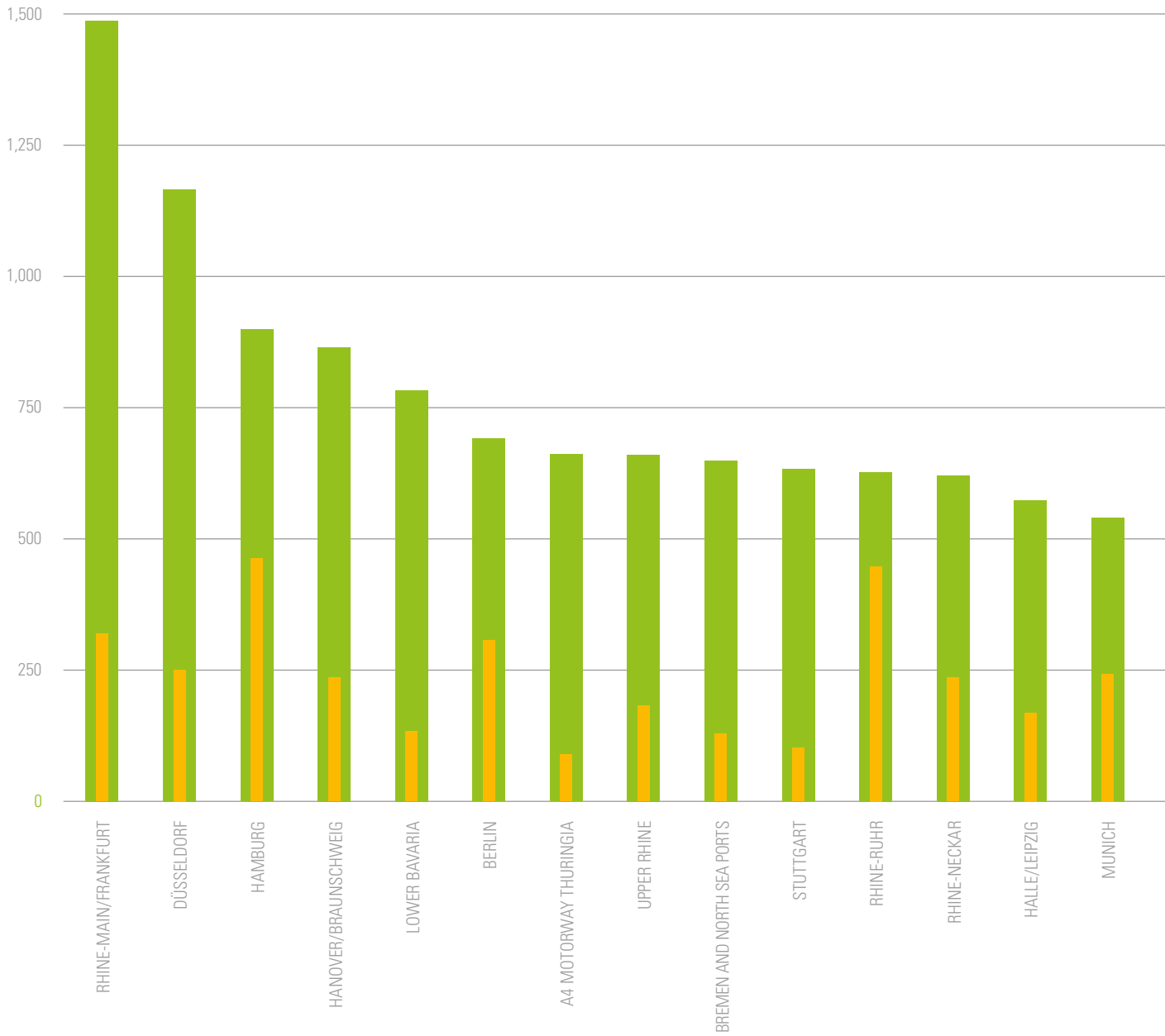
The five regions with the highest volume of new construction account for 27.7% of the logistics completions. With nearly 1.5 million sqm of completed floor area and a 7.9% share of the total completions during the period under review, Rhine-Main/Frankfurt once again takes the lead among Germany's 28 logistics regions, as it did in last year's ranking. With 400,000 sqm in completed logistics space, the region was in keen demand among developers in 2016 due to its central location in Germany and Europe as a whole and also because of Frankfurt's freight airport. 2017 will be another banner year, with an anticipated completions total of 320,000 sqm.

The runner-up among the logistics regions is Düsseldorf with over 1.1 million sqm of new completions (up from fourth place the previous year). More than 300,000 sqm of logistics space were completed here in 2016. The fact that Düsseldorf is part of the Rhine-Ruhr metro region and close to the countries on Germany's western border continues to appeal to developers. Demand is strong here, and roughly 250,000 sqm of floor area completed in 2017 suggest as much.

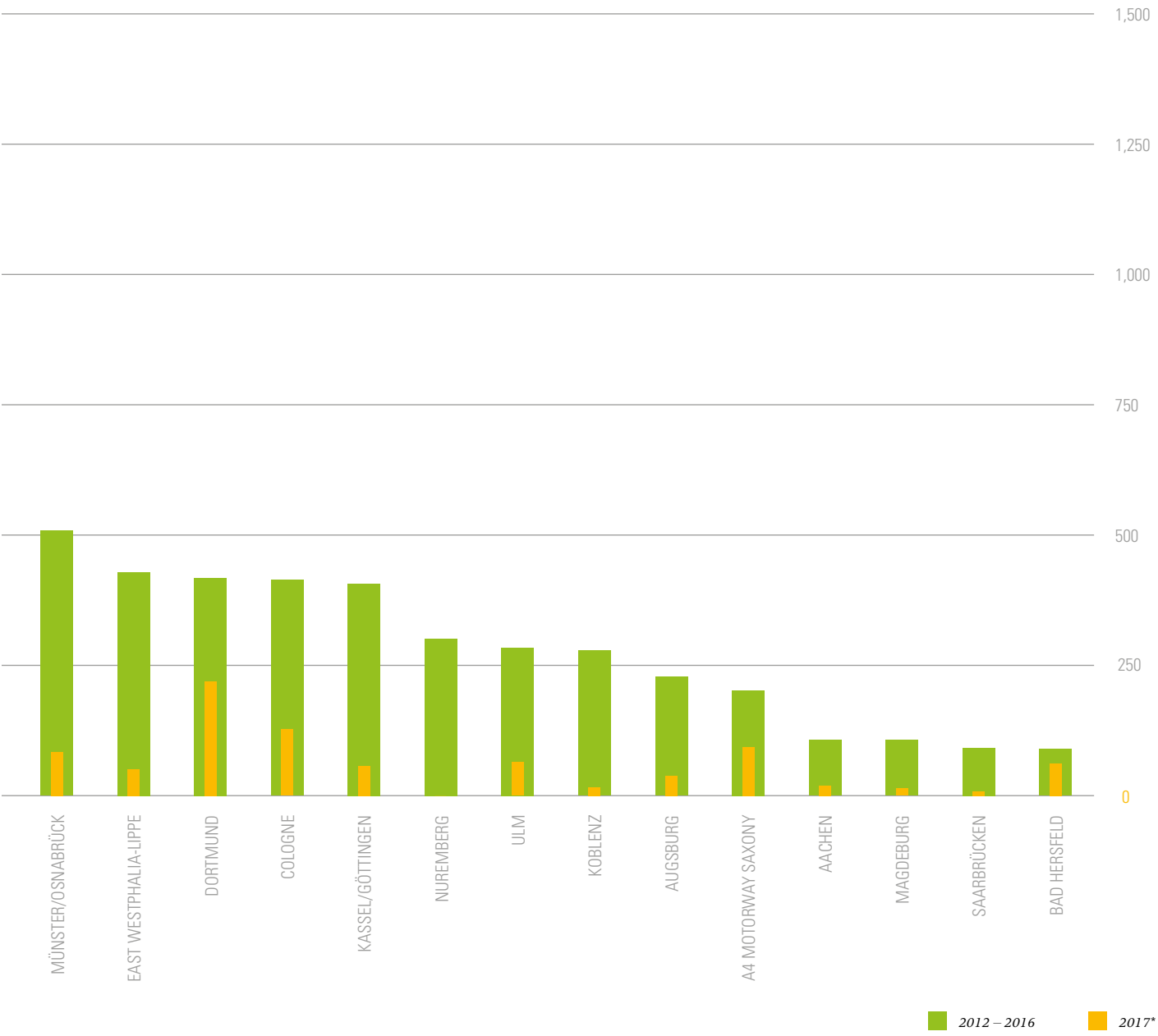
[3] For a definition, see the online glossary

GOODMAN NÜRNBERG III LOGISTICS CENTRE
(Source: Goodman)

Fig. 16 *NEW COMPLETIONS BY LOGISTICS REGION, IN '000 SQM, 2012–2016, 2017**



The Hamburg logistics region registered the third-largest volume of new construction among the logistics regions during the period under review with nearly 900,000 sqm. Its port, many freight centres and excellent infrastructure connectivity, ensure that Hamburg remains a highly sought location. Still, Hamburg lost one spot in the ranking year on year. It remains to be seen whether Hamburg's market appeal will suffer from the delayed dredging to deepen the Elbe River and the increasing acceptance of the new deep water port in Wilhelmshaven. As of 2017, there is no evidence for any change, quite on the contrary: The building activity has increased, if anything, and with more than 460,000 sqm, Hamburg has a higher volume of new construction than any other logistics region. In the Hanover/Braunschweig logistics region, about 865,000 sqm will



* The evaluation includes all completions up to the key date of 31 July 2017 plus floor space still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)

be completed between 2012 and year-end 2017. The last of the top 5 with 783,000 sqm in new completions is the Lower Bavaria logistics region. In the longer term, Lower Bavaria with its moderate completions volume of around 130,000 sqm in 2017 is likely to lose its top 5 ranking. Its place in the lead group will be taken by the Rhine-Ruhr region which has registered very brisk building activity lately. The volume of completions is expected to add up to around 450,000 sqm there. Munich, while not counting among Germany's top 5 logistics regions in terms of building activity, will end the year with a comparatively large volume of completions. This should somewhat mitigate the floor space shortage in the region. The same goes for Berlin—a logistics region that made enormous gains in significance in recent years.

48 ASSET SIZES AND ASSET CLASSES

SMALL LOGISTICS ASSETS DEFINE THE DEVELOPMENT MARKET

In 2016, four logistics assets with a footprint of more than 100,000 sqm were completed—as many as during the years 2012 through 2015 combined. That being said, smaller properties continue to dominate the developments in Germany's logistics landscape. Well over 49% of the logistics assets completed between 2012 and 2017 measure less than 10,000 sqm, and nearly two thirds are smaller than 15,000 sqm. Only 0.5% of all logistics properties raised during the investigated period belong in the size category of more than 100,000 sqm. Nonetheless, these properties account for almost 5% of the new completions. Similarly, just over 13% of the completed properties belong in the size band of 25,000 to 50,000 sqm, yet they claim around 30% of all new construction.

BUT LOGISTICS PROPERTIES KEEP GETTING BIGGER ON AVERAGE

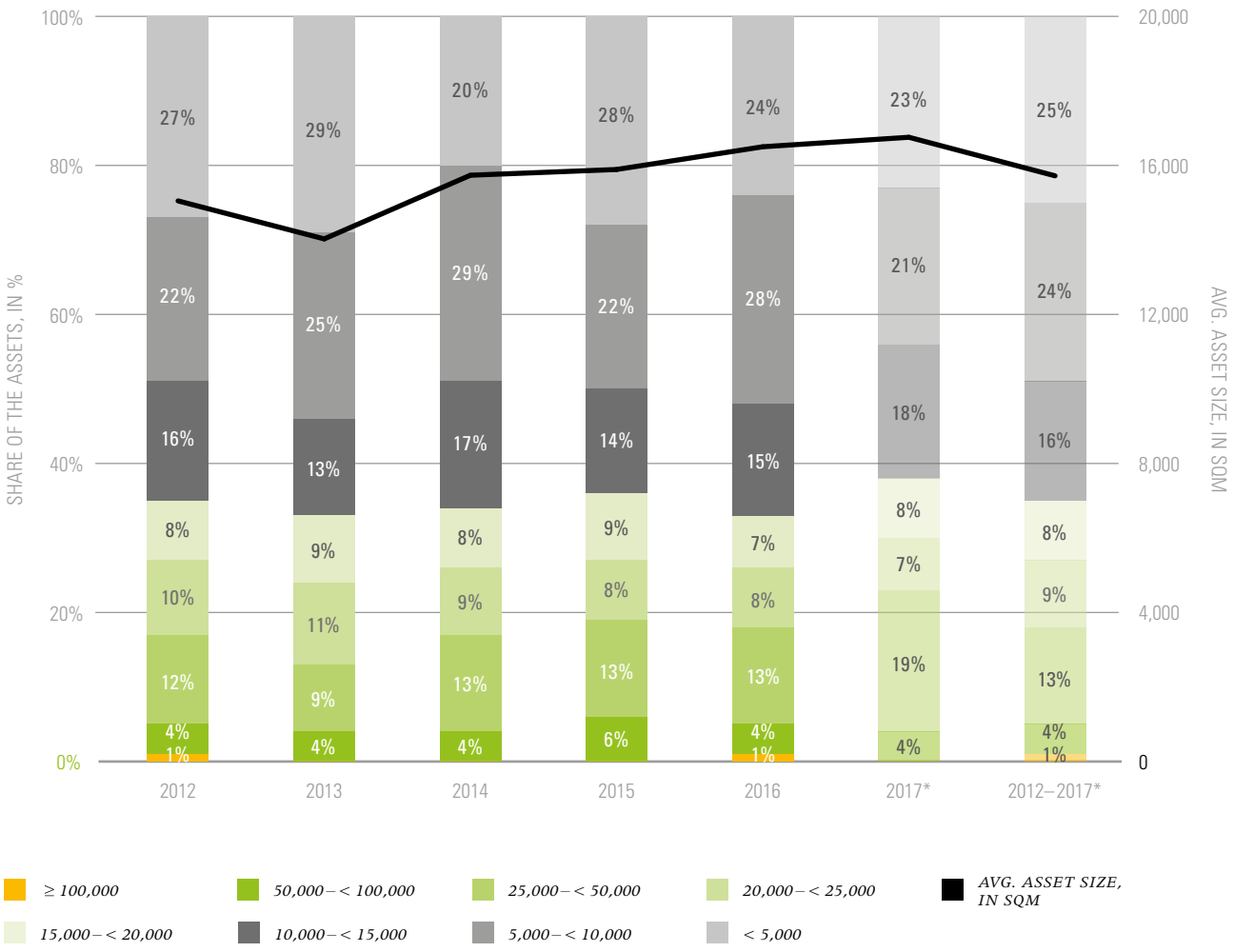
The average size of completed logistics properties has steadily increased since 2014. In 2016, the average crossed the mark of 16,000 sqm for the first time. It is now, in 2017, moving fast toward the 17,000 sqm mark.

Lately, the trend toward the realisation of smaller logistics assets has begun to slow down. While more than 50% of the completed properties were smaller than 10,000 sqm in 2015 and 2016, their share is expected to be down to 44% by the end of 2017. Properties of this size band include, for instance, delivery sites or distribution centres of CEP service providers, but mainly smaller properties used by owner-occupiers, including SMEs. Even though the share that properties measuring between 10,000 sqm and 15,000 sqm will have in 2017 is the highest of any year of the survey period at 18%, the total share of properties smaller than 15,000 sqm is the lowest at 62%.

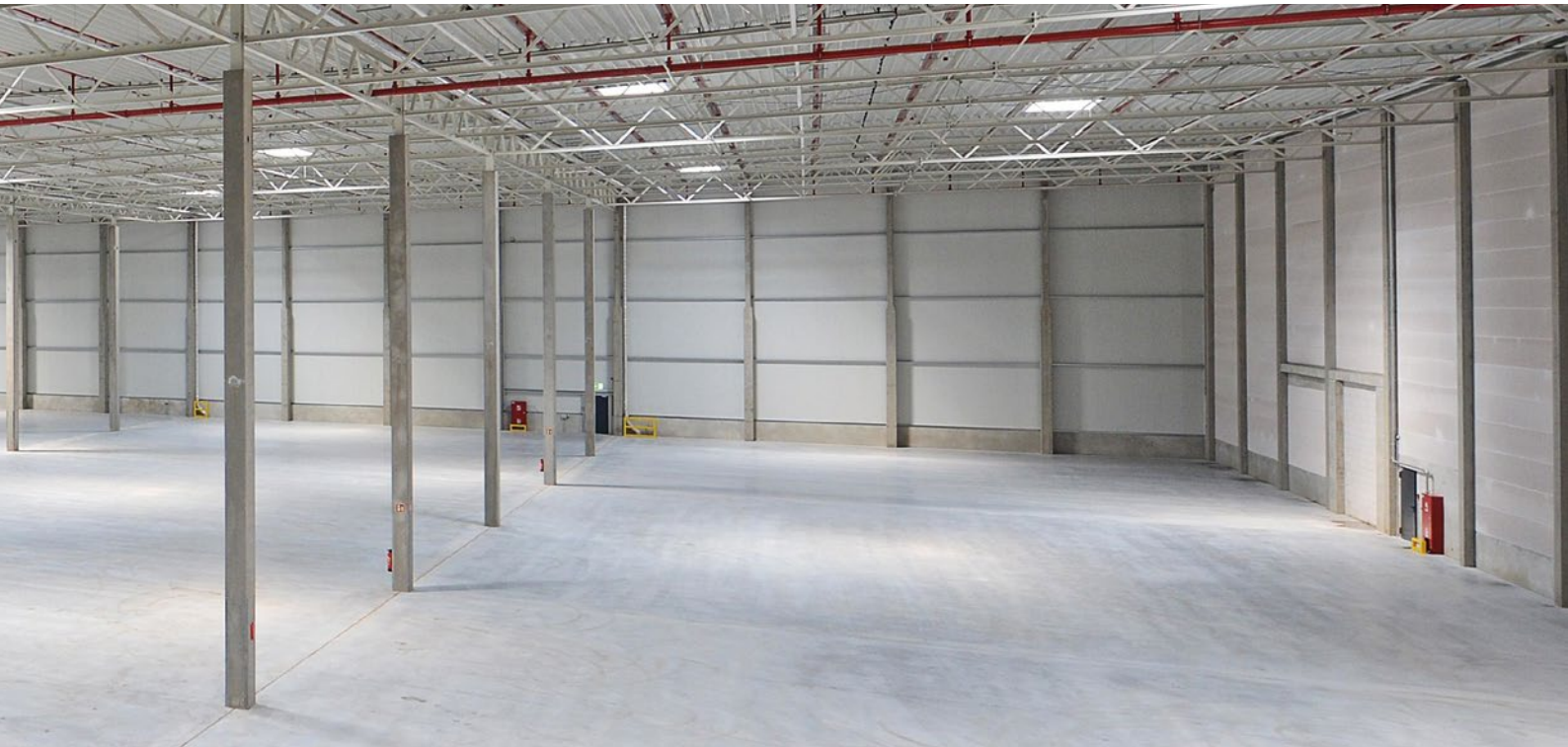
At the same time, the share of properties in the size band of 25,000 sqm to 50,000 sqm is up to around 19% in 2017, which is noticeably more than the level of prior years. Properties of this category include larger distribution centres and e-fulfilment facilities operated by retail logistics operator or regular logistics operators. In some instances, such properties are used by owner-occupiers/industrial companies that increasingly hail from the automotive sector. The other property size categories did not experience major fluctuations in regard to their share in new-build completions.

GOODMAN DUISBURG III LOGISTICS CENTRE
(Source: Goodman)

Fig. 17 *DISTRIBUTION OF COMPLETED ASSETS BY SIZE CATEGORIES, 2012–2016, 2017**



* The evaluation includes all completions up to the key date of 31 July 2017 plus floor space still in the pipeline (projects under construction or in planning, slated for completion before the end of 2017)



DOES THE BUILDING ACTIVITY MEET THE NEEDS OF CITY LOGISTICS?

DESPITE KEEN DEMAND, FEW NEW-BUILD CITY LOGISTICS PROPERTIES ARE COMPLETED

Driven by the strong demand for space, the building activity is at an all-time high. Logistics and last-mile requirements have continuously increased over the past years. Is there even enough space available to meet the rise in demand? At first glance, the answer appears to be affirmative, because a number of large-scale properties are under development that focus expressly on e-commerce and ultimately on last-mile deliveries. Extensive state-of-the-art fulfilment centres are built to ensure that the population is supplied with goods bought online. However, the bulk of these are located close to inner cities/metropolises in conveniently accessed locations, the majority being greenfield developments because of their sheer dimensions. Accordingly, they are symptomatic of the building activity of the past ten to 15 years. Examples of such developments include:

Fig. 18 *SELECTED LARGE-SCALE PROJECTS OF RELEVANCE FOR E-COMMERCE/CITY LOGISTICS*

TENANTS/OCCUPIERS	LOCATION	DEVELOPER	STATUS	SIZE IN SQM OF USABLE AREA	COMPLETION DATE
Amazon	Mönchengladbach	Ixocon	Under construction	150,000	Q4 2018
Amazon	Winsen/Luhe (Hamburg)	IDI Gazeley	Completed	130,000	Q3 2017
Amazon	Werne (Dortmund)	Verdion	Under construction	104,000	Q1 2018
Amazon	Achim (Bremen)	Amazon	Brainstorming phase	70,000	Q4 2019
Amazon	Frankenthal (Mannheim)	VGP	Under construction	66,500	Q1 2018
reuter	Bedburg (Cologne/Düsseldorf)	reuter	Detailed planning	60,000	Q3 2018
Amazon	Dortmund	Garbe	Under construction	54,000	Q4 2017
Galeria Kaufhof	Zülpich (Cologne/Bonn)	Fiege	Under construction	50,000	Q4 2018
Adidas	Rieste (Osnabrück)	Hochtief Projekt-entwicklung GmbH	Under construction	44,000	Q4 2017

Logistics assets are also raised in inner-city locations. But if you take a closer look at these developments you will see that virtually no properties have been raised in German metro regions that are suitable for SDD and SHD fulfilment purposes. A good case in point is the Hamburg logistics region, where a matrix view of the new-build completions shows that many of the new logistics assets occupy remote locations and have large dimensions. The majority of smaller logistics properties were also raised in peripheral locations, are used by owner-occupiers, and are not designed for handling city logistics functions. Even properties whose site and size criteria meet the specifications for city logistics properties were often developed by owner-occupiers and are not intended as solutions to the last-mile and final-mile issue.

If you analyse the projects that major developers completed in recent years, you will notice that virtually no small assets or small-scale properties close to downtown were built. Urban construction activities are almost exclusively limited to big-ticket developments in inner-city industrial zones, such as Hammerbrook in Hamburg. Only a few projects are known earmarked for city logistics because they have been dedicated for this purpose or converted to it.

Fig. 19 *NEW-BUILD COMPLETIONS OF LOGISTICS PROPERTIES: THE EXAMPLE OF HAMBURG, 2012–2016*

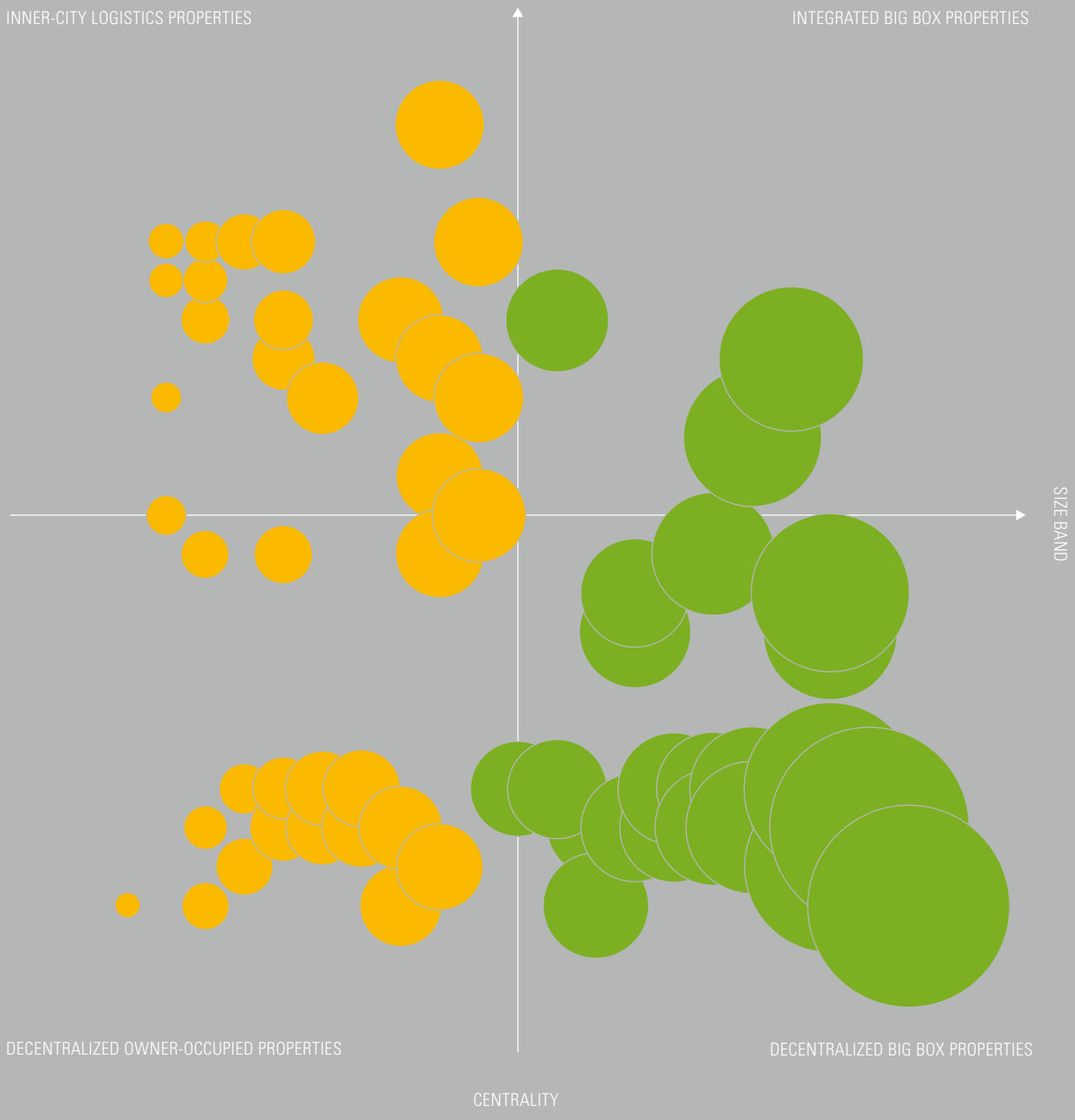


Fig. 20 *SELECTED DEVELOPMENTS CLOSE TO THE TOWN CENTRE/BUILT TO SUIT CITY LOGISTICS*

TENANTS/OCCUPIERS	LOCATION	DEVELOPER	STATUS	SIZE IN SQM OF USABLE AREA	OCCUPIED BY
Amazon Fresh	Munich	SEGRO	Completed	15,000	Q3 2017
Amazon Fresh	Berlin	n/a	Completed	14,000	Q1 2016
Aponeo	Berlin	Dibag	Under construction	10,000	Q3 2017
Kaufland	Hamburg	Schwarz Group	Completed	8,000	Q1 2017
Amazon Prime Now	Berlin	n/a	Completed	3,000	Q2 2016
Amazon Prime Now	Munich	n/a	Completed	2,000	Q3 2016

Established developers build no properties of the type that is urgently needed in city logistics and that would permit same-day or same-hour deliveries—or so it seems. The one exception are the mechanised delivery sites (MechZB) set up by Deutsche Post DHL, but rarely are they located in inner cities. Although these properties are designed to cope with inner-city logistics processes, their suitability for handling last- and final-mile deliveries remains doubtful, given the fact that most of them occupy peripheral urban locations.

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"For big-box developers with logistics competence, city logistics assets are too small in scale and too low in their return on investments compared to larger assets. The classic urban developers for mixed-use area (office, residential) or shopping centres lack the required logistics competency. While the asset classes mixing here are conventional ones, there are no market players who provide them yet. The upfront costs for a warehouse in a size band of around 10,000 sqm are comparatively high. Typical property developers of large-scale warehouses therefore do not serve this segment and dread the costs, not least because standardised warehouse design is inapplicable in the urban context and because entirely new concepts need to be developed."

