

Sicherheit in Technik und Chemie



# **Digitalization in Conformity Assessment** in Croatia

QI-FoKuS

Research on Conformity

Assessment and Safety

BAM

Bundesanstalt für

Materialforschung

und -prüfung

A QI-FoKuS study

www.bam.de www.qi-fokus.de





ISI

# A study conducted within the framework of the QI-FoKuS initiative



Basic statistical population for the survey	440 accredited conformity assessment bodies (CABs) in Croatia	QI-FoKuS Research on Conformity Assessment and Safety
Data collection method	Online survey	Digitalization in
Survey period	March 30, 2022 June 12, 2022	Conformity Assessment
Sample	43 fully completed questionnaires (= 10% response rate)	





Fraunhofer



#### Supported by



### The Study - An Overview



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 depend 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, digitalization also offers new opportunities. Our QI-FoKuS study explores "Digitalization in Conformity Assessment" based on data from an online survey of accredited CABs in Croatia.

#### Major topic areas covered

**Digital Maturity Level** 

 Assessment of digital readiness and status of digital transformation in CABs based on a tailored digital maturity model

#### Drivers, Benefits and Barriers

 Drivers and motives for digital transformation, the benefits and impacts realized, and barriers faced by CABs towards digital transformation

#### **Technology Trends**

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



### **Table of Contents**



Page Chapter

#### <u>5</u> <u>The Sample</u>

- <u>9</u> <u>Digitalization in Croatian CABs: A General Overview</u>
- <u>13</u> Digital Maturity of CABs
- <u>20</u> <u>Motives, Impacts, Hurdles of Digitalization</u>
- <u>24</u> <u>Technologies and Trends</u>
- <u>29</u> Digitalization and the COVID-19 Pandemic
- <u>33</u> <u>The Project and Contacts</u>

#### <u>35</u> <u>Annexes</u>





# **The Sample**

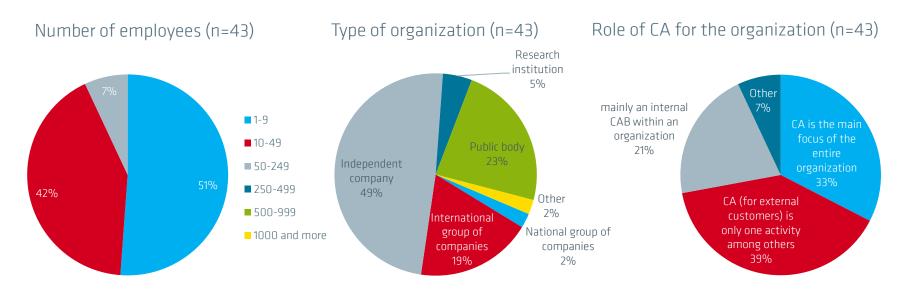
General information about the participating Conformity Assessment Bodies

www.bam.de

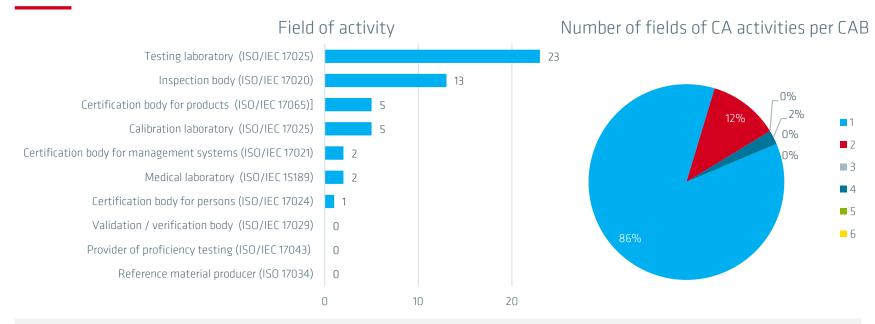
# 43 conformity assessment bodies (CABs) in Croatia participated in the survey



- 93% of participating CABs are **small businesses** with less than 50 employees.
- 49% are **independent companies**, 23% are **public bodies** and 19% belong to an **international group**.
- For 33%, Conformity Assessment (CA) is the main economic focus of activity and for 39% it is one activity among others.



