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Please cite this paper as:

OECD (2021), "Preparing the Tourism Workforce for the Digital Future", *OECD Tourism Papers*, No. 2021/02, OECD Publishing, Paris, https://doi.org/10.1787/9258d999-en.

OECD Tourism Papers No. 2021/02

Preparing the Tourism Workforce for the Digital Future

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Preparing the Tourism Workforce for the Digital Future

Embracing digitalisation throughout the tourism ecosystem will help to drive the ability of business to build resilience in a post-COVID-19 era. This will include exploiting the opportunities digitalisation opens up for marketing, product and destination development, as well as investing in human capital and skills to retain and develop a skilled workforce. To support the digital transformation of the sector, this report examines: i) the role of digital technology in tourism and its impact on work organisation; ii) how digitalisation affects the demand for skills in the sector; and iii) the role of government in creating the conditions to support the digital transformation of tourism business models, and preparing the tourism workforce for change. Acknowledging that national policies will need to be responsive to needs across a diverse sector, with varying levels of digital maturity amongst enterprises (and people), the report presents a selection of policy considerations to prepare the tourism workforce for the digital future.

JEL codes: (Z38, L83, J24)
Keywords: tourism, workforce, digital skills, digital future

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The report was approved and declassified by the OECD Tourism Committee at its 107th session on 15 April 2021 [CFE/TOU(2020)4/FINAL] and prepared for publication by the Secretariat. It was authorised for publication by Lamia Kamal-Chaoui, Director, Centre for Entrepreneurship, SMEs, Regions and Cities, OECD.

This document, as well as any statistical data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Acknowledgements

This report was prepared by the OECD Centre for Entrepreneurship, SMEs, Regions and Cities (CFE), led by Lamia Kamal-Chaoui, Director, as part of the programme of work of the OECD Tourism Committee. The project is undertaken with the financial support of Portugal, Switzerland and the European Union[1].

The report was co-ordinated and edited by Peter Haxton, Policy Analyst (CFE), under the supervision of Alain Dupeyras, Head of the Regional Development and Tourism Division (CFE), and Jane Stacey, Head of the Tourism Unit (CFE). It was primarily drafted by Dr. David Parsons and Ken Walsh (P&A Research and Consulting), with support from Dr Miju Choi (Leeds Beckett University), and significant inputs from the OECD Secretariat. The report benefitted from specific contributions from Anna Bolengo, Junior Policy Analyst (CFE), who provided co-ordination, research and drafting inputs, Laetitia Reille, Statistician (CFE), who provided statistical support, and Monserrat Fonbonnat, Assistant (CFE), who provided administrative support.

It has been informed by desk research and survey responses and inputs received from 33 OECD Members and Partners[2], and in-depth discussions with countries at the 106th (13-14 October 2020) and 107th sessions (13-15 April 2021) of the Tourism Committee. It has also been informed by discussions at the OECD-EC Policy Workshop on *Preparing the tourism workforce for the digital future*, co-organised by the Swiss State Secretariat for Economic Affairs (SECO), with support from the European Commission.

The report has also benefited from feedback from the OECD's Centre for Skills, Directorate for Science Technology and Innovation, and the Directorate for Education and Skills. The International Labour Organization (ILO), along with EU-funded Next Tourism Generation Alliance, the European Centre for the Development of Vocational Training (CEDEFOP), and the World Trade Organisation (WTO), have also provided inputs.

[1] This document was produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union.

[2] 33 OECD Members and Partners responded to the country survey: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Finland, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Japan, Latvia, Lithuania, Mexico, New Zealand, Poland, Portugal, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United States.

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Overview and policy considerations

Digitalisation of the economy can spur innovation and productivity growth, but it is also changing the way that work, and production, is organised, creating, in turn, challenges for jobs and skills. Tourism, which, until the COVID-19 crisis, had been a sustained engine of growth in advanced economies in recent decades, has an opportunity to capitalise on digitalisation to accelerate its recovery from the collapse of the sector in 2020. However the transition will require support, in particular to address skills shortages and gaps.

While the outlook for tourism jobs and businesses remains highly uncertain, it is clear that the up-take of digitalisation in the sector has accelerated due to the pandemic, and that the tourism sector is likely to be very different in the future. Embracing digitalisation throughout the tourism ecosystem will help to drive the ability of business to build resilience in a post-COVID-19 era. This will include exploiting the opportunities digitalisation opens up for marketing, product and destination development, as well as investing in human capital and skills to retain and develop a skilled workforce

Emerging impacts of digital technologies on tourism jobs

In looking cautiously to prospects for recovery, the tourism sector is already anticipating an expanded role for digitalisation; through the utilisation of: online platforms and mobile access, which are transforming customer interactions; data technologies for tracking customer preferences and building ongoing relationships; advanced technologies including virtual and augmented reality, artificial intelligence (AI); and the 'internet of things', task automation; and service robotics. In developing this report, initial evidence indicates that:

- Pre-pandemic uptake of digital technology (although uneven) had been broadly transformative for tourism, moving from a driver of marginal efficiency gains to an enabler of fundamental innovation, reformed value chains, and transformed and enhanced productivity.
- The significant loss of jobs and workers resulting from the pandemic will impact on the capacity of the tourism sector to rebound, both directly, through efforts to rebuild human capital, and indirectly, through impacts on demand, which have already prompted further digitalisation and this is set to intensify further.
- Work organisation impacts from digitalisation have so far been accommodated largely within existing occupational and job structures. These impacts are expected to intensify and will be widespread, especially where low and middle-level skills need to combine digital competences with complementary skills. These are set to be the main workforce effects, although digitalisation will also see a rise in the use of specialist ICT skills and some 'new' job types emerging.
- Machine-based learning, task automation and robotics have considerable potential for job displacement in tourism. This is already evident for low-skilled service workers in some countries but the scale of early job displacement across the sector is likely to be constrained by certain cultural factors, including customer resistance in some regions.
- AI and Big Data can boost personalised travel but raise challenges (and customer concerns) about personal data protection, which, in turn, calls for greater workforce awareness of personal information sharing, skills to support cyber-security and better privacy protection.

Beyond business adjustment, digitalisation in tourism creates additional challenges for governments and industry bodies. These include slower adoption by SMEs, outdated standards and regulations, digital diversity within and across countries, overcoming shortcomings in legacy systems, and digital infrastructure investments.

Addressing skills gaps and shortages in the digital tourism economy

Unpicking the impacts of the digital transformation on both current and future skills needs is complicated by limited tourism-specific research on skills and digitalisation and imperfect labour market information for the sector and its component parts. Nonetheless, the available evidence suggests that:

- The multiplicity of skills needed in the sector will see great variation in the level of digital proficiency required, but care should be taken not overstate the ability of technology to supplant interpersonal skills (especially in the accommodation and food services sub-sector).
- Most change will come from new or enhanced digital systems or tools integrated within existing job structures, with technology impacting most jobs to some extent. This will see a digitalised reduction in some codifiable, routine tasks in lower and mid-level jobs, but a rise in 'hybrid' jobs combining transversal skills with a basic level of 'digital fluency'.
- Digital fluency needs will be different for different occupations and workplaces, depending on the use and integration of task-specific digital systems or sets of tools. More job holders will need stronger complementary skills and well-developed cognitive abilities to make effective use of the new or enhanced technologies.
- New skills mixes will result in greater skills convergence for tourism with other sectors for both technical skills (e.g. for using cloud computing, Big Data and social media) and digital applications skills, with implications for intensifying competition in the wider labour market.
- Both skills shortages and skills gaps are likely to cause a drag on digital transformation. 'Digital' skills shortages are likely to be more extensive for hybrid lower and middle level occupations, for SMEs, and in particular those that are not digitally proficient. This may be partly counterbalanced by automation helping to reduce persistent skills shortages in more traditional occupations but it will be important to also address place based challenges (notably in rural areas) related to poorer digital infrastructure.
- For those already in the tourism workforce, emerging skills gaps include the need for intensified complementary skills, and concerns for much more widespread digital fluency, especially for staff working with productivity-geared software. However, many workers in the most affected jobs, especially in SMEs, are less likely to receive on-the-job training.

The review also shows challenges for managing digitalisation, especially in a sector dominated by SMEs. Skills demands of digitalisation for managers in tourism suggest a need for broader digital fluency in their own roles, an awareness and agility relating to technology opportunities, and aptitude to lead teams that were fundamentally different from traditional tourism employment. This combination appears at odds with some current manager skills sets and often with the provision of initial vocational education.

Current public policy responses to support digital transformations in tourism

There is considerable, if sporadic, governmental activity to support the digital transformation in and around tourism. The available country evidence shows that:

- These initiatives vary greatly in scale and focus, and are typically constituted to reflect different country traditions, situations and capacities; some are at national level, others more localised or targeted on specific communities. Most are very recent (within the past three years).
- Weaknesses in available labour market and skills foresight data in this area means few actions appear to be robustly 'evidence-led'; many current and prospective actions are informed by largely subjective information coming mainly from stakeholder liaison rather than well founded labour market evidence.
- Most identified initiatives are fragmented, partly because of narrowly defined funding pathways and a lack of necessary co-ordination across (different) policy-setting ministries or agencies. This is counter to the need for more *holistic* responses called for by some industry bodies.
- Policy responses and initiatives to the digital transformation have been enhanced in some countries to help the sector build resilience to the pandemic, and respond to the accelerated pace of digitalisation, but remain substantially underdeveloped in many.
- Actions have centred on various forms of proactive and funding support for digital uptake (e.g. technology awareness, digital strategy development, innovation or facilitated technical support). Fewer policy actions have looked to better understand tourism digital skills shortages and gaps and to facilitate skills development and adjustment for digitalisation.
- Policy responses aimed at knowledge or skills development in digitalisation emphasise 'continuing vocational education and training' (CVET) over 'initial vocational education and training' (IVET), although both areas continue to evolve. IVET responses are more likely to come from industry bodies than public policy, and are largely a commercial response to member needs.
- With SMEs typically lagging behind the digitalisation curve, some policy responses specifically target smaller firms. These initiatives have had some difficulties in engaging SMEs, and especially smaller SMEs (micro-businesses), which may stem from some systemic challenges to helping those firms most likely to benefit from digital transformation. Some countries are looking to the natural links of Destination Management Organisations (DMOs) to SMEs to demonstrate and promote those benefits.

There is little evidence indicating whether or not these are the most effective policy instruments, or whether they have sufficient ambition to rise to the challenges faced by a sector under acute stress from the COVID-19 crisis and with greatly weakened capacities to adapt. In particular, there has been little systematic evaluation of these actions nationally or more widely to assess either effectiveness and/or impact. This may reflect limited policy evaluation traditions or capacity in some countries, or systemic challenges to better measuring impacts in tourism in others.

Policy considerations to prepare the tourism workforce for the digital future

The opportunities offered by the digital economy are promising, even if not yet extensively taken up in tourism especially among SMEs. Further exploiting this potential may be a crucial factor in the sector's recovery from the economic crisis arising from COVID-19, which has also accelerated the pace of digitalisation. Proposals for action to help the sector should seek to leverage these opportunities.

National policies will need to be responsive to the diversity of needs across the sector and according to the varying levels of digital maturity amongst enterprises (and people), as well as being sufficiently agile to take advantage of new technologies and workforce opportunities as they arise. Potential actions include:

- **Reviewing and strengthening national skills foresight for the tourism sector** to provide more robust, forward-looking, labour market information to inform education and training providers, enterprises and policy initiatives. More effective tourism skills foresight arrangements are also

required to provide more granular analyses of the needs and contrasts across a diverse sector. Enhanced foresight efforts could be undertaken as part of National Digital Strategies.

- **Encouraging national responses to better integrate support for tourism digitalisation and skills development.** Co-ordinated cross-ministry and cross-stakeholder policy responses are needed to better integrate support components (management awareness and digitalisation capabilities, strategy support, selection and use of systems and tools, staff training, reformed curricula, etc.) and provide for more holistic support packages that are responsive to enterprises' different starting points on the digitalisation journey.
- **Reviewing the potential for transformation support from the higher education sector.** Established specialist provision in higher education has considerable potential to be an agent for digital transformation by supporting tourism and hospitality management education and awareness, professional skills development and as a locus for technology demonstration. This capability is essentially latent and there is considerable scope to exploit this potential within wider collaborative arrangements to support digital uptake and reskilling across the sector.
- **Encouraging responsive digitalisation adjustment training for the existing workforce** to address workforce development needs and ensure early uptake and effectiveness. To avoid individual enterprises needing to 're-invent the wheel', policy makers should invest in collaborative, SME-friendly and, where possible, 'ready-made' sub-sector training packages to improve access to, and reduce costs of, workforce reskilling and upskilling.
- **Targeting and improving the effectiveness of digitalisation adjustment initiatives for SMEs** by raising SME managers' awareness of digitalisation opportunities and capabilities in this 'hard to reach' part of this sector. Mechanisms might include regional SME champions, SME targeted and locally customised support, and workplace training. Facilitated local digitalisation networks, communities of practice and resource sharing will also have a role to play in localising SME knowledge-sharing and exchanging good practice, and will also adjust engagement needs to local circumstances.
- **Building value-chain communities of digital transformation practice** by harnessing existing formal and informal value chains and business coalitions as communities of digital transformation practice. Transformation communities could be based on industry clusters or local coalitions with participating firms selected for their collaborative potential to overcoming any barriers of inter-firm competition. Such communities might also work towards interoperability of systems, and stronger digital security, privacy and risk management, which could also streamline training challenges and shared knowledge in digitalisation.
- **Building SME digitalisation and skills adjustment exemplars through 'pathfinder' or similar initiatives** to identify good practices in digital transformation, and the benefits of building COVID-19 recovery and resilience at the enterprise level. To speed up identification of 'exemplars', national initiatives might also look to include 'pathfinder' actions to support 'volunteer' firms and to build exemplars as policy responses progress.
- **Developing effective support for displaced employees and those at risk by** combining cross-sector active labour market policies with sector-targeted measures for early intervention and re-employment support. Initiatives will be most effective where there is close collaboration between enterprises, training providers and public employment services combining cross-sector (general) active labour market policies with sector-specific measures for early intervention and re-employment assistance for workers regardless of type of employment contract.
- **Providing enhanced access to publicly funded adult learning** has considerable scope to support digitalisation in tourism, by empowering individuals to develop their skills mix with new or improved digital and transversal skills. This raises wider issues for national delivery capabilities including strengthening adult learning funding, training the trainers, and building greater

technological resilience to help prevent future skills depreciation. Policy responses will need to tackle access barriers for those who need improved skills mixes but where there is currently low levels of engagement (low-skilled, older adults, job losers and non-standard workers).

With a significant proportion of tourism an inherently cross-border activity and **built on global value chains**, national responses could be even more effective with supporting action between countries, and where international organisations and fora, such as the OECD, could play an important facilitation role. Areas of activity might include:

- **Digitalisation and jobs benchmarking studies** to quantify and better understand the potential and likely impacts of digitalisation for work organisation, job creation and job displacement.
- **Studies to address critical evidence gaps**, including: sub-sector projections of automation potential; engagement barriers for tourism SMEs; better understanding skills needs and implications for education and training; and improved employment practices for labour market competitiveness in a digital era.
- **Building tourism policy evaluation, capabilities and practice,** including through the sharing of good country practices to assess digitalisation impacts in other sectors and their potential application to assess the effects and efficacy of 'tourism-related' actions.
- **International tourism skills foresight exercises** to anticipate and track the impact of new technology in tourism and help policymakers plan for the longer term and be better prepared for future adjustment challenges and unforeseen events.

Digital technologies and trends shaping work in tourism

Digitalisation is the process through which technology and data-driven management is transforming our social and economic systems and lives. The push to adopt digital technologies is driven by the convergence of advanced technologies and the increasing social and economic connectivity unfolding under globalisation. Digitalisation has the potential to boost innovation, to generate economic and environmental efficiencies and increase productivity, including in the highly globalised tourism sector (OECD, 2017a).

The labour intensive and geographically dispersed nature of the tourism sector has long been an advantage for jobs growth in many national economies, while at the same time raising persistent challenges for the acquisition, retention, and development of its human capital (Boella and Goss Turner, 2019; OECD, 2016a). Long standing challenges of poor competitiveness in the jobs market for many tourism occupations adds to those challenges. Against that background, the sector now also faces two key pressures on jobs growth. The first is the potential for evolving digital technologies to reshape skills demand across tourism activities, and the second is the unforeseen effects of the COVID-19 pandemic. These two pressures may be inter-related.

Less than 20 years ago, proponents of digitalisation were talking of the rise of new products and processes through e-tourism (Buhalis, 2003). Within 10 years, tourism and travel was the largest category of products and services sold globally over the internet. The widening reach of digital tools and systems has seen digitalisation go from a driver of marginal efficiency to an enabler of far-reaching innovation and change. It has become a truly 'disruptive technology' across tourism businesses, value chains and tourism eco-systems, altering barriers to entry, transforming distribution (and supply) channels, optimising costs and productivity (Asaf and Tsionas, 2018). Internet and mobile access have transformed customer interactions as tourists exploit online platforms for search, comparisons and making choices, with businesses exploiting *informationalization* (Dijkmans et al, 2020) by tracking customer preferences and seeking to build ongoing customer connections, relationships and loyalty.

Before the devastating onset of COVID-19, the sector saw no likelihood of those transformation challenges easing; now they are set to intensify. As the sector takes tentative steps to emerge from the current crisis, it is evident that there are already far reaching consequences for the way people travel, vacation, and engage with tourism businesses. Digitalisation, in its different forms, is set to be a driving force in mobilising business responses to these changes and building business resilience after COVID-19. This is likely to stimulate new forms of work organisation and changing skills mixes; some jobs and skills may become obsolete.

Established and emerging digital technologies impacting tourism jobs

In this Fourth Industrial Revolution, digital technologies have brought extensive transformation to the tourism industry, revolutionising tourism enterprises, products, experiences, business ecosystems and

destinations. Digitalisation has expanded its value and scale by removing barriers to travel transactions and reducing transaction costs. The tourism sector is shifting from the traditional hospitality focus of many businesses, to a personalised economy in an increasingly high-tech industry centred on digital platforms and embedded systems and tools. In the past there was some degree of disconnection between businesses and customers, but today these disconnections and distinctions have become blurred due to the revolution in production and consumption through digitalisation (OECD, 2019a).

The emergence of a digital platform economy across the tourism industry has seen Online Travel Agencies (OTAs) establishing advertising and sales agreements with hotels, travel and travel servicing companies, and transforming customer-supplier relationships. Using OTA platforms, customers can also compare information on a vast number of products from around the world, classify this information, and often purchase at better prices than are available directly from suppliers. There are direct benefits also for operators since OTAs also perform certain marketing activities on behalf of hotel and airline companies, helping to increase the number of purchasing customers. In Germany, pre-pandemic evidence (February and March, 2020) from the Federal Competence Center for Tourism showed 62% of SMEs generating added value from online booking of accommodation. Customers' reviews, embedded in the platform, offer rapid quality feedback and provide useful suggestions for improvements to companies' products and feedback on competitors' products.

OTAs have already overtaken traditional travel agencies in their market share in most countries, with ripple effects throughout the tourism industry's value chain and ecosystem. In response to these effects, national tourism bodies have expanded into areas that promote convergence in the tourism industry ecosystem, such as promoting new co-operation and expanding existing co-operation within and outside the traditional boundaries of the industry (WEF, 2017).

In the last two decades a wide literature has variously proposed the key advanced technologies which underpin e-tourism. Looking across these and the survey's feedback on individual country situations, the established and emerging digital technologies most likely to impact jobs and skills in the tourism industry include, digital platforms, virtual reality (VR), augmented reality (AR), artificial intelligence (AI), big data, automation and service robots, and other emergent advanced technologies. Each is looked at briefly below:

- **Digital platforms:** As hyper-connected platforms spread throughout technologies, economies, and societies, more of the process of production and consumption became 'intelligent', bringing revolutionary change to the way production and consumption interact. In tourism, OTAs enable consumers and producers to connect with each other directly with information and communication technology (ICT), Big Data and AI sharing information in real time. The success of Airbnb, as a leading online vacation rental marketplace company, also secured it a competitive advantage as a platform enabling individuals to engage in the accommodation rental business by greatly reducing the transaction costs. This sharing economy model is likely to expand more than any other industrial sector, given that it accounts for a large portion of goods from resources, a key production factor for tourism products. It is estimated that by 2025 USD100 billion of produced value in tourism will be transferred from traditional businesses to OTAs and other new enterprises including in the sharing economy (WEF, 2017).
- **AI, Big Data and personalised tourism:** The realisation of an on-demand economy and more personalised offers in tourism is made more flexible and intensified through AI and Big Data. Through data-based personalisation, airlines and hotels can understand customers better, provide more convenient services and engage in more efficient marketing, resulting in additional sales and profits. In doing so, AI and Big Data can play a significant role in optimising travel experiences by providing opportunities for customised advice on destinations, hotels, restaurants, facilities, often in real time. Recommender Systems (RSs), for example, in mobile and other devices can reduce the information overload by offering personalised recommendations relevant to the tourist's current

position and to previous online searches . As a result, consumers can interact with more diverse brands and make wider choices through the tourism services available.

