# WMS MARKET REPORT COMPACT 2022

FRAUNHOFER INSTITUTE FOR MATERIAL FLOW AND LOGISTICS // TEAM WAREHOUSE LOGISTICS

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## Trends and Developments of the Market for Warehouse Management Systems

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# Introduction

»Crises and wars in recent years have faced both large companies as well as small and medium-sized enterprises (SMEs) with challenges. The keys to sustainable resilient logistics processes are the responsible use of resources and data sovereignty. The application of software provides the basis for continuous data capture and case-specific processing. Accordingly, companies strive to increase the transparency of processes and nodes in order to be able to react to internal and external influences in a targeted manner and also to act proactively. Due to the rapidly increasing demand for the digitalisation of logistical processes, providers of logistics IT systems and especially Warehouse Management Systems are more in demand than ever. This trend includes all company sizes and starting points, so that the variety of projects ranges from initial implementations of mainly manual processes to retrofits and expansions of automated warehouses.

The »Team warehouse logistics« of the Fraunhofer Institute for Material Flow and Logistics IML has been operating one of the world's leading information platforms for the comparison of logistics IT systems such as Warehouse Management Systems (WMS), Transport Management Systems (TMS), Resource Planning Systems (RPS), Forklift Guidance Systems (FGS), Business Intelligence Systems (BI) und Pick-by Systems (Pick-By), since more than 22 years. As a continuous market study, it analyses the trends and developments regarding the WMS Market, Standard WMS and WMS Projects.

With the participation of almost all relevant WMS providers, warehouse-logistics.com offers comprehensive information about the current status of general market and industry trends.

The present WMS MARKET REPORT COMPACT 2022 summarises the essential findings for you.


**Kira Schmeltzpfenning**
Head of »Team warehouse logistics«

**Linda Maria Wings**
»Team warehouse logistics«
Coordination of Studies & Publications




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# Methodology

The WMS MARKET REPORT was first published in 2007. Since then, the successful publication has been an integral part of the »Team warehouse logistics« service portfolio. The WMS MARKET REPORT COMPACT 2022 shows essential trends as well as possible development potentials of the WMS market. It contains numerous analyses and evaluations of the functionalities of Warehouse Management Systems and WMS project planning. In order to bundle the findings of the analyses in a descriptive way, the study deals with partial aspects of WMS Market, Standard WMS and WMS Project.

For the warehouse-logistics.com platform, around 100 systems are validated annually by the »Team warehouse logistics«. The main findings about the development of the market and the systems are made available to the public in a two-year cycle with the WMS MARKET REPORT as a comprehensive market study.

To collect the data, selected aspects from the WMS questionnaire are evaluated, which are queried during validation processes and stored in the »Logistics IT Database«. The questionnaire comprises a total of nearly 3.700 aspects. It is adapted annually to the current trends and developments. After a successful validation, the information is released anonymously for evaluation and analysis. By linking different questions, correlations between company and market structures are highlighted.

In addition, all »WMS Reference Projects« listed on the warehouse-logistics.com platform are validated and evaluated. By comparing the statements of WMS providers and WMS users, a representative overview of prevailing trends and developments is created.

In addition, the market report addresses trends and developments from current key research areas. The contents and results are based on research findings. All aspects are presented graphically and underlined with text.

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# THE WMS MARKET

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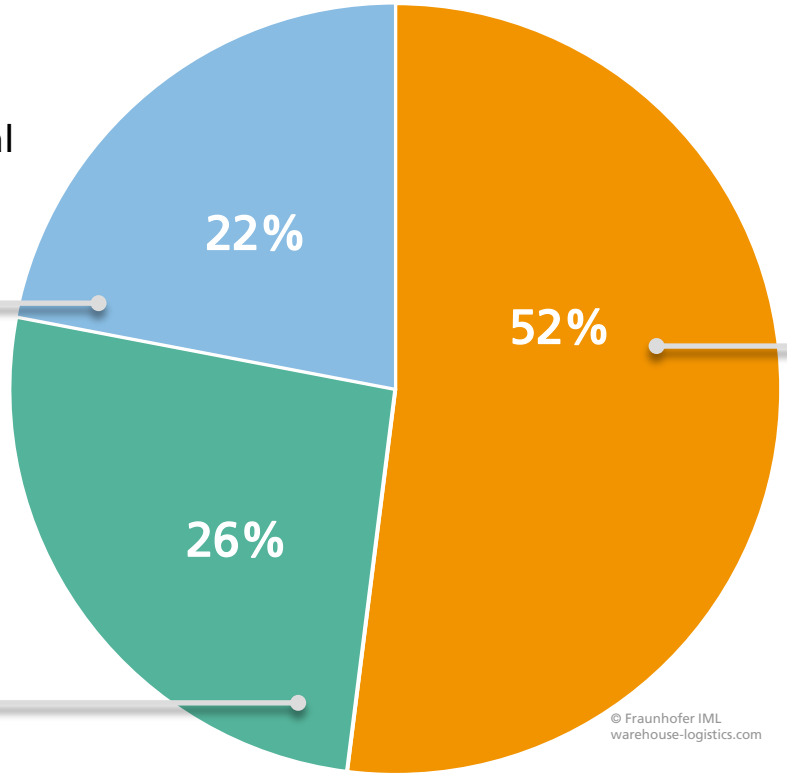
# Provider Types

## Differentiation based on the Product Portfolio of the WMS Providers

The integrator often acts as a general contractor and supplementary offers material handling equipment (»one-stop shop«). In general, the WMS is highly integrated into the material flow control system.

The core competence of a »pure« WMS provider is software for the warehouse – possibly with focus on dedicated industry sectors. This provider type might offer supplementary warehouse-related software (e. g. Forklift Control Systems, Pick-by-Voice solutions).




A WMS of a suite provider is mostly part of a broader software suite (e. g. ERP / SCM system) and generally features a higher level of integration in intercompany or multi-site modules and functions of the business suite.

52% of the WMS providers surveyed describe themselves as suite providers. Compared to 2020, a slight decrease in »pure« WMS providers can be observed. The assignment to a provider type provides information about the functional orientation of the provider. Depending on the scope and framework of the project, the respective strengths of the provider types can be decisive for the success of the project.

The given data is based on the statements of the WMS providers.



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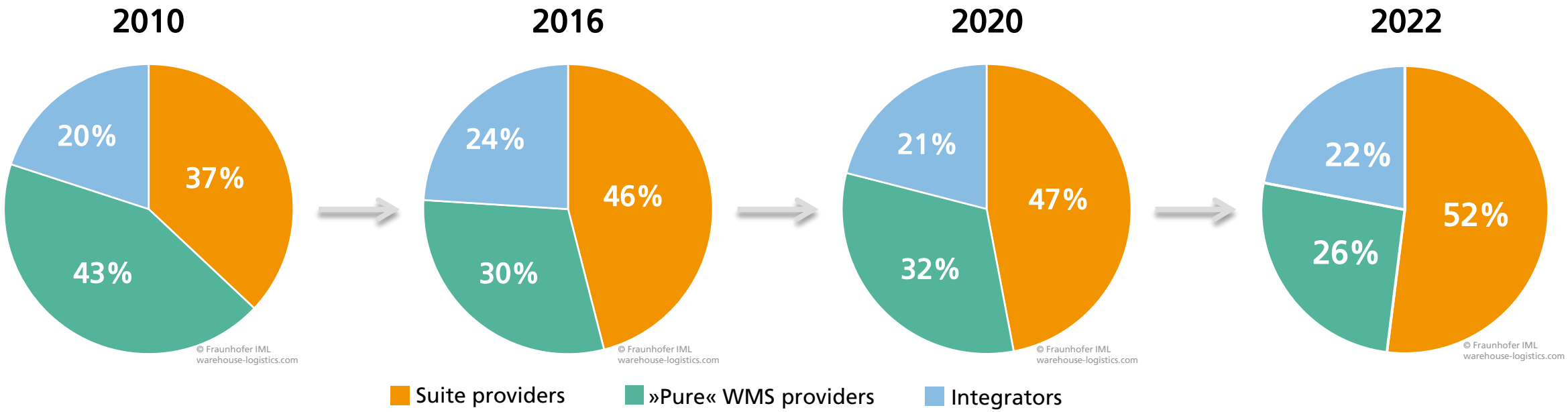
# Development of Provider Types

## Development of the Distribution of Provider Types from 2010 to 2022




Already more than half of the listed WMS providers identify themselves as suite providers and thus focus on offering several types of systems. During the last 12 years, the continuous trend towards expanding the product portfolio has become apparent. While the share of warehouse technology providers has remained rather constant, the share of »pure« WMS providers is shifting towards suite providers. Since 2010 there has been an increase of +15%. Project experiences of the "Team warehouse logistics" show that the process-related conditions demand specialised system solutions and the offer as well as the comparison of adjacent logistics IT systems are gaining relevance.

The given data is based on the statements of the WMS providers.
The data for 2010, 2016 and 2020 is taken from the WMS Market Report Compact 2020.



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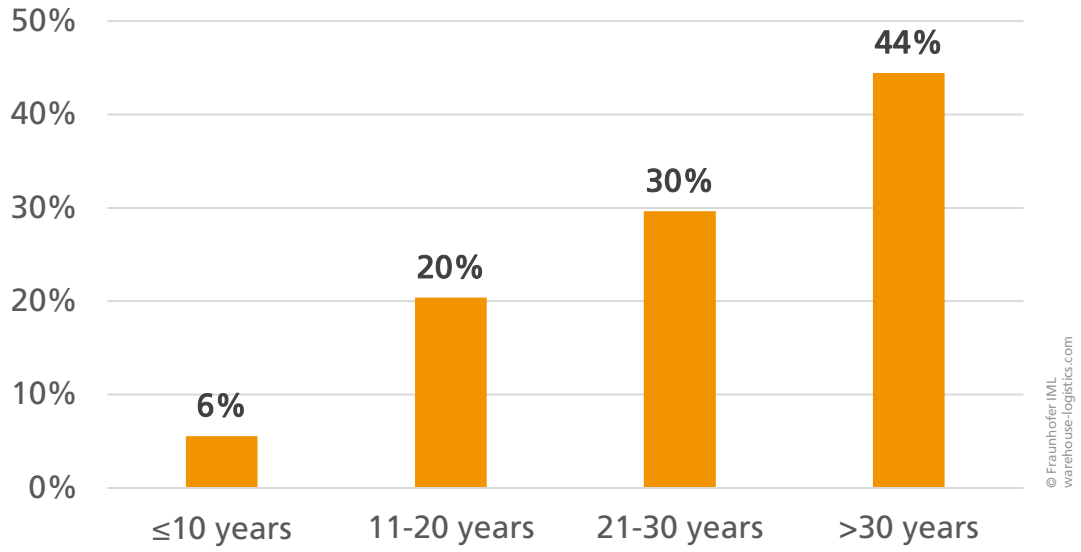
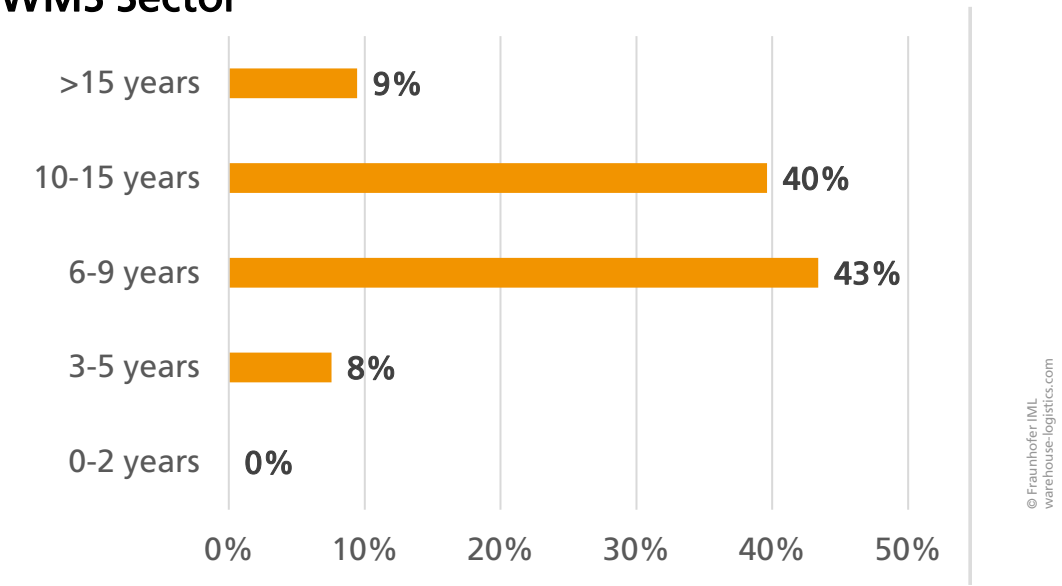
# Expertise of WMS Providers

## Market Presence of WMS Providers




## Employment Period of Employees in the WMS Sector




Almost three quarters of the WMS providers have been offering warehouse management systems for more than 20 years. Most providers even with 44% show more than 30 years of experience in the WMS area and have thus been present on the market since the beginning of the possibilities for digital warehouse management. The majority of WMS providers state that almost every second employee has been working in the company for more than 9 years, which also indicates many years of experience.

The given data is based on the statements of the WMS providers.



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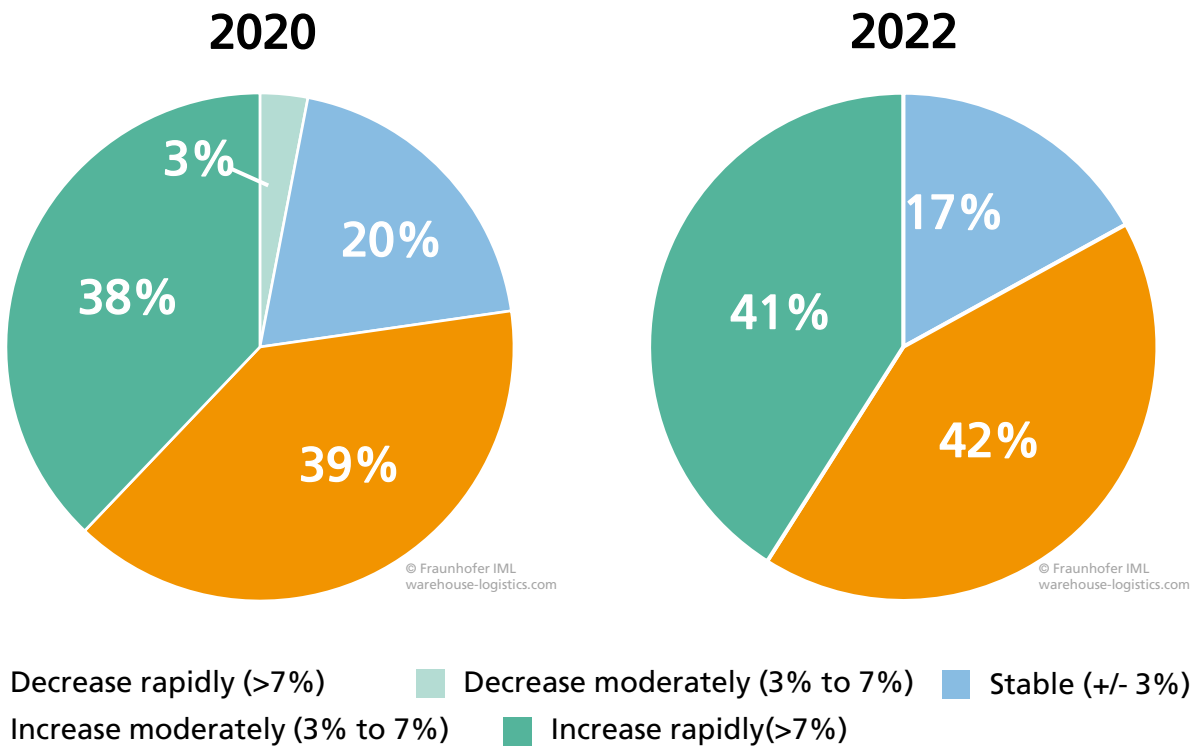
# Employee Development in the WMS Sector

## Estimation of the WMS Providers regarding the Annual Development of their Headcount in the WMS Sector




## Actual Development of the Average Number of Employees from 2013 to 2021

**9%**

**Employee Growth per Year**

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The given data is based on the statements of the WMS providers.
The data for 2020 is taken from the WMS Market Report Compact 2020.



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# Employee Development in the WMS Sector

## Development of Employee Numbers from 2013 to 2021

### Distribution of the Number of Employees in the WMS Sector per Company

| | | |
|---|---|---|
| 25% | < 25 | employees |
| 25% | 25-49 | employees |
| 17% | 50-100 | employees |
| 33% | > 100 | employees |

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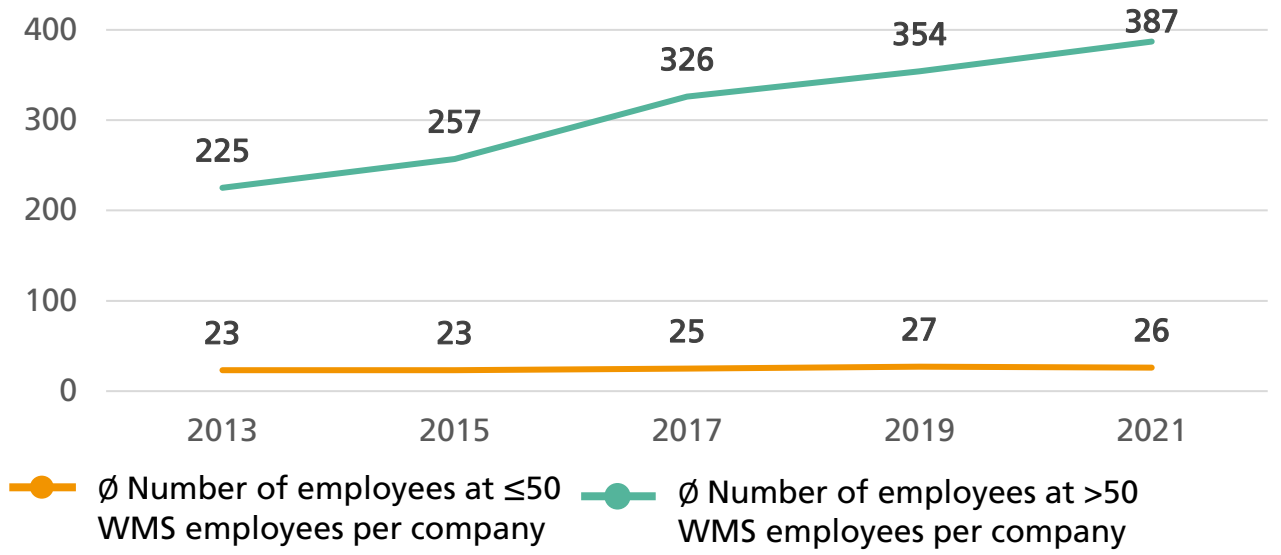
### Development of the Average Number of Employees from 2013 to 2021 in the WMS Sector per Company

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The average number of WMS employees at WMS providers is shown. A categorisation was made between large companies with more than 50 employees and smaller companies with less than 50 employees in the WMS sector. The distribution of companies between these two categories is the same. While the number of WMS employees in smaller companies remains constant, there is a steady increase in the number of employees in larger companies.

The given data is based on the statements of the WMS providers.
The data for 2013, 2015, 2017 and 2019 is taken from the WMS Market Report Compact 2020.