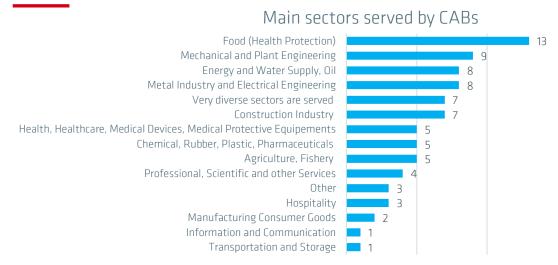
# The 43 participating CABs cover a broad range of $\ge$ BAM activities



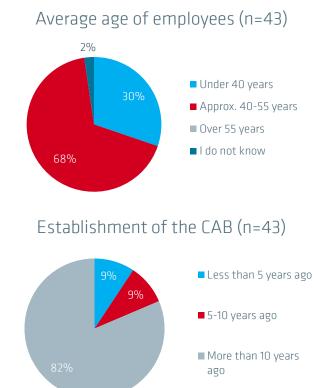
- Testing laboratories represent the largest group of participants, followed by inspection bodies and certification bodies for products.
- 86% of CABs are **specialized** in a single field of conformity assessment activity; only a few cover a broad range of activities (up to 4).



# The CABs serve a broad spectrum of sectors// most established for a long time



- The main industries served by the CABs are from the food sector, but also the mechanical and plant engineering industries are important.
- While the **average age of the employees** is 40-55 years in 68% of the CABs, 30% have staff under 40 years on average.
- 82% of the CABs were **established** more than 10 years ago; only 9% are younger than 5 years.







# **Digitalization in Croatian CABs A General Overview**

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

www.bam.de

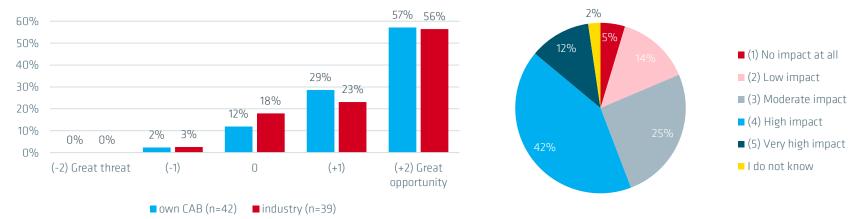
# Digitalization more of an opportunity rather than a threat // Major influence expected



Expected impact of digitalization in the

next 5-10 years (n=43)

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

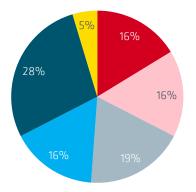


- In general, the CABs have a **positive perception** of digitalization: 86% of the surveyed CABs recognize digitalization as an **opportunity or even a great opportunity** rather than a threat for their own organization, and 79% with regard to the whole CA industry.
- 54% of the participants expect a **high or even very high impact of digitalization on CA activities** in the next 5-10 years. Every fourth CAB expects a moderate impact.

## Diverse status of digitalization across the CABs// Focus mainly on internal processes



#### Status and extent of digitalization in the CABs (n=43)

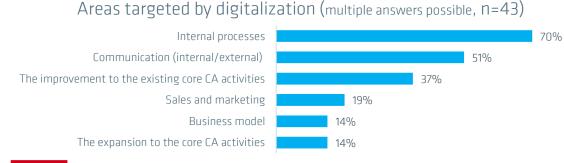


2022

Digitalization is not a topic of interest for our CAB

We have started to address digitalization

- We have launched single smaller projects (pilots)
- We have implemented overarching projects
- We have integrated digitalization across the entire CAB
- I do not know

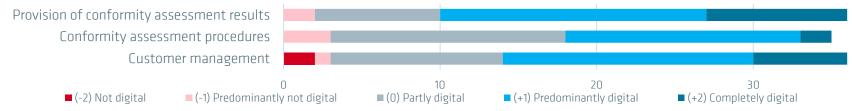


- The status of digitalization is quite diverse across the CABs in Croatia: While 16% of the CABs have just started to address this topic, 19% have launched single smaller projects and 16% have already implemented overarching projects. 28% state to have integrated digitalization across the whole organization. However, for 16% digitalization is not a topic of interest.
- Most digitalization activities concern internal processes. Yet communication and the improvement to the existing core CA activities are also relevant areas. However, digitalization is currently rarely used to adopt new business models or to expand CA services.

