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A REPORT FROM THE RESEARCH PROJECT FUTUREHOTEL

FUTUREHOTEL – THE SMART RESILIENT HOTEL

HOW DOES DIGITIZATION HELP HOTELS IN TIMES OF THE CORONA CRISIS AND AFTERWARDS?

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Preliminary remark:

For reasons of better readability, this publication does not use female, male and intersexual language forms. Nevertheless, all references to persons apply to each gender.

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1 INTRODUCTION

This study deals with the »Smart Resilient Hotel«. The meaning of this term will be explained in the following. The key question is: How does digitization help hotels in times of the Corona crisis and afterwards?

1.1 CONCEPTUAL INTRODUCTION

What is meant by the term »resilience«?

During the Corona crisis, we encounter this term time and time again in the press and media. »Resilience« comes from Latin and means »to jump back« or »bounce back« and is used in the field of psychology. Here it is used in the context of »psychological resilience«. »Resilience is the ability to survive difficult life situations without being confronted with permanent impairments.« (Duden Online, 2013).

»The `Smart Resilient Hotel´ describes a hotel that is characterized by a high degree of digitization and is capable of surviving stressful, threatening situations without persistant damage.«

Consequently, digitization is an important competence in companies in order to better cope with the Corona crisis.

What do we understand by »digitization«?

»Digitization is the conversion of analogue values into digital formats. Storing information digitally, making it available to electronic data processing, that's what we understand by digitization today and how we use it.« (Riedel, 2019)

Furthermore, the term »digital transformation« is often used.

»Digital transformation« is also referred to as the process of profound digital change. Digital technologies are used for supporting or promoting an ongoing process of change in economic terms, especially in companies. (Wolan, 2013) Usually this is a long-term process.

The process of digital transformation is driven by different technologies, such as internet, digital data management, Artificial Intelligence (AI) technologies, Machine Learning, data analytics, proximity technologies, Internet of Things (IOT), Augmented and Virtual Reality solutions and also blockchain technologies as well as digital platforms, mobile payment solutions, i.e. digital payment processes. Further relevant are voice and emotion-based control systems, up to future technical solutions enabling to control devices in our environment via our thoughts. Technology is the basis for Smart Services and Smart Environments, whereby »smart« in this context means »networked« and »digitized«. (Borkmann et al., 2020a, p. 48ff)

The »Smart Hotel Concept« - what does it means?

»The `Smart Hotel Concept´ stands for a networked, technical system solution that improves the comfort and feel-good quality, security and energy efficiency in a hotel. It also features a high degree of automation through digitization. The use of digital data provides an important contribution in this respect.« (Borkmann et al., 2020a, p. 4)

Health protection of employees and guests is an important aspect of safety in a hotel. It can be significantly improved by »smart solutions«. This is through automation, digitization and the use of technology.

1.2 DATA ON THE SITUATION OF THE HOTEL INDUSTRY DURING THE CORONA CRISIS

In the following, the situation of the German hotel market in April 2020 is described. In the media you can follow the current situation regarding the hotel and restaurant industry. The negative impact of the Corona crisis on various industries is displayed in figure 1. It shows a comparison of the tourism and hospitality industry with other industries, such as sports, music, automotive, beverages, retail and pharmaceuticals. The impact of COVID-19 can be seen in different categories, for example when it comes to the gathering of larger groups of people. Further categories are interactive, interpersonal exchange as well as hygiene or the perception of hygiene, dependence on travel activities or travel services. It is evaluated whether services and products can be postponed or whether their demand accumulates over time. This does not apply necessarily to hotel stays and visits to restaurants. The tourism and hospitality industry is strongly harmed by the current crisis compared to other industries.

In the past and up to the present the hotel and tourism industry have regarded themselves as a **»high touch industry«**, because in this branch of hospitality a great deal is about personal service. However, now the crisis requires a change towards a so-called **»low touch economy«**. We should no longer meet, we should no longer see each other, we should no longer touch each other. Meanwhile, the future seems to lie in contactless solutions.

Industry characteristics
If a characteristic exists in your company or at your customers, the effects are negative unless you can successfully turn around.

	Large gatherings indispensable	Close human interaction essential	Hygiene or its perception is decisive	Depending on travel (business or private)	Product or service can be moved/ extended	Impact analysis
Tourism and hospitality	particularly high	particularly high	high	particularly high	high	particularly high
Sport	particularly high	particularly high	medium	low	medium	high
Music	high	high	low	medium	medium	high
Automotive	low	low	medium	low	particularly high	high
Drinks (alcoholic)	high	high	medium	medium	gering	medium
Trade (non-food)	high	medium	medium	medium	medium	medium
Pharmaceuticals	low	low	high	low	low	low

Figure 1: Industry Impact Analysis (Source: Own illustration based on Boardofinnovation.com)

How does the industry deal with this development in perspective?

The German Hotel and Restaurant Association (DEHOGA) predicts a loss around 10 billion Euros in turnover by the end of April 2020. This concerns 223,000 businesses in Germany. Further 70,000 businesses are threatened by bankruptcy. These are alarming figures. (Spiegel Online on 19.04.2020)

On April 25th, 2020, a first lifting of the restrictions in Germany was assumed by the beginning of May 2020 and a reopening of schools from May 4th. The construction and production sector have not yet been forced to shut down. The restrictions on trade were eased on April 20th. Meetings of groups of more than 100 people are expected to be tolerated until August 31st, 2020. It is not yet clear when gradual exits from restrictions on the hotel and catering industry can be relaxed, including the opening of national borders. (STR, 2020, p. 20; CoStar Reality Information, Inc.)

The following graphs (Fig. 2, Fig. 3) refer to current developments in the international market and show that flight bookings and hotel bookings have declined strongly and correlate with the spread of COVID-19. International hotel bookings report a decline by 75% in March 2020. Looking at these numbers it has become clear that the economy is taking a much worse battering than expected and its impact will have long-term consequences.

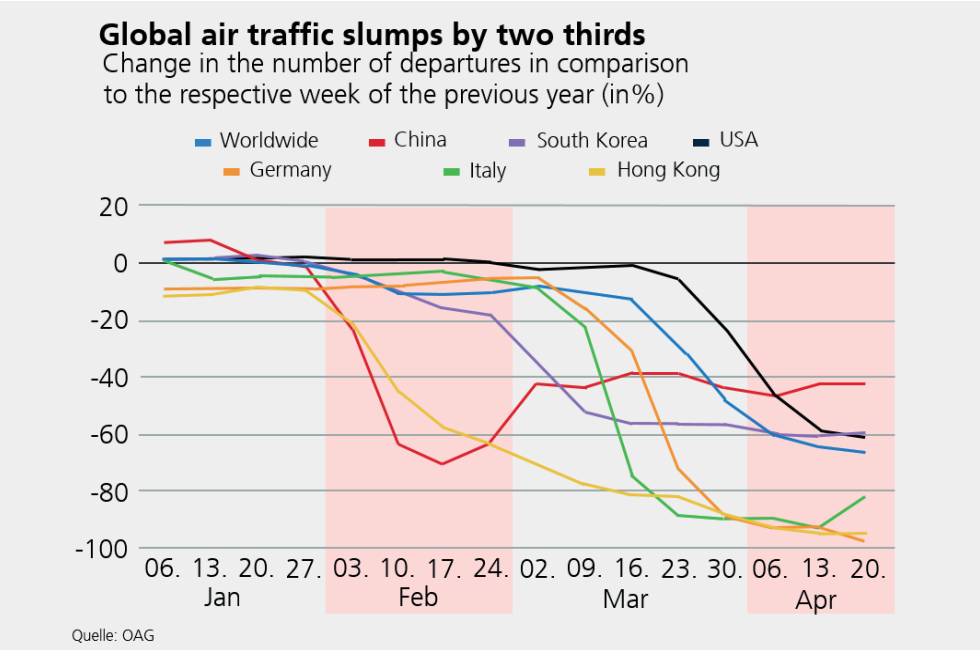


Figure 2:
Decline in flight bookings worldwide
(Source: Own illustration based on OAG/ Statista 2020)