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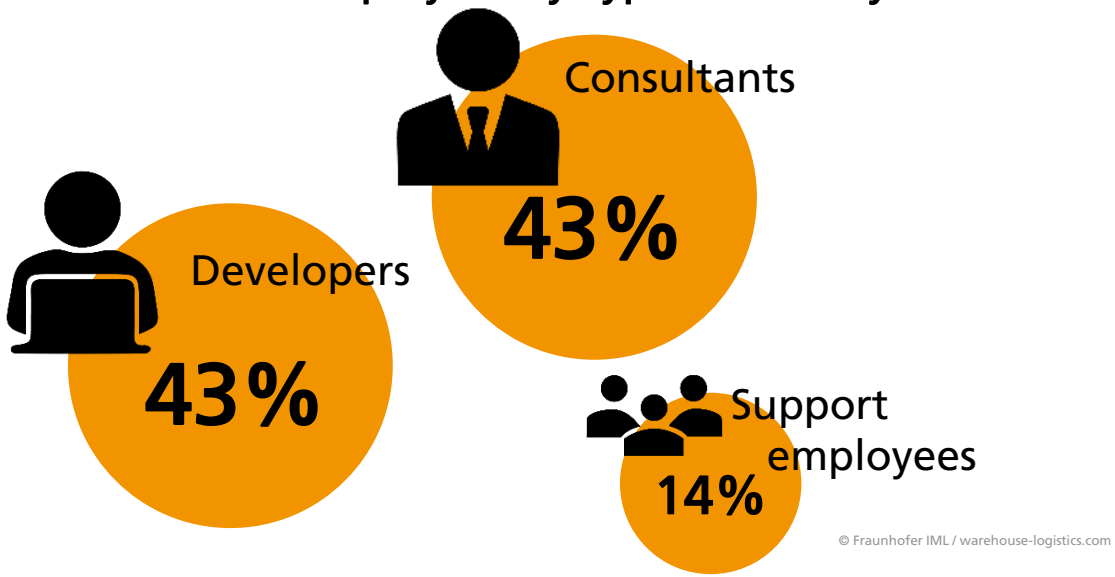
# Employee Structures in the WMS Sector

## Distribution of Employees by Type of Activity

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## Difficulties in Recruiting Skilled Workers

1. (Industry) experience of the applicants
2. Qualification level of applicants
3. Professional aptitude of the applicants
4. Competition between providers
5. Different salary expectations

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The share of consultants who, as logistics and process experts in WMS projects, are increasingly also responsible for the customised parameterisation and configuration of the system, has expanded in the last two years to the same share as developers and now accounts for 43% of the types of employee activity. For the optimal design of logistics IT projects, such an interdisciplinary team, in which both process-related, logistical expertise and profound IT know-how are guaranteed, is essential.

The given data is based on the statements of the WMS providers.



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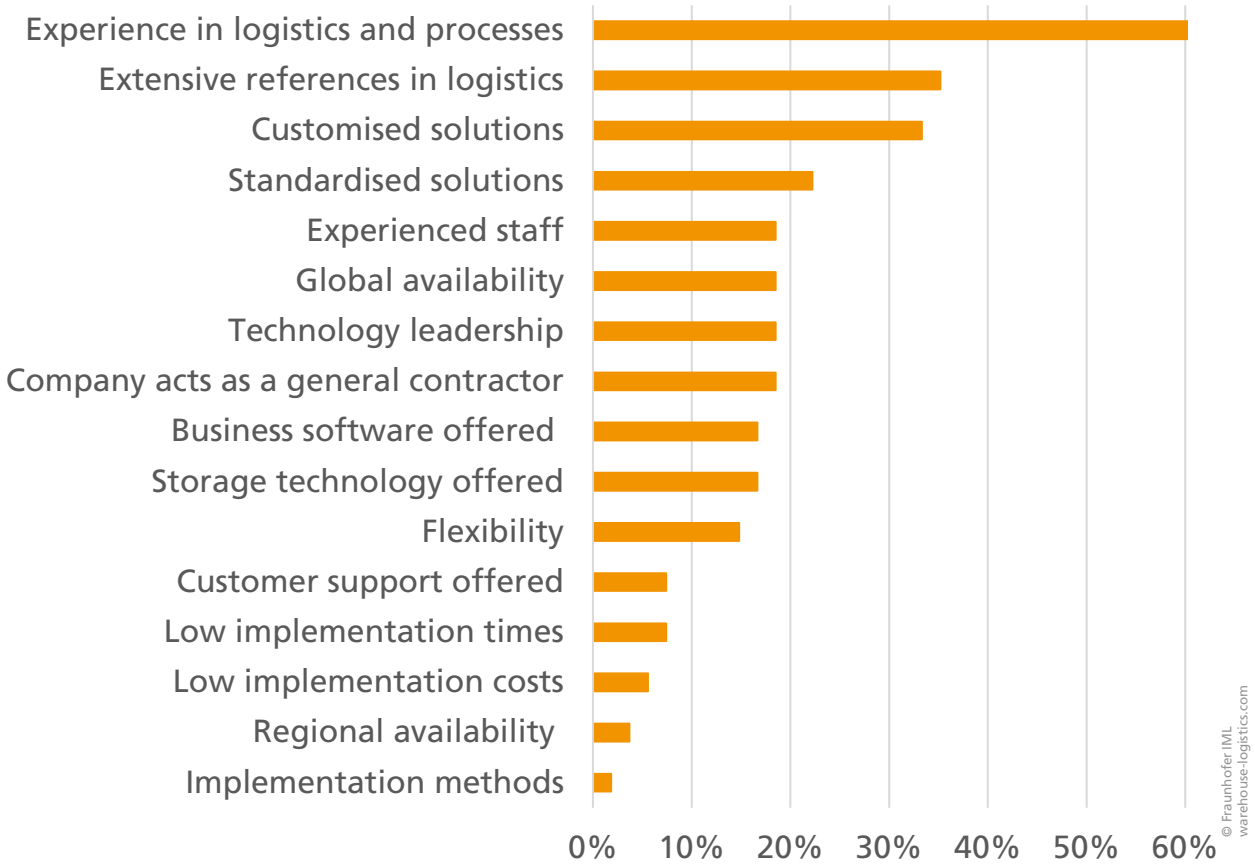
# Success Factors of WMS Providers




## Top 5 Success Factors of the WMS Providers

| | |
|---|---|
| **61%** | Experience in logistics and processes |
| **35%** | Extensive references in logistics |
| **33%** | Implementation of customised solutions |
| **22%** | Implementation of standardised solutions |
| **19%** | Experienced staff |

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The successful positioning of WMS providers on the market is particularly due to their logistics and process know-how. This success factor is followed by the extensive references in logistics and the realisation of individual solutions.

The given data is based on the statements of the WMS providers.



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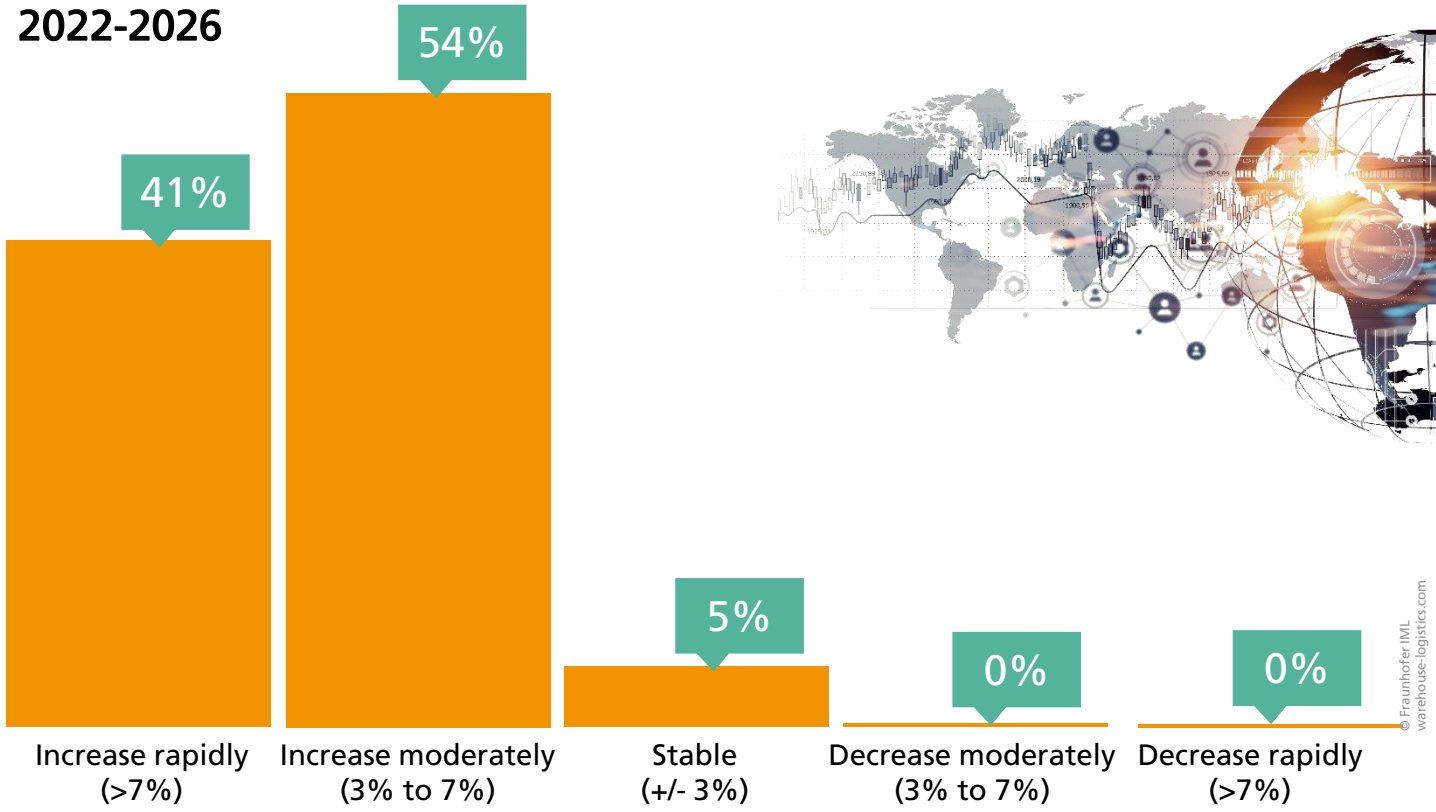
# Development of Turnover in the WMS Sector

## Estimation of the Annual Turnover Development for the Years 2022-2026




## Average Annual Turnover Increase from 2015 to 2022

**10%**

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In 2018, almost a third of WMS providers predicted a strong increase in turnover for 2022. This has been confirmed. The annual increase in turnover over the past 7 years is 10%. This year's forecast differs noticeably from the results of the WMS Market Report Compact 2020. While only 24% expect a strong increase in turnover in 2020, this share has risen up to 41%. Therefore, well-founded project planning is even more important for a WMS project, so that the project can be completed successfully despite high workload.

The given data is based on the statements of the WMS providers.
The data for 2015-2020 is taken from the WMS Market Report Compact 2020.



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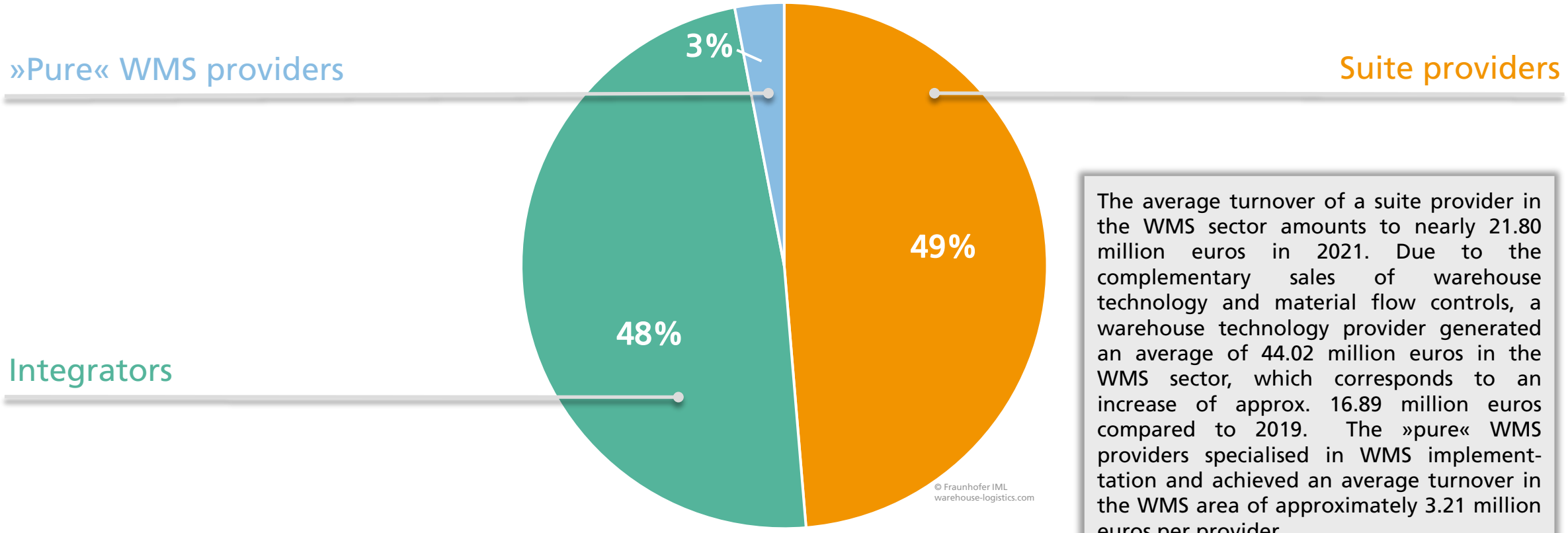
# Share of Turnover by Type of WMS Provider

## Division of the Total Annual Turnover 2021 in the WMS Sector




The average turnover of a suite provider in the WMS sector amounts to nearly 21.80 million euros in 2021. Due to the complementary sales of warehouse technology and material flow controls, a warehouse technology provider generated an average of 44.02 million euros in the WMS sector, which corresponds to an increase of approx. 16.89 million euros compared to 2019. The »pure« WMS providers specialised in WMS implement-tation and achieved an average turnover in the WMS area of approximately 3.21 million euros per provider.

The given data is based on the statements of the WMS providers.



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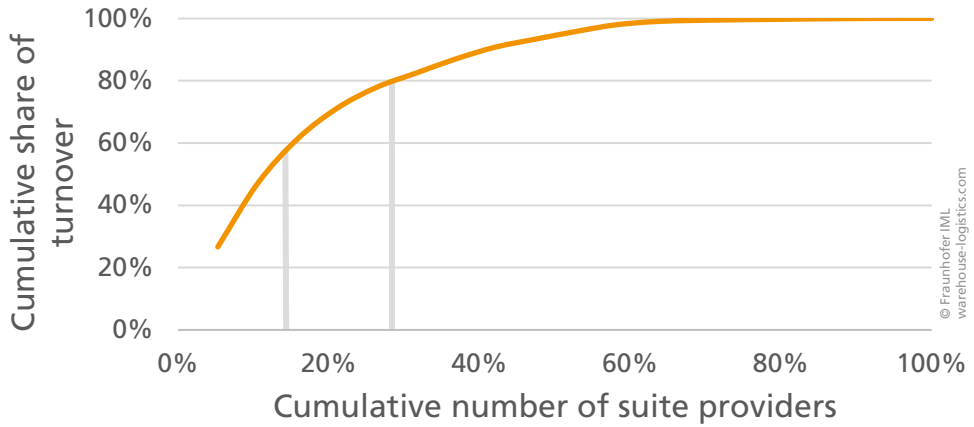
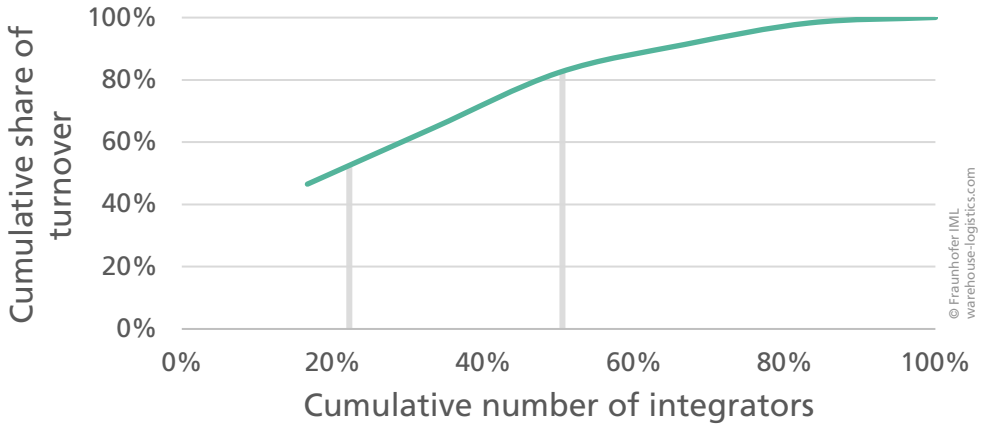
# Cumulative Share of Turnover per Provider Type

## Sales Shares in the Market Segments of the Respective Provider Types

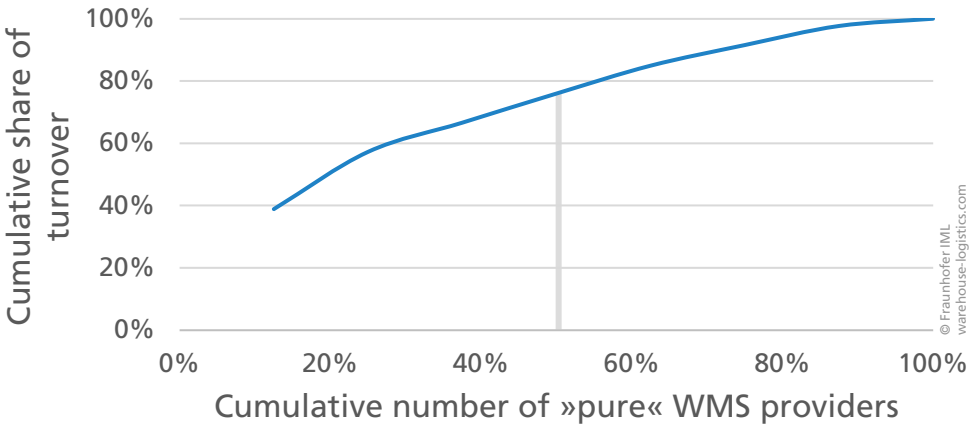
Suite providers




Integrators




»Pure« WMS providers




Nearly 80% of the suite providers' turnover continues to be dominated by several large companies, as about one third of the providers represent this share. The development of the turnover shares in the integrators' category shows that the annual turnover is higher on average than that of the other areas. This is due to the additional sales of warehouse technology. Among the providers, the »pure« WMS providers basically generate less turnover due to the portfolio of offers. The shares are relatively evenly distributed in the market. There are only a few companies in this category with an above-average annual turnover.

The given data is based on the statements of the WMS providers.



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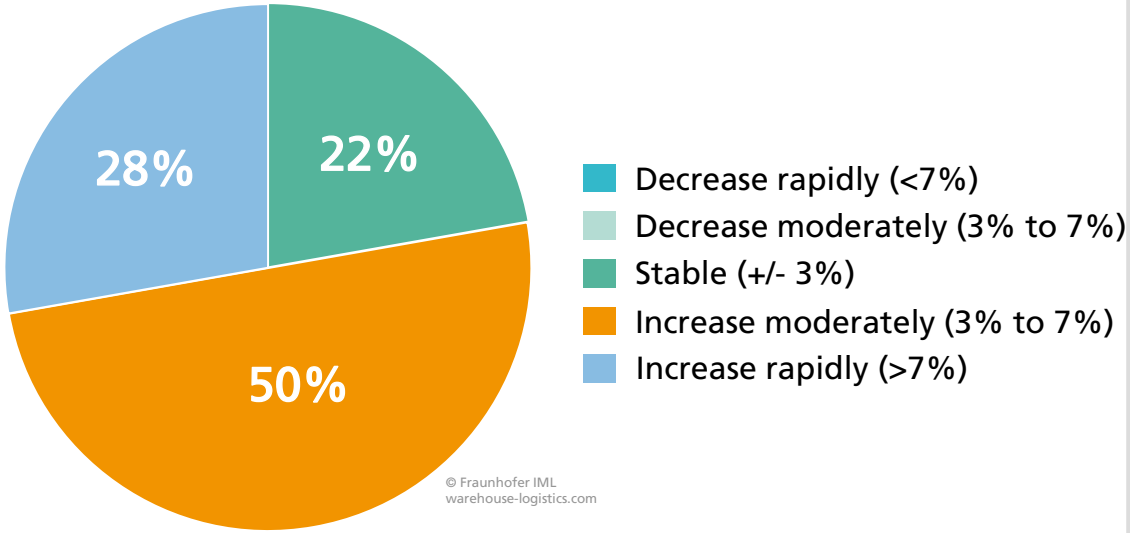
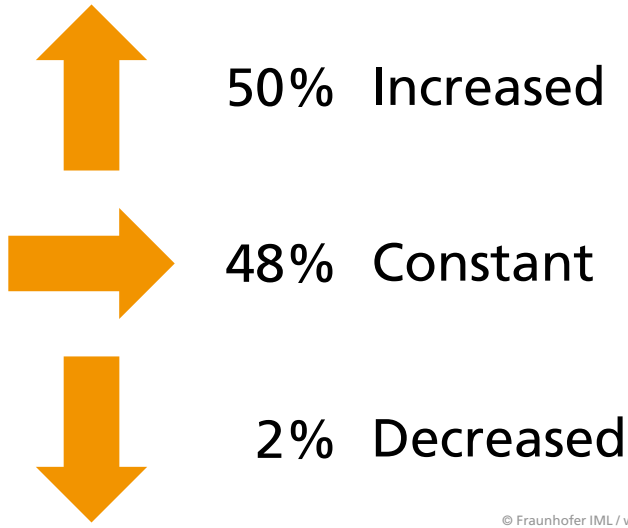
# Development of Market Volume and Competitive Pressure

## Expected Annual Development of the WMS Market Volume in the Upcoming 4 Years




## Expected Development of the Competitive Pressure in the past 3 Years

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Despite increasing market volume, half of the WMS providers experience an expanding competitive pressure in the industry. Only 2% of the WMS providers have the impression that competitive pressure has decreased in the last three years. A decrease in WMS market volume is not expected overall.

