

2022

Digitalization in Conformity Assessment in Germany

A QI-FoKuS study

The digital transformation of the economy as well as increasingly networked and complex products and applications are bringing digitalization into the focus of conformity assessment bodies (CABs). Innovations, new technologies and processes rely on corresponding conformity assessment services. This poses new challenges for testing and calibration laboratories, inspection and certification bodies, and other CABs. At the same time, however, new digital technologies and applications also offer new opportunities. This study is the first to comprehensively explore "Digitalization in Conformity Assessment" building on data from an online survey of accredited CABs in Germany.

Major topic areas covered

Digital Maturity Level

- Assessment of the digital maturity of the CABs in Germany based on a tailored digital maturity model

Drivers, Benefits and Barriers

- What motivates CABs to transform digitally, what impact do they experience, and what hurdles must be overcome?


Technology Trends

- Assessment of the digital technologies and applications currently in use (now and in a 5-year perspective)

A Study conducted within the framework of the QI-FoKuS initiative




Basic statistical population for the survey	3,200 accredited conformity assessment bodies (CABs) in Germany
Data collection method	Online survey
Survey period	December 16, 2021 January 31, 2022
Sample	354 fully completed questionnaires (= 11% response rate)



QI-FoKuS
Research on Conformity
Assessment and Safety

Digitalization in Conformity Assessment

Online Survey





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The Sample

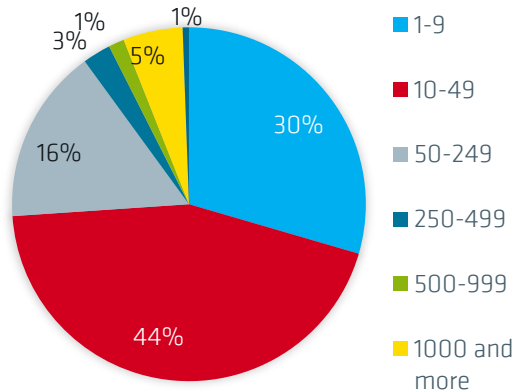
General information about the participating Conformity Assessment Bodies

www.bam.de

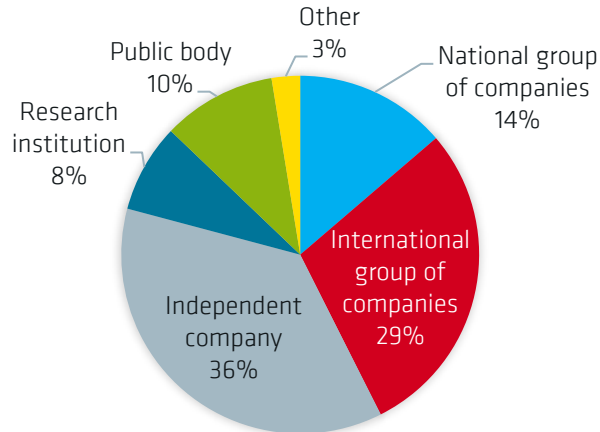
354 conformity assessment bodies (CAB) in Germany participated in the survey

- 74% of participating CABs are **small businesses** with less than 50 employees
- 36% are **independent companies**, 29% belong to an **international group**. Every 10th participating CAB is a **public body**
- For 39%, Conformity Assessment (CA) is the main economic **focus of activity**, 16% are an **internal CAB** of a higher-level organization

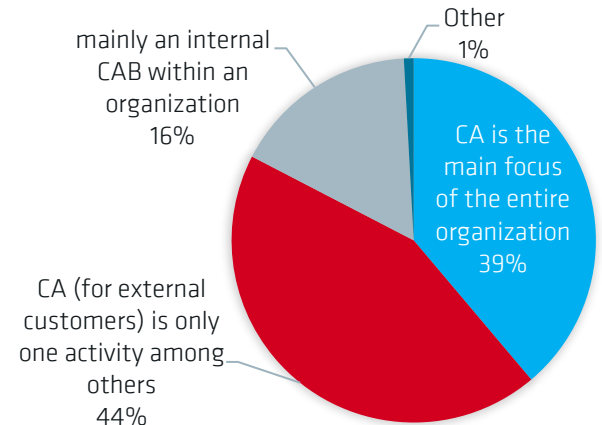
Number of employees (n=349)



Type of organization (n=350)



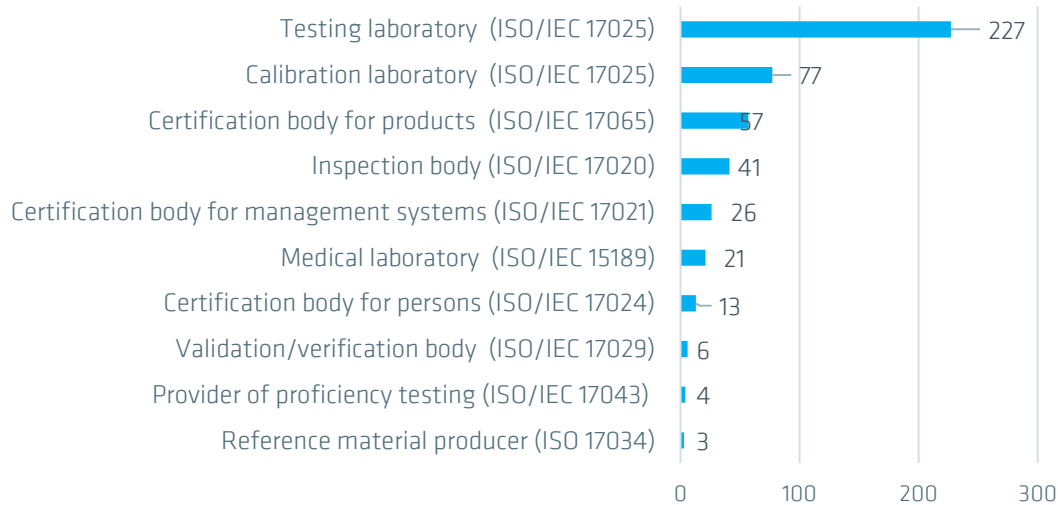
Role of CA for the organization (n=345)



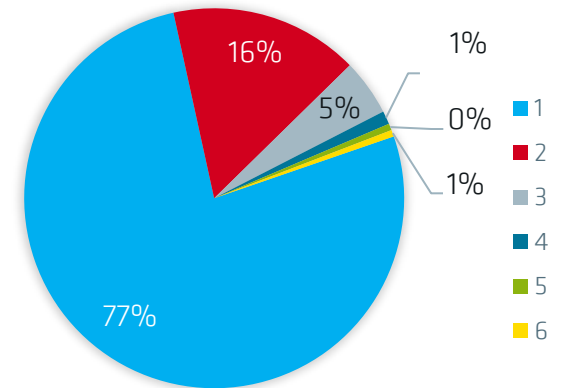
The 354 participating CABs are active in (almost) all fields of conformity assessment



Field of activity



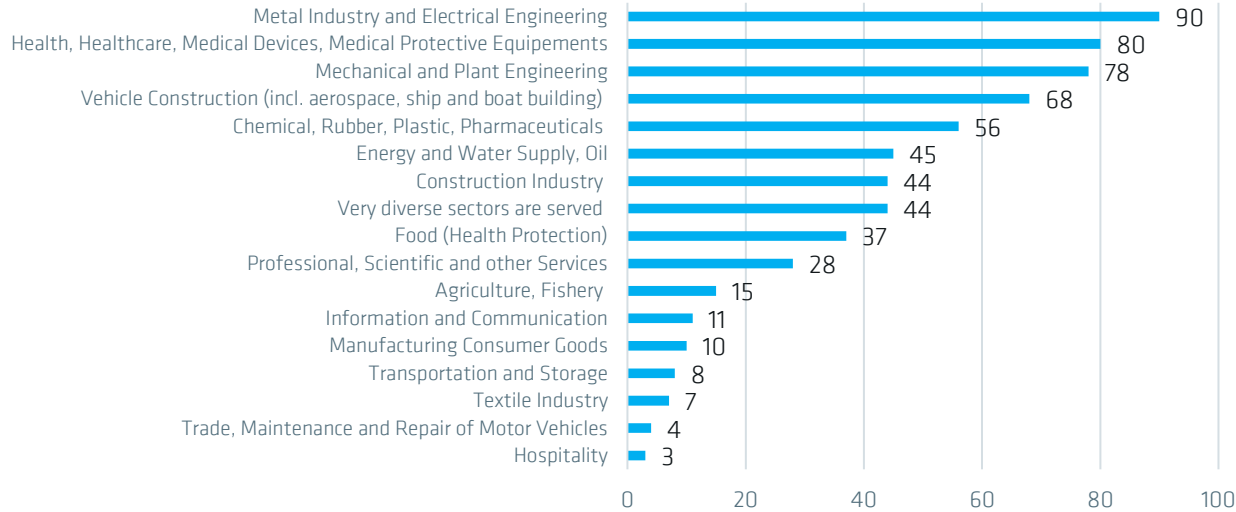
Number of fields of CA activities per CAB



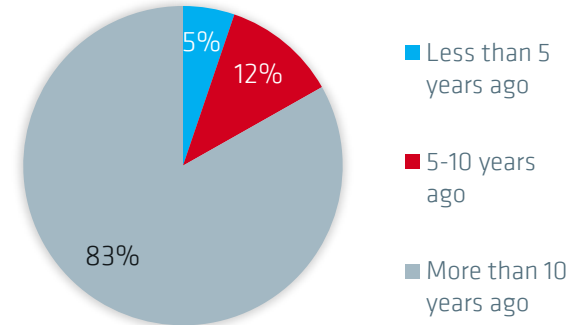
- Testing laboratories represent the **largest group of participants**, followed by calibration laboratories and certification bodies
- 77% of CABs **specialize** in a single field of activity in conformity assessment; only a few cover a broad range of fields of activity (up to 6)