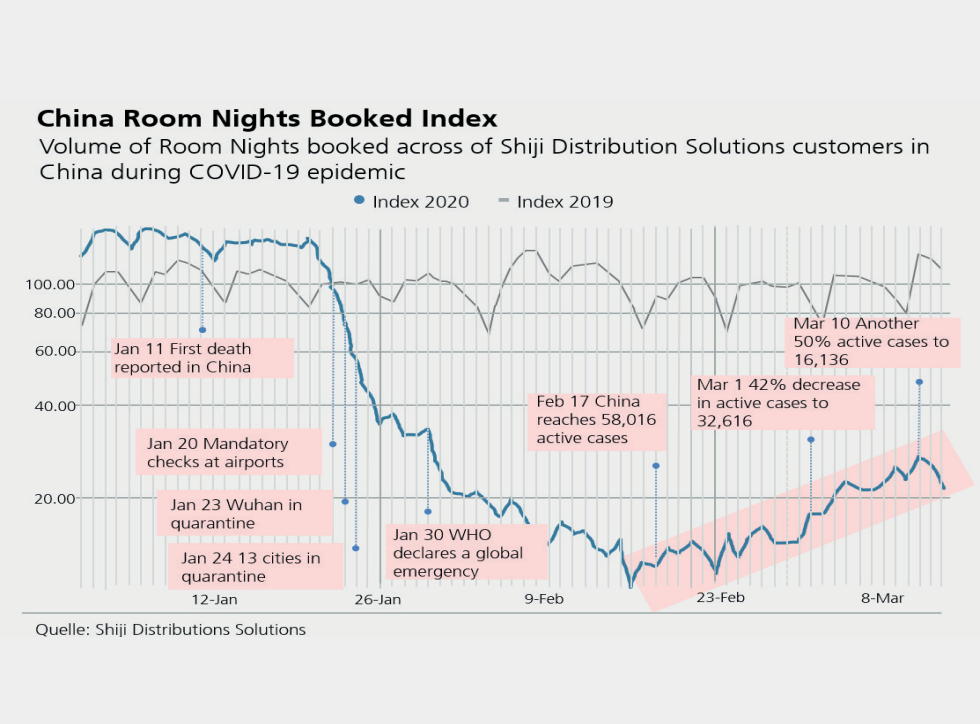


Figure 3:
Decline of Hotel bookings in China
(Source: Own illustration based on Shiji Distributoin Solutions)

Outlook (US Market)		
	Forecast 2020	**Forecast 2021**
Supply	-14,9%	+15,6%
Demand	-51,2%	+81,8%
Occupancy	-42,6% (37,9%)	+57,3% (59,7%)
ADR	-13,9% ($112,91)	+3,7% ($117,05)
RevPAR	-50,6 ($42,84)	+63,1% ($69,86)

Figure 4:
Forecast for RevPar development in the US hotel market (Source: Own illustration based on STR/ Tourism Economics, 2020)

According to industry experts a reasonable recovery or return to operating mode will take about 6-10 months for the hotel industry. In contrast, ADR (Average Daily Rate) and RevPAR (Revenue per Available Room) will take approximately 12-16 months. For RevPAR in the US hotel market (Fig. 4), a decline of 50% is currently predicted for 2020 (NextGuest, 2020, p. 7). Assumably comparable figures of the German market are less optimistic. Faced with the most brutal recession in living memories, industry has been severely hit and hoteliers are struggling hard to save their business on a long-term perspective. Top priority must be the implementation of appropriate solutions for their business in order to survive this crisis.

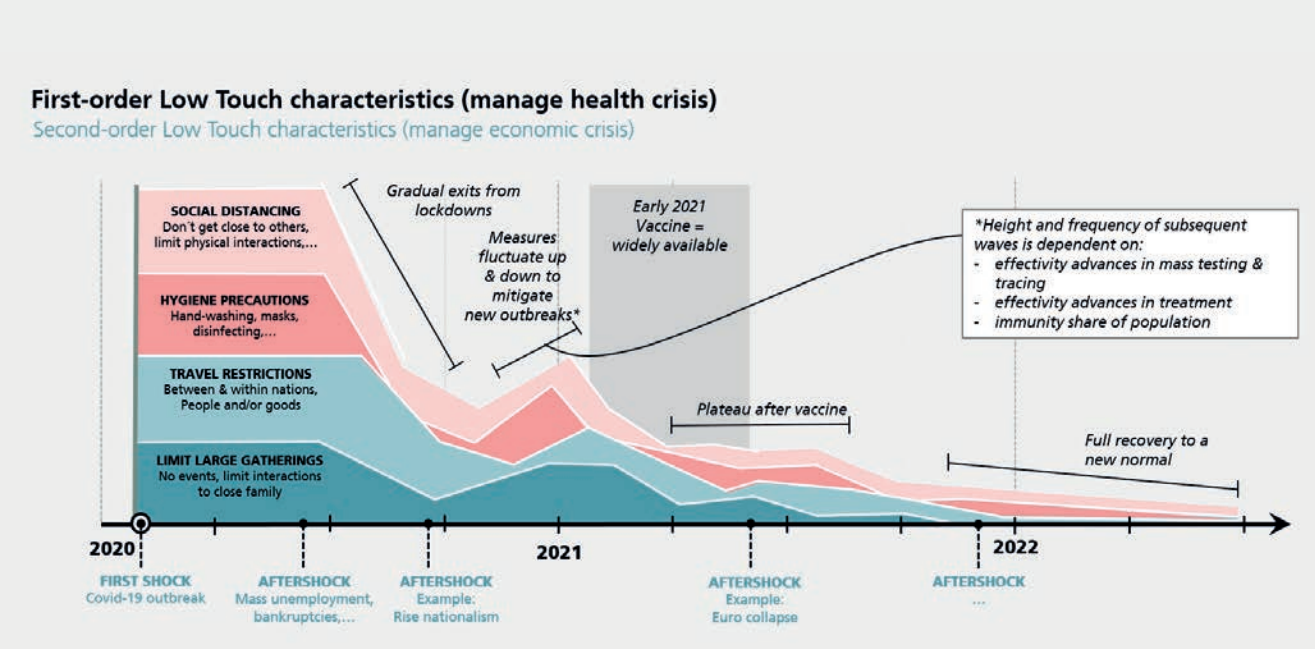


Figure 5: Low Touch Economy After Shocks (Source: Own illustration based on Boardofinnovation.com)

Figure 5 shows the assumption of an expected temporal development triggered by COVID-19, including the effects on travel and logistics. According to this diagram, a going of »back to a new normal« can not be expected before 2022. (De Mey; De Ridder, 2020, p. 26)

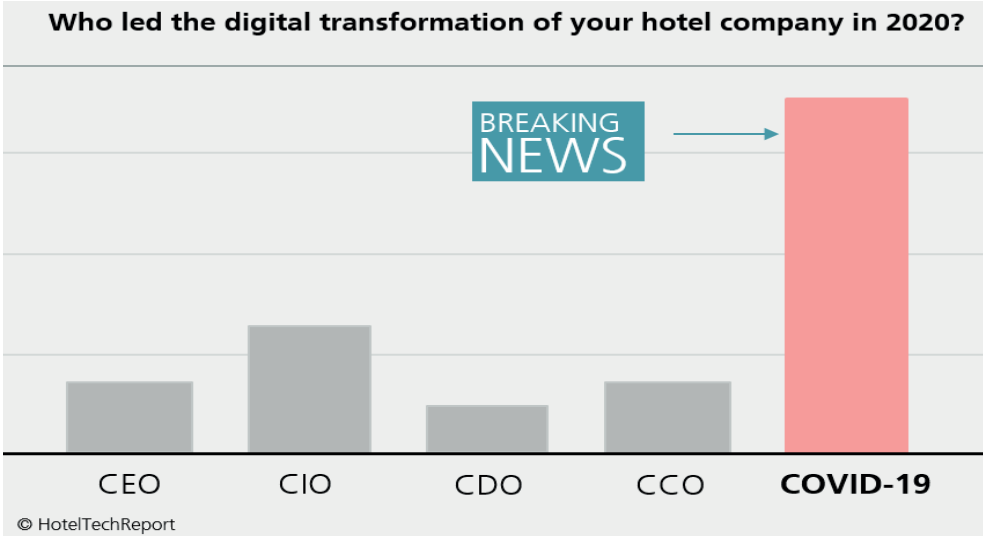


Figure 6:
Drivers of the digital transformation in hotels in 2020 (Source: Own illustration based on HotelTechReport)

During the pandemic, digitization becomes a critical success factor more than ever.
Unfortunately, in recent years in the hospitality industry many companies have quite neglected digitization. A survey by Bitkom in 2016 shows 72% of all companies (across all trades and industries) still regarded digitization as the biggest challenge after hiring skilled workers (73%). In the tourism industry in general, 67% of all companies »tend to see themselves as stragglers when it comes to digitization«, well behind automotive, pharmaceutical and banking industries. Comprehensive insights into the status quo of digitization in various industries were provided by the Bitkom »Trend Study Digitalisation« (Bitkom, 2019). Fig. 6 underlines the important role of COVID-19 for the digital transformation of hotel companies. (Hollander, 2020)

Achim Berg, president of Bitkom, proclaimed an appropriate quotation on 1st April 2020:

»The crisis is a wake-up call to push digitization massively, [...]. In the past, we did not take enough effort towards digitization. The motto of `keeping things the same´ no longer applies.«

2 IMPLEMENTATIONS BASED ON A (LONG-TERM) DIGITIZATION STRATEGY

Why does it make sense following a (long-term) digitization strategy?

It may seem challenging, but at this point it is important to see the crisis as an opportunity to take action and devote oneself to one's own digitization strategy. In the following four strategic fields of action will be shown, in which a digitization strategy can be made tangible by different measures.