Analogously, it is safe to say in regard to the CEP service providers: Neither in 2016 nor in the ongoing year of 2017 has there been any evidence that CEP service providers are about the change their strategy in regard to the development of logistics real estate in face of growing competitive pressure and fundamental changes in the supply chain.

What types of property are needed in city logistics? Will the currently observable trends in the development landscape suffice to solve the issues of inner-city logistics? Of course, fulfilment centres in the urban environment represent an important link, but do they alone have the solution potential for the last-mile and final-mile problem? Are they suitable as city depot for the deliveries of online grocery retailers?

Or will other real estate products be needed in addition? If so—why are they not already under extensive development? The subsequent chapter will look into these questions.

WANTED: LOGISTICS FACILITIES FOR THE LAST AND FINAL MILE

WILL A NEW TYPE OF LOGISTICS REAL ESTATE FOR CITY LOGISTICS ACTUALLY EVOLVE?

At this time, there is no real estate product on the market specifically dedicated to the city logistics of the last and final mile. The question is: Will a new type of logistics real estate actually evolve over the coming five to ten years whose forte is the coverage of the so-called "last mile"? Here is the question that was answered both by the five panels and the experts:

LOGISTICS CENTRE SEIFERT MALSCH
(Source: Goodman)

Fig. 21 *DO YOU THINK THAT A NEW TYPE OF LOGISTICS REAL ESTATE FOR THE LAST/FINAL MILE WILL BE DEVELOPED IN THE COMING 5–10 YEARS?*

POSSIBLE REPLIES	MEAN ACROSS PANELS	MUNICIPALITIES	TENANTS/ OCCUPIERS	PROPERTY DEVELOPERS	INVESTORS	LENDERS
Yes, an entirely new type of property will have to be created.	66%	68%	54%	54%	77%	75%
No, city logistics will have to make do with the existing building stock.	34%	32%	46%	46%	23%	25%

REPLY FREQUENCIES IN %

Note to the reader:
The chart shows the responses to the question at hand in vertical order. The reference bracket for the change in colour is 50%. The farther the actual score is below 50%, the deeper the hue of red, whereas the green gets darker the farther it is above 50%.

According to the panel survey, investors and lenders are the respondents most convinced that such a property type will evolve. The vote is clearly affirmative at 75%. While the municipalities share the opinion, their rate of conviction is slightly lower. The groups of tenants/occupiers and property developers are least convinced that a new property type will emerge, even though more than 50% of the respondents agreed. This could possibly be associated with the fact that very few properties of the type have so far been raised or that occupiers have a hard time finding any on the market—prompting a comparatively sceptical response.

The opinions of the experts are somewhat more differentiated at first glance. They depend strongly on the experts' backgrounds and their point of view. Responses ranged from "Yes, definitely" to "Yes and no" and all the way to "No."

JANINE DIETZE, DREES & SOMMER:

"I do not believe that a completely new type of logistics property will be developed, but rather that existing properties will be re-developed through structural alterations and upgrades. There is a rising demand for micro-hubs in the (inner) cities. Here, I expect to see a smaller, more flexible and mutually networked structure in the next five to ten years in addition to the midsize- and macro-hubs outside the cities proper."

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"Cities and their real estate are not optimally adjusted to the specific requirements in city logistics. The main place to look for city logistics floor space is therefore the existing building stock. From a structural point of view, its asses will definitely lend themselves to flexible use. But in the long run, optimised city logistics structures would be desirable."

Read together, the two sources of information present a clear picture: Yes, there is definitely a need for a new design, but that does not imply in every case that a revolutionary new-build solution or an entirely new real estate product is called for. Rather, it is more important to establish new formats in existing structures or to apply new thought patterns. So it will matter far more how we put the existing building fabric to use.

RAINER KIEHL, UPS GERMANY:

"The city logistics of the CEP sector does not necessarily require an entirely new type of property. Our workflows can be performed in many existing building structures: In the morning, parcels are loaded into roll cage trolleys, which are loaded onto a 7.5-ton lorry via a ramp, and then hauled off to the relevant city depot. There, the process is carried out in reverse order. Ensuring a smooth workflow for the process does not require a new type of property. Its successive steps can be carried out in many existing schemes as long as they have a small storage space, a parking spot for the van, while it would also be nice to have or to add a ramp, a goods lift or similar where possible."

At this time, real-life examples for city logistics real estate remain in short supply. This is also due to the fact that no prototypical models exist. Rather, we are currently passing through an experimental phase. Some of the market operators have looked into the subject matter for years.

PROF. TOBIAS JUST, IREBS REAL ESTATE BUSINESS SCHOOL:

"The coming years will see a lot of experimentation. I doubt that a new property type will emerge as standard within the next five years, but within the next ten years it could arguably happen."

RAINER KIEHL, UPS GERMANY:

"UPS started looking for a new city logistics concept in 2012. Initially, no one had an idea what the future 'micro depots' would look like. So we started by experimenting a lot and gathering experience.

Over the years, we created several model solutions:

- *the 'Hamburg model': Under this model, we are using four sea cargo containers from which all customers in the inner-city area are served. At the start of the project, there were no other ideas, which is why the container was chosen. It took three years to develop a concept that would be approved, to find a location, and eventually to implement the idea. Here is our experience: The distances are still far too long to quickly implement city logistics by using an effective lever.*
- *In Herne, we rented an old kiosk in the city centre from which the entire city is supplied via cargo bike.*
- *In Oldenburg we keep a trailer with 14 to 16 cubic metres of capacity in a parking lot on the city's periphery to cover the inner city with cargo bicycles.*

We kept developing our initial efforts, and some of the results went into various model projects, for example:

- *the City2share project in Munich: Just recently, on 13 July 2017, we went live with the operating activities of this project. It represents a joint project, and is part of a public-private collaboration with the City of Munich, local industry partners and scientists. The purpose of the project, which is being tested in another variant in Hamburg, is to develop model quarters for sustainable urban electric mobility. The task of UPS is to handle the e-logistics end. The project shows that logistics in residential areas directly connected to the inner city—in this case the Glockenbachviertel neighbourhood—will work. Like in Hamburg, we started with containers, but are already looking for permanent premises. It is something we need for the sake of planning certainty, which is extremely important to us."*

JANINE DIETZE, DREES & SOMMER:

"Due to our limited capacities in floor space and the cost pressure in the logistics industry when compared to other industries, the requirements in the actual property are relatively modest. Conversely, the requirements in terms of logistics processes are much higher. The solution for inner cities is rather to find floor space in existing facilities that are no longer needed due to technological changes or due to changed patterns the way they were originally intended or realised. These could, for instance, be premises of wholesalers who tend to need less sales and storage area for their own purposes. Such buildings can be partitioned and accommodate another occupier, not least because the access to the transport infrastructure is already in place."

What other reasons come to mind why the number of real-life examples or the building activity is so very reticent? The various panels evaluated six possible factors to determine the extent to which they would discourage the use of a logistics property close to the town centre for the purposes of city logistics.

GATEWAY TO ZALANDO LOGISTICS CENTRE LAHR
(Source: Goodman)

Across panels, it is easy to recognise that one of the most important reasons is an economic one. The panel members seem to see the use of inner-city premises as economically undesirable. Against the background of the high rent level in the urban centres and of the generally low rent levels of logistics facilities, this is plausible insofar as inner-city facilities are subject to such fierce competitive pressure that their use for logistics purposes—conventionally understood—simply does not seem sustainable economically.

This contrasts with the legal situation under German building law. While often cited, none of the panels considered the argument a serious obstacle, as the intense green shade of the response illustrates. The same is true, and in the eyes of some respondents even more so, for the supposed lack of acceptance of logistics hubs. With the exception of tenants/occupiers, whose experience in day-to-day business may differ, all other panels returned their lowest score for this kind of obstacle here.

Transport-related factors, such as traffic movement and the increased emissions associated with it are quoted by municipalities and lenders as the key factors standing in the way of operating logistics real state close to inner cities. Investors, by contrast, take a particularly bleak view of property availability. To be sure, it is an aspect that all panels consider difficult, albeit not always the most limiting factor.

Political unwillingness was cited especially by tenants/occupiers and property developers as the biggest single barrier to the logistics use of inner-city areas.

Fig. 22 *IN YOUR OPINION, WHICH FACTORS PRESENT THE STRONGEST ARGUMENT AGAINST THE USE OF AN LOGISTICS PROPERTY CLOSE TO DOWNTOWN FOR LAST- AND FINAL-MILE DELIVERY?*

POSSIBLE REPLIES	MEAN ACROSS PANELS	MUNICIPALITIES	TENANTS/ OCCUPIERS	PROPERTY DEVELOPERS	INVESTORS	LENDERS
Rigid building code	11%	10%	8%	11%	12%	15%
Transport-related factors	19%	23%	12%	14%	20%	25%
Availability of facilities/real estate	19%	18%	15%	19%	22%	20%
Poor acceptance of logistics hubs	9%	8%	15%	8%	7%	7%
Logistics a politically unpopular type of use	20%	16%	27%	28%	17%	14%
Logistics an economically unpopular type of use	22%	25%	23%	19%	22%	19%

REPLY FREQUENCIES IN %

Note to the reader:
The chart shows the responses to the question at hand in vertical order for each panel. The reference bracket for each change in colour is 16.7%, that is, a neutral value that gives equal weight to each factor (with 6 possible responses adding up to 100% of the answers). The greater the upward deviation of the actual score from the neutral value, the deeper the red hue to suggest that this factor is perceived as a greater obstacle. The greater the downward deviation of the actual score, the richer the green hue to suggest that this factor is deemed less of an obstacle.

WHICH TYPES OF REAL ESTATE WILL BECOME IMPORTANT TO CITY LOGISTICS?

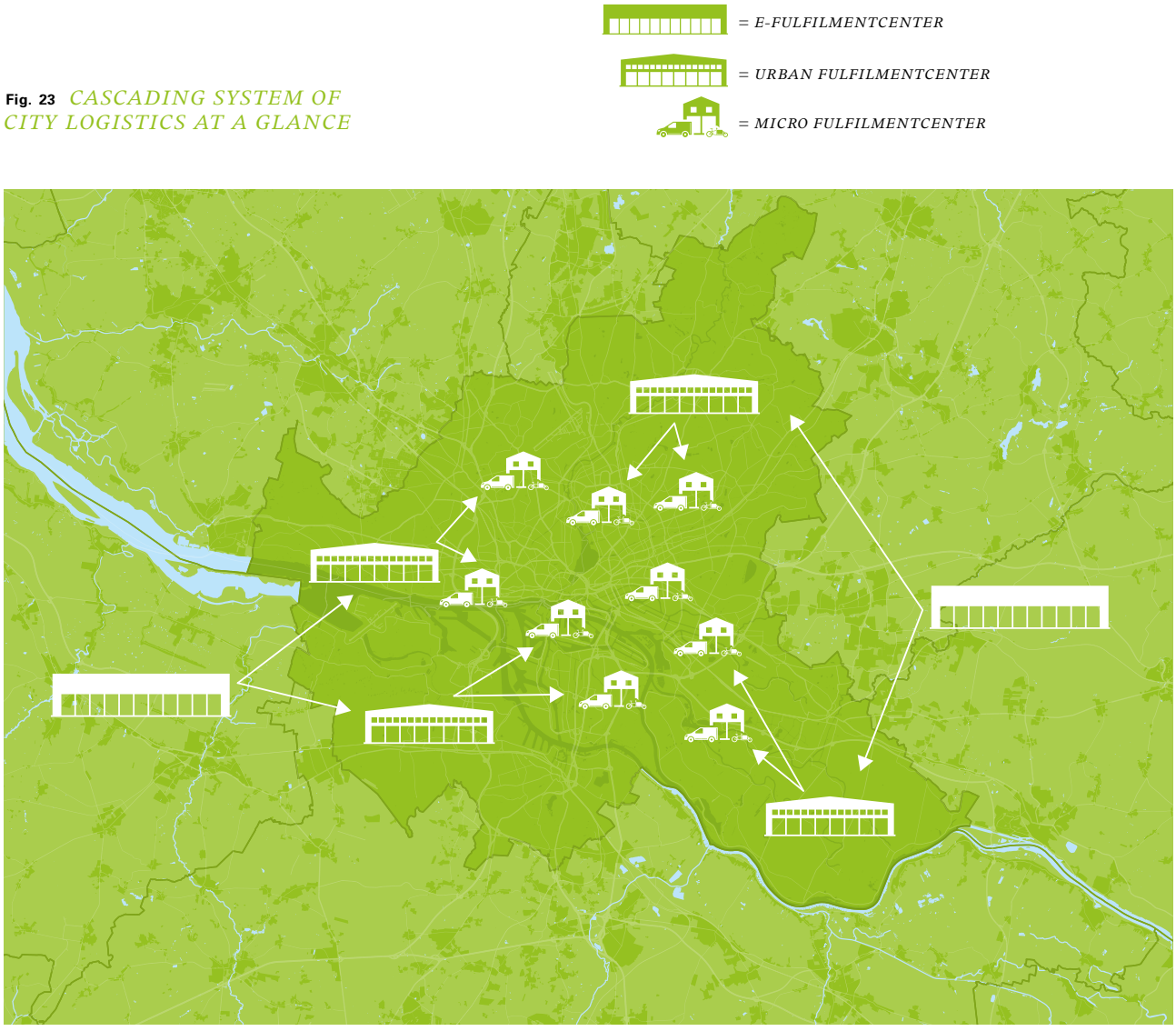
Many stakeholders are still experimenting to figure out which sort of building or facility and which qualities meet their needs. But some have already gone a step further, and have precise ideas of what their optimal city logistics property should look like. Principally, the question presents itself whether to opt for existing or for new-build structures. A new scheme would have the added advantage of letting you implement exact building specifications, assuming they exist.

JANINE DIETZE, DREES & SOMMER:

"To be able to act flexibly and swiftly (while remaining mobile), a large number of micro-hubs with a smaller market area in sub-districts or on the periphery will be used in (inner) cities in addition to the midsize- and macro-hubs. Given the limited supply of space and the cost pressure, I expect to see the use of existing properties to increase, possible in the form of mixed-use arrangements together with other functions, and involving technical upgrades."

Regardless of whether a given property is newly built or an existing structure converted from prior use: Which property types are eligible or needed? What would a corresponding system of properties have to look like to tackle or indeed solve the "problem of the last and final mile"?

Fig. 23 *CASCADING SYSTEM OF CITY LOGISTICS AT A GLANCE*



Plus: when talking about real estate for city logistics purposes, it needs to be remembered that the wheel will keep on turning and that the properties will have to be fit for future requirements.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"When it comes to city logistics, we are looking at an evolution. The primary point being: The majority of hub currently operated are set up for same-day delivery. These hubs are used to carry out deliveries the same day the orders where placed or the next morning if the orders where placed in the evening. Even this task is actually still in its trial phase at the moment. And it is not so much a service option that can actually be picked, but rather a silent upgrade, meaning you won't be expecting it. If we now bring in online-to-offline commerce as an add-on option, the question presents itself how all of this could be linked up. Here, we are looking at something still in its absolute infancy. We are floating all sorts of ideas, and are doing just as many test runs. Zalando is currently engaged in brick-and-mortar retailing in the form of outlets in Berlin, Cologne and Frankfurt. Going forward, other stores will be added here and there. On top of that, we acquired the retail chain Kickz. So we are operating physical stores in a number of German cities. Linking online and offline works exactly along these lines."

NEEDED: A CASCADING SYSTEM OF CITY LOGISTICS PROPERTIES

Technically speaking, what could the real estate used for the last/final-mile supply line look like?

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"At this time, real estate designed specifically for the needs of city logistics does not actually exist yet. When we realised a few years ago that same-hour delivery would eventually require a dedicated real estate solution, we began to experiment liberally. We were not looking for a city hub, because city logistics would not be about trans-shipments, but for a way to carry out end customer deliveries from a place close to downtown: a micro-distribution or micro-fulfilment centre.

Our initial ideas were along the lines of a regional distribution centre where lorries dock at four or five in the morning, unload their goods, and deliveries to individual markets are put together in palette-sized consignments. Once done, all vans would head out at the same time. But warehouses or systems of this type cannot cope with the requirements of order fulfilment in e-commerce. Regional distribution centres were therefore unsuitable, not least because the properties are located too far out of town.

A second approach therefore conceived of so-called 'dark stores' in the town centre, meaning (decommissioned) supermarkets or DIY stores where no shoppers enter the premises and where goods are not sorted like in a logistics centre. Couriers did their order picking right off the shelves. Since the stores used for the purposes had originally been designed to stimulate buying impulses in shoppers, the pick density was much too low at 200 articles per hour and unsuitable for a same-hour delivery model. Dark stores were too unproductive and unable to establish themselves.

The micro-fulfilment centres set up and being used by Amazon function like a large e-fulfilment centre on the periphery does—except with a smaller number of articles and a focus on fast-moving goods. Here, a direct picking in a chaotic system is used to put the consignments together. Order picking proceeds at a rate of 500 articles per hour, and there is little that resembles the dark stores of the past. But now, as then, operations are still constrained by the structural parameters of a building's original purpose."

In the eyes of the experts, a functioning system for city logistics should be structured in a cascading system like grocery retailing. After all, the properties required in city logistics are not self-sufficient but must be resupplied. This makes a combination of final inner-city storage units—the micro-depots—and supply warehouses on the urban periphery a plausible model. The supply warehouses are in turn replenished from central warehouses.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"The food retail trade has basically perfected this system, i.e. they have always had their outlets, the corresponding regional warehouses, and their central warehouses. But the cascading arrangement with wholesalers has virtually ceased to exist. City logistics will takes its cue from the system nonetheless."

A cascading system in city logistics, especially in the implementation of same-hour delivery or very-last mile delivery model could be structured as follows.

Outside the city limits or the wider region surrounding the urban periphery:

- e-fulfilment centres for the large-area distribution in the e-commerce sector
- regional deport in the conventional sense to supply inner-city outlets

Within the city limits:

- urban fulfilment centres for the metropolitan distribution of food sold online
- micro-fulfilment centres serving as inner-city supply spokes and permitting a customer delivery within 1 or 2 hours, i.e. effectively SHD
- micro-depots that are used particularly by CEP service providers for deliveries in the close-knit network of the final mile

Existing facilities located outside the city limits were the primary focus of last year's survey, and will therefore not be discussed again here. Transshipment properties—some of which are more remote from the core city than others—are also frequently used as link between the integrated conurbation and the city proper. Cases in point include the mechanised delivery sites operated by Deutsche Post DHL, but while certainly playing a key role, this type of property will also be neglected in the subsequent discussion.

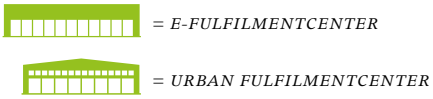
Urban Fulfilment Centres

Urban fulfilment centres permit the direct delivery of online orders to the customer, and are needed particularly wherever fresh food logistics need to be based on a refrigeration chain. Examples include the food retail trade, which raises such facilities exclusively for its online distribution, or Amazon Fresh.

PROF. TOBIAS JUST,
IREBS REAL ESTATE BUSINESS SCHOOL:
"Especially e-commerce deliveries of groceries presuppose city logistics real estate in crucial hot spots. These should be dedicated, mechanised and capable of re-supplying local residents with whatever goods they ordered online. Since the assortment is widening and may extend from erasers to frozen pizza, the available storage types play a decisive role. They require therefore a comprehensive mechanisation, including automation engineering, refrigeration, hazardous materials zones, et al. in order to accommodate the diversity of goods sold. In short, they represent a complex real estate product."

Since new-build properties of this kinds are virtually unavailable, the focus has so far been on the option to re-use former retail warehouses like DIY stores or garden supply centres, or abandoned supermarkets. The advantage of this workaround is that a relevant infrastructure, such as heavy-duty goods lifts, are already in place. Finding such a facility is usually requires a bit of luck. The greater the pressure to act becomes and the more the competition for available floor space intensifies, the harder it will be to identify such stock properties.

Whenever such a property is built from scratch, the outcome rarely compares to a conventional logistics property. It lacks many of the qualities that are considered prerequisite today for "modern assets with alternative use potential," including ceiling heights of more than six to seven metres, or floor load capacities of up to seven tons per square metre. This does not mean that these schemes have no alternative use potential.



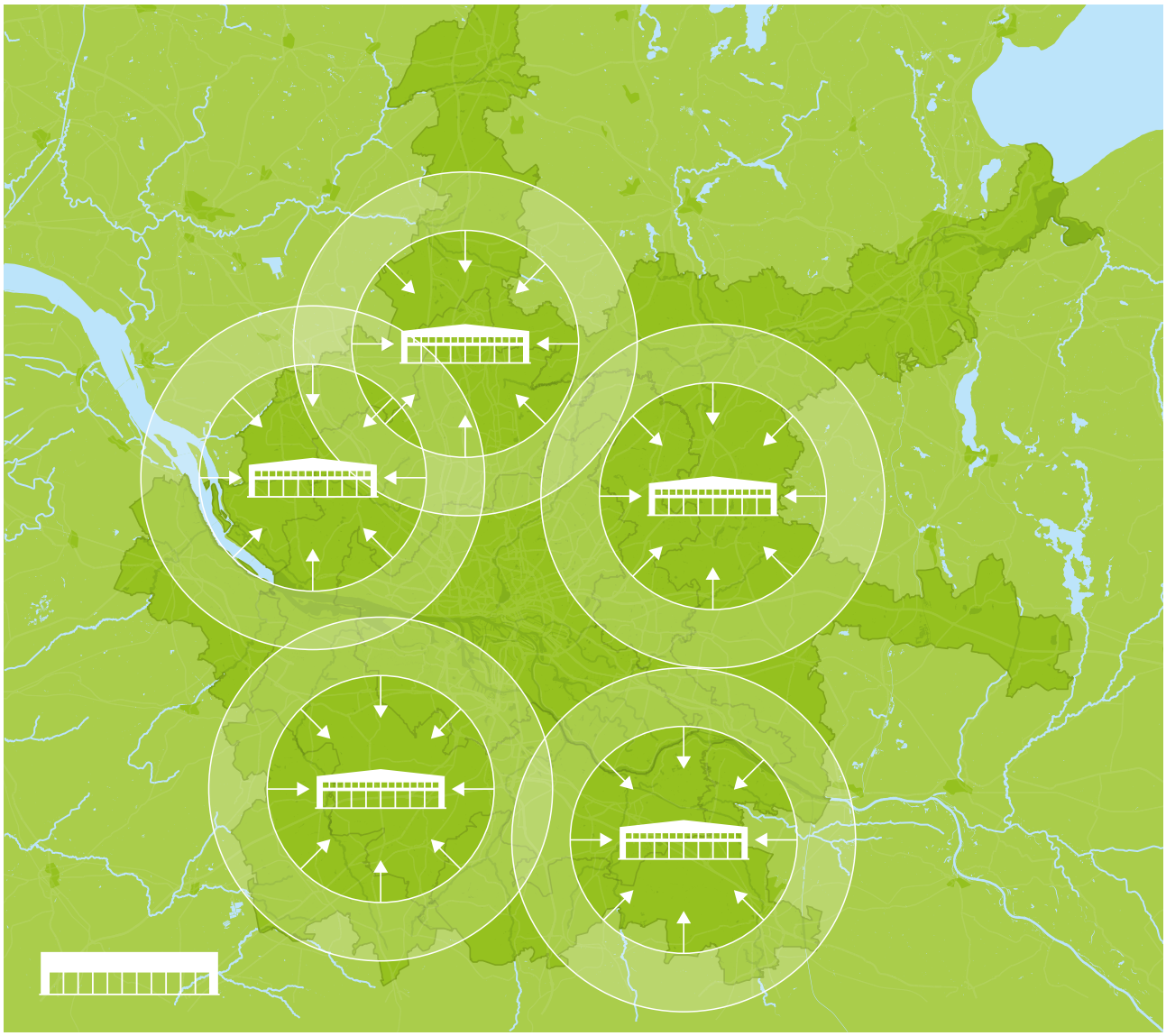
Micro-Fulfilment Centres

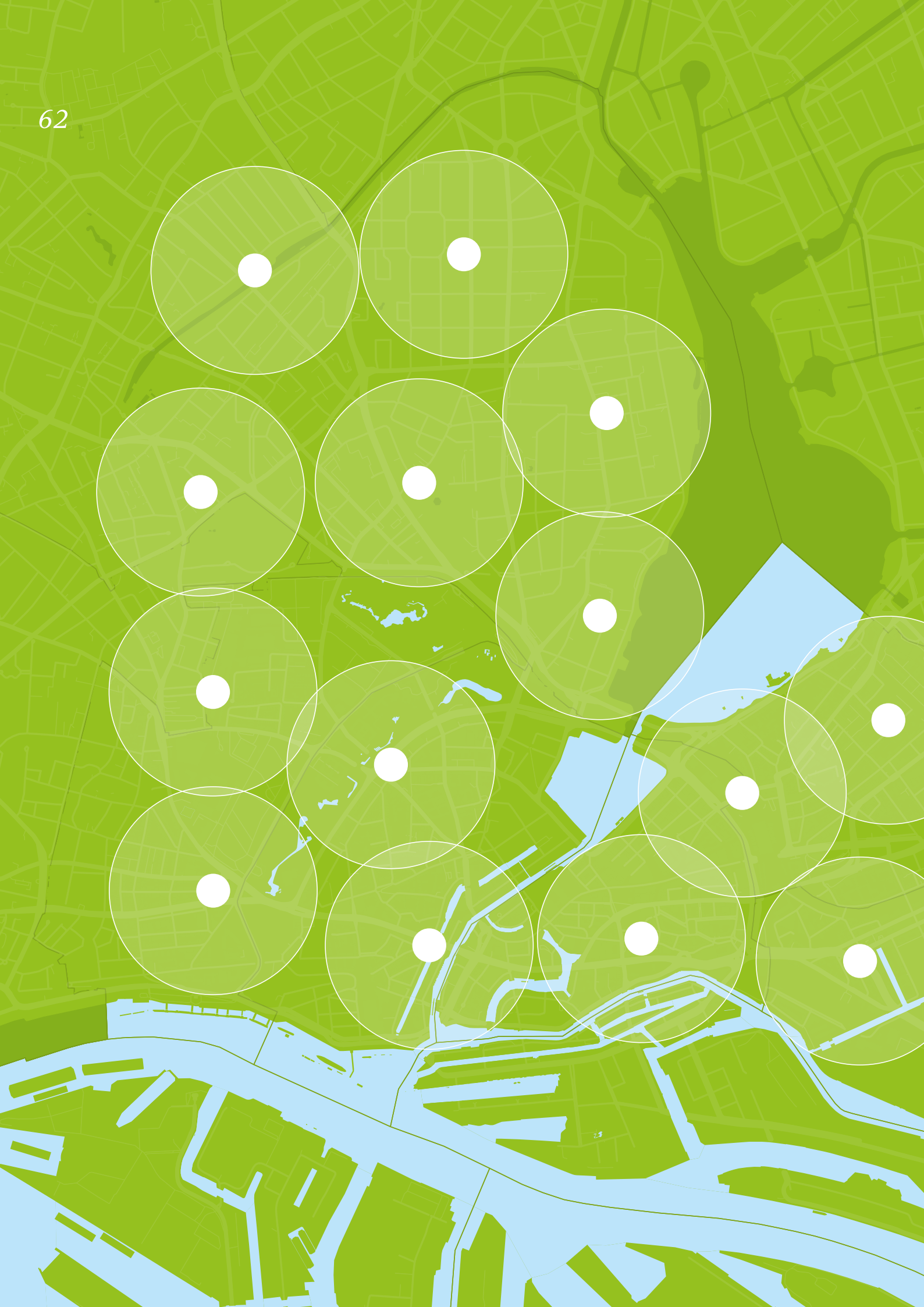
Micro-fulfilment centres are steadily gaining in significance for implementing SHD. Their key requirement is to be as close to the customer as possible. The properties used for the purpose are generally rather small and not particularly sophisticated. In fact, many office and retail properties would hypothetically qualify. Competitive pressure in the area of office real estate, and general reservations about the chances to obtain approval for the logistics usages, tend to hamper the implementation on the ground.