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







- The CA results are provided partly, predominantly or completely digitally by the majority of CABs. Conformity assessment procedures 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 slightly better, especially with regard to relevant authorities and customers.
- Digitalization has not been a topic for long: the majority of CABs (51%) has only started to deal with it during the last 5 years. Nearly one in four CABs has done so at least 10 years ago.

Own status of digitalization compared to... (n=41) (on a scale of (-2 much worse) to (+2 much better))



CABs started to deal with digitalization... (n=35)







# **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 Croatia based on a model developed specifically for this study.

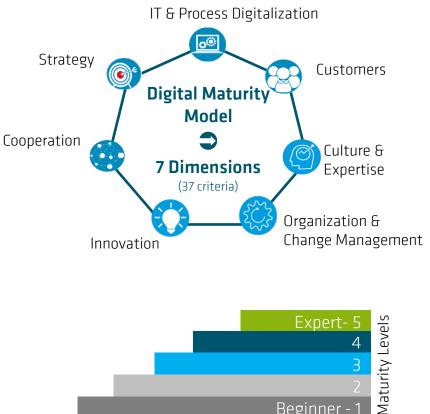
www.bam.de

## The digital maturity model for the conformity assessment industry



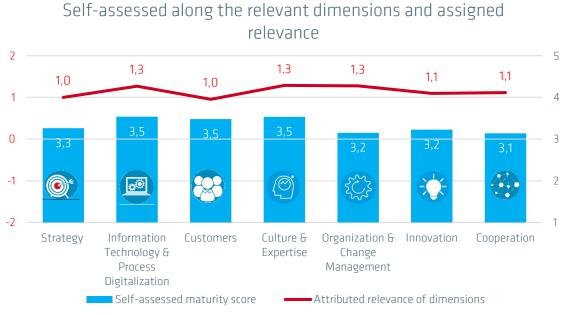
- The digital maturity level reflects the status of digital transformation of an organization and includes technical as well as organizational and strategic aspects.
- Becoming a digitally mature organization requires efforts, **capabilities** and **resources** across many areas.
- These are mapped in 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").

2022



Beginner

# Different maturity of dimensions: IT, Customers and $\ge$ BAM Culture advanced, Cooperation at a lesser extent



\* 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 CABs slightly differs in the various dimensions:
  - The CABs consider themselves to be most advanced in the area of "IT & Process Digitalization", "Customers" and "Culture and Expertise".
  - The greatest need to catch up is in the area of "Organization and Change Management" and "Innovation" and "Cooperation".
- Respondents are aware of the high relevance of the "IT & Process Digitalization", "Culture & Expertise" and "Organization & Change Management" dimensions.
- Details on the composition and partial results in the individual dimensions can be found in the appendix.

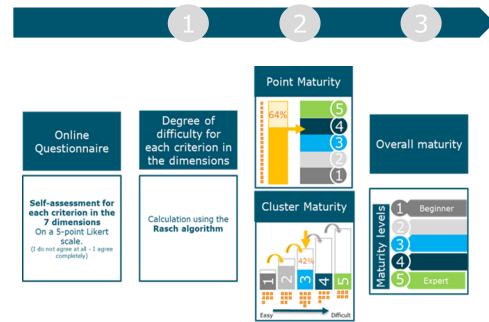
# Background information: Calculation of the digital maturity level



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:

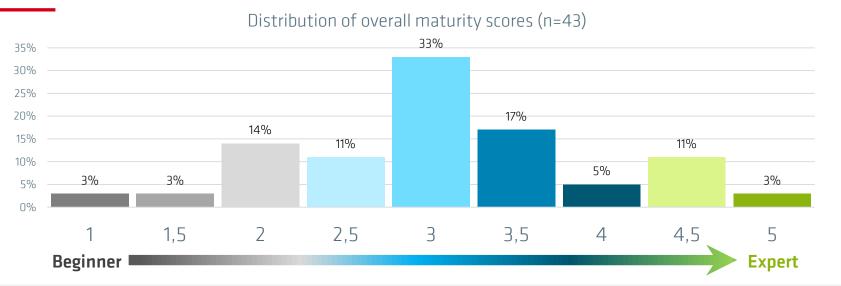
- For each criterion, the Rasch algorithm is first used to calculate how difficult it is to achieve a good result for it (**degree of difficulty**). If, on average, a large number of participants state that they can meet this criterion, it is classified as easy to achieve.
- Based on this, 2 types of 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.