Looking at the ecosystem of a hotel, you realize the hotels´dependence on its surroundings. In fact, it is embedded in a macro-system, which comprises its social environment, neighbourhood, families of the staff, service providers, suppliers, cooperation partners and also a building environment. This is the stage of a hotel with its guests, its employees and its premises. All these components are linked into a smart, digitized overall system, called Internet and exchange of data in real time. Through digital networking, the Internet, and digital data exchange, a hotel becomes a »Smart Service Ecosystem« (Fig. 7).

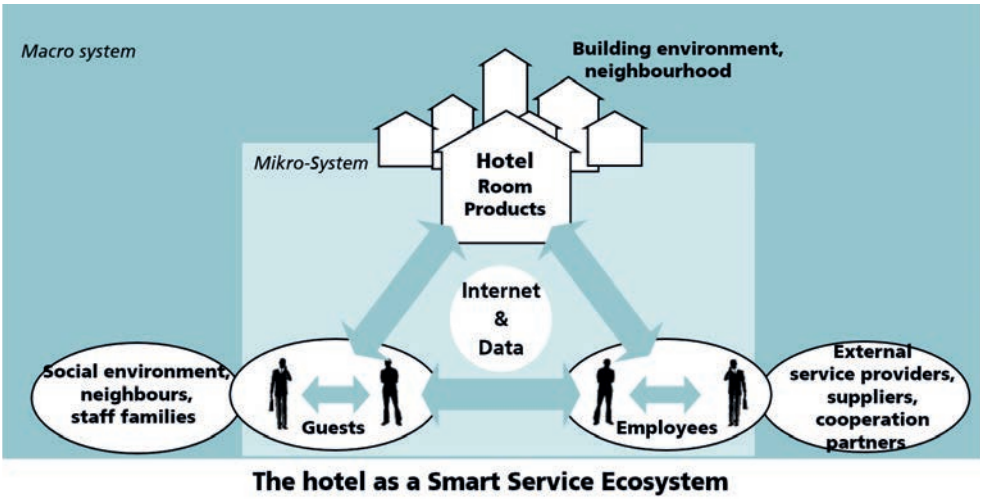
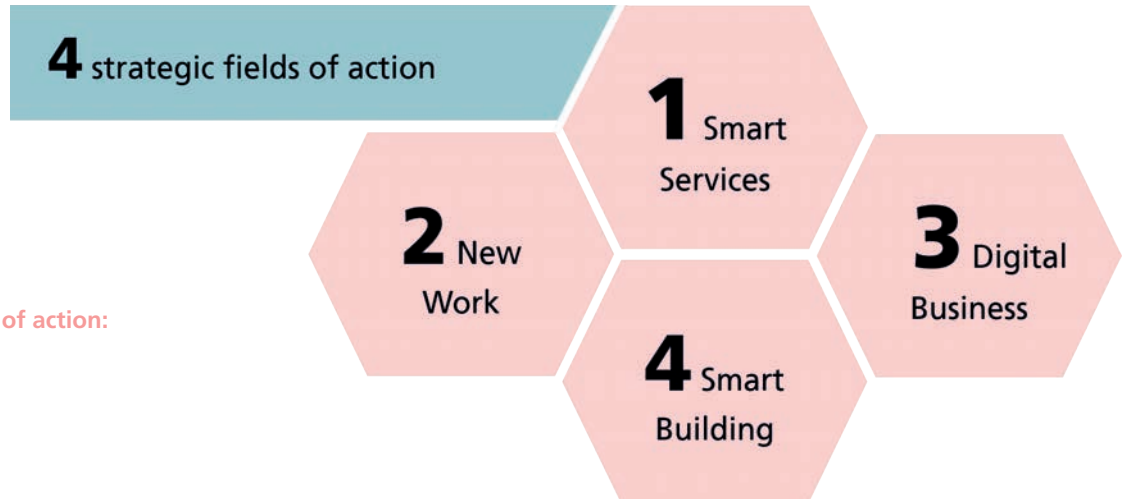


Figure 7:
The hotel as a Smart Service Ecosystem

In other words: Only a hotel with a smart ecosystem can offer smart services. »Smart Services« describe services that can be offered and booked online, but often come along with a physical component to provide the actual service. For example, a taxi service can be ordered and paid online via the platform »UBER«, but the trip itself is performed by a real car and a driver. Smart Services in hotels use a system that digitally links guests and employees and therefore ensures digital communication in real time. Also, the hotel can provide personal services between guests and employees at any time and address guests in a personalized way. In addition, real time user data and resource consumption can be analyzed and processed digitally. These examples show impressively why digitization is very appropriete to implement and offer services and processes - despite the remoteness between the parties involved. A hotel employee does not have to be in or near the hotel in order to offer, present, sell or execute certain services or performances. Digitization permits services and processes despite physical distance.



The four strategic fields of action:

1. Smart Services
2. New Work
3. Digital Business
4. Smart Building

Physical distancing of persons (guests, employees, etc.) through digitization can render a significant contribution to health protection and can easily be realized by the four fields of action. Measures are explained in the following chapters.

Note: Check for yourself which of the following measures have already been implemented in your company. Which of them meet already the requirements, and could be quickly implemented? Which are most useful to you?


Crowd Management
Smart Check-In, Check-Out
Booking of Additional Services
Demand-oriented Real-time Housekeeping
Additional Sales (Ancillaries)
Digital Key, Digital Payment
Communication via Display, TV, App, Website

2.1 FIELD OF ACTION 1: SMART SERVICES

Digitization of services in the hospitality industry tends to have the reputation of being rather impersonal. However, exactly this supposedly »impersonal« but especially »contactless« digital and automated service turns out to be just a competitive factor in the current crisis striking the formerly »high touch industry«.

2.1.1 Approaches and measures in the field of Smart Services

By booking and checking-in and -out online, the physical distance is maintained in a hotel. Further well applicable approaches in the field of smart services are e.g. reiceiving the keys, payment and demand-oriented housekeeping. (Borkmann et al., 2020a) Which measures regarding Smart Services are suited for supporting digitization and, most importantly, create the necessary social distance between staff and guests or the staff themselves?

Smart Services represent a valuable instrument when selecting and booking a hotel or restaurant either via app or its website. They are very convenient for guest communication, the selection and booking of services and support by means of assistance functions carried out by a chatbot. Digital Concierge Services are also related to Smart Services.
However, a check-in via smartphone can also be done at a terminal or a vending machine. Certainly, check-out can also be fully automated.

»Crowd management« is a practice where the flow and accumulation of crowds is systematically planned and monitored. Most hotel businesses are currently closed and are looking forward to the time when restrictions will be lifted. In this context croud management means a prior contact to expected guests in order not to have them arriving at the same time. The separation can be done by assigning different arrival times to guests. Further, the arrival scenario is explained such as the procedures on site and the current hygienic requirements. Here a hotel app or displays inside the hotel can be used for online tracking of guests and real-time communication. All of these measures ensure the physical distance between guests and staff as well.

By offering a virtual tour of the building and premises with 360 degree spheres on the hotel's website, the guest or a service provider can obtain information in advance on the rooms and the walking routes. This helps guests find their way immediately, for example the car park, th eentrance of the building or how to get to their rooms. This measure allows smooth processes with less face-to-face contact.

Also to be integrated into the virtual space are »Shop functions«, giving a boost to online sales (E-Commerce). Apart from the possibility of booking a hotel room within a 360 degree sphere, product purchases and service bookings can be made either during a 360 degree tour or on the hotel website. In addition, guests can book breakfast or purchase selected items offered by the hotel in cooperation with partners. Hotels may also offer room delivery services which means to the guest contacltess ordering, receiving and paying. Especially in times of a pandemic, these sources may serve as an important additional »revenue factor« for hotels.

Digital ordering processes, additional bookings and additional sales virtualize the contact between customer and employee. This way the direct exchange with physical presence is avoided. While employees and guests are protected, guests can continue to access services on an ad hoc basis: select, book and ideally pay digitally.

Video communication like displays in the lobby, reception area or guest rooms can helpful to get in touch with guests and vice versa. Employees on duty in the hotel would introduce themselves on the displays. Also employees can get in touch from their home office. Information or current offers can also be provided on the displays. Another mobil communication device would be tablet computers in the guest rooms.

Smart Services in the future may mean using service robots or automated guided vehicle systems (AGVs) or even drones for delivery and transport services. They might be future devices for satisfying service requirements, additional bookings and requests of guests.

As of January 2020 cashless payment has been introduced by the hotel chain Prizeotel. This hotel is solely cashless oriented, that means cash is no longer accepted, not even for beverages at the bar. The cashless development is being discussed controversially in society, but the Corona crisis shows how this means of payment can contribute to a life with less direct personal contact - a trend for the future, without a doubt.