The given data is based on the statements of the WMS providers.



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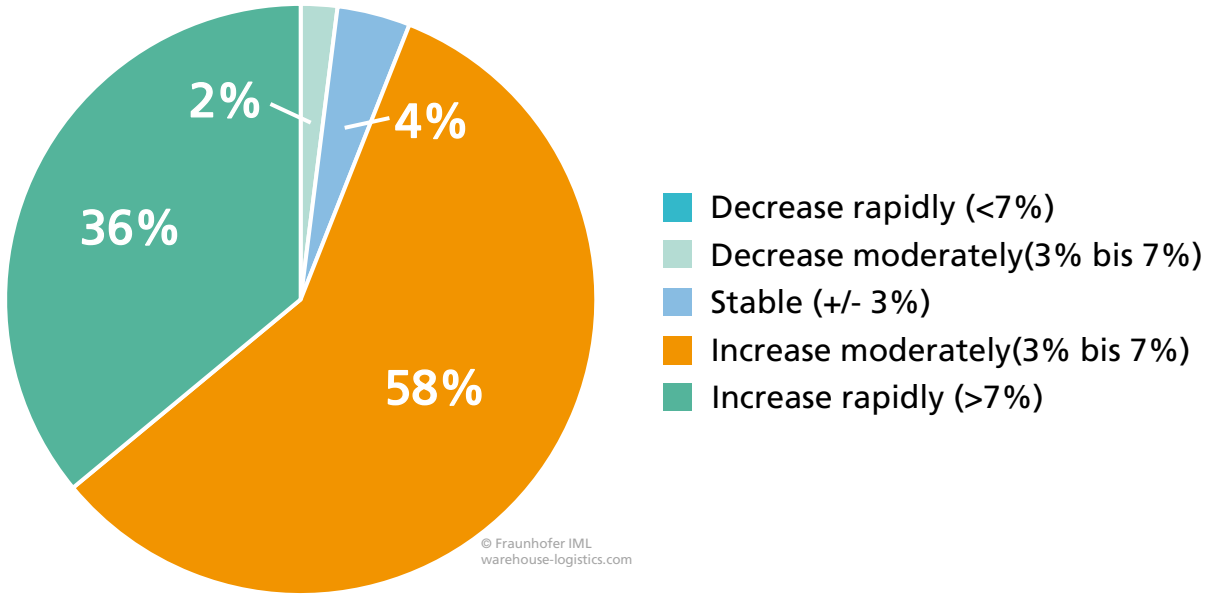
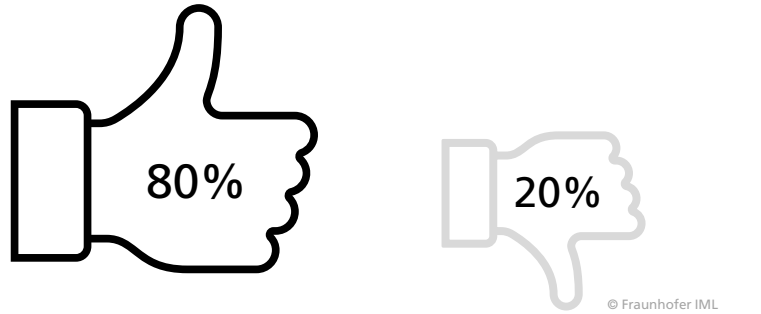
# Developments of Cloud Solutions in the WMS Market

## Expected annual Development of the WMS Market Volume of Cloud-based Systems in the next 4 Years




## Active Marketing of WMS Cloud Solution




94% of the providers expect a moderate to strong increase in the development of the WMS market volume of cloud-based systems in the next 4 years. Only 2% of the providers expect a decline. These values are reflected in the active marketing of WMS cloud solutions. In 2021, 80% of the providers have actively promoted their cloud solution.

The given data is based on the statements of the WMS providers offering a validated cloud solution.



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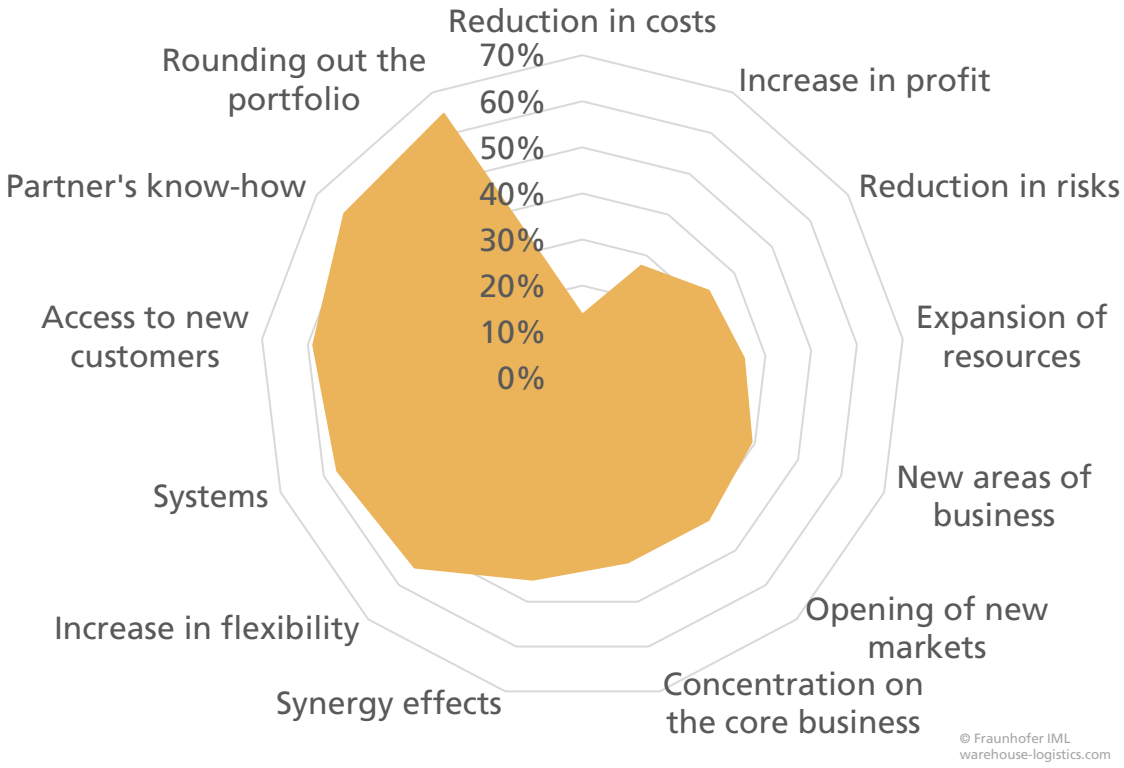
# Partnerships of WMS Providers

## Benefits for the Providers through Partnerships

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## Partnerships of the Providers in the WMS Sector

**87%**
Sales partnerships

**83%**
Technology and development partnerships

**69%**
Implementation partnerships

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More than 80% of the WMS providers maintain sales partnerships. The partnerships are considered particularly useful for completing the portfolio by 65% of the WMS providers and due to the partner's know-how by 63% of the WMS providers.

The given data is based on the statements of the WMS providers.



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# Internationalisation

## Reasons for Expansion and Future Establishment of Foreign Branches

1. Strategic expansion
2. Growth market
3. Proximity to customers for service and support
4. Existing customers are located in the country and are planning new investments in WMS
5. Existing customers plan to expand to those countries

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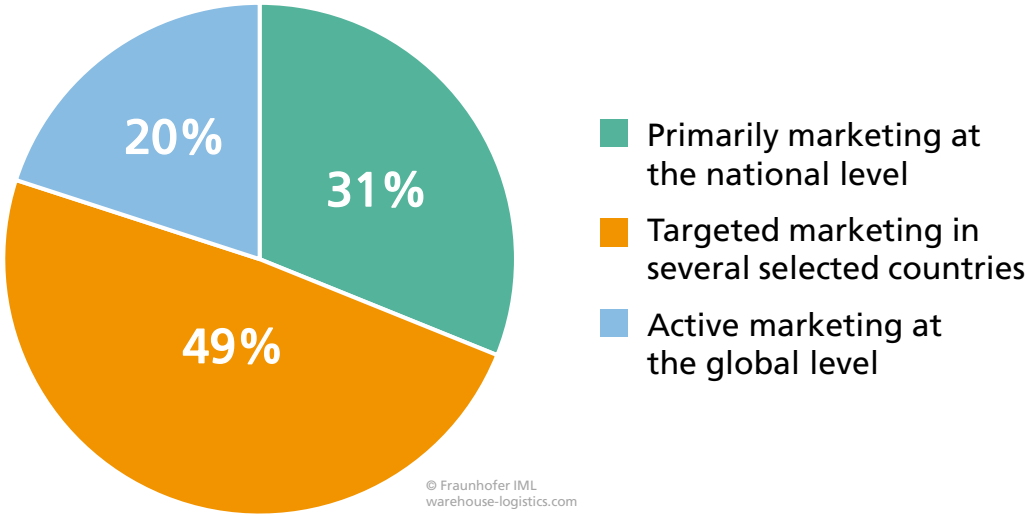
## Strategies with regard to Marketing and Internationalisation




The given data is based on the statements of the WMS providers.



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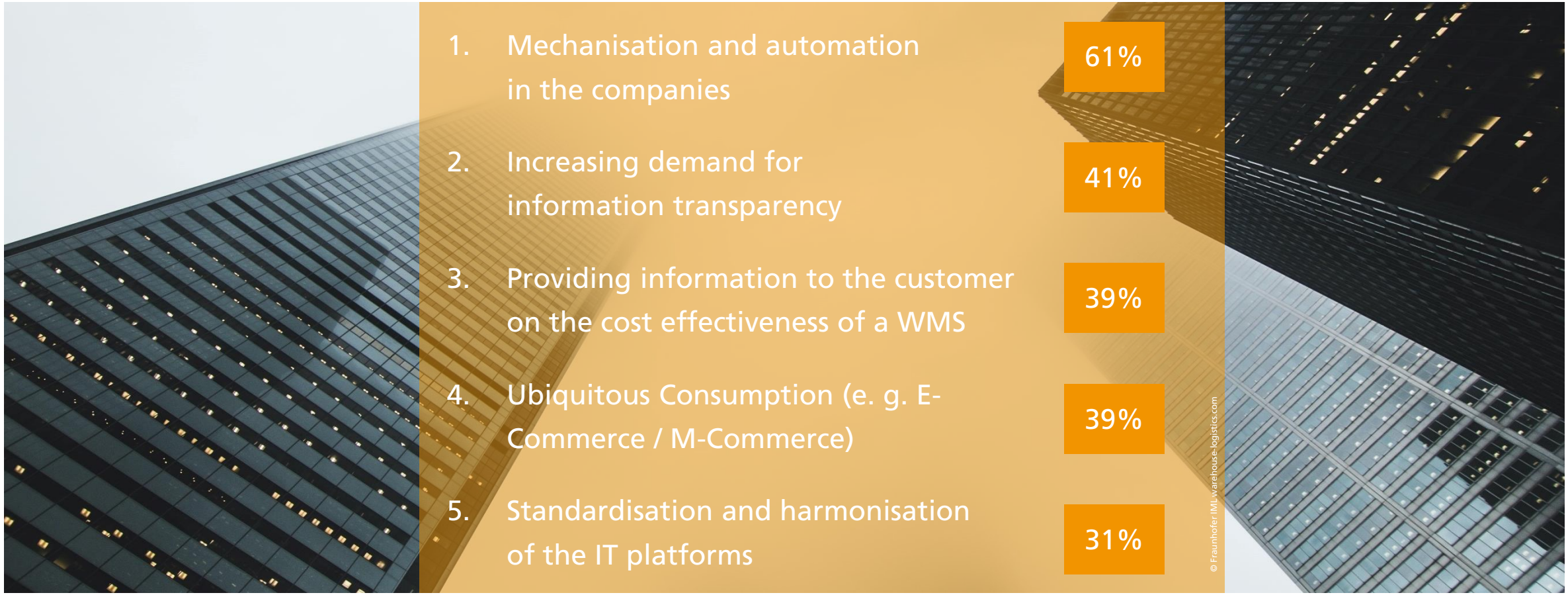
# Top 5 Growth Factors for the WMS Market




The given data is based on the statements of the WMS providers



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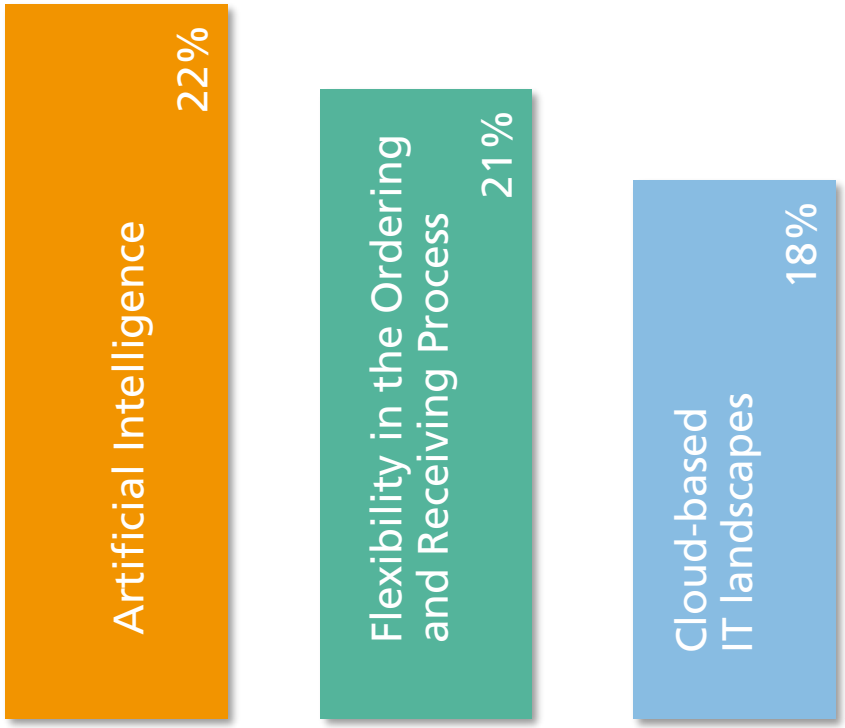
# Cloud Solutions - Trend and Success Factor

## Development Trends in the WMS Market under Consideration of the next 4 Years

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## Success Factor of WMS: Availability in the Cloud

**22%**

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Cloud-based IT system landscapes are with 18% among the top three development trends in the WMS market over the next 4 years. 22% of the listed providers count the availability in the cloud among the success factors of their WMS.

The given data is based on the statements of the WMS providers offering a validated cloud solution.



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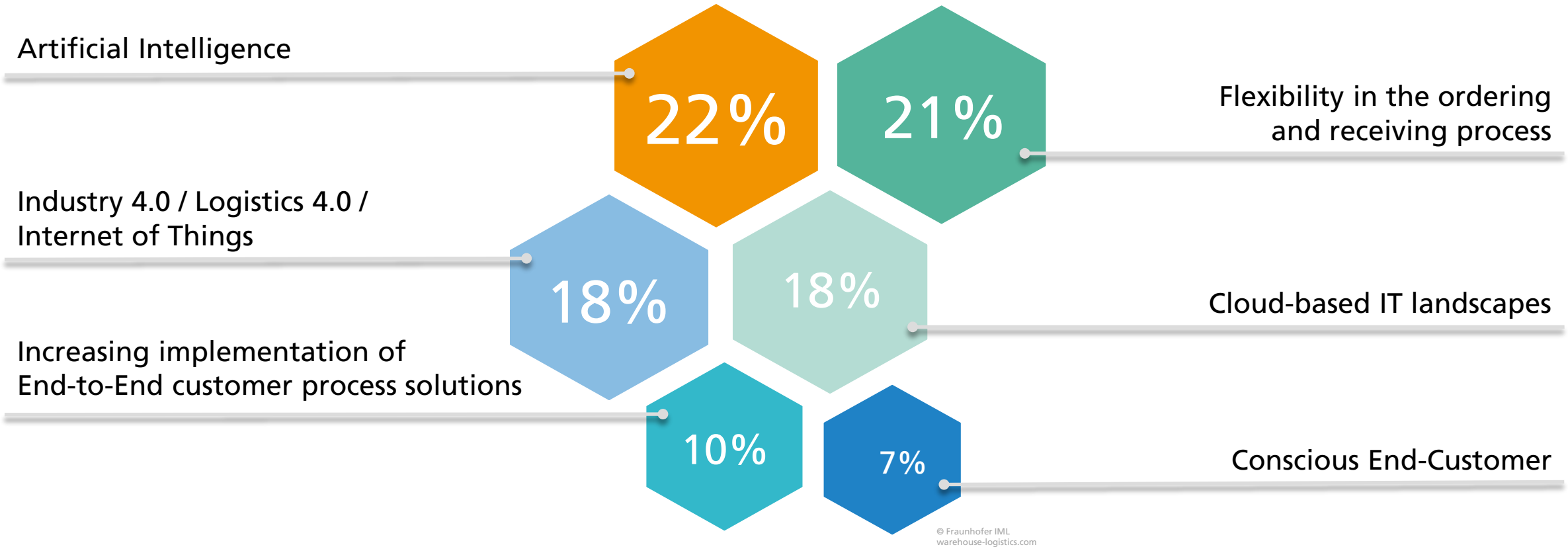
# Development Trends in the WMS Market

## Consideration of the Upcoming 4 Years




The given data is based on the statements of the WMS providers.



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# Conclusion »The WMS Market«

## Provider types

The share of suite providers is steadily increasing, so that more than half of the WMS providers already consider themselves suite providers and are focusing on expanding their product portfolio to include complementary logistics IT systems.

## Employees

While the number of employees in the WMS sector remains constant in smaller companies, it is growing continuously in medium-sized and large companies.

The role of consultants as logistics and process experts is becoming more and more important, so that the number has already grown to the share of developers.

## Growth factors

The standardisation / harmonisation of IT platforms as well as the increasing process and product complexity is gaining relevance as a growth factor for the WMS industry.

## Expertise

Logistics & process know-how has proven to be the greatest success factor for the majority of WMS providers.

Almost three quarters of the WMS providers have at least 20 years of market presence and use this expertise to expand functionalities and develop complementary IT systems.

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# THE STANDARD WMS

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Definition · Plane Model of System Landscape · Functional Scope · Popular Functionalities · Development Focus · Budget · Software · Licensing Models · Strenghts of WMS



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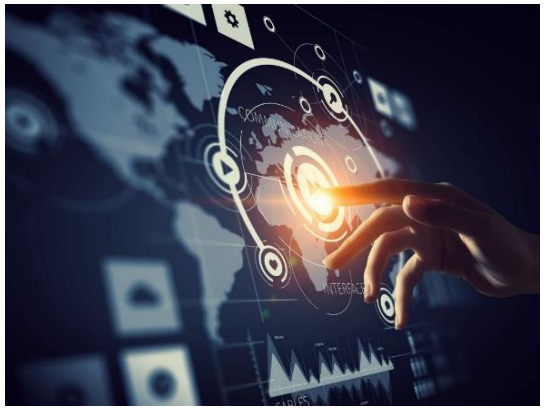
# Definition and Demarcation

## Warehouse Management System (WMS)

Warehouse management is the general term for the management, control and optimisation of storage and distribution systems. In addition to the elementary functions of a warehouse management system, which include quantity and storage location management as well as conveyor control and disposition, the scope of services of a warehouse management system includes

- methods and means for controlling system statuses and
- a selection of operating and optimisation strategies.