2022



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 Croatian CA industry



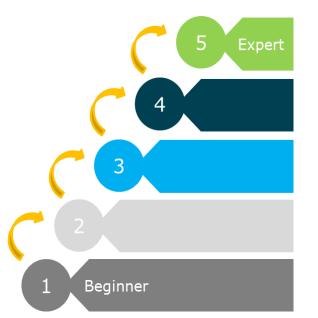
Statistically, the **digital maturity levels** achieved by the 43 participating CABs in Croatia follow a *normal distribution*:

- Every second CAB has reached medium level (i.e. 3 and 3,5). 19% of CABs have already reached a higher level of maturity. However a high share of CABs (31%) is still in an earlier stage of transformation.
- So far, only 3% of the CABs have reached expert level 5.



### The Digital Maturity of CABs in Croatia // Summary of the observed patterns





- At the **first maturity level**, CABs are open to change and pursue digitalization as a driver for new value creation.
- For stage two, capabilities, resources, and capacities are activated further in all dimensions. Digitalization is given a central place in the corporate strategy. Customer care is digitalized and customer data is analyzed. The necessary personnel skills/competences are available and there is cross-departmental collaboration on this topic. The importance of digital transformation is well understood. Corresponding investments in digital technologies are made.
- Organizations at the **third maturity level** have automated routine processes and drive digital innovations based on customer needs. CABs offer targeted training to employees and generate competitive advantages through digitalization.
- CABs in the **fourth maturity stage** focus on organizational adaptation. CABs have well defined and measurable digitalization goals and sufficient innovation resources are available. Also, collaboration is strengthened, also with external stakeholders.
- In the final **fifth stage** organizations use key indicators to measure the implementation of the digital strategy and have an early warning system to identify relevant digital technologies.



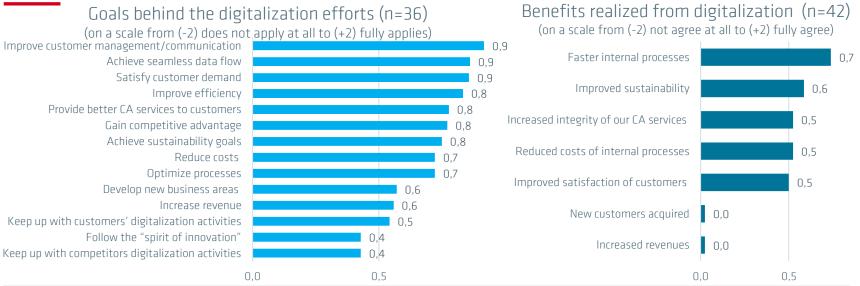


# Motives, Impacts and Hurdles of Digitalization

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

www.bam.de

# Focus on customer management/communication improvements

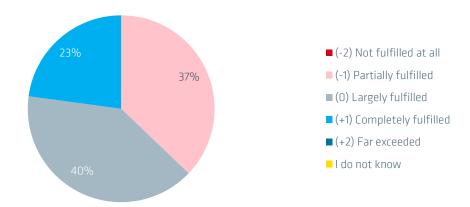


- Improving customer management/communication and achieving seamless data flow are the main goals behind the digitization efforts of CABs in Croatia. In fact, faster and more cost-effective internal processes are considered as the greatest realized benefits.
- Market objectives such the development of new business areas and increase revenues are no big drivers and the effects achieved on sales and new customer acquisition are correspondingly low. However, many respondents see the satisfaction of existing customers as well as the CAB's sustainability improved.

# CABs' expectations in connection with digitalization are partially met



Whether the expectations behind the introduction of digital processes/technologies have been fulfilled overall so far (n=35)

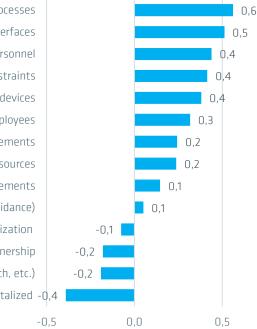


- 63% of the CABs consider their expectations behind the introduction of digital technologies to have been largely or completely fulfilled. However, one out of three CABs find them only partially met.
- No CABs state that their expectations were not met at all.