Digital room keys, for example via barcode or app on the smartphone also help avoid physical contact. If the access control system to rooms and other areas in the hotel can be controlled digitally or online, a personalization of access authorizations for guests, for employees and also for service providers can be issued in real time. This process can of course also be controlled from home office. Of course, further authorizations can be assigned or deleted via software at any time. As far as room cleaning is concerned guests may decide a convenient time for themselves and communicate their request by using the before-mentioned devices. For example the desired cleaning time might be between 3 and 4 pm, while he will be absent. If cleaning of the room is not possible during this time, the guest can refrain from this service. In the future real-time communication will become increasingly important in the service and logistics sector. It should also be a central component of the hotel´s own digitization strategy.

2.1.2 Effects of actions in the field of Smart Services

to summarize the positive effects in the first field of action: staff in the front and back office, in the service areas, in the catering trade and on the floor have less physical contact with other people as a result of digitization. Guests can still experience comprehensive, cordial and personalized service.


Data Management Platform, Collaboration
Exchange Formats, Online Knowledge Transfer
Virtual and Online Meetings
Training, Teaching, Education Online
Team Spirit and Corporate Identity, Social Participation
Home Office, ICT and Tech Support
Mental Support, Consideration of Personal Requirements

2.2 FIELD OF ACTION 2: NEW WORK

The corona crisis requires a rapid change from inflexible, rigid work to a more flexible form of work with concepts from the »new work« sector. (Borkmann et al., 2020c) The flexibilization of work through digitization and automation turns out to be a competitive factor during the pandemic.

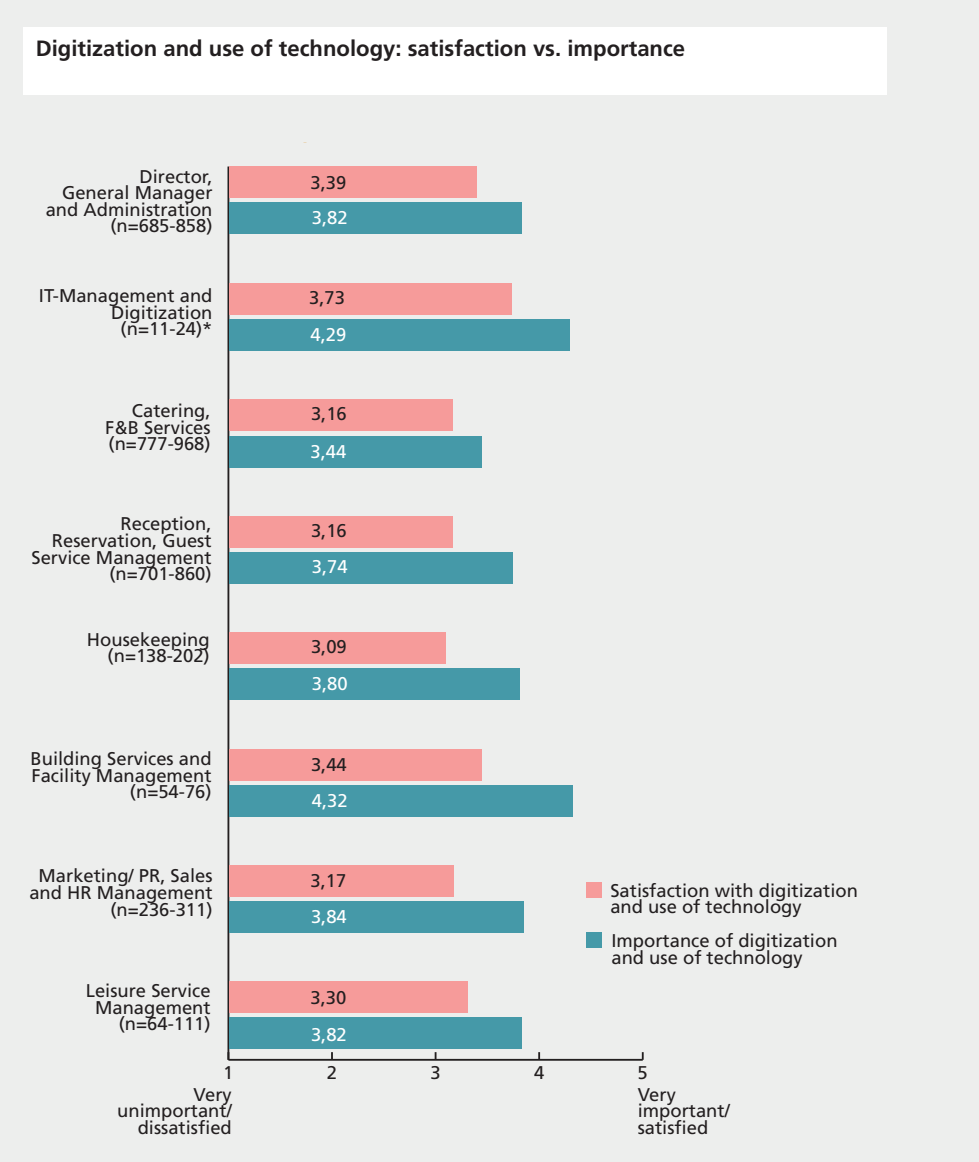


Figure 8:
Satisfaction and and importance of technology use and digitization according to working areas

Digitization and the use of technology serve as tools to develop the topic of new work into a competitive factor. Last year, the Fraunhofer IAO conducted a survey among approx. 4,000 people in the hospitality industry on the current use of digitization and technology. The result was differentiated between representatives from different work areas of a hotel. Fig. 8 reflects the grade of satisfaction after implementaton and also the importance of the topic technology use itself. Here a remarkable gap between participants fro the field of building services and facility management is noticed.

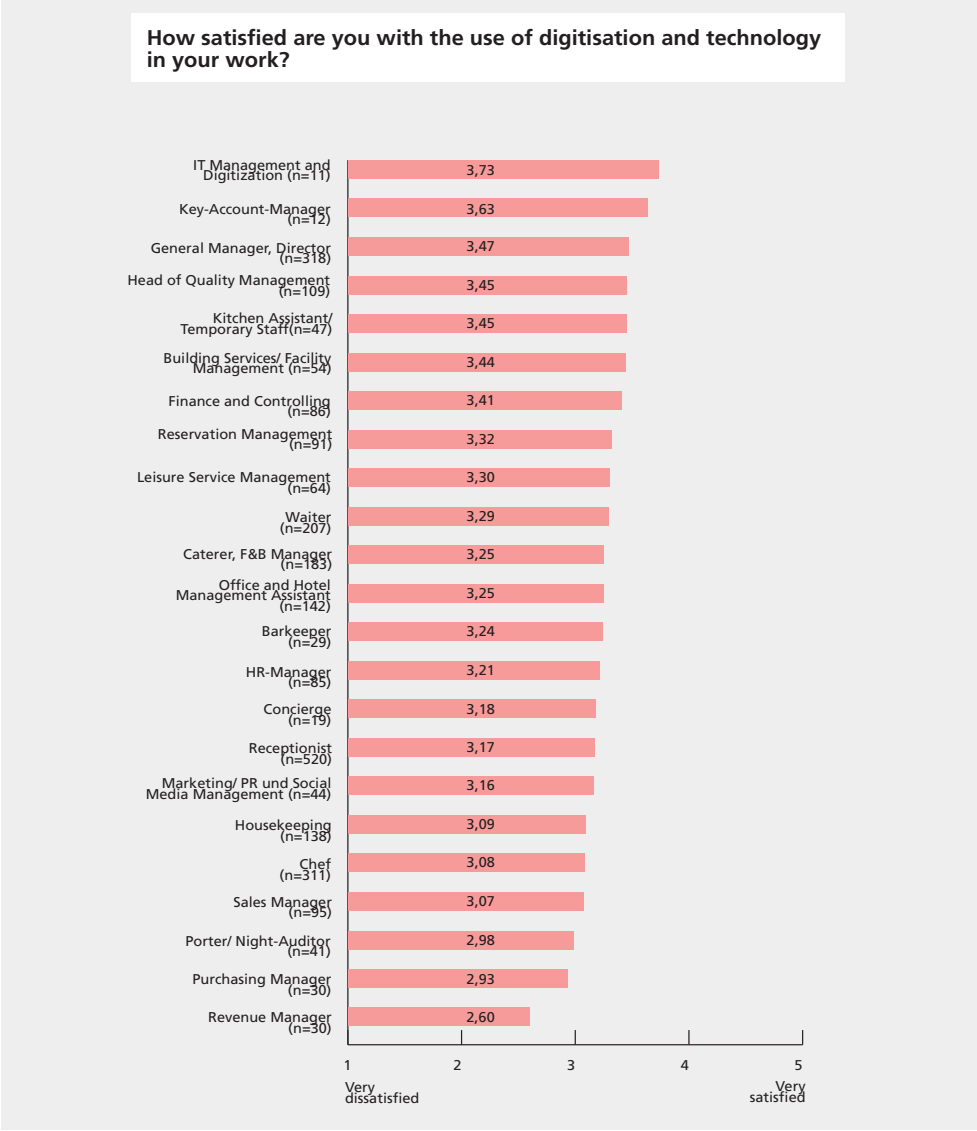


Figure 9:
Satisfaction with the use of technology and digitization according by occupation

In a comparison of professions (Fig. 9), people in IT management are currently most satisfied with the use of technology and digitization in their work. People from revenue management are in particular dissatisfied. Depending on the profession profile, the level of satisfaction with digitization at work is different.