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"What is needed therefore are not actual logistics sites but any site marked by centrality and proximity to the customer. The property requirements are rather negligible. Some of the structurally altered properties may include fixtures that are not actually needed. Larger facilities could be housed on the vacant level of a shopping centre, for instance."

Fig. 24 *E-FULFILMENT CENTRES IN THE OUTSKIRTS AND SMALLER URBAN FULFILMENT CENTRES INSIDE THE INNER CITY AREA TO BE SUPPLIED*





Micro-Depots

Deliveries over the final mile are handled mainly by CEP service providers today, and things are likely to stay this way. In addition to the introduction of new types of transshipment properties like mechanised delivery sites, certain CEP service providers have been hunting for solutions to the final-mile problem for some time. The outcome of the search is the concept of the micro-depot, a very small-scale type of property that is densely networked across an entire city.

JANINE DIETZE, DREES & SOMMER:

"Micro hubs will be spread throughout the city in a small-scale grid that supplements the midsize hubs (also located within the city) and the major hubs (close to the city)."

Fig. 25 *MODEL GRID OF MICRO-DEPOTS ACROSS A CITYSCAPE*

WHAT SORT OF REQUIREMENTS DOES CITY LOGISTICS HAVE?

What does the Perfect Location Look like?

No matter what type of property is involved: The perfect location will be tailored to the requirements of the respective business, and tends to reflect one-off definitions. Operators use a variety of analytic tools for the purpose, such as centre-of-gravity analyses or order volume analyses. One thing that occupiers agree on, however, is that a given property site should be located as close to the town centre as possible. At the very least, it should be ensured that a maximum number of customers is accessible on short notice. Aside from a thorough site analysis, smart routing solutions are increasingly employed, as elaborated in the opening chapter.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"The despatch of a parcel needs to start somewhere, as the parcel will not just drop out of thin air but must get to this starting point in some manner. The perfect location for a city logistics facility, aside from its site, is also a matter of technology. The question that takes centre stage here is how the parcel gets to the customer with the least effort, meaning without having to be hauled from a greenfield e-fulfilment centre to a customer located downtown. There is a good chance that the requested product is in stock at a physical store within walking distance of the customer. This brings ambitious notions about delivery speed into play, and major e-commerce players are currently trying to outdo each other to get orders to the customer in a matter of minutes.

Ultimately, it is up to algorithms and apps to find the fastest and cleverest way, and to deploy the optimal means of transport for the job. No matter how smart the algorithm of big-data analysis and regardless of how autonomous the delivery vehicle is, no bicycle messenger or aerial drone will be fast enough to gain a head start over the competition if your location is ill chosen. On top of that, our goal is not necessarily to deliver as swiftly as possibly, but to deliver exactly the way the customer wants it. Existing resources should be used to the extent possible: e.g. by using convenience stores, kiosks, etc. as micro-depots. These will then serve as local base for neighbourhood deliveries. But the customer also has options to choose from: getting the parcel immediately, getting it at a certain time, or picking it up in person in a place and at a time freely chosen. So it is not the idea of same-hour delivery that takes chief priority for us, but the concept of a local delivery network. The challenge for us is to consider several approaches and to determine the smartest solution for a local delivery concept. Exact specifications would constrain us in this effort."

RAINER KIEHL, UPS GERMANY:

"We need to be where our customers are. It makes no sense to maintain facilities in a trading estate far from our target group. They should be located in the inner city or at least in densely populated districts. That does not mean we need to occupy prime locations. But even in the high-street pitches you will find vacant stores we could use if they were open to this kind of use. So far, however, the units offered to us have been much too large. One would have to see whether they could be carved up into several slots for different CEP service providers. Someone should check this out. But it is easier said than done. If you are lucky enough to locate the owner of a given facility, it is often a community of heirs or something like it, with no one willing to take matters in hand."

The panel survey has already returned a rather clear idea of what constitutes a suitable location. Favoured most are locations close to the customer, which in metropolises tend to be locations near residential areas. Tenants and occupiers are very emphatic about this preference. Municipalities, by contrast, consider intermodal stations to be particularly well suited—in stark contrast to tenants/occupiers. Proximity to the central business district is also deemed suitable as long as such locations are not overly remote from residential areas. Property developers take a similar view, with minor deviations in their ratings.

The classic qualities of logistics real estate, e.g. conveniently accessible locations, are rated as having a negligible significance, most notably by potential tenants/occupiers.

Fig. 26 *WHICH TYPE OF LOCATION DO YOU CONSIDER MOST SUITABLE FOR AN URBAN FULFILMENT CENTRE?*

POSSIBLE REPLIES	MEAN ACROSS PANELS	MUNICIPALITIES	TENANTS/ OCCUPIERS	PROPERTY DEVELOPERS
Close to an arterial road	10%	10%	13%	9%
If possible, in densely populated sub-districts (near the end customer, urban context in combination with secondary roads)	35%	19%	50%	36%
Close to transport hubs (multi-modal options such as public transportation, railway, road, waterway)	20%	34%	0%	27%
The closer to the CBD (central business district, high streets), the better	17%	19%	13%	18%
As close to the central railway station as possible	1%	2%	0%	0%
Close to motorway junctions	5%	2%	13%	0%
In pedestrianised areas	0%	1%	0%	0%
In trading estates near town centre	11%	12%	13%	9%

REPLY FREQUENCIES IN %

Note to the reader:
The chart shows the responses to the question at hand in vertical order for each panel. The reference bracket for each change in colour is 12.5%, that is, a neutral value that gives equal weight to each site option (with 8 possible responses adding up to 100% of the answers). The greater the downward deviation of the actual score, the richer the green hue to suggest that a given site is deemed more suitable. The greater the upward deviation of the actual score from the neutral value, the deeper the red hue to suggest that this type of site is considered less suitable.

What Types of Facility are Needed?

What kind of unit size is needed strongly depends on the city logistics concept or city logistics property at hand. At the same time, the demand for space definitely depends on the supply area and, connected to that, on the number of staff that will work at the site.

Urban fulfilment centres obviously need a larger footprint than micro-fulfilment centres and micro-depots. Depending on the city, the degree of market penetration and the delivery concept, a floor space requirement between 4,000 sqm and 6,000 sqm is cited for urban fulfilment centres. In some cases, the requirements are lower, but they can also be higher, of course. For the time being, customers in Germany remain reluctant to order their groceries online. The market segment is still in its infancy, but has tremendous development potential. The dimensions currently quoted could therefore suffice to cover an entire city area during the present pioneering phase. If the market penetration was to intensify, additional facilities in other sub-district would probably be added.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

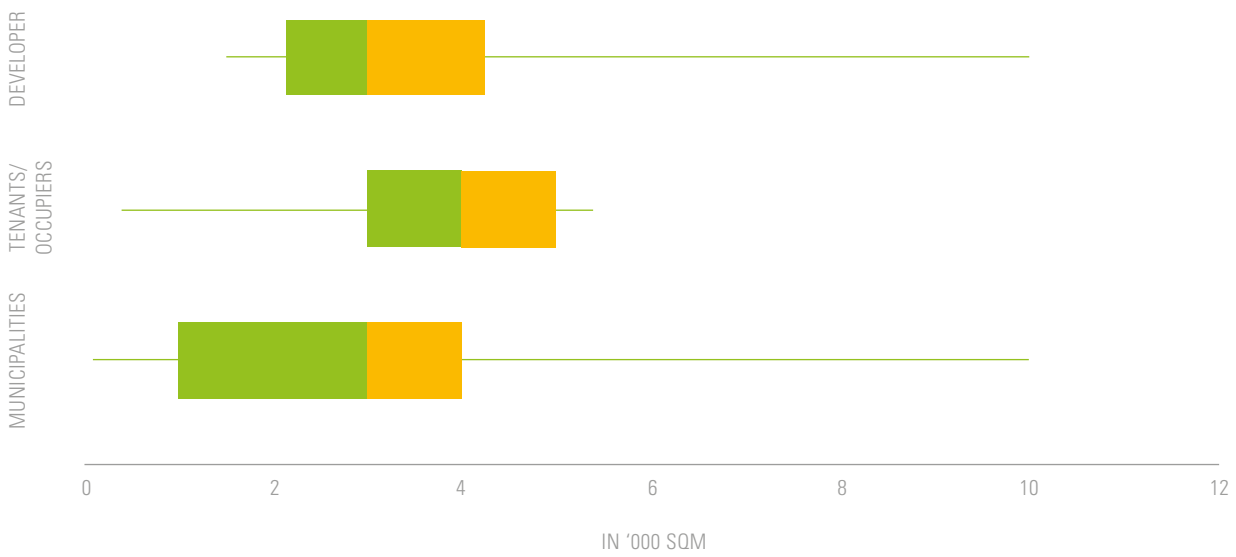
"Initially, all market players will experiment on their own, trying to find the optimal solution for their needs. It is still too early for us to assess the situation. We have not reached this stage yet. My gut feeling tells me that in perspective a floor area between 200 sqm and 500 sqm per city would be required to operate a micro-fulfilment centre."

RAINER KIEHL, UPS GERMANY:

"Initially, we took a trial-and-error approach with our micro-depots. We often deployed mobile units, which are well suited for the set-up stage. In the longer term, we prefer in-store solutions. The floor space requirements per micro-depot are ultimately very modest, just 14 sqm to 20 sqm, possibly 25 sqm. They serve as basis for covering a radius of about one kilometre, meaning in regard to the customer reach for picking up or delivering a shipment. So this is our measurand for any given site, not the number of parcels handled. In smaller cities, just one well-located micro-depot will often do the job, whereas in the metropolises you need a dense network of micro hubs."

Principally speaking, the footprint identified by the experts matches the assessments of the expert panels. German municipalities already have a pretty good idea of the overall requirements, and the outliers they quote cover both the micro-depot category and the larger fulfilment assets. The estimated benchmark figure could still be somewhat too small. The other two groups quote a slightly larger one. An adequately derived median across panels appears seems to be a maximum footprint of 4,000 sqm for urban fulfilment centres.

Fig. 27 *IN YOUR ESTIMATE, HOW MUCH FLOOR AREA DOES AN URBAN FULFILMENT CENTRE REQUIRE?*



The chosen type of representation is called boxplot.
For a reading aid to boxplots, see the online glossary.

How Big are the Covered Delivery Areas (Radius/Residents)?

It would be impossible to define a prototypical delivery area, because so many factors come into play. The closer to the town centre a given site is located, the higher the stop density and the smaller the delivery area. The usability of the means of transport (van, cargo bicycle, public transport in some cases) also impacts the delivery time as well as the potential delivery area. In the case of same-hour deliveries, the shipment will presumably be handed over to the courier within ten to 20 minutes. This leaves the courier—depending on the means of transport—a hypothetical drive time radius of 40 to 50 minutes. The net time available is shorter, because each tour combines several deliveries, and because time spent coming back must be factored in.

The question concerning a reasonable delivery area returned different answers from the respondent panels. Municipalities assume a rather small-scale supply area with a benchmark of 10,000 to 20,000 residents for each fulfilment centre. Property developers have already widened their estimated delivery area slightly to cover between 20,000 and 30,000 residents. Occupiers and tenants, some of whom already report empirical data, take a more differentiated angle. Their estimates start as low as 10,000 residents but go a high as any of the other panels, the maximum being 50,000 residents. Whenever an entire city is covered, the degree of coverage is proportionately greater. The benchmark figure for tenants/occupiers is just below 40,000 residents at a maximum.

These respondents returned a similarly differentiated picture for the radius to be covered. All panels assumed that the maximum radius covered would be greater than 2,000 metres. The benchmark across panels is 1,000 to 1,500 metres.

It is a radius perfectly plausible for micro-depots. Larger fulfilment centres of either category would presuppose a larger radius, though. It can extend to 10 km or even beyond if an entire city area is covered.

RAINER KIEHL, UPS GERMANY:

"Our micro-depots have a catchment area of around 1 km—the higher the stop density, the more efficient the deliveries will be. This area coverage is basically provided already by some market operators of the CEP sector. These have set up a network of access points consisting of parcel shops in dry cleaners', kiosks, etc. Whether or not the required storage area of around 25 sqm is actually available may differ from one case to the next. But even if not: You will find retail units across a given city area which have storage rooms that are sometimes no longer used. These may be used as micro-depots. You only need a party that identifies the owner and brokers a lease. One option would seem to be to bring in the city marketing or business development entities, which represent the retailers anyway."

Fig. 28 *IN YOUR ESTIMATE, HOW LARGE IS THE DELIVERY AREA OF AN URBAN FULFILMENT CENTRE?*

What are the Human Resources Needs?

Facility types differ considerably in terms of their correlating human resources needs. For obvious reasons, a micro-depot with a footprint of just a few square metres can only employ a very limited number of staff, even though the ratio of employees per square metre is still bound to be very high.

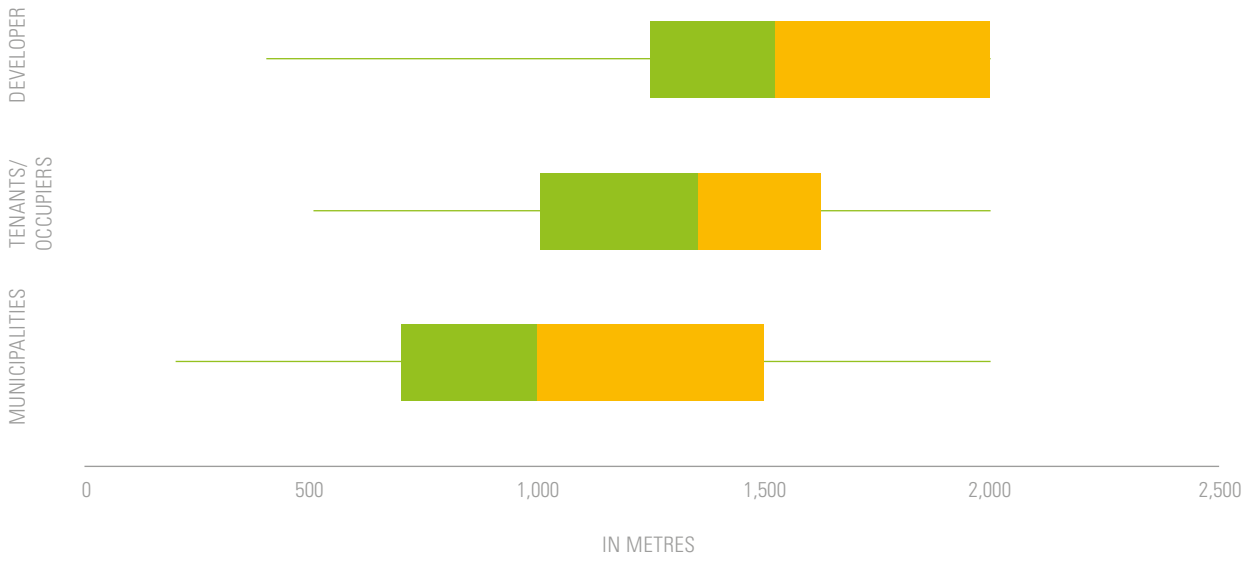
RAINER KIEHL, UPS GERMANY:

"The typical micro-hub employs only one or two staff. One employee delivers shipments on a cargo bicycle while another operates the warehouse using a dolly."

This does not apply to urban fulfilment centres in inner cities. Here, the floor-space to employee ratio tends to be far higher than is the case with greenfield logistics assets. The background to this is the low level of automation these facilities have. Order picking in the grocery segment of city logistics is primarily done manually, and this is unlikely to change in any serious way going forward. Still, it is hard to define uniform human resources needs for city logistics facilities because they depend on factors like market area, urban structure, and ultimately the size of the warehouse area. If the operator is also handling the deliveries, and if the drivers are in-house staff, an urban fulfilment centre in a small facility may employ around 20 to 30 staff, larger ones around 250 to 300 staff (including drivers). Other than drivers, staff are employed to handle incoming and outgoing goods, flexibly deployed standby staff, office staff and systems engineering staff, where applicable.

The respondent panels found it hard to derive a standard floor-space to employee ratio. Bandwidths vary from 100 sqm to 150 sqm of floor area per employee all the way to 500 sqm or indeed much more space, which is explained, inter alia, by the fact that the reference properties vary in size.

Fig. 29 *IN YOUR ESTIMATE, HOW LARGE IS THE CATCHMENT AREA (RADIUS) OF AN URBAN FULFILMENT CENTRE?*



Which Ownership Structure is Preferred?

It is impossible to pinpoint a single preferred ownership structure for city logistics solutions at this time. The solutions tested so far are too experimental, and the differences between the specific strategies used too stark.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"We have not actually looked at the question whether to build or rent properties or to share them with others hard enough to make any meaningful statement about it. Having rented floor space for the trial phase, we realised how hard it is to integrate such facilities in the logistics system. Realistically speaking, I think should focus on collaboration partners who have the necessary floor space and staff capacities."

RAINER KIEHL, UPS GERMANY:

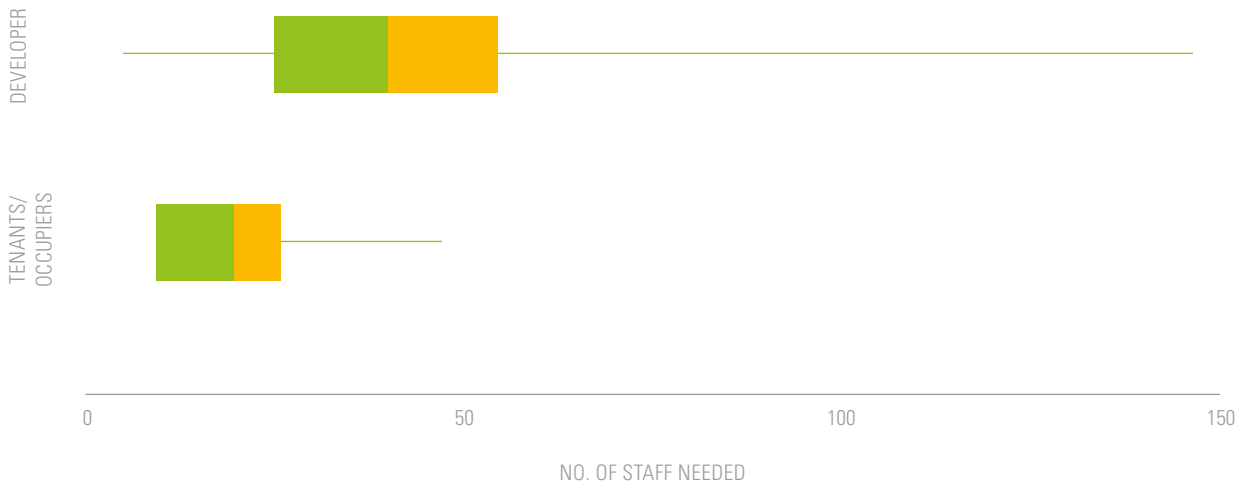
"We would normally never think of buying or building micro-depots in our own right. However, there is virtually no supply side for them. That is why we improvise with proprietary solution such as the use of containers. But these are nor permanent solutions, and will only work temporarily. We are ultimately not a real estate company, and so we prefer a lease solution."

Whenever occupiers engage in structural alterations or building new structures, they tend to opt for outright ownership, not least because the real estate industry cannot supply any premises to suit their needs or because property developer cannot yet offer any suitable product. But occupiers do not generally see themselves as owners, and keep an open mind toward lease solutions like those for greenfield facilities.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"At the end of the day, the most pressing question is currently what the fastest and most flexible way is to acquire capacities. If you create them yourself, you compromise your flexibility. Such facilities and locations are limited. They are virtually non-existent. It is hard to even find 50 sqm or 100 sqm in central locations that satisfy our requirements."

Fig. 30 *WHAT IS YOUR ESTIMATE OF THE HUMAN RESOURCES NEEDS?*



What Qualitative Requirements are Involved?

Micro-depots and micro-fulfilment centres are not particularly aspirational assets in terms of their must-have qualities.

RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"Micro-fulfilment centres are not exceptionally sophisticated, and may be realised in converted office or retail premises. The inner-city Amazon hub in Berlin, for instance, was set up in a former consumer electronics store in a prime high-street location on Kurfürstendamm. Such facilities come with loading docks and corresponding fitout features (loading zones for cars and cargo bike couriers, etc.)—which is entirely sufficient, and almost overshoots the requirements brief. Having public transportation links is also helpful because the occasional use of the underground for deliveries is also conceivable."

RAINER KIEHL, UPS GERMANY:

"Micro depots: If a small storage area and, if possible, a loading dock, a goods lift or similar are available or may be retrofitted, and if there is a possibility to unload a 7.5 ton lorry, then our basic requirements are met."

What about larger floor space requirements, for instance for urban fulfilment centres? Asked about the qualitative requirements, several panels provided highly informative insights. They once again highlight the fact that their qualities contrast starkly with those of large-scale greenfield facilities. Extensive manoeuvring areas or 360-degree access to a building are not among the prerequisites. Much more important to the tenants is to have easy ways to maintain their electric cargo bicycles or vehicles, and to have docking options for vans.

Fig. 31 *WHAT SORT OF QUALITIES SHOULD AN URBAN FULFILMENT CENTRE GUARANTEE?*

POSSIBLE REPLIES	MEAN ACROSS PANELS	TENANTS/ OCCUPIERS	PROPERTY DEVELOPERS
Grounds must be entirely fenced in and lockable.	12%	11%	14%
Premises must have high-speed internet connectivity, redundant if possible.	11%	11%	12%
Adequate infrastructure to charge electric vehicles and to maintain cargo bikes much be available on site.	19%	19%	18%
Ground level access must be available.	11%	14%	8%
Access and parking spots for articulated lorries/lorries with trailers must be available on site.	9%	8%	10%
Access and parking spots for vans must be available on site.	19%	17%	22%
Access and parking spots for cargo bikes must be available on site.	14%	17%	12%
A manoeuvring area of 35-metre radius must be available on site.	2%	0%	4%
Building must have 360-degree access.	2%	3%	2%

REPLY FREQUENCIES IN %

Note to the reader:
The chart shows the responses to the question at hand in vertical order for each panel. The reference bracket for each change in colour is 11.1%, that is, a neutral value that gives equal weight to each quality (with 9 possible responses adding up to 100% of the answers). The higher the percentage, the richer the hue of green, because the respective quality is deemed important. The greater the downward deviation of the actual score, the less important the quality is believed to be.

Fig. 32 *REQUIREMENTS OF THE VARIOUS PROPERTY TYPES IN A CASCADING SYSTEM OF CITY LOGISTICS REAL ESTATE*

PROPERTY TYPE	DESCRIPTION	TYPE OF LOCATION	PERFECT SITE	PERIODICITY	INDUSTRY/ USE TYPE
E-fulfilment centres	Mega-hubs in integrated conurbation	Outside city limits	Integrated metro region, excellent transport hub	Standard shipping	Retail logistics, e-commerce
Regional depot	Midsize hubs in the vicinity for re-supply	Suburbs to inner city	In the integrated conurbation or greater metro area, sometimes inner city	Supply, standard shipping	Retail logistics, CEP industry
Urban fulfilment centres	Inner-city supply spokes	Inner city	Conveniently accessible on the urban periphery or inside a sub-district	Same-day delivery (last mile)	Retail logistics
Micro-fulfilment centres	Direct customer deliveries of online orders	Inner city	Inner city, in densely populated locations (close to the customer)	Same-hour delivery (final mile)	Retail logistics
Micro-depot	Tightly knit and small-scale final distribution	Inner city	Spread grid-like across entire city area (very close to the customer)	Same-hour delivery (final mile)	CEP industry, some retail

EXAMPLE	SPACE REQUIREMENT	MARKET AREA/RADIUS	RESIDENTIAL SUPPLY	MANPOWER NEEDED	OWNERSHIP STRUCTURE	PROPERTY COMPLEX-ITY
Amazon.de, Zalando, eBay	from 25,000 up to 150,000 sqm	c. 100–250 km or more	c. 2–5 million	500 to more than 1,000	Lease and owner-occupancy possible	High
Retail logistics, Deutsche Post DHL	c. 15,000 sqm	c. 50–70 km	Internal supply structures	100 to 200	Lease and owner-occupancy possible	High
Amazon Fresh, Kaufland delivery service	c. 4,000 to 6,000 sqm	City to district, about 10 km/ c. 15-minute drive time radius, outer orbital	c. 20,000–40,000	30–250	Lease and owner-occupancy possible	High
Amazon Prime Now	c. 1,000 to 3,000 sqm	City districts, c. 1–5 km/ c. 5-minute drive time radius, inner-city ring road	c. 10,000–20,000	30–50	Lease and owner-occupancy possible	Medium
UPS, Hermes, etc.	c. 15 to 25 sqm (CEP), c. 200-500 sqm (retail)	1 km radius (CEP industry), 2–4 km (retail)	about 5–10,000	2–5 (CEP industry), 15–20 (retail)	Lease and owner-occupancy possible	low

DISTRIBUTION CENTRE IN KLEINAITINGEN
(Source: BREMER)

WHERE TO FIND SPACES FOR CITY LOGISTICS?

There has been no noteworthy building activity dedicated to the city logistics sector yet. So far, no property developer has tapped into this market. Instead, logistics developers have either focused on large-scale warehouses beyond the city limits, or active urban developers have concentrated on conventional types of real estate. There is no evidence for a real estate supply intended specifically for city logistics. Property developers are very slow to realise that there is an actual demand for smaller warehouses that will retain their alternative use potential even with lower ceilings or lower floor load capacity. However, simply deflating the large-scale warehouses will not do—it would fall short of the mark.

That being said, some market players have discovered niche solutions, in most cases by falling back on existing properties. This can either be by re-using retail warehouses or by renting a large warehouse and accepting the high overhead without actually requiring the building's specifics, such as its high ceilings.

Until the time comes when purpose-built property developments come on-stream, the question presents itself: What is the best way to meet the floor space requirements using existing real estate stock?

New Types of Use for Old Concepts

European cities today are still strongly defined by their historically evolved structures. These structures are persistent, and it takes a long time to change them. Meanwhile, some of the societal and technological changes move at a faster pace. It can by all means happen that properties meant for a certain use type are no longer required in the quantity of floor area in which they are available. Assuming it is safe to say that consumption patterns and personal mobility are changing, retail outlets or underground car parks may to some extent become dispensable. The retail trade is showing first signs of erosion. Could this free up floor space for the purposes of city logistics? This question was put to the experts as well as to the various panels:

(PARTIAL) CONVERSION OF UNDERGROUND AND MULTI-STOREY CAR PARKS FOR CITY LOGISTICS PURPOSES

Tenants and occupiers consider the (partial) use of floor space in underground and multi-storey car parks as feasible, and clearly attribute a comparatively sustainable potential for providing city logistics solutions to this option. Investors and property developers also warmed to the idea, but more reticently so. Lenders and municipalities, by contrast, took a rather dim view of the idea to put such facilities to different use.

DR. THOMAS STEINMÜLLER,
EXECUTIVE BOARD OF CAPTEN AG:
"At the moment, the current business model of multi-storey and underground car park operators in metropolises is working out quite well. So there is no need to start rocking the boat. This will change whenever people stop frequenting car parks because the mobility behaviour in metropolises has undergone a massive change. By then, at the latest, the business model of the car park operator will become unsustainable, and property owners will have to probe alternative options. Here, underground and multi-storey car parks come to mind as possible place for city logistics depots—at least in sub-sections. However, the property owners would have to adjust their yield expectations. Car parks are currently too pricey from an investment point of view because they are let on significant lease agreements. In the future, this will no longer be the case. Operators are well advised to probe alternatives early on, and not to wait until the situation actually deteriorates. Once city logistics firms have found the premises they need it will be too late to rezone multi-storey and underground car parks, which may then become non-performing assets."

USE OF (VACANT) LOCK-UP RETAIL UNITS OR OFFICE FLOORS

It is readily apparent in German cities even now that not every retail unit is needed anymore. Although only Grade B through D locations are under pressure for the time being, there is every chance that the trade flows will keep shifting to e-commerce and render more physical retail units obsolete. And while there are currently no signs suggesting it, technological progress could eventually reduce the office requirements and release office space onto the market. Would offices lend themselves to the use for city logistics purposes?