The CABs serve a wide range of industries // mostly established on the market for a long time

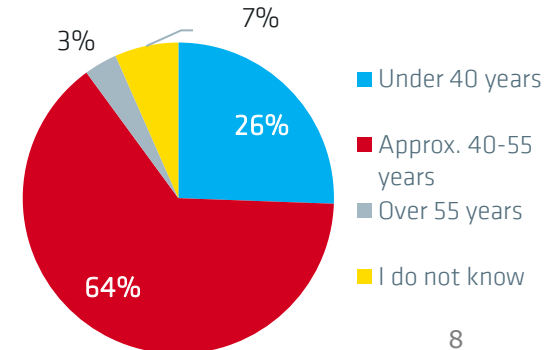
Main sectors served by the CABs



Establishment of the CAB (n=348)



Average age of employees (n=348)



- The customers served by CABs are mainly from the **manufacturing sector**, but also the health sector is important
- 83% of CABs were **established** more than 10 years ago
- While the **average age of the employees** is between 40 and 55 years in 64% of the CABs, it is below 40 years in one out of four CABs

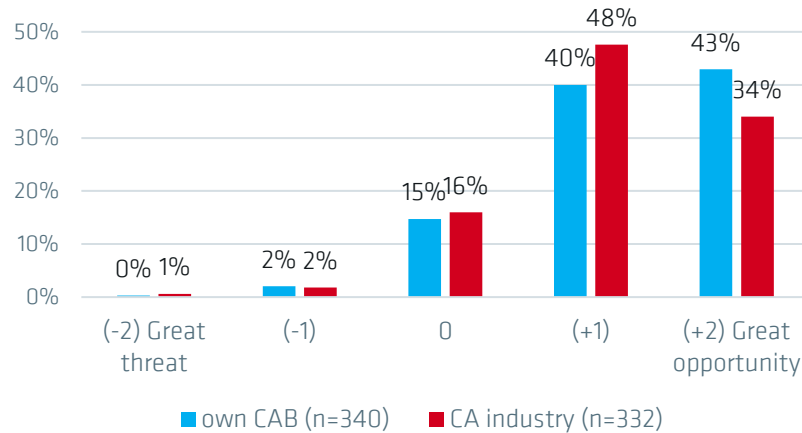
Digitalization in German CABs A General Overview

This section covers how the participating CABs perceive digitalization for their organization (now and in perspective) and how they self-evaluate their current state of digital transformation.

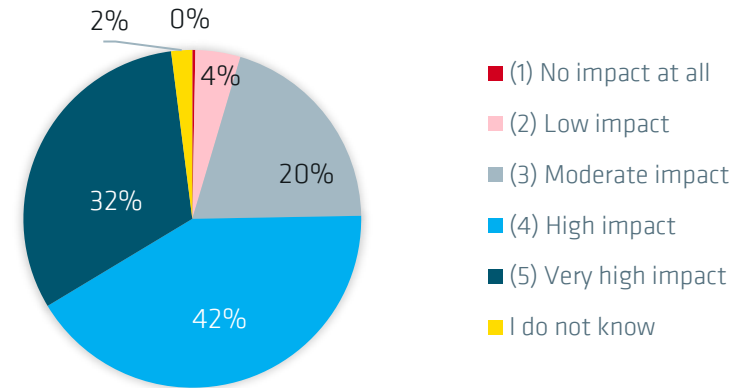
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Digitalization more of an opportunity rather than a threat // Major influence expected

For the CAB itself and the whole industry, digitalization is viewed rather as a...



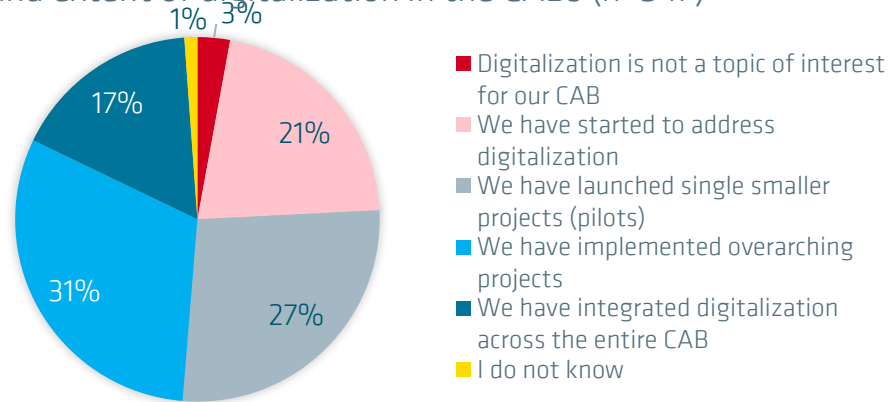
Expected impact of digitalization in the next 5-10 years (n=348)



- In general, CABs have a **positive perception** of digitalization: More than 80% of the surveyed CABs recognize digitalization as an **opportunity or even a great opportunity** rather than a threat, both for the own organization and for the whole CA industry
- 74% of the participants expect digitalization to have a **great or even very great impact on CA activities** in the next 5-10 years

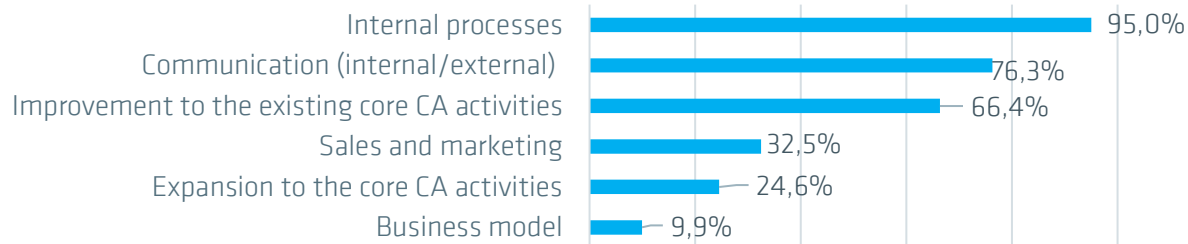
State of digitalization varies greatly // Focus mainly on internal processes

Status and extent of digitalization in the CABs (n=347)



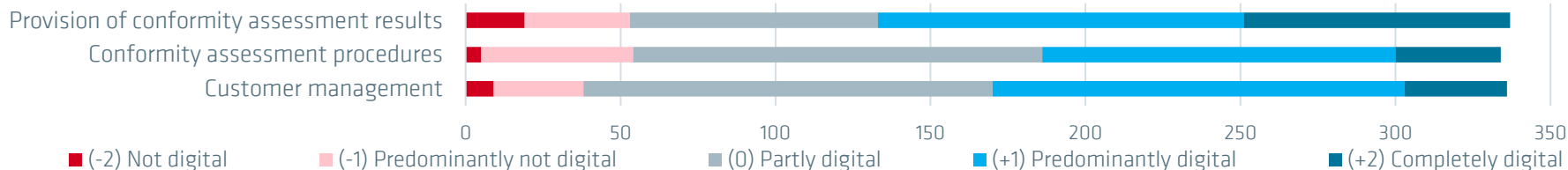
- **The status of digitalization is quite divers** among the CABs in Germany: While almost every fifth CAB has just started to address this topic, 27% have launched single smaller projects and 31% have already implemented overarching projects. 17% state that they have integrated digitalization throughout the whole organization.
- Most **digitalization activities concern internal processes**. Yet communication and improving CA activities are also relevant areas. However, digitalization is currently rarely used to expand the provision of CA services or even less to adopt new business models.

Areas targeted by digitalization (multiple answers possible, n=342)



Positive self-assessment on digitalization in core areas - and in comparison with stakeholders

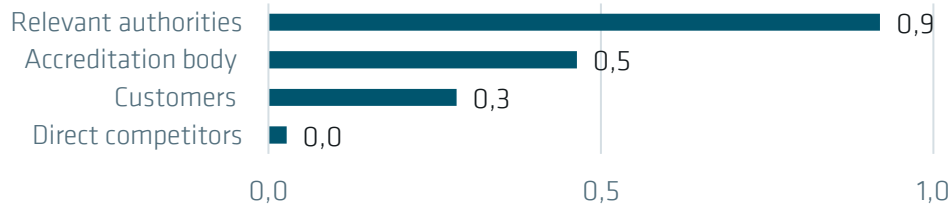
Self-evaluation of the CABs' status of digitalization in different areas (n=338)



- The CA results are provided predominantly or completely digitally by the majority of CABs. The CA processes themselves are less frequently digitalized.
- Compared to **other organizations** that are direct stakeholders, CABs rate their digital status on average as at least as good or better, especially with regard to the relevant authorities and the accreditation body.
- Digitalization has not been a topic for long: every second CAB **has only started to deal with it** during the last 5 years. Only 20% have already done so at least 10 years ago.

Own status of digitalization compared to... (n=347)

(on a scale of (-2 much worse) to (+2 much better))



CABs started to deal with digitalization... (n=337)



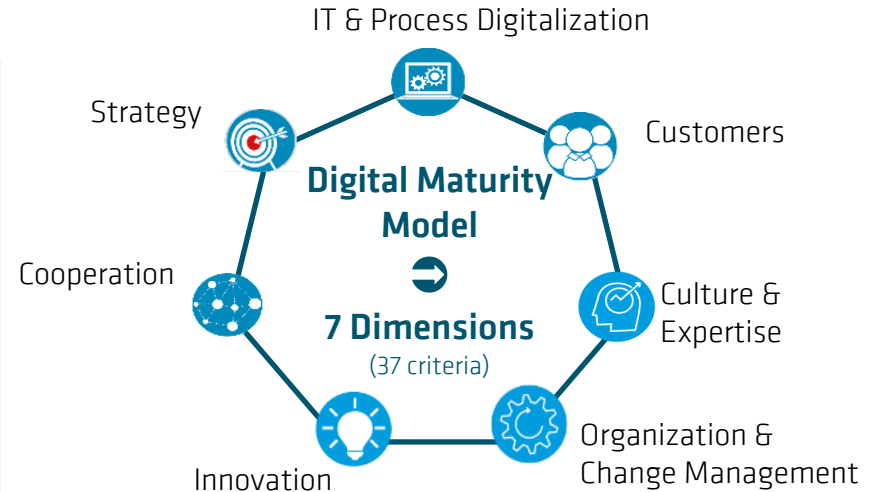
Digital Maturity of CABs

The "digital maturity" of an organization describes its status in the digital transformation. Digital maturity models use predefined dimensions and criteria to assess the ability of organizations to cope with the digital transformation. The following chapter presents the results for CABs in Germany based on a model developed specifically for this study.