The survey responses show Finland expects Big Data to accelerate their transition to an on-demand tourism economy. In Germany personalisation of the travel experience is an increasingly important success factor involving the use of smart and open data in data-based marketing and intensifying the need for intelligent management of Big Data. Japan sees opportunities to introduce biometrics that can be used to identify visitors wearing face masks, as well as real-time demand driven pricing, which could help to reduce congestion and improve profitability.

There is great variation across OECD countries in the current use and prospects for automation and service robots. Japan has a strong history in the robot market, based on established technology and infrastructure. Service robots have become embedded in areas of Japanese daily life, including medical and nursing care, security, welfare, and customer service, where they are now starting to feature in some tourism functions, ranging from hotel room service to robotic restaurants, although widespread use remains some way off. Other survey responses were more cautious about robotics diffusion in tourism, with Switzerland characterising other responses in their caution about early adoption. This was felt to be partly due to the strength of the established business focus on quality through optimised personal service and to customer resistance. In Germany, the Pepper robot has had rising presence in check-in and reception activities. the Netherlands, KLM Royal Dutch Airlines has deployed a service robot called 'Spencer' at Amsterdam Airport Schiphol since 2016 (Box 1).

Box 1. 'Spencer' passenger assistance robot at Amsterdam Airport Schiphol (Netherlands)

In 2016, 'Spencer', a passenger assistance robot developed by Dutch airline KLM, completed a series of trials at Amsterdam Airport Schiphol in the Netherlands. The initiative was conceived by KLM as a robotic guide to help reduce costs associated with passengers missing connecting flights. To help 'Spencer' safely navigate the large and often busy spaces involved with the Schiphol terminals, the robot uses a laser guidance system that measures the distance to stationary objects and people. This allows it to circumnavigate large groups and adjust its speed to passengers following behind. The 'guide' function of 'Spencer' is seen as a success. The combination of the robotics and guidance system technologies are now being looked at to consider the development of a multi-function mobile robot to carry luggage and speak with passengers.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

- **VR and AR**: There is increasing interest and investment in virtual experience systems using VR and AR technologies to construct virtual tourist destinations and experiences in cyberspace. In hotels, Marriott International, for example, has introduced VR through its 'Vroom' in room entertainment facility so guests can explore ice cream stores in Rome or the Eiffel Tower in Paris from the comfort of their own rooms. In this and similar situations, hotel rooms have the potential to go beyond a limited function as a comfortable personal lodging space but become a service hub equipped with complex entertainment functions to meet various potential customer needs. VR can be applied at the travel desire and booking stage and supporting tour guides. In some cases it may even take the place of actual travel, a feature that may increase in the era of COVID-19. For example, in Germany, the most popular castles (Neuschwanstein Castle, Sanssouci Castle and Hohenzollern Castle) can be experienced by means of several campaigns with mixed reality applications.

- **Other emergent technologies:** Although less frequently mentioned, other advanced digital technologies feature in the digital transformation of tourism operations and customer engagement. Security concerns and minimising traveller and guest contact may come together in systemic use of bio-metric software in video cameras to allow for fully contactless check in. Much also seems to be expected of the Internet of Things (IoT) with web interconnection of objects, devices, and technologies via embedded sensors and wireless communication. Hotel rooms with IoT technologies enable predictive maintenance and enhanced audio-visual control, climate control, etc., using QR (Quick Response) codes or mobile applications as in Marriott's IoT demonstrator project in Bethesda, Maryland, United States (Box 2).

  QR codes are also increasingly used in restaurants, bars etc., and in the COVID contactless era provide customers with quick and convenient access to menus (via smart phones), on occasion with integrated ordering functions. These are largely 'silent' technologies in tourist experiences but contribute to enhanced guest experiences with benefits to the business through service economies and customer satisfaction. Blockchain technology are seeing rising interest. Here, 'blocks' contains user-based online transaction details that allows a network to be configured as a system and value to be exchanged between trading parties without a third party guaranteeing the transaction. To these can be added machine-based learning, and the opportunities and challenges presented by social media, digital security, and encryption in digital transformation.

Box 2. Marriott, Samsung, and Legrand Reveal IoT Hotel Room of the Future (United States)

In 2017, Marriott International collaborated with Samsung Electronics and Legrand to build an 'IoT hotel room' in Bethesda, Maryland, where Marriott's headquarters are located. This hotel room connects various devices and sensors, such as televisions, lighting, air conditioners, and smart mirrors, via the IoT to provide personalised services for guests. For example, when a customer makes a hotel reservation, they can set their desired room temperature or brightness, enabling the room to be prepared accordingly before they arrive. On the customer's subsequent visits, the hotel will automatically provide the same personalised service.

In the IOT hotel room, guests can control devices and lighting and set their morning alarm by voice control. Using a smart mirror, they can schedule a yoga class, adjust the water temperature before they enter the shower, or fill up the bathtub. The use of IoT is also expected to increase hotels' operational efficiency. Customer satisfaction can be enhanced by understanding each customer's requirements in detail and providing personalised services. IoT technology also enables hotel staff to provide services at the time desired by customers, thereby improving work performance.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Acceleration of digitalisation trends in an era of COVID-19

At the end of 2019, the Chinese government reported the first outbreak of the COVID-19 virus to the World Health Organization (WHO); within 10 weeks WHO declared a worldwide pandemic. An unprecedented global economic crisis has followed. By May 2020, most worldwide destinations had partially or entirely suspended international flights. To this was added domestic and community lock downs, severe domestic travel limits, self or mandatory quarantine, and a plethora of safe distancing measures and other business restraints. Whole tourism value systems had effectively shut down (Jamal and Budke, 2020) and worldwide the industry was facing its most devastating crisis of modern times (UNWTO, 2020a).

Policymakers have responded on an unprecedented scale to likely (and now very evident) GDP shortfalls, depressed consumer demand and sharply accelerating unemployment, with rescue packages for businesses and individuals. Some of these targeted the tourism sector specifically, and notably hospitality, to help preserve future capacity. After lockdowns were eased for a time, recovery in consumer demand started to trickle through but for most tourism enterprises demand has been at best muted. Much of the underpinning international travel capacity remains effectively in hibernation. 2020 was also the worst year in history for air travel demand, with both international (by 75.6%) and domestic (by 48.8%) passenger demand significantly down on 2019 levels, and forecasts suggesting air passenger numbers are unlikely to return to pre-pandemic levels until 2024 (IATA, 2020 and 2021).

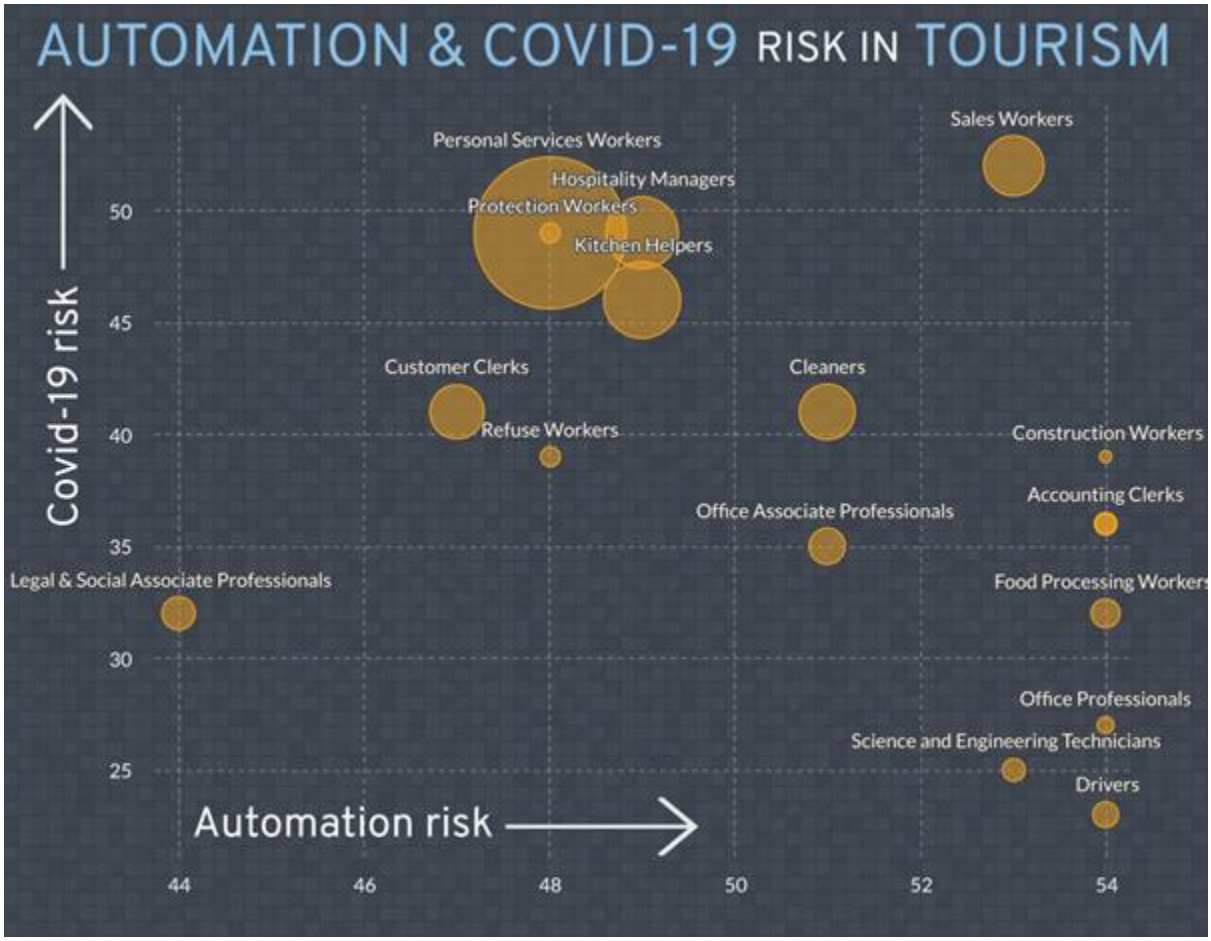
Consumer confidence remains cautious not only with air travel but also with cruise operators, common services accommodation, and events and any activities or attractions where social distancing may be impaired. For those tourism enterprises which have survived, reserves or resources from recapitalisation are being quickly consumed. As the crisis continues to evolve it is premature to start to count the full consequences for tourism jobs. Nonetheless, the OECD estimates that international tourism declined by around 80% in 2020, while the UN World Tourism Organization (UNWTO) estimates that it could take between two-and-a-half and four years for international tourism to return to 2019 (OECD, 2020b; UNWTO 2021).

Latest UNWTO estimates also point to a loss in export revenues from international tourism of eight times that recorded in 2009 amid the global financial crisis (UNWTO 2020), while it is thought that more than 150 million jobs have been lost or at risk due to a sustained drop in travel and tourism activity (UNWTO, 2020b; WTTC, 2020). The European Commission's Joint Research Centre (2020) estimated that 6.6 – 11.7 million jobs in businesses operating and/or dependent on tourism-related activities were at risk of a reduction in working hours or permanent losses in 2020, representing between 3.2% and 5.6% of the total active population in the European Union. Women, young people, rural communities, and indigenous people are likely to be disproportionately affected – groups that are more likely to be employed in micro or small tourism businesses. Job losses among causal, seasonal and other informal workers are likely to be especially acute.

A correlation of COVID-19 job loss risk with automation and other risks from digitalisation (Figure 1) suggests that in hospitality, some occupations rate moderate or high risk on both measures – notably hotel management, kitchen semi-skilled staff, marketing and sales administrators; similar assessments elsewhere in tourism are not available. Many other tourism jobs have, in effect, been suspended on furlough or similar support schemes while others, which have continued, perhaps with diminished hours and earnings, will be also be seen as vulnerable. To set against this, the survey has shown that digital tools such as QR codes and online ordering have widely helped retain some jobs in food and drinks service, facilities and attractions as businesses adjust to contactless and other regulatory changes and start to rebuild consumer confidence.

Tourism may be dramatically 'down' but it is not 'out'. A few segments of the market report early signs of recovery, notably destinations boosted domestically by 'staycationing', self-catering accommodation and some short haul destinations in the global north. As other parts of the sector start to cautiously look at how to emerge from the crisis, some analysts are starting to anticipate far reaching 'post pandemic' consequences to the way people will travel, holiday and engage with tourism businesses (Gössling, Scott and Hall, 2020). These changes may stimulate new forms of work organisation and changing skills mixes (as discussed in section 3) with digitalisation set to be a driving force in mobilising these and other changes and building business resilience.

Figure 1. Congruence of job loss risk from COVID-19 and automation: Selected Occupations



Source: Cedefop, 2020a

Much of tourism is rooted in the human touch and the quality of customer care from personal contact and responsiveness. Nonetheless, sector responses to the COVID-19 pandemic have intensified 'online' and contactless measures; these are set to endure. In response to the survey, many countries pointed to the pandemic extending digital processes in accommodation such as registration, self-service, semi-automated or voice activated elevators. Numerous responses saw similar changes for retail catering and food service including online booking, digital menus and remote ordering and more widespread uptake of contactless payment methods.

Enthusiasm for other aspects of digitalisation was also thought to have been boosted by the experiences of enterprises during the pandemic. In Spain, a survey on digitalisation in accommodation shows the pandemic has accelerated business aspirations with a shift from planned investment pre-COVID more commonly in lower level digitalisation (e.g. Smart TVs in lodgings) to higher level technology, with an increase from 14% to 33% of enterprises planning to introduce guest room virtual assistants and 'chatbots'. Both France and Greece identified the pandemic as accelerating 'lingering' changes in basic and more advanced digital systems. Israel also reported the pandemic had become a major catalyst for wider digital transformation and in e-commerce more generally, with significant implications for tourism. Switzerland, reported that the pandemic had especially accelerated digitalisation in food service for rapid uptake of online reservations and the use of QR codes. In travel, Finland related a shift from group travel to foreign independent tours and from traditional tour operators to OTAs as pandemic related.

The COVID-19 related intensification of digitalisation has for the most part focussed on long-established technologies. However, a few countries also saw the pandemic causing deeper rethinking of policies and practices by some tourism enterprises. New Zealand anticipated that COVID-19 would accelerate virtual tourism offerings using VR and AR technology to: *"… access the international market, without having tourists physically present in New Zealand",* which could be said to re-enforce other developments aimed at more environmentally-friendly and sustainable tourist offers. Other countries have responded to the crisis by developing virtual training platforms for tourism practitioners with examples highlighted in Box 3.

Box 3. Providing virtual training for tourism operators during the COVID-19 crisis

Ireland launched, in February 2021, the *Developing Leaders for Hospitality and Tourism* programme with different tracks available for managers and employees. Supervisory staff can access upskilling training in finance and people management. While employees will be trained in customer care, digital skills, communications, strategic planning and management, and green skills. The programme was developed by Fáilte Ireland (the National Tourism Development Authority), the State Agency responsible for further education and training (SOLAS), and the Irish Hotels Federation (IHF).

Pacific Trade Invest (PTI) Australia, an Australian Government-funded trade and investment promotion agency, created an advanced online workshop series, to respond to the COVID-19 crisis, for Pacific tourism operators to build capacity and improve their digital skills. To build expertise in Search Engine Optimisation (SEO) marketing, content marketing, delivery methods and payment solutions, four workshops, led by global experts, were customised for the Pacific region. The series was built through the Pacific Business Monitor, following clear feedback, which established the development of online trading capabilities as a key initiative for Pacific businesses.

Portugal adapted the *Business Education for Smart Tourism Training Program* (BEST), established in 2019, to an online format to support stakeholders during the COVID-19 crisis. The program aims to promote the development of strategic and competitive management skills of tourism companies and encourage their preparation in relation to current trends in the global market. More than 256 sessions for 25,340 participants were provided between April and August 2020.

In Japan, initiatives have been implemented to build the capacity of local governments and DMOs to support the development of VR and AR tourism content. Also, initiatives to support digital marketing, and to consolidate regional guest and tourist data in a digital platform have enabled DMOs to formulate data-driven strategies in partnership with local governments and assist local tourism operators to identify emerging trends. In addition, the prepaid *Suica* smart card can be used when taking public transport, for self-service check-in at a hotel and retail purchases, and also when entering a guest room by using an app as the key. This makes it possible to improve the traveller experience while at the same time improving health safety through reducing opportunities for contact.

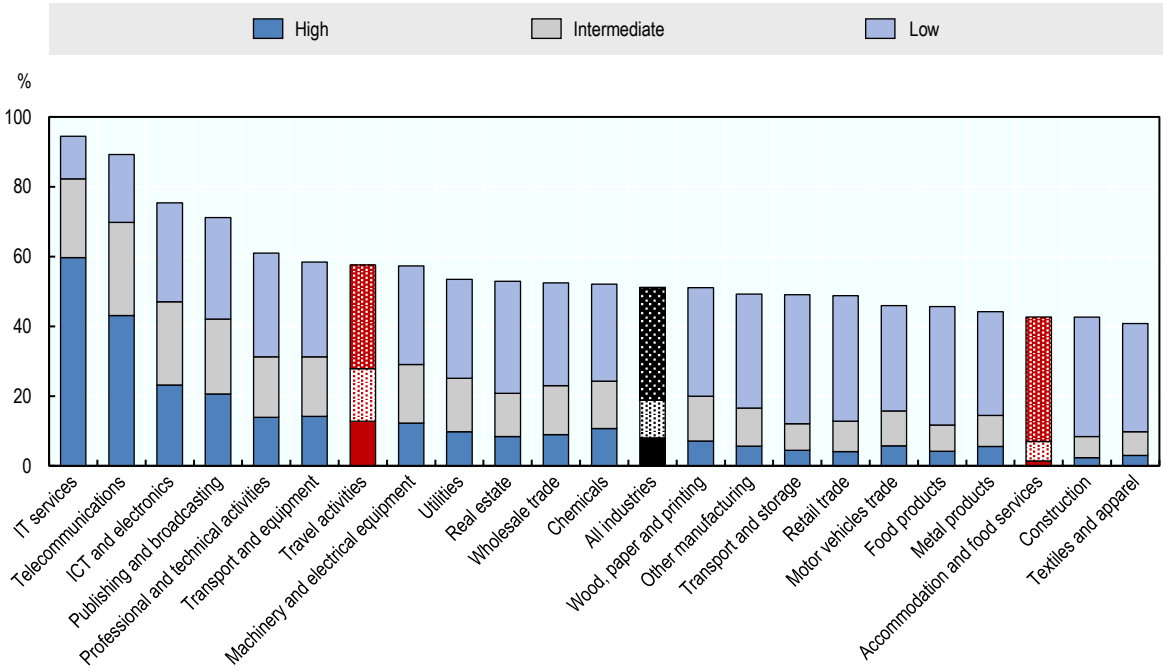
Country responses to the survey indicate that as employment returns to tourism and with the digital connectivity of populations increased during restrictions, the need for effective embedding and use of digital systems and tools will become much more important. Well-placed or prepared tourism employees will help mobilise those changes but this is set against a backdrop of a lost workforce for many remaining businesses. To this is added a rise in many countries of the informal economy in tourism and where businesses may be reluctant to invest in the necessary digitalisation skills in impermanent workers. Several countries indicated that the increase of non-standard workers in tourism could hold back building digitally responsive businesses because such workers would not enjoy the same training opportunities as those in more stable employment situations. Tourism enterprises which are not prepared for these challenges and the necessary transformations in systems, work organisation and skills development to support them, may find themselves emerging from the crisis to face a potentially challenging set of new demands.

Changes to the nature of tourism work and its organisation due to digitalisation

Even before COVID-19 digitalisation was changing the nature of work and work organisation in tourism, increasing the demand for specialist ICT workers in the development, integration and maintenance of tourism products and services and management and operating staff capable of effective use of the new systems and tools. Beyond tourist-facing roles, digitalisation has also changed businesses' 'back office' operations by reducing the layers and streamlining administrative work, increasing efficiency and reducing the cost of service support functions but also creating new demands in form example use of integrated systems, data and digital security.

Figure 2. Enterprises with internal ICT capabilities, by industry, EU countries, 2018

As a percentage of enterprises with ten or more persons employed in each industry



Source: OECD calculations based on Eurostat, Digital Economy and Society Statistics, January 2019.