The experts more or less agree that individual floors of office buildings or in retail schemes are well suited for city logistics purposes. They have already proven successful in the field, as the example of Amazon in Berlin's downtown facility at Ku'damm-Karree shows. The euphoria is not fully shared by the panel respondents. Their responses, while allowing for minor deviations, present a similar picture as their opinions in regard to the conversion of underground/multi-storey car parks. Here as there, tenants/occupiers are the respondents who as-

sociate the greatest potential and implementability with this option among the panelists, whereas property developers and investors again take a more conservative view. At the same time, lenders and municipalities were again the ones with the greatest reservations.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"Vacant lock-up retail units and office properties will become highly significant for city logistics solutions. Especially in sub-districts and in the outskirts of cities, there are many storefronts that feel the pressure from the prime high-street locations and shopping centres. And these may regain their significance as long as they have a loading dock that permits the use of a pallet truck for loading and unloading. When interacting with delivery vehicles that feature a tail lift, venues of this type will be easy to operate. No doubt, they were originally raised for a different purpose, but they will generally do the job. In any case, this opens up opportunities for investors who are invested in such properties in Grade B through D locations and are worried they may otherwise have to let them to bargain stores and mobile phone shops. Their outlook is somewhat brightened by the new option to use their premises as base for last-mile deliveries.

As far as grocery supplies sold through online channels are concerned, I assume that REWE and other supermarket chains will primarily handle their deliveries from their physical outlets. As it is, they use their outlets both for old-school retailing and as base for logistics deliveries. Either customers come in to shop for their groceries, or a courier comes in and picks the order off a shelf. There is no need for maintaining parallel structures."

Fig. 33 *HOW IMPLEMENTABLE OR FEASIBLE DO YOU CONSIDER THE USE OF UNDERGROUND/ MULTI-STOREY CAR PARKS FOR CITY LOGISTICS PURPOSES?*

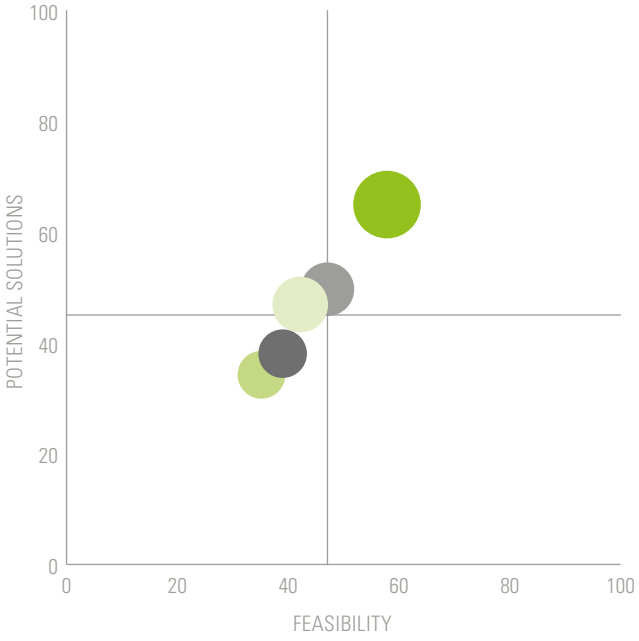
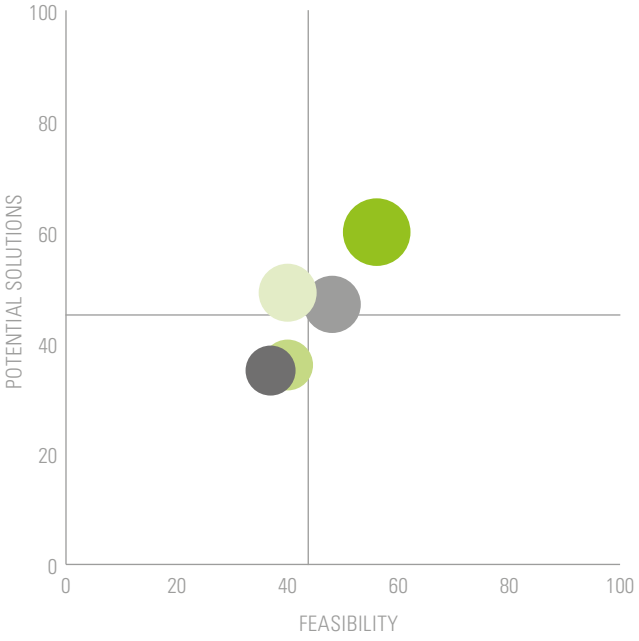


Fig. 34 *HOW IMPLEMENTABLE OR FEASIBLE DO YOU CONSIDER THE USE OF VACANT OFFICE FLOORS, LOCK-UP RETAIL UNITS, ETC. FOR CITY LOGISTICS PURPOSES?*



Interpretation aid:
Each of the colours refers to a different panel of experts interviewed. The position along the x axis shows how implementable a given use type is estimated to be. The position on the y axis shows how high the solution potential for city logistics is rated. The diameter refers to the estimated sustainability/persistence of the approach. The straight lines reflect the average of solution potential and implementability as benchmark figure across all panels.

Renaissance of Historic Formats

CITY LOGISTICS IN INNER-CITY BUSINESS PARKS

Business parks had their hey-day in the early 1990s. Offering a mix of warehouse, services and office facilities, they address a broad spectrum of tenant groups. Located mainly on the urban periphery and featuring an excessive share of office accommodation, they were deemed obsolete by end of the zero years. Yet in the recent past, they have experienced a comeback. By introducing modern concepts and reshuffling the mix of use types, they can be flexibly adjusted to the latest requirements of commercial tenants. Interesting new products have evolved lately, some of them in very central locations. A case in point would be the CityPark by SEGRO in downtown Düsseldorf. It conveniently accommodates city logistics usage—which is why Deutsche Post DHL installed a mechanised delivery site there. It this a model that could be adopted elsewhere? Are business parks the prototypes for future city logistics—at least if they are centrally located and not somewhere in the suburbs?

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"Inner-city business parks are experiencing a renaissance. After all, not only are the new order picking requirements concentrated in the inner cities, but so will future production themes be that will rely on 3D printing. However, a lot will depend on the location parameters. Properties on the edge of town are less attractive. Examples of suitable properties include new schemes, e.g. some raised by SEGRO, and existing buildings, e.g. those by BEOS."

The respondent experts returned a strongly affirmative response here, as they associate this option with a high potential. Less enthusiastic, by contrast, were the interviewed panels. The panel of property developers, who can drew on relevant experience in this field, was the only one that conceded easy feasibility and a certain potential as city logistics solution in some sections. The other panels were much more sceptical—and none more so than the municipalities. Why are experts and the panels so divided in their opinions? You need to go back to the slump in the 1990s to understand. During that market cycle, business parks experienced a regular boom, being raised mainly as office parks in outside the inner cities that proved no longer marketable once the recession hit in the wake of the New Economy bubble. The weakness of these historic concepts continues to be associated with this asset class. For many respondents, it probably calls to mind unsuitable floor plans typical of old-style business parks.

CONSOLIDATION CENTRES (WHITE LABEL HUBS) ON THE PERIPHERY

City logistics have already been the subject of discussion for several decades. From time to time, the discussion returns to the idea of operating consolidation centres on the urban periphery. Here, the goods to be forwarded into the city are consolidated. The actual transport into the city is in many instances handled by a neutral ("white label") service provider. Recent concepts of subterranean transportation revive the idea. The experts and the survey panel provided diverging assessments of this concept.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"The idea keeps coming back up. Ultimately, the ideas of the 1970s on the subject of city logistics laid the ground for today's freight centres. For a number of reasons, they never worked out in the inner city. One of the main reasons for their failure is the intrinsic interest of all market players to do their own hauling in order to stay in touch with their customer bases. The age of digitisation has made this even harder to accomplish. It has also made the idea of the white label centres seem even more remote."

RAINER KIEHL, UPS GERMANY:

"There is no way white label hubs will work. Initially, everyone will agree and say "Yes, of course, that's something worth thinking about"—but whenever things get more specific, people keep back-paddling. Running joint tours in an unlabelled white fleet is even less conceivable because it would delegate the planning competence and the warranty for customer shipments to a third party. But customer loyalty and with it corporate profits can only be generated at the front door via face-to-face encounters between customer and CEP company. It happens, for instance, if your courier shows up at the same time each day to pick up your parcels. Imagine a hospital that urgently needs a new hip joint, and it is despatched via a CEP service provider. Time would be of the essence, that is, the courier could not start asking his way around the hospital and get lost in the maze of corridors, but would have to know exactly where to go. This kind of reliability cannot be provided by a third party that simultaneously represents the interests of several other stakeholders. The same goes for the delivery of shipments: When you do a good job getting the order to the end customer, the latter will acknowledge the sound performance when placing his or her next online order and select the same delivery service."

The responses by tenants and occupiers, however, suggest that consolidation centres harbour a massive solution potential. Apparently, the assessment by CEP service providers, as a specific industry, clashes with the opinions of other industries represented in the tenants/occupiers group.

Interesting to note is that the municipal respondents were extremely reluctant to make up their minds although a lot our urban traffic could hypothetically be avoided with such schemes. Perhaps municipalities have been sobered by past experience. Then again, the concepts have been brought back to life with plenty of fresh ideas, and could gain momentum. It is, for instance, possible to position the consolidation centres not on the urban periphery but—in analogy to the super blocks in Barcelona—to spread them across the city, e.g. on the edge of each district.

Fig. 35 *HOW REALISTIC OR FEASIBLE DO YOU CONSIDER BUSINESS PARKS CLOSE TO INNER CITIES?*

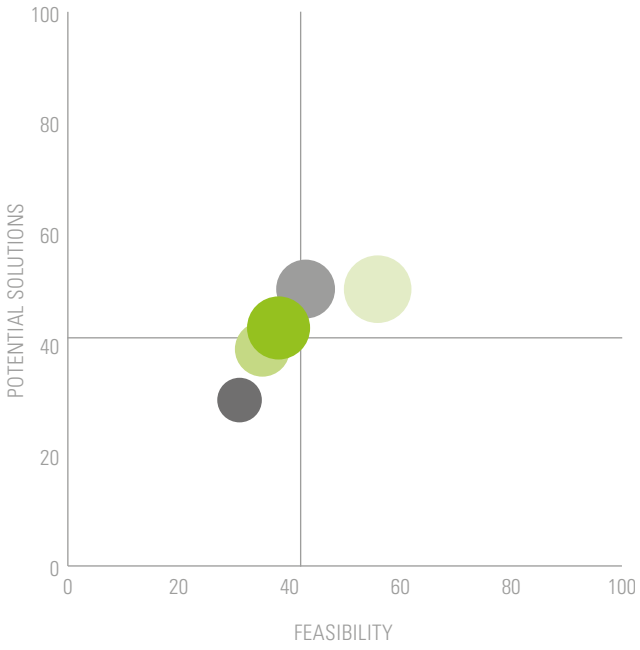
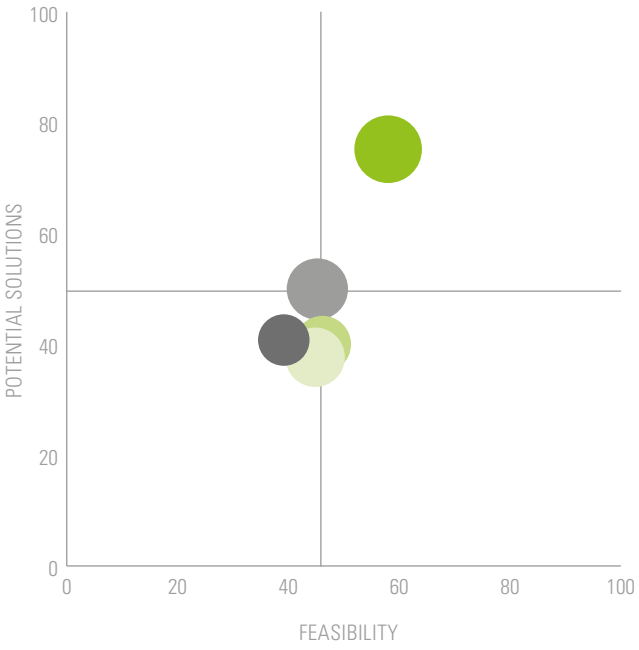


Fig. 36 *HOW REALISTIC OR FEASIBLE DO YOU CONSIDER THE INTRODUCTION OF CONSOLIDATION CENTRES?*



Interpretation aid:
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Are there Other Synergy Opportunities?

In addition to the properties discussed above, there are numerous other options for finding suitable premises in the city that generally qualify for the use as city logistics facilities. In some cases, you need to think outside the box and overcome conventional thought patterns.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"What matters is this: You need to take a step back from the parameters of conventional asset classes when dealing with city logistics. It will not do to take the same approach as with other asset classes. In fact, the subjects under discussion extend across asset classes. There is a vast potential in further densification. Many department stores, e.g., would lend itself to city logistics purposes after it is decommissioned. In cities that have not experienced structural changes yet you may find properties you did not have on your radar initially: car dealerships, for instance, or repair shops. Many of these have storage facilities of sufficient dimensions while facing obsolescence as private mobility declines. Conventional freight forwarding facilities have already been written off, but have regained in significance because palletised deliveries are becoming more important again. After all, the outposts that are scattered in an atomised pattern across the city area and that need to be resupplied in a cascading process receive their deliveries in palletised form."

New Formats

FLEX SPACES IN MIXED-USE FACILITIES

The solutions discussed so far can be considered transitional stages, but do not qualify as buildings optimally adapted to the needs of city logistics. To a significant degree, however, city logistics require only a small footprint per site, and are rather frugal in their fit-out requirements. The most important characteristic of a given site is its central location. It is by all means possible therefore that city logistics needs are essentially served by mixed-use properties. Due to the low floor space requirements per site, this approach appears to be more realistic in many cases than new-build stand-alone buildings.

But this would hardly be a new concept, for its core idea has been around since the late nineteenth century. A good case in point is the GSG-Höfe trading estate in Berlin where multi-tenant units are flexibly let to various types of occupiers. Facilities of this kind are called flex spaces. As far as size and quality go, they can accommodate—in addition to urban light industrial uses—advertising agencies and architects as well as gyms and office tenants, and city logistics formats like micro-depots or micro-fulfilment centres would fit right in.

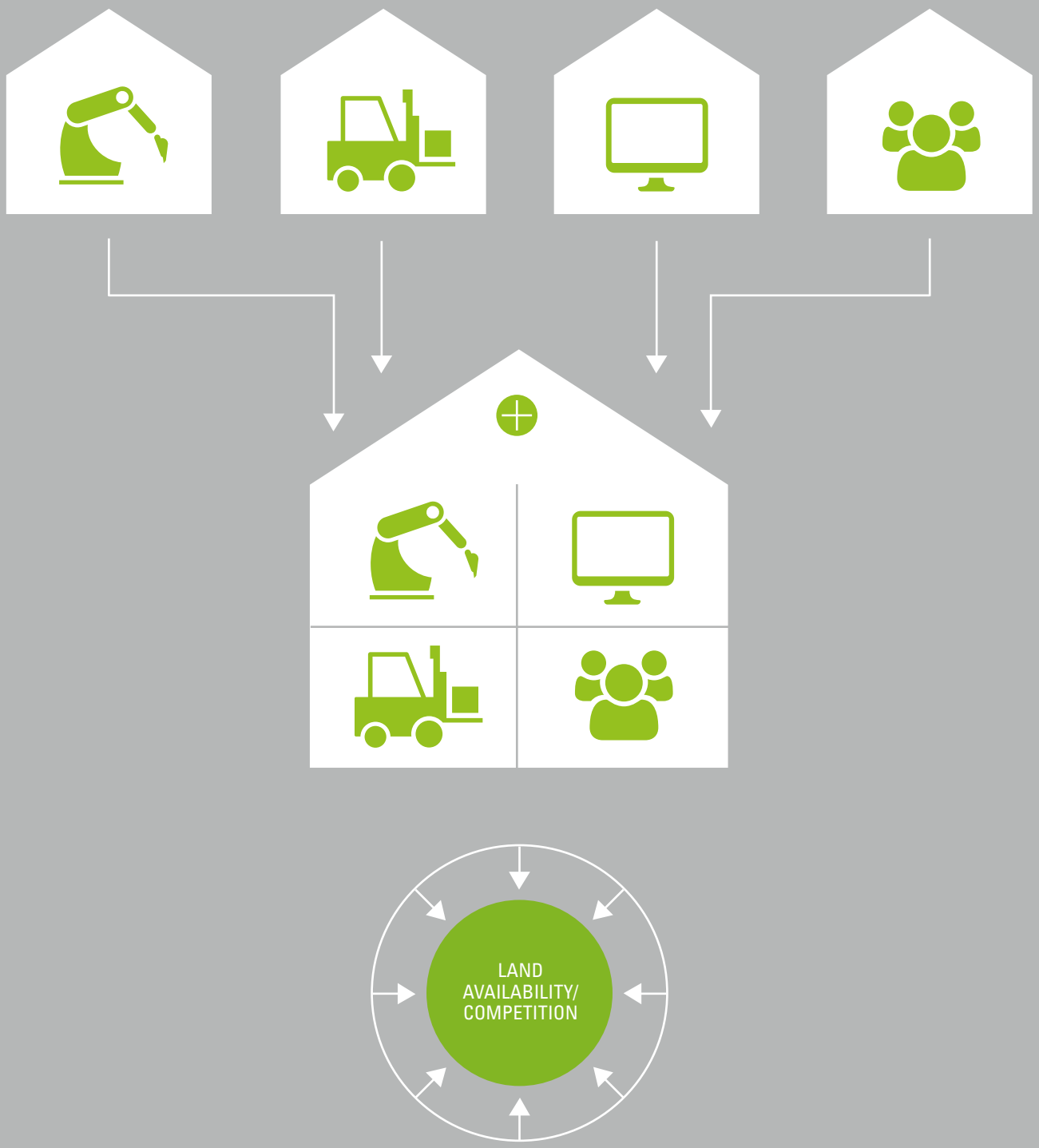
RAIMUND PAETZMANN, INDEPENDENT ADVISER:

"I am convinced that we will see new types of logistics real estate. What I have in mind are mixed-use formats above all. Logistics in combination with residential, office and retail will (have to) become normal. Multi- and omni-channel formats require new infrastructures for deliveries. A small hub in a sprawling urban shopping centre, local micro-depots at the local convenience store or in an office block. Pick-up points or drive-ins, possibly even modular, stackable micro-container systems that serve as transport system and are transported in ever smaller consignments in the course of distribution and are then used for the last mile, or directly serve as parcel box—we will see more of these things in the future."

What matters most in the longer term is the mixing of all types of floor spaces and uses of relevance in the city. This approach to existing real estate is already being implemented in converted properties or business parks in inner cities, although it should be added that city logistics operators have only rented premises on some of these so far. The use types that will (have to) be mixed more and more frequently in the future include residential, leisure, recreational and cultural. The result will be the opposite of a city divided by functions. What stands in the way of the widespread introduction of such concepts (for the time being) are the short supply of land, the rivalry among the different types of use, and Germany's restrictive building code.

However, converted properties and inner-city business parks are practically no longer developed. The creation of such facilities, including through construction, is gaining increasingly in significance because here is an opportunity to implement building forms and floor plan specifications that are optimised for city logistics purposes.

Fig. 37 *FLEXIBLY USABLE FACILITIES (FLEX SPACES) WITHIN A MIXED-USE CITY*



DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

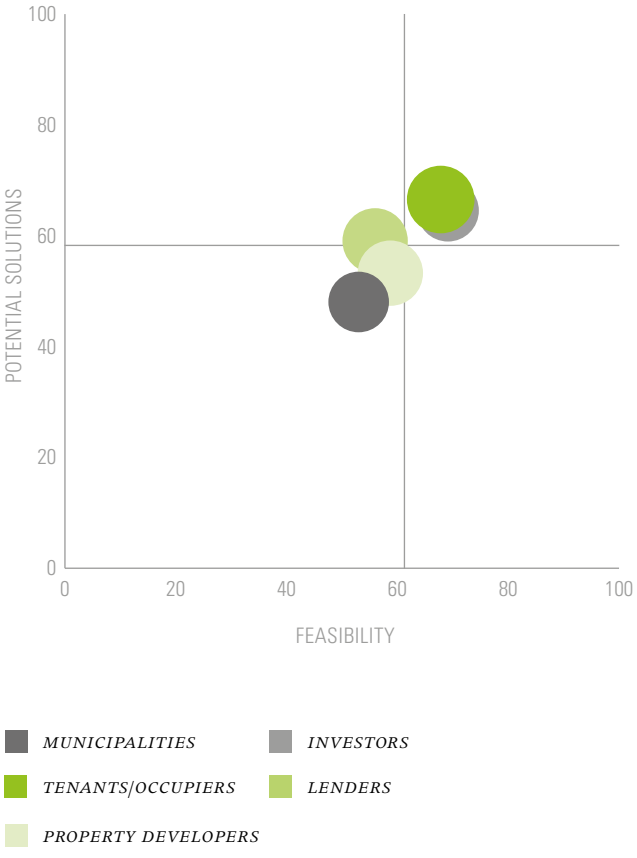
"The main obstacle is considered the right of use whenever conversions are contemplated. They need to be properly approved, and this can sometimes be prevented by obsolete interpretations or regulations. This explains why the ZIA German Property Federation seeks to have the strict differentiation of use types softened up. We assume that an existing building may be divided into different sections. For instance, two basement levels could be used for logistics, the ground floor for retailing, and the upper floors for offices or residential units. So we need permit procedures that cover all of this. What we need, if you will, is a planning permit for general purpose accommodation or 'flex space' to accommodate all of these types of use.

The situation calls for legal amendments. It would be helpful to enter into an open, but constructive dialogue as soon as possible. Otherwise the dynamic of the markets will simply outmanoeuvre the restrictions in an uncontrolled manner. Using a former consumer electronics store on Berlin's prime high-street boulevard is probably not entirely in line with applicable law, but is currently a business reality as a result of market demand."

The ongoing debate on the subject of tomorrow's "smart city" calls to mind the alternative of "vertical cities" in this context. Rather than technological networking, these focus on the vertical stacking of use types that symbiotically share the same building. Eligible types of use in this context are residential, including serviced apartments and other derivative formats, along with office, but also conventional and online retailing (multi-channel strategy). Also well suited to supplement the concept would be micro-fulfilment centres or micro-depots.

The shift in strategy from pure player toward omni-channel is a trend that is already in an advanced stage in the United States. Amazon, for instance, has supplemented its online business with urban brick-and-mortar retailing formats like Amazon Books, Amazon Go and the recently acquired organic food chain Wholefoods. In Germany, a comparable strategy is pursued by Zalando, who acquired the sporting and leisure goods retailer Kickz. Online and offline retailing are blending together more and more. The trend has to be reflected in the real estate used. It is therefore safe to assume that every mall and shopping centre will set aside space for city logistics purposes in the future. Shoppers will get to decide whether they prefer to carry their purchases home under their own steam or would rather have them delivered in analogy to online shopping. Physical retailing and e-commerce rely on the same infrastructure in this context. To implement this strategy requires city logistics facilities along with the corresponding skills.

Fig. 38 *HOW REALISTIC OR FEASIBLE DO YOU CONSIDER CONSOLIDATION POINTS IN INTERMODAL SITES (CONVENIENTLY ACCESSED LOCATIONS LIKE SERVICE STATIONS, SELF STORAGE FACILITIES, ETC.)?*



Interpretation aid:
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MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"One thing you can do if you are unable to find any premises is to identity collaboration partners. What comes to mind are shopping centres with large basement facilities or underground car parks—these being options where storage areas and staff can be deployed. And such a place could be served by a courier service. The collaboration partners would benefit from the optimisation of their resources and a better utilisation of their floor space."

INTERMODAL STATIONS

One conceivable way to get more efficient in covering the last and final mile is to use city logistics solutions more intensely in conveniently accessed locations than has been the case so far. Certain steps could be bundled in the city logistics process chain. Suitable locations could include:

- parcel boxes/parcel lockers in the streetscape
- pick-up stores in railway stations, in storefronts, etc.
- service stations
- self-storage facilities
- late night convenience stores, kiosks

PROF. TOBIAS JUST,
IREBS REAL ESTATE BUSINESS SCHOOL:

"Intermodal stations are places or buildings that serve city logistics functions. They are used for transshipment purposes and for further distribution. Much more important, however, is the option to leave or accept shipments in these places. The facilities occupy transportation-friendly locations in intermodal spots, e.g. railway stations, and in places you pass in the morning and in the evening anyway. Of key importance is to clearly designate the spots that feature intermodal crossings, and that these are understood as such. Otherwise, it would be just another development stage of a distribution network like the one operated by the postal service. It would be another drilldown from the large distribution centre down in successive steps until a shipment is ultimately delivered by bicycle—which would not be a new system. It would be truly new only if the whole process was automated and if it proceeded autonomously, with the recipient only scheduling the delivery process—including a place and time for the delivery or the pick-up, as the case may be."

Since these places already exist in the city, the interviewed panels deem an implementation highly realistic. In addition, the attribute a comparatively high solution potential to the intermodal points.

RAINER KIEHL, UPS GERMANY:

"Lately, we identified well-suited floor space in self-storage centres that are located in densely populated areas. Equipped with goods lift and loading zones, they feature an infrastructure that suits our purposes."

INNOVATIVE LAYOUT CONCEPTS USING MOBILE ASSETS

The foregoing chapter includes a detailed discussion of property types that could serve city logistics purposes. They are complemented by deliberations to step up the use of mobile solutions.

Micro-Depots as Pop-up Storage in Containers

The sea cargo containers used by UPS already demonstrated that mobile solutions will work. Asked about the solution potential and the feasibility of micro-depots in the form of containers, the most favourable view was clearly taken by the tenants/occupiers group, which already gathered positive experience with them and were able to confirm their feasibility. Investors also returned a positive response. Lenders, by contrast, took a comparatively dim view of the implementability and the solution potential of this option.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"Micro depots definitely have their purpose, and are already used by some players. Since they function in analogy to pop-up stores in the retail sector, they could arguably be labelled pop-up storage. Extensive floor area could be made available for this purpose that we have not yet focused on. A downward trend in personal mobility would free up large sections in the parking lots of ALDI, Lidl and other supermarkets. These would lend themselves to the flexible operation of pop-up storage sites, including for the purpose of staging and relocating specials."

Flex Hubs

Floor space requirements gravitate increasingly toward flexibly adjustable facilities. Occupiers show a growing desire for some kind of modular Lego block system. The modular design systems available on the market are of limited use, however, because they are not mobile and/or not flexible enough. They hardly lend themselves to custom solutions. Industrial companies (e.g. Siemens, BMW) are therefore developing proprietary solutions that will also be of interest for logistics purposes. Concepts of this kinds are grouped together under the term "flex hub." They show strong analogies to the automobile industry and electric mobility. The StreetScooter was DHL's response to the indifference of the automobile industry toward a product for which it perceived only a negligible demand, but which was very much needed from the perspective of occupier DHL. The carmakers' response may have been market-consistent in past decades—but in the age of digitisation and the start-up movement, a stronger customer orientation is expected. If no adequate answers are provided, the market will find its own solutions. The same is true for the real estate universe in this context.

Flex hubs are, strictly speaking, not real property because they are assembled from mobile units, e.g. shipping containers. What makes this type of property mobile are its flexible reconfiguration options in terms of size, structure and capabilities. The modular building is steadily gaining in significance in logistics and in manufacturing.

Their usability for the inner city market has been limited so far, no least because they can only be built up to a certain height, and have therefore a poor floor space efficiency. Instead, they expand horizontally, using up more surface area, which is an approach more suitable for greenfield sites than for the inner city with its fierce competition for land. Their appeal is much greater for midsize and large facilities in peripheral business areas because they are flexible enough to be set up and dismantled within short periods of time. The flexibility of the floor space is limited by the maximum floor area approved, but may freely be downscaled whenever less space is required. Flex hubs will become a more frequent sight, albeit mainly in the outskirts of cities.

In terms of planning-law, they are subject to elevated requirements and constraints if the container modules are not simply stacked like on a container vessel, but people circulate between them or goods are loaded and unloaded. But from a technical point of view, the imagination can virtually run wild. One option under discussion, for instance, is a modular compound structure of separate containers that may be flexibly joined together. Since no standards have been defined yet for this use of shipping containers, an established solution is not in sight at this time.