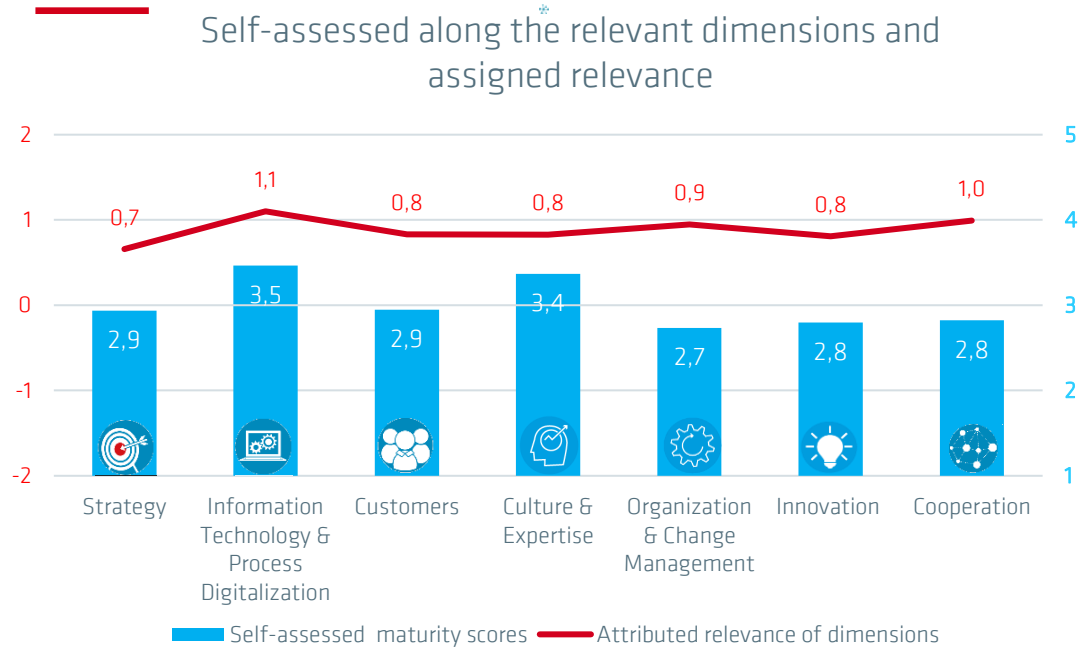
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The digital maturity model for the conformity assessment industry

- The digital maturity level reflects the status of digital transformation of an organization and includes technical as well as organizational and strategic aspects.
- Becoming a digitally mature organization requires efforts, **capabilities** and **resources** across many areas.
- These are mapped in a maturity model using various **dimensions** and **criteria**:
 - Our specially developed model takes into account 7 dimensions that are essential for the digital transformation of CABs: from technological to strategic and organizational to cultural aspects.
 - Each dimension is operationalized by 4 to 6 criteria describing basic success factors in terms of capabilities, capacities, and resources.
- By means of a self-assessment of the participating CABs along these criteria, an individual digital maturity level is calculated - from level 1 ("beginner") to level 5 ("expert").



Maturity very different in the dimensions: Technology advanced, organization not yet



* The CABs were asked to self-evaluate their maturity/performance along statements in 7 topic areas (dimensions) on a scale from 1 (I do not agree at all) to 5 (I fully agree). These statements and dimensions are displayed in detail in the annex. The participants were then asked to rate the importance of each dimension with regard to a successful digital transformation on a scale from -2 (not important at all) to +2 (very important).

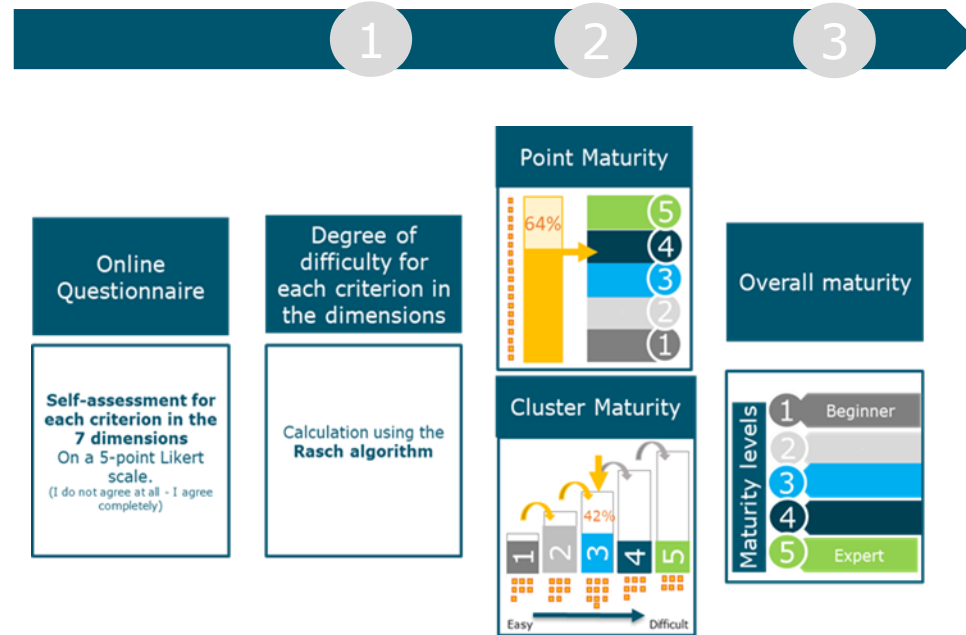
- The results of the maturity model show that the status of the CAB slightly differs in the various dimensions:
 - The CABs consider themselves to be **most advanced** in the area of "Culture and Expertise" and "IT & Process Digitization" and followed by "Strategy" and "Customers"
 - The **greatest need** to catch up is in the areas of "Innovation" and "Cooperation" - although the respondents are actually aware of their high relevance
- This **pattern is typical**: Digital transformation in organizations starts with the introduction of technologies and develops into an implicit holistic organizational transformation

➔ *Details on the composition and partial results in the individual dimensions can be found in the appendix.*

Background information: Calculation of the digital maturity level

In the questionnaire, participants indicate the extent to which each of the criteria of the 7 dimensions applies to their CAB. In a **multi-stage process**, digital maturity is determined on the basis of these assessments:

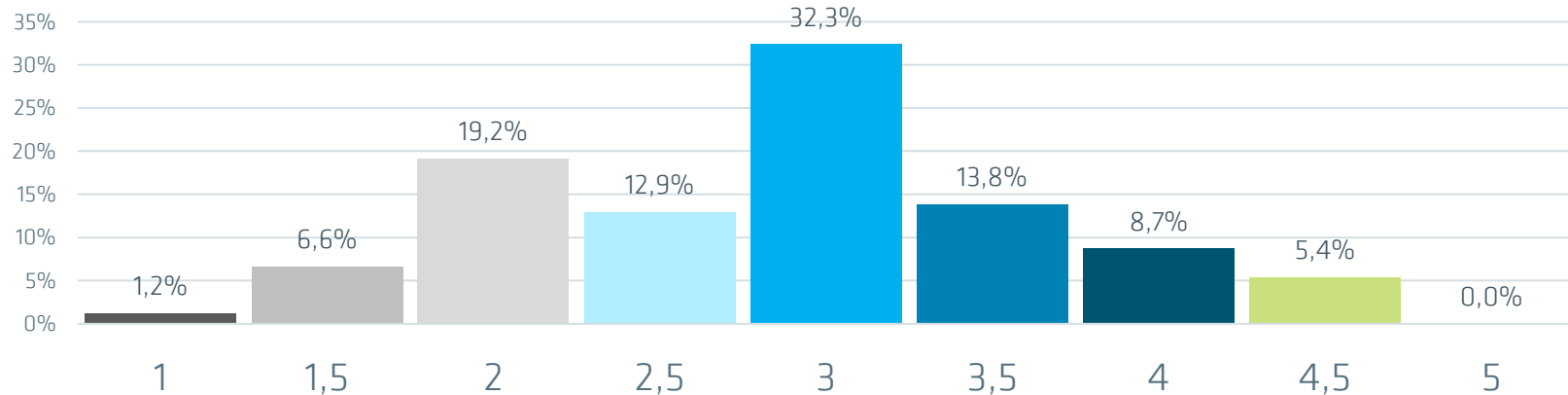
1. For each criterion, the Rasch algorithm is first used to calculate how difficult it is to achieve a good result for it (**degree of difficulty**). If, on average, a large number of participants state that they can meet this criterion, it is classified as easy to achieve.
2. Based on this, 2 types of maturity levels are determined: **Cluster analysis** is used to divide the indicators into 5 sequential maturity clusters (1 = easiest indicators; 5 = most difficult). To reach a higher maturity, the thresholds of the lower maturity levels have to be met first. In addition, the **point maturity** is calculated: Here, the points achieved count in comparison to the possible total points.
3. The **overall digital maturity score** is the average of the cluster and point maturity scores.