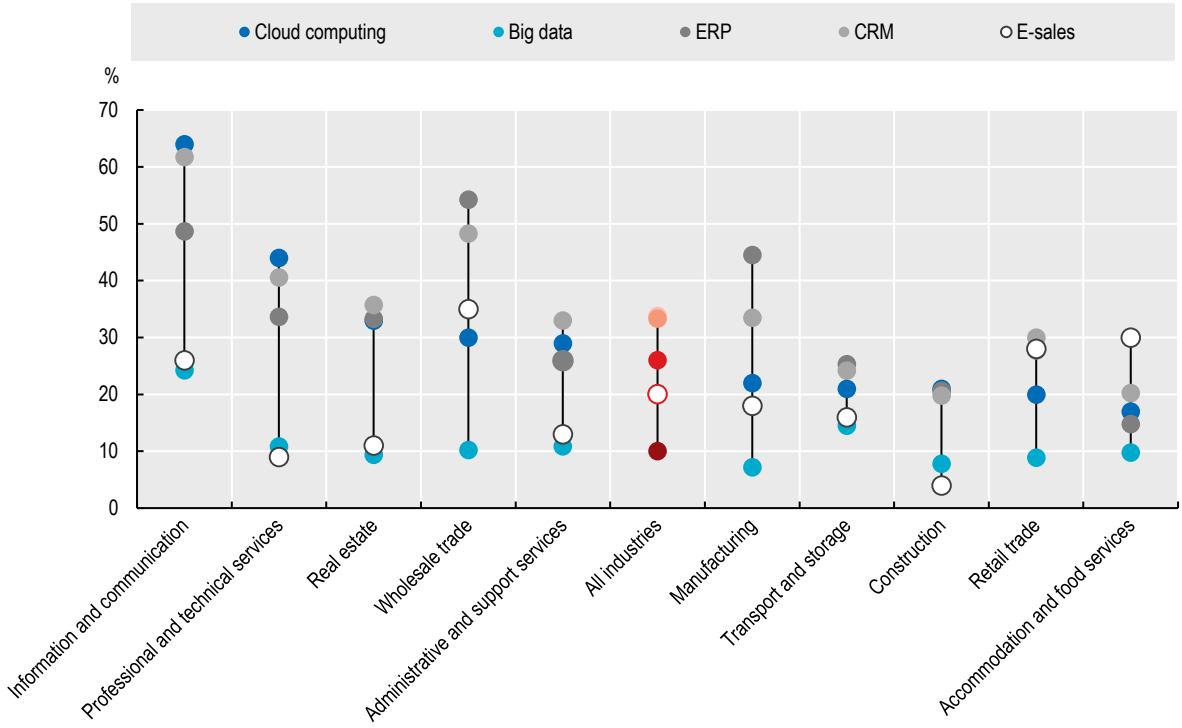
The sectoral effects, however, have been rather different and some have interpreted the diffusion of digital systems and tools as taking place in different waves. In Australia, one recent (pre-COVID) analysis (Austrade, 2019) suggested three uptake waves, with accommodation and aviation as early digitalisation adopters where the linked disruption peak had passed, while Destination Management Organisations (DMOs), and tours and food service were seen as not yet at but approaching peak digitalisation disruption. There is some wider evidence to support this with an OECD assessment suggesting that in Europe at least, accommodation and food service was lagging 19th of 22 economic sectors as late as 2018 (Figure 2).

Other OECD evidence suggests that while accommodation and food service was a leading sector for e-sales, it lagged nearly all others for adoption of CRMs and integrating cloud computing (Figure 3). Comparative data for other travel and tourism sectors is not readily available. Data are most likely to report experiences in accommodation and food service but not for other sub-sectors of travel and tourism due mainly to issues of data classification. While hospitality may be the largest employment sector its

experiences of digitalisation and its skills profile are atypical of other 'tourism' sub-sectors and as such it is not a reliable proxy for the whole sector in this context.

Figure 3. ICT uptake by industry, EU28, 2018

As a percentage of enterprises with ten or more persons employed in each industry



Source: OECD, based on Eurostat, Digital Economy and Society Statistics, January 2019.

Pre-COVID evidence from Australia suggests that there are other slow adopters and showed that visitor attractions and transport were yet to experience (much) disruption from digitalisation. This pattern of diffusion may look different in other countries but it does illustrate the need to look at different parts of the sector separately for work organisation effects, and in particular for the impact of digitalisation on:

- **Travel and tour organisation:** The travel and tour organisation sector has widely established a platform-based travel ecosystem drawing on OTAs, metasearch engines and reservation platforms to meet the diverse travel needs of consumers. New 'platform' companies were already challenging more traditional tourism industries such as aviation and established tour and travel operators, so the existing businesses have been striving to adapt work organisation both to the new digital model and subsequent COVID disruption. In other words, there were already ongoing efforts to meet the changing demands of 'digital customers' and connect with existing industries.

  To this can be added, the emergence of niche business virtual travel assistant applications using digital systems and tools. For example, 'Pana' is a virtual concierge mobile travel agency equipped with AI and Big Data analytics. 'Pana' provides for optimised tour and travel organisation services for customers by integrating consumer information through app messages, texts or e-mails. For these and similar niche businesses, virtual travel assistant applications have already started to provide a basis for managing an end-to-end travel experience for customers and extending the travel business model.

- **Accommodation and lodging industry:** In the accommodation sector, digitalisation has most widely affected distribution and marketing, but the effects of technology go much deeper. The use of social media, for example, as a tool to organise and engage in a wide range of e-Human Resources Management (HRM) activities plays a major role in driving workplace change in tourism. The use of social media in the workplace has positive (faster communications, virtual project teams) and negative (depersonalising aspects of HRM) consequences. Employees are increasingly impacted in both positive and negative ways by reviews on sites such as Trip Advisor, which can influence both future customers and employees. Social media has the ability to influence customer decisions and where consumers may trust other traveller's views expressed in online communities over marketing literature, with significant effects for (changing) tourism distribution systems, primarily through evolving technologies.

  'Smart' hotels have become a feature of some of the larger chains in the past decade, sometimes engaging with advanced digital technologies. Early applications have been online reservation and booking systems, digital menus, digital capture of customer data, and digital customer cards, with 'trend' applications including digital guest folders, hotel entertainment and digitalised self check-in and check-out. A few operators have gone well beyond these establishing technologies. An early development by Hilton, working with IBM, was the Watson-powered concierge robot called 'Connie', which has been in use since 2016 although its work organisation effects were limited to supplementing, rather than wholly replacing, staff-delivered concierge services. Similarly, the IoT has been increasingly applied in smart hotels worldwide, using real-time data from sources such as ventilation and lighting systems, occupancy detection sensors, entertainment devices and minibars, streamlining skills needs and reducing labour (and other) costs. In smaller hotels and providers, Greece has pointed to the value of direct e-marketing and active use of social media for direct online sales harnessing the potential of smaller operators own websites. This also has value in enhancing their visibility and accessing distant markets and market niches at low cost integrating them into global value chains.

  Most of the consequent changes to work organisation in hotels have so far been incremental and accommodated within existing, although sometimes simplified, staffing structures. Potentially deeper structural changes may come from the hotel industries' early interest, and some uptake, in the deployment of service robots. In a sector where some of the traditional guest facing roles are lower skilled and many administrative functions and middle skill level also involved routine and codifiable tasks, there is the potential for widespread job displacement by automation. The same may be true of service robots and as early as 2014 Aloft Cupertino in Silicon Valley, part of the Marriott Hotels chain, debuted Savioke's *Relay* robot. Nicknamed 'Botlr', this autonomous robot uses various sensors, 3D cameras, and Wi-Fi to operate lifts and deliver additional room amenities. A more autonomous robot capable of communicating with customers was deployed at Hilton McLean Tysons Corner in Virginia in 2016. While the technologies are emerging, and the job displacement potential is possibly extensive, survey returns (especially from Europe) caution that robotic roll out will be held back by customer resistance.

- **Airline industry:** The changes to work organisation in the airline industry resulting from digitalisation can be seen in the areas of automation, Big Data and 3D printing. Many airlines have adopted self-service check-in and self-service bag-drop using mobile devices, websites and kiosks at the airport to reduce waiting time and congestion and simplifying check-in procedures. South Korea and Germany recently adopted automated airport immigration based on facial recognition and fingerprint readers. Intelligent automation has boosted airline and airport efficiency and again with the primary effect on work organisation of delayering and substituting rather than replacing manned 'desks', raising productivity and reducing labour costs through lower staff-passenger ratios in routine functions.

  Big Data has also been adopted by some airlines to personalise and enhance customers' travel experiences. In partnership with Umbel, Qantas Airways has created a data hub centred on

customer preferences and behaviour to contribute towards increased customer loyalty. Qantas has also invested in a smartphone application with a personalised interface to create personalised itineraries with an interactive function that can act as a full-service digital travel companion.

In addition, 3D printing has been used in the aviation industry in the production process to generate products that are 30–55% lighter and cheaper. In recent years, the range of materials that can be used in 3D printers has greatly expanded, leading to more applications for customised 3D-printed products and improving turnaround of parts transportation and inventory storage. At present, 3D printing mainly affects original equipment manufacturers (OEMs) and maintenance providers in aviation, but as the technology, the materials it works with and regulations advance it is likely to expand into other areas of the tourism and travel ecosystem.

- **Meetings, incentives, conferences and exhibitions (MICE):** This is an important 'platform industry' where knowledge, experience, products and technology converge with benefits for the tourism economy. Although there are still cases of manual registration, application and ticketing at MICE venues, online marketing, registration and payment had become widespread before COVID-19. There is also an advancing trend of 'smartisation' integrating operation and event management software and applied at various stages in the delivery of events. This includes barcode imprinted registrant identifiers, real-time analysis of attendee movement and content engagement, event promotion on online channels and social media, food and beverage consumption, etc., and also to evaluate event performance and participation at a granular level.

  Digitalisation has also seen enterprises in the MICE sector incorporating 'hybrid' events that welcome visitors to physical venues while also livestreaming to audiences on online platforms. Venue closures and restrictions on meeting numbers from pandemic control measures in 2020 have accelerated the shift towards a hybrid MICE industry, and to fully virtual events during the pandemic. This has seen a likely enduring acceleration in the shift to digitalised content and delivery, and integration with enhanced use of social media, virtual reality and the Internet of Things. While many suppliers are well placed to extend digitalisation further, there will undoubtedly be a financial cost, and the market may not yet be ready to accept the full cost for the services required to organise fully virtual events post COVID-19.
- **Food service industry:** Whilst the food service industry has traditionally provided human-to-human services, advances in digital technology have substantially changed business operations. Businesses in the food service industry are more labour-intensive and typically have lower returns to scale than other service businesses. Even before the pandemic intensified use, managers of some food service businesses have implemented the use mobile apps and self-ordering systems to raise table service productivity. For some this was prompted by demand especially from 'Generation Z' consumers; for others by persistent recruitment and retention problems for table service staff or efficiency from reduced awaiting times and integration with inventory checks. In fast food outlets, companies have expanded self-service functionality to improve efficiency, with food ordered and paid for via self-service kiosks, so that fewer cashiers are needed on site.

  Food service even before COVID-19 had widely taken up digitally based mobile payment methods, such as near-field communication (NFC) payment or 'mobile wallets', mobile banking, SMS payment, and QR code payment. The demand for these during the pandemic was widely seen to have increased exponentially in the survey as regulation, or consumers, demand cashless and contactless payment opportunities. In all these areas, food service staffing has seen streamlined and better integrated operations and back office function, with an effect on increasing productivity and de-layer staff.

There is limited comparative evidence of the extent and potential impacts of digital uptake for travel and tourism relative to other sectors. Although some national data are available, this is usually drawn from one-off surveys of in-scope enterprises, covers very few countries and lacks comparability across those that are covered. One comparative source is the World Economic Forum's (WEF) multi-sector enterprise

survey on the adoption of advanced technology for 2018-2022 (WEF, 2018a). It provides comparative cross-sectoral information (within and between sectors including travel and tourism[3]) on company expectations for:

- **Adoption of selected digital technologies:** for travel and tourism the technologies mentioned most often by companies included 'internet of things' (by 95% of companies surveyed), 'app- and web-enabled markets' (95%), and 'user and entity big data analytics'(89%), 'machine learning' (79%), and 'cloud computing' (79%)
- **Anticipated skills and knowledge barriers to uptake:** for travel and tourism the barrier to adoption most often by companies included 'skills gaps: local labour market' (89% - the highest response across all sectors), and 'lack of knowledge of opportunities' (50%)
- **Anticipated workforce implications of the uptake**: for travel and tourism the projected workforce effects mentioned most often by companies included 'expand workforce due to automation' (50%), 'reduce workforce due to automation' (50%), and 'expand task-specialised contractors' (50%).

Digitalisation, jobs displacement and job creation in tourism

For tourism, digitalisation is a genuinely 'disruptive' technology bringing positive, and less positive, impacts on job creation, job losses, job quality and skill requirements; the last of these is considered in the next section of the report. This juxtaposition of effects is illustrated well by the rise of peer-to-peer online platforms such as Airbnb and Uber, creating new markets, digitally-centred business models and new jobs for workers and hosts at the same time as challenges to work and work organisation have been presented to traditional providers. In much the same way, OTAs have seen diversifying options for lodging, airline companies, car rentals, and the like but also the demise of, and job losses in, many traditional 'bricks and mortar' travel agencies across OECD countries.

While digitalisation can displace but also create (different) jobs, much of the literature and survey responses focussed on the possibilities for job displacement although of the likely scale and focus for this in tourism is surprisingly limited. Cross sector studies have looked at the potential for skill or task-based substitution by technology with a recent analysis for OECD (Nedelkoska and Quintini, 2018) suggesting that this may be extensive over the next decade although not as much as previously projected. This suggests that automation of routine, regular and codifiable tasks across the economy could affect nearly half of all jobs (47%) significantly with around one in seven (15%) of all jobs having a high risk of displacement.

In the tourism economy, the survey responses also anticipated that automation and service robots have considerable potential to replace tasks that are repetitive and require low skill levels. This is expected to focus, as in the recent past, on checking in/out of hotels, serving food and beverages, kitchen assistance and some housekeeping tasks. They viewed these new technologies as part of the workforce of the future, due to their consistent service quality, outcome quality and productivity, along with their low operating costs. On this model, displacement of these and other tourism jobs is set to be a progressive feature of work organisation.

Whilst there is a coherent view across OECD countries on this trend, there remain very different views on the speed, breadth and depth of any job displacement. While Croatia indicated that significant technology-led job displacement was already taking place, several other countries emphasised the distinctive focus in tourism for the human touch and personalised service. . In the Czech Republic, Iceland, New Zealand and Switzerland, among others, it was felt that tourism and hospitality will, in the short term at least, remain firmly based on interaction between staff and clients and the quality of personal services. Here, automation was not expected to cause significant job displacement. While in Greece, the point was made more strongly

[3] WEF's definition of travel and tourism differs from the NACE classification and excludes parts of retail food service

by stakeholders who highlighted that the personal contact upon which hospitality and the tourism sector depend, cannot be replicated by automation.

In Switzerland, it was also felt that service automation, and especially robots, would encounter resistance from guests, though this was not a universal view. The response from Iceland felt that automation would become significantly more extensive, with job displacement especially in lower skilled hospitality jobs. The Bulgarian response recognised the role of digitalisation in optimising business processes and some aspects of service delivery but felt that progress would be slow.

In this rather mixed picture, it seems that while there is extensive potential for job displacement through task automation in many jobs, these effects in Europe at least, may be slow to come about and will be unlikely to widely displace personal support roles even in those occupations likely to be most affected. Experience in Germany drew attention to counterbalancing influences in some segments of tourism, with continued emphasis on personal service (e.g. business travel, group travel, long-haul travel). With travel restrictions and destination regulations becoming more complex (notably because of COVID-19), more individual and personal advice would continue to be valued by many customers.

To what extent the ongoing process of digitalisation will also contribute to the emergence of new types of jobs in tourism has attracted less attention in the literature, although some sources suggest the effect may be relatively small and centred on a few individuals with largely technical skills. In their response to the survey, France summarised a need for numerical competence as being indispensable for tourism enterprises today. Germany indicated an expectation that digitalisation will expand the numbers of 'numerate' tourism jobs especially in data management, manipulation, and analysis, as well as others where the focus was on rising demand for content production and management and mobile applications.

An analysis of digitalisation employment effects, including across 'aviation, tourism and travel', found that for this sector, software specialists were a key occupation in each of five areas of technological development (WEF, 2018b). Computer systems analysts featured as occupations most in demand in four of the five. Other recurrent occupational needs for digitalisation in the sector were database administrators and programmers. With a focus on the likely frequency of demand, not levels of new job creation, some specialist needs for data analysts, cybersecurity specialists and user experience designers, were identified. Country survey feedback also recognised emerging demand for robot 'trainers' as specialists in programming, managing fixed and mobile robots and for VR and AR 'area' designers, and what would likely be more periodic areas of demand for market research analysts and 'innovation professionals'.

Many of the 'new' jobs arising from the digitalisation of tourism will be technical occupations with often very specific ICT or application skills geared to specific app and web-enabled markets. Jobs for innovation professionals are needed to take advantage of digitalisation take-up and to reform and better integrate digital systems and tools in the business. Survey feedback from France saw numerate 'professions' emerging in tourism for data analysts, webmaster, and yield managers. Russia and Israel indicate that this might include roles such as:

- ***Space brand manager*** – designing and filling a virtual world with product or destination specific content to attract visitors, build relationships and competitive advantage.
- ***Smart travel system designer*** - creating automated ticket booking, navigation and hotel booking systems and capitalising on search algorithms.
- ***Tour navigator/designer*** - developing software and applications to help users find their way on a particular itinerary based on their interests, tastes, plans, and ongoing events.
- ***Territory 'architect'*** – a counterpart to a brand manager creating 'information landscapes' which blend destination content with trends currently popular in the travel industry.

In Israel, there was also thought to be rising demand for individual tour operatives and managers as professionals able to develop and in some cases also conduct personalised itineraries. This is not to suggest these were the only areas of 'new' job formation. New job demands seemed relatively small

compared to the challenges of new skills mixes in largely existing jobs; an issue returned to in Section 3 of this report.

Transition of tourism SMEs to a digital economy

Despite the uneven uptake of digital technologies by tourism SMEs, the digital transformation has, and will continue to have, a profound impact on tourism. The digital economy is transforming the process of communicating with tourists and marketing tourism services, and opening up new and highly creative ways of delivering tourism services and enhancing the visitor experience. It is changing the way work is organised and services delivered, and also presents opportunities to take advantage of digital advancements to handle transactions, capture and process information and data on tourism supply and demand, and improve and connect operations along tourism value chains and ecosystems (OECD, 2020a).

While many of the challenges and opportunities for tourism SMEs are similar as those for SMEs more generally, tourism is a unique proposition for several reasons. For example, the tourism sector is highly fragmented and heterogeneous and covers a wide range of industries with many demonstrating a dual structure characterised by a very small group of large businesses combined with a large group of SME/micro-businesses. The sector is also 'information intensive', which means many tourism services are ripe for digitalisation. Understanding digital uptake by tourism SMEs is particularly relevant as around 85% of those enterprises with a major role in the delivery of tourism services in OECD countries are SMEs (e.g. accommodation and food services, travel agencies, tour operators), compared to roughly two-thirds for the wider economy. Although they constitute the majority of tourism businesses, SMEs and micro-companies face more difficulties to vertically integrate than larger companies (such as hotel chains in the accommodation sub-sector) and to reach potential customers. Another particularity of the tourism sector is that tourism enterprises operate in a global market place while delivering at the local level, as part of a unique tourism destination offer. The geographical distribution of businesses is limited only by the attractiveness and accessibility of destinations.

Realising the benefits from the digital revolution will depend on a combination of investment in digital infrastructure, as well as the skills development of human capital and innovation in business models and processes (OECD, 2019b). Such investment will be key to opening up the opportunities from the digital transition for tourism SMEs. This requires investment in the skills and technical inputs needed to facilitate the adoption and effective use of new technologies, but also in organisational change, process innovation and new business models, otherwise referred to as 'knowledge-based assets' (OECD, 2020a).

Many OECD countries will echo the experience of Australia, for example, where 95% of tourism businesses are micro or small enterprises and where very nearly half (49%) have a turnover under AUD 200 000. Many SMEs are established, owner-managed and often family businesses; others will take advantage of low barriers to entry with start-ups from female and other entrepreneurial talent or from young and digitally proficient entrants. SMEs are consequently a vital part of the tourism ecosystem, but the evidence suggests they lag larger operators in digitalisation and face growing challenges in making the transition to a digital tourism economy. These technology lags are not unique to SMEs in tourism but survey responses indicate they may be particularly acute in this sector.