JANINE DIETZE, DREES & SOMMER:

"Industrial and logistics companies are under the impression that the building industry is too glutted with projects at the moment, especially in the logistics sector, to devote much innovative strength to the issue. Since the market does not seem to offer suitable answers to their floor space requirements, these companies are developing their own solutions."

Fig. 39 *HOW REALISTIC OR FEASIBLE DO YOU CONSIDER MICRO DEPOTS AS CONTAINER SOLUTION IN SITES NEAR THE TOWN CENTRE?*

Interpretation aid:
Each of the colours refers to a different panel of experts interviewed. The position along the x axis shows how implementable a given use type is estimated to be.. The position on the y axis shows how high the solution potential for city logistics is rated. The diameter refers to the estimated sustainability/persistence of the approach. The straight lines reflect the average of solution potential and implementability as benchmark figure across all panels.

Fig. 40 *ILLUSTRATION OF THE BMW FLEX HUB (IM)MOBILIEN CONCEPT*

(Source: Drees & Sommer)

GATEWAY TO ZALANDO LOGISTICS CENTRE LAHR
(Source: Goodman)

THE INVESTMENT MARKET FOR LOGISTICS REAL ESTATE—PATTERNS AND PREFERENCES IN THE INVESTOR LANDSCAPE

The demand for logistics real estate is ascending to record levels this year. The reasons: Investors inside and outside Germany are looking for sustainable investment objectives that will yield an attractive rate of return. This is where the German market for logistics and industrial companies comes in as a destination of choice. Compared to other asset classes or countries, returns are comparatively high even if yield compression has drastically narrowed the gap to other types of real estate. At the same time, the German market is characterised by an amalgam of renowned high-net-worth industrial groups while also being home to dynamic and highly qualified spectrum of small and medium-sized enterprises (SME). The high level of industrialisation compared to other countries and the high owner-occupier rate imply a rich diversity of investment options. Other perks that boost the appeal of this asset class include its low cyclicality and its high cashflow return.

Navigating this market without getting lost requires sound and precise positioning. How have transaction volumes developed over time? Which logistics regions do investors focus on? Who are the major market operators? These and other questions are addressed in this chapter.

To answer them we carefully analysed the investment market of the past five years and the ongoing year, and compiled a valid data base that covers the fundamental key ratios of all regions. The "Logistics and Real Estate" survey analyses exclusively the market for logistics real estate. German "Unternehmensimmobilien" (light industrial real estate) including multi-tenant assets such as business parks and converted properties, except for warehouse properties, are not considered by the survey, but are instead covered by the reports of the Initiative Unternehmensimmobilien . To permit comparability to other publications that fail to differentiate between the various asset classes, the investment volumes of either market segment are represented in the introduction.

THE INVESTMENT MARKET FOR LOGISTICS PROPERTIES IN GERMANY 2012 THROUGH 2016, 2017

Investment-grade commercial property was in short supply in the wake of the record sales volume of 2015, with the investment market for commercial real estate more or less swept clean. Predictably, the 2015 sales volume was not matched in 2016. In fact, the year-end total of 52.9 billion euros represented a dip—albeit a modest one—of 5.2% year on year (2015: 56 billion euros). But it still topped the five-year mean by 27.5% (average 2012 through 2016: 41.5 billion euros).

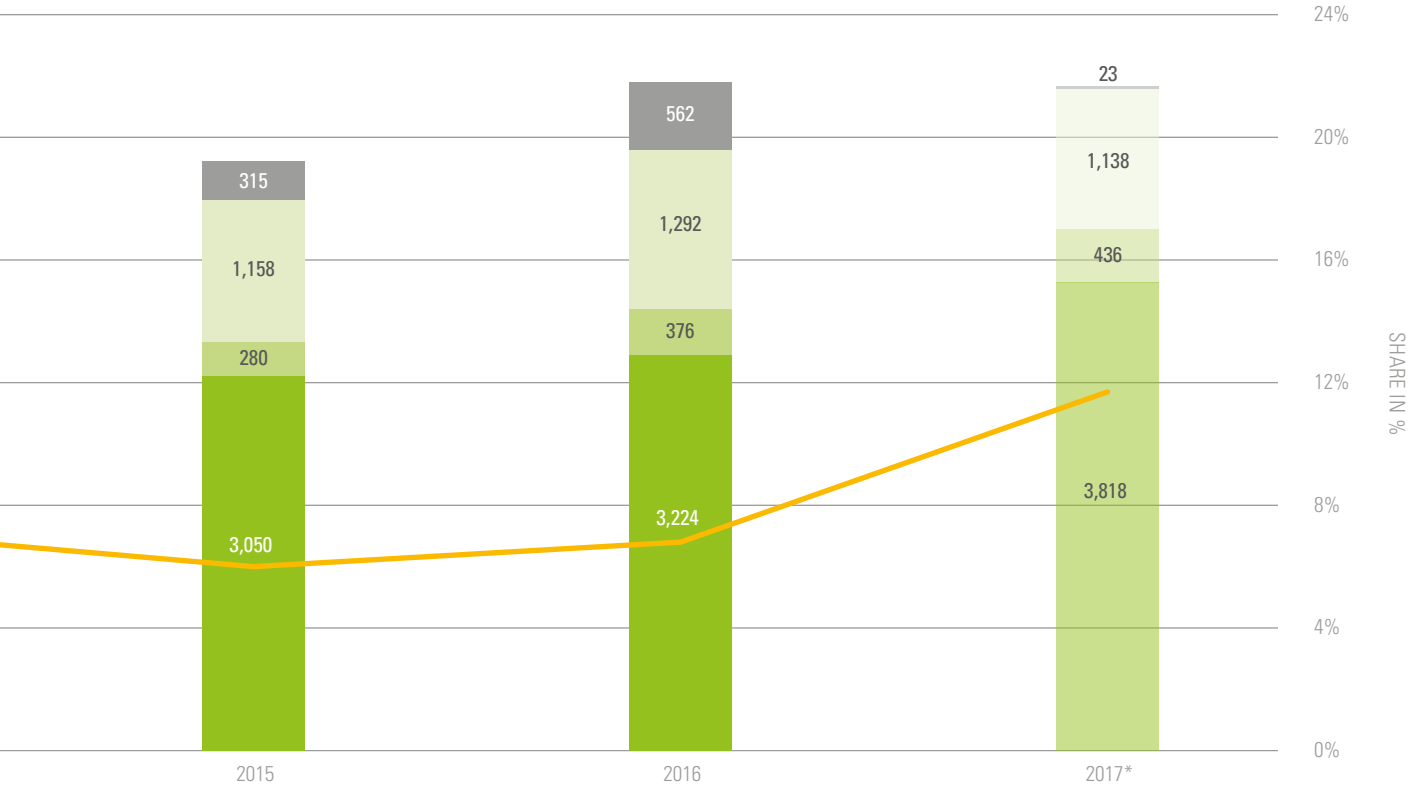
INVESTMENTS IN LOGISTICS REAL ESTATE CLIMBED TO NEW ALL-TIME HIGH IN H1 2017 ALONE

Warehousing and logistics properties have come to claim a growing piece of the investment market. Between 2012 and 2016, a total of c. 13.9 billion euros was invested in warehouse/logistics real estate. Adding the amounts invested in German corporate and industrial real estate brings the investment total for this period up to c. 20.5 billion euros. Investments in warehouse/logistics properties did not slow down in 2016. Indeed, the 2015 record level of c. 3.3 billion euros was exceeded in 2016 because the market continued to accommodate demand. The year-on-year increase (Δ 2015 to 2016) in traded assets exceeded 270 million euros, which adds up to a total volume of c. 3.6 billion euros and an investment growth

Fig. 41 *INVESTMENT VOLUME IN GERMAN LOGISTICS, CORPORATE AND INDUSTRIALS REAL ESTATE, IN MILLION EUROS, 2012–2016, 2017**

by 8%. Total investments in warehouse/logistics properties are well beyond the 5-year average (2012 through 2016) of 2.8 billion euros. So there is nothing to suggest a downward trend. On the contrary, a look at the first seven months of 2017 demonstrates a continued surge in investment demand for warehouse/logistics real estate compared to last year. The investment volume of the ongoing year to date already tops last year's total by 18.0% (H1 2017: 4.3 billion euros). Multi-use and multi-let commercial properties of the sort covered by the "Initiative Unternehmensimmobilien" attracted a large investment volume of 1.1 billion euros during the first half of this year, just 12% short of the year-end volume of 2016.

In sum, more than 4.5 billion euros have been invested in the mentioned categories in 2017 to date. This brings the investment volume for the current year as of the key date up to over 99% of the total amount invested in the banner year of 2016. The decisive factors here include the increased building activity, which produces more investment properties, and an accelerated trading intensity. Some properties and portfolios actually changed hands more than once in 2017.



* The evaluation includes all transactions up to the key date of 31 July 2017

** Warehousing and logistics properties were not studied collectively.
Check *unternehmensimmobilien.net* for an exact definition of warehouse properties in the sense of "Unternehmensimmobilie."

LOGISTICS CENTRE IN GROSSBEEREN
(Source: Goodman)

Demand for the classic investment products residential, office and retail remains strong against the background of the persistent interest rate trough. The price spiral in these segments has gathered momentum, and international investors are pushing onto the German market, which they consider quite affordable. However, international and institutional investors concentrate primarily on the country's metro regions where they expect the lowest exposure to threats and the greatest benefits from economies of scale via centralised asset management. Logistics regions like Ulm or Hanover used to be relatively unknown to (international) investors. Logistics and industrial real estate therefore offered sound yield opportunities. But since classic investment assets in the hot spots are getting increasingly expensive, foreign investors have lately shifted their focus to include logistics and industrial properties outside the "Big Seven" cities. This makes it reasonable to assume new records will be set in 2017 and the years to come.

ONLY 2 TO 3% OF THE INVESTMENT POTENTIAL IS BEING EXPLOITED

It is safe to say that German logistics real estate will remain subject to strong demand. An estimated year-end total of 7 billion euros or more, which would be a historic record, seems by all means realistic. It would raise the segment's share in the overall commercial real estate transaction total, which is estimated at 55 to 60 billion euros by the end of 2017, to around 12%.

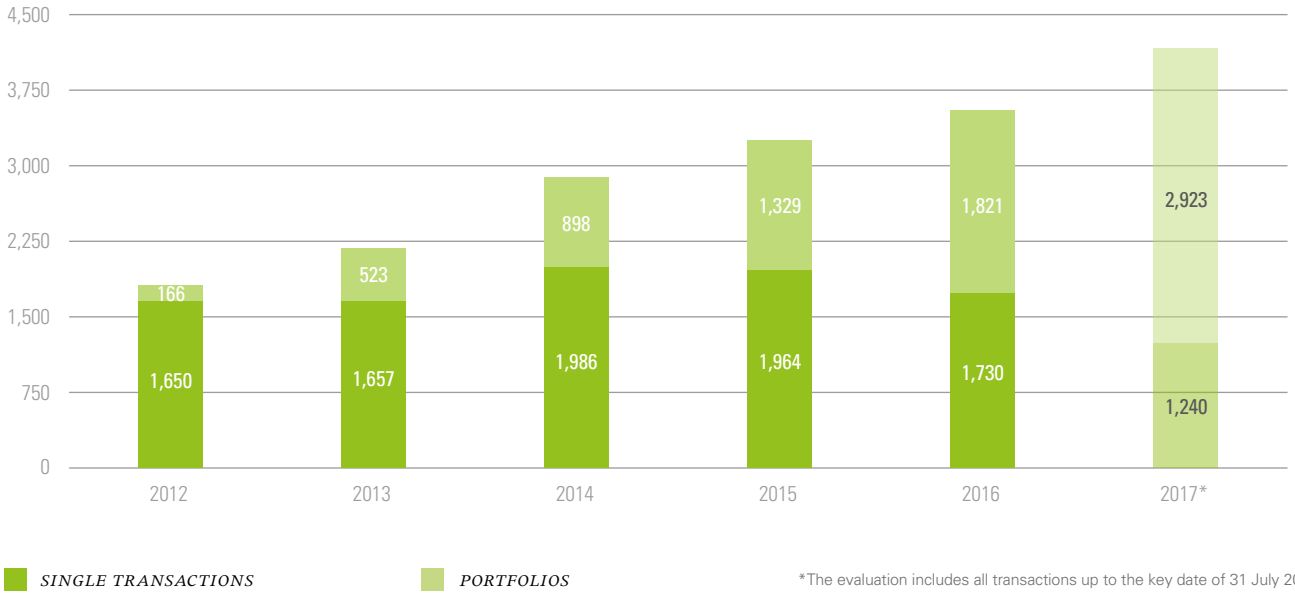
Taking a long-term perspective, the segment presents enormous potential for investment. According to calculations by Initiative Unternehmensimmobilien, warehouse/logistics properties potentially eligible for investments add up to 119.3 billion euros. Compared to the actual transaction figures, the long-term time series suggests that only 2–3% of this potential are exploited. The reason: Many logistics assets continue to be owner-occupied. In order to satisfy the growing investment demand, many investors would like to capitalise this potential.

PORTFOLIO TRANSACTIONS ON THE GERMAN LOGISTICS REAL ESTATE MARKET

The share of portfolio sales in the transactions market has increased steadily. Portfolio transactions are often seen as a quick way to invest large sums of capital, and to acquire a sizeable chunk of the market in strategic locations. In 2016, portfolio deals accounted for a market share of around 51%, up from around 40% in 2015. But the year of 2017* has set yet another high-water mark, with portfolio transactions claiming around 70% of the market. It suggests that the significance of portfolio acquisitions continues to grow, especially among foreign market operators. For the analysis of the portfolios, we considered exclusively German logistics assets, and thus often mere parts of larger portfolio sales because some portfolios include assets located outside Germany or belonging to other asset classes.

Decisive for the development in the year 2016 are properties of more than 40,000 sqm EFA in package sales—for instance a logistics centre in Kamen of 114,000 sqm EFA overall. The asset was bought by GIC (Government of Singapore).

Fig. 42 *LOGISTICS INVESTMENT VOLUME IN MILLION EUROS, BY TYPE OF TRANSACTION, 2012–2016, 2017**



*The evaluation includes all transactions up to the key date of 31 July 2017

25 PORTFOLIO TRANSACTIONS IN 2016 AND 2017 ALONE*

Portfolio deals represent the largest transaction volumes in Germany, and tend to be in the nine-digit price range. Out of the 17 portfolios that changed hands in 2016, three ran in the triple-digit millions (average: 107 million euros). In 2017, nine block sales have already been transacted so far, thereof five for more than 100 million euros each. The single largest deal was closed by CIC (China Investment Corporation) when it acquired the portfolios of logistics platform Logicor from Blackstone for approximately 1.6 billion euros.

Some of the portfolio assets changed hands more than once within a year. The properties held in the Hansteen portfolio, for instance, were initially bought by Logicor/M7 before being resold together with other property of the Logicor portfolio to CIC a short while later.

PORTFOLIO DEALS DURING THE FIRST HALF-YEAR OF 2017 MAY HAVE GENERATED ANOTHER RECORD-BREAKING TRANSACTION TOTAL

A look at the list of traded portfolios shows that eight portfolio transactions involved logistics real estate in Germany this year to date. For the sake of comparison: Nine transactions were registered during the first six months of 2016. This does not permit any inferences whether or not package deals have lost in appeal. A closer look at the transactions reveals that around 3.7 million sqm of floor area in a transaction volume of more than 2.7 billion euros already changed hands this year. The portfolio deals shown in Figure 43 alone account for an increase in capital (in euros) of around 49% over the year-end total in portfolio transactions in 2016. It should be added that the portfolio deals were closed mainly by foreign market players. These use package deals as an easy way to buy into an increasingly sought and low-risk investment type in Germany, and thereby to acquire a sizeable market foot print with the stroke of a pen. German portfolio buyers prefer smaller batch sizes or indeed single-asset investments. There is reason to expect this pattern to become more established going forward. This is in any case safe to expect as long as the global parameters on the capital market remain as they are.

Fig. 43 *TRADED LOGISTICS REAL ESTATE PORTFOLIOS BY INVESTMENT VOLUME IN GERMANY, 2017**

RANK	PORTFOLIO TRANSACTION	BUYER	SELLER	VOLUME IN MILLION EUROS	AVG. INVESTMENT VOLUME, IN EUROS/SQM	BUILDING FLOOR AREA, IN '000 SQM	AVG. ASSET SIZE, IN SQM
1	Logicor (Blackstone)	CIC China Investment Corporation	Logicor (Blackstone)	2,295,000	1,584	690	27,651
2	Gramercy portfolio	Axa Core Europe	Gramercy Property Trust	474,100	401	846	43,100
3	Hansteen portfolio	Logicor (Blackstone) (90%) / M7 Real Estate (10%)	Hansteen Holdings PLC	444,000	274	617	13,100
4	Geneba portfolio	Frasers Centrepoint	Geneba Properties N.V.	219,000	183	835	24,333
5	Hellmich t o CBRE	CBRE Global Investors	Hellmich Group	51,000	128	2,518	5,100
6	Panattoni/Montea	PATRIZIA Immobilien AG	Panattoni Europe Properties (42%)/ Montea (58%)	74,000	74	1,000	18,500
7	DSV portfolio	Deka Immobilien	DSV	86,000	67	779	28,667
8	n. a.	Heitman International	n. a.	50,000	n. a.	n. a.	n. a.

*The evaluation covers all portfolio transactions in 2017 up to the key date of 31 July 2017. It should be noted that the listed deals include solely properties defined as logistics real estate, including distribution facilities and e-fulfilment centres, smaller warehouse

WHO BUYS IN GERMANY?—ORIGINS OF THE INVESTORS

KEY PLAYERS IN PORTFOLIOS, BUT REGRESSIVE OVERALL: SHARE OF INTERNATIONAL INVESTORS DROPS TO 56% BETWEEN 2015 AND 2016

Since 2012, international investors have visibly and steadily expanded their share of the German investment market in logistics real estate; by 2015, they accounted for a market share of 70%. Up to then, the strongest demand had been generated by North American and European players, specifically investors from the United States, the United Kingdom but also from Australia. In the time since 2015, Asian investors have shown a growing interest in German warehouse/logistics properties. While the stake of this investor group was a comparatively modest 4% at the time of its market entry in 2015, they expanded by five percentage points to claim a 9% market share just one year later.

But 2016 also marked a momentary hiatus as the share of foreign market players plunged back to 56%. Still, foreign investors continue to be in the majority. The situation is explained not by any slack in demand, but by the bustling activity of domestic players, who were responsible for two of the five biggest transactions. Foreign players concentrated mainly on big-ticket investments beyond the mark of 100 million euros, which more or less represents the average transaction value of the twenty largest investments. Most prominent among the countries of origin in this context were top-performers Australia, France, the United States, the United Kingdom and Singapore. The high capital flow from the United Kingdom to Germany may also have had something to do with the Brexit referendum. Local market participants gravitate toward smaller batch sizes.

In the ongoing year 2017, foreign players claimed a huge piece of the German logistics market. By the key date for the analysis (31 July 2017), they accounted for nearly 80% of all investments, a far higher share than in prior years. Compared to the year 2016 as a whole, this would be a difference of roughly 24%. A decisive role played the portfolio transactions by Logicor (Blackstone/USA) and CIC (China Investment Corporation).

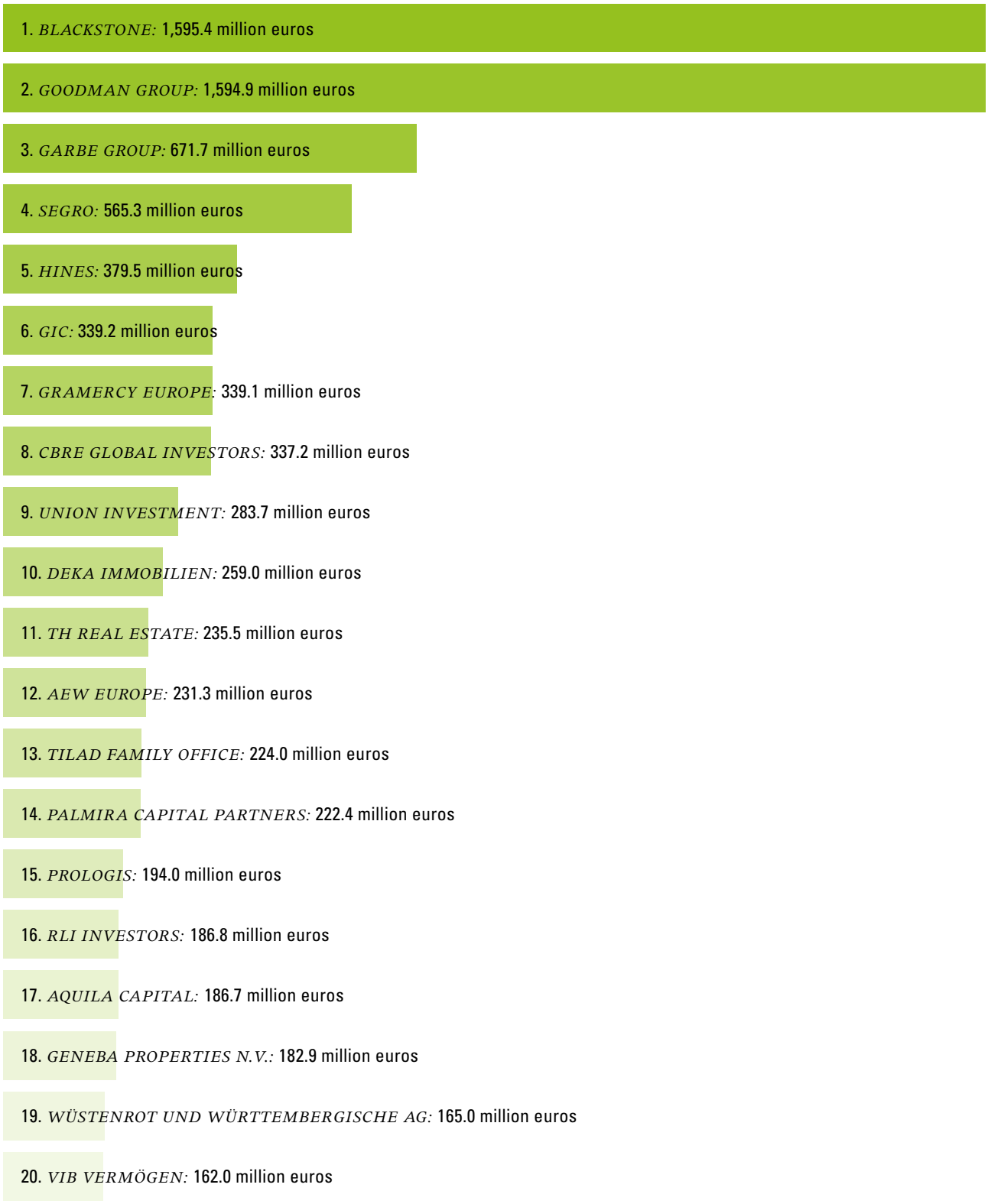
It is therefore safe to conclude that foreign operators continue to consider the German logistics market to be highly significant.

Fig. 44 *INVESTMENTS BY ORIGIN OF BUYER AND YEAR, 2012–2016, 2017**

* The evaluation includes all transactions up to the key date of 31 July 2017

THE INVESTOR LANDSCAPE FOR LOGISTICS PROPERTIES IN GERMANY

Fig. 45 *TOP 20 INVESTORS IN LOGISTICS REAL ESTATE IN GERMANY, BY MILLION EUROS, 2012–2016*



NEW MARKET PLAYER FROM ASIA CREATES STIR ON THE GERMAN INVESTMENT MARKET

The reasons for the increased activities of international players on the German logistics real estate market are quite diverse and have not changed since last year's survey but merely intensified.

- Increasing transparency of the German logistics real estate market
- Ramifications of the global mega trends make logistics and thus logistics real estate more attractive
- Diverse investment opportunities due to a dynamic industrial landscape that include large conglomerates, small and medium-sized enterprises (SME), and hidden champions
- (Still) attractive rates of return combined with stable cash flows from German logistics real estate when contextualised with the global pressure to invest and the need for yield

Due to the robust market activities of Logicor (Blackstone) and especially CIC, the ranking has been reshuffled since last year, with Goodman Group losing its lead position.

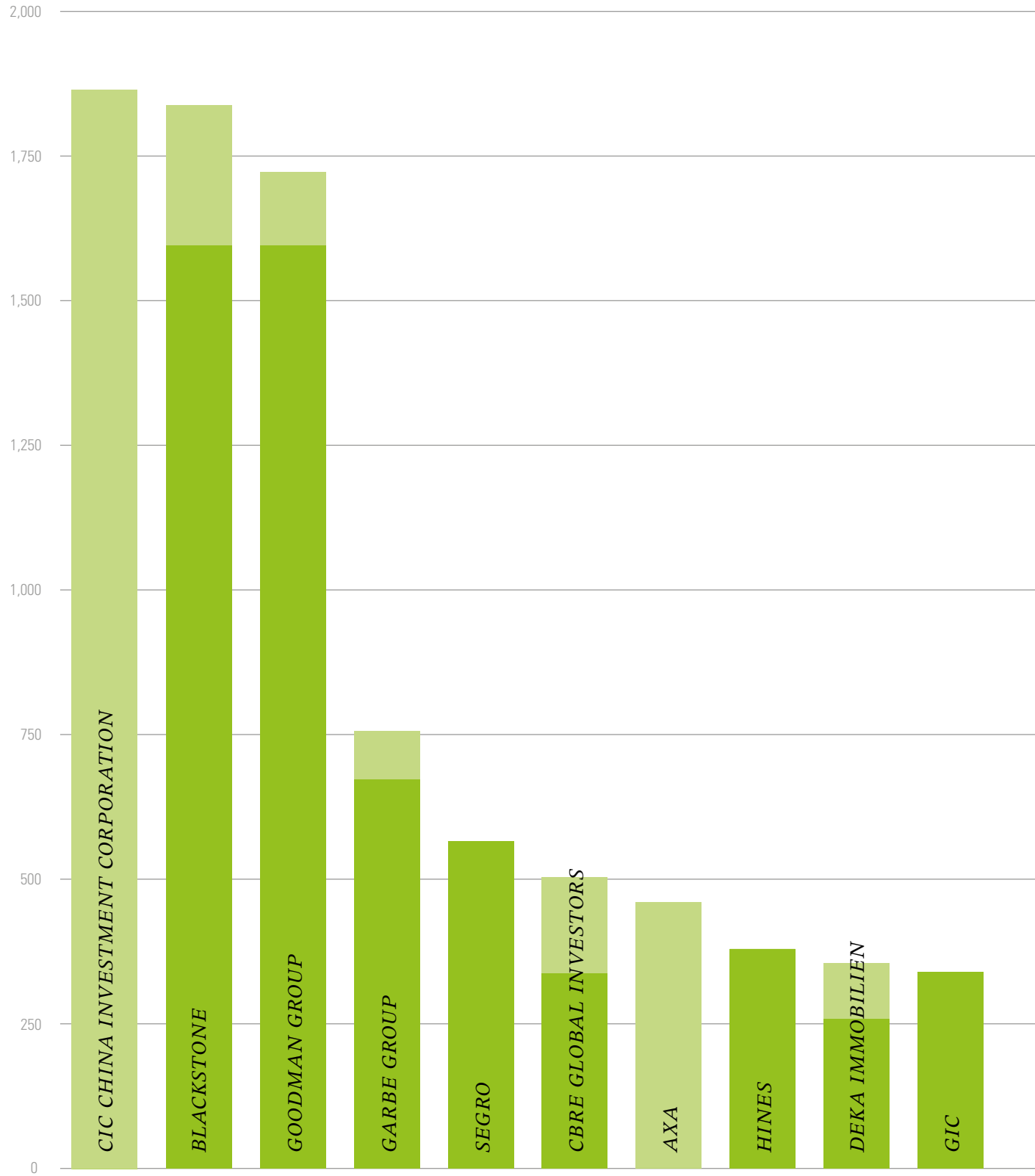
Between 2012 and 2016, Logicor committed approximately 1.6 million euros in Germany. As a result, the company has taken over the top spot in the ranking, followed by Goodman Group. While maintaining an almost identical investment level—just half a million euros less—the company ranked second in the years 2012 through 2016. The German logistics real estate developer and asset holder Garbe Group invested c. 920 million euros less than Goodman Group. In 2016, it invested more than 670 million euros in German warehouse/logistics properties.