The task of a WMS is to manage and optimise intra-company storage systems.



Definition according to VDI guideline 3601 - Warehouse Management Systems (2015).



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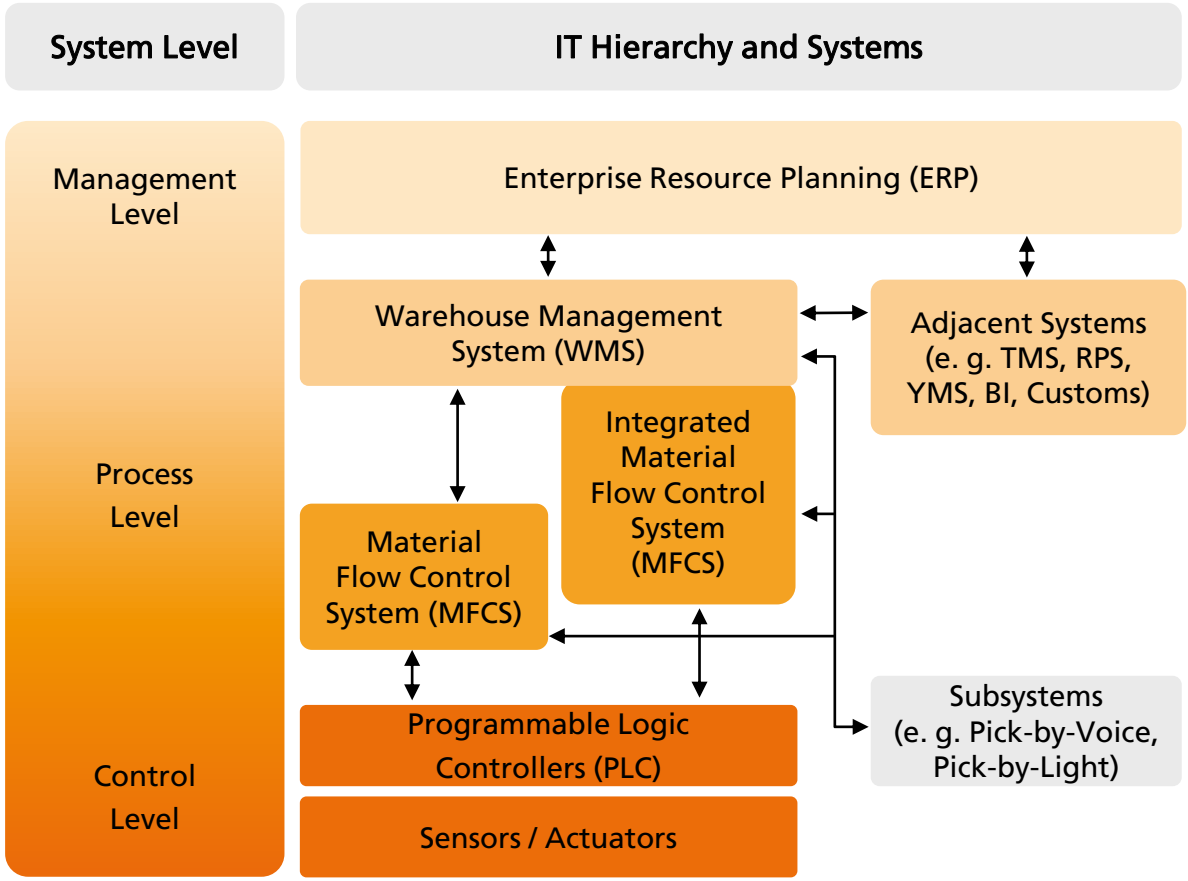
# Plane Model of System Landscape




Tasks per System Level

- Management, Planning, Disposition (Company)
- Process Control, Control, Optimisation (Warehouse)
- Identification, Handling, Transport (Warehouse)

As part of the corporate system landscape, the WMS communicates with adjacent systems via interfaces (cf. plane model according to VDI Guideline 3601).

The management level includes among others finance and accounting, human resources, master data and inventory management.

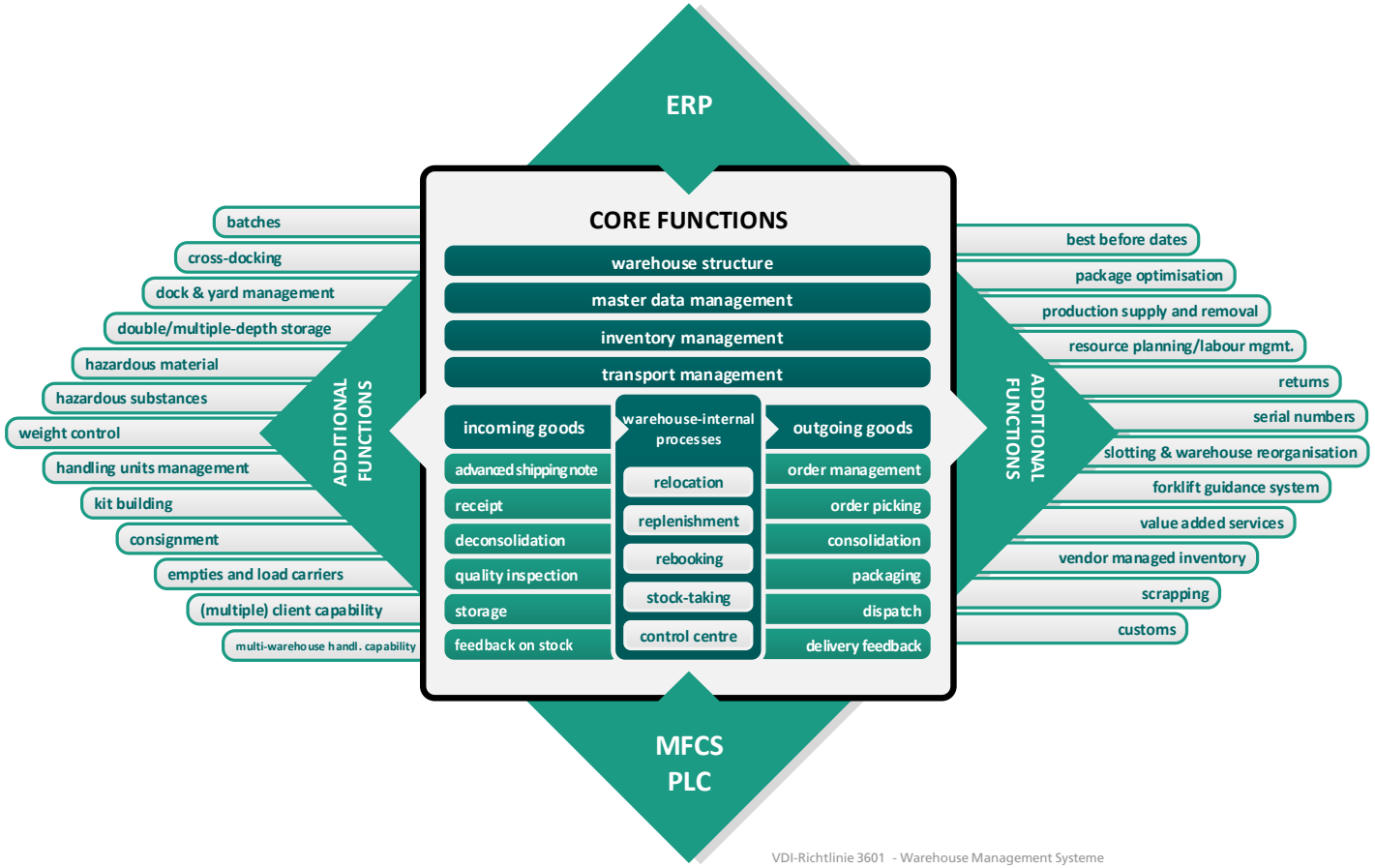
The process level deals with the warehouse structure, the internal transport management and the support of the processes from incoming goods to outgoing goods. Master data and inventory management is limited to the intralogistics area.

The control level deals with data acquisition and transfer as well as the execution of material movements.

Mapping according to VDI Guideline 3601 – Warehouse Management Systems (2015).

# Functional Scope of a WMS

## Core and Additional Functions




VDI-Richtlinie 3601 - Warehouse Management Systeme

Mapping according to VDI Guideline 3601 – Warehouse Management Systems (2015).



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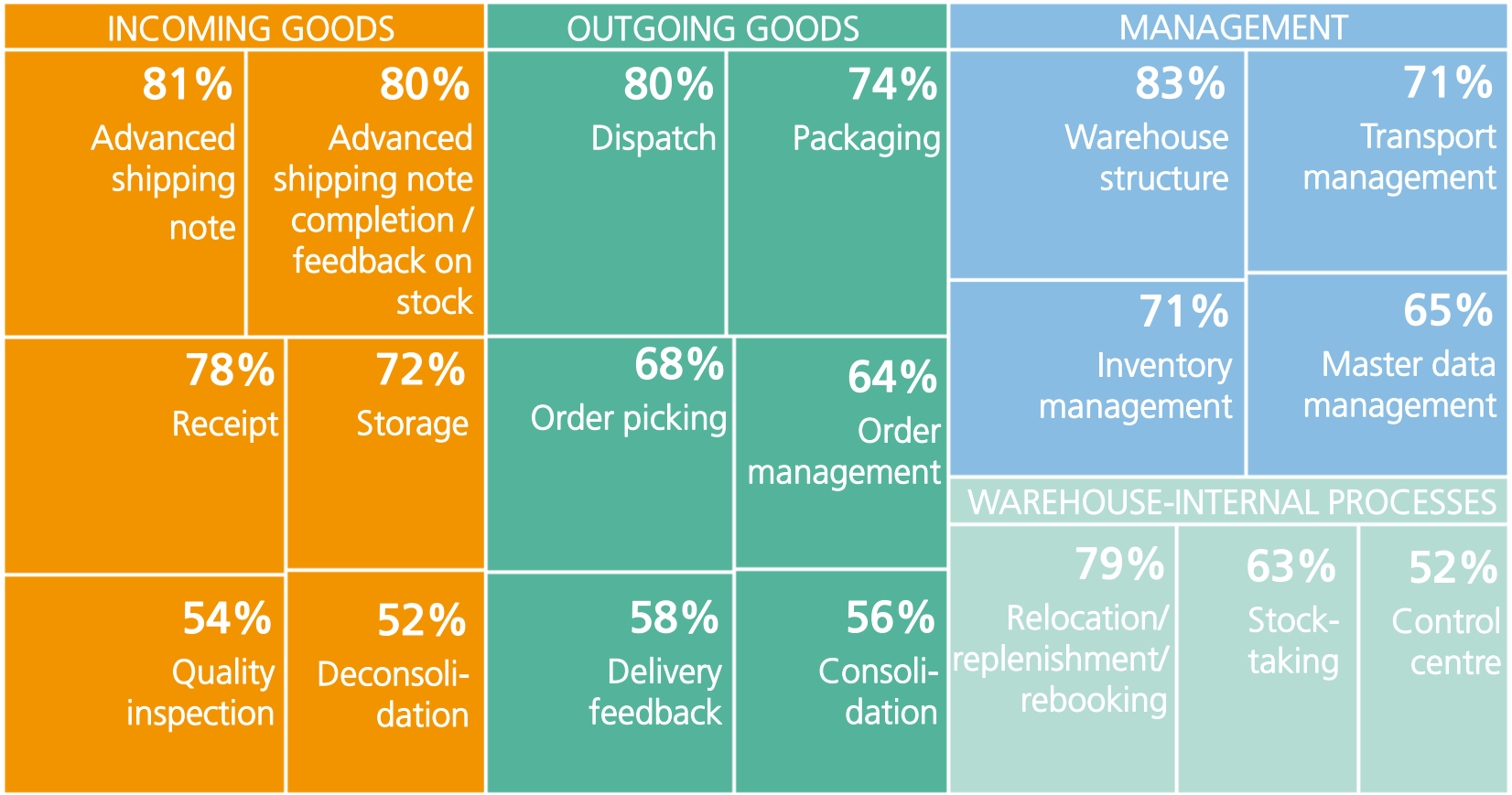
# Core Functions of a WMS

## Average Degree of Functional Performance of the Listed Systems

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### Top 4 developments compared to 2020

+ 7% Delivery feedback

+ 7% Deconsolidation

+ 3% Warehouse structure

+ 3% Transport management

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Data for 2020 is taken from the WMS Market Report Compact 2020.
The data has been determined using the »Logistics IT Online Selection«, which is based on the validated values of 2022.



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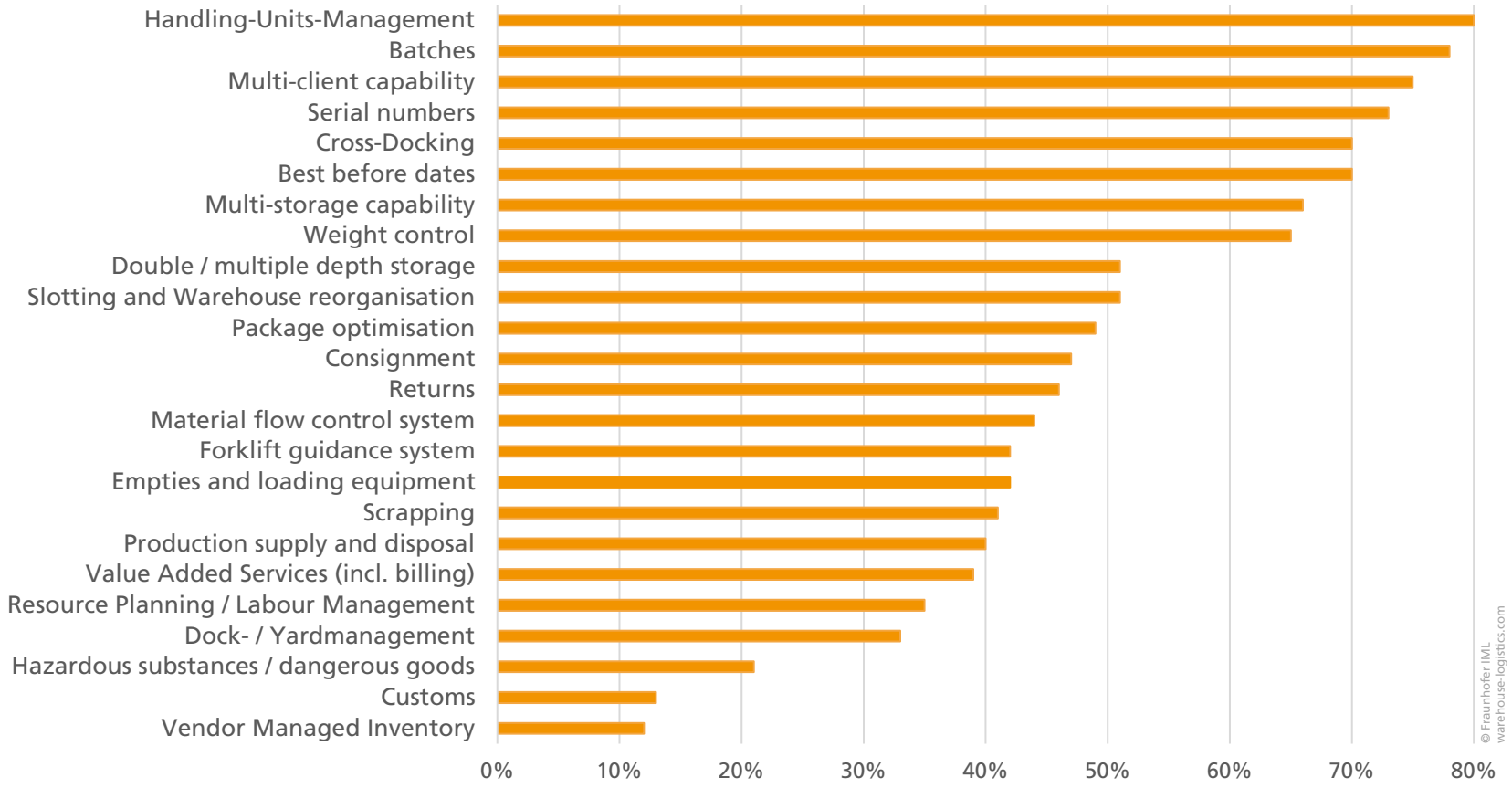
# Additional Functions of a WMS

## Average Degree of Functional Performance of the Listed Systems




Additional functions supplement the core functions depending on individual process requirements and can be developed in varying degrees of detail for each WMS. Some additional functions are popular requirements and are therefore already extensively developed by the WMS providers. However, if more distinctive expertise or functionalities are required, it is advisable to consider specialised logistics IT systems as a supplement to the WMS, which are connected via an interface within the IT system landscape.

Additional functions that have gained particular relevance since 2020 are package optimisation with +10% and material flow control with +6%, as well as slotting and warehouse re-organisation with +6%.

The data for 2020 is taken from the WMS Market Report Compact 2020.
The data has been determined using the »Logistics IT Online Selection«, which is based on the validated values of 2022.



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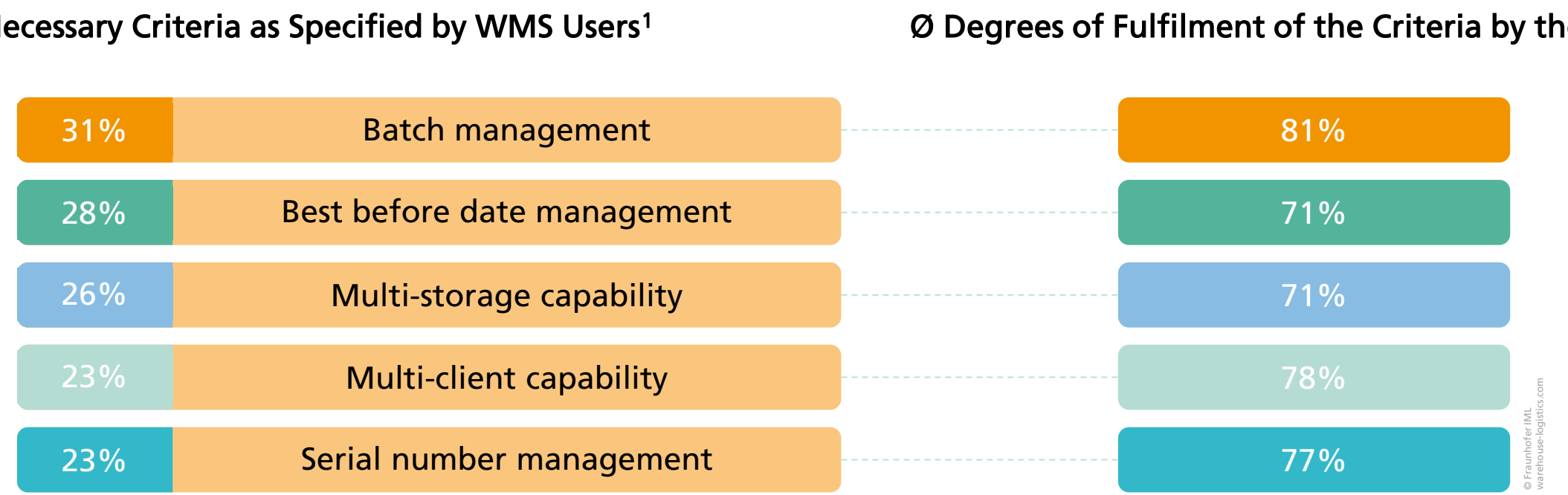
# Benchmarking Supply and Demand

Top 5 of the most Requested K.O. Criteria from the »Logistics IT Online Selection« in the WMS system group




The overview lists the K.O. criteria most frequently selected by WMS users in the »Logistics IT Online Selection« and compares this information with the functional fulfilment levels of the listed WMS. Compared to 2020, these are still the same five most requested K.O. criteria. The fulfilment levels of multi-warehouse capability and serial number management have grown the most, with an increase of +6% each.