# Complexity of digital processes is the biggest hurdle

Hurdles to digital transformation (n=42) (Scale from (-2) not at all to (+2) very much)



- The general complexity of digitalization processes is the biggest hurdle for CABs, followed by the lack of uniforms
- Lack of qualified personnel and time constraints are also barriers.
- The inability to digitalize CA services is not a hurdle for CABs.







# **Technologies and Trends**

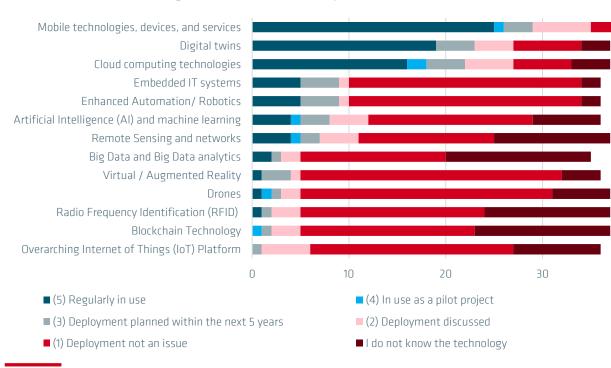
This section highlights the actual (or planned) use of concrete digital technologies and applications in the CABs. In addition, the use of remote procedures and technologies is presented.

www.bam.de

# Latest digital technologies are not yet widely used in CABs



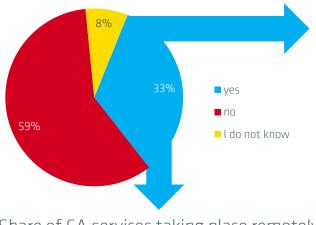
#### Technologies that are used or planned to be used (n=37)



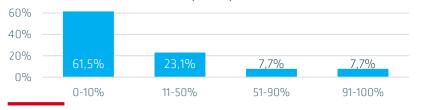
- Many of the latest digital technologies such as digital twins, artificial intelligence and Big Data, are used by CABs in Croatia, but (besides digital twins) not yet on a large scale.
- Blockchain technologies mean nothing to 38% of the respondents, Big Data to 43%.
- Among CABs, mobile technologies are widely used, followed by digital twins and cloud computing technologies.

## Remote methods and technologies are not largely used by most CABs

#### CABs that use remote methods in CA (n=39)

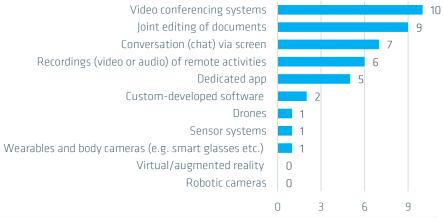


Share of CA services taking place remotely (n=13)



2022

#### Technologies used for remote procedures (n=13)



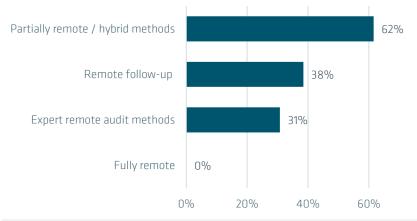
- Only one out of three CABs use remote methods in their CA activities.
- 62% of the CABs still perform a maximum of 10% of their activities remotely. Only 8% of the CABs have already switched completely.
- Video conferencing systems are the most commonly used tool for remote working, followed by joint editing of documents.

Digitalization in Conformity Assessment in Croatia - A QI-FoKuS study

### **Diverse approaches used and experienced hurdles in remote procedures**

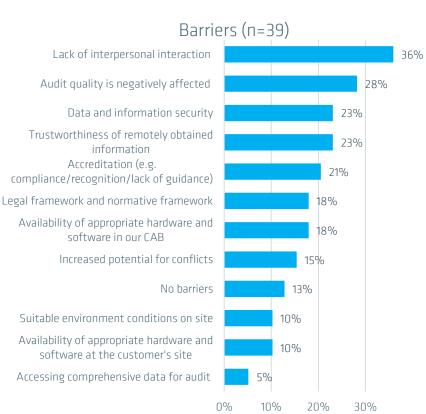


Type of remote procedures used (n=13)



- **Hybrid methods** are the predominant type among remote methods used by CABs.
- The lack of interpersonal interaction and the impairment of audio quality are considered to be the biggest **hurdles** to the use of remote procedures.