The calculation is based on the method of the St. Gallen Maturity Model. See Back & Berghaus (2016). Digital Maturity & Transformation Study; Berghaus & Back (2016). Stages in Digital Business Transformation; and Friedel & Back (2012). Determination of enterprise 2.0 development levels with a maturity model.

Overall Digital Maturity Scores of the German CA industry

Distribution of overall maturity scores (n=354)



Beginner  Expert

The **digital maturity levels** achieved by the 354 participating CABs in Germany follow a statistically *normal distribution*:

- One in three CABs has reached medium level 3, and 28% have already reached a higher level of maturity. However, even more, namely 40%, still have a lower maturity level.
- No CAB has yet reached expert level 5; rather, 7.8% are still at the absolute beginner level.

The 5 Digital Maturity stages in German CABs

Beginner

1

- ✓ Digitalization has central role in strategy
- ✓ IT security: awareness and compliance
- ✓ Openness to change
- ✓ Digital activities integrated into core processes

2

- ✓ IT usage reliably ensured
- ✓ Networked processes
- ✓ Knowledge of most important digital technologies
- ✓ Investments in digital technologies
- ✓ Digital opportunities are exploited
- ✓ Digitalized customer interactions
- ✓ Understanding of the importance of digital transformation
- ✓ Suitable personnel and know-how
- ✓ Cross-functional and cross-departmental collaboration

Intermediate

3

- ✓ Documented digital strategy
- ✓ Clear responsibilities for digitization goals
- ✓ Evaluation of digital technologies with regard to innovation potential
- ✓ Automated routine processes
- ✓ Integrated, digitalized customer care
- ✓ Targeted training
- ✓ Risk of failure is accepted
- ✓ Digitalization as a new source of value creation
- ✓ Competitive advantages through digitalization
- ✓ Driving innovations forward in a targeted manner
- ✓ Exchange with external experts
- ✓ Effective internal collaboration

4

- ✓ Digital Roadmap
- ✓ Analysis of customer data
- ✓ Digital solutions based on customer needs
- ✓ Rapid response to change
- ✓ Defined roles, responsibilities & decision-making processes
- ✓ Measurable goals
- ✓ Sufficient resources to drive digital innovations
- ✓ Effective collaboration with external stakeholders

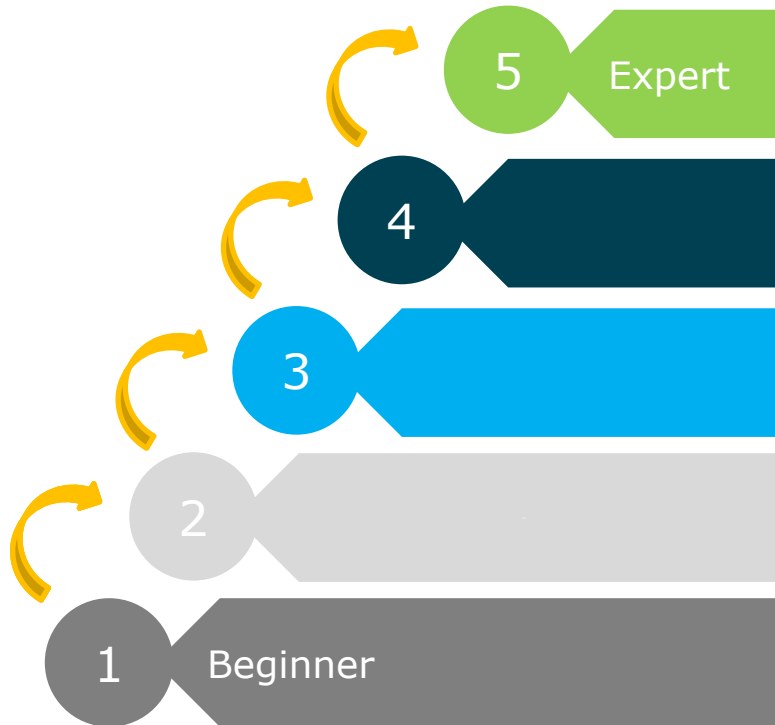
Expert

5

- ✓ Key indicators to measure the implementation of the digital strategy
- ✓ Early warning system to identify relevant digital technologies and business models
- ✓ Clearly defined innovation process
- ✓ Customers involved in development of digital innovations
- ✓ Comprehensive partner network for digitalization

The Digital Maturity of CABs in Germany//

Summary of the observed patterns



- Even at the **first maturity level**, digitalization is given a central place in the corporate strategy.
- Organizations at the **second maturity level** have a strong focus on IT and process digitalization. Corresponding investments are made, and the necessary personnel skills/competences are available. There is cross-functional and cross-departmental collaboration on this topic.
- For **stage three**, capabilities, resources, and capacities are activated in all dimensions, especially with regard to strategy implementation and innovation. To this end, internal and external collaboration is strengthened. Digitization is recognized and pursued as a driver for new value creation.
- Finally, in the **fourth maturity stage**, the focus is on organizational adaptation with the definition of responsibilities and allocation of resources. Customer needs and analyses also increasingly come into focus.
- The final **fifth stage** is characterized by intensive collaboration, in particular through the establishment of a targeted partner network and the involvement of customers, as well as clear innovation processes.

Motives, Impacts, and Hurdles of Digitalization

What is driving digitalization in the CABs? What effects can be achieved for the organizations? Are expectations being met? And what are the biggest hurdles to be overcome in the digital transformation?

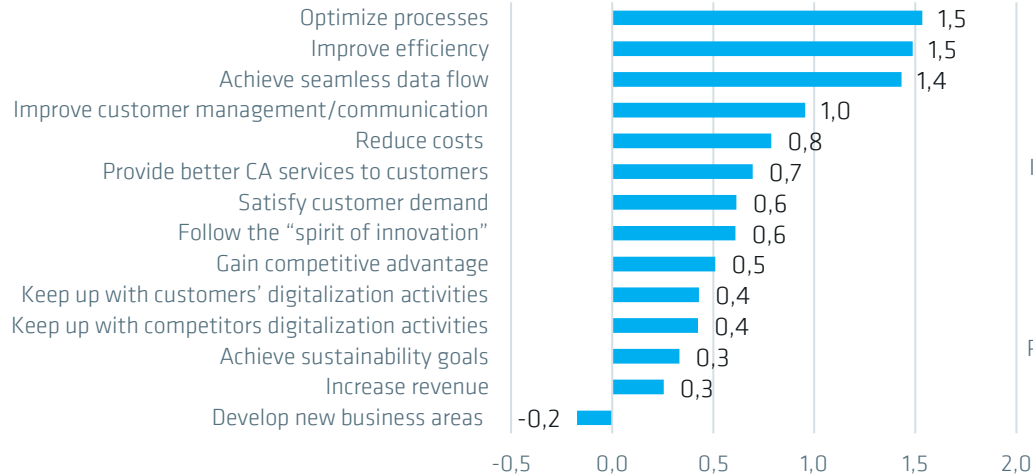
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Focus on process optimization and efficiency enhancement – but not yet realized on a large scale



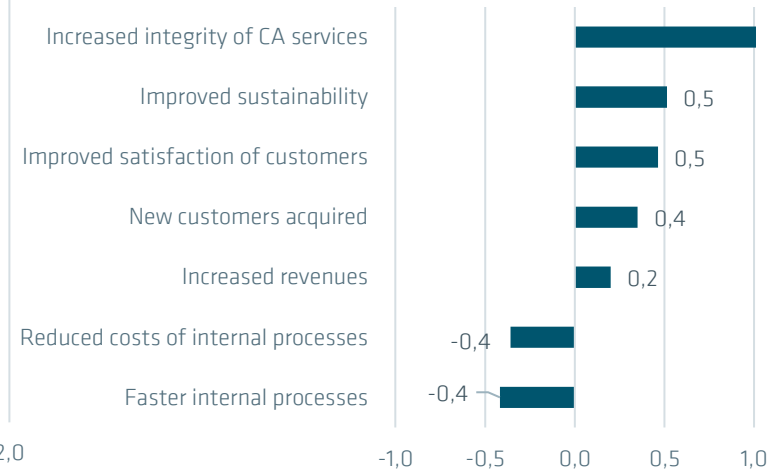
Goals behind the digitalization efforts (n=334)

(on a scale from (-2) does not apply at all to (+2) fully applies)



Benefits realized from digitalization (n=343)

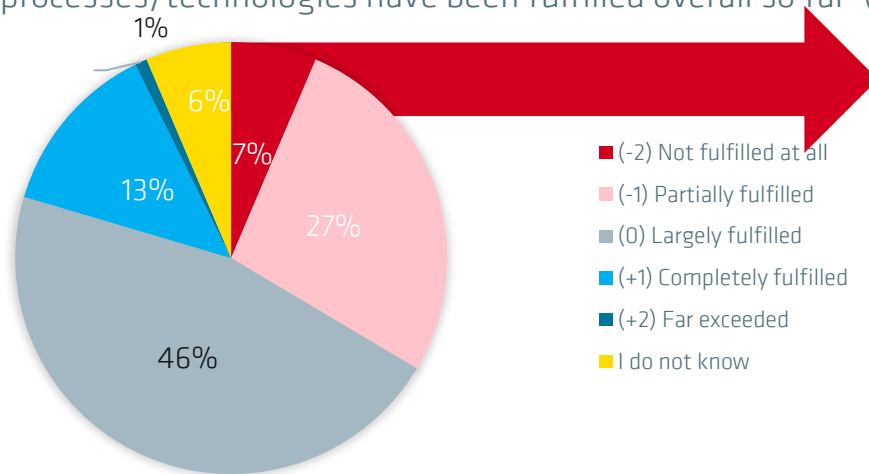
(on a scale from (-2) not agree at all to (+2) fully agree)



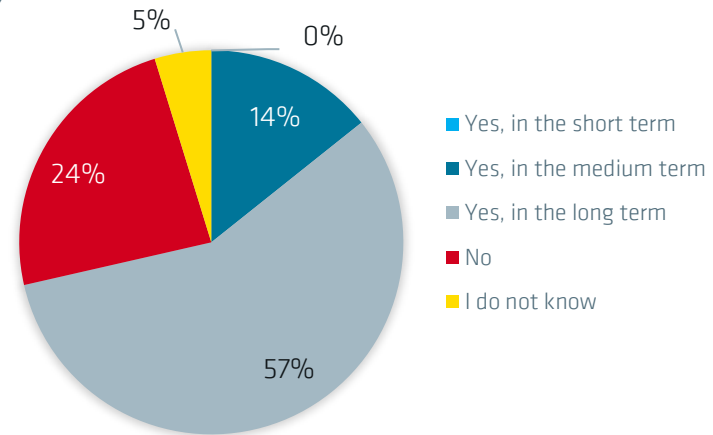
- Process optimization and increased efficiency are the **main goals** behind the digitization efforts of CABs in Germany. In fact, faster and more cost-effective internal processes are among the greatest and most frequently realized effects. This can, however, not (yet) translate into actually realized benefits.
- Market objectives such as increased sales or the development of new business areas are not drivers - and the effects achieved on sales and new customer acquisition are correspondingly low. In contrast, many respondents see an improvement in the satisfaction of existing customers as well as in the sustainability of the CAB.