1 The given data is based on the information of 179 WMS users of the »Logistics IT Online Selection«.
2 The data has been determined using the »Logistics IT Online Selection«, which is based on the validated values of 2022.



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# Benchmarking Supply and Demand

## Top Values when Using the»Logistics-IT Online Selection« in the WMS system group

| | Fulfilment by Validated Systems[2] | Selection through WMS Users[1] |
|---|---|---|
| **Mapping of a Batch Management** | 100% | Top Value 31% |
| **Support of a Multi-storage Capability** | 95% | Top Value 26% |

Batch management was indicated as a K.O. criterion in the "Logistics IT online selection" by 31% of the WMS users. Basic functionalities are offered by all listed WMS. Batch management is primarily related to the legally required traceability of stock-separating batches. The features of batch management can vary among the WMS providers.

26% of WMS providers consider multi-storage capability, which is already supported by 95% of WMS, as a fundamental functionality. Multi-storage capability refers to the support of at least two geographically and organisationally separate storage locations by a WMS. The ability to display a stock overview per location and an overview of the total stock of all locations as well as to carry out replenishment or consolidation between the individual locations is important.

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1 The given data is based on the information of 179 WMS users of the »Logistics IT Online Selection«.
2 The data has been determined using the »Logistics IT Online Selection«, which is based on the validated values of 2022.



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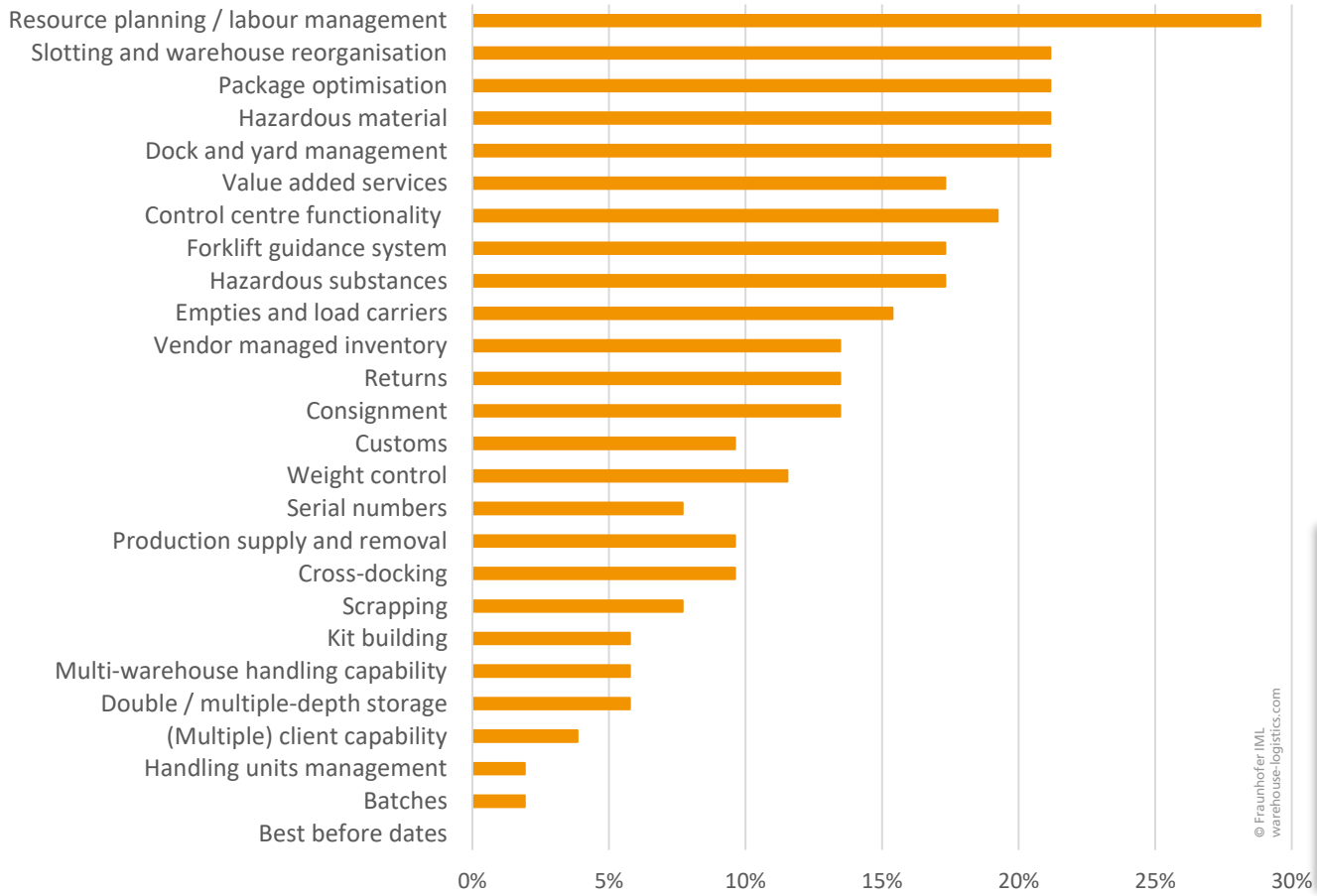
# Functional Development Focus

## Project Already Started or Concretely Planned for the Upcoming 4 Years




### Percentage Change of the Top 3 Development Priorities since 2020

| | |
|---|---|
| **-2%** | Resource planning / labour management |
| **-2%** | Slotting and warehouse reorganisation |
| **+1%** | Package optimisation |

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Resource planning and slotting remain, despite a small percentage decrease of -2% each, as one of the most important success factors for WMS providers. Nearly 29% of WMS providers having already started or planning projects in the field of resource management. In addition, package optimisation has become more relevant in the last two years. The management of best before dates is fulfilled by all systems and therefore no development focus of WMS providers.

The given data is based on the statements of the WMS providers.
The comparative data for 2020 is taken from the WMS Market Report Compact 2020..



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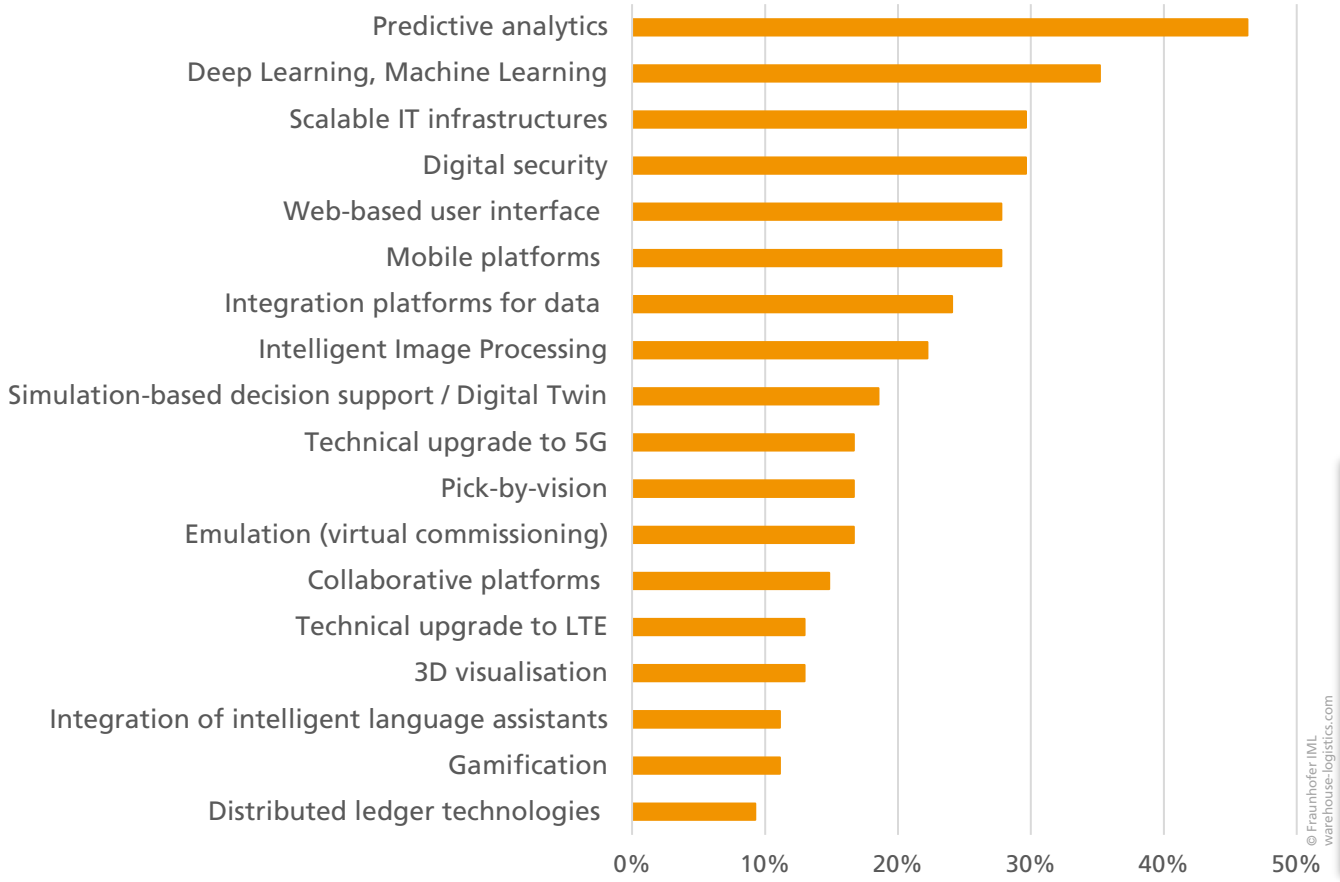
# Technological Development Focus

## Project Already Started or Concretely Planned for the Upcoming 4 Years




### Percentage Change of the Top 3 Development Priorities since 2020

**+5%** Predictive Analytics

**+4%** Scalable IT infrastructure

**+1%** Deep Learning, Machine Learning

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In the field of predictive analytics as a development focus, there has been an increase of +5% since 2020. More than 45% of providers have already started a project in this area or have concrete plans to do so. Scalable IT infrastructures and digital security are becoming more of a focus for WMS providers. In the WMS industry, the importance of predictive analytics as well as deep learning and machine learning as part of artificial intelligence continues to increase. The management of best-before dates is fulfilled by all systems, hence none of the providers defines this as a development focus.

The given data is based on the statements of the WMS providers.
The comparative data for 2020 is taken from the WMS Market Report Compact 2020.



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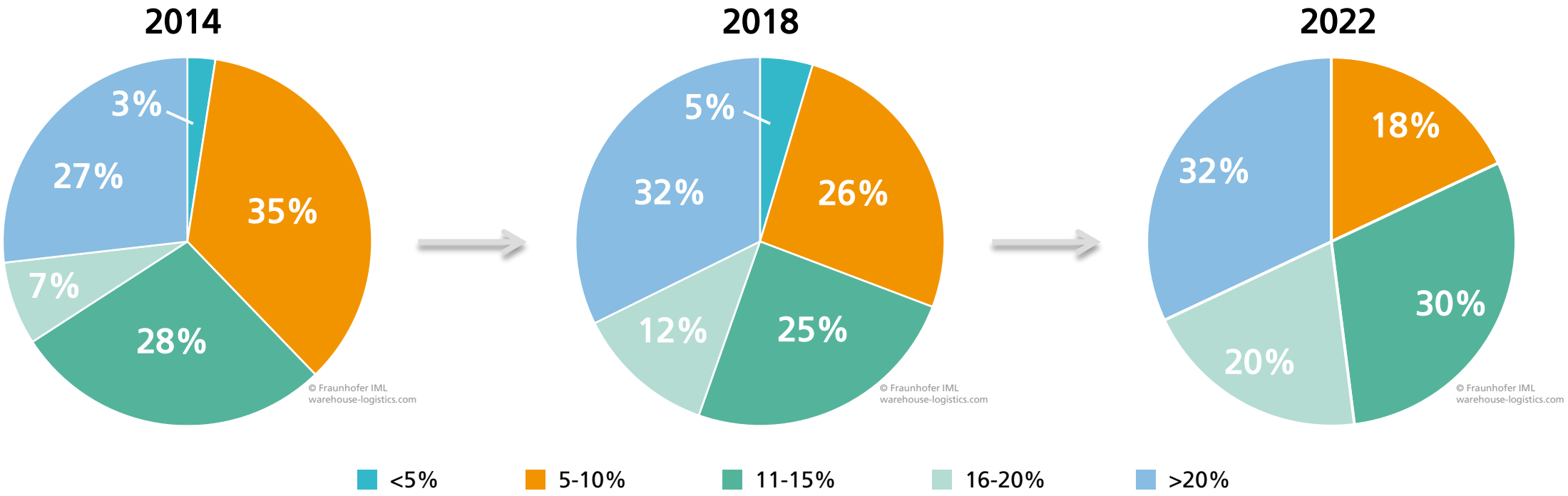
# Development Budget

## Annual Effort for Further Development of the WMS




The percentage figures represent the annual expenditure of the WMS providers for the further development of their systems in relation to their annual turnover in the WMS area. Since 2020, all WMS providers have been investing at least 5% of their turnover in further development. In 2022, the investment budgets of half of the WMS providers will amount to 11-20% of their turnover.

The given data is based on the statements of the WMS providers.
The data for 2014 and 2018 is taken from the WMS Market Report Compact 2020.



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# Standard software vs. Individual software

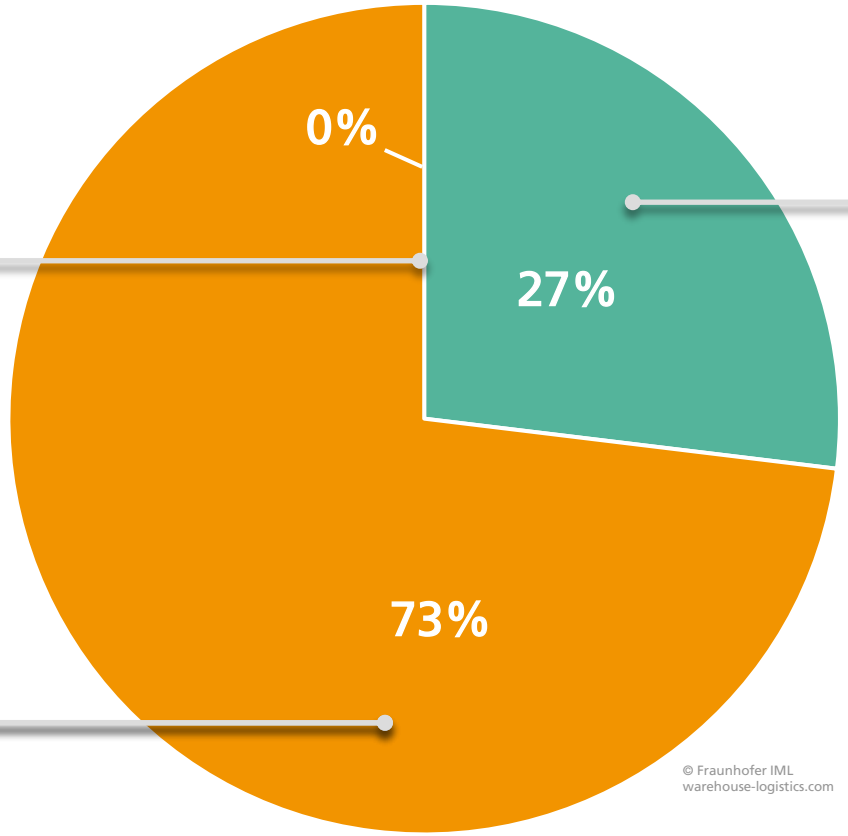
## Assessments of the Degree of Standardisation of WMS Providers

### Individual software

Large proportion of customisation, low coverage above standard (~ 80/20)

### Standard software

Small part of client specific customisation , basically coverage by software standard (~ 20/80)




### Individual standard WMS

Share of customisation and coverage above standard is roughly balanced (~50/50)

Almost three quarters of the WMS providers define their WMS as standard software. The standard software includes the mapping of a high variance of process characteristics without programming-side, customer-specific adaptation. Customer requirements can be balanced by flexible adaptation with the help of parameterisation and a further developed range of functions. In addition, standard software often offers best practice processes, so that the customer's process design can be partially adapted to the processes. None of the WMS providers classify their systems as individual software.

The given data is based on the statements of the WMS providers.



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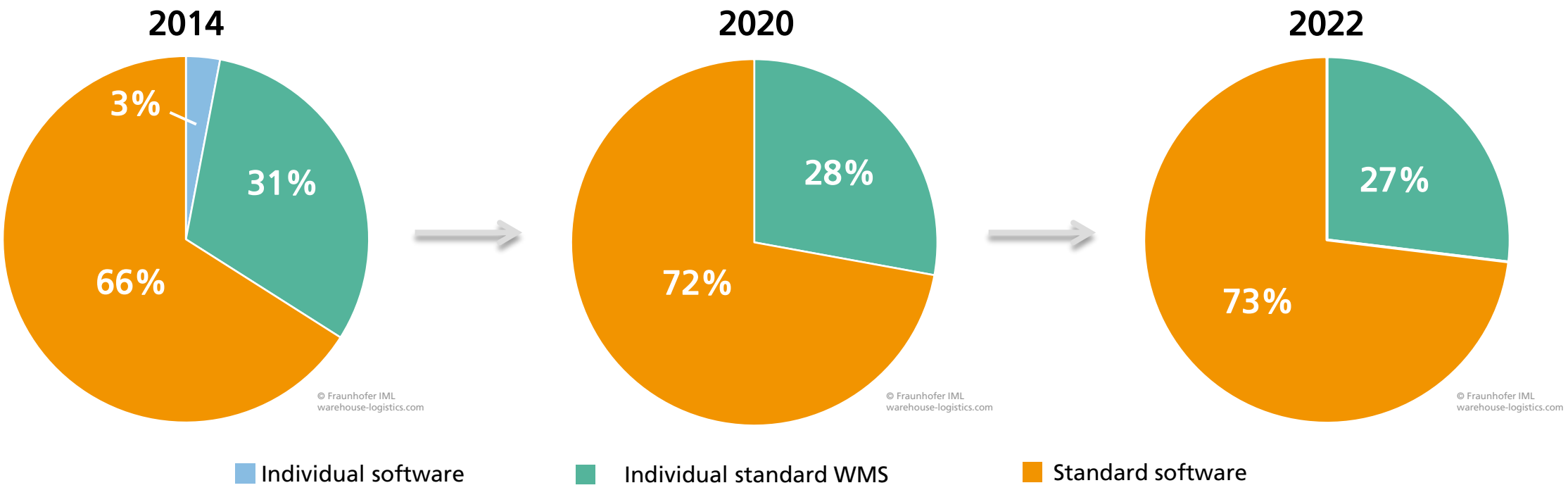
# Developments in the Area of Standard Software




Since 2020, all WMS providers define their system either as standard software or as an individual standard WMS. Almost three quarters focus on a standard product with extensive functionalities. Project-specific programming and customer-specific adaptations can increasingly be carried out via parameterisation and customising due to the high level of functionality in many systems.

The given data is based on the statements of the WMS providers.
The data for 2014 and 2020 is taken from the WMS Market Report Compact 2020.