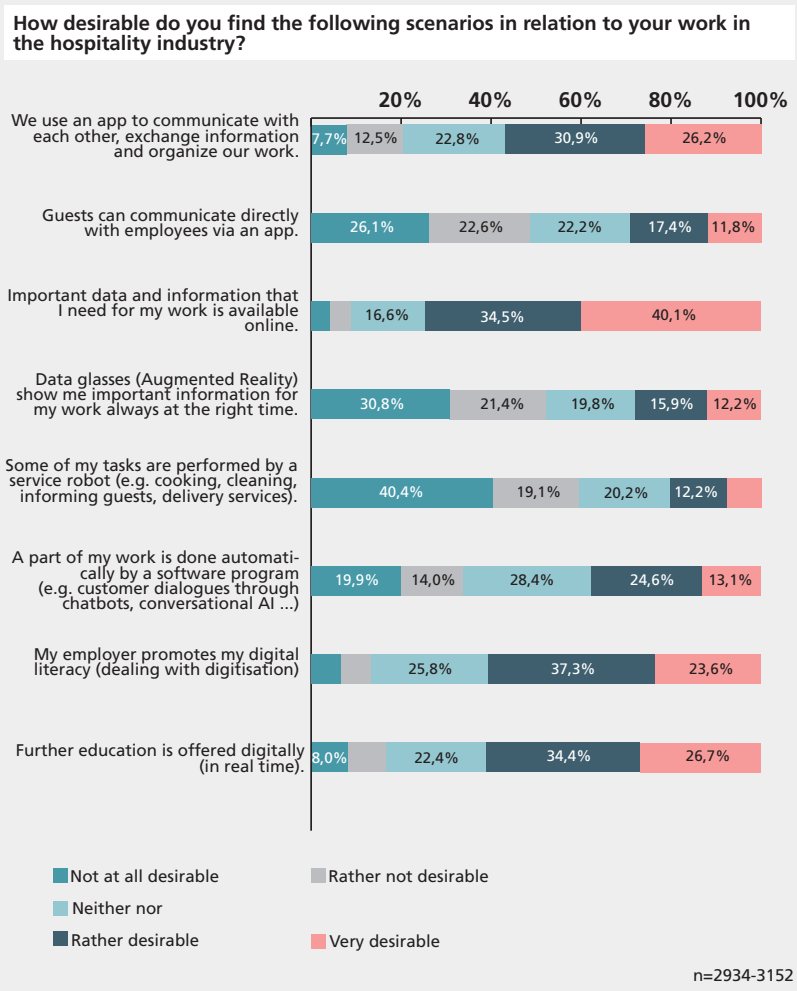


Figure 10:
Desire for digital work scenarios in the hospitality industry

Figure 10 shows how desirable different scenarios for work in the hospitality industry are evaluated. It is therefore highly desirable that »important data and information that I need for my work is available online«.

2.2.1 Approaches and measures in the field of New Work

»New Work« stands for innovative working environments or new organizational forms of work, such as the flexibilization of work. Which digitization methods are classified as New Work? Which digital methods are appropriate making the work of hotel employees more flexible in terms of time, location and satisfaction? Which methods are suited for a mutual »contactless co-working« with guests, service providers or colleagues?

Particularly beneficial in this context is digitization of processes in as many fields of work as possible, including ordering, delivering and receiving. An overall networked Smart Hotel Ecosystem also includes online accessibility of employees and data. Do employees have access to the Internet at home? Do they have access to a telephone while working at different locations? How can employees be contacted? A digital data management system of a company is an essential precondition, so employees have access to relevant information at any time and any place, for example via internet. With a functional extension, a data management system can be extended to a collaboration platform, so data can be exchanged and files can be viewed and edited online from several coworkers at a time.

Working from home ideally should be possible to every employee of a company, at least for specific activities. However, not every activity can be performed from home. At least, access to information and the availability of employees make selected activities possible, such as planning, accounting or the exchange of information with colleagues. This way more flexible working hours are possible, based on a certain amount of trust between employer and employee. Depending on the job description, depending on the area of application, this working time model is more or less suitable. This also applies to so-called teleworking, i.e. working at places other than the actual workplace - it does not always have to be from home. Work can also take place temporarily in another office, for example in a co-working space.

Looking at the above development, digital workforce management proves to be a useful tool. It makes digital workforce planning possible via apps, for example, and can be managed either by teams or by individuals among themselves or by a manager. The very personal requirements of individuals can also be taken into account, e.g. childcare or the care for relatives. This consideration is especially important in times of crisis, when everyone is exposed to a high level of psychological stress.

Ideally, in the system all digital information is available in different languages. This leads, for example, to a better comprehensibility and higher acceptance of the tools and information by an international workforce.

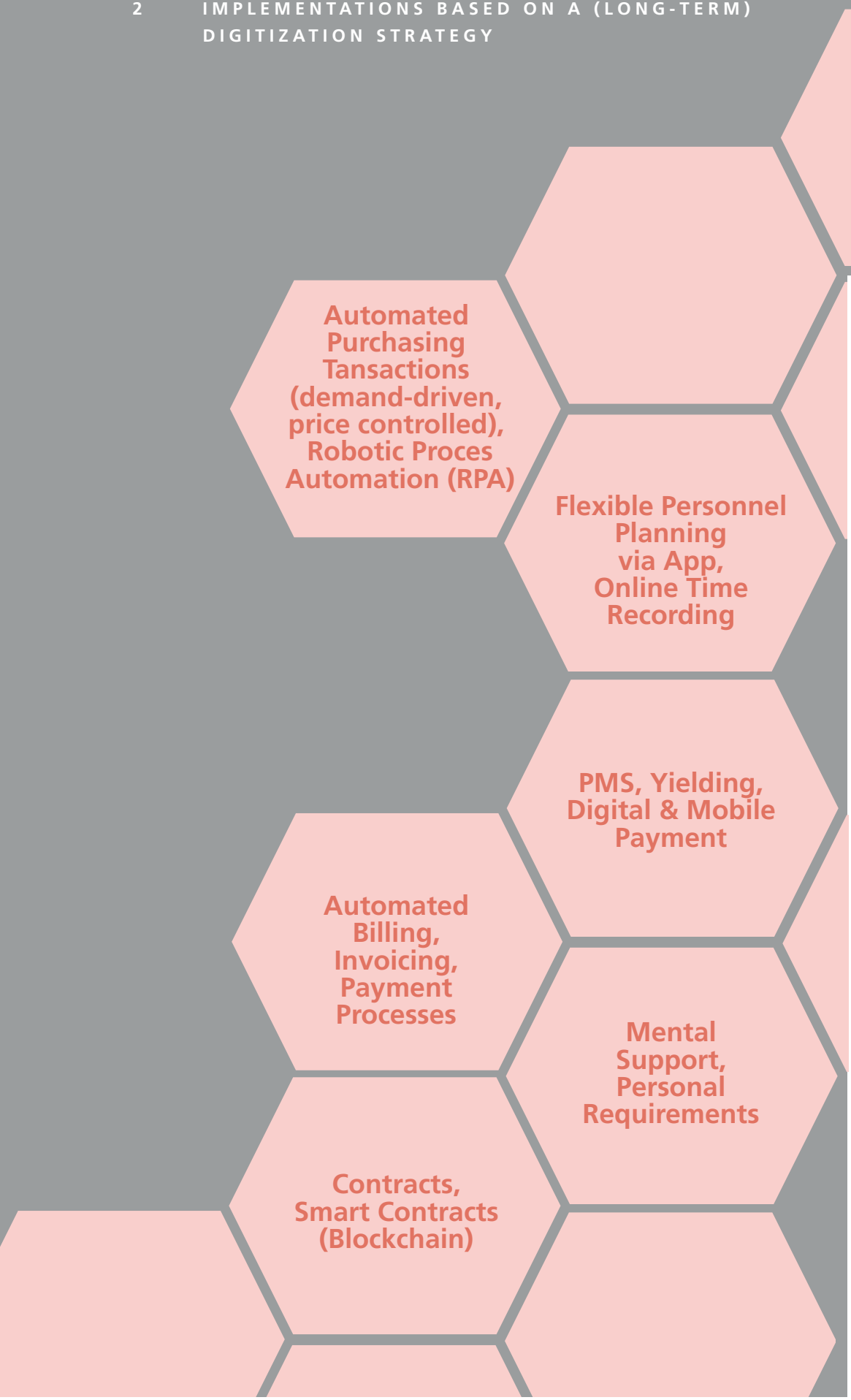
In times of the Corona crisis audio and video conferencing systems are increasingly used in every company and are experiencing an extremely high demand. In all industries, people learn how to handle this technology and lose their reservation when facing a camera. Online meeting serves as an important tool of coordination between colleagues in the team and with external parties, regarding their different steps of actions or keeping up to date with developments.