These challenges are in part due to a lack of aspiration or digital skill sets within businesses, a lack of, or lack of awareness of, government support programmes and a lack of understanding of how boosting their digital presence can improve productivity and profits. In Greece, most tourism businesses are small, often family owned and run businesses, and where their degree of digital transformation depends on whether the manager is a first, or second-generation entrepreneur. Here, older managers were commonly risk averse, focussed more on day to day routine than longer term planning and lacking an appetite for technical innovation. In Iceland and New Zealand among others, low business profitability margins and consequent capital investment constraints and uncertainty over returns on investment from digitalisation were also

identfied important barriers. In Germany, a 2021 panel survey by the Federal Competence Center for Tourism shows nationwide broadband coverage, financial support, employee qualification and the establishment of uniform data standards to be the most common barriers to digital uptake. COVID is likely to have intensified some of those challenges particularly where firms have reduced any capital 'reserves' and/or intensified their debt. Elsewhere, many smaller operators are located in rural or remote areas, often with limited resources to realise and adapt to innovative solutions. In Brazil, Canada, Colombia, Hungary and Bulgaria it was felt that many are in localities lacking critical digital infrastructure, a feature which Switzerland also felt exacerbated a brain drain of young people who might otherwise provide skills and knowledge to support tourism digitalisation locally.

New Zealand also mentioned that many smaller tourism operators do not prioritise investment in digital tools, platforms, and systems across tourism operators. This was echoed in other countries with a substantial focus on tourism in rural regions, and especially where destinations were either widely dispersed or remote, including Canada and Iceland. In Greece, it was pointed out that in rural areas, and especially island communities, the fact that tourism businesses are owned and run mostly by local families, limits the potential for incoming knowledge flows from younger, digitally proficient newcomers.

Other general (cross-sector) evidence on SMEs suggests they are more involved in continuous vocational education and training (CVET) and succeeding in closing the upskilling gap with large firms (OECD, 2019c), they engage less often in structured collaboration with higher education and other educational institutions (OECD, 2021) impairing their potential for digital adjustment. Evidence from Portugal from a 2019 survey of digitalisation perceptions and uptake in (predominantly) SMEs suggested a mismatch between managers' perceptions and practice in digitalisation. While most felt their businesses were either digitally mature (31%) or maturing (60%); this was not reflected in their business practices including attitudes to digital innovation, skills and investment.

A common experience across advanced economies is that smaller tourism businesses are unaware of how digitalisation could potentially enhance their business. Tourism SMEs are also seen to face challenges in the following digital areas:

- Basic digital tools, platforms and systems are inadequate and lack the capacity to target visitors through different channels (e.g. website, booking systems and social media)
- Lack of financial resources to invest in digital systems and tools, or the specialised staff or skills needed to direct or optimise digitalisation investments.
- Lack of digital capabilities (e.g. to redevelop digital platforms).

If the appetite for digitalisation has been lacking for many tourism SMEs, the pandemic may be changing that situation. Responses to the survey (e.g. Brazil, Bulgaria, Croatia, Germany, Greece, New Zealand, Poland, Portugal, Spain and the Slovak Republic) indicated that SMEs in the tourism sector have increased their demand for developing digital skills or to receive support in areas such as: website development and articulation; e-commerce including online bookings and digital payments; digital marketing including social media integration, online marketing, search engine optimisation and data management and analysis including generating analytics and insight reports.

A significant gap is apparent between the understanding, aspiration and capabilities of tourism SMEs and larger businesses, to benefit from the digital transformation. Some countries felt that the gap had narrowed for web presence and connectivity but remains wide when it comes to more advanced technologies like data analytics, channel management, Property Management Systems (PMS) or virtual and augmented reality. The gap is especially wide for microbusinesses (with fewer than 10 employees), of which there are many in tourism, which creates a serious gap in the supply chain and a likely bottleneck to the sector's ability to leverage the opportunities of digitalisation. This gap may be widening as surviving SMEs emerge from the negative effects of the COVID-19 pandemic with limited human and financial resources.

Understanding skills needs in the digital tourism economy

Understanding the current and emerging skills consequences of digitalisation requires one to differentiate the demand for skills from the general supply of skills to and from the labour force (causing potential skills shortages), and those already in employment (causing potential skills gaps). The distinction is especially important for tourism, where there is a legacy of challenges in both skills shortages and skills gaps, but each require a different remedial approach. Skill shortages call for a more holistic approach, with sector stakeholders working through the tiers of the education and training sector to ensure a closer match between labour supply and demand.

In bridging skills gaps, the focus is much more on employers collectively or individually developing appropriate training/retaining responses, although the 'nudging' role of wider policy has an important role to play in both areas. The focus should be forward-looking, examining evidence of skills shortages and gaps that are likely to develop in the future, from the digitalisation patterns and prospects (as described in Section 2).

Current difficulties are a useful guide to future challenges. However, current evidence for tourism digital skills shortages and gaps is limited, even more so for future perspectives, although some comparative data from Europe's Next Tourism Generation (NTG) Alliance, is drawn on below. To this can be added useful evidence from tourism related sources of issues and trends in ICT and associated skills demand.

One of the limiting factors in the current analysis is the focus in most data sets and analyses with sectoral breakdowns on the 'accommodation and food services activities' sector (NACE 55 and 56). Data on the wider tourism economy is often impossible to aggregate from existing classifications. In part, this is because the tourism elements of sectors such as 'air transport' (NACE 51) and 'sea and coastal passenger transport' (NACE 50.1) are difficult to limit to the tourism sector; distinguishing tourism and visitor attractions is even more challenging from 'official' data classifications. The lack of consideration or emphasis on 'travel agencies and tour operators' (NACE 79) is an omission, given that much of the recent (and likely future) significant effects of digitalisation have occurred here[4].

Identifying new and emerging digital skills needs

The secondary sources tend to show that the tourism sector is affected by the process of digitalisation in some similar ways to other sectors. Most jobs now have a need for some basic, level of digital skills. For example, the latest European Skills and Jobs Survey (ESJS) estimates that around 85% of all jobs need basic level digital skills among all the other generic and specific skills required for the job (Cedefop, 2020b). In all sectors (including tourism) survival in the jobs market requires an appropriate mix of these digital competencies with cognitive skills (such as problem-solving, creativity, learning to learn, etc.) and socio-emotional skills (such as communication, collaboration, etc.). While this applies widely to high-skill

[4] These four NACE categories are used in the latest statistical assessment of skills developments and trends in the tourism sector in the EU (Cedefop, 2020b).

occupations, ESJS suggests it has also increasingly been a feature for lower skilled, non-routine jobs where these involve close human interaction. This is likely to be the case with many lower skilled tourism jobs and may present substantial challenges for mid or older aged employees and other groups of the workforce who may not be digitally proficient.

Some commentators do see a specific set of changes leading to what has been referred to as a 'new paradigm' that is transforming the way tourism is conceived and managed (European Commission, 2015). Significantly, this statement does not specifically refer to the delivery of tourism services. This may indicate that while there are certain parts of the business model undergoing many of the transformative effects from digitalisation, as outlined in the previous section, they may, as yet, be less well established at the point of delivery of the (Tourism) service.

Some data on current and changing digital skills demands across tourism enterprises are available from the Next Tourism Generation (NTG) Alliance and large-scale survey conducted in 2019 looking at current and likely future levels of digital proficiency. This showed tourism firms were widely confident in current levels of organisational proficiency for user skills in basic digital technologies including use of operating systems (e.g. Windows) and commonplace software packages such as Ms. Office (Word, Excel, PowerPoint). There was less confidence in their current skills proficiency for higher order digital systems and tools and notably machine-based learning, AI and all forms of robotics. On the basis of their skills needs, food and beverage emerged strongly as the sector with lower levels of technological absorption and accommodation as the sub-sector which was confident in its current levels of digital expertise. Looking ahead these firms (pre pandemic) anticipated rising proficiency levels needed in the medium term across all 13 areas of tested digital skills, and across all sectors although this acceleration in skills levels needed was modest for food and beverage enterprises. In contrast, travel agents, tour operators and DMOs were expecting to need much higher levels of proficiency for many of the digital competencies and especially for online marketing and communication skills, and social media.

Looking at the proficiency gaps between current and expected longer term usage the NTG data suggested only a small gap between current proficiency levels and those anticipated for 2030 for basic digital skills but this widening for AI, robotics and VR/AR, although evidence in the survey suggested these were not expected to be widely in demand across tourism enterprises. However, the study authors (Dijkmans, et al, 2021) suggest the picture may be strongly influenced by firms projecting forward current patterns of use rather than accounting for changing potential for different aspects of digitalisation.

Other specific analyses of the sector often point to the need for 'generic' or 'transversal' skills at most levels combined with the specific technical skills needed for the job (such as cooking, waiting, administration, etc.). Many of these jobs will have tasks (and skills) affected or likely to be affected by digitalisation; information-finding and associated judgements, Nonetheless, even with these technologies impacting further on working lives in tourism, the need for generic skills will remain extensive and may be even intensify as the focus shifts to customised services.

Even with advances in machine-based learning and AI, for example, many work tasks involving 'social intelligence' are likely to remain challenging to design and embed into responsive and guest-facing digital systems. Consequently, tasks such as persuading, negotiating, or caring for others are interpreted as likely to remain relatively untouched by current technology or its anticipated application soon (Arntz M., et al, 2016). As such it can be argued that care should be taken not to overstate the comparative advantage of technology in the many tasks performed in the tourism sector that require a high degree of flexibility, judgement, and common sense, including effective communication, and the ability to co-operate and work in groups.

This view was echoed in some of the survey responses notably, but not exclusively in Europe. In Bulgaria, for example, the flexibility and judgement often required for problem-solving as having limited digital application. Other countries cautioned about adopting a too deterministic or instrumental interpretation of

the task reach of digitalisation. Colombia, among others, emphasised that flexible and adaptable skills were viewed as a fundamental requirement for the sector.

When examining tourism-related sectors, the demand for advanced digital skills in the workforce is driven by firms embracing the opportunities presented by advances in cloud computing, big data, and social media (OECD, 2019a). Some of the survey responses suggested this is also a feature for faster adopters in tourism and may become more widespread as more firms build ongoing digital relationships with consumers and seek to personalise offers. If so, the tourism sector will find itself competing with a potentially large demand for similar skills from other sectors. Portugal, for example, anticipated rising challenges for talent attraction in accommodation, especially for higher qualified staff, as a legacy of the perception of a low wage sector.

Even if the numbers needed with similar advanced skills will be relatively small (as a proportion of the total tourism workforce), such recruitment challenges may suggest this could act as a drag on those aspects of digitalisation. It has been estimated that across all sectors, IT specialists account for under 3% of total employment in all but five OECD countries (i.e. Denmark, France, Germany, United Kingdom and United States) and shortages were reported in only 3.5% of firms (OECD, 2017b). These figures do not suggest widespread skills shortages for IT specialists.

Technical skills densities in some specific activities may be greater, notably for OTAs where there will continue to be demands for software engineers, system engineers, UX writers, PHP developers[5], and front-end specialists (NTG, 2018). Even where technical skills demands are at low density, these skills can be critical to digital transformation and those firms with shortages can be seriously affected. This challenge has been recognised in, for example, Russia, which has opted for a collective response by embedding similar digital skills needs in the relevant first-degree studies in higher education to help ensure a wider supply of information and informatics specialists. The digital skills deemed essential to underpin a quality tourism experience in the context of growing digitalisation in the sector were itemised by Latvia (Table 1):

Table 1. Digital and related skills necessary for a quality tourism experience (Latvia)

Digital skills transferable across sectors	Tourism specific digital skills
• Data science and tourism data analysis	• Digital tourism marketing sales professionals
• Artificial intelligence and machine learning specialists	• Specialists in new technologies and tourism innovations
• Project and process managers	• Tourism business development managers
• Software, application developers & analysts	• Tourism information technology services
• Big data analysts and professionals	
• Digital transformation specialists	

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Clearly some of these are specific digital skills (e.g. software application developers and analysts) which have currency across many sectors, while others (e.g. tourism information technology services) have an element of sector specificity, although underpinned by more general digital skills. In their response, Switzerland provided details of the processes driving digitalisation in the tourism sector, distinguishing between two trends: i) Customer evolution – where there is a growing appetite for information delivered online, and; ii) Business process optimisation – where digitalisation responds to customer demand.

[5] UX writing involves crafting the texts that appear throughout the interface of digital products such as websites and mobile apps. PHP is a general purpose scripting language particularly suited to website development.

It remains unclear whether the tourism sector is responding to a growing customer appetite for online services or if the sector is adopting digitalisation to support a more business-oriented model that sees the 'dematerialisation'[6] of services as a way to reduce costs and/or in response to recruitment past difficulties?

Switzerland also makes the point that for most tourism jobs the application of new technology is into existing jobs. This is particularly evident in such tasks as making online reservations, advance bookings, check-in, and check-out, etc. According to the Swiss employer federations, for most jobs in tourism, digitalisation will bring some task changes and a need for user competence in digital systems and tools. However, in most cases, the advance of digitalisation is unlikely to require wholesale changes in the way work is carried out.

The potential for task automation (including the use of static and mobile robots) has been of interest to the tourism sector and as the previous section has illustrated, various (usually larger) hospitality and travel enterprises have been experimenting with novel systems. While their scale-up and roll-out has been slow, as the technology improves, the potential for their use is widely expected to increase (albeit from a very low base).

The survey responses suggest there may be different trajectories for advanced automation and robotics in tourism. There is some evidence that advances in other service sectors in the Pacific Rim (e.g. Japan, South Korea) may have seen guests more open or responsive to robotics, notably in the hospitality sector. In Switzerland there was also an acknowledgement that any resumption (post Covid-19) of persisting recruitment and retention challenges for lower skilled staff might accelerate the use of robotics as staffing substitutes.

Changing tourism skills mixes, and emerging gaps and shortages

In response to the survey countries widely reported the intensifying need for 'digital fluency' among employees. This is consistent with much wider evidence from the European Skills and Jobs Survey, which found that 17 out of every 20 jobs in the EU require at least a basic level of digital skill (NTG, 2019). Similarly, across all sectors 'generic ICT skills' are in widespread use, including in such tasks as customer negotiating, problem solving, and horizontal interaction tasks such as presentations (OECD, 2019b). What constitutes digital fluency or generic ICT skills is less easily characterised although feedback from the country survey is summarised in Table 2.

Digital competency or fluency needs are likely to be a mosaic of requirements whose specific needs will vary, not only with the (changed) task mix, but with the specific digital tools or systems in use for a particular business. Digital fluency requirements will consequently change as software, data or systems interrogation or enterprise systems also change.

Significantly, only the last of these fluency skills (use of Global Distribution Systems (GDS), Distributed Control Systems (DCS) and other online booking systems) could be considered specific to tourism. As digital fluency becomes a feature of more tourism occupations and tasks, it will see widening competition for those competencies with other sectors looking for many of the same skills sets.

[6] Broadly defined, dematerialisation means the reduction in the quantity of materials required to provide a product or service – essentially doing more with less and fundamental to achieving this is the use of ICT in the delivery of services.

Table 2. Summary of likely digital fluency needs across different tourism occupations

Fluency needs	Skills/competency requirements
General user skills in Ms.Office	Applying generic (MS Word, Excel, MsPowerpoint etc), associated software and embedded apps to business processes and customer interactions
Online communications	Using of internet and intranet communications systems, e-mail correspondence and other online communication including online meetings
Digital purchasing	Processing and administration of electronic point of sales (EPS) and other digital purchasing systems
Data literacy	Inputting, retrieval, basic analysis, routine reporting and presentation using server or cloud based databases including CRMs
Big data and analytics	Generating, recoding and making sense of platform and machine-derived data customer and utilisation data (eg platforms such as Booking.com, Expedia and from Facebook Twitter, Trip Advisor, and other media)
Content creation	Developing, integrating and re-elaborating content for digital systems and users, and managing content related copyright and licenses
Data and systems security	Complying with data privacy, data security and cybersecurity protocols and regulations
Travel and bookings management software	Using global distribution systems and software (eg Amadeus, Sabre, Travelport/Galileo, Worldspan), other online booking/reservation systems, and specialized travel agency management software (e.g. DCS)

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Digital fluency was not the only element of changing skills mixes. Others have recognised that digitalisation will also call for additional qualities: According to one source, '*The future of the travel experience must be a seamless blend of talent and technology*' (Weissenberg and Langford, 2018) and talent has been seen as a (changing) composition of personal skills and aptitudes with one assessment pointing to the 'rising qualities' (WEF, 2018b), including:

- Analytical thinking and innovation
- Active learning and learning strategies
- Creativity, originality, and initiative.
- Technology design and programming
- Creative thinking and analysis
- Complex problem-solving
- Leadership and social influence
- Emotional intelligence

These sorts of skills are not unique to the tourism sector and will be in demand by other industries, though tourism businesses will be searching for certain combinations of skills they need. Of those countries that expanded on the changing digital skills landscape, Austria reported a growing need for those skills in data management, systems thinking, managing self-organisation and software, while Brazil singled out the need for digital marketing skills, particularly in the burgeoning SME tourism sector. Croatia went into more detail in its response listing the following developing needs in the sector: Problem-solving via social digital tools; multilingual and fast response to customers (e.g. communication, digital marketing, website and graphic design, etc.); and data handling with interpretation, presentation and security. Finland responded that the way skills are developing digitally is mostly about selling online and less about the delivery of the service, a view to some extent echoed by the response from Iceland.

The needs of the majority SMEs in tourism was highlighted by Switzerland where there has been a marked contrast between the way digitalisation has been adopted by large companies, franchised and other hotel chains and the individual SMEs. This was particularly marked for SMEs' ability to market their services on social media. In Canada, 23% of tourism SMEs were classified as 'digitally advanced' (higher than the

19% across all sectors), with the effective use of digital technology to run their businesses and with the right culture to drive change across the organisation. However, 59% of tourism SMEs were classed as 'digitally conservative' suggesting a hesitancy or reluctance to engage with technology.

Emerging skills shortages in the tourism sector

An examination of available literature offers little detail on the nature and extent of skills shortages in the tourism sector. Most commentary on skills shortages continues to focus on the long-standing difficulties of recruiting 'traditional' skills such as chefs, housekeepers, food service and sales staff. A recent EU study (Cedefop, 2020b) shows that the tourism sector continues to rely largely on workers with lower levels of education. In general, these were not skill shortages linked to digitalisation.

However, there is general commentary about the growing need for digital skills across all sectors, but little or evidence provided, of current or likely skills shortages associated with digitalisation. There are some specific references to unmet increasing demand for digital 'green skills linked to sustainable tourism and to likely difficulties (pre-COVID-19) of recruiting specialists in data security, notably for airlines. Others draw attention to likely challenges for the tourism sector in attracting staff with skills and experience of online engagement with customers (WEF, 2017).

A recent analysis of online job vacancy advertisements, showed the top skills in demand in tourism (2018-2019) included digital fluency, but placing this alongside personal skills, which emphasised an ability to lead others, work in teams, be adaptable, able to communicate, speak English, and problem-solve (Cedefop, 2020a). This corresponds with some national survey submissions, with Greece, for example, underlining the continued importance of horizontal and soft skills in tourism.

A cross-sector international study (ILO, 2018) makes the point that local users of digital systems do not necessarily need to know much about the underlying technology or to make sophisticated inputs to devices. Rather the day-to-day usage could be handled through AI systems generating the necessary advice and guidance to which staff could respond. This would then generate lower barriers to entry to the diffusion of such technologies, allowing staff to focus on other activities, some of which will require appropriate education and training.

Some of the country survey responses on skills shortages were informative and a selection of the more specific reflections are summarised in Table 3. Germany provided good detail on specific skills shortages, although as for all the relevant responses, the sorts of skills listed tend to be transferable across sectors and not necessarily tourism specific. Several countries saw the effect of COVID-19 as persuading more businesses to move online and more customers to adopt the technology in their dealings with tourism providers. For many this involved new or intensified use of digital marketing, e-sales and online or other digital ordering and payment systems. This was felt to be a long-lasting stimulus to wider change which would generate possible shortages for management and administrative skills associated with online sales, social media, and related aspects. For some, these future shortages might be intensified because the COVID-19 crisis has seen an outflow of such skills to other sectors. As and when tourist demand returned, there as concern employers would find it difficult to attract them back.