CABs' expectations in connection with digitalization are (at least partially) met

Whether expectations behind the introduction of digital processes/technologies have been fulfilled overall so far (n=328)



Will the expectation be met? (n=21)

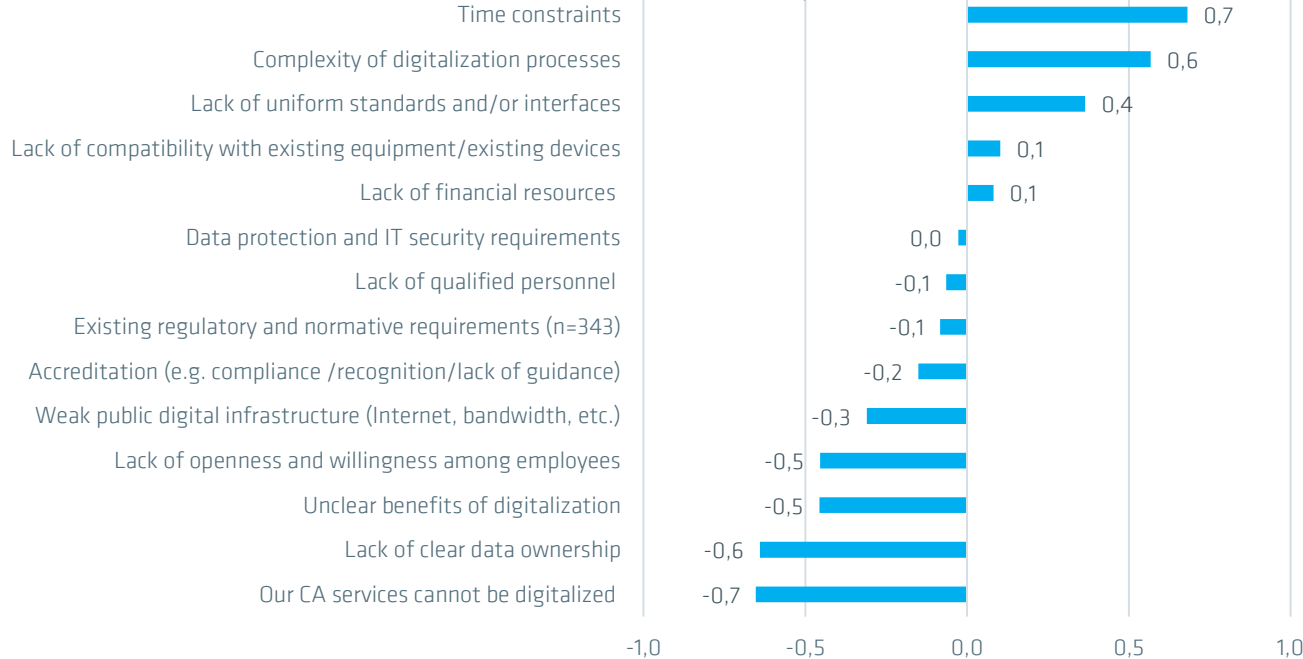


- 60% of the CABs consider their expectations behind the introduction of digital technologies to have been largely or completely fulfilled. Another 27% find them at least partially fulfilled.
- For 7% of the CABs, the expectations are not fulfilled at all. However, only every fourth of them is pessimistic that this will remain the case. Others are more confident that expectations will still be met in the medium or long run.

Lack of time and complexity of the topic are the biggest hurdles to digital transformation

Hurdles to digital transformation (n=344)

(Scale from (-2) not at all to (+2) very much)



- Time constraints in managing the digital transformation are the biggest hurdles for CABs, followed by the general complexity of this topic.
- Technical aspects such as lack of standards and/or interfaces and lack of compatibility are also an issue for many CABs.
- In contrast, lack of openness/readiness on the part of employees or lack of clarity about the benefits do not represent major hurdles.

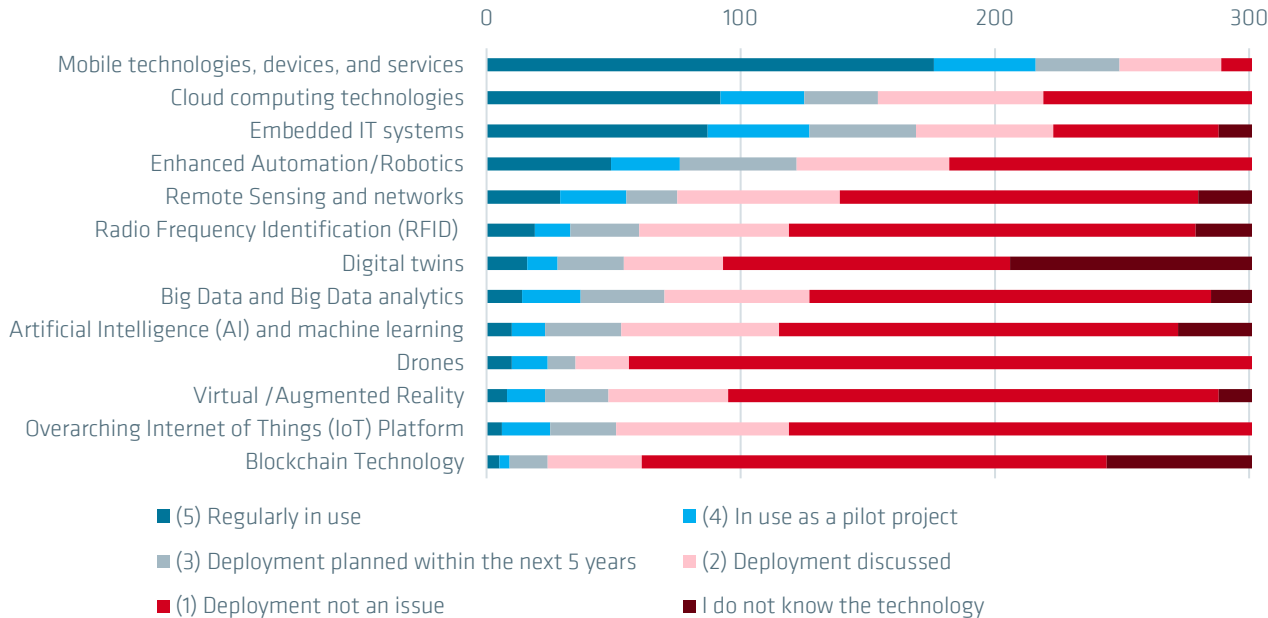
Digital Technologies and Trends

This section highlights the actual (or planned) use of concrete digital technologies and applications in the CABs. In addition, the use of remote procedures and technologies is presented.

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Latest digital technologies are not yet widely used in CABs

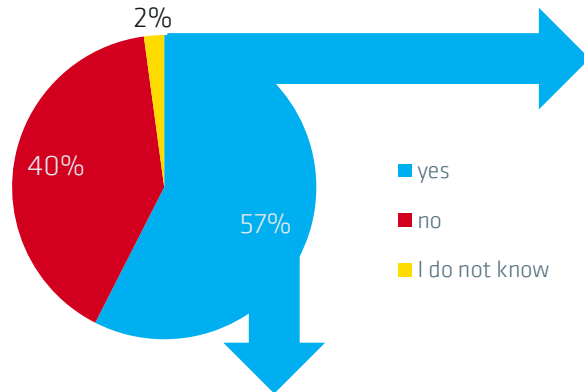
Technologies that are used or planned to be used (n=326)



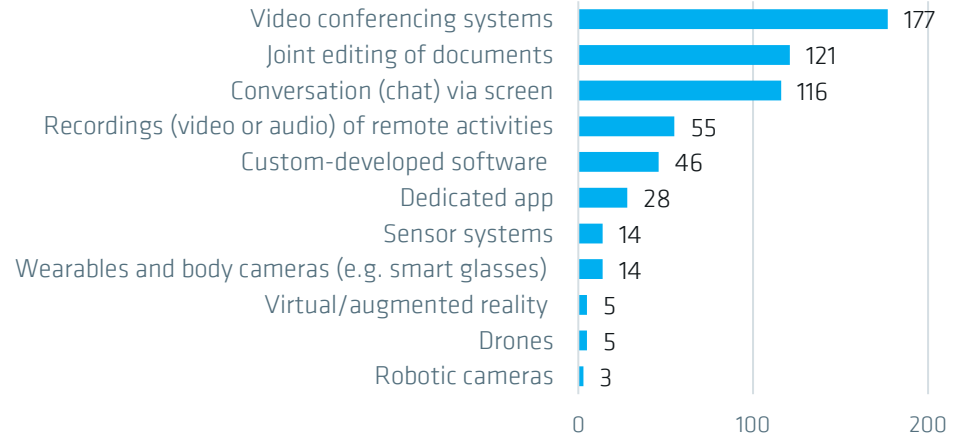
- Everyone is talking about the latest digital technologies such as blockchain, artificial intelligence, virtual reality, and big data analytics - but not yet in widespread use by CABs in Germany. Only a few use them for their work. In some cases, they are not even known (blockchain technologies, for example, mean nothing to every 5th respondent). Digital twins are unknown to.
- Among CABs, mobile technologies are the most widely used.
- Cloud computing technologies and embedded IT systems are also used.