It is to be assumed that there will be clearly more virtual or hybrid meetings in the future compared to the time before the Corona crisis. In hybrid meetings people come together physically and in reality, but some of the people join in virtually. Education and training measures are also increasingly take place online. This development currently happens at universities, in educational institutions of all forms. Digital transformation efforts are carried out for topical reasons. This way remote access to educational content is possible independently of location and time. This is an enormous opportunity for qualification measures, part-time further education and training in the hospitality industry. The wheel of this development is no longer turned back.

Not to underestimate in the current situation is the fact that many people not only use the home office from time to time or use it in a self-determined way, but (have to) work in the home office without alternative. The virtualization and the required physical distance are in contradiction to the fact that we humans need social interaction for our well-being and for our mental health - we need contact with other people. Social participation is therefore an important measure, not only to strengthen the team spirit among colleagues, but also to involve people and allow them to continue to participate in what is happening in the company. Regular updates in online meetings, which include every employee - really everyone, even people who are not necessarily decisive for a certain question or for a certain topic, help to achieve this. The feeling of being part of a team that pulls together, has access to up-to-date information and offers all employees the opportunity to participate, i.e. to take everyone with them, is important.

2.2.2 Effects of actions in the field of New Work

In all areas of work, digitization leads to a flexibilization of work regarding place, time and content. Working time is used more efficiently, travel time is eliminated. Especially front office manager (FOH), concierge, night manager, back office (BOH), HR management and labor in other management areas can be saved. At the same time social participation, use of technology, availability of technology, autonomous responsibility but also more self-determination emerge as current challenges.


Automated Purchasing Tansactions (demand-driven, price controlled), Robotic Proces Automation (RPA)
Flexible Personnel Planning via App, Online Time Recording
PMS, Yielding, Digital & Mobile Payment
Automated Billing, Invoicing, Payment Processes
Mental Support, Personal Requirements
Contracts, Smart Contracts (Blockchain)

2.3 FIELD OF ACTION 3: DIGITAL BUSINESS

Connecting different IT systems in a network to form one total system enables remote control and monitoring of all digitized processes. An automated process can be managed based on current demands and events. This allows a quick adjustment of processes and the adaption to changing demand. Therefore, support through digitization like data-driven decision making turns out to be a competitive factor in times of the pandemic.

2.3.1 Approaches and measures in the field of Digital Business

»Digital Business« relates to organizational management, which affects all areas of a company. As the heart of a digital ecosystem, the online hotel management system (PMS) provides access to data and information from anywhere and at any time.

Working time and shift planning of employees and the organization of personnel can be managed and controlled with software. This happens according to the needs and depending on how, where, when, and for which activity certain persons or skills are required. These demand-driven processes take place digitally or automatically. Personnel deployment can be managed even competence-oriented with the help of a »matching tool« via app or on the computer. This way, innovative working time models and new forms of employment are made possible. In addition, apps or software for digital time recording is now available for this purpose. Real-time online time management and recording enables employees to manage their overall time more flexible. These tools are helpful for employees to manage and structure their day e.g. in the home office.

Online time recording, time management and digital access control systems offer the possibility to control who walks through a door in a company at a certain time. Access control becomes particularly relevant during and after a pandemic to separate people and to manage the number of contact points of one person with another to reduce potential threats. During the pandemic, restaurant visits or the visit of the breakfast area are clearly defined and the number of people are regulated. In addition, the whereabouts of the guests within the room are precisely determined and controlled. This control can be carried out, for example, with an app that uses sensor technology to record which persons had »contact points« in a certain period of time (see Pan-European Privacy- Preserving Proximity Tracing PEPP-PT; https://www.pepp-pt.org/).

A corresponding technology, based on location recognition of persons, can be used for working time recording. The moment when personnel enters and leaves the company is captured and the working time is detected depending on the persons´presence at certain workstations.

2 IMPLEMENTATIONS BASED ON A (LONG-TERM) DIGITIZATION STRATEGY

In an existing business, new working time models cannot be introduced overnight, as they require not only the technical solution but also an intensive coordination process with the workforce. New working time models for instance include the »tandem model«, when companies hire multiple people to fill one FTE (Full Time Equivalent), or the »four-day week« (instead of a five-day week). The »five-hour day«, instead of an eight-hour day, are other possible models that are already in use or being tested in some companies. Such approaches offer an opportunity for the hospitality industry and its employees to break new ground in the future.

Digitization allows automating the contracting business. This development is currently experiencing strong demand and includes digital contract conclusion, contract management by automated contracts like for instance »Smart Contracts«. In the future, Blockchain technology (or distributed ledger) will be of particular help.

The use of software systems to digitize procurement processes and invoicing links these processes directly to the registration of inventory and goods receipts. In addition, these processes can be carried out semi-automated, as well.

The hotel industry is focusing on opportunities through so-called »Dynamic Pricing«. Here, dynamic and automated price determination mechanisms act like shares on the stock ex-change. As supply and demand fluctuate, or the presentation of offers in one's own com-petitive field change, so do prices (not unlike share prices on a stock exchange). Smartly timed purchasing decisions can thereby optimize buying power and actively help save re-sources. Thus, presettings can be defined that certain goods are bought at a time depend-ing on their price or not bought at all if it becomes too expensive. It is then better to buy the goods again later when they are offered at a lower price. These processes are based on the use of Artificial Intelligence and the use of data for so-called »Predictive Services«. In this way, corresponding processes are highly automated and thus efficient.

Online Revenue Management and Yield Management are already in use in many compa-nies and support employees in their work. Employees can operate software programs and control processes directly from their home office or any other location without be physical-ly present at their workplace to access files and folders. Online Revenue Management and Yield Management Systems are directly connected to the financial accounting and pricing strategies are following real-time demand. Digital payment transactions are automatically recorded and balanced in the system, as are bookings, purchases and sales.

Online communication with suppliers and service providers is another relevant measure in the field of Digital Business. More than ever, in times of a crisis, it is important to stay in touch with each other.

This also applies to the communication processes with job candidates and to the search for candidates. Today, online recruiting and application management can be supported by software and Artificial Intelligence, chatbots and by apps. After a successful application, the new employees want to be introduced and trained in the company as part of an onboarding process. It requires new solutions, supported by digital tools, to make the new employees' first day at the company pleasant with a personal touch. Onboarding online for new staff will continue to be an important issue after the pandemic, then of course in combination with real-life exchanges.

Online marketing offers opportunities for a highly personalized approach to get in touch and to communicate with people. Various software products are already existing in this area. Personalized online marketing uses dynamic content based on data analysis and bots. Therefore, it is important that personal data and the corresponding information can be accessed while at the same time privacy and data protection are guaranteed by following the General Data Protection Regulation (GDPR).

A particularly important aspect in the field of Digital Business is that guest services and service offerings can happen online.

2.3.2 Effects of actions in the field of Digital Business

Hotel operation processes can be controlled and monitored online. This means that many of the employees' activities are no longer physically tied to the workplace inside the hotel. Digitization paves the way to more efficiency as well as to more precise and sustainable use of resources, to the automation of standardized processes in particular, such as SOPs (Standard Operating Procedures). Especially employees in procurement (also in the field of F&B), sales, controlling, reservations, human resource management and in general management are greatly relieved by measures in the field of Digital Business.

As a prerequisite for Digital Business processes there are challenges like the reliability, signal strength and bandwidth of the Internet connection. Furthermore, the implementation of a holistic, digital ecosystem that successfully links all subsystems represents a main challenge.


Smart Energy Control Systems
Robotics and Artificial Intelligence (AI)
Smart Home Technology and PMS
AR, VR, XR
Data Analytics
Asset Management, Facility Management
IOT, Proximity, Smart Objects, Sensor Technology

2.4 FIELD OF ACTION 4: SMART BUILDING

Digitization results in an economic and ecological optimum in management, regulation, operation and control of buildings. This happens in a demand-oriented way based on data and algorithmic rules. Accessibility to smart building management systems at any time and any place turns out to be a competitive factor during the pandemic.

What does »Smart Building« mean?