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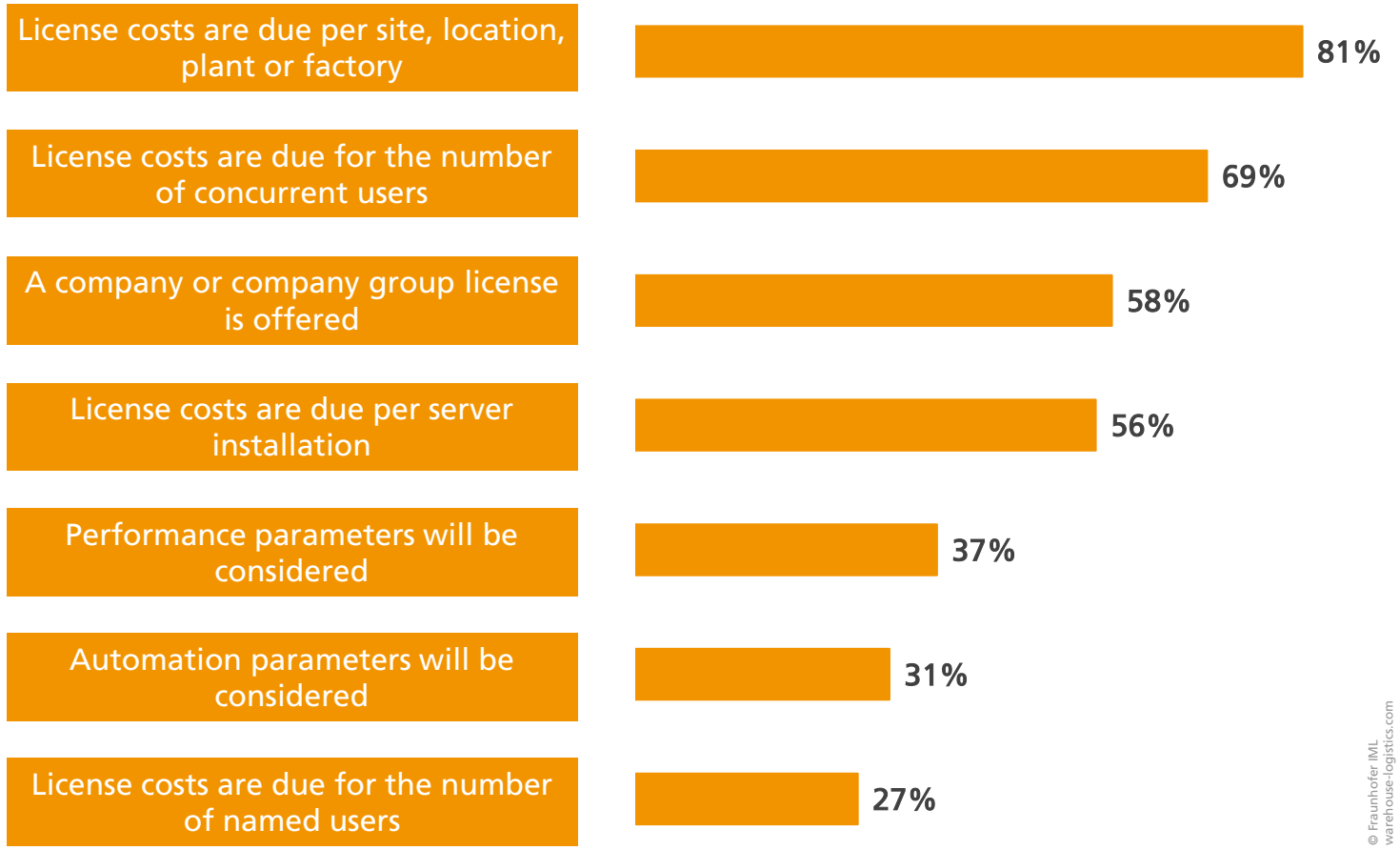
# Licensing Models of WMS Providers

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## Explanation of Licensing Models

**Concurrent User:**
This license model specifies the maximum number of users allowed to access the WMS at the same time.

**Named User:**
This license model specifies the number of users who are allowed to access the WMS with a registered, named access.

**Performance Parameters:**
In this license model, licensing is based on performance parameters, such as the number of order items, delivery positions, picks, cartons, etc.

The given data is based on the statements of the WMS providers.



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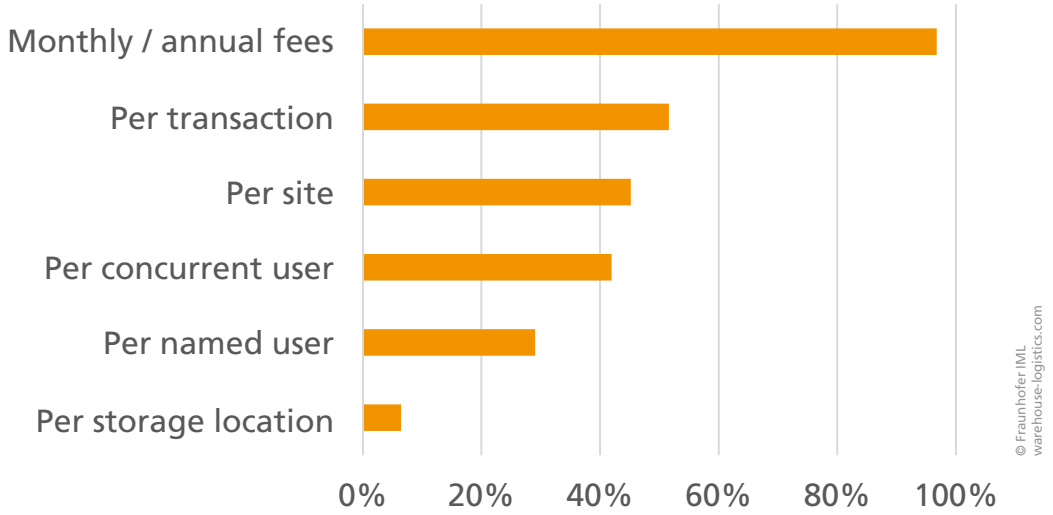
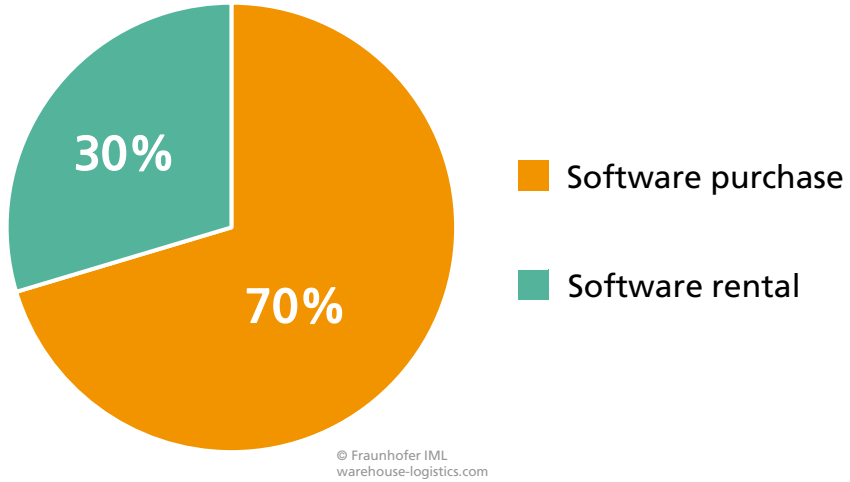
# Licensing Models of Cloud Solutions

## Licensing Models offered for Cloud Solutions of WMS Providers with Cloud Solutions




## Revenue share of business or licensing models of WMS providers with cloud solutions




WMS providers of cloud solutions offer different cost models. In almost all models, monthly or annual costs are charged. These can be calculated from various performance parameters. A common factor is the number of transactions as the basis for calculating costs. Less common is the calculation according to the number of storage locations. Almost one third of the total turnover in the WMS sector is generated by WMS providers offering a cloud solution in their portfolio with the purchase of software. Only 30% of the turnover is generated by providers with their rent.

The given data is based on the statements of the WMS providers offering a validated cloud solution.



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# The Strongest Aspects of WMS

## Top 5 Strengths of their own WMS from the Perspective of WMS Providers

1. Great functional range in standard package
2. Integration of automation technology
3. Easy adaptability
4. Possibility to individually supply of customer specific requirements
5. Usability / ergonomics

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The given data is based on the statements of the WMS providers.



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# Conclusion »The Standard WMS«

## Scope of functions

When choosing the right WMS, both functional and non-functional requirements are important. Especially in the functional area, there are criteria that are mandatory. The comparison of the most requested K.O. criteria and the degree of fulfilment by WMS has shown that there is a high coverage on the market.

## Software

Similar to the data from two years ago, no WMS provider classifies its system in the category of individual software.

Due to the expansion of the range of functions in recent years, standard software systems now have a large repertoire of functions, which reduces the share of customisation.

## Success factors

Offering a wide range of functions in the standard can thus be served by continuously transferring functionalities into the standard and is rated as the greatest success factor.

## Development focus

Predictive analytics, deep learning and scalable IT infrastructures are the main focus areas for planned or ongoing technological developments. In terms of functional development priorities, human resource planning and slotting have declined slightly, but are still among the core topics.

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# THE WMS-PROJEKT

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Project Distribution · Level of Automation · Logistics Sites· Installations · Time Frame & Costs · Storage Technologies · Cloud Solutions · Server Operating Systems · Sector Focus · Chances & Challenges · Selection Criteria



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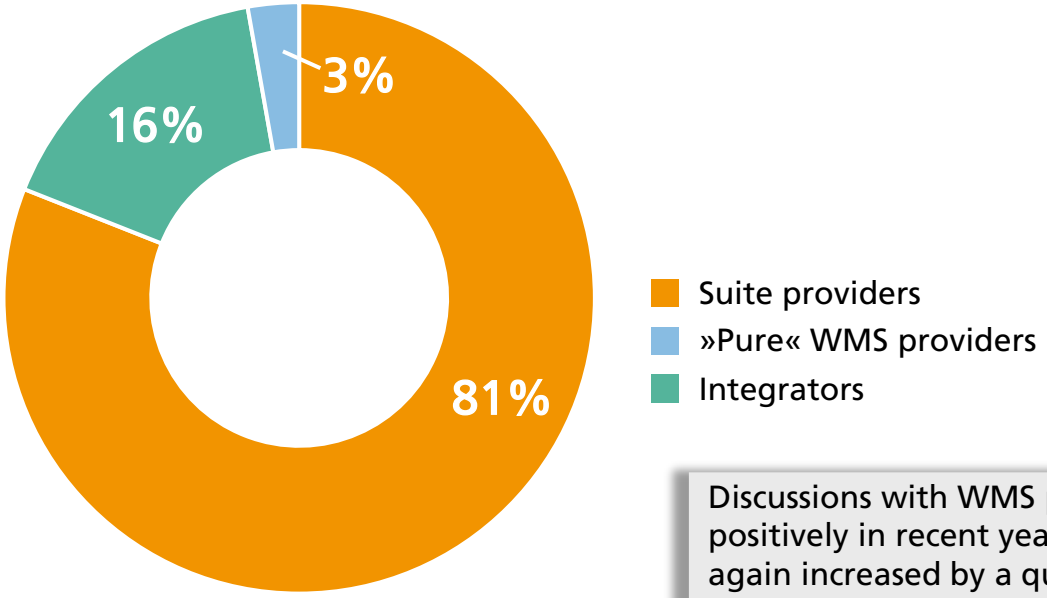
# Number and Distribution of WMS Projects

## Percentage Distribution of WMS Projects to WMS Provider Types in 2021

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**2.468**

WMS projects in 2021
realised by 52 WMS providers

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## Ø Number of Projects per Provider in 2021

74 | 31 | 6

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Discussions with WMS providers show that the demand situation for providers has developed positively in recent years. This is also confirmed by the absolute number of WMS projects, which has again increased by a quarter compared to 2020. With an average of 74 projects per provider and a share of 81% of all WMS projects, most projects are carried out by suite providers. A lower number of projects can be seen in particular among »pure« WMS providers with 3%. The shift can be explained, among other things, by the development of the provider types.

The given data is based on the statements of the WMS providers.



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# Customer Structure of WMS Provider

## Distribution of Customer Projects according to the Project Type

### REPLACEMENTS

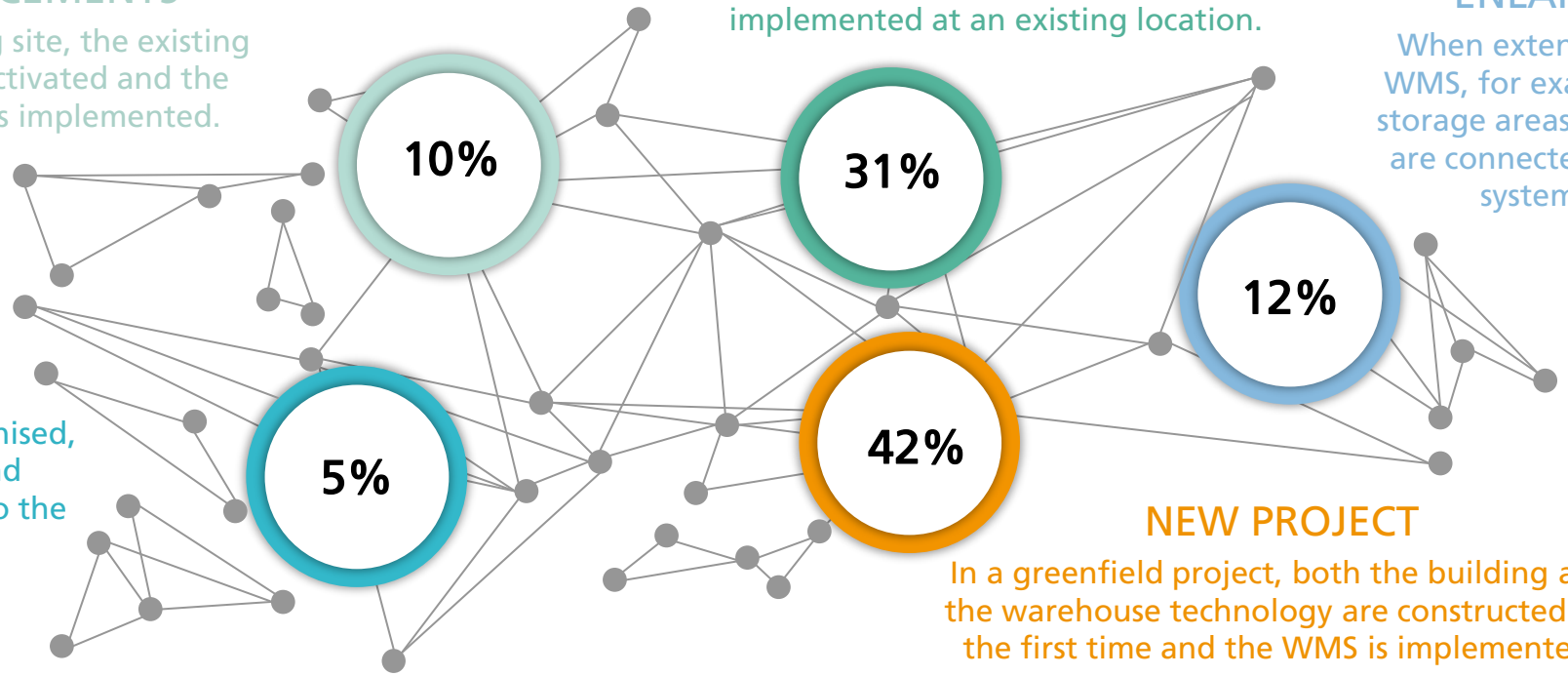
At an existing site, the existing WMS is deactivated and the new WMS is implemented.

### FIRST INTRODUCTION

For the first time a WMS is implemented at an existing location.

### ENLARGEMENT

When extending an existing WMS, for example, additional storage areas or functionalities are connected to the existing system structure.




### RETROFIT

The existing WMS is modernised, with the connections and interfaces being adapted to the system.

### NEW PROJECT

In a greenfield project, both the building and the warehouse technology are constructed for the first time and the WMS is implemented.

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The given data is based on the values of »WMS Reference Projects«.



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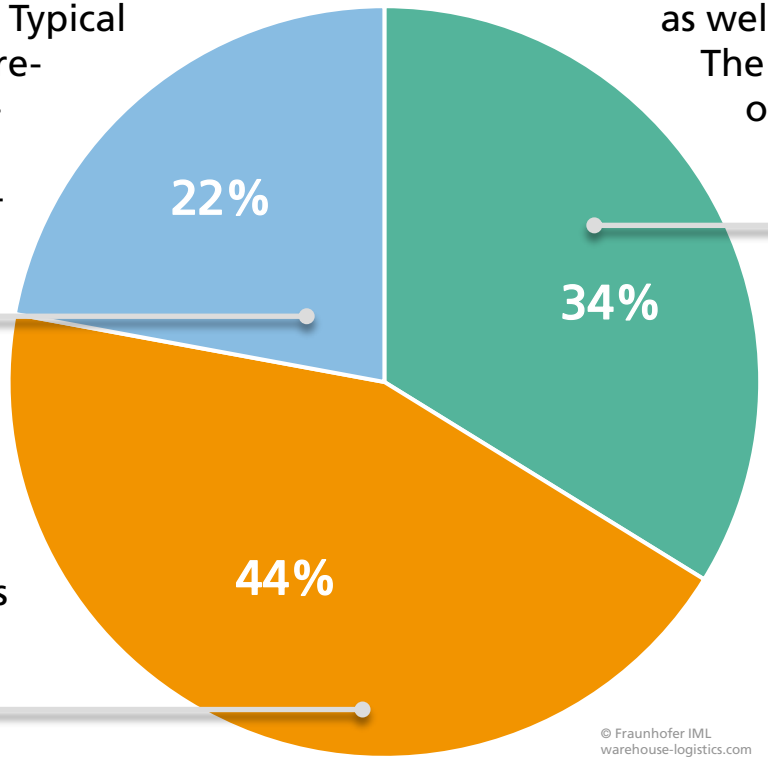
# Level of Automation

## Distribution of Customer Projects according to the Level of Automation

A fully automated warehouse is characterised by the use of automated storage and conveyor technology. Typical storage systems are automatic small parts warehouses (ASPW) and automatic high-bay warehouses. Here, the goods are transported to the employee by means of automated conveyor technology. Picking is carried out according to the goods-to-person principle.

In the manual warehouse, shelving and pallet racks as well as floor block storage are traditionally used. The goods are stored and retrieved with the help of employee-operated industrial trucks such as forklift trucks. Order picking is carried out according to the person-to-goods principle.




The majority of WMS projects involve semi automated warehouses. Semi automated warehouses consist of a combination of individual automated sections (e. g. miniload) and manual storage areas (e. g. pallet rack warehouse).

The graphic shows a current overview of the completed WMS projects at customers with regard to the degree of automation in the warehouse. Through the combination of automated and manual processes, the companies benefit both from an increase in productivity and from a flexible design option for the processes, e.g. in the area of order picking.

The given data is based on the values of »WMS Reference Projects«.



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# Aspects of Logistics Sites in the DACH region

## Use of Logistics IT, Number of Employees and Level of Automation

### Current Use of Logistics IT

**86%** Time Recording Systems

**82%** WMS

**54%** ERP Systems

**29%** BI Systems

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### Planned Use of Logistics IT

**37%** RPS

**25%** WMS

**16%** TMS

**12%** Pick-by-Systems

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### Number of Employees

| up to 100 | up to 500 | up to 2.000 | 2.000+ |
|---|---|---|---|
| 29% | 34% | 31% | 6% |

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### Level of Automation

| manual | semi automated | fully automated |
|---|---|---|
| 48% | 48% | 4% |

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The given data is based on the information of 95 Warehouse Locations in the DACH region.
The data were collected in 2021 for the RPS study (https://www.warehouse-logistics.com/152/de/whitepaper.html#RPS_Studie).