During the period 2012 through 2017,* there have been seven German companies among the top 20 investors. Considering the fact that this maps a period of several years, it is striking to note that a Chinese investor, CIC, took the lead from the moment it entered the market. Second place was taken by a US hedge fund. There is only one German market player (Garbe Group) among the top 5 and only one other among the top ten (Deka).

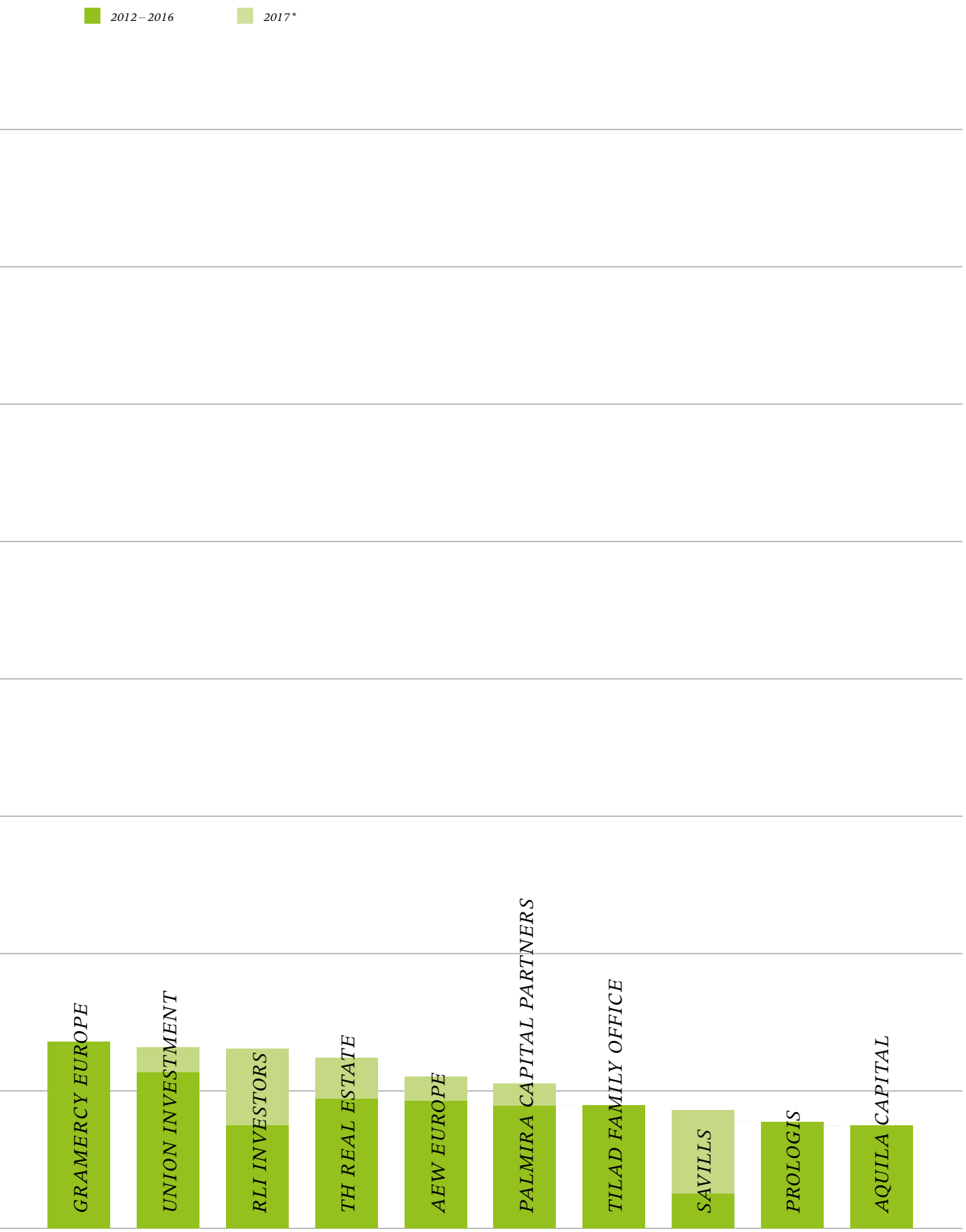
A look at the year 2017 reveals unambiguous figures. The logistics real estate transactions evaluated by the key date are dominated by portfolio deals. Only logistics property transactions were taken into account, while other asset classes were ignored. Clearly in the lead is CIC (China Investment Corporation) with nearly 1.9 billion euros of capital invested as it took over the logistics platform Logicor (Blackstone). Just months earlier, Blackstone had taken over the company Hansteen Holdings PLC along with its real estate through a joint venture with the internationally active property manager M7 Real Estate. Meanwhile, the takeover of Geneba marked the entry of another Asian real estate company into the German logistics market: Based in Singapore, Frasers Centrepoint has invested 183 million euros in 2017 so far. While this places the company among the top 5 for the ongoing year, it is obviously not enough to qualify for a rank among the top 20 for the period of 2012 through 2017.* AXA and Blackstone positioned themselves ahead of Frasers Centrepoint and directly behind CIC with major portfolio deals of 460 million euros and 242 million euros, respectively. CBRE ranked behind Frasers Centrepoint with a 17-million-euro gap in committed capital.

The top 10 rankings for the 2012-2017* period account for a total transaction volume of c. 8.8 billion euros. This is roughly one third of all transactions closed during that period. The two Asian investors among the top 10 alone accounted for a combined transaction volume of c. 2.2 billion euros.

Fig. 46 *TOP 20 INVESTORS IN LOGISTICS REAL ESTATE IN GERMANY, BY MILLION EUROS, 2012–2016, 2017**



*Key date for the analysis: 31 July 2017 The methodology of this years analysis deviates from the procedure used last year. To provide a clearly structured representation, the transactions of the years 2012-2017 are analysed in summarised form. To ensure comparability nonetheless, the years 2012-2016 are shown separately from the 2017 figures. The evaluation considers arm's length transactions between two unaffiliated entities on the open market ("external transactions") as well as transactions between two affiliated entities (under company law, e.g. a company's property development arm and an investment fund of the same company) were not taken into account ("internal transactions"). The



internal transactions are posted separately. These transactions are by all means relevant if they represent changes of ownership at arm's length (see the reporting guideline for the commercial property investment market published by the "gif" real estate research society). It is transaction model applied to many properties, e.g. those of property developers who commit their assets into institutional fund vehicles for third-party (investor) capital. As a rule, however, such transactions are not publicised and are therefore invisible to normal market observation. Still, they are considered in this schedule wherever possible. The internal transactions are quite substantial, though.

INVESTMENT ACTIVITY BY LOGISTICS REGION

Due to its central location in Europe and its rather sound infrastructure, Germany has evolved as one of the most important logistics hubs in the world. While the overall market constellation is favourable, some of the German regions manifest exceptionally attractive characteristics for logistics services. Relevant criteria include: A sound infrastructure, modern and attractive new-build developments as well as a robust labour market and economic structure. The volume of investments committed in a given region may also be rated as a success and performance indicator. This makes the analysis of the regional investment activity particularly meaningful.

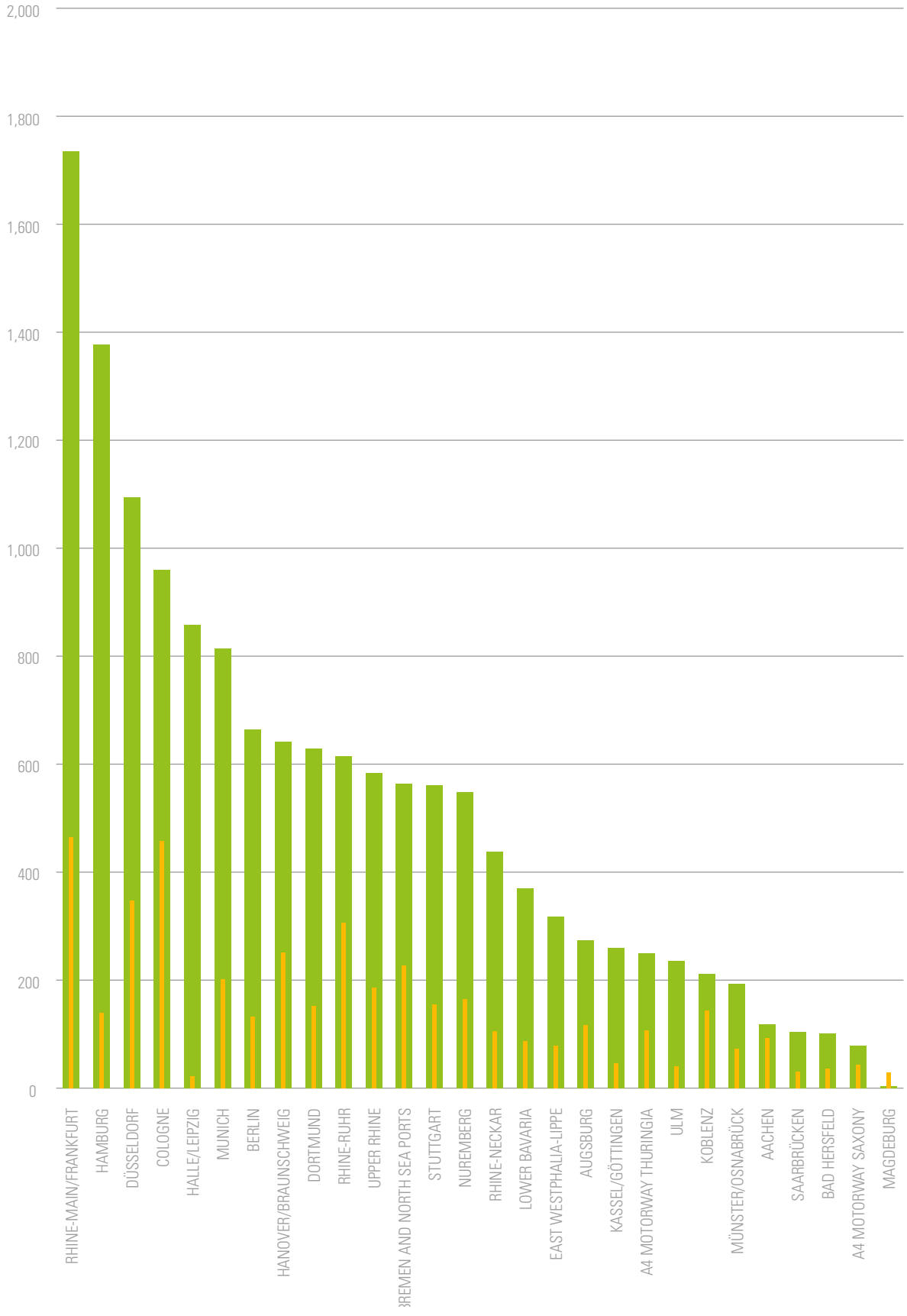
During the survey period 2012 through 2016, the Rhine-Main/Frankfurt logistics region retained its lead position from previous years. Halle/Leipzig dropped three ranks and lost its second place to the much-sought logistics region of Hamburg. Inversely, the Düsseldorf region improved by one notch this year. The Cologne logistics region also moved up two spots and now ranks behind the Düsseldorf region while remaining ahead of Halle/Leipzig. The top 5 logistics regions each generated a transaction volume of more than 800 million euros during the survey period of 2012 through 2016. Striking to note, the top 3 all totalled transaction volumes of more than one billion euros each.

In the ongoing year, transactions have been relatively slow in the regions Halle/Leipzig and Hamburg, whereas each of the top 5 logistics regions already crossed the mark of 400 million euros. Munich climbed an amazing four ranks, up from 10th place in 2016. In the bottom segment, the Augsburg logistics region moved up six ranks in 2017 (up from rank 24 in 2016). The lower spots in the ranking, including the regions A4 motorway Saxony, Aachen and Magdeburg, registered a certain amount of logistics activities, but do not (yet) play a role on the investment market and clearly lag behind. Interesting to note is the slump in investment activities specifically in the logistics regions of Nuremberg, A4 motorway Thuringia and Bad Hersfeld (2016: ranks 5, 14 and 21, respectively).

The investment transactions in 2017 to date suggest the ways in which the region will position themselves next year. The Rhine-Main/Frankfurt region will consolidate its lead position. The regions Cologne and Düsseldorf will ascend in rank—provided no major changes in the existing investment structure transpire in the remainder of 2017. The single biggest change will probably involve the Rhine-Ruhr logistics region, which already attracted investments in an amount nearly as large as the investment volume during the entire survey period of 2012 through 2016. Much the same can be said for the Koblenz region.

GOODMAN LAHR LOGISTICS CENTRE
(Source: Goodman)

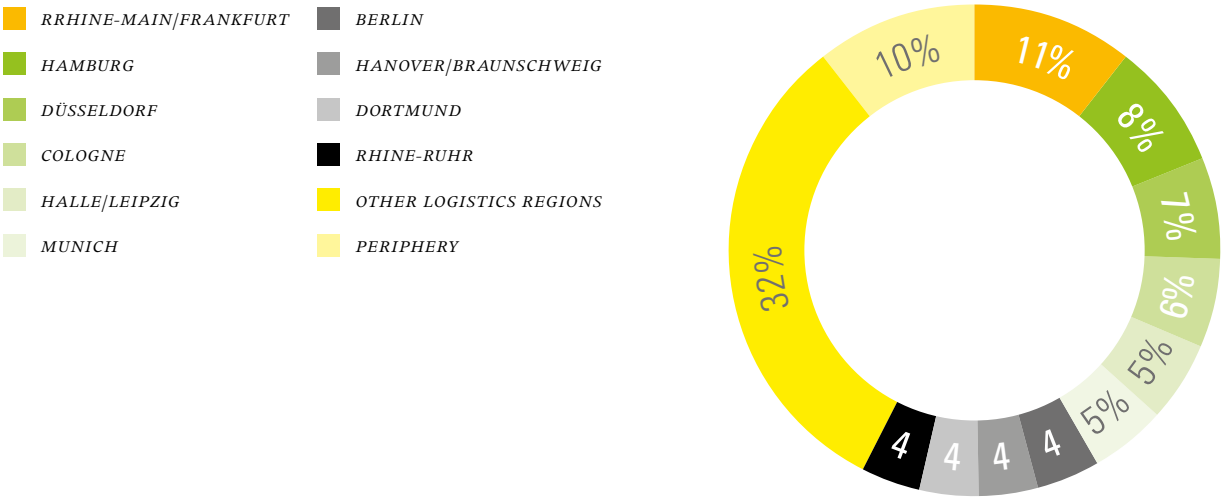
Fig. 47 *LOGISTICS REGIONS BY TRADED INVESTMENT VOLUMES, IN MILLION EUROS, 2012–2016, 2017**



*The evaluation includes all transactions up to the key date of 31 July 2017

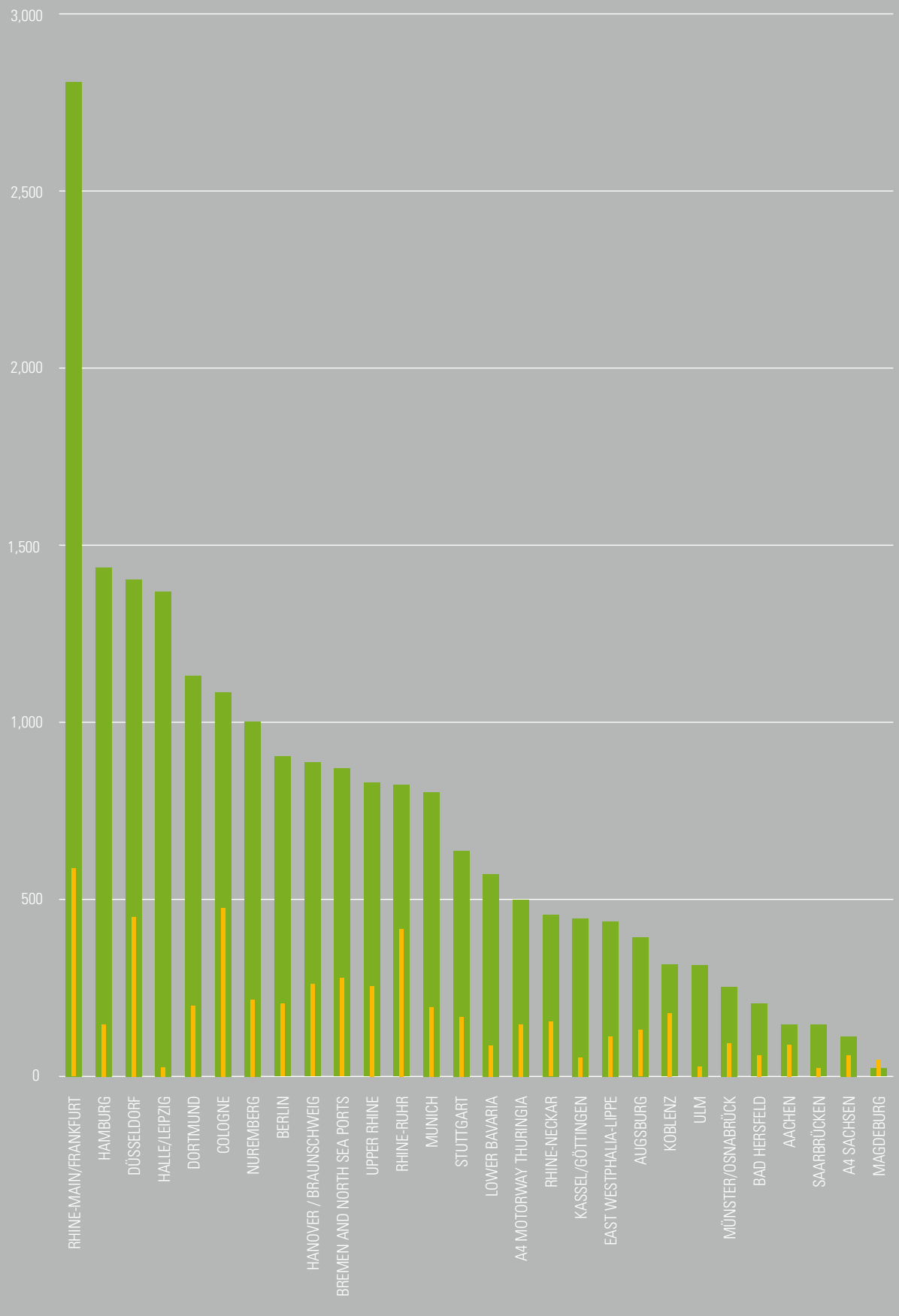
The Top 5 regions alone account for roughly 37% of the total amount invested during the period of 2012 through 2016. The top 10 regions that attracted the highest investment volumes also accounted for nearly 58% of the total transaction volume. Compared to last year's survey, the growth amounted to one percentage each. The resultant ranking is not based exclusively on the regions' appeal. A fundamental factor is the available investment-grade supply in logistics real estate, which is definitive for a given region's transaction potential, among other things.

Fig. 48 *BREAKDOWN OF INVESTMENTS BY LOCATION, 2012–2016*



This year's ranking of logistics regions by traded floor area volume differs only in minor details from the prior year ranking. There were no clear winners or losers. Like last year, the Rhine-Main/Frankfurt logistics region tops the list, reporting a traded floor area volume of around 2.8 million sqm (2012 through 2016). The volume traded in 2017 is already nearing the mark of 600 million square metres, while also being the largest overall. The region of Hamburg remained in second place, trailed closely by the logistics regions of Düsseldorf and Halle/Leipzig (2016: ranks 3 and 4, respectively). The Berlin logistics region made a small upward leap as it improved from its prior-year ranking of 10th place by two spots in the ongoing year. The logistics region of Bremen and North Sea ports and the region of Munich dropped two ranks each (2016: ranks 8 and 11, respectively). The differences in floor area traded in the midfield are negligible, which means that regions could yet swap ranks as the year progresses. The rankings in the bottom segment also experienced but minor variations year on year. Striking to note in this context are the logistics regions of Rhine-Neckar and Aachen. For the survey period 2012 through 2016, they show an elevated transaction volume that entered into this year's evaluation and caused the regions to ascend two ranks each (2016: ranks 19 and 27, respectively).

Fig. 49 *LOGISTICS REGIONS BY TRADED FLOOR AREA VOLUME, IN '000 SQM, 2012–2016, 2017**



*The evaluation includes all transactions up to the key date of 31 July 2017

METRO REGIONS EXPAND THEIR LEAD—RHINE-RUHR CATCHING UP

The investor interest concentrates increasingly in the "Big Seven" cities, although there are exceptions. For one thing, the Rhine-Ruhr logistics region has positioned itself among the top 5 this year with an investment volume of c. 310 million euros to date. During the same period last year (H1 2016), the region had registered virtually no investments at all. The reason for this trend reversal are mainly the large-scale portfolio deals closed by the foreign investors Blackstone/M7 and CIC (China Investment Corporation) whose investment properties are to a large extent located here.

But apart from this special case, investments were predominantly focused in the major metro regions. In fact, the regions of Rhine-Main/Frankfurt, Cologne and Düsseldorf positioned themselves ahead of the Rhine-Ruhr logistics region still. They will moreover remain highly attractive to investors in the ongoing year, claiming the top spots with investment volumes of more than 350 and up to 460 million euros this year to date. The Hanover/Braunschweig logistics region also benefited from the large portfolio deals of the first six months of 2017. A total of c. 250 million euros reported at mid-year pushed this region up into 5th place (2016: rank 8). The floor area traded in the Hanover/Braunschweig region differed only minimally from the volumes in Bremen and North Sea ports region and the greater Munich area. In 2017, several single investments in the amounts of c. 230 and 20 million euros were registered here. The regions next in line—Upper Rhine, Nuremberg and Stuttgart—reported few transactions in a volume between 150 and 190 million euros this year.

The ten regions with the largest investment volumes already attracted a combined total of 2.8 billion euros in 2017, which implies an increase in investment volume by around 190% (evaluation up to 31 July 2017: 970 million euros). Investment demand in established regions is as lively in 2017 as it was in previous years.

SIZE STRUCTURE OF THE TRANSACTIONS

As far as single transactions go, most investments had price tags between 20 million and 50 million euros. In 2016, about 17% of all investments in this segment were in the size band of 20 million to 30 million euros.

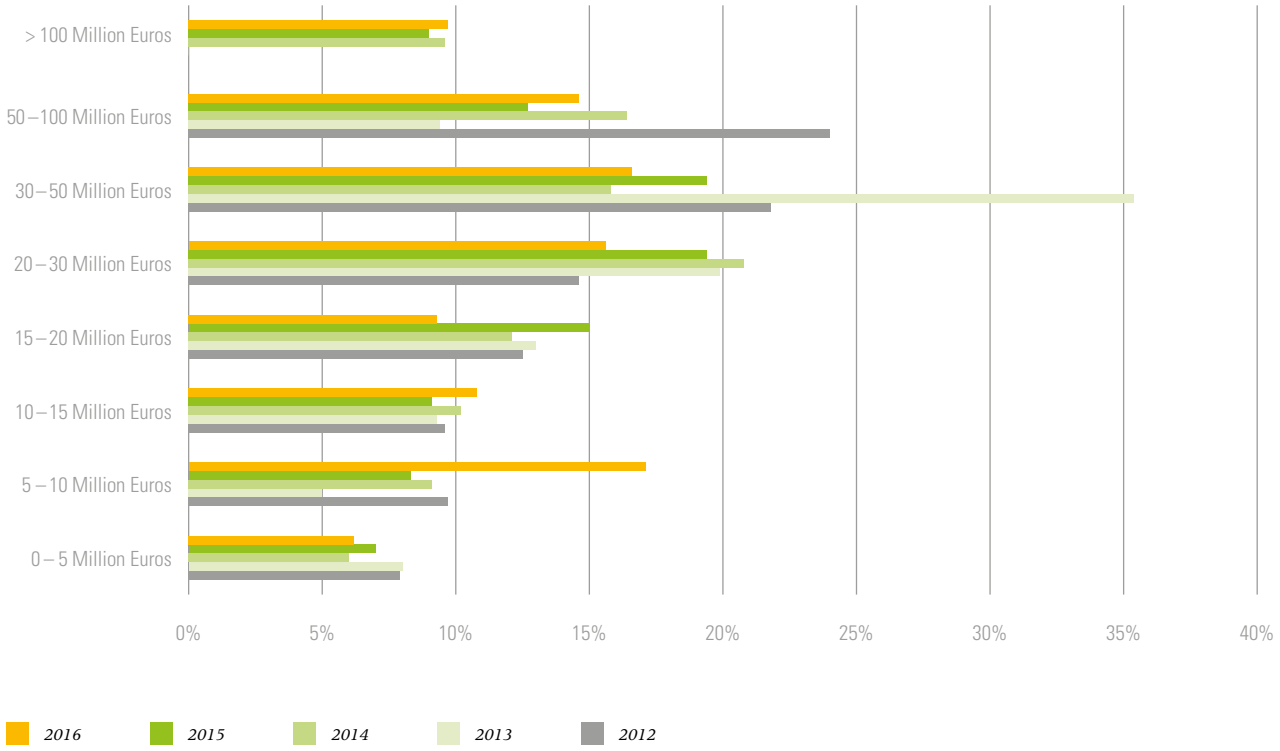
The transaction volume registered in the bracket of 50 million to 100 million was virtually unchanged year on year. It should be added that a few big-ticket deals suffice to push this segment. This is the investment level preferred by most foreign investors, as is the size band of 100 million euros, because big-ticket investment score a high market share on short notice and permit the fast set-up of a substantial portfolio. The years 2012 and 2013 had seen no transactions in this size band at all.

German investors, by contrast, try to avoid cluster risks by investing in single assets even if doing so involves higher costs. While investors from outside Germany prefer established locations or metro regions, domestic investors with detailed regional know-how will also consider investments in smaller regions or peripheral locations.

SMALLER TRANSACTION VOLUMES GAINING IN SIGNIFICANCE

Smaller assets with a market value of up to 20 million euros were buoyed in 2016 by a sustained upward trend of 4% year on year. All things considered, this category combines roughly 44% of all transactions with an average property size of 13,000 sqm of usable area, and thus represents a popular investment segment; the average size of properties selling for less than 10 million euros is 8,000 sqm of usable area. Only a few institutional players invest in the smaller properties. These logistics assets tend to be part of package sales or else are acquired of owner-occupiers or private investors.

Fig. 50 *INVESTMENTS BY TRANSACTION SIZE BANDS, PRO-RATA IN %, 2011–2016*



YIELD STRUCTURES OF THE LOGISTICS REGIONS

NET INITIAL YIELD RATES COVER AN EXTREMELY WIDE SPECTRUM FROM ONE LOGISTICS REGION TO THE NEXT

One of the most important measurand for the investment market is net initial yield (NIY). It captures the ratio of net income of the year for a given property to its total investment costs. The lower the NIY, the higher the price of the property relative to the rent revenue it generated. The higher the NIY, the lower the total investment costs relative to the generated rent revenue. The net initial yield is considered a reference benchmark for alternative investments and also as a risk parameter. A rise in NIY will normally be understood to imply an increasing investment risk. Low NIY rates are the hallmark of established markets and thus of higher property price tags, whereas high NIY rates tend to be associable with markets of low appeal and thus of lower-priced real estate.

A look at the NIY rates of the logistics regions in 2016 highlights once more the appeal of the established regions. The list of logistics regions is led by Munich (NIY 2016: 5.00%), Hamburg (NIY 2016: 5.10%), Berlin (NIY 2016: 5.00%), Rhine-Main/Frankfurt (NIY 2016: 5.15%) and Düsseldorf (NIY 2016: 5.30%) .