Remote methods and technologies are used by most CABs

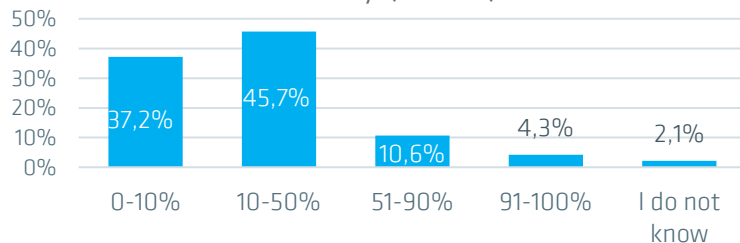
Use of remote methods in CABs (n=327)



Technologies and applications for remote procedures (n=188)



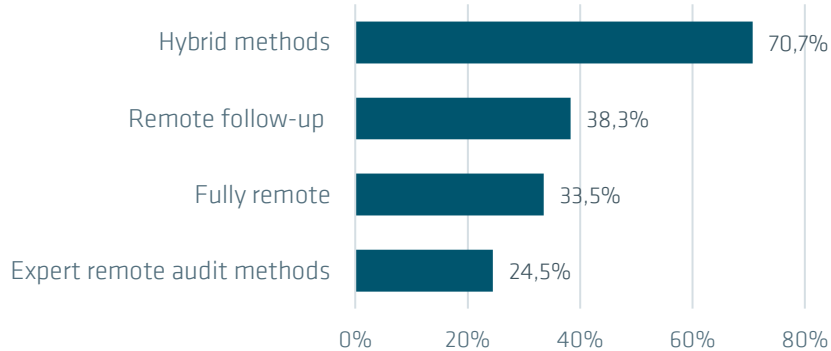
Share of CA services take implemented remotely (n=188)



- 3 out of 5 CABs use **remote methods** in their CA activities.
- Very few (4%) have switched completely. Much more often, up to half of all activities are done remotely (46% of CABs). More than one in three CABs have not even reached to perform 10% of activities remotely.
- Video conferencing is the most common used **tool for remote working**, while wearables, drones or virtual reality are still rarely used.

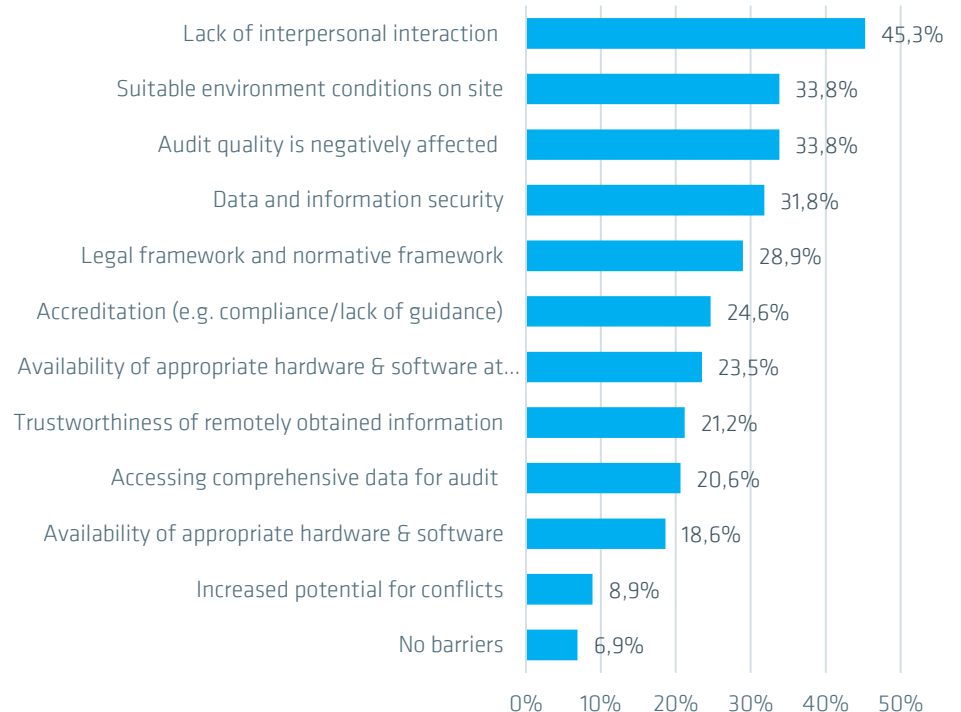
Diverse approaches used and experienced hurdles in remote procedures

Type of remote procedures used (n=188)



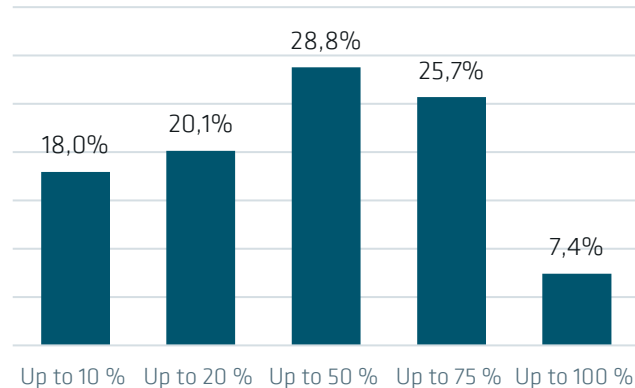
- **Hybrid methods** are the predominant type among remote methods used by CABs.
- Lack of interpersonal interaction is seen as the biggest **hurdle** to using remote procedures. However, practical issues such as on-site conditions or impairment of audit or inspection quality are also perceived as potential obstacles.

Barriers (n=349)

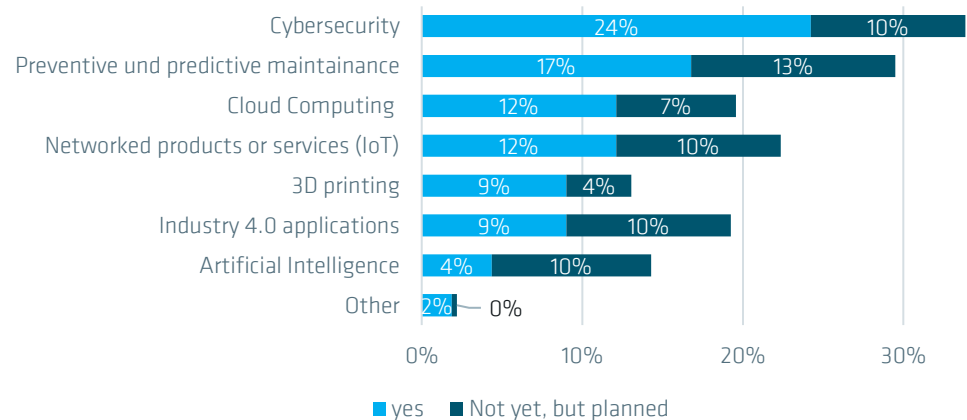


CA for advanced digital technologies is only performed by a minority of CABs so far

Share of routine processes that are digital (n=323)



Digital products and applications for which CA is conducted (n=322)



- One in three CABs has digitalized more than half of its **routine processes**. However, almost one in five CABs has not digitally converted even 10% of their processes.
- 41% of the surveyed CABs conduct **conformity assessments for modern digital technologies and applications**. In focus: cybersecurity (24%) and predictive maintenance (17%).

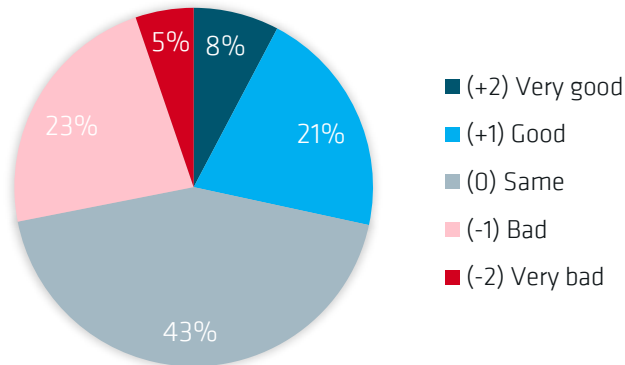
The COVID-19 Pandemic and Digitalization

The COVID-19 pandemic has accelerated digitalization in many organizations. At the same time, previous studies show that digital organizations are more resilient. This section looks at the interaction of pandemic response and digitalization in CABs.