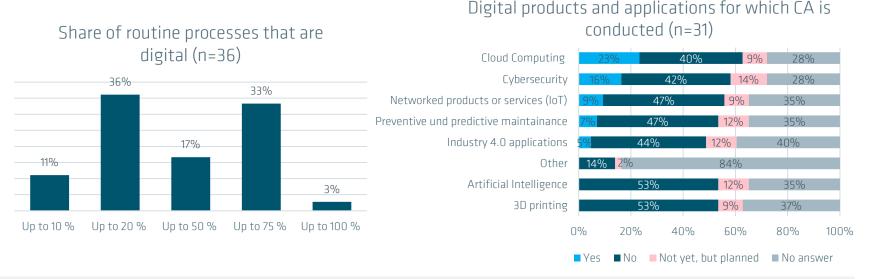
2022



Digitalization in Conformity Assessment in Croatia - A QI-FoKuS study

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





- 36% of the CABs have digitalized more than half of their routine processes. However, one out of ten CABs has not even digitally converted 10% of their processes.
- 33% of the surveyed CABs conduct **conformity assessments for modern digital technologies and applications.** In focus: cloud computing (23%) and cybersecurity (16%).





# The COVID-19 Pandemic and Digitalization

The role of digitalization in responding to the challenges posed by the COVID-19 pandemic and the impact of the pandemic on digitalization.

www.bam.de

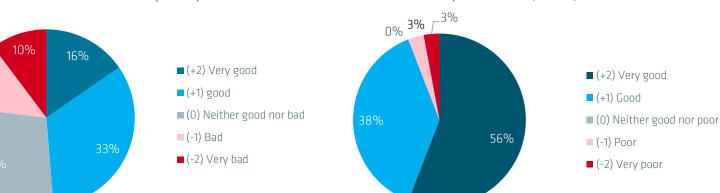
## Most CABs have not coped well with the COVID-19 pandemic



Response to the challenges of the COVID-19

pandemic (n=34)

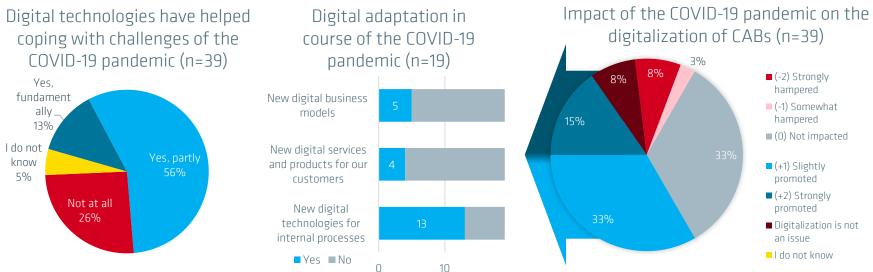
CABs' order situation in 2021 compared to pre-COVID-19 times (n=39)



- For 28% of the CABs, the economic situation in terms of incoming orders in 2021 was no better or worse than before the pandemic. 23% of the CABs stated that their orders have declined. The majority (49%) has actually seen their order situation improve.
- The majority of CABs (94%) reported that they had responded well or very well to the challenges associated with the COVID-19 pandemic.

### **Pandemic and digitalization**





- For 56% of the CABs, digital technologies have helped in coping with the challenges of the COVID-19 pandemic.
- The majority of the CABs (48%) reports that digital transformation has been slightly or even strongly encouraged and has led to adaptations:
  - 68% of CABs have introduced new digital technologies for internal processes, 21% new digital services and products for their customers, 26% even new digital business models.

### **Conclusion and Outlook**



- CABs in Croatia clearly see digital transformation as an opportunity. The level of digitalization varies among CABs. The majority of participants has reached a medium or higher level of digital maturity.
- Even though digital transformation is an individual project for each organization, typical patterns of digital maturity in Croatian CABs are nevertheless confirmed: An initial focus on technology, customers and culture is followed by holistic organizational transformation, including strategy, cooperation and change management.
- Many of the cutting-edge digital technologies such as Big Data, virtual reality and artificial intelligence are used by CABs in Croatia, but (besides digital twins) not yet on a large scale.
- 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.