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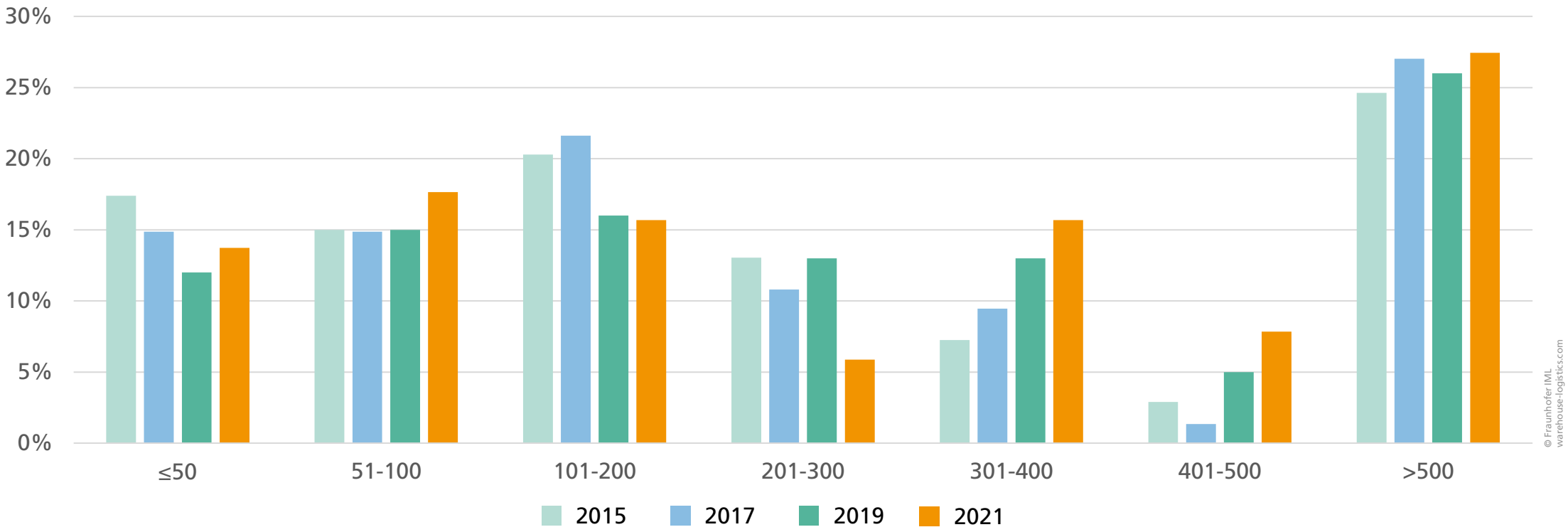
# Extent of WMS Installations

## Number of Users in the Largest Installations of WMS Providers in 2015, 2017, 2019 and 2021




The given data is based on the statements of the WMS providers.
The data for 2015, 2017 and 2019 is taken from the WMS Market Report Compact 2020.



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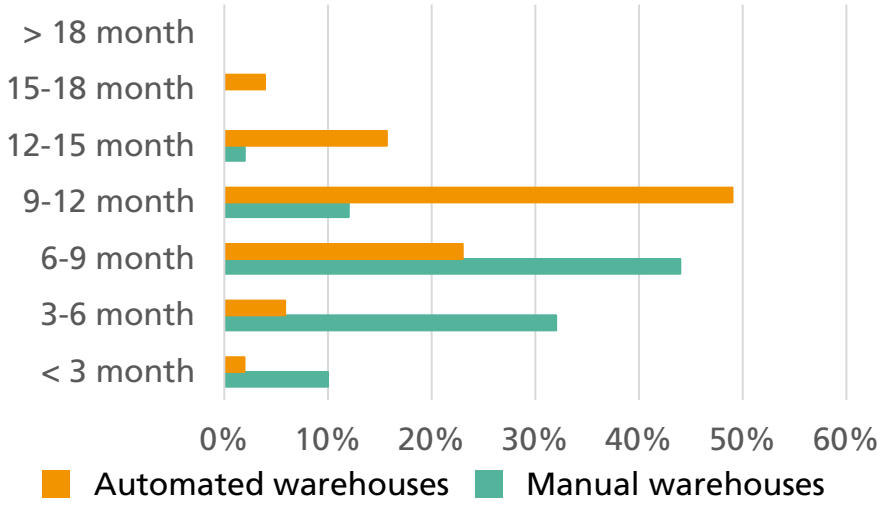
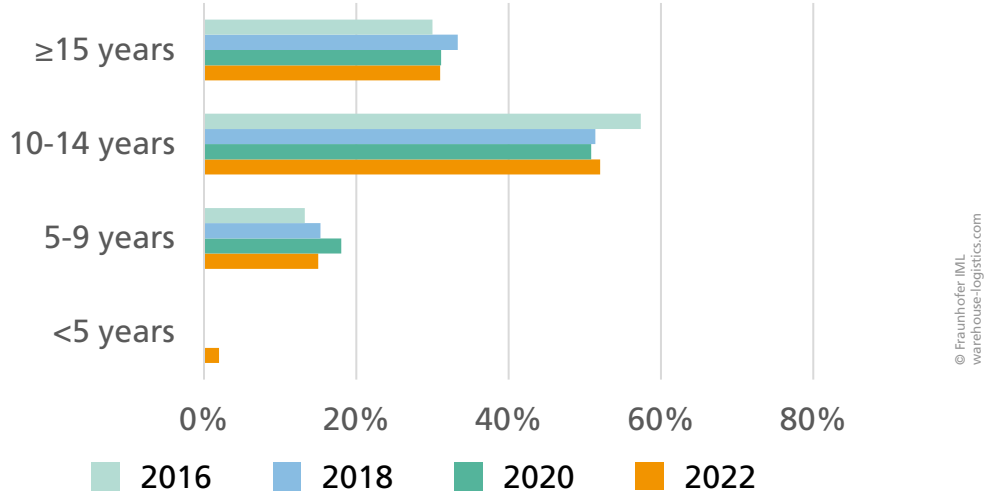
# Time Frame for WMS Projects

## Average Duration of WMS Implementation and Usage

### Ø Duration of a WMS Implementation for Manual and Automated Warehouses for New Customers




### Ø Duration of Use of a WMS according to the WMS Providers




Compared to 2020, a longer project duration can be observed for the WMS implementation in manual warehouses. The majority of WMS providers indicate a timeframe of 6 to 9 months, which has increased by 3 months in the last 2 years. In contrast, almost half of the WMS providers calculate 9 to 12 months for the introduction in automated warehouses. 83% of WMS providers state that the useful life of WMS is at least 10 years. This implies that the selection of a suitable WMS provider enables long-term partnerships.

The given data is based on the statements of the WMS providers.
The data for 2016, 2018 and 2020 is taken from the WMS Market Report Compact 2020.



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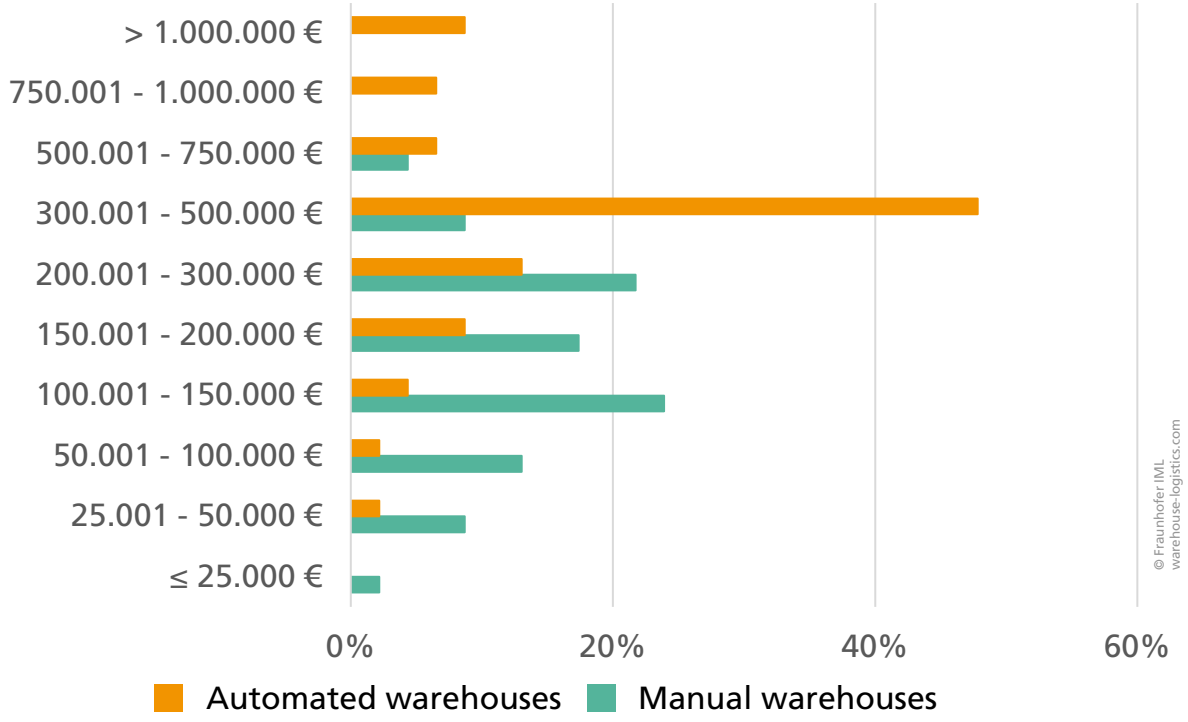
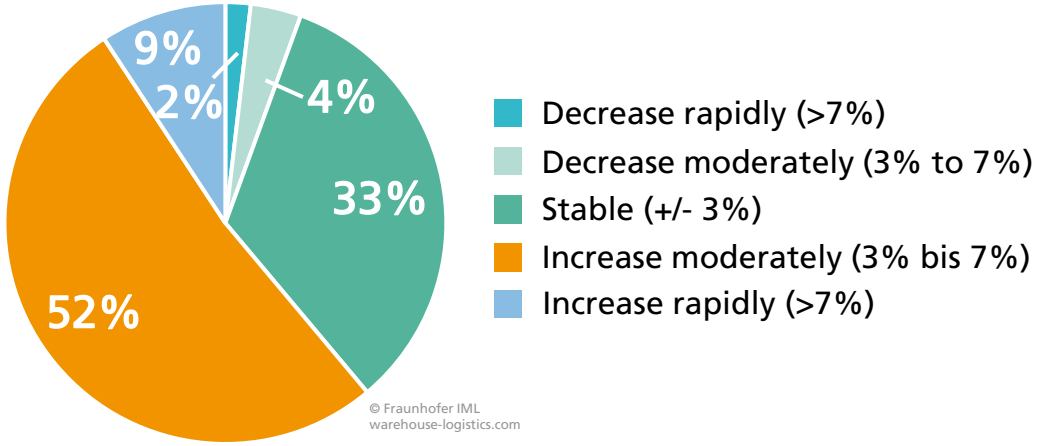
# Costs of a WMS Implementation

## Ø Project Volume with regard to the Level of Automation in the Warehouse according to the WMS Providers




## Expected Annual Price Level Developments over the next 4 years




The average project volume for the realisation of an automated warehouse is 300.000 to 500.000 euros in 48% of the projects. The costs for a manual warehouse vary strongly due to their individual process complexity and usually amount to 100.000 to 300.000 euros. WMS providers expect a moderate to strong increase in price levels over the next four years.

The given data is based on the statements of the WMS providers.



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# Market Differentiating Factors in the Project Experience with the Connection of Warehouse Technologies

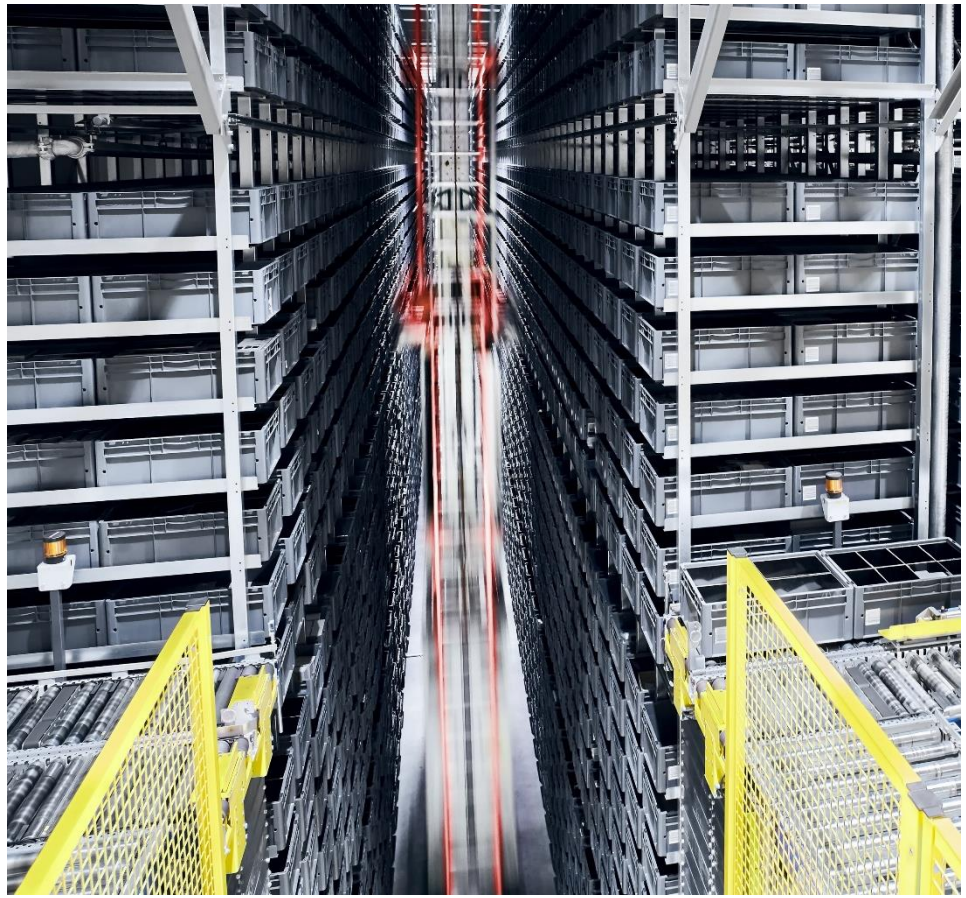
Less than a quarter of WMS providers say they have already implemented a project for **paternoster warehouse / vertical rotary rack**, **storage system with a gallery level** or **parking systems**.

The share of WMS providers that have implemented projects for **silo and mobile racking storage** has increased sharply since 2020, representing two of the top developments.

Over 70% of WMS providers have already executed a project for **automated high-bay and small parts warehouses**, among others.

**Small parts warehouses** continues to be one of the storage technologies that all WMS providers have already implemented projects.

44% of WMS providers say they have already implemented a project for **AutoStore**.



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The given data is based on the statements of the WMS providers
The data for 2020 is taken from the WMS Market Report Compact 2020.



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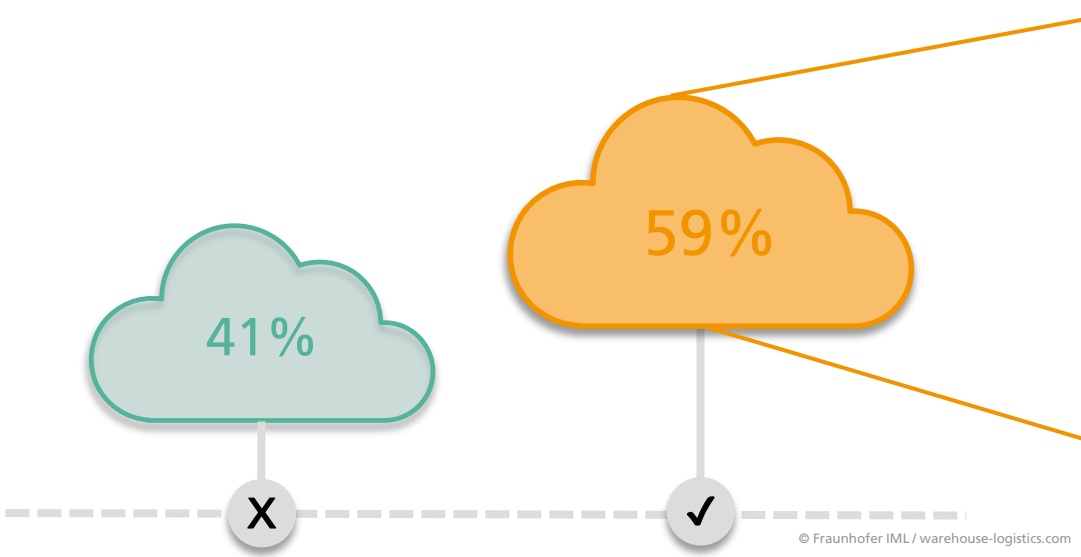
# WMS as Cloud Solution

## Share of WMS Providers who also offer their WMS as a Cloud Solution

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## Offered Architectures of the Cloud Solution

| | |
|---|---|
| **60%** | Single-tenant cloud architecture only |
| **3%** | Multi-tenant cloud architecture only |
| **37%** | Both architectures |

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The range of cloud solutions is increasingly coming into focus in the WMS market. In terms of architectures, single-tenant cloud architectures continue to be offered most frequently. In contrast, the alternative of multi-tenant cloud architecture is rarely represented. Compared to the single-tenant solution, with a multi-tenant architecture several customers work on one system infrastructure. This is maintained and further developed centrally by the WMS provider.

The given data is based on the statements of the WMS providers offering a validated cloud solution.



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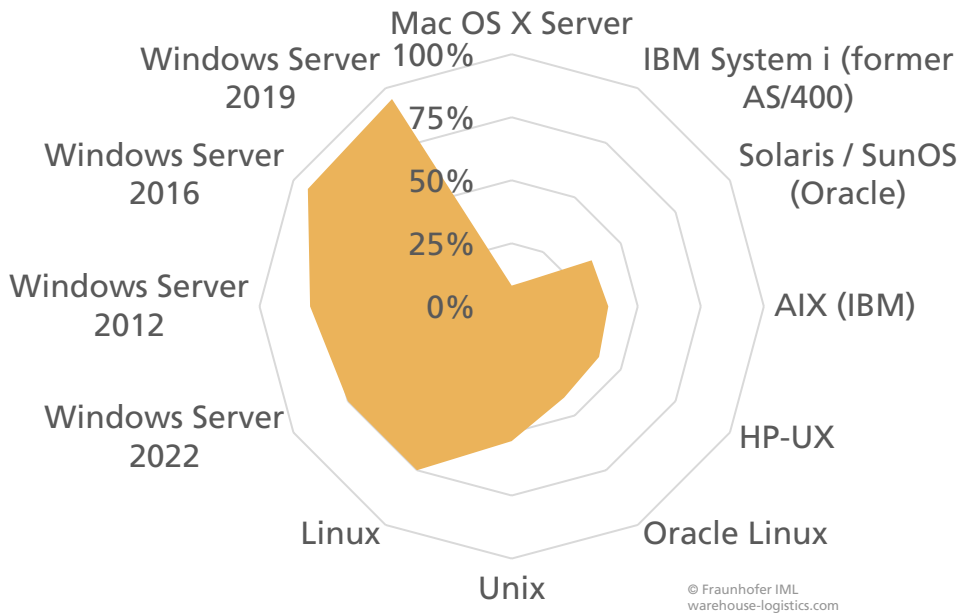
# Server Operating Systems

## Compatibility of WMS with Server Operating Systems according to the WMS Providers




## Top 3 Server Operating Systems used according to WMS Customers

| | |
|---|---|
| **39%** | Windows Server 2012 |
| **22%** | Windows Server 2016 |
| **18%** | Linux |

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The majority of systems are compatible with Windows Servers from 2012 to 2022, according to WMS providers, which includes the most widely used server operating systems, Windows Servers 2012 and 2016.