What do we understand by »smart buildings« and »smart interiors«? »Yotel«, a hotel chain with hotels for example in Singapore and New York, serves as an illustration that allows us to actively experience what a »smart« future might look like. Service robots are already in use. All media in a hotel room can be controlled digitally, e.g. by a tablet computer, or by voice control. The services in this hotel room are highly networked. Comparable solutions are also available at the Hotel Schani in Vienna. Additionally, the consumption of water and electricity are measured in real time, so that conclusions can be drawn about use of resources and optimization potential. It is also possible to draw inferences as to whether the lights are still on or whether the window is still open. Depending on the situation, required regulations can be initiated, e.g. to close the window. Comparably this takes place in the hotel »SI-SUITES« in Stuttgart, which automatically regulates energy consumption. There, lighting is digitally controlled in scenes and their work and service processes in all hotel areas are smart and networked to a high extend. (Borkmann et al., 2020a)

Users in smart environments are supported by different technologies. The interaction between people and space becomes interactive with the help of voice-based assistants or hotel apps. For example, this enables guests to control environments with their own smartphone or any other mobile device. Hotel staff with an appropriate authorization can be given remote access to parts of the system. This might help to check, whether the windows are closed inside the guestrooms where no guest is present in case of a thunderstorm. Furthermore, remote control and monitoring enables to detect water leaks and accidents by sensors. In case of emergency, a corresponding alarm is transmitted directly to the smartphones of available staff. Many other technologies additionally support use cases and applications in the field of »Smart Building«. (Borkmann et al., 2016)

2.4.1 Approaches and measures in the field of Smart Building

Which actions in the field of »Smart Building« are helping hoteliers to manage their premises? A supportive measure in this regard is digital building and process management based on data collection, analytics and data evaluation. Therefore, sensors are integrated in various application fields. Smart home technology enables to control room parameters dependent upon usage and

demand. For example, rooms are only heated or cooled if guests are present or if the room is booked at all. Otherwise the rooms are only kept at a minimum temperature or not operated at all. Digitization and networking all technical components facilitates the user to intuitively control and interact with the hotel interior. Many helpful products and devices with integrated sensor technology and Artificial Intelligence, e.g. chatbots, voice assistants, are already in use today. In this way, guests and staff can interact with the environment. In addition to voice control, other tools like a digital control panel that automatically adjusts to the user's language can be helpful.

The approach of a smart building among others is supported by an intuitive design of digital interfaces and control elements, e.g. voice control, by touch and motion-sensitive digital surfaces and by location-based services.

A smart building management and control system helps to improve energy efficiency and to reduce energy costs through automated energy management. An automated building management includes, for example, automated flow of water. Quite a few companies are currently sending staff through their premises on a regular basis - not only within the hospitality industry, but also in office buildings, for example - to let water run from the water outlets for minutes in order to prevent legionella. This process can be fully automated.

Facility management tasks can also be performed remotely or (partially) automatically by installing sensors and using appropriate management software. This includes, among other things, digitalization measures like intelligent room control (light, air conditioning, ventilation, water), using sensors and IOT (Internet of Things). Thus, room parameters can be adapted to certain frame factors, such as the intensity of solar radiation, or the ventilation system only switches on depending on air quality. In a smart building, maintenance and cleaning or any other routine is digitally optimized and adapted to usage, to needs and requirements and to the availability of employees.

Smart building management also contributes to physical separation of people inside a hotel building. Therefore, helpful tools are online booking systems of hotel rooms and real-time room occupancy monitoring and management systems. For example, the (maximum) room occupancy per floor can control whether and how many people can meet in the corridors and thus contribute to physical separation in times of a pandemic. Spatial organization of interiors can adapt to current usage of the indoor environment. Moreover, this can support flexible space utilization scenarios including marketing and sales of hotel guestrooms for alternative use. For example, guestrooms can be offered as office spaces per hour. Besides, hotel floors can be temporarily converted into wards or can be rededicated to quarantine patients. Smart building technology and management enables rapid »reprogramming« of building operations and immediate adaptation to newly emerging conditions and routines. Another application scenario is the evacuation of buildings by using presence sensors and digital control systems, e.g. in the event of fire.

Technological solutions in the field of Augmented or Virtual Reality also provide support, for example by simulating emergencies such as accidents in advance.

Sooner or later it will be useful for every hotel business to have a »Digital Twin«. The Digital Twin is a digital representation of a hotel in the virtual world. This includes all associated tangible and intangible objects and processes from the real hotel world. In addition, solutions planned for the future can be depicted in a Digital Twin. Hence, the planning process and the 3D-visualization of the building design is digitized in an early project stage. This results in various benefits and opportunities in the field of Digital Asset Management and in construction-accompanying Facility Management as well as advantages for marketing and sales through visualizations and simulations. A Digital Twin is also beneficial for construction planning within the framework of BIM processes (Building Information Modeling). Instructions and supportive information can be provided digitally or online.

Robots, Automated Guided Vehicles (AGVs), drones and virtual or digital assistants contribute to physical distance and contactless service: The service personnel is able to instruct the technology, but the personnel does not have to be on site themselves.

2.4.2 Effects of actions in the field of Smart Building

Digitization leads to better control and management of all processes and use cases over the entire life cycle of a building. This is closely linked to a higher reliability of functionalities, to avoid capacity shortages and to use the building more flexible and efficient. Maintenance of the building is improved economically and ecologically. In particular, staff in facility management, asset management, technical services, room division management, housekeeping, event management and reservations is greatly relieved.

A significant challenge is the initial integration of technical components.

Digitization and use of technology enables hotels to operate contactless and thereby provide greater protection and security for people during the pandemic.

Figure 11:
Self Check-In in the lobby
© Schani Hotels,
Gregor Hofbauer

»OUR SUCCESSFUL COOPERATION WITH FRAUNHOFER IAO HAS LED TO THE DEVELOPMENT OF THESE SERVICES AND WE HAVE PUT A LOT OF TIME AND EFFORT INTO THEM. NOW, THE ADVANTAGES OF THESE TECHNOLOGIES CAN CLEARLY BE SEEN MORE THAN EVER. RESEARCH PAYS OFF«

BENEDIKT KOMAREK
CEO AND OWNER OF SCHANI HOTELS

SCHANI HOTELS STILL PIONEERING CONTACT-FREE CHECK-IN AFTER CORONAVIRUS LOCKDOWN ENDS

After five successful years in use, Schani recently updated its app with mobile check-in and mobile key.

Contact-free check-in has become a guest-friendly essential given the concerns raised by the Coronavirus pandemic. Schani Hotels have already been offering guests mobile check-in and smartphone room keys for five years.

To continuously optimize user-friendliness in terms of digital guest journeys as a key factor in ensuring smooth, stress-free hotel stays is essential for Komarek, CEO and owner. Contactless check-in is even faster, easier and safer with the recently improved Schani App. Guests can access their room keys even more quickly, update their reservation data at any time and access useful information needed for their trip.

»Thanks to our pioneering work, we are well prepared for re-opening after the lockdown. A guest's journey can begin and end with their smartphone, should they desire it. This allows us to fulfil security and safety needs and create trust« emphasizes COO Markus Marth. All other guests can access the self-check in facilities in the lobby, which enables people to check in using a tablet in several different languages and print their room card completely automatically. »Our team can support our guests' needs upon request around the clock.«

Figure 12:
Mobile key © Schani Hotels, Gregor Hofbauer

3 CHALLENGES FOR THE HOTEL INDUSTRY RESULTING FROM THE CORONA CRISIS

What are the central and strategic challenges for the hotel industry beyond digitization?

1. Securing liquidity, financing models, product design and distribution

Securing liquidity is one of the most central challenges. In this context helpful measures are novel financing models, innovation in product design and distribution. Hotelier Managers start Crowdfunding Campaigns, activate partners and involve their guests. Vouchers are sold and special sales are advertised, such as temporary offers with cooperation partners. The hotel brand Koncept Hotels from Cologne for example has sold street art photography courses instructed by a photographer after the crisis. This offer is supported by the artist as a social commitment. At an auction guests can also purchase the option to customize a hotel room. They are allowed to choose a name for one of the guest rooms and to influence the design of the room. In some hotels, new business models are being implemented, e.g. the development of a new type of product like renting out hotel rooms temporarily as workplaces. This is made technically possible by the start-up »byHours« from Barcelona, for example.

The study »FutureHotel - Innovative Experiences as a Success Factor for the Hotel Industry« presents comprehensive approaches for innovation in product design and for expanding the service portfolio of a hotel business as an opportunity for additional earnings. (Borkmann et al., 2020b)

2. New standards for hygiene, health and safety

- Health protection: Development, implementation and compliance with increased and new hygiene standards and processes in the entire hotel
- Meeting requirements for building protection, data protection, personal security
- Set and secure standards for legislation, ethics and privacy

3. Measures in human resources management and in dealing with external service providers

- Progressive crisis management and clarification of responsibilities
- Higher standards and new measures for contactless service and physical distancing
- Rules and regulations for external service providers and suppliers

4. New design of contracts and insurance policies

- Establishment of contractual provisions based on partnerships
- Check of insurance law
- New corporate travel management agreements (e.g. in the area of business travel) for the period after the crisis
- Automated contracting through »Smart Contracts«

5. Active development of networks with cooperation partners and guests

- Development of loyalty management towards guests and cooperative partners
- Partnerships and collaborative development of prevention measures, regulations and strategies
- Targeted communication policy and increased access to online communication channels
- Data collection and analysis, e.g. for personalized communication
- Strategic, local cooperations and networking

The importance of a strategic preparation for crises and crisis management is also underlined by the following quotation from the president of the Fraunhofer-Gesellschaft e.V., Prof. Dr.-Ing. habil. Reimund Neugebauer :

»The current pandemic touches on our confidence that we can handle any problem quickly. [...]«

4 POSITIVE THINKING: ENHANCING EFFECTS

Can the current digitization effort also bring benefits in the long term? The current change also has positive effects. The competence of the change management is important here. The following chart (Fig. 13) shows the opportunities arising from the crisis-related digitization campaign.