In reflecting on likely skill shortages several countries identified the effect of COVID-19 as having persuaded more businesses to move online and more customers to use technology in their dealings with tourism providers (such as online booking, contactless check-in/out, etc.). For many businesses this involved new or intensified use of digital marketing, e-sales and online or other digital ordering and payment systems. This was felt to be a long-lasting stimulus to wider change which would generate possible shortages for management and administrative skills associated with online sales, social media, and related aspects.

Table 3. Digital skills shortages identified in selected country surveys

Country	Digital skills shortages
Colombia	• Business and marketing skills using digital systems
Croatia	• Skills in AI and augmented and virtual reality • Lack of digital skills supply in general is more pronounced in rural areas with poorer IT infrastructures
Czech Republic	• General skills shortage in the service sector (including tourism) for those with digital literacy
Germany	• Digital knowledge in digital processes and technologies • Open data systems • Digital marketing and sales • Customer orientation • Dealing with and operating software systems • Sustainable action competences
Greece	• Shortages for handling reservations via booking engines • Maintenance of software (all sectors) • Data handling, data safety and security skills (notably digital security for air carriers) • Digital marketing and sales skills • Managing and analysing data and digital content • Yield management using digital systems
Slovenia	• Revenue management using digital systems • Social media integration and content management • Online distribution management • Specialists in digital security and personal data protection
Switzerland	• Employees combining digital skills with 'soft' skills • Rural areas and particularly in SMEs often have skills shortages due to a brain drain to the urban areas

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

The impact of future skills shortages relating to digitalisation across the sector is likely to be uneven. A particular concern to which attention was drawn in the survey was a dichotomy between urban and rural areas with the latter tending to lose out on digital skills potential. This can be attributed to several factors such as a relatively poor infrastructure in rural areas, with countries identifying limited broadband access as a major challenge for the digitalisation of the sector (e.g. Canada and Germany). The preponderance of SMEs in the accommodation and food services sector outside the large urban areas and a lethargy or unwillingness to engage with the technology may also be a factor.

The 'push' and 'pull' factors behind the geographic shift in skills is also evident in transnational movements of tourism staff. This has been a long-standing feature of the sector particularly in Europe but also in Australia and New Zealand. This see's extensive labour and skills supply to some of the larger tourist economies from attracting migrant workers on a large scale, most employed on short term work visa's and on a seasonal basis. However, most of these skills are likely to be in traditional service jobs with low levels of digital skills requirements. Furthermore, the temporary nature of the work tends, and little or no prospects that job holders will remain in post, means that few such staff receive significant training to enhance their skills.

Emerging skills gaps in the existing tourism workforce

Skills gaps refer to skills deficiencies in the current employed workforce and are important in ensuring that businesses are ready to meet future challenges. However, as with skills shortages, the literature offers little in the way of specific guidance on what needs to be done. The situation with skills gaps has also been deeply disrupted by the pandemic as many tourism businesses shed or furlough much of their existing

workforce to respond to lock downs or dramatically diminished supply. The evidence to be drawn on consequently reflects the pre-pandemic situation which is an uncertain guide to what emerges for the sector as lock downs, domestic and international travel restrictions and consumer hesitation on venue safety ease.

Some studies (e.g. NTG, 2019) reported that employers saw gaps mainly in softer skills such as language ability, inter-personal skills, and basic ICT skills – all not necessarily tourism specific. Another report (WEF, 2017) referred to the challenges managers face in dealing with the effects of automation on employment, the need to re-skill the workforce for the digital economy and creating a safety net for workers in precarious forms of work (such as platform or gig workers).

A study of skills gaps in the wider economy (OECD, 2017b) using the OECD's International Assessment of Adult Competences (PIAAC) showed that between 7 and 15% of those in work using communications and information search software have insufficient skills to carry out their tasks effectively. This skills gap rose to 42% for those using office productivity software. Although not tourism-specific, it suggests a shortfall in keeping staff up-to-date and fully competent in incoming digital systems and tools, which may intensify in tourism with digitalisation. Compounding this, another study (Nedelkoska et al, 2018) suggests that those in jobs capable of being fully automated were three times less likely to have received on-the-job training than those on jobs at low risk of automation.

The country survey offered only limited insights to the current or prospective skills gaps in their tourism workforces. In Portugal, a survey of digitalisation take-up in tourism showed that a lack of skills in the existing workforce was seen by three in four firms as a constraint to making investments in digital systems and tools. In Germany, the Federal Competence Center for Tourism very recently estimated (February 2021) that 49% of tourism businesses lack qualified employees and know-how to be able to use digitalisation as an opportunity. In Greece, stated travel agents felt that the digital skills of current staff were adequate, but businesses in accommodation and food service were experiencing weak supply of key digital skills in software protection, solving technical problems, and managing data and digital content. Croatia highlighted the principal 'digital' gaps as being online digital security, blockchain technology, mobile and web applications development, digital marketing, and cloud work. Greece and Croatia were among several countries reporting a lack of functional analytical knowledge and presentation skills as a rising problem among the current tourism workforce.

Finland saw a large gap in skills needed for digitalisation in tourism among the current workforce and also pointed to workforce resistance as contributing to these gaps which required a change of mindset on the part of many workers to tackle it. Similar concerns were echoed by the Czech Republic, which also indicated that those workers with long lengths of service could be slow to change and embrace new technology. In Israel, it was felt that 'senior workers' could be challenged by the adoption of new technology. Canada emphasised the need for all businesses to have workforce plans that take into account the new skills and changing work environment for all staff resulting from COVID-19. These plans will need to include reskilling or training to prepare workers for new demands and to accommodate the introduction or enhancement of technology. The need for such plans at business level were re-enforced by Germany who felt these were rarely in place for SMEs.

Even with workforce adjustment plans, it seems likely that some workers will be resistant to change. Training can help to overcome this along with the prospect that for some jobs, digitalisation may improve the quality of daily work by removing some of the more mundane routine tasks. The effectiveness of filling workforce skills gaps will consequently need to accommodate fears and resistance and where it is practical and possible, persuading employees that the growth in the use of technology will not threaten their jobs but may enhance them.

Building capacity of managers and entrepreneurs to support digital transition

Digitalisation of the sector may be enabled by stronger digital and complementary skills in the incoming and existing workforce, but it will be driven by judgments and decisions made by entrepreneurs and managers. The importance of management capacity to take advantage of digitalisation opportunities and addressing risks, is emphasized in much of the secondary material. While this is widely acknowledged as an issue for the sector, there is much less detail from evidence and experience on what is required for managers to help drive this forward and flourish as digitalisation progresses. Enhanced managerial digital skills are essential also to drive recovery in the sector, as they navigate uncertainty (Box 4).

Box 4. Guiding tourism managers in supporting recovery in Smart Destinations (Spain)

In Spain, the Smart Destinations initiative, established by the State Organisation for Innovation and Tourism Technology Management (SEGITTUR), fosters innovation, sustainability and competitiveness at a local level through the development and deployment of ICT with the aim of creating differentiated and highly competitive services. As part of the initiative, SEGITTUR developed a Guide to accelerate the reactivation of Smart Tourist Destinations in the context of COVID-19. The guide's objective is to provide destination managers with guidance and methodological tools to face the new environment of uncertainty, taking as a reference the model of tourism smart destinations. The guide defines recommendations and concrete action proposals to guide the managers of the destinations. The recommendations have been structured around six dimensions linked to the axes of the Smart Destination model, including Marketing and Communication, and data management. Similar to this initiative, the 2020 edition of *Anfitriones*, a training programme developed by the Ministry of Tourism, was revised in the wake of COVID-19 to include new courses on Digital Tourist Competences and Smart Tourist Destinations.

One source (WEF, 2018a) cautions that managers in tourism may not yet be well-placed to act as informed drivers of change for digitalisation. It notes that globally 39% of executives of travel and tourism firms expect the skills and knowledge of their managers to hold back technological adaptation in their firms. More specifically, they found that a half of surveyed tourism firms felt their managers did not understand digitalisation opportunities, concluding that more than most other sectors this was a critical upskilling issue for tourism enterprises. However, the WEF data also shows that local skills supply was more widely (89%) expected by these firms to act as a constraint to technology uptake and investment.

One study looked at what managers need in digitalisation and suggests there are two aspects to the way in which managers need to adapt to what has been called 'the new paradigm' (European Commission, 2015). This suggests managers' own digital skills need to be of a standard that they can maximise their use in their own roles. Secondly, they need to be able to manage their workforces to ensure they can operate in a developing digital environment. This has emphasised the need for managers to have more strongly developed HR skills and especially for coping with the challenges of (re)upskilling the lower qualified in more digitalised business processes. This is not seen as a 'one-off' activity, but more the management of skills development (including for their own capabilities) over the lifecycle; and where the pace of change due to digitalisation was seen to require an agility on the part of managers that may be new to many of them.

The country survey to date, provided limited specific information on management knowledge and skills needs relating to digitalisation. Finland and Switzerland both echoed the European Commission study findings by seeing managers' capability as a potential bottleneck unless they have the conceptual skills and knowhow to develop and implement digital strategies and select appropriate digital solutions. Brazil indicated that managers needed technology-related knowledge to be able to lead teams that could be

fundamentally different in nature to those from traditional tourism employment. In Portugal, in addition to technological knowledge and agility, tourism managers were likely to need stronger skills to support flatter working structures as digitalisation compressed work organisation into less vertical and more horizontal structures. Greece indicated a poor supply of digitally proficient managers in hospitality able to deal with issues of sustainability, revenue and yield management, and reservations via booking engines.

In Germany there was a clearer view of the digitalisation skills needs of tourism managers providing an extensive list of needs for the sector, in particular for operational and line managers (Table 4).

Table 4. Management skills needed for the digital economy (Germany)

Executive/strategic management	Human resource management	Operational/line management
• Championing digitalisation/Digital leadership	• Development of more flexible work organisation/working time models	• Reorganisation of workflows/work processes
• Development of a digitalisation strategy	• Identifying individual competence and related needs of employees	• Targeted allocation of tasks and functional areas according to individual strengths
• Development/promotion of a value-based digitalisation culture	• Implementing support measures and incentivising adaption	• Clear communication of change requirements to teams/individuals
		• Supporting working in flatter work organisation 'hierarchies'
		• Supporting space for team/individual creativity

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

In Switzerland managers developing the use of digitalisation needed to be able to lead employees though the use of adaptive and flexible management tools, themselves reacting flexibly to the unfolding trends. However, there was a note of caution in that some managers can act as a 'bottleneck' to digitalisation and they need 'conceptual level' skills and knowledge to develop and implement digital strategies.

Many of the attributes sought in managers in tourism are not unique to the sector and can be found across many sectors. However, as one national study (Skills Development Scotland, 2016) has indicated, management and leadership skills are particularly important to develop for digitalisation in tourism, though the sector needed a persistent focus in this on those skills needed to 'ensure a high-quality customer experience' and that good management should also focus on allowing their workforces an appropriate degree of flexibility to develop their own skills in digitalisation, and elsewhere.

Some commentators go further in their assessment of what management in tourism needs for the future. In one case (Baum M, 2015) the view is that tourism businesses face new leadership challenges that include developing millennials and what the author calls 'multiple generations' of leaders with "… *global fluency and flexibility, building the ability to innovate and inspire others to perform and understanding the rapidly changing technologies"*.

Looking ahead to the future supply of managers in tourism, it was felt that those joining through the higher education system are more likely to be digitally proficient. They are likely to start with a stronger foundation in digital skills that should provide a solid basis for responding positively to further digitalisation in their early and subsequent careers. However, the fact remains that not only will this take time to build the necessary management assets, but that tourism businesses will be seeking these recruits in competition with other sectors seeking similar attributes. It seems that to achieve this change, the sector must be vigilant in what it can offer in job interest, career progression and competitive terms and conditions.

Challenges for tourism education and training providers

Education and training providers are crucial to the future supply of skills to the tourism sector as well as in contributing to skills development in the existing workforce. This includes providers at various levels active in specialist education and skills development (tourism, travel and hospitality) at operational, craft and technical, professional and managerial levels. To be effective agents of change both initial vocational education and training (IVET) and continuing education and training (CVET) providers must be able to respond to clear signals from the labour market on emerging skills gaps and what skills are needed in the future. Employers experience and foresight are crucial in providing for those signals. The scope and quality of labour market information systems drawing on employer and other evidence varies greatly across countries, and they are often less than perfect in projecting and communicating skills needs in a way which is helpful to providers. This is especially where specific sectors of the economy or particular skills are the necessary focus of any foresight analysis.

Recognising some of these challenges, responses to the country survey indicate a call for greater co-operation between stakeholders, including better information on skills shortages (now and in the future) and improved linkages with education and training providers. However, while better information on labour demand can inform labour supply, it is also important to get the level of detail right in terms of what employers need and this requires co-operation in curriculum development. In Switzerland, for example, this close co-operation is assured because the training provider is commonly the industry itself (Box 5)

Box 5. Bringing innovation in education through the Lab Hotel (Switzerland)

The Lab Hotel, in Switzerland, is both a commercial three-star hotel and a research laboratory, bringing together tourism stakeholders and students to develop innovative hospitality solutions. In addition to 6 lab rooms, the hotel has 45 modern hotel rooms, 13 serviced apartments and 6 capsule rooms. Future hoteliers are able to test the latest technologies and hotel concepts in a live setting with actual guests. Students of the Hotel Management School of Thun, in particular, are able to experiment with new ideas, with those proving most successful with guests getting scaled up. “Upcycled” is the name of one Lab room, which has a sustainability focus, and is developed by refurbishing materials used to test previous experimental rooms. Innovation in hospitality requires space, networks, and innovative methodologies, and the Lab Hotel supports the broader Swiss ‘Hospitality Booster’ programme, connecting tourism stakeholders, in implementing and scaling innovation projects in line with their needs.

In the tourism sector, much of the demand for skills will remain in the more traditional roles in accommodation and food services (such as chefs, waiting staff, receptionists, administration). While there will be increasing demands for digital elements to these tasks, much of the competencies (and training) required is likely to continue to be for established skill requirements and vocational preparation for established tasks. More specific effects of digitalisation are set to be focused on more specialist provision. In Russia, for example, a specific discipline has been developed on ‘information and communication technologies in tourism’ consisting of: Information and communication and the Geographic Information System (GIS) technologies in tourism; and Software and automation of tourism enterprises. A recurring theme in the survey responses reflected that cross-stakeholder engagement involving government and its agencies, industry or its representatives, and with a range of IVET and CVET providers is essential to ensure education and training supply meets the emerging digitalisation needs of the sector.

A likely key feature of education and training provision is the quality of responsiveness to what the tourism industry uses in terms of marketing, booking and other platforms and automated systems. The survey suggests that in those countries which do have existing tourism and hospitality management degree (or similar) provision, those emerging from higher education with such degrees are expected to have the digital

competencies that reflect systems use in the sector now and in the future. This is not always the case. In Finland, for example, travel companies have raised concerns that such higher education modules do not offer up to date technologies or access to key platforms and digital ecosystems.

Some commentators have raised other concerns about the ability of initial vocational education and training (IVET) in higher education and elsewhere to deliver the level of digital skills needed for the sector. In one case (Buluga A, 2019) the need to get teachers fully on board with the digital technologies is raised, with the implication that some teachers are reluctant to change and some lack sufficient competences and proficiency to deliver the appropriately focussed teaching. A parallel issue is how up-to-date IVET and CVET providers are in current technologies and here Greece, among others, was concerned over the ability of tourism and hospitality schools to keep pace with the digital developments in the sector. Greece, and also Portugal and Italy are among a small number of countries which have responded to this need by establishing technology demonstrator hubs within, usually, one or more higher education centres.

The higher education sector has significant potential to support digitalisation transformations in tourism (as elsewhere). The survey highlighted some transformation actions where universities were key providers as in Austria with four projects started in 2020 to bridge higher education and tourism SMEs through developing better digital understanding and qualifications. In Greece initiatives included a programme of digitised distance learning for students, and an e-learning pilot for seasonal tourism employees to learn skills in digital marketing, social media, and business software and applications. In Portugal, higher education institutions were important partners in a network bringing together universities, technology suppliers, operators and financial institutions to support digital and other innovation in tourism start-ups and smaller enterprises. These actions in or involving higher education all appeared to be public policy led, and government or government agency funded.

Some of the literature focuses on the need for continuous training where skills can be updated as technologies develop. Lifelong learning has been highlighted by various organisations as crucial in providing for early responses to digitalisation and also for keeping skills current. This emphasizes rather different challenges for the continuing vocational education and training (CVET) providers, and the OECD (2019) has previously identified the need for better funded and strengthened adult learning to help prevent skills depreciation and facilitate the transition between jobs. Such demands on the sector were anticipated under the call for stronger lifelong learning capabilities from the European Tourism Manifesto, 2017.

The same OECD analysis also points out that tackling these challenges calls on SMEs particularly to improve their engagement with lifelong learning provision. Investing in lifelong learning support is a cost for all tourism businesses and particularly for SMEs. Evidence from a 2019 survey of digitalisation in tourism in Portugal found that three in four SMEs failed to invest in new digital systems and tools because they lacked the staff competencies to select and make use of these systems, and the ability to invest in those skills and knowledge gaps.

A particular feature of CVET adjustment is likely to be how digital transformation in the sector responds to the needs of workers displaced by incoming technologies, or at risk of doing so. Tourism related research (Parsons, Bysshe and Walsh, 2010) has shown such actions are effective where they involve close three-way localised collaboration between firms and both education and training providers and the public employment services. The impact of COVID-19 may provide a test bed for supporting displaced workers as in New Zealand where the Go with Tourism initiative launched in 2020 includes the development of new curricula to support tourism employees losing their jobs due to the pandemics impact.

These CVET challenges seem intensified for the tourism sector where smaller businesses proliferate. Data also shows that low skilled workers are significantly less likely (at 24%) to participate in adult education and training than those with higher skills (at 72%). It suggests that the lower skilled risk being consistently side-lined in CVET provision and this has important implications for the acquisition of digital skills and for digital transformation.

From the country survey, some interesting developments in education and training relationships with the sector were highlighted. For example, in Austria the curriculum on vocational training was adapted in 2020 to address skills shortages and gaps with enhanced collaboration between businesses, providers of education and training, and policymakers. Such collaboration is also evident in other countries such as Bulgaria, Brazil, Colombia, Germany, Israel, Mexico, Slovakia, and the United States.

Most of these developments have the potential to provide for better stakeholder engagement in the curriculum for tourism. In Iceland, there have been sector-specific developments over the past three years with its Tourism Skills Centre Iceland working closely with tourism businesses and training providers to implement training programmes customised to individual employer needs (Box 6).

Box 6. Tourism Skills Center Iceland

In 2017, the Tourism Skills Center Iceland was founded to address the seemingly uneven quality issues in tourist services. Its mission is to increase skills in tourism, thereby improving the quality, professionalism, job satisfaction and profitability of the sector. A steering group consists of the Ministry of Industries and Innovation and the Ministry of Education, Science and Culture, employers (Icelandic Travel Industry Association), employees (Confederation of Trade Unions) and the Icelandic Tourist Board. The Tourism Skills Center was a pilot project from 2017-2020 but has now been extended until the end of 2023. The Center is funded by the Ministry of Industries and Innovation and hosted at the Education and Training Service Centre, a company owned and founded by the Social Partners in 2003.

The Tourism Skills Center focuses on two major tasks:

- **Influence and co-operate with the formal school system to better adapt current and future study programmes to the training needs of the industry** - The Tourism Skills Center started the work in 2018 with representatives from the tourism sector, the Ministry of Education, Science and Culture and the formal school system. Over 130 representatives engaged in a series of sessions to analyse the needs of the tourism sector, to evaluate current study programmes, and to suggest improvements. A report on the findings was published with concrete suggestions to the formal school system in order to make the programmes more accessible, practical and based on the NQF system (competence levels). The development of core subjects is now underway in collaboration with lifelong learning centres, high schools, and universities. The curriculums are expected to be completed by the end of 2021 for implementation to start in 2022.
- **Increase training inside tourist service companies in Iceland –** The Tourism Skills Center systematically approaches tourism companies to increase on-site training, in collaboration with training providers. Since 2018, over 180 companies have been visited, leading to 100 training contracts signed, involving more than 3,000 employees in training. The project includes analysis of the company's training needs, development of a training plan, implementation of training, and evaluation of the results. However, as over 60% of tourism companies in Iceland consist of less than 10 employees, it is difficult for some companies to fully engage in training programmes. Thus, the work in 2021 focuses on enhancing the delivery of training by establishing sub-regional clusters consisting of companies interested in collaboration around training. In addition to coordinating this training strategy, the Center is working towards bringing together key stakeholders with the aim to assess and increase innovation and digital skills in tourism. The Skills Center has developed various digital training tools to assist the training process, available on the website haefni.is.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

In Finland, 'Visit Finland' has developed the 'Digitalisation ABC' initiative to develop e-learning in tourism businesses with a focus on benefiting SMEs across all the Nordic countries (Table 5). Finland's tourism studies at university level now have some e-commerce modules, with a master's degree in e-commerce available in at least one university. Nevertheless, there is still concern in the industry in Finland that some university courses fail to keep up with changing platforms and ecosystems constantly evolving.