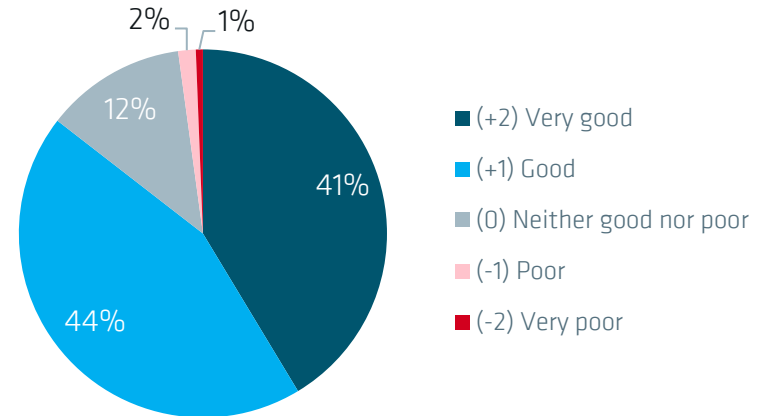
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Most CABs have coped well with the COVID-19 pandemic

CABs' order situation in 2021 compared to pre-COVID-19 times (n=326)



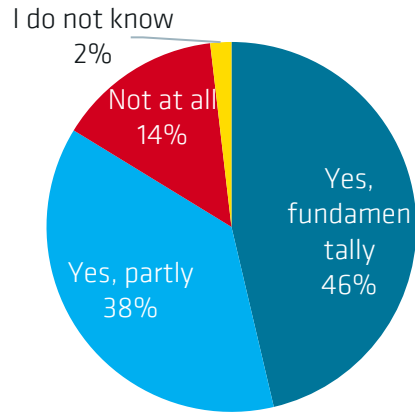
Response to the challenges of the COVID-19 pandemic (n=324)



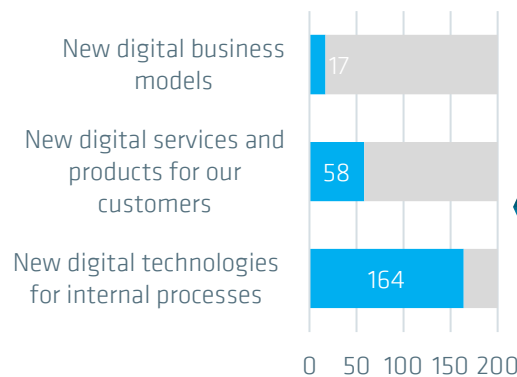
- For 43% of the CABs, the **economic situation** in terms of incoming orders in 2021 was no better or worse than before the pandemic. 29% claimed their order development had improved, for another 28% orders had declined
- The majority of CABs (85%) reported that they had **responded** well or very well to the challenges associated with the COVID-19 pandemic

Pandemic and digitalization

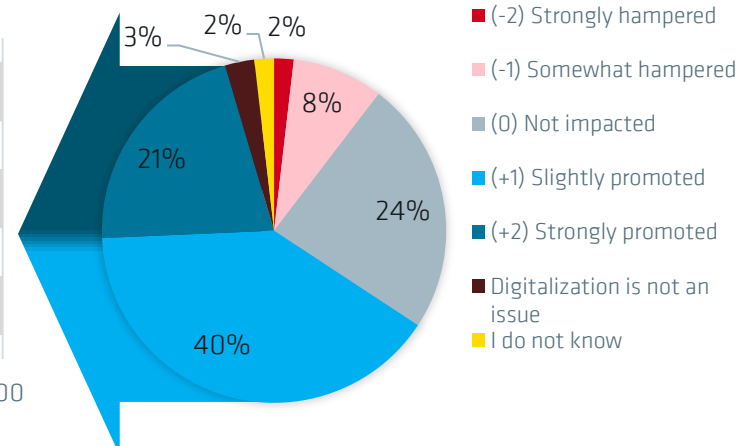
Digital technologies have helped coping with the challenges of the COVID-19 pandemic (n=326)



Digital adaptation in course of the COVID-19 pandemic (n=200)



Impact of the Covid-19 pandemic on the digitalization of CABs (n=327)



- For 84% of CABs, digital technologies have helped in coping with the challenges of the COVID-19 pandemic.
- The Corona pandemic has hindered digitalization in only one in 10 CABs. Rather, 61% of CABs report that digital transformation has been slightly or even strongly encouraged and has led to adaptations:
- 82% of CABs have introduced new digital technologies for internal processes, 29% new digital services and products for their customers, 9% even new digital business models.

- CABs in Germany clearly see digital transformation as an opportunity. The **level of digitalization** varies greatly. Many CABs are still at an early stage of maturity.
- Even though digital transformation is an individual project for each organization, **typical patterns of digital maturity** in German CABs are nevertheless confirmed: An initial strong technological focus is followed by holistic organizational transformation, including change management and strong innovation networks.
- It is striking that many of the **cutting-edge digital technologies** that are on everyone's lips as buzzwords have not yet found their way into application in CABs. Blockchain, Artificial Intelligence, Big Data Analytics are only used by a few, many are not yet aware of the technologies and their potentials.
- With their digitalization efforts, the CABs are primarily **aiming** at internal process improvements. Routine processes are increasingly being digitalized and there is a switch to - mostly hybrid - remote processes.

Germany in international comparison

How do German conformity assessment bodies compare internationally? We have conducted the survey on digitalization in conformity assessment in around 20 other countries. The individual country reports and a final comparative study will be published step by step on our website. Furthermore articles and an extensive report with further detailed analyses are planned.

➔ www.qi-fokus.de



This study was developed in the context of the QI-Digital initiative. Its goal is to develop solutions for a modern digital quality infrastructure (QI) - together with stakeholders from business, politics, science, and QI.

More information on the initiative and the opportunities for participation can be found at

➔ www.qi-digital.de

The project



Project partners



Supported by



Scientific execution / authors

Dr. Claudia Koch, Dr. Luana Ladu, Parsa Asna Ashari (BAM)

Prof. Dr. Knut Blind (TU Berlin, Fraunhofer ISI)

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Support: Timo Kabierski



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QI-FoKuS stands for **Qualitätsinfrastruktur - Forschung für Konformitätsbewertung und Sicherheit** ("Quality Infrastructure - Research for Conformity Assessment and Safety").

The initiative was launched jointly by BAM and TU Berlin in 2019 and is supported by the Federal Ministry of Economic Affairs and Climate Action (BMWK).

We conduct studies on current and fundamental topics of conformity assessment and accreditation. The studies are based on our comprehensive surveys of companies and in particular conformity assessment bodies in Germany and abroad. By publishing the results, we contribute to an improved database, scientifically sound findings and the identification of trends in quality infrastructure.

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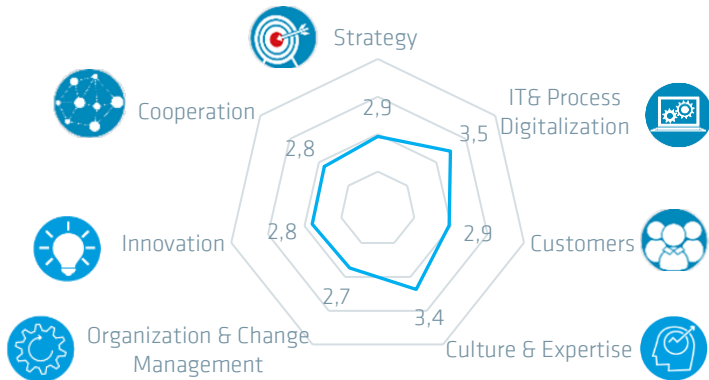
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Annexes

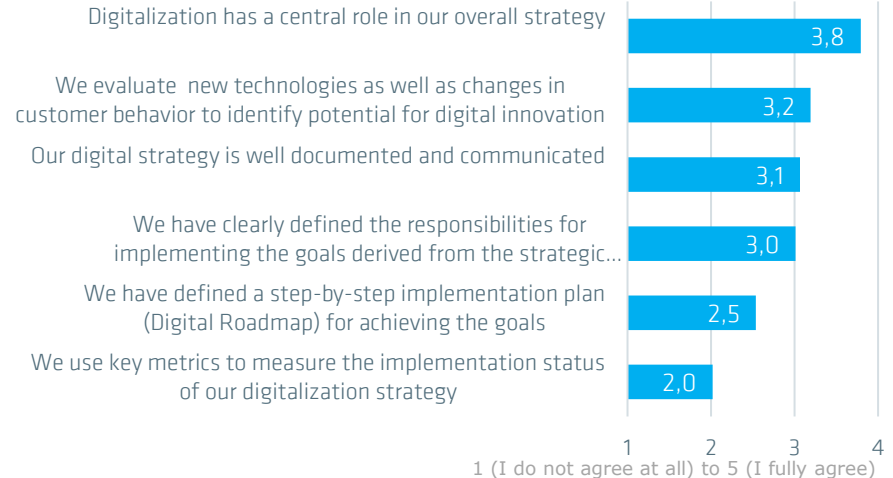
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Dimensions of digital maturity: Detailed overview

Each dimension of the maturity model consists of 4-6 criteria that describe its content. This includes, for example, relevant skills and resources. The survey participants were presented with corresponding statements for agreement on a 5-point scale (from 1 - I do not agree at all - to 5 - I fully agree). These values form the basis for calculating the digital maturity. The average results for the individual criteria in all dimensions are presented in detail below.



Strategy (n=336)

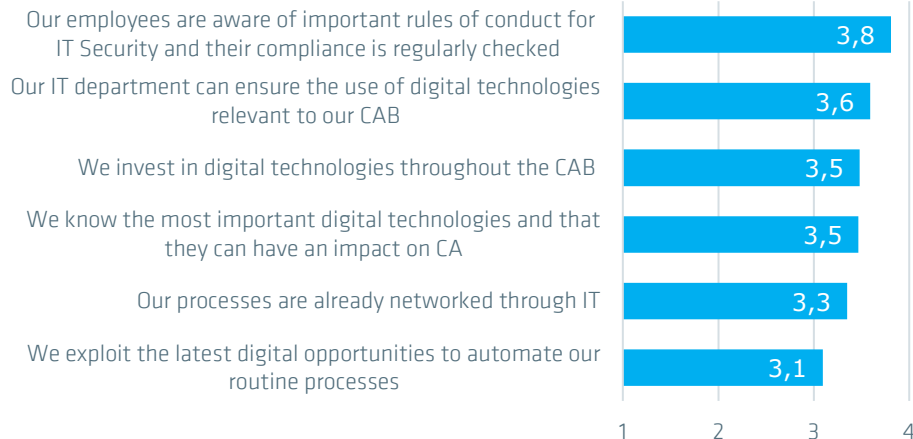


- In most CABs (76%), digitalization plays a central role in their overall strategy, with 62% having a well documented digital strategy.
- Only 50% have set up a Digital Roadmap and less than 40% use key metrics to measure the implementation status of their digitalization strategy.