# Croatia in international comparison

How do Croatian 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



QIThis study was developed in the context of the QI-Digital initiative. Its goal is to develop solutions for a modern<br/>digital quality infrastructure (QI) - together with stakeholders from business, politics, science, and QI.DIGITALMore information on the initiative and the opportunities for participation can be found at• www.qi-digtal.de

### **The Project and Contacts**





#### Scientific execution / authors

Dr. Claudia Koch, Dr. Luana Ladu, Parsa Asna Ashari (BAM) Prof. Dr. Knut Blind (TU Berlin, Fraunhofer ISI) Prof. Dr. Pavel Castka (University of Canterbury, NZL)

#### Support: Timo Kabierski

#### Acknowledgement

2022

We would like to thank the Hrvatska Akreditacijska Agencija for their support in conducting this study. Our thanks further goes to all those who were involved in the preparation and implementation of this study, e.g. who were available for expert interviews and questionnaire tests.



**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.

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 quality in infrastructure.

Swww.qi-fokus.de

Supported by

Hrvatska akreditacijska agenci Croatian Accreditation Agency





### Contact

#### Bundesanstalt für Materialforschung und -prüfung (BAM)

S.2 Accreditation and Conformity Assessment <u>www.qi-fokus.de</u> qi-fok<u>us@bam.de</u>

Dr. rer. oec. Claudia Koch

Tel.: +49 30 8104-3718 e-mail: <u>claudia.koch@bam.de</u> Dr. rer. oec. Luana Ladu

Tel.: +49 30 8104-4485 e-mail: <u>luana.ladu@bam.de</u>

www.bam.de





## Annexes

www.bam.de

### **Digital Maturity Model Cluster 1 (Beginner)**



		Dimensions								
Level 1: Beginner				Ø	Ĩ,					
Our employees are aware of important rules of conduct for IT Security and their compliance is regularly checked										
Most of the interactions with our customers (e.g., advise, purchase conclusion and customer service) take place via digital channels										
Our CAB is open to new technologies, change and transformation										
With digitalization, we open a new source of value creation										



### **Digital Maturity Model Cluster 2**



Description Dime				ensions								
Level 2												
					र्ट्रे							
Digitalization has a central role in our overall strategy												
We evaluate new technologies as well as changes in customer behavior to identify potential for digital innovation												
Our digital strategy is well documented and communicated												
Our processes are already networked through IT												
We know the most important digital technologies and that they can have an impact on CA												
We invest in digital technologies throughout the CAB												
Our IT department can ensure the use of digital technologies relevant to our CAB												
The provision of services for customers, as well as customer care are digitally integrated, and personalized												
Customer data is analyzed, and relevant actions are taken accordingly												
The understanding of the importance of digital transformation is pronounced within our CAB												
We have the right people and skills for a successful digital transformation												
We accept the risk of failure in new digital activities												
Digital activities are integrated into the core processes of our CAB												
We work across departments and functions on the topic of digitalization												
Strategy IT & Process Digitalization Customers Culture & Expertise Organization & Change Management					Соор	erati	on					

### **Digital Maturity Model Cluster 3**



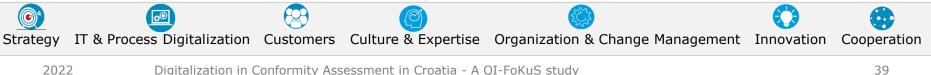
Description Level 3		Dimensions							
		0	8	Į					
We exploit the latest digital opportunities to automate our routine processes									
We systematically and specifically analyze customer needs in order to develop appropriate digital solutions									
We promote the development of digital expertise through targeted training of our employees at all levels									
We generate competitive advantages through digitalization									



## **Digital Maturity Model Cluster 4**



Description		Dimensions									
Level 4			8	Ø	2223						
We have clearly defined the responsibilities for implementing the goals derived from the strategic consideration on digitalization											
The goals of the digitalization within our CAB are defined and measurable											
The digital transformation is managed on the basis of defined roles, responsibilities and decision-making processes											
We are able to react quickly to changes in the technological or market environment											
We have enough resources to drive digital innovation											
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 collaborate effectively with stakeholders on digital initiatives											
We undertake actions (e.g., workplace concepts) that support employees in collaborating effectively											