Table 5. Digital learning initiatives in tourism (Finland)

Initiative	Description
Digitalisation ABC' e-learning programme initiative	• The e-learning programme has been created by Visit Finland Includes 10 'A-B-C' foundation modules (steps) to digitalisation in tourism • Modules variously include: digital content creation; online sales; social media channels and content; digital marketing
Visit Finland Skills Academy	• Digital skills training modules for businesses • Companies can book in-house' digital skills training modules delivered via the academy's teacher network
Digital Tourism Norden	• Funded by the Nordic Council of Ministers (Iceland, Finland, Greenland, and the Faroe Islands) • Developing Nordic digital community and 'digital toolbox'

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Policy responses to prepare the tourism workforce for the digital future

The scope for public policy and other actions to support digitalisation transitions is considerable. The chronic pressures of COVID-19 on tourism businesses suggest such actions are urgently needed to support the resilience and recovery of the sector and alignment with post-pandemic tourist needs and expectations. The country survey carried out as part of this review provides a picture of what is, and what is not, happening on policy prescription and it shows a plethora of relevant, although rather fragmented, responses.

These actions came directly from central government and from actions devolved to bodies within or close to the sector, including national tourism bodies or employer bodies. Where countries have systems of devolved or more localised government responses, they have been more fragmented and vary with the discretion of different regional or sub-regional bodies.

Added to this diversity, policies to promote or support digital transformation in tourism may be driven by sector (or sub-sector) specific initiatives, but may also be delivered as part of cross-sector programmes aimed at helping any in-scope firm with digitalisation, whatever its activity. Most of these will have the scope to benefit the SMEs that dominate much of the sector across all OECD countries, but few policies appear to have been specifically customised to tourism SMEs.

In all, responses to the country survey to date, have identified over 60 distinct policy initiatives covering 20 countries, with three cross-national initiatives. Just over a half of all the identified actions were clustered in seven countries (Finland, Germany, Greece, Iceland, Portugal, New Zealand, Switzerland)[7]; 13 of the responding countries were unable to identify any current specific sector response. These responses variously focussed on:

- Identifying current or emerging skills shortages or gaps associated with digitalisation (3 tourism specific initiatives)
- Support to digital uptake or transformation (19 tourism specific initiatives; 4 all sector)
- Skills adjustment support for digitalisation to firms and education and training providers (12 tourism specific initiatives; 2 all sector)
- Changes to initial vocational education and training systems to enhanced digitalisation curricula (6 tourism specific initiatives; and 2 all sector)
- Uptake and skills adjustment support for digitalisation targeted at SMEs 4 tourism specific initiatives; and 7 all sector)
- Other related adjustments (3 tourism specific initiatives)

[7] The clustering may reflect the diversification of policy responses in some federally governed countries but also the quality of stakeholder engagement and consequent contrasts in depth of evidence provided by countries.

Each of these areas of policy responses are examined below with some highlighted examples of policy actions from survey responses. Annex A provides more detail of identified country actions on both tourism specific (Table A.1.), and cross-sector responses accessible to tourism firms (Table A.2.).

Building future-oriented evidence on digital skills needs in tourism

Tourism has a long legacy of skills shortages and gaps affecting businesses of all sizes and much of the sector. Although universally overshadowed by the effects of COVID-19, in the long run digitalisation is set to re-establish and perhaps exacerbate many of those shortcomings. Consequently, a starting point for any evidence-based policy to enable digitalisation is well-placed information on the likely skills challenges.

Developed economies often have well-established processes for identifying skills needs and gaps and feeding this into changed IVET/CVET systems/standards (OECD, 2016b). The country survey shows that, although not widespread, some of these arrangements have provided policymakers with specific evidence of digitalisation or associated skills needs in tourism. For example, in Iceland the Tourism Skills Center (*Hæfnisetur ferðaþjónustunnar*) set up in 2017, has a role to monitor and assess skills gaps in the sector and to apply this to education and training solutions. The rising profile of digitalisation in the Finnish Tourism Strategy (2019-2028) has seen a stronger focus for analysis of changing demands and requirements for digital skills in tourism; this is now contributing to revised standards in hospitality and elsewhere.

Box 7. Skills intelligence from the Next Tourism Generation Alliance

Set up in in 2018, the Next Tourism Generation (Skills) Alliance (NTG) is a European partnership which brings together a unique industry and education partnership of six universities and seven trade associations and a sector skills council in eight target countries. Working towards a Blueprint Strategy for Sectoral Skills Development, its focus is on current and prospective (to 2030) skills needs and shortfalls across digital, green and social skills, covering five constituent sectors (hospitality, food and beverage operations, travel agencies and tour operators, visitor attractions and destination management). The main aim of the Alliance is an evidence-based and scaleable mechanism of Core NTG modules to support employees, employers, entrepreneurs, teachers, trainers and students. To date it has produced:

- An early (January 2019) 'desk research' map of the skills situation and prospects for the sector.
- Conducted an eight-country survey covering over 1,400 business, professional groupings and individuals.
- Published skills analyses for its eight constituent European countries, with country reports available to the whole sector.
- Produced a series of 'research insight' reports and an evidence-sharing portal on its web site.

NTG's next steps, already well developed, will use this evidence to build and test a 'skills matrix'. From this is being developed a self-administered need analysis' diagnostic tool customised to different parts of the tourism sector, and backed by an e-learning toolkit to provide a focus for firms developing digital (and social and environmental) skills. It will conclude with a 'Skills response Strategy' for the whole sector (December 2021).

Source: Synthesis of NTG Alliance 'The Project' and 'Partnership' information (web-site: https://nexttourismgeneration.eu/); Interviews with senior NTG managers (August, 2020)

The Slovak Republic has also seen its Gastronomy and Tourism Sector Council using its regular analyses of VET gaps in the sector to provide a focus on digital skills needs. Some of the specific adjustment policies considered in the rest of this section will also have 'evidence-based' contributions. More commonly, however, policymakers have drawn on looser inputs on digitalisation skills needs from stakeholder liaison.

Skills intelligence actions have not been limited to individual country actions. The Next Tourism Generation (NTG) Alliance is an important cross-national action supported by the European Commission (EC) bringing together industry and education collaborators in eight countries (Box 7). Its focus is foresight work on tourism skills, with a particular focus on digital skills and associated initial and continuing vocational education and training challenges. Together these have started to create a picture of emerging technical and wider digital skills challenges and the necessary responses.

Supporting uptake and use of digital technologies in tourism businesses

Policymakers seem particularly focussed on initiatives which help tourism firms in digitalisation take-up and implementation. Well over one third of all the identified policy responses have been in this area. Some are distinct but integral parts of national tourism strategies (e.g. Austria, Finland, Hungary and Portugal) and where digitalisation has been identified as a distinctive lever on the competitiveness of the sector, or necessary to underpin other goals such as sustainable tourism. In Portugal, for example, *Turismo 4.0* organised through *Turismo de Portugal* promotes innovation and the use of technology in tourism through a network of over 40 innovation outlets. As part of this, the NEST-Tourism Innovation Centre has been set up as a public-private partnership between *Turismo de Portugal* Microsoft, Google, Via Verde, the national telecom body (NOS), ANA Airports and two banks.

Some of these initiatives focus on specific areas of need or digitalisation priorities, including local tourism offices and DMOs. Box 8, for example, illustrates the Tourist Office 3.0 initiative in Switzerland which is an action to support digitalisation in a priority sector for the Swiss national tourism strategy. The Swiss strategy recognises that the wider DMO sector has the potential to promote digitalisation by example and through its natural links to connect with local SMEs. Other actions are geared to support individual managers and entrepreneurs in coming to grips with the technology and integration challenges. This includes the *e-coaches* programme for tourism firms in Bavaria, Germany. Box 8 also highlights the Nordic Council of Ministers' support for a cross-border initiative to promote tourism digitalisation in the Nordic countries (Iceland, Finland, Greenland, and the Faroe Islands) and the development of enabling tools, as well as examples from France, Germany, and Lithuania.

Some of these actions remain at pilot stage and few have attained a significant level of maturity, (Annex A). Some are embryonic such as in Italy, where under its Tourism Strategy and National Innovation Fund (*Fondo Nazionale Innovazione*) the *Cassa Depositi e Prestiti SpA* has invested in a small number of pathfinder start-up firms specialising in process digitalisation for the sector. Others remain in development, at trial or pre roll-out stage. Most can only be expected to have just started to impact on the sector before it was hit by COVID 19. Difficulties in engaging firms in some of the actions and notably SMEs, are reported by some countries including Hungary, who point to the disappointing take-up of available support funds by micro-businesses and smaller SMEs. To counter this, both Brazil and Austria have adopted a 'challenge' approach to stimulate digitalisation by enterprises (Brazil's Tourism Innovation Challenge; Austria's Innovation Prize); both initiatives were launched (pre-pandemic) in 2020.

Box 8. Examples of country initiatives to support the digital uptake

France NUMerique

France NUMerique is a government initiative launched in 2019 and designed to help and support small businesses and SMEs in their digital transformation. It aims to support the digital transformation of micro and small businesses by providing information and tools through an online platform focused on business models, upgrading technology and understanding options for SMEs. An accompanying network - *Activators France Num* – with more than 1,500 business counsellors spread all over France is already mobilised to advise companies who want to achieve their digital transformation. For tourism, the platform offers an innovative solution to raise awareness of the challenges of digital transformation, obtain targeted recommendations, find tourism-specialised *Activators France Num* advisors nearby, and identify events and meetings organised locally, as well as funding offers. It also provides a self-diagnosis tool for businesses to learn how to digitalise their tourism business. Performance of the platform and associated network is being monitored and will inform future improvements to the initiative.

Digital Now (Germany)

The Federal Ministry for Economic Affairs and Energy (BMWi) designed the program 'Digital Now - Investment Funding for SMEs', running until 2023, to provide financial grants and encourage SMEs to invest more in digital technologies and in the upskilling of their employees. Applying SMEs must present a digitalisation plan to invest in either software/hardware or employee training.

Tourism Innovation measure (Lithuania)

During the pandemic, the Ministry of the Economy and Innovation in Lithuania initiated a 'Tourism Innovation' measure, implemented by the Agency for Science, Innovation and Technology. The project aims to train employees and provide funding to tourism companies to encourage innovation in the sector. Main funding activities include the development and improvement of tourism services, marketing of tourism services, and training of employees of tourism companies. Most companies requested funding to create and improve tourism services, including implementing new innovative ICT systems, travel reservations programs, e-services, and automatic generation of consumer offers.

Tourist Office 3.0 (Switzerland)

In Switzerland, one focus of digitalisation support has been on tourist offices. Here, Innotour, a federal government funded programme, has financed 'Tourist Office 3.0', a development covering 16 destinations. This has brought together technology partners, tourist offices and other stakeholders locally to analyse the future significance and function of the tourist office against the background of digitalisation and the changing needs and expectations of guests and service providers. Tourist Office 3.0 is moving from research into development and testing and pilot projects and will be launched in the destinations testing different technology-based models. The aim is to put in place tested scenarios for digitalised future tourist offices.

Digital Tourism Norden

A four-country collaboration of the Nordic Council of Ministers to build a coherent and integrated Nordic digital region. Digital Tourism Norden takes this forward through collaborations on innovation and marketing for tourism. Still evolving, the focus is digitalisation of tourism SMEs with industry partners working together to build a Nordic digital community and also a Digital Toolbox and 'roll-out' platform to provide diagnostics and resources to support in-firm digitalisation. The initiative is expected to expand to engage local universities to help further develop, roll-out and maintain the joint toolbox and platform.

Austria's quasi-competitive response has been combined with a more collaborative emphasis in the development within its National Tourism Strategy (Plan T) of *Next Level Tourism Austria* (NETA), a national hub and 'future laboratory' focusing on complex digital technologies and applications for enterprises. NETA adopts a network approach to join the sector with digital leadership and its *eCampus* initiative, and recent 'hackathon', among others, support a growing learning community on digitalisation in tourism enterprises.

The survey has also identified a smaller number of embedded initiatives (Annex A – Table A.2.) where digitalisation support may be a part of cross-business or institutional support to tourism business development. An example is the Digital Iceland Project Center (Digital Iceland) which focuses on digitalisation of public bodies and which includes recent initiatives working with the Icelandic Tourist Board for the development and roll out of digitised licences and COVID-19 domestic travel vouchers.

Developing the digital and complementary skills mix

There have been two different (but interrelated) areas of policy response in supporting digital transformation of firms through new and remixed skills:

- Policies aimed at supporting digitalisation skills adjustment for the existing tourism workforce
- Policies to support the development of new digitalisation skills supply and enabling education and training provision.

Although there can be some overlap, this division aligns broadly to 'continuing vocational education and training' (CVET) responses and 'initial vocational education and training' (IVET). Specific tourism policy responses in both areas appear to be limited to a handful of countries (Annex A) and in most cases tend to still be evolving.

Encouraging the existing tourism workforce to develop the skills mix

Several of these initiatives centre on redefining or developing new competency and standards to support staff in tourism in adjusting to emerging digitalisation needs (Hungary's 'Digital Tourism Strategy'; Finland: Finnish Tourism Strategy *'Digital Pilot Action Plan'* for reformed competencies for enterprises, tourism agencies and DMOs, and in the Russian Federation revised tourism training packages under the "Digital economy of the Russian Federation" programme. A common theme of these programmes appears to be rebalancing 'blended learning' to emphasise more digitised resources and training.

Some of these actions have seen the establishment of one or more new institutional focuses for CVET delivery for tourism centred on or including significant digitalisation. In Italy, for example, the *Scuola Italiana di Ospitalità* was established in 2019 through a partnership of Italian universities, trade associations, and TH Resorts to support professional development in the sector and this has included 'digitalisation and innovation' programmes and a Hospitality Innovation Lab.

All these initiatives appear to be centred not on digital or ICT specialists for the sector, but on raised levels of application and user skills, often to support remixed skills in the workforce. For some this is limited to specific application skills. The Slovenian Tourist Board, for example, following the national tourism strategy focus for digitalisation on digital marketing alone has established the Digital Academy to promote knowledge and skills for tourism employees in digital marketing. Initiatives have commonly stemmed from government or government funded agencies although a notable exception is the industry-led *Typsy* programme in the hospitality sector of Switzerland (Box 9)

Box 9. Professional training for hospitality employers (Switzerland)

Typsy is a developing CVET platform for professional training which has now been adopted for its member businesses by *Hotelleriesuisse*, (the Swiss hospitality employer federation). Part of the "Future Hospitality" initiative aimed at combatting the shortage of skilled workers in the sector, it offers access to a wide range of 'free' skills and knowledge-related modular training (over 700 units) using digitised self-driven courses accessible for member employers. The programme is provided in Switzerland in collaboration with the globally recognised *Ecole Hoteliere de Luasanne* (EHL) and Thun Hotel Management School.

To optimise access, courses are provided online through modular programmes and webinars with support from EHL and Thun Hotel Management School. An introductory video has also been prepared for industry managers to introduce the programme and access arrangements. After member registration this provides for mediated employee access including through pre-set employee groups and teams. Although not specific to 'digitalisation' skills, it encompasses several digital and associated skills courses including 'Instagram for Hospitality Employees' and 'Social Media for Hospitality Employees'.

Typsy is becoming highly regarded as more flexible and responsive than state CVET provision. The programme is funded, in part, by enforcement (levy) cost contributions built into the Swiss VET system. The platform provides further scope for modular training to support rising industry demands for skills training in digitalisation and also for CVET programmes for career-changers from other sectors.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

In Greece, in response to the pandemic the Ministry of Tourism working with the Greek Tourism Organisation and Marketing Greece, has set up the online platform "Greece from Home" which includes e-courses for tourism professionals to enhance their digital skills. In a parallel development, and working with Google Hella, the Ministry provides in its "Grow Greek Tourism Online" initiative opportunities for free customized online training with a Google expert to enhance the digital presence of their business. A similar initiative in Portugal was developed in response to the COVID-19 crisis and where the NEST-Tourism Innovation Centre developed a programme of webinars and online training courses on digitalisation and digital skills, attracting over 60,000 participants. Chile also developed a Training Programme for Competitiveness and Digitisation for Tourism aiming to support the digital transformation of tourism SMEs, with a dedicated investment of CLP 277 million.

In another initiative, Greece has seen its Organisation for Labour Force Employment set up a pilot tourism digital skills programme with Athens University of Economics and Business focussed on seasonal tourism employees. This provides training 'out of season' on digital marketing, social media, business software and applications in the tourism sector.

The country survey and other evidence indicates there is widespread concern that the existing skills and knowledge of managers in tourism enterprises without being addressed by policy makers, are set to hold back digitalisation in the sector. However, there is little evidence from this review that current or planned skills support policies or initiatives have specifically targeted these needs.

Many countries will also have cross-sector initiatives aimed at adjustments in the current workforce for the digital era. Two examples are the Croatian National Coalition for Digital Skills and Jobs, which has established a *Digital Jobs Charter* as a self-development tool for all firms to support the digital orientation and capability of employees to increase the number of permanently employed individuals in well-paid, globally competitive and secure jobs. Sweden's *Innovation Partnership Programmes* (IPP) includes a

cross-industry action on “digital skills and competences”. Many others could be cited, although their impact on digitalisation in tourism is likely to be muted by both the cross-sector focus and other sectors being perhaps better placed to exploit the opportunity.

Developing the new skills mix pipeline for tourism

Some developed economies will have various ongoing reforms to IVET systems which might contribute to a more competent future workforce to support tourism digitalisation. However, few have targeted specific actions in those (or other) reforms on digital understanding or competencies for tourism. An example of a proactive approach can be found in Austria, where the existing collaborations between higher education (HE) institutions and industry have been strengthened in tourism with a competitive initiative on Research Competencies for Business (*Forschungskompetenzen für die Wirtschaft*). This cross-sector initiative (worth EUR1.2 million) has funded four programmes joining HE and tourism SMEs to provide education programmes geared towards developing better digital understanding, skills and qualifications for tourism SMEs. The initiative is delivering a better education offer to support digitalisation in the sector, while also providing education and research institutions with a closer insight into the practical knowhow required by small businesses for the development of their operations. In addition, the Russian Federation programme on the “Digital Economy of the Russian Federation” includes the development and delivery of five new digitalisation modules in tourism and hospitality education bodies.

Targeting the digitalisation of tourism SMEs

With a tourism workforce dominated by SMEs, in many cases small, single establishments and often owner-managed enterprises, transformation policies aimed at the whole sector might be expected to widely benefit SMEs. However, whole sector initiatives risk SME engagement being held back by barriers such as direct or opportunity costs, lack of awareness or limited flexibility; such constraints are much less likely to trouble larger or multi-establishment enterprises. Recognising these risks, some policymakers have preferred to target measures specifically at smaller businesses, including the ‘digital toolbox’ for the Faroe Islands, Finland, Greenland and Iceland developed through Digital Tourism Norden (Box 8 above).

Other examples are the Canadian federal government’s support for the Indigenous Tourism Association of Canada (ITAC) to assist Indigenous businesses with market/export readiness and digital transformation. The Ministry of Tourism in Israel is also assessing the feasibility under its Open-Innovation initiative of a separate programme to provide e-Commerce systems and skills support for SMEs in the sector. In Iceland, the Icelandic Tourist Board, launched a ‘Digital Sandbox’ pilot study in response to an identified need to accelerate innovation in tourism. The initiative provides a platform to bring together tourism companies/organisations facing specific challenges, with tech companies vying to identify digital solutions. Participation is free for tourism companies, unless they wish to invest in the solution following the trial period. The main incentive for tech companies is to gain access to tourism companies facing challenges that are widespread in the industry and thus likely to result in solutions that can be sold to multiple players in the market.

Recently, New Zealand launched a sector-wide response to the impact of COVID-19 on this key ingredient of its economy. As a part of the Tourism Recovery Initiative, there is a new initiative to support SMEs in the uptake of digital tools and systems (Box 10).