Dimensions of digital maturity: Detailed overview



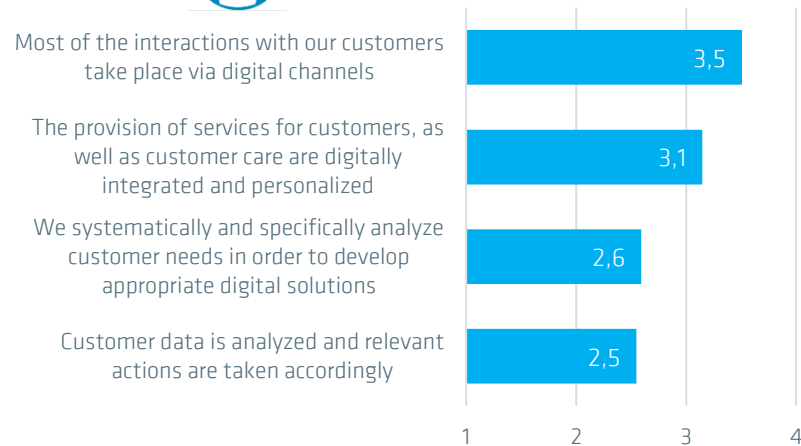
IT & Process Digitalization (n=332)



- At least 70% of CABs are aware of, invest in and are able to use digital technologies properly while complying with IT security regulations.
- More than 60% of CABs have networked their processes and automated routine procedures.



Customers (n=331)

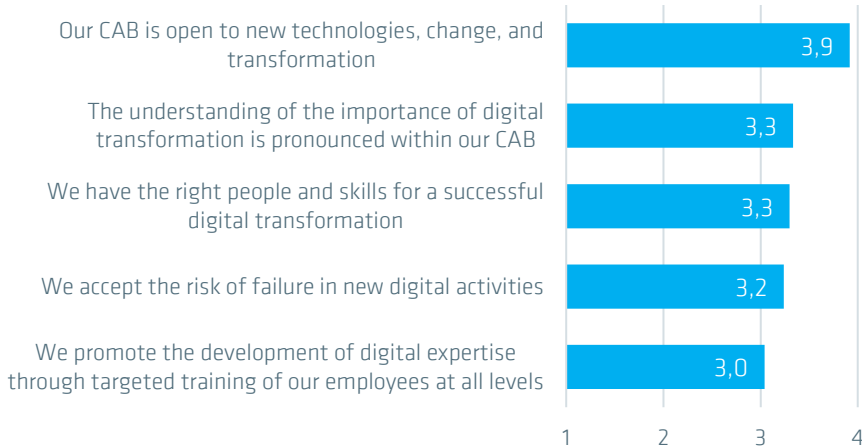


- 70% of CABs in Germany interact with their customers via digital channels.
- However, a lower proportion of CABs (62%) offer digitally integrated services to customers and only 52% of them develop appropriate digital solutions based on customer needs.

Dimensions of digital maturity: Detailed overview



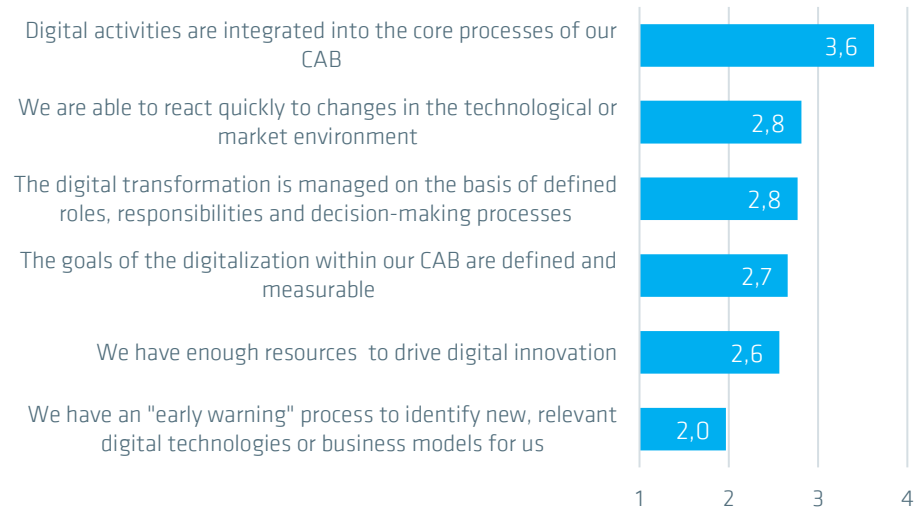
Culture & Expertise (n=333)



- German CABs are definitely open to new technologies, changes and transformations (78%).
- 66% of them have a strong understanding of the importance of digital transformation and have the right skills to successfully implement the change.



Organization & Change Management (n=332)

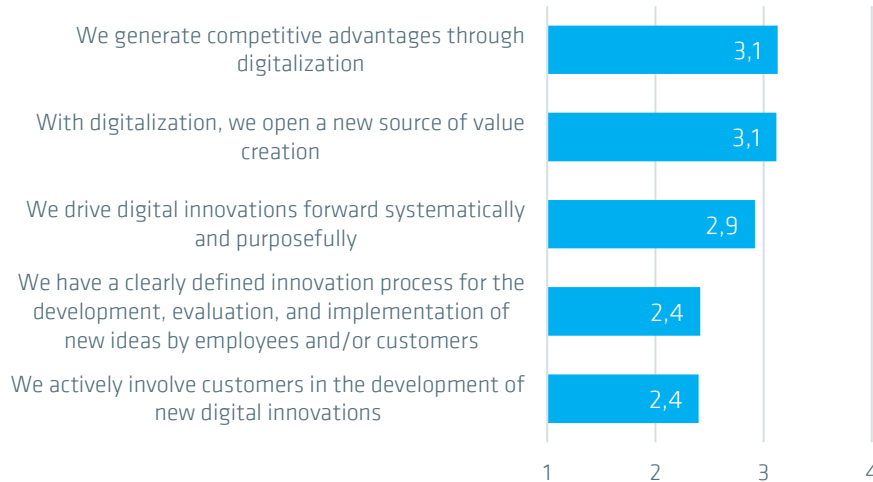


- 72% of CABs have integrated digital activities into their core processes. The clear definition of responsibilities and strategic goals is key to the implementation of digital transformation.

Dimensions of digital maturity: Detailed overview



Innovation (n=330)



- For the majority of participants (62%), digitalization represents a new source of value creation and creates competitive advantages.
- However, customers are hardly involved in the innovation process.










Cooperation (n=330)



- The majority of CABs work across departments and functions on the topic of digitalization and obtain additional knowledge by consulting external experts.
- Collaboration with specific stakeholders of the CAB is less intensive. Only 40% maintain a partner network with external parties.

Digital Maturity Model








Level 1 (Beginner)

Description Level 1: Beginner	Dimensions						
							
Digitalization has a central role in our overall strategy	■						
Our employees are aware of important rules of conduct for IT Security and their compliance is regularly checked		■					
Our CAB is open to new technologies, change, and transformation				■			
Digital activities are integrated into the core processes of our CAB					■		






Digital Maturity Model

Level 2

Description Level 2	Dimensions						
							
Our processes are already networked through IT							
Our IT department can ensure the use of digital technologies relevant to our CAB							
We invest in digital technologies throughout the CAB							
We know the most important digital technologies and that they can have an impact on CA							
Most of the interactions with our customers (e.g., advise, purchase conclusion, and customer service) take place via digital channels							
The understanding of the importance of digital transformation is pronounced within the CAB							
We have the right people and skills for a successful digital transformation							
We work across departments and functions on the topic of digitalization							


Digital Maturity Model

Level 3

Description Level 3	Dimensions						
							
Our digital strategy is well documented and communicated	■						
We have clearly defined the responsibilities for implementing the goals derived	■						
We evaluate new technologies as well as changes in customer behavior to identify potential for digital innovation	■						
We exploit the latest digital opportunities to automate routine processes		■					
The provision of services for customers as well as customer care are digitally integrated and personalized			■				
We promote the development of digital expertise through targeted training of its employees at all levels				■			
We accept the risk of failure in new digital activities				■			
With digitalization, the CAB opens a new source of value creation						■	
We generate competitive advantages through digitalization						■	
We drive digital innovations forward systematically and purposefully						■	
We use exchanges with external experts to build up additional knowledge in the area of digitalization							■
We undertake actions (e.g., workplace concepts) that support employees in collaborating effectively							■








Digital Maturity Model

Level 4

Description Level 4	Dimensions						
							
We have defined a step-by-step implementation plan (Digital Roadmap) for achieving the goals	■						
We systematically and specifically analyzes customer needs in order to develop appropriate digital solutions			■				
Customer data is analyzed, and relevant actions are taken accordingly			■				
We are able to react quickly to changes in the technological or market environment					■		
The digital transformation is managed on the basis of defined roles, responsibilities, and decision-making processes					■		
The goals of digitalization within the CAB are defined and measurable					■		
We have enough resources to drive digital innovation					■		
We collaborate effectively with stakeholders on digital initiatives							■

Digital Maturity Model

Level 5 (Experts)

Description Level 5: Expert	Dimensions						
							
We use key metrics to measure the implementation status of its digitalization strategy	■						
We have an "early warning" process to identify new, relevant digital technologies or business models for us					■		
We have a clearly defined innovation process for the development, evaluation, and implementation of new ideas by employees and/or customers						■	
We actively involve customers in the development of new digital innovations						■	
In the field of digitalization, we maintain a partner network with external service providers, start-ups, or research institutions							■