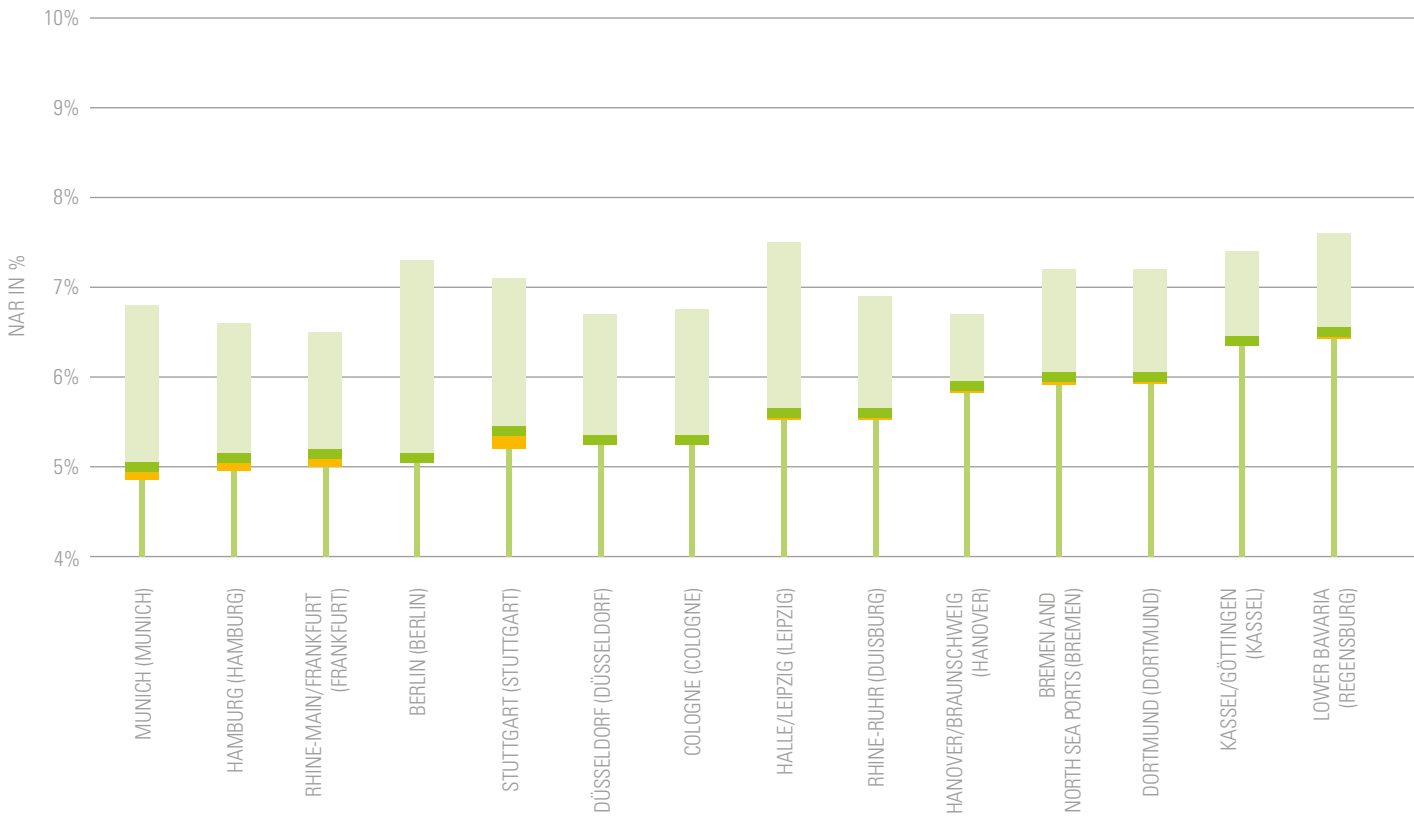
The rising attractiveness of logistics investments triggered an extremely strong NIY compression during the period of 2012 through 2016. The most dynamic yield performance was registered in the Berlin region. Here, the NIY hardened by around 220 basis points, dropping from 7.3% in 2012 to 5.1% in 2016. Although Berlin is not the most expensive market, it was the region with the fastest yield compression during the survey period. Strong compression in the years 2012 through 2016 was also reported from the logistics regions Upper Rhine (190 bps), Halle/Leipzig (190 bps), Munich (180 bps), Stuttgart (170 bps) and Rhine-Neckar (160 bps). These regions showed an extremely dynamic performance in recent years.

A somewhat less dynamic NIY performance was shown by the logistics regions in central Germany, including A4 motorway Saxony, A4 motorway Thuringia and Koblenz. Here, compression was limited to a relatively narrow delta of 70 bps. The lowest compression was registered in Münster/Osnabrück at 40 bps.

YIELD COMPRESSION SLOWING— MARKET STRAIN EXPECTED TO START EASING DURING THE SECOND HALF-YEAR OF 2017

During the period 2012 through 2016, yield rates in virtually all logistics regions dropped by more than one percentage point. A breather had been anticipated as early as the first half-year of 2016, and was expected to bring a trend reversal for the pressure on the hardening NIY. But it did not materialise until a year later, in H1 2017. That being said, the drops between 2016 and 2017 were limited to a few basis points. By mid-year 2017, the NIY rates in the much-coveted markets were down to 4.9% in Munich and 5.0% each in Hamburg and Rhine-Main/Frankfurt. Across all German logistics regions, the maximum decline year on year was 15 basis points. Stuttgart is the one region that took exception with a yield compression of around 20 bps between year-end 2016

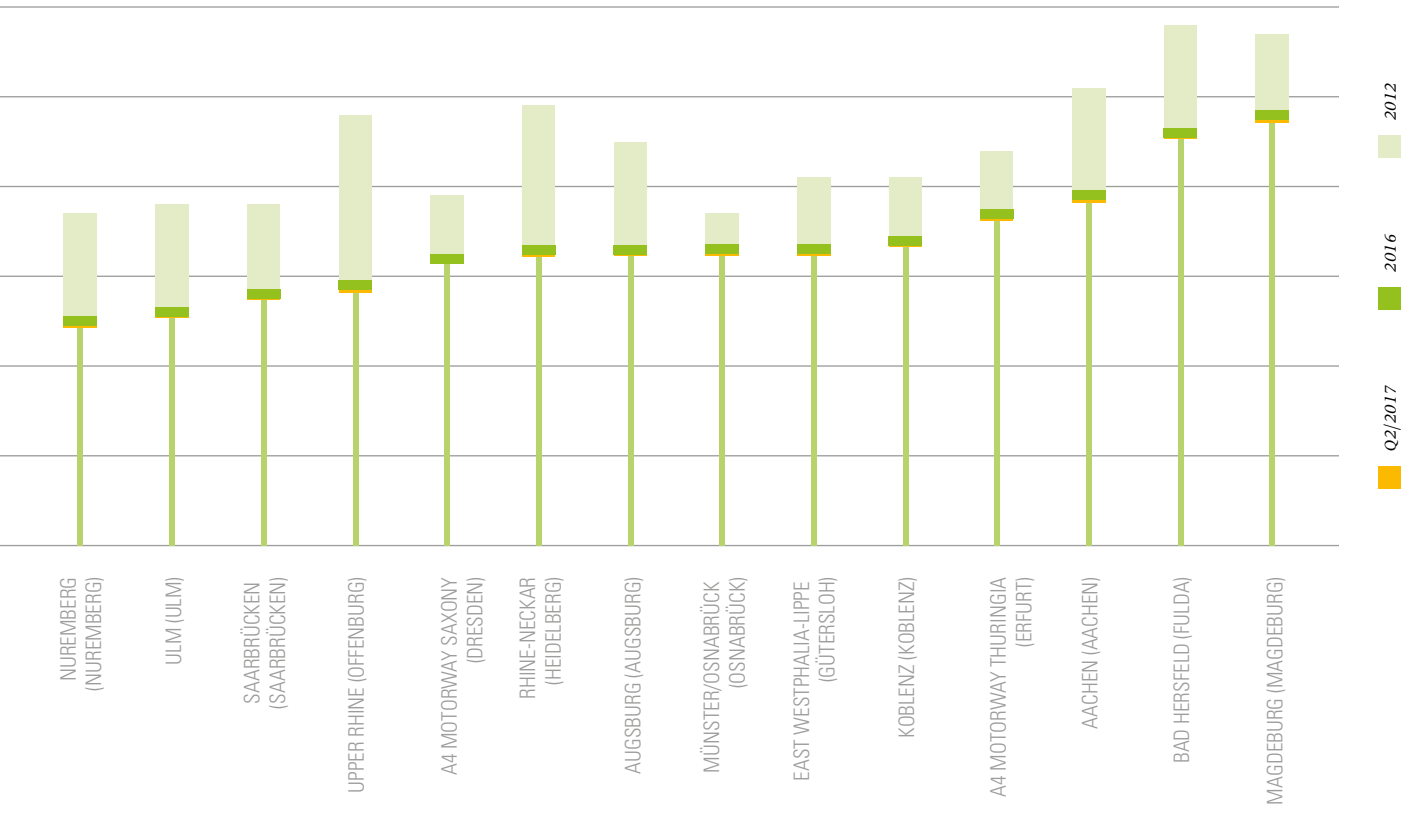
Fig. 51 *STRONG COMPRESSION OF PRIME NET INITIAL YIELDS (NIY) FROM 2012 TO 2016 AND UP TO MID-YEAR 2017**



and mid-year 2017. The dynamic expansion of the supply side with attractive new-build properties has kept the investment potential on a high level, whereas other top regions, such as Munich, brace themselves for a supply contraction.

The remainder of the year is expected to bring additional modest yield drops even in the remote regions. Since the sustained demand in the top logistics regions translates into high selling prices, local players have already started buying in place away from the popular locations. The rising demand in peripheral regions like Magdeburg, Aachen, or A4 motorway Thuringia is reflected in an average compression of 8 bps (Δ between year-end 2016 and mid-year 2017).

Despite the decelerating yield compression, logistics real estate continue to offer a significant yield pick-up compared to other real estate classes. The investment market for logistics real estate will probably be nearing the peak of its cycle by the end of 2017, although there is nothing to suggest a significant decline in demand. Rather, the investor focus is shifting toward alternative locations intended for sustainable commitments. It is reasonable to assume that yield rates will stabilise on the current level.



*In the chart, the top score of the colour gradient represents the NIY at the start of the period under review in 2012. The single-colour score in the centre represents the peak-cycle NIY at the end of the period under review in 2016. The bottom colour gradient shows the continued NIY compression this year alone at the end of the first two quarters of 2017

INTERIOR SHOT LIDL LOGISTICS CENTRE HILDESHEIM
(Source: BREMER)

MARKET APPEAL OF THE LOGISTICS REGIONS—REGIONAL DEVELOPMENT TRENDS

The location of logistic properties in sustainably attractive logistics regions is of enormous significance for logistics operators, property developers, investors and financiers. While the deciding factors for owner-occupiers may include personally motivated location parameters, the above market players mainly seek to maximise property sustainability in real estate economic terms.

The purpose of conducting a scoring process on the market attractiveness of the logistics regions is to provide decision guidance to all market participants so as to help them identify investments marked by long-term security. Among the key influencing factors are the market data identified in the foregoing chapters, including the construction and investment volumes in the logistics real estate sector. The scoring is provided as part of this survey series for the third time in combination with other real estate economic figures from the RIWIS data system of bulwiengesa, as well as with regional economic key market indicators on the labour and sales markets. Since the same calculation method was applied, and since historic time series for the input data are available, the patterns that can be derived are demonstrably meaningful.

RATING THE ATTRACTIVENESS OF LOGISTICS REGIONS FOR THE REAL ESTATE ECONOMY

We used a scoring process to assess the market attractiveness of all 28 logistics regions. The method involves the calculation of an upper score for each key market indicator, such as take-up, building activity or investment activities, etc. The individual upper scores for each logistics region enter into an overall scoring. The model attributes more or less the same weighting to each. Only the score values of demand (investment and occupier demand) are weighted a little higher because the model is to express the stable long-term viability in real estate economic terms, and because these two factors have a special significance. There have been no changes to the calculation scheme since last year. In addition to the top-down information on the logistics regions, the fold-out included with the survey provides a detailed account of the most important key ratios used in the scoring.

The scoring system represents an assessment in purely real estate economic terms (e.g. rents/yields) while ignoring the logistics angle. To make the scoring results easier to read and interpret, we supplemented all scoring results with a grade that is analogous to the 6-point grading scale used in German education, with grades ranging from 1 ("very good") to 6 ("insufficient") However, the grades awarded in the overall comparison do not necessarily cover the entire grading spectrum (1 to 6) because of the mathematical methods used, such as the standardisation of figures.

Fig. 52 *TOP SCORES AND WEIGHTINGS WITHIN THE FRAMEWORK OF THE SCORING OF LOGISTICS REGIONS*

THE SCORING SYSTEM FOR LOGISTICS ATTRACTIVENESS		
TOP SCORE	ANALYTIC ASPECT OF THE PARAMETERS IN THE LOGISTICS REGION	WEIGHT
Supply score	Supply in existing building stock, and submarket variable in the overall architecture Scale and dynamic of the building activity Significance of the building activity for the total stock	10%
Demand score	Scale of the stabilised take-up, dynamics of the take-up Significance of the occupier market for the total turnover Balance and stability of industry demand	20%
Rent score	Level, dynamics and projection of prime rents in best-of-class locations Level, dynamics and projection of average rents across the market area	10%
Investment demand score	Level, dynamics and market significance of the investment demand, in sqm Level, dynamics and stability of the investment demand, in euro	20%
Yield score	Level, dynamics and projection of stabilised prime yield (net) in premium locations Level, dynamics and projection of average yields (net) across the market area	10%
Land score	Level, dynamics and stability of the maximum prices for commercial building land in premium locations Level, dynamics and stability of the average prices for commercial building land across the market	10%
Regional score 1	Level, dynamics and stability of the population Level and dynamics of the gross value added (absolute) and share of the industrial sector trade & transportation	10%
Regional score 2	Level and dynamics of gainful employment (absolute) and share of the industrial sector trade & transportation	10%

Fig. 53 *SYNOPSIS OF MARKET ATTRACTIVENESS AND THE VARIOUS TOP SCORES*

LOGISTICS REGION	RANK	OVERALL SCORE MARKET ATTRACTIVENESS	GRADE FROM 1 TO 6	CHANGE IN RANK
Munich	1	1.64	1	1 ↑
Berlin	2	1.71	1	1 ↑
Hamburg	3	2.02	2	-2 ↓
Halle/Leipzig	4	2.06	2	2 ↑
Lower Bavaria	5	2.06	2	7 ↑
Rhine-Ruhr	6	2.09	2	4 ↑
Rhine-Main/Frankfurt	7	2.13	2	-2 ↓
Stuttgart	8	2.17	2	3 ↑
Cologne	9	2.18	2	-2 ↓
Düsseldorf	10	2.19	2	-6 ↓
Hanover/Braunschweig	11	2.20	2	-2 ↓
Rhine-Neckar	12	2.34	2	2 ↑
Münster/Osnabrück	13	2.37	2	9 ↑
Bremen and North Sea ports	14	2.43	2	-6 ↓
East Westphalia-Lippe	15	2.53	3	0 –
Upper Rhine	16	2.64	3	10 ↑
Augsburg	17	2.69	3	-4 ↓
A4 motorway Saxony	18	2.72	3	1 ↑
Dortmund	19	2.80	3	-2 ↓
Nuremberg	20	2.82	3	-4 ↓
Aachen	21	2.86	3	2 ↑
Saarbrücken	22	2.92	3	5 ↑
A4 motorway Thuringia	23	2.92	3	-2 ↓
Koblenz	24	2.93	3	0 –
Bad Hersfeld	25	3.05	4	-7 ↓
Kassel/Göttingen	26	3.05	4	-6 ↓
Ulm	27	3.10	4	-2 ↓
Magdeburg	28	3.16	4	0 –

DISTRIBUTION CENTRE IN MÖNCHENGLADBACH
(Source: BREMER)

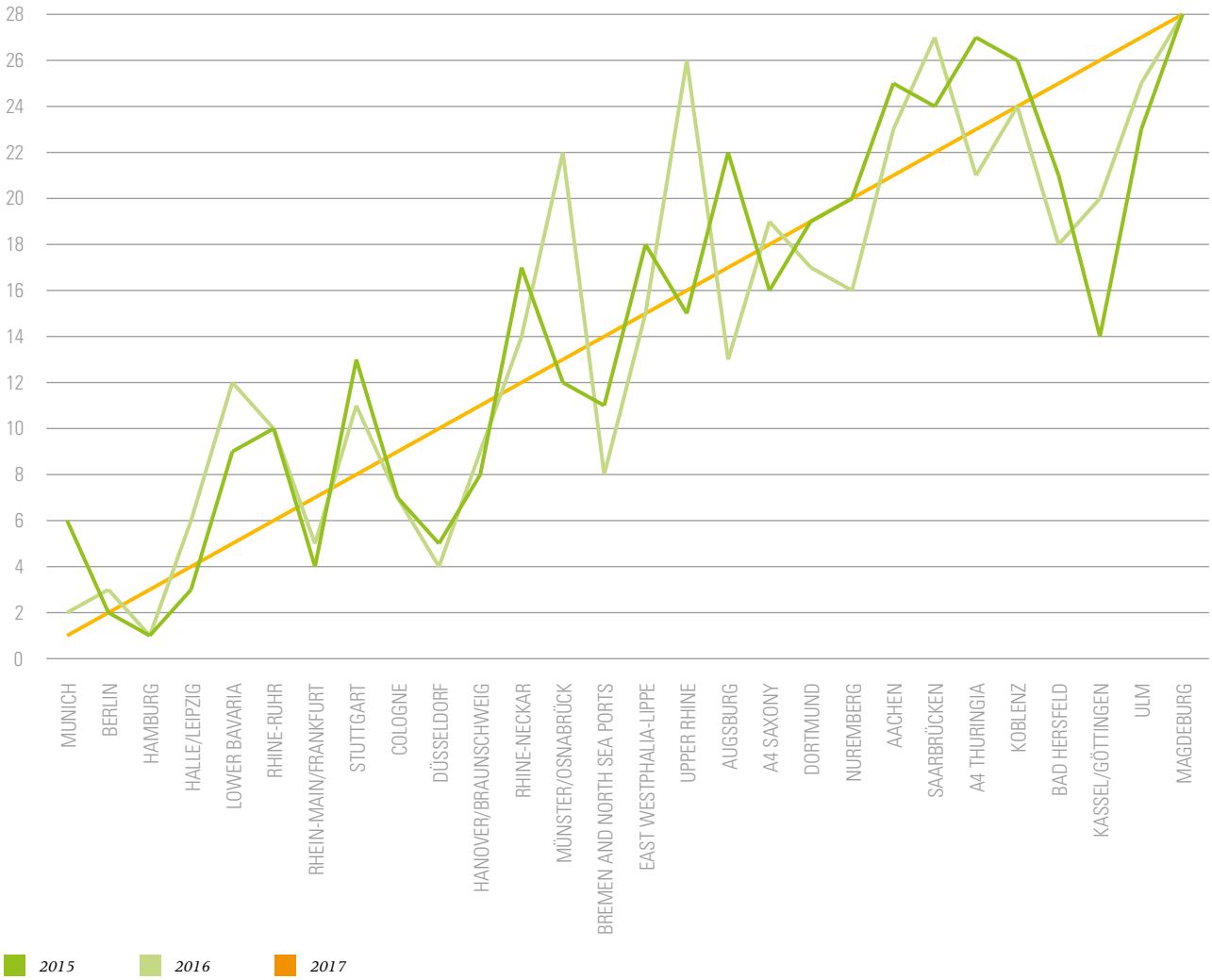
COMPARING THE ATTRACTIVENESS OF LOGISTICS REGIONS FOR THE REAL ESTATE ECONOMY

The market attractiveness ranking of the various logistics regions underwent changes year on year, some of them quite significant. Although a few regions—and more than last year—retained their positions, the composition of the ranking changed considerable in some areas. Several locations, for instance, saw their rankings drop despite an improved market performance because other regions developed far more dynamically yet. This is easy to see when comparing the score values of all regions, whose average has improved across the board. Having stood at 3.19 as recently as 2016, the score improved to 2.48 this year.

SHIFTED POSITIONS IN THE LEAD GROUP—MUNICH THE NEW TOP-PERFORMER

The top 10 of Germany's logistics regions shows some major changes in this year's line-up. For one thing, Hamburg lost its lead position to Munich, and was also outperformed by Berlin which pushed up into second place. Key drivers of this development are the dynamic demand (for both floor area and investment opportunities) in Munich and the brisk rent growth in Berlin. Moreover, both logistics regions stood out with their socio-economic and regional economic outperformance.

Fig. 54 *YEAR-ON-YEAR RANKING OF GERMANY'S LOGISTICS REGIONS, 2015–2017*



The Hamburg logistics region continues to be positioned as one of Germany's top locations, but in terms of demand and rent performance as well as in regard to its economic parameters it lags behind Munich and Berlin this year. Then again, the city boasts a brisk construction activity, available floor space, and a brisk investment demand.

Other up-and-coming regions include Rhine-Ruhr (up 4 ranks year on year), Stuttgart (up 3 ranks) and Lower Bavaria (up 7 ranks). While Rhine-Ruhr outperforms virtually all other regions in terms of demand and investments, Lower Bavaria stands out because of the very brisk development of its floor space supply. The region also counts among the country's top logistics regions in terms of rent rates. The Stuttgart region accomplished its upgrade primarily through a spike in investment demand and the superior performance of its regional economy.

The top third is completed by the logistics regions Halle/Leipzig, Rhine-Main/Frankfurt and Cologne. Halle/Leipzig, having reversed last year's trend, and showing a positive supply/demand relations as well as bright economic parameters, improved its scoring rank and is now in 4th place. Rhine-Main, by contrast, dropped two ranks, explained mostly by a drop in demand when compared to previous years.

UP-AND-COMING REGIONS—MÜNSTER/ OSNABRÜCK AND UPPER RHINE

After heavy losses last year, the regions Münster/Osnabrück and Upper Rhine made a big leap forward in this year's scoring as they improved faster than any other region. Münster/ Osnabrück, for one, moved up nine ranks, driven by a dynamic demand trend above all. The socio-economic and regional economic environment has also much improved. The Upper Rhine region, which shot up by ten ranks, benefits from substantial improvements in terms of rent level and investment demand.

Inversely, the heaviest losses in the midfield were suffered by the regions Düsseldorf (-6), Bremen (-6) and Augsburg (-4). It should be added, though, that all three of these regions delivered a largely stable performance, and that they are downgraded mainly because they are outperformed by more dynamic regions. Accordingly, the trend could realistically reverse itself at any time.

INTERIOR SHOT OF A HALL FOR TEXTILE LOGISTICS
(Source: BREMER)

NUMEROUS DOWNGRADES IN THE BOTTOM THIRD

The lower third of the table is defined by a number of regions that dropped in the ranking year on year. The drop is particularly conspicuous for the logistics locations Bad Hersfeld, Kassel/Göttingen and Nuremberg. This development in central Germany is explained primarily by the low building activity and low demand. Investment activities are also sub-average. It should moreover be added that some logistics activities have relocated to larger adjacent regions.

The only regions who made gains in the lower third are Saarbrücken and Aachen, these being very small regions. The rise reflects noticeable improvements in rent levels and investment activities.

Magdeburg once again brings up the rear of the ranking. The Saxony-Anhalt region actually improved its market attractiveness, and considerably so. But both supply and demand trailed behind the other regions, as did the economic parameters.

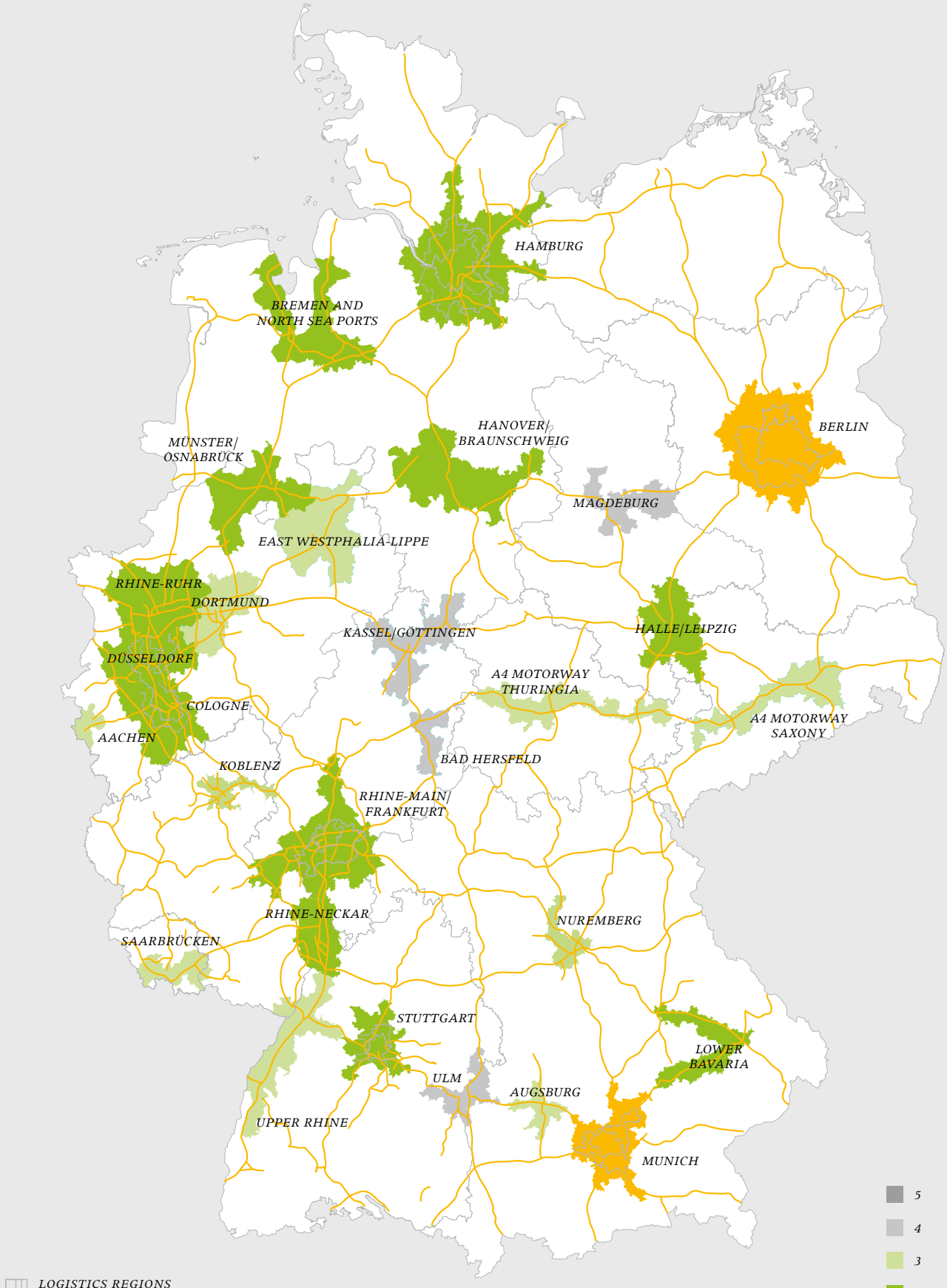
SHIFTING DEMAND PATTERNS IN THE LOGISTICS REGIONS

The market is in motion and defined by a fast-paced dynamic. In analogy to other real estate segments, the market evidence suggests that the metro regions generate far-reaching appeal and high logistics centrality ratios. Meanwhile, logistics regions located in the heart of the country, like Kassel/Göttingen or Bad Hersfeld, are losing in relevance. The hubs located there, which were primarily important for overnight transportation are losing in significance for the same reason. In the long term, overnight transportation will vanish—whereas being close to the customer to be able to deliver on the same day or within an hour will keep getting more important. And in this regard, the classic "Big Seven" cities stand to win while also being at the focus of Germany's residential and office real estate market action. Naturally, this implies an intensifying competition for floor space. Alternative concepts and new mindsets will be needed to meet the requirements of all user groups—as the discussion on the subject of city logistics (Chapter 4) demonstrates.

MAP OF LOGISTICS REGIONS KEEPS CHANGING: CLEAR FOCUS ON METROPOLISES

In addition to the "Big Seven" or Class A cities, there are certain other logistics regions that, while being noticeably smaller than the top 7 locations, do have sizeable volumes of consumers and labour. These locations serve as backup for setting up large-scale logistics operations that the metro regions are unable to accommodate. At the same time, they are usually located next to major trunk roads that permit fast haulage to the metropolises. Land and human resources tend to be available here still, while either is beginning to be in short supply in the metro regions. Examples of such logistics regions would be Hanover/Braunschweig, Halle/Leipzig, and Lower Bavaria. Although regions with optimal transport locations such as Kassel/Göttingen and Bad Hersfeld are also well situated within the road network and still have land reserves, they lack convenient accessibility to a large consumer constituency and an adequate supply of human resources.