Figure 13:
Opportunities arising from the current digitization offensive

»IT'S THE DIGITIZATION,
THAT KEEPS OUR SOCIAL LIFE GOING
IN THE WORLD TODAY,
FROM ONLINE SHOPPING
AND THE DIGITAL CITIZENS' OFFICE
TO THE VIRTUAL CLASSROOM. [...]
AS FOR ALL OTHER AREAS OF
OUR SOCIAL LIFE
THE WHEEL OF DIGITIZATION
MAY NOT BE TURNED BACK.«

ACHIM BERG, BITKOM E.V., APRIL 2020

5 THE RESEARCH PROJECT FUTUREHOTEL

The content of this report is based on research work carried out in the FutureHotel innovation network at the Fraunhofer IAO in Stuttgart.

The Fraunhofer IAO's FutureHotel innovation network, which is currently in transition to its seventh research phase, is a leading think tank and innovation laboratory for the research and development of future-oriented hotel solutions. For more than 10 years, the expert network has been conducting research on topics such as the hotel room of the future, current and future guest needs, the new working world in the hotel, the use and potential of technology in the hotel industry, innovative concepts for room utilisation and business models for the hotel industry. Excerpts from the diverse research work and findings are listed at www.futurehotel.de.

FutureHotel - Visions and solutions for the hotel industry of the future

Back in 2008, the FutureHotel network developed and presented the FutureHotel showcase of the same name, a demonstration laboratory for a smart hotel room in 2020.

This was followed by several hotel guest surveys from 2009 to 2017, a hotel management survey, Delphi surveys among experts and various future scenarios. In addition to the surveys, the results of the project are based on numerous interviews and workshops with focus groups, industry and technical experts.

Access to Fraunhofer's own laboratories, such as the 600 m² hotel laboratory in Duisburg and the 150 m² Urban Living Lab in Stuttgart, allowed the research team to implement innovative approaches in a prototype form and to develop them further to market maturity in cooperation with manufacturers and users. An important component of FutureHotel research is the strong practical experience gained through direct, long-term cooperation with hoteliers and their suppliers. Solutions that are ready for market application are implemented in the partner companies, e.g. the use of the smartphone for check-in and check-out, and as a key to the hotel room, implemented in the Hotel Schani in Vienna in 2012.

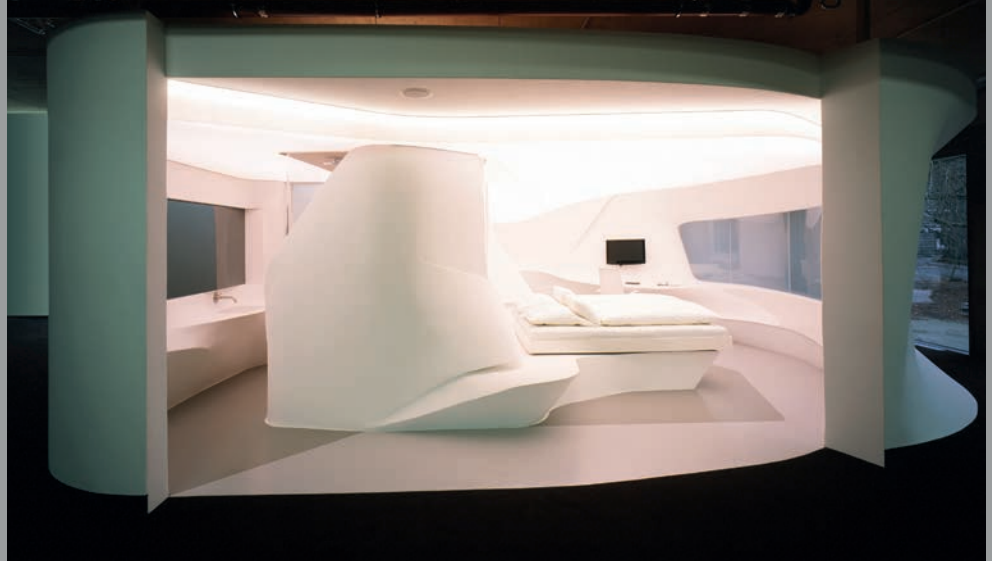


Figure 14: Showcase FutureHotel, © Rainer Rehfeld, OSRAM

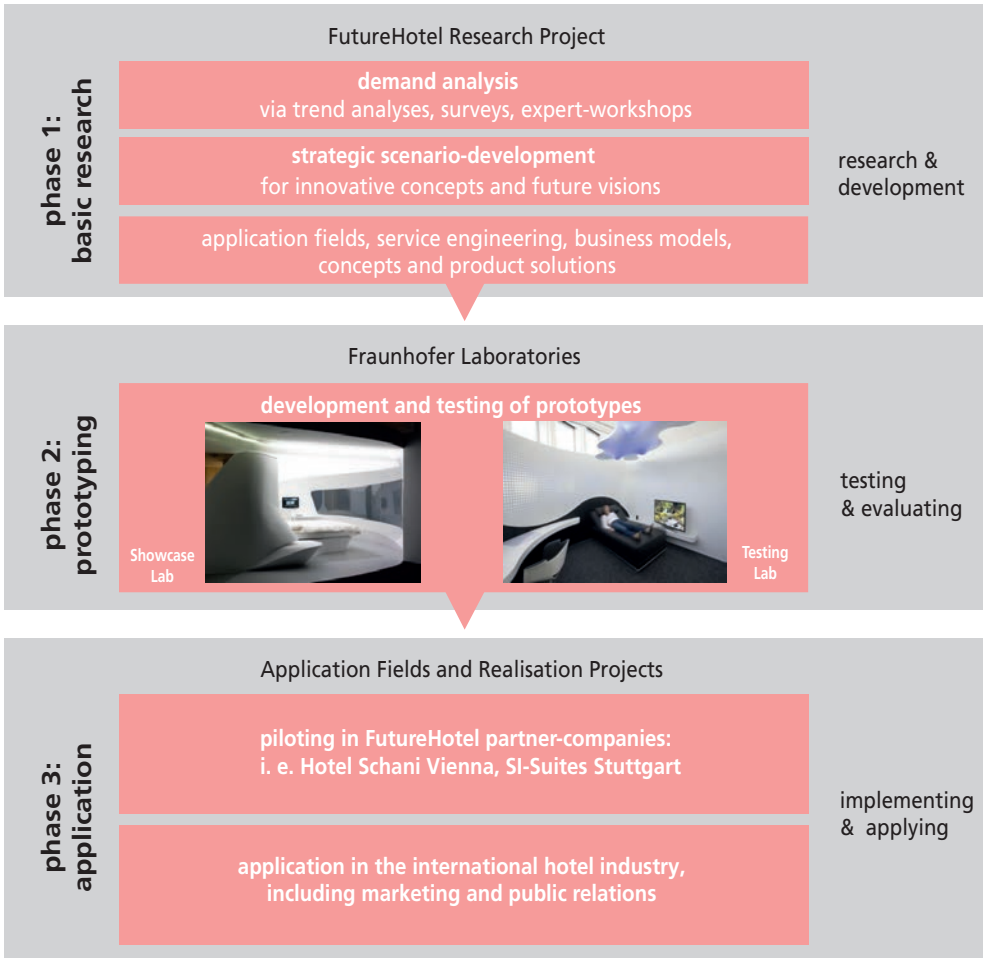


Figure 15:
FutureHotel research methods and instruments

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»IT IS NOT THE STRONGEST OF THE SPECIES THAT SURVIVES, NOR THE MOST INTELLIGENT; IT IS THE ONE MOST ADAPTABLE TO CHANGE.«

CHARLES DARWIN

7 IMPRINT

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1st German edition from May 2020
1st English edition from June 2020

The study »Smart Resilient Hotel« presents actions and solutions to foster the digital transformation of hotel businesses. For this purpose, the current situation in the hotel industry caused by the Corona pandemic is first introduced. In the following, digitization measures are presented, the central challenges facing the hotel industry are pointed out. Finally, opportunities and fruitful outcomes of the current digitization efforts are described.

»The term `Smart Resilient Hotel´ descibes a hotel that is characterized by a high degree of digitization and therefore capable of surviving stressful, threatening situations without persistant damage.« Hence, digitization is an important competence in hotel companies to better manage the corona crisis and its impact. It enables contactless services and processes despite physical distance. The study refers to actions and solutions in four strategic fields of action:

1. Smart Services
2. New Work
3. Digital Business
4. Smart Building