Box 10. SME digitalisation support in the COVID-19 Tourism Recovery Plan (New Zealand)

In May 2020, the New Zealand government announced a NZD 400 million initiative to support recovery of the tourist industry during and after the pandemic. The Tourism Recovery Fund includes targeted support for tourism SMEs to facilitate their digitalisation and extend provision under existing digital enablement initiatives. This initiative is funded through a NZD 5 million allocation within the Recovery Fund and focuses on helping smaller tourism businesses adapt and recover from the dramatic downturn in the sector by accessing specialist advice and training to lift their digital capability and to find and use the right tools to realise the benefits of digitalisation. The initiative is run on behalf of the government by Qualmark, New Zealand's long established tourism quality grading agency, as a well-known and trusted organisation already working widely with small tourism business across the country. The initiative is guided by the following objectives for small businesses: i) *Energise:* they are motivated to adopt digital tools and practices; ii) *Educate:* they understand the benefits of digitalisation; iii*) Equip*: they can access a range of trusted and relevant digital tools and services; and iv) *Embed:* they embed digital tools and practices into their operations. Qualmark's delivery involves a collaboration with private sector technology and educational providers to provide initial awareness raising workshops, follow up guidance and customised packages of training and subsidised technology investments in supported firms.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Support that can benefit tourism SME digitalisation can also come from cross-sector initiatives aimed at SMEs. Germany, for example, has been particularly active in this area with its '*mittelstand*' economy, including the '*Mittelstand-Digital*' (SME digital) initiative by the Federal Ministry of Economic Affairs and Energy funding 26 SME 4.0 digitalisation competence centres throughout Germany. Centres provide direct support to SMEs to assess their digitalisation status and cybersecurity needs, develop firm specific digitalisation 'roadmaps' and support them in the selection and implementation of suitable systems and tools. Since 2019, in the context of the programme entitled "Enhancing performance and promoting innovation in the tourism sector" (LIFT – *Leistungssteigerung und Innovationsförderung im Tourismus*), Germany's Federal Ministry for Economic Affairs and Energy has provided funding for innovative project ideas that serve as a model to make SMEs in the tourism sector ready for the future. This includes the "Show what you know" project introducing digital training formats for SMEs. The funding, totalling EUR 1.5 million, serves to provide fresh impetus from within the sector. The Federal Competence Center for Tourism selects particularly suitable projects and provides implementation advice as to the implementation. To date, eleven tourism projects within Germany have received support to realise mainly digital innovations.

In Germany, the longer established 'go-digital' initiative has also supported German SMEs in digitalisation with access to three e-learning modules: i) Digital Business Processes; ii) Digital Market Development; and iii) IT Security. A fourth module on setting up home office workplaces has been added as a response to the pandemic. SMEs also have access to the Digital Now ('Digital jetzt') subsidy programme for technology solutions and employee training. Many tourism SMEs are thought to have benefited from these programmes although the extent of this sector's engagement is not known.

Slovenia has a similar cross-sector focus with support for digitalisation of tourism SMEs centred on digital marketing. Wider support can be accessed through the all-sector Digitalisation and Digital Transformation programme which provides government vouchers of up to EUR10 000 for strategy formation, digital marketing development, enhancing digital competences or digital security development. Slovenia's all-

sector Digital Transformation one-stop-shop (DIH Slovenia) also provides guidance on digitalisation processes and staff training in the digital competencies of employees.

Not all policy responses identified by countries fit easily into this (loose) classification. Along with other developed economies, Germany has had persistent challenges in recruiting and retaining employees in many tourism activities, and here the Federal Competence Center for Tourism has instituted a government-funded career information and advice campaign "#richtiggemacht", although it is not clear how this will aid digitalisation specifically.

Some responses have also been aimed at stimulating demand for digitalisation, particularly among smaller tourism businesses. Hungary, for example, has developed the National Tourism Data Supply Centre (NTAK) system for digitised data on accommodation. Here access to the “My Guest Room” app in NTAK is aimed at boosting demand and helping to digitalise micro-enterprises.

For tourism SMEs, and particularly those not at the innovation frontier of digital tourism businesses, building human capital and digital capacity can be a difficult proposition. It is a process that involves attracting talent, building expertise, implementing new technologies, understanding and exploiting opportunities offered through converging technologies and objects. It can extend to developing capabilities in e-commerce, social media and data analytics, as well as more advanced technologies. This includes businesses taking inventory of the digital capabilities of the current workforce and being open to adapting work practices. In other cases, it requires reviewing the local infrastructure to assess whether there is the possibility to increase digital capability, such as access to high-speed internet. In Canada, for example, the Universal Broadband Fund will support broadband projects across the country, with a focus on rural, remote and northern communities. It will enable tourism businesses in underserved communities and participate in digital value chains (Box 11) (OECD,2020a).

Box 11. SME digitalisation and rural broadband roll out (Canada)

A country with a particularly large proportion of its landmass in remoter rural areas, the Canadian federal government has recognised that tourism businesses in rural areas require broadband access to have a meaningful online presence and manage their online marketing, operations and client interactions.

The Federal Budget of 2019 announced a new, coordinated plan to deliver CAD 5 – 6 billion of new investments in rural broadband to 2030 with a focus on rural, remote and northern communities. While the investment has a much wider reach than rural tourism, it is expected to enable tourism businesses in underserved communities to develop and expand their digital footprints to access new markets, join wider value chains and create seamless experiences for visitors.

This initiative complements the launch (May 2019) of Canada’s new tourism strategy, *Creating Middle Class Jobs: A Federal Tourism Growth Strategy* which aims to unleash the potential of tourism to drive economic growth and job creation in all parts of Canada. The rural broadband investment is seen as a key enabler to empowering smaller rural business, including those in indigenous communities, to realise their potential as tourism destinations.

Source: OECD Survey on preparing the tourism workforce for the digital future (2020)

Challenges in measuring effectiveness of policy responses

Understanding policy effectiveness raises some special challenges for a complex and widely dispersed sector such as tourism, and for applying appropriate measures (and measurement) of digitalisation impacts. Just over a half of responding countries were unable to share relevant evaluation experience, with some pointing to a lack of methodologies for measuring impacts or, as with Colombia, problems in applying those that did exist to tourism. Those countries with some evaluation experience, or aspiration (mainly in Europe) drew attention to three measurement pathways:

- **Enterprise level review**, with Austria suggesting tourism enterprises supported by digitalisation initiatives using time recording systems or work-logs to provide data on employee behaviour and performance changes. Germany also suggested the possible use of a common online platform where companies might report a specific lack of digitalisation staff or skills.
- Use of available or customised **visitor feedback evidence or 'big data'**, which Poland, among others, felt had some evaluation potential. Israel suggested this might tap into existing digital platforms used by the tourist sector to provide *before and after* comparisons.
- **Cross-enterprise, multi-enterprise review**, drawing together representative and comparative evidence across the sector for selected use and impact indicators for digitalisation initiatives.

Of these, cross enterprise approaches were most proposed usually favouring periodic enterprise surveys. However, this appears to be based on aspiration rather than practical experience and the country survey was not able to identify any where these methods had yet been used to systematically evaluate digitalisation policy impacts in tourism. For some countries, the policy developments may have been too small-scale or immature to merit the necessary evaluation efforts. However, some, such as New Zealand, have developed what they call *low level* evaluation tools to evaluate (all sector) digitalisation promotion campaigns, on an event-by-event basis, using before and after (post 4 weeks) feedback by participating SMEs to see what changes they have made.

Some countries felt that evaluation of policy developments would need a more customised approach with Russia, alongside Slovenia, encouraging the use of pre-set key performance indicators (KPIs) within its *Programme Target Methods* which have become a mainstay there of budgetary policy and review, A further possible pathway for evaluation which might be widely and readily applied (and be cost effective) would be use of existing large data sets as an alternative to enterprise or visitor surveys. This was not widely favoured, with Hungary, among others, pointing out the shortcomings of existing national (or cross-national) databases, where the activity or job classifications used were ill-fitted to identifying tourism evidence[8].

Where other publicly available data sets were indicated, these were also thought not to be sensitive enough to support tourism specific analysis. Latvia, for example, drew attention to the potential of using the European *Digital Economy and Society Index* (DESI) but recognised countries lacked specific measurement methods to apply it to reviewing digitalisation development and impacts within tourism. Some reforms have looked to adapting existing data sets to be more sensitive to assessing digitalisation. Mexico, for example, in its recent (2019) Economic Census (INEGI) has included enterprises in the digital economy and has all-sector metrics on the use of the internet and ICT; they are now looking into the scope for tourism analyses as a special product from that census.

[8] This reflects a long-standing problem with international classifications of economic activity (ISIC) which unlike other major components of economy define only one tourism constituent activity as a 'major' order (accommodation and food service). Others are classified at lower orders and where available data may be too limited to reliably use. There are similar problems for the international classification of occupations (ISCO).

Some countries had been considering how to tackle the likely challenges involved in implementing digitalisation impact assessment. Hungary pointed to necessary changes to sampling strategies for existing survey-based data bases, with enquiries supplemented by new 'digitalisation impact' data. Several (European) countries outlined possible enterprise and new skills impact measures or proxy indicators to assess digitalisation impacts[9], although they had yet to apply these to tourism businesses. Slovenia encouraged the use of micro-data to provide for this evidence, rather than enterprise 'opinion' surveys which were felt to be unreliable. Others, including Bulgaria, Germany, Iceland, and Israel, pointed to the potential to start to apply appropriate technological solutions to data collection, to optimise data quality and minimise disturbance to the sector.

When considered together, the evidence suggests a wide recognition of the value of impact evaluation (and monitoring) of digitalisation policy developments, but, as yet, little practice to draw on to provide lessons for others. However, there does appear to be an appetite among countries to share experiences on the measurement and evaluation of the effects of digital technologies on the tourism workforce, which is recognised as complex policy area.

[9] These variously included measures related to: changes to aggregate job levels; changing occupational and functional distribution; productivity; working time; metrics on hard to fill vacancies; new entrant (job) destinations and job search (from new/reformed digitalisation courses); metrics of business performance such as service levels/quality, capacity utilisation, new product or service innovations; and financial performance including revenue levels, return on investment and profitability.

Policy implications for the digital tourism economy

Implications of digitalisation for the tourism labour market

Across the tourism sector, the spread of advanced technologies in the so called 'Fourth Industrial Revolution' has seen sweeping changes taking place in the tourism industry. This has transformed distribution channels, notably through online (sharing) platforms; facilitated and systemic price comparisons; optimising costs and has brought about important changes to productivity in operations and 'back-office' functions. It has transformed the nature of customer interactions and relationships as businesses and destinations track customer preferences and seek competitive gains through more personalised offers, ongoing connections, relationships and loyalty.

For tourism, digitalisation has been a genuinely disruptive technology, although uptake appears to have come faster for some sub-sectors than others and has been uneven across countries. Also, within sectors there has been significant variation among businesses. Some tourism enterprises have been redesigning business models to take advantage of the opportunities offered by tourists' digital preferences and increasing digital presence, but others have been slow or struggling to adapt. Widely, SMEs who are the bedrock of much of the sector, have often been lagging in taking up and optimising digital systems.

The pace of digitalisation and the opportunities presented in tourism show few signs of slackening, and in some has clearly been accelerated by COVID-19. Client-orientated simulation through virtual and augmented reality, machine-based learning and harnessing the Internet of Things are realities already for more advanced adopters. Automation, self-service kiosks and fixed and mobile service robots have shown the potential for replacing labour in some areas where low-skilled service workers have traditionally been in high demand. Some businesses are coming to see digitalisation as a remedy for the recruitment and retention skills problems which, up to the current pandemic, had been a persistent problem for tourism businesses.

While not universal, for many parts of the sector some of these changes were well established by the time the COVID-19 coronavirus dramatically changed the prospects and outlook for the sector. A full stock-take of the impacts of the pandemic has yet to be made (and it would be far too early to expect one) but from an economic and employment perspective, it is likely to prove more devastating than any other crisis in modern times. Its consequences as the sector starts to cautiously look to prospects for recovery remain uncertain, but with the probability that the pandemic will see a slow recovery and permanent changes in tourist choices and behaviours.

There is also a likelihood that tourism enterprises will face juxtaposed challenges, with diminished capacity to invest in and absorb new technology (at least in the short term) set against intensified potential for deepening digitalisation among adopters and forcing the pace of take-up for others. How enterprises will rise to this challenge in recovery may well determine how successful they are in building resilience to changes in consumption. From this perspective, intensified digitalisation is set to be a feature of successful recovery for many tourism enterprises in what may prove to be a radically changed tourism market.

To date, the impacts of digitalisation on work organisation in tourism have not been profound, with the strongest effects on aviation and accommodation and even here there have been contrasting responses. Elsewhere, its effects have been slower to evolve and across the sector work organisation effects from digitalisation have so far been accommodated largely within existing occupational and job structures. This may not remain the case; widening the automation of occupations where tasks are routine, regular and codifiable has the potential to affect (across the economy) nearly half of all jobs significantly, with one in seven having a high risk of displacement.

While specific projections are not available across tourism, on this evidence it seems significant changes to task requirements and possibly job displacement may extend further into low and middle-level tasks and occupations, so far relatively sheltered from automation. The evidence, however, does not provide a consistent picture of how this potential will translate into practice; in particular differences are apparent between Europe, where there is thought to be greater consumer resistance and business caution with respect to automation, and the Pacific Rim countries where automation may be more readily accepted by consumers.

Digitalisation also creates other challenges for the sector and not the least as AI and user and entity Big Data analytics raise concerns about personal data protection and digital security. For the digital economy to continue to develop and meet the desire for higher-quality travel and destination experiences, it has been necessary to adopt more systematic and robust approaches to personal information-gathering and better privacy protection, as well as the staff awareness and skills to underpin it.

Put together, it seems the role of digital technology is shifting rapidly, from a driver of marginal efficiency to an enabler of fundamental innovation in much more of the sector. COVID-19 is set to intensify these changes. While providing unparalleled opportunities for value creation, this has also represented a major source of disruption to work organisation and the wider risks associated with the speed of change, the cultural shock induced by rapid digitalisation, and the need to build digital diversity within and across countries. To this is added the acute challenges associated with overcoming, shortcomings in legacy systems, outdated regulations, and the need to fund and deliver complimentary investments in public goods including both digital and physical infrastructure.

The capability to anticipate and cope with the work organisation and transformational challenges of digitalisation is part of those risks. However, major uncertainties remain over the likely scale of job displacement from automation and machine-based learning. What seems likely, at least in the short to medium term, is that the main impacts will be on changing task content in a wider range of jobs and what has been referred to as ‘hybridisation’ of those jobs (explored further below). In uncertain times, investments in the technologies and workforce change, and in public policies facilitating adjustment, will help build capabilities and reduce the transformation risks.

Opportunities and challenges to developing the tourism skills mix

The major part of workforce transformation will be the availability of sufficient and appropriate workforce skills to enable (or constrain) digital transformations of the sector. While the evidence is sparse, it appears that the current levels of digitalisation in tourism have yet to create significant skills disturbance or job displacement in some sub-sectors. However, this situation is likely to change as the take up of current technologies intensifies, and as more firms take advantage of opportunities from emerging digitalisation systems and tools, including the scope for greater levels of automation.

The scale of new and modified skills needs remains uncertain but there is a risk that an instrumental view of technology effects, or technological determinism, may exaggerate transformative skills demands and anticipate new jobs emerging and old ones being widely displaced. Digital technologies in service industries require the willing engagement, or at least passive compliance, of customers. In this, tourists

are not always prone to rational responses; they are affective human beings living in dynamic and interacting communities and are invested in expectations and values based on legacy behaviours and choices. Consequently, it may be too easy to overstate the comparative advantage of technology in many tasks performed in the tourism sector that currently require a high degree of personal interaction with customers and from this, substantial amounts of flexibility, judgement, and common sense to be exercised.

Put simply, the available evidence remains inconclusive on issues such as the risks of automation for the displacement of lower skilled and routine work in tourism. While automation and robotics replacement would appear to be widely possible, it is perhaps impractical for many of these occupations until robotics can fully substitute for social interactions between tourism employees and customers. In addition, the levels of displacement may vary with what is culturally acceptable to those customers. Middle-level skills where tasks are now capable of replacement through machine-based learning, may be more susceptible to displacement including within DMOs. An additional uncertainty here is the extent to which enterprises, post pandemic, and pressed by resumed and perhaps persistent recruitment and retention problems, may choose to try and ease them through automation.

A more consistent feature is that to optimise the value of digitalisation in the next decade as tourism enterprises attempt to regain consumer confidence and recover from the pandemic, the sector will call for a more complex set of skill mixes among more of its employees. Not only will these mixes vary, as at present, with differing activities, types of firms and supply chains in tourism, they will also vary with technology mix (and use) and with individual enterprise choices of specific digital systems and tools for particular sets of tasks.

For those directly affected, engaging with new or modified digital systems and tools, the level of digital proficiency required is also likely to vary greatly. Looking across the available evidence suggests that commonplace needs for digital skills are likely to emphasise in particular:

- Use of mainstream operating systems (e.g. Windows) and software packages such as Ms. Office (Word, Excel, PowerPoint)
- Website development and articulation
- e-commerce including online bookings and digital payments
- Digital marketing including social media integration, online marketing, search engine optimisation and ‘desk top’ publishing skills
- Generating and monitoring online reviews and data for customer insights, engagement and relationships building
- Operational and environmental data analytics, business intelligence and insights, big data skills
- Maintenance and enhanced skills to adjust and optimise digital equipment and Wi-Fi connectivity.

There is unlikely to be a one-size-fits all model for how these will affect work organisation; they are likely to be distributed differently across different occupations and tasks , and differently in different businesses. Nonetheless, some of these skills needs will affect the great majority of tourism tasks in some way; with the mix and intensity depending on levels of digitalisation, use of specific digital systems or tools and work organisation choices to accommodate these made by individual businesses.

In contrast, high level technical skills will probably affect few jobs and beyond businesses such as OTAs needing these skills in higher density, such needs may be sourced predominantly from external contractors, specialist firms or the self-employed. Many of these specialist firms and contractors will not be, or need to be, tourism specialists. For many more, the skills sets will require a combination of levels of digital fluency needed for specific digital systems or tools, with ‘non digital’ cognitive, behavioural, and social skills needed to optimise their value to employers.

Increased digitalisation will consequently see transversal skills in much greater demand not only to support uptake but, crucially, effective integration and use of the potential of the technologies in daily tasks. If the

sector's response to COVID-19 and future resilience is to accelerate these trends, such skills will become widely sought-after among existing staff and new recruits. Transversal skills are already in widespread demand by other sectors. This greater convergence of skills demand between the tourism skills mixes and those of other sectors is set to see tourism employers facing intensifying competition for essential skills to support effective take up of technology. Against a backdrop of persisting recruitment and retention challenges, many tourism enterprises may feel they are not well-placed to rise to the challenges of a more competitive labour market either during the period of recovery from the pandemic or beyond.

Against these uncertainties, it is ambitious to reduce these future (uncertain) skills dynamics to questions about sector preparedness and the likelihood of skills shortages and gaps. The aspiration to distinguish between skills shortages and skills gaps is nonetheless important since both are likely to act as a drag on the digital transformation of businesses and need to be tackled through different types of response in terms of funding, delivery, and other factors. The problem is that providing confident answers on emerging shortages and gaps is dangerous when reliable future skills needs information is imperfect.

More and better evidence is needed before some of these questions can be confidently addressed. Without clear signals from the labour market, providers of education and training cannot be expected to prepare effectively to meet changing demands. Contrasts are apparent from country responses in skills use and adjustment challenges for digitalisation not only between the constituent sectors within tourism, but also larger firms and SMEs, rural and urban, family firms and others; yet available evidence can tell us little about the scale and nature of those contrasts. Add to this the uncertainty about the legacy of the pandemic including for a 'lost' workforce and a rise in the informal economy and the acceleration in the pace of digitalisation, and this makes for a particularly uncertain future.

One area where there appeared to be greater confidence on skills mismatch was for the digital capabilities of tourism managers, with an estimated half of current managers thought to be wanting in their knowledge or skills. These management capability gaps went well beyond the digital fluency of managers to include, in particular:

Awareness of nature of digitalisation and the value of integrated 'solutions' customised to business circumstances and fit within value chains

Understanding the scope and potential of specific digital systems and tools for improved business performance including understanding and adjusting to changing customer preference

Understanding of the benefits and investment pay back for businesses from digitalisation uptake and workforce reskilling

Capability to lead the adjustment of skills and work organisation to motivate, upgrade or reskill existing employees in (incoming) digital and complementary skills

Knowledge of funding or other support mechanisms to provide for uptake and implementation.

These capability gaps are partly concerned with overcoming resistance to new technology-based processes but also about demystifying the opportunities and how to go about change. Among tourism SMEs, these management capability gaps appear to be deeper than for some other service sectors, and in tourism it seems as many as four in ten firms felt this would hold back technological adaptation.

Any residual effect of the pandemic in slowing the entry of younger and more digitally proficient entrants to management positions is also set to further impair digitalisation transitions. The skills and knowledge of tourism managers appears to be one of the few areas of certainty on skills challenges from digitalisation in this sector. It represents both a fundamental constraint and competitive lever between firms and supply chains for optimising the opportunities presented by digitalisation.