### **Digital Maturity Model Cluster 5 (Expert)**



Description Level 5: Expert		Dimensions									
			8	Ø	EC22						
We use key metrics to measure the implementation status of our digitalization strategy											
We have defined a step-by-step implementation plan (Digital Roadmap) for achieving the goals											
We have an "early warning" process to identify new, relevant digital technologies or business models for us											
We actively involve customers in the development of new digital innovations											
We have a clearly defined innovation process for the development, evaluation, and implementation of new ideas by employees and/or customers.											
In the field of digitalization, we maintain a partner network with external service providers, start-ups, or research institutions											







We evaluate new technologies as well as changes in customer behavior to identify potential for digital innovation

Digitalization has a central role in our overall strategy

Our digital strategy is well documented and communicated

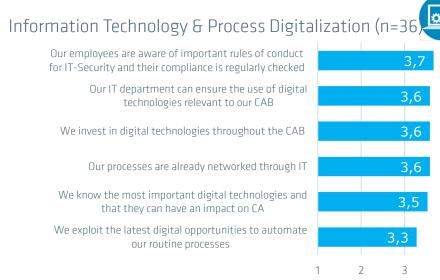
We have clearly defined the responsibilities for implementing the goals derived from the strategic consideration on digitalization

We use key metrics to measure the implementation status of our digitalization strategy

We have defined a step-by-step implementation plan (Digital Roadmap) for achieving the goals

2022





1 (I do not agree at all) to 5 (I fully agree)

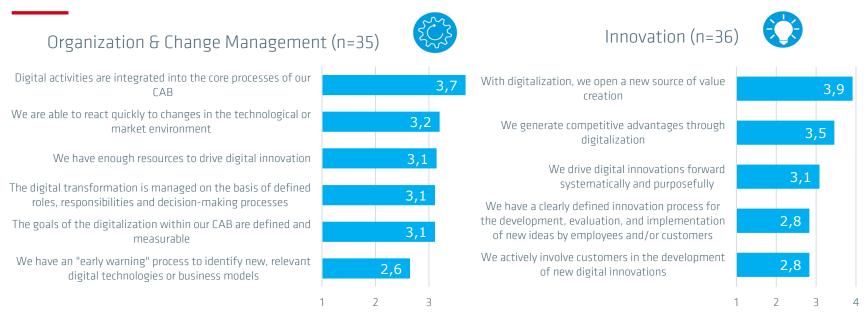
- In most CABs (72%), digitalization plays a central role in their overall strategy, with 70% having a well documented digital strategy.
- 56% have set up a Digital Roadmap and 60% use key metrics to measure the implementation status of their digitalization strategy.
- At least 72% of CABs are aware of, invest in and are able to use digital technologies properly while complying with IT security regulations. 72% of CABs have networked their processes and 66% have automated routine procedures.



Customers (n=36) Culture & Expertise (n=36) Most of the interactions with our Our CAB is open to new technologies, change, and 3,8 3,9 customers take place via digital transformation channels The understanding of the importance of digital The provision of services for customers, 3,6 transformation is pronounced within our CAB as well as customer care are digitally 3,5 integrated, and personalized We accept the risk of failure in new digital activities 3,5 Customer data is analyzed and relevant 3,4 actions are taken accordingly We have the right people and skills for a successful 3,5 digital transformation We systematically and specifically analyze customer needs in order to 3,2 We promote the development of digital expertise 3,2 develop appropriate digital solutions through targeted training of our employees at all levels

- 76% of CABs in Croatia interact with their customers via digital channels.
- 70% offer digitally integrated services to customers and only 64% of them develop appropriate digital solutions based on customer needs.
- Croatian CABs are definitely open to new technologies, changes and transformations (78%). At least 70% of them
  have a strong understanding of the importance of digital transformation and have the right skills to successfully
  implement the change.





- 74% 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.
- For the majority of participants (78%), digitalization represents a new source of value creation.
- However, customers are hardly involved in the innovation process.





- In order to work on the topic of digitalization across departments and functions (72%), 64% of CABs build additional knowledge through external expert consultations. They also collaborate effectively with stakeholders on various digital activities.
- 58% maintain a partner network with external service providers.