Fig .55 MARKET ATTRACTIVENESS OF GERMANY'S 28 LOGISTICS REGIONS (OVERALL SCORING)



DISTRIBUTION CENTRE IN KLEINAITINGEN
(Source: BREMER)

CITY LOGISTICS REAL ESTATE FINANCING— ASSESSING THE RISK PROFILE

Building activities are on a record level. In the city logistics system, however, they focus on major e-fulfilment centres and regional transshipment and supply chain facilities. There has been virtually no construction of city logistics properties yet. How do you explain that? Is city logistics real estate still not on the radar for lenders? What are the assessments for the current and future scalability and risk profiles of real estate suitable for city logistics purposes?

Once again, experts and panel members took stock of the present situation and provided fascinating assessments and outlooks.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:
"The dynamic development of technology and consumption have left their mark on the world of real estate. We have reason to assume that today's blue-chip tenants will no longer be welcome tomorrow. Inversely, the leads currently rejected will be the future tenants."

116 SHIFTING RISK-RETURN PROFILES

Notwithstanding the general gains that online retailing has made and the associated growth in delivery volumes, it is doubtful whether same-hour-delivery (SHD) will become a widespread standard in Germany. Rather, facilities expressly designed for the SHD business currently seem a sensible investment proposition only in Class A and possibly Class B cities. After all, an economically sufficient customer density is only available in highly urbanised environments.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"City logistics are subject to a clear distinction between urban and non-urban regions. Investing in German B- and C-class cities according to the same criteria can be risky because they are defined by different structures."

But what about cities where the implementation of an inner-city supply chain characterised by same-day and same-hour delivery (SDD, SHD) will become a reality in the medium term? What lenders care about in particular is the future marketability of a given property. Essential criterion for its long-term viability, in addition to a functioning concept, is the demonstrable existence of a general demand for the developed property type. The quantity of comparables tends to be substantially lower for special-purpose real estate. This makes them a rather demanding product. One thing that is always checked in this context is the risk-return profile of a real estate financing arrangement. What are the risk factors involved and what the arguments in favour of the investment?

Interesting to note, it is not even the special know-how city logistics real estate requires that makes most lenders cautious. Accepting an existing facility agreement for a property whose terms propose the property's conversion from offices to a city logistics facility is what give lenders pause. They dread the possibility that the cashflow might be reduced compared to what could be expected from office or retail use, for instance.

In addition to the anticipated drop in rental income, e.g. when compared to office or retail occupancy, the so far indeterminable demand for the property type serving the last and final mile delivery market is another reason that lenders often cite to explain why they decline to underwrite city logistics real estate. There are currently very few benchmarks to draw on when making a loan decision.

Fig. 56 *FROM A LENDER'S PERSPECTIVE, WHAT ARE THE ARGUMENTS AGAINST FINANCING A CITY LOGISTICS PROPERTY FOR THE LAST AND FINAL MILE?*

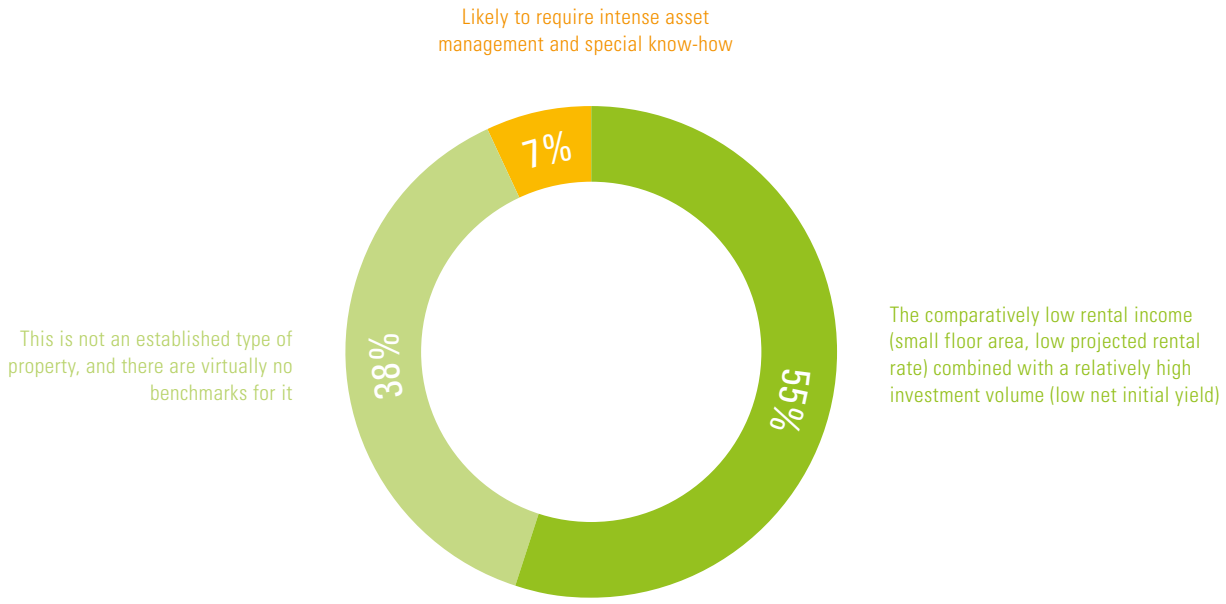
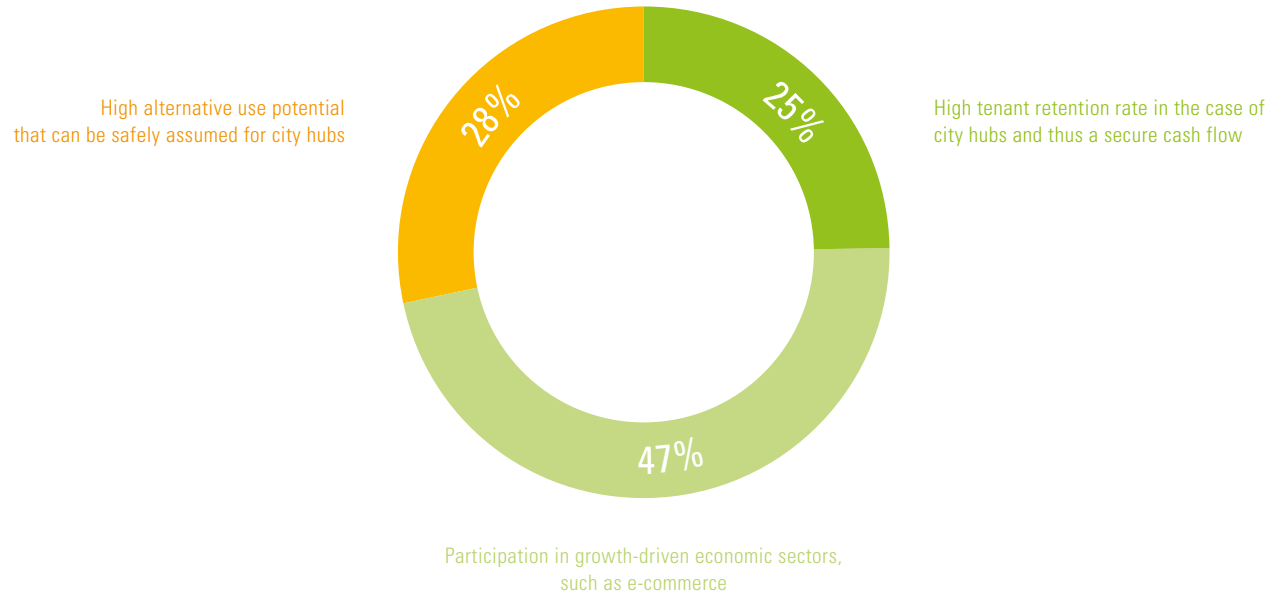


Fig. 57 *FROM A LENDER'S PERSPECTIVE, WHAT ARE THE ARGUMENTS IN FAVOUR OF FINANCING A CITY LOGISTICS PROPERTY FOR THE LAST AND FINAL MILE?*



That being said, the interviewed lenders are by all means aware of the positive qualities of city logistics real estate. In fact, half of the respondents (47%) assumes that e-commerce, being a growing economic sector will eventually open up significant and auspicious options for participation. Well over one in four respondents (28%) already acknowledge the high alternative use potential of city logistics real estate in terms of its usability by entirely different tenant groups (retail, office, etc.) as a positive quality. Another quarter of all respondents consider it a positive aspect that tenants of city logistics properties are marked by a high tenant retention rate, and generate a secure cash flow as a result.

STILL AN UNKNOWN ASSET WITH SPECIAL CHARACTERISTICS—CITY LOGISTICS REAL ESTATE IS COSTLIER TO FINANCE

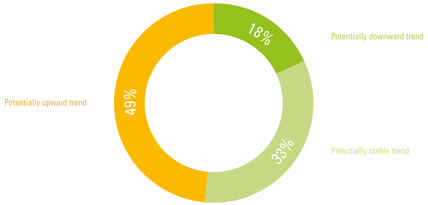
Even from a lender's point of view there are certainly good reasons for a commitment in city logistics real estate. Then again, there are several reasons discouraging it. The trial-and-error phase to build up the necessary know-how has only just got underway in the field of city logistics real estate. So the success of the concepts now being tested in the market will only known in the medium term. Not until it has become clearer what a marketable product is supposed to look like will the financier remain cautious and charge higher markups. While logistics properties on greenfield land have become something of a standard product even for lenders, city logistics real estate still represents uncharted territory for most. This is another reason why the majority of respondent lenders (48%) estimated that the markups for city logistics real estate will be higher than for large-scale assets outside the city limits. Then again, one in three respondent lenders assumes the markups will be more or less the same as for other asset types, while 18% believe they may actually be lower.

PROF. TOBIAS JUST,
IREBS REAL ESTATE BUSINESS SCHOOL:
"The more often the concept is implemented in other cities, the more interesting it becomes for financiers. Stand-alone solutions constitute special purpose properties in the eyes of financiers, and thus require advanced know-how. Which means that a lender would have to be a meta-expert for many real estate products. This makes the lender's job harder, especially when complex products are involved."

OVERVIEW OF THE MOST IMPORTANT KEY FIGURES OF THE 28 GERMAN LOGISTICS REGIONS		A4 MOTORWAY SAXONY	A4 MOTORWAY THURINGIA	AACHEN	AUGSBURG	BAD HERSFELD	BERLIN	BREMEN AND NORTH SEA PORTS	DORTMUND	DÜSSELDORF	HALLE/LEIPZIG	HAMBURG	HANOVER/ BRAUNSCHWEIG	KASSEL/ GÖTTINGEN	KOBLENZ	COLOGNE	MAGDEBURG	MUNICH	MÜNSTER/ OSNABRÜCK	LOWER BAVARIA	NUREMBERG	UPPER RHINE	EAST WESTPHALIA-LIPPE	RHINE-MAIN/ FRANKFURT	RHINE-NECKAR	RHINE-RUHR	SAARBRÜCKEN	STUTTGART	ULM
Top-Down Information	Size of the logistics region, in sq. km (2017)	1,984	1,913	364	451	719	4,419	2,748	1,696	2,000	2,089	4,988	3,318	1,903	645	2,259	1,380	2,877	2,373	1,868	1,052	2,603	2,637	4,152	1,412	2,817	925	1,934	1,107
	Surface area by type of actual use: Industrial and commercial floor area, in '000 sqm (2013)	45	28	8	14	7	104	60	51	73	74	113	77	22	16	55	20	34	38	22	21	72	49	78	55	114	30	49	22
	Gross domestic product (estimate), in billion euros (2012)	35.3	21.0	15.0	17.9	7.7	128.9	46.7	50.6	109.7	32.8	137.4	77.0	23.4	18.4	105.1	10.6	131.7	37.7	26.3	39.5	55.3	51.4	169.9	60.1	101.7	24.1	93.2	18.7
	Unemployment, in '000 (2016)	53	27	24	9	4	187	54	84	123	47	110	67	14	4	113	24	48	35	12	26	22	32	91	36	188	28	45	10
Benchmark data used in the scoring, inter alia																													
Supply score	Investment-grade stock, in '000 sqm (2017)	60	147	90	132	60	205	277	200	450	26	147	260	54	179	476	46	196	94	88	217	256	113	587	155	417	24	168	28
	New-build completions in the logistics region, in '000 sqm (2012–2016)	202	661	107	228	89	691	649	418	1,166	573	899	865	407	278	414	107	540	508	783	301	660	429	1,487	621	627	92	633	284
Demand score	Take-up in the logistics region, in '000 sqm (average 2012–2016)	55	139	41	55	21	407	198	215	331	204	631	259	72	18	227	23	348	156	187	91	142	150	506	189	360	27	220	68
	Share of the letting take-up, in % (2012–2016)	20 %	52 %	50 %	75 %	79 %	74 %	56 %	76 %	73 %	78 %	64 %	60 %	67 %	57 %	74 %	7 %	54 %	44 %	67 %	69 %	68 %	38 %	70 %	58 %	53 %	51 %	49 %	32 %
Industry demand in the logistics region (2011–2015 in %)	in the logistics & transport sector	49.9 %	31.3 %	35.8 %	75.7 %	79.1 %	43.4 %	57.7 %	39.9 %	34.0 %	63.5 %	51.9 %	43.6 %	69.2 %	20.4 %	54.3 %	58.8 %	58.8 %	40.4 %	46.2 %	63.1 %	43.2 %	48.1 %	55.5 %	47.2 %	45.4 %	67.9 %	37.9 %	41.3 %
	in the trade sector	25.6 %	59.1 %	39.3 %	12.2 %	7.6 %	39.4 %	21.1 %	51.9 %	39.4 %	19.9 %	24.7 %	30.0 %	19.1 %	54.8 %	25.8 %	41.2 %	20.4 %	34.3 %	2.2 %	6.7 %	28.7 %	32.3 %	28.4 %	34.5 %	34.3 %	7.1 %	21.9 %	28.8 %
	in the manufacturing sector	23.8 %	9.3 %	21.7 %	10.6 %	5.4 %	14.3 %	19.8 %	6.0 %	24.8 %	15.6 %	17.6 %	18.9 %	8.5 %	20.8 %	11.4 %	0.0 %	17.4 %	23.0 %	48.8 %	13.1 %	27.3 %	19.1 %	12.0 %	17.2 %	16.9 %	25.0 %	38.7 %	29.9 %
	in miscellaneous	0.7 %	0.3 %	3.2 %	1.5 %	8.0 %	2.9 %	1.5 %	2.3 %	1.8 %	1.0 %	5.8 %	7.4 %	3.2 %	3.9 t%	8.5 %	0.0 %	3.4 %	2.3 %	2.8 %	17.0 %	0.9 %	0.5 %	4.1 %	1.1 %	3.5 %	0.0 %	1.5 %	0.0 %
Rent score	Prime rents in the logistics region, in euro (2016 in city*)	4.20	4.00	5.20	4.90	4.40	4.90	4.30	5.10	5.40	4.50	5.70	5.80	4.30	4.50	5.60	4.20	6.80	4.40	5.20	5.00	5.20	4.30	6.10	5.30	5.00	4.40	6.10	5.00
	Average rents in the logistics region, in euro (2016)	3.00	2.80	3.80	3.90	3.30	4.00	3.20	3.40	4.00	3.50	4.50	3.40	3.10	3.40	4.10	3.30	5.10	3.40	4.40	3.60	3.50	3.00	4.80	3.90	3.40	3.20	4.60	4.20
Investment demand	Investment activity in the logistics region, in '000 sqm (2012 – 2016)	113	540	157	394	227	1,071	940	1,163	1,438	1,640	1,571	939	493	319	1,179	23	936	312	571	1,002	918	438	2,963	541	997	146	638	314
	Investment activity in the logistics region, in million euros (2012 – 2016)	79	291	127	274	114	719	588	647	1,121	925	1,478	667	295	214	1,024	3	953	234	370	548	635	317	1,913	476	734	104	560	236
Yield score	Prime yield (net) in the logistics region, in % (2016 in city**)	7.20	7.70	7.90	7.30	8.60	5.10	6.00	6.00	5.30	5.60	5.10	5.90	6.40	7.40	5.30	8.80	5.00	7.30	6.50	6.50	6.90	7.30	5.15	7.30	5.60	6.80	5.40	6.60
	Average yield (net) in the logistics region, in % (2016)	9.20	9.30	8.80	8.20	9.80	7.10	7.90	8.50	8.00	7.60	6,60	8.40	8.50	8.90	7.80	9.80	5.90	8.50	7.60	7.60	8.70	9.20	7.10	8.70	8.70	8.00	7.00	8.60
Land score	Maximum land prices in the logistics region, in euro (2016 in city***)	110	100	195	180	120	150	130	280	400	130	220	240	95	150	160	65	1,500	150	320	275	310	90	480	350	125	150	700	195
	Average land prices in the logistics region, in euro (2016)	75	65	115	125	85	95	60	90	280	75	160	140	65	100	115	40	660	80	250	170	195	60	325	270	80	80	470	130
Regional score 1	Population in '000 residents (2015)	1,429	741	554	286	220	3,688	1,086	1,677	2,947	1,056	3,078	1,753	378	113	2,888	501	2,177	1,274	644	783	920	946	2,915	1,226	3,433	703	2063	445
	Gross value added, total, in billion euros (2014)	38.3	20.4	16.4	11.4	6.7	111.4	39.1	46.7	113.0	27.7	127.6	72.5	13.0	6.6	112.0	12.6	130.4	40.9	27.0	36.3	36.0	32.2	144.1	49.6	95.8	24.2	99.5	15.7
	Gross value added, trade & transport, in billion euros (2014)	6.8	3.7	3.1	2.0	1.4	23.8	9.9	9.5	27.0	5.9	38.4	13.9	2.7	1.3	31.0	2.3	35.4	8.7	3.6	8.0	8.4	6.9	36.5	8.9	18.8	4.4	17.8	3.3
Regional score 2	Gainful employment total (in '000) (2014)	770.8	418.3	293.4	191.0	125.2	1,916.7	650.5	811.0	1,626.8	549.4	1,771.5	1,051.2	227.5	102.8	1,565.0	246.8	1,485.3	717.8	410.1	563.0	550.6	528.5	1,835.2	732.3	1,574.2	407.2	1,248.3	259.7
	Gainful employment, in trade & transport sector (in '000) (2014)	181.3	100.1	74.8	44.4	33.7	502.1	179.9	230.3	467.3	138.0	571.5	259.0	57.5	27.0	442.4	57.6	439.4	193.3	95.1	149.6	152.3	138.2	548.4	177.1	405.8	99.4	296.3	64.3
	Insurable employment, total, in '000 (2014)	545.6	324.2	168.8	188.4	84.5	1,496.0	513.0	548.9	1,092.7	454.5	1,350.3	804.2	265.9	183.7	1,000.6	149.8	1,130.0	406.8	278.9	457.5	565.1	574.3	1,631.6	606.3	1,058.1	277.8	880.5	199.9
	Insurable employment, in trade & transport sector, in '000 (2014)	137.7	74.1	49.6	31.5	23.1	352.8	127.3	156.4	332.1	102.1	416.3	189.9	39.2	18.2	304.8	44.8	326.8	134.1	65,7	113.5	108.8	100.2	406.9	127.4	276.5	71.8	219.4	46.1
	The prime rent in the logistics region refers to:	* Dresden	* Jena	* Aachen	* Augsburg	* Fulda	* Berlin	* Bremen	* Dortmund	* Ratingen	* Leipzig	* Hamburg	* Wolfsburg	* Kassel	* Koblenz	* Co-logne	* Magdeburg	* Munich	* Osnabrück	* Regensburg	* Nuremberg	* Karlsruhe	* Bielefeld	* Frankfurt	* Heidelberg	* Duisburg	* Saarbrücken	* Stuttgart	* Ulm
	The prime yield in the logistics region refers to:	** Dresden	** Erfurt	** Aachen	** Augsburg	** Fulda	** Berlin	** Bremen	** Dortmund	** Düsseldorf	** Leipzig	** Hamburg	** Hanover	** Kassel	** Koblenz	**Co-logne	** Magdeburg	** Munich	** Osnabrück	** Regensburg	** Nuremberg	** Karlsruhe	** Bielefeld	** Frankfurt	** Mannheim	** Duisburg	** Saarbrücken	** Stuttgart	** Ulm
	The maximum price of land in the logistics region refers to:	*** Dresden	*** Jena	*** Aachen	*** Augsburg	*** Fulda	*** Berlin	*** Bremen	*** Dortmund	*** Düsseldorf	*** Leipzig	*** Hamburg	*** Hanover	*** Kassel	*** Koblenz	*** Bonn	*** Magdeburg	*** Munich	*** Osnabrück	*** Regensburg	*** Nuremberg	*** Pforzheim	*** Bielefeld	*** Frankfurt	*** Heidelberg	*** Mülheim an der Ruhr	*** Saarbrücken	*** Stuttgart	*** Ulm

INTERIOR SHOT OF A LOGISTICS CENTRE FOR FASHION/TEXTILES
(Source: BREMER)

Fig. 58 *HOW DO LENDERS RATE THE DIFFERENCE IN MARKUPS BETWEEN CONVENTIONAL GREENFIELD LOGISTICS REAL ESTATE AND CITY LOGISTICS REAL ESTATE?*



FAMILIAR PARADIGMS ARE SHIFTING

In the present macro-societal situation, it is hard to say which way the known patterns are trending. Like other sectors, the real estate universe is influenced by the dynamics of technological development and consumption: Megatrends such as the increase in automation and the growth of e-commerce will wreak massive changes on work environments in the retail sector. Even the office work environment is undergoing changes, as is well known. Nonetheless, the development of, and investment in, new floor space continues on a grand scale. While the office sector is still said to suffer from a floor space shortage, the retail sector is already manifesting signs here and there of excess floor area, for the time being mainly concentrated in secondary locations. With increasing frequency the question is raised whether so much physical retail area will actually be needed in the future. What is the situation in the retail sector?

Within the next five to ten years, city logistics real estate will replace retailers in parts of the urban retail locations, according to the experts. However, lenders should not be expected to apply the same return-security approach as the one applied to classic retail real state right away. Not until the product starts becoming more standardised at the end of the trial-and-error phase will the rates of return and the markups for city logistics assets pull level with those of retail real estate.

PROF. TOBIAS JUST, IREBS REAL ESTATE BUSINESS SCHOOL:

"In the medium term, meaning within the next ten years, it is reasonable to expect that city logistics real estate will take over a major share of the non-discretionary supply function. A more stable segment will evolve. Once it has taken over a major share of the typical non-discretionary retail trade, financiers and investors will accept this asset class as a low-risk product."

Once the societal and technological transformation has reached the office environments, at the latest, it will be important to have accommodation that lends itself to several purposes along the lines of a genuine potential for alternative use. With a view to the lack of potentially suitable floor space and property solutions, the interviewed experts attribute a high potential for providing solutions to the last and final mile logistics issue to properties originally used for office or retail purposes but facing obsolescence now or in the future. As new approaches to the use of these existing properties establish themselves, their attractiveness to the lending market could improve.

THE CARDS ARE BEING RESHUFFLED—SOME FAMILIAR PROPERTY TYPES BECOMING OBSOLETE

An entire research project could be launched on the subject of how the required premises in cities will have to change and adapt in order to be sustainable. Some of the well-known property types may become completely obsolete.

Against the background of the re-organisation of inner-city supply chains, the experts are already beginning to doubt the continued profitability of some property types. Will, for instance, the same number of transshipment properties (cross-docking facilities) be needed?

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"Since same-hour delivery does not involve overnight transportation, there will be no need for cross-docking facilities in the longer term. Parcel deliveries will become a thing of the past, replaced by order-picking in local warehouses, racks, etc. In my opinion, we will see a drastic drop in the volume of parcel shipments, even if they continue to increase in the near term as a result of the e-commerce boom. But as soon as city logistics has aligned its systems to the new requirements, the inner-city facilities will become entirely obsolete. In the CEP business, the courier service will gather momentum, more so than parcel services. Accordingly, I would not touch cross-docking facilities with a ten-foot pole, because it would be a misguided investment. Exceptions could possible include facilities that are integrated into larger systems and located outside the city area."

"FLEXIBILITY, FUNGIBILITY AND A SMART LOCATION!"

The ideal type of city logistics real estate therefore includes flex spaces—meaning floor space of genuine alternative use potential—that would make the premises suitable for multi-tenant and simultaneously flexible use. Once marketable real estate products have crystallised at the end of the trial-and-error phase, the requirements of occupiers, investors and lenders for both existing and new-build facilities will be easy to meet—assuming development land (plots) is actually available.

For the time being, city logistics solutions are frequently implemented in existing property. One should bear in mind, though, that city logistics operators have no use for all floors of a six-storey office building, for instance, but would limit their operations to the basement levels, the ground floor and the first two of the upper floors perhaps. This means that logistics operations covering the last and final mile in existing buildings of this type will appeal to investors only if the top floors are available for other types of use that do not conflict with the logistics business.

JANINE DIETZE, DREES & SOMMER:

"City logistics in particular gravitate toward non-standardised solutions that involve existing or converted properties. Accordingly, it is probably time to abandon the focus on the potential for just one alternative use type. Rather the magic words are multi-tenancy and flexibility."

THE BIG CAVEAT: PROPERTY USE FOR CITY LOGISTICS PRESUPPOSES COMPETITIVE RENT LEVELS

Investors and lenders will principally be interested in real estate only if the realistically achievable rent level promises profitability. Even during the ownership phase, a property should have an assured capital servicing capacity in the event that it is sold.

The respondent experts and the panel of lenders are convinced that the biggest obstacle standing in the way of getting a financing arrangement for city logistics real estate approved is the difficulty to achieve a headline rent level with city logistics facilities. With a view to the current parameters, developers prefer residential and commercial developments in inner-city locations.

MARIO GLÖCKNER, ZALANDO REAL ESTATE:

"Real estate companies face the challenge of having to come up with solutions and to find a balance between e-commerce and tenant, on the one hand, and the capital market, on the other hand. City logistics operators will have to pay headline rents in line with the market. We recently used the example of a vacant facility to discuss the issue. The facility at hand was to be sold to the highest bidder. No city logistics concept is currently able to generate the same kind of rent that a residential or commercial development would yield. It is therefore of the essence for the developer side to coordinate with architects and to develop viable concepts."

From the experts' point of view, rent rates for city logistics occupancy will adapt to the rent level paid by classic urban types of use. It stands to reason therefore that the risk assessments for such investments will have to be adjusted. This would mean in turn that the same kind of standards would be applied to city logistics as to the office, retail and residential types of use. At this time, many of the active stakeholders, such as appraisers and lenders, have yet to become aware of city logistics' imminent shift in significance.

DR. THOMAS STEINMÜLLER, EXECUTIVE BOARD OF CAPTEN AG:

"We are dealing with a property in Berlin with a floor load capacity of 1.5 tons that is currently let as office space. But we could also rent it out as logistics property. Appraisers would still say that 10.00 euros/sqm are a reasonable rate for office use, while projecting only 4.00 euros/sqm for its use as city logistics facility. This is completely out of touch with reality. The rate of 4.00 euros/sqm applies to large greenfield locations, whereas the going rate in Germany's inner cities is 10.00 euros/sqm or more even for city logistics facilities."

Now, as then, lenders consider office and retail real estate a safe investment. Property valuations have so far ignored the imminent withdrawal of brick-and-mortar retailers from the inner cities.

PROF. TOBIAS JUST, IREBS REAL ESTATE BUSINESS SCHOOL:

"Conversely, classic retail trade concepts ought to get a higher risk rating if they fail to take the latest trends into account. This is principally possible, as even shopping centres could take over central micro-logistics tasks. Failure to make the necessary adjustments would compel financiers to raise their markups and to lower their LTV ratios."

In a few instances, the rents paid for city logistics properties serving the final mile have been on a level with the rents paid by other types of use.

RAINER KIEHL, UPS:

"Wherever we rent property, we are prepared to pay up to 20.00 euros/sqm for inner-city storage areas, provided the premises are permanently earmarked for city logistics operations. Of course, the situation varies from one city to the next. Not every location justifies this rent level."

LIST OF FIGURES

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