Digitalisation will continue to drive the tourism sector forward. One side-effect of the devastating impact of COVID-19 is the acceleration of digitalisation by limiting staff-consumer contacts, and further and more far

reaching digitalisation is set to accompany a recovering sector. Whatever the resulting uptake, skills mixes and responses, it seems clear that the minority of the workforce with the key digital skills and contextual experience will have a disproportionate effect on digital transformation and are set to be the key drivers of change. It is therefore important that they are identified, and supported, and that others are appropriately upskilled and qualified to ensure a future capability base for the sector.

Effectiveness and gaps in country policy responses

Policymakers have not been blind to the challenges of digital transformation across tourism and to date over 60 relevant country-level policies have been identified through this review. However, these initiatives appear to be patchy, often fragmented, and lack maturity. There are also unanswered questions about whether these are the most effective policy instruments with remarkably little evaluative evidence to show which are effective and which less so. Questions also remain on whether these policy instruments have sufficient ambition to rise to the challenges faced by a sector severely affected by the COVID-19 crisis.

Around one half of responding OECD countries have yet to put specific actions on digitalisation in tourism in place. In those that have policy responses, they vary greatly in scale and focus with differences reflecting different country traditions, situations and capacities, but also contrasting digital maturity in the wider economy. The actions also appear to be often limited in scope, supporting some specific aspects of digitalisation such as technology awareness, digital strategies or technical support but rarely integrating these with other needs such as technical skills supply or the development of workforce skills for the effective use of systems or tools.

This fragmentation may stem from funding pathways and a lack of necessary integration at the level of policy-setting ministries or agencies. There is a risk that policies which are focussed on single elements of digitalisation will lack effectiveness, or fail altogether, if they do not address a wider range of constraints to ensure take-up and utilisation. This has been recognised by some employer bodies who have called for more *holistic* responses to rise to the challenges faced by tourism businesses and SMEs especially.

Little is yet known about how effectively these policies have been engaging with the sector. While it remains early, there is some cause for concern about the difficulties in engaging SMEs, and especially smaller owner-managed and micro-businesses to participate in initiatives or benefit from available support funds. SMEs commonly lag in digitalisation yet dominate many parts of the sector. If too many are failing or are unable to engage with the available digitalisation support, this is set to impact more widely on destination value-chains and tourist eco-systems.

To counter SME rigidities, some countries have adopted a ‘challenge’ or competition style approach to stimulate SME demand yet the effectiveness of these schemes may risk being held back by many of the same constraints affecting funding bid arrangements. If an SME-dominated sector is to achieve a step-change in digitalisation, it appears that more imaginative mechanisms may be needed to get to the ‘hard to reach’ parts of the sector. The country survey showed that a few regarded DMOs as having the potential to act as digitalisation exemplars, addressing their own challenges while also using their natural links to connect with local SMEs to encourage digital uptake by example. Collaboration within supply-chains and between SMEs would also seem an important part of such approaches.

The policy responses aimed at knowledge or skills-development appear to emphasise ‘continuing vocational education and training’ (CVET) over ‘initial vocational education and training’ (IVET), although both areas appear to still be evolving. This is well-placed in addressing short-term challenges in keeping displacement at a minimum, by ensuring digital knowledge and an enhanced mix of cognitive and non-cognitive skills for those in the existing tourism workforce. At the same time, there is a need for investing wisely in current and future generations of tourism students and recent graduates, as agents of continuing change in tourist enterprises and as a way of raising the digitalisation aspirations of SMEs.

While all areas of publicly and privately funded education and training are set to have a role to play, a special case could be made for the necessary engagement of institutions of higher education in sector transformation. These are potentially important actors in digital transformations of the sector with a roles to play in providing enhanced curricula for management education, management and professional upskilling, applying expertise in digital education to flexible provision for the tourism workforce and also in the area of digital technology demonstration and support. At present, however, there is little evidence of innovation aimed at digitalisation uptake or skills support from higher education.

A final but substantial issue for policy makers is that the evidence-base informing and underpinning the effectiveness of their actions is limited. There have been relatively few country-level actions to fill the considerable information gaps about digitalisation or associated skills needs in tourism. This apparent weakness in underpinning 'needs' evidence is amplified by a lack of ongoing evaluation evidence of transformation support schemes that are in place. Both monitoring and evaluation appear to be affected by some systemic data challenges to better understand their efficacy and impacts. Some of these evidence gaps may be partly filled by ongoing trans-national actions, notably by the EU, but at present, the impression is that current and prospective actions are informed by largely subjective evidence provided from stakeholder liaison. This is an insubstantial platform from which to improve and better integrate current actions. Policy makers require much better and more timely evaluation evidence to develop, implement and improve more effective responses.

References

Arntz M, Gregory T, and Zierahn U (2016), *The risks of Automation for Jobs in OECD countries: A Comparative Analysis*. OECD Social, Employment and Migration Working Papers No. 189. OECD Publishing Paris.

Asaf A. G. and Tsionas M. (2018), 'The estimation and decomposition of productivity' pp. 131-142 in *Tourism Management* 65.

Austrade (2019), *Technological Disruption in Tourism*. Tourism Research Australia. October 2019. Canberra.

Balula, A et al (2019), 'Digital transformation in tourism education'. *Tourism in Southern and Eastern Europe*, Vol. 5, pp. 61-72.

Baum, T (2015), 'Human resources in tourism: Still waiting for change? A 2015 reprise'. *Tourism Management* 50, pp.204-212.

Boella M. J. and Goss Turner S. (2019), *Human Resource Management in the Hospitality Industry*. 9th Edition. Routledge, Abingdon, UK.

Buhalis D. (2003), *Etourism: Information Technology for Strategic Tourism Management*, Pearson, FR and Prentice Hall. London.

Cedefop (2020a), *Skills Developments and Trends in the Tourism Sector. Skills Panorama Analytical Highlights*. Available at: https://skillspanorama.cedefop.europa.eu/en/analytical_highlights/skills-developments-and-trends-tourism-sector [Accessed 22 Aug. 2020].

Cedefop (2020b), *Tourism at a Crossroads: Skills and Jobs Demand in a Coronavirus Era*. European Centre for the Development of Vocational Training (Cedefop), Thessaloniki (GR).https://www.cedefop.europa.eu/en/news-and-press/news/tourism-crossroads-skills-and-jobs-demand-coronavirus-era.

Choi, Y., Choi, M., Oh, M. and Kim, S. (2020), *Service Robots in Hotels: Understanding the Service Quality Perceptions of Human-robot Interaction.* Journal of Hospitality Marketing & Management, 29(6), pp.613-635.

Dijkmans C. Kerkof P. and Beukeboom C. (2020), 'Adapting to an emerging social media landscape: The rise of informationalization in companied commercialisation in tourism'; pp3-14 in Neidhardt J. and Worndl W. (Eds), *Information Communication Technologies in Tourism*. Springer International Publishing. Cam, Switzerland.

European Tourism Manifesto (2017). *European Tourism Manifesto for growth & jobs*. Retrieved August, 2020, www.tourismmanifesto.eu/the-manifesto.

European Travel Commission (2020), Study on Generation Z Travellers. European Travel Commission. https://etc-corporate.org/reports/study-on-generation-z-travellers/.

Eurostat (2020), *Employment in the Tourism Industries in the EU*. Eurostat. http://ec.europa.eu/eurostat.

Joint Research Centre (2020), Behavioural changes in tourism in times of Covid-19: Employment scenarios and policy options, JRC Science for Policy Report.

Gossling S, Scott D and Hall C M (2020), 'Pandemics, tourism and global change: A rapid assessment of

COVID-19; in *Journal of Sustainable Tourism*. Published online: 24 April 2020. https://doi.org/10.1080/09669582.2020.1758708.

IATA (International Airline Transport Association) (2020), Recovery Delayed as International Travel Remains Locked Down, Press Release No. 63. https://www.iata.org/en/pressroom/pr/2020-07-28-02/.

IATA (2021), 2020 Worst Year in History for Air Travel Demand, Press Release No. 6, https://www.iata.org/en/pressroom/pr/2021-02-03-02/.

ILO (2018), *Skills policies and systems for a future workforce*. International Labour Office Issue Brief (Cluster 4) Prepared for the 2nd Meeting of the Global Commission on the Future of Work.

Jamal, T and Budke C (2020), 'Tourism in a world with pandemics: Local-global responsibility and action'. Pp. 181-188, in *Journal of Tourism Futures*. Vol. 6 (2). https://doi.org/10.1108/JTF-02-2020-0014.

Nedelkoska, L. and G. Quintini (2018), *Automation, skills use and training*, OECD Social, Employment and Migration Working Papers, No. 202, OECD Publishing, Paris. http://dx.doi.org/10.1787/2e2f4eea-en.

Next Tourism Generation (2019), *Desk Research Summary on the Future of Digital, Green and Social Skills in Tourism, NTG Alliance*. https://nexttourismgeneration.eu/wp-content/uploads/2019/03/NTG_Desk_Research_Summary_January_2019.pdf.

OECD (2021), The Digital Transformation of SMEs, OECD Studies on SMEs and Entrepreneurship, OECD Publishing, Paris, https://doi.org/10.1787/bdb9256a-en

OECD (2020a), "Preparing tourism businesses for the digital future", in *OECD Tourism Trends and Policies 2020*, OECD Publishing, Paris. DOI: https://doi.org/10.1787/f528d444-en

OECD (2020b), Tourism Policy Responses to the coronavirus (COVID-19). OECD Publishing, Paris. https://read.oecd-ilibrary.org/view/?ref=124_124984-7uf8nm95se&title=Covid-19_Tourism_Policy_Responses.

OECD (2019a), *Preparing for the Changing Nature of Work in the Digital Age*. OECD Publishing, Paris. http://www.oecd.org/going-digital/changing-nature-of-work-in-the-digital-era.pdf.

OECD (2019b), *Going Digital: Shaping Policies, Improving Lives.* OECD Publishing. Paris. http://www.oecd.org/going-digital/going-digital-shaping-policies-improving-lives-9789264312012-en.htm.

OECD (2019c), *SME and Entrepreneurship Outlook 2019*, OECD Publishing, Paris, https://doi.org/10.1787/34907e9c-en.

OECD (2018), *OECD Tourism Trends and Policies 2018*, OECD Publishing. Paris. https://doi.org/10.1787/tour-2018-en.

OECD (2017a), The Next Production Revolution: Implications for Governments and Business. https://dx.doi.org/10.1787/9789264271036-en.

OECD (2017b), 'ICT usage and skills'. pp 159-192 (Chapter 4) in *OECD Employment Outlook*, 2017. OECD Publishing. Paris.

OECD (2016a), *New Skills in the Digital Economy: Measuring the Demand and Supply for ICT Skills at Work.* Ministerial meeting on the Digital Economy: Technical Report. OECD, Paris.

OECD (2016b), Getting Skills Right: Assessing and Anticipating Changing Skills Needs. OECD Publishing. Paris. https://doi.org/10.1787/9789264252073-en.

Parsons D. J. (1999), 'Education and Training Policy', pp.153-165 in Thomas R (Ed), *The Hospitality Industry, Tourism and Europe: Perspectives on Policies*. Cassel. London.

Parsons D. Bysshe S and Walsh K (2010), *Socially Responsible Restructuring: Effective Strategies for Supporting Redundant Workers*. Working Paper No. 7. Cedefop. Luxembourg: Publications Office of the European Union. https://www.cedefop.europa.eu/files/6107_en.pdf.

Stacey J. (2015). Supporting quality jobs in tourism. OECD Tourism Papers, 2015/02. Paris, France: OECD Publishing. Retrieved September, 2018, http://dx.doi.org/10.1787/5js4rv0g7szr-en.

UNWTO (2021), World Tourism Barometer, Volume 19, Issue 1, January 2021. Madrid, Spain:

https://doi.org/10.18111/wtobarometereng.

UNWTO (2020a), World Tourism Barometer, Volume 18, Issue 6, October 2020. Madrid, Spain: https://doi.org/10.18111/wtobarometereng.

UNWTO (2020b), dashboard. https://www.unwto.org/unwto-tourism-dashboard.

WTTC (2020), *Travel and Tourism Global Economic Impact and Trends, 2020*. World Travel and Tourism Council. May 2020. London, UK. file:///C:/Users/Owner/Downloads/Travel_&_Tourism_Recovery_Scenarios_2020_and_Economic_Impact_from_COVID_19.pdf.

World Economic Forum (2017), *Digital Transformation Initiative: Aviation, Travel and Tourism*. White Paper from World Economic Forum. Geneva. http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-aviation-travel-and-tourism-white-paper.pdf.

World Economic Forum (2018a), *The Future of Jobs Report*. Centre for New Economy and Society Insight Report. World Economic Forum. Geneva. https://www.weforum.org/reports/the-future-of-jobs-report-2018.

World Economic Forum (2018b), *Towards a Reskilling Revolution: Industry Led Action for the Future of Work.* Centre for New Economy and Society Insight Report. World Economic Forum. Geneva. https://www.weforum.org/reports/towards-a-reskilling-revolution.

World Travel and Tourism Council (2020), *Travel and Tourism: Global Economic Impact and Trends, 2020*. Insight Report. June 2020. London. https://wttc.org/Research/Economic-Impact/Global_Economic_Impact_&_Trends_2020%20(1).

Annex A. Country policy responses

Tables A and B summarise public policy and other actions to support digitalisation transitions in tourism with a particular focus on uptake, work organisation and skills adjustments. The evidence is drawn wholly from the country survey carried out by OECD as part of this review. It provides a picture of what is happening in responding countries where one or more policy responses were identified. Actions include those from central government, other publicly funded bodies devolved governmental or specialist agencies including national tourism bodies or employer bodies. Country evidence was based on a request to consult appropriate bodies nationally but may underrepresent industry-led or sub-national responses where those bodies did not engage with national coordinating agencies in the survey. The summary cannot take account of any actions taken in the smaller number of countries who did not respond to the survey.

Table A.1. Summary of identified tourism specific policy responses

Identification of digitalisation skill shortages/gaps
• **EU**: Next Tourism Generation (NTG) Alliance - an eight-country industry and education partnership developing a *Blueprint Strategy* for Skills (to 2030) including digital skills • **Iceland**: Tourism Skills Centre - identifies tourism skills gaps & integrated education and training solutions • **Slovak Republic**: Gastronomy and Tourism Sector Council analysis of VET gaps and with a focus on digital skills needs.
Digitalisation stimulus or support
• **Austria**: National Tourism Strategy (Plan T) set up Next Level Tourism Austria (NETA) – a future lab/hub for the sector focusing on complex digital technologies and application for enterprises. Includes the NETA eCampus developing a learning community on digitalisation in tourism. • **Austria**: Austrian Innovation Prize 2020 for innovation in tourism work (not specific to digitalisation). • **Brazil**: Innovation Challenge in Tourism set up with the Wakalua Innovation Hub and WTO to promote collaborative digital technology solutions across the sector. • **Canada**: Canada's Federal Tourism Growth Strategy includes Economic Strategy Table, which could include collaboration to help firms develop responses to digitalisation. • **Finland**: Finnish Tourism Strategy (to 2028) sets out the need to develop digital competences (Digital Pilot: Action Plan, to 2023) including reformed competences for firms, tourism agencies and Destination Marketing Organizations (DMOs). • **Finland**: Finnish Tourism Strategy – provides for an annually updated Digitisation Roadmap (via Visit Finland) setting out the digital development measures and emerging skills needed. • **Germany**: Miscellaneous localised responses, for example, the eCoaches programme in Bavaria (contacts for tourism firms offering support and orientation in digitalisation). • **Greece**: 'Grow Greek Tourism' is a Ministry- Google Hela collaboration also provides for firms to apply for customized online training on the digital presence of their business. • **Hungary**: National Tourism Development Strategy strand "Digital Tourism Strategy" (digitalisation and skills). • **Israel**: Ministry of Tourism Open-Innovation initiative – considering Start-up POC program to assimilate digital technologies. • **Mexico**: Tourism Competitiveness Institute (SECTEUR) "Tourism & digital transformation" programme (with UNWTO Academy) to enhance tourism secretariats' knowledge & skills (including Ecuador, Brazil and Argentina). • **Portugal**: *Turismo 4.0 program (Turismo de Portugal) resources a network of more than 40 innovation outlets including at universities to work with startups and companies to increase digitalisation in the tourism sector.* • **Portugal**: Establishment of NEST-Tourism Innovation Centre as a multi-partner public-private collaboration to promote digitalisation and skills development in the sector. • **Spain**: Establishment of the *Instituto Tecnológico Hotelero* (ITH) working with the Spanish Confederation of Hotels and Touristic Accommodation (CEHAT) to promote (wider) innovation and technology uptake in the accommodation sector . • **Spain:** Set up of SEGITTUR and a post COVID rebuilding initiative to promote local business innovation in 'Smart' tourism • **Switzerland**: Switzerland: Tourist Office 3.0 Programme (Innotour) assessing digitalisation implications of tourist offices. • **Switzerland**: Collaborative development through Hotelleriesuisse, Innotour, hotelfacschule Thun and EPG group of the Hospitality Booster programme to demonstrate and encourage uptake of digital (and analogue) business processes and tools. • **New Zealand**: Aotearoa's Tourism 2025 and Beyond: industry-led support to digital innovation and technology uptake. • **Nordic countries** (Iceland, Finland, Greenland and Faroes): Digital Tourism Norden building a Nordic digital community and Digital Toolbox for tourism enterprises.

Skills adjustment: Enhanced/reformed digital or associated skills at workplace
• **Australia:** Pacific Trade Invest (PTI) Australia set up a series of tourism focussed advanced online workshops to respond to the COVID-19 crisis for Pacific tourism operators to build expertise in Search Engine Optimisation (SEO) and other digital knowledge and skills. • **Finland**: Finnish Tourism Strategy (to 2028) includes developing digital competences (Digital Pilot: Action Plan, to 2023) with reformed standard for firms, agencies & DMOs. • **Greece**: Ministry of Tourism with the Greek Tourism Organization, and Marketing Greece set up the "Greece from Home" online platform which included digitally accessed courses and online seminars for tourism professionals to enhance their digital skills; • **Greece**: The Organisation for Labour Force Employment has started an off-season course with Athens University of Economics and Business on digital and social media marketing, software and applications to upgrade digital skills of seasonal employees. • **Hungary**: National Tourism Development Strategy "Digital Tourism Strategy" skills strand. • **Iceland**: Tourism Skills Centre – developing a new multi-level hospitality curriculum together with ministries, schools and the industry. • **Ireland**: Failte Ireland set up of the Digital Leaders for Hospitality programme to upskill managers, supervisors and others in the sector on digital uptake. • **Portugal:** COVID stimulated reform of the existing 'Business Education for Smart Tourism' programme to provide for fully online access to this digital skills and knowledge building initiative. • **Russia**: "Digital economy of the Russian Federation" programme is developing digitised training packages for tourism professionals (not digitalisation specific). • **Slovenia**: Slovenian Tourist Board has set up a Digital Academy to promote knowledge and skills for digital marketing and advertising tools. • **Switzerland**: *Hotelleriesuisse* (Swiss hotel employer federation) provides free digital training courses in its "typsy" platform. • **New Zealand**: The recently developed government backed 'Digital Boost' programme provides training for tourism entrants and employees in a range of digital skills.
Skills adjustment: Enhanced/ reformed digital or associated skills supply or education reforms
• **Austria**: Initiative on R&D competences (Forschungskompetenzen für die Wirtschaft) joins HE & tourism SMEs with a focus on developing digital understanding and skills. • **Greece**: Ministry of Tourism has revised the IVET curricula (2018) to provide with new courses on PMS, online reputation management and channel management; • **Greece**: Ministry of Tourism has also set up specialist faculty (2019) for the tourism and travel industry for student training in digital systems from booking platforms to Content Management Systems. • **Italy**: The *Scuola Italiana di Ospitalità* set up in 2019 to support professional development including development of 'digitalisation and innovation' programmes and including a Hospitality Innovation Lab developing and demonstrating digitalisation solutions for this part of the sector. • **Portugal**: COVID_19 response through the NEST-Tourism Innovation Centre providing digitalisation and digital skills training (webinars and online courses) for tourism enterprises. • **Russia**: "Digital economy of the Russian Federation" programme includes 5 new digitalisation modules in tourism and hospitality education bodies.
Digitalisation or skills supply support specific to SMEs
• **Canada**: Federal government supported the Indigenous Tourism Association of Canada to assist Indigenous businesses with digital transformation. • **Israel**: Ministry of Tourism Open-Innovation initiative