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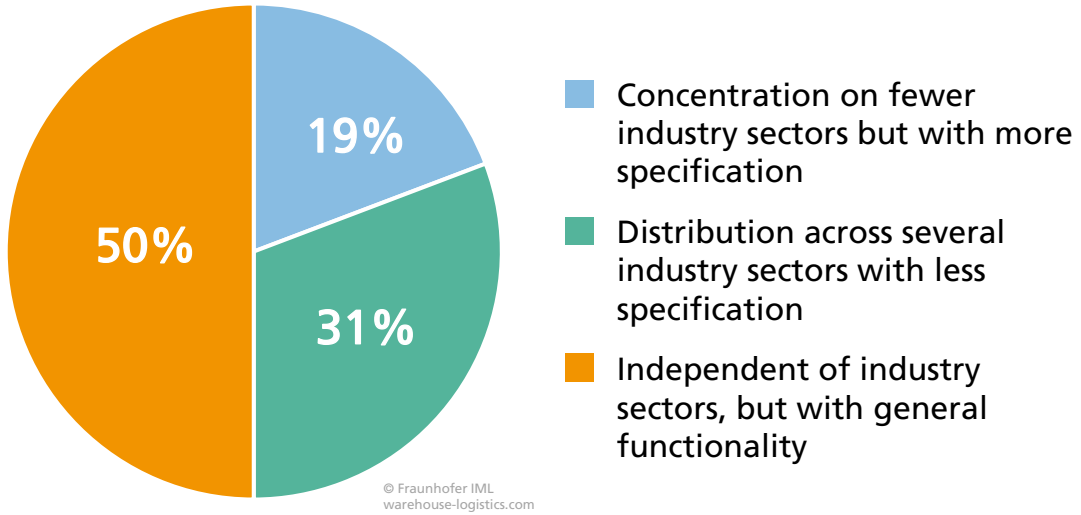
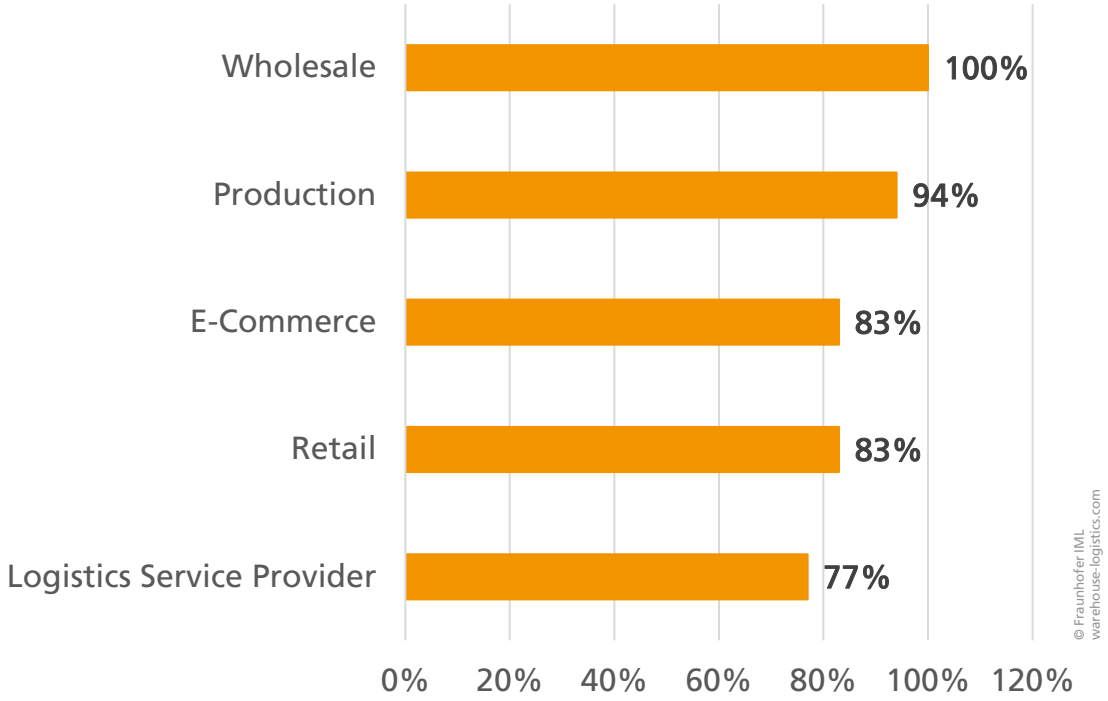
# Sector Focus of WMS Providers

## Strategic Orientation of WMS Providers




## Project Experience in Various Industry Sectors




The given data is based on the statements of the WMS providers.



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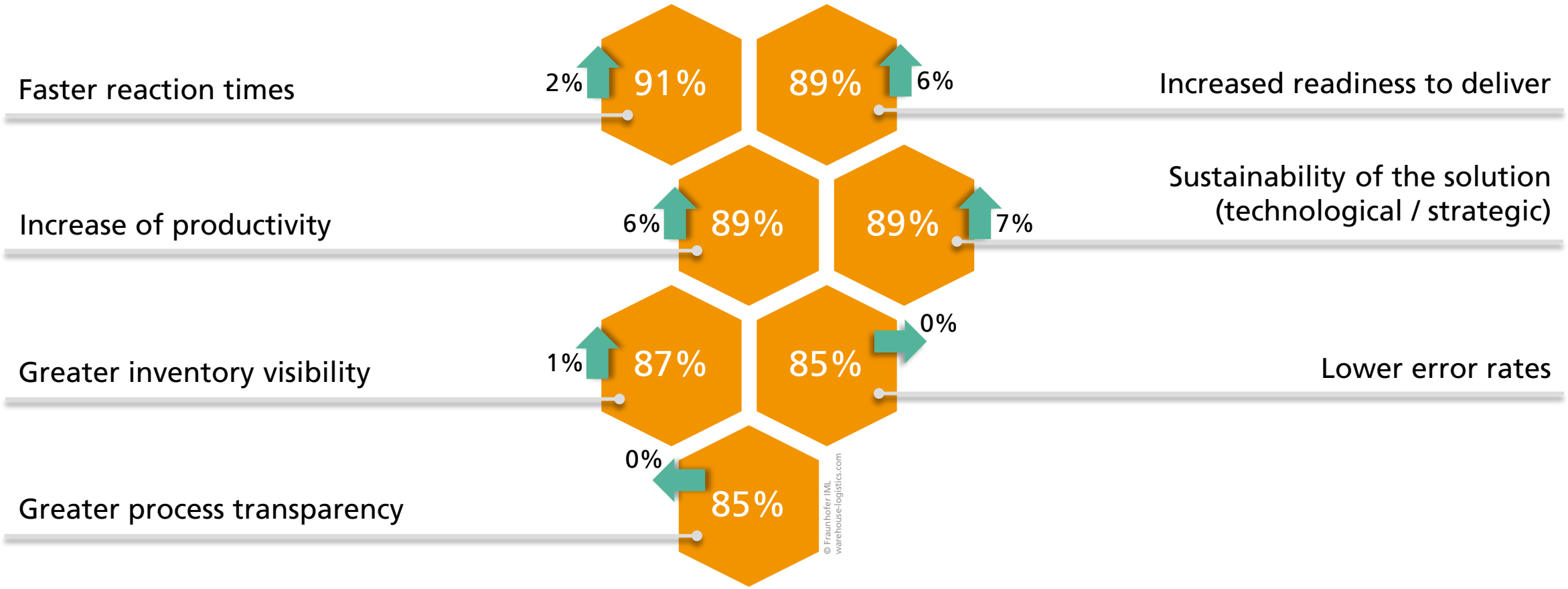
# Goals for the Implementation of a WMS

## Opportunities for the WMS customer




The given data is based on the statements of the WMS providers.
The comparative data for 2020 is taken from the WMS Market Report Compact 2020.



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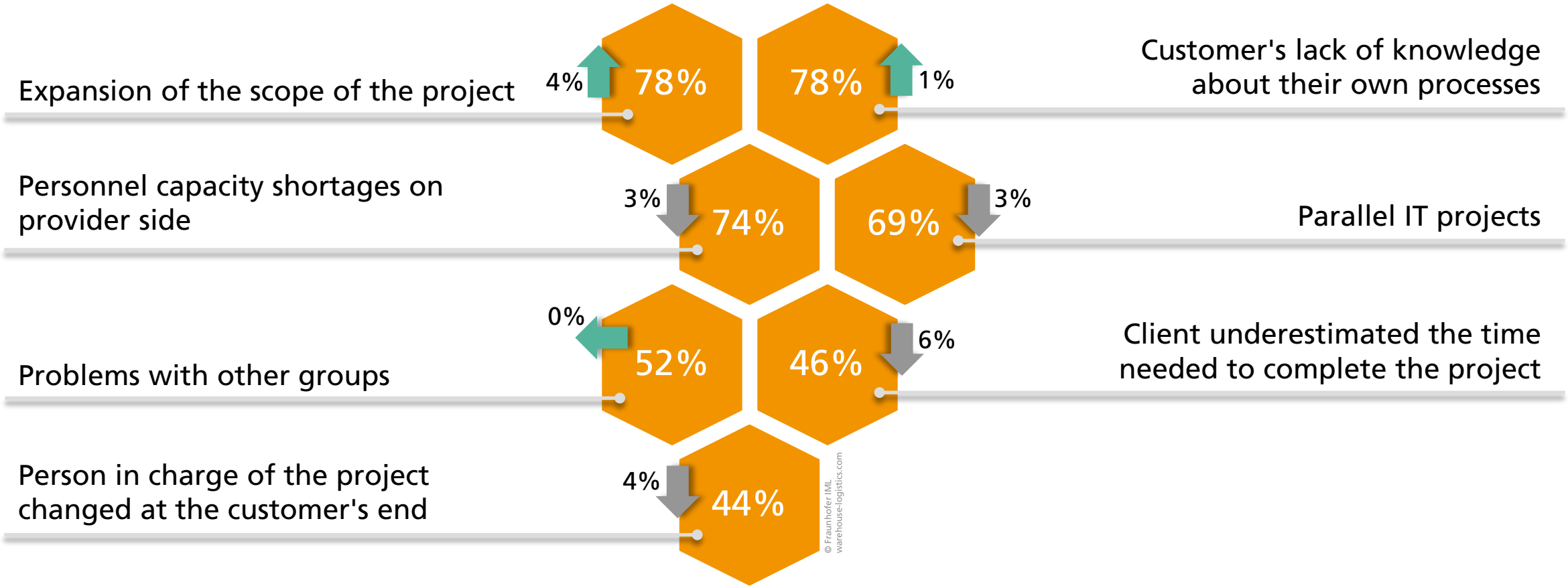
# Challenges for the Implementation of a WMS

## Reasons for Delays or Terminations of WMS Projects

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# Criteria to Select a WMS Provider

## Major Aspects from the Suppliers´ and Customers´ Point of View

| View of the WMS Provider | Top 5 Criteria | View of the WMS Customer |
|---|---|---|
| WMS provider has customer references | 1 | Functionality |
| Implementation time | 2 | user-friendliness |
| Implementation costs | 3 | Implementation costs |
| Professional qualifications of the employees | 4 | Simple parameterisation (flexibility) |
| After Sales Services | 5 | Simple Integration in existing processes and IT landscapes |

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The given data is based on the statements of the WMS providers and on the values from »WMS Reference Projects«.



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# Selected Aspects of WMS Projects

## Distribution of WMS projects

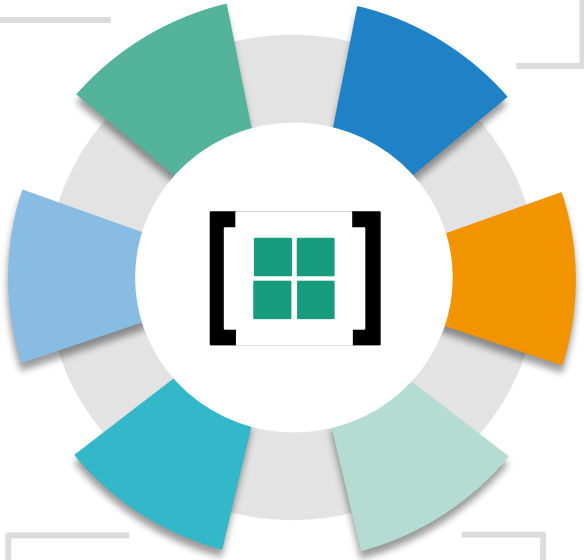
**81%** of WMS projects have been executed by **suite providers**.

## Usage duration of a WMS

**83%** of WMS providers indicate a Ø usage duration of a WMS of more than **10 years**.

## Implementation duration

**49%** indicate a Ø implementation duration of **9-12 months** for automated warehouses. For manual warehouses **44%** indicate a Ø implementation period of **3-6 months**.



## Implementation challenges

**78%** of the WMS providers see an **expansion of the scope of the project** and the **customer's process lack of knowledge** as the main challenge during WMS implementation.

## WMS as a cloud solution

**59%** of WMS providers offer their WMS as a cloud solution.

## Goals for the WMS implementation

The main goals of the WMS implementation are **faster reaction times** and **higher supply capability.**

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# Conclusion »The WMS-Projekt«

## Projects

The number of WMS projects is increasing greatly. In most cases, these are first-time implementations, where a WMS is implemented at a location for the first time, as well as new projects, which concern the implementation of the WMS in greenfield projects.

## WMS providers

When choosing the right WMS provider, not only the functional aspects of the system should be considered, but especially the project experience, the customer service offered and the global availability of the provider.

## WMS users

Nearly one third of the WMS projects have been using the system for more than 15 years. In about half of them, it has been in use for more than 10 years. A well-founded and systematic selection of logistics IT is a strategic investment in the future.

## Benefits

By using a WMS, the WMS customer exploits potentials such as faster response times, higher delivery readiness and an increase in productivity in the warehouse.

For a timely and successful project completion, challenges such as the expansion of the project scope or personnel capacity bottlenecks on the customer side should be recognised and reflected at an early stage.

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# APPENDIX

Fraunhofer-Gesellschaft · Fraunhofer IML · warehouse-logistics.com ·
Team warehouse logistics · Current Participants · Database · Imprint

# Fraunhofer-Gesellschaft and Fraunhofer IML

**29,000**
employees

**75 institutes**
and research institutions

**2.8 billion**
research volume

Development investment and defence research
German federal and state government base funding
Contracts with industry and publically financed research projects


## Fraunhofer IML, Dortmund

**334**
employees

**300**
post grad students and student assistants

**35.2 million**
turnover, 50% from industry and commerce

Information according to Fraunhofer's Annual Report 2021.



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# Selection of Current Research Topics and Projects of Fraunhofer IML




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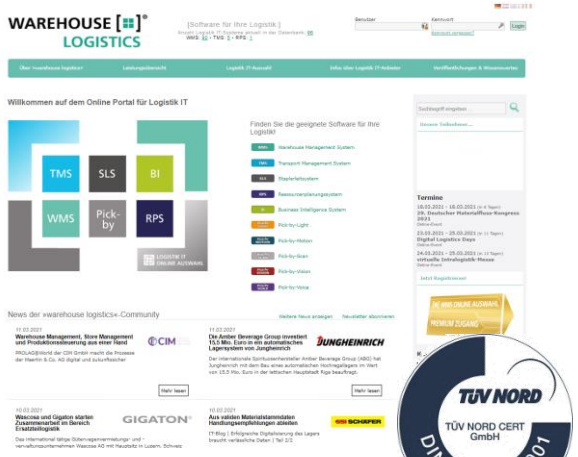
# One of the Leading Logistics Platforms

## The selection of logistics IT systems at www.warehouse-logistics.com

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SYSTEM VALIDIERT
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PROJEKT VALIDIERT
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| | |
|---|---|
| Logistics IT Database | Since 2000, provider-independent »Logistics IT Database« for the functional comparison of about 100 participating systems of the system groups WMS, TMS, SLS, RPS and BI |
| Question-naire | Annually updated questionnaires per system group and personal validation of system functionality |
| DIN | Certified according to DIN EN ISO 9001 |
| VDI | Complies with VDI guideline 3601 |
| WMS Reference Projects | Validated »WMS Reference Projects« to present project specifications and provider expertise in the project business |
| Language | Multilingual information available, e. g. in German, English, Italian |



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# Fields of Activity of »Team warehouse logistics«

**1 | Knowledge Management**

Preparation of market studies, execution of lectures and seminars, expert activities for trade fairs, associations or committees in the field of Logistics IT.

**2 | Research**

Development of new processes, methods and tools as well as studies, future scenarios and roadmaps. Operational pilot projects ensure practical suitability.

**3 | Strategy Consulting**

Execution of various strategy and portfolio consulting projects for WMS providers and support in technical due diligence audits on the WMS market.

**4 | Logistics IT Consulting**

Personal and system-supported consulting from analysis through tendering up to the introduction of a WMS or other Logistics IT systems.



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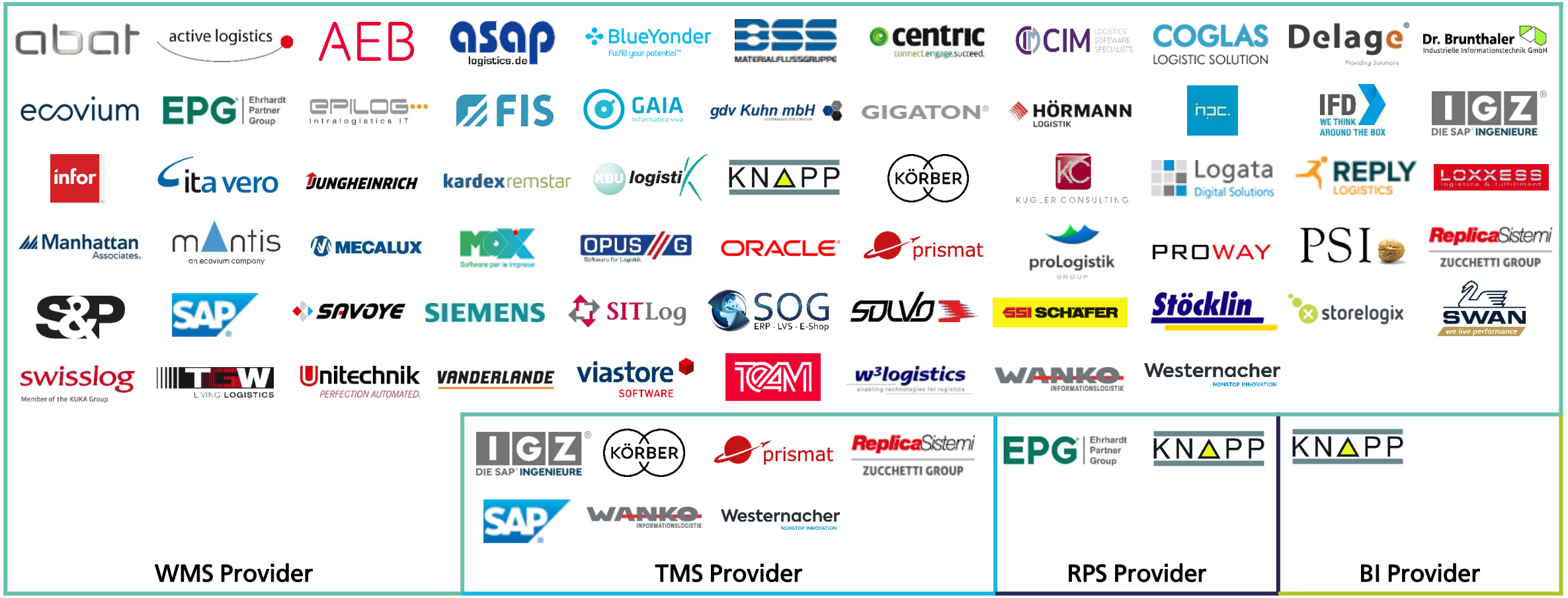
# Current Participants of the »Logistics IT Database«

Status: 08.06.2022



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# Database

The WMS MARKET REPORT COMPACT is based on the 22 years of expertise of Fraunhofer IML and its partners in the field of Warehouse Management Systems. Since 2000, the »Logistic IT Online Selection«, has been one of the world's leading »Logistics IT Databases« for continuous market evaluation and trend analysis and has been operated and further developed in terms of content and technology.

For the » Logistic IT Online Selection« as well as for the »WMS Reference Projects« the »Team warehouse logistics« developed questionnaires to capture relevant information

- about WMS providers,
- about the functional scope of the systems and
- to evaluate current and future trends and developments on the WMS market.

In 2022, the questionnaire behind the »Logistics IT Online Selection« covered around 3.700 criteria, the questionnaire for the »WMS Reference Projects« covered around 500 aspects. The data of the completed questionnaires (up to September 2020) were aggregated and evaluated. The data is presented cumulated and anonymized and is supported by tables and graphics.

If not explicitly mentioned, the data, graphs and tables refer to the year 2020. The data were collected from all participating WMS providers and systems through personal expert interviews (within the annual validation).

According to the »warehouse logistics« advisory committee, the participants of the »WMS Database« represent approx. 90% of the relevant providers in the markets considered.

## Key Figures of the Study

| Category | |
|---|---|
| Total period of the assessment | February 2012 to September 2022 |
| Haupterhebungszeitraum | February 2022 to September 2022 |
| Total number of involved WMS providers | 103 providers |
| Total number of involved systems | 126 systems |
| Number of WMS providers participating in the 2022 assessment | 57 providers |
| Number of systems participating in the 2022 assessment | 67 systems |

# Imprint


## Publisher

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Fraunhofer-Institut für Materialfluss und Logistik IML
Joseph-von-Fraunhofer-Str. 2-4
44227 Dortmund
http://www.iml.fraunhofer.de
http://www.warehouse-logistics.com
marktreport@warehouse-logistics.com


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## Authors and Contributors

Linda Maria Wings
Kira Schmeltzpfenning
Aleyna Erdogan
Jonathan Otto
Jonas Kus
Maximilian Barlang
Günter Dietze
Norman Grünewald
Bacem Helaoui
Mirko Ljucovic
Mauro Napierala
Juana Perelló Riera
Sidney Carina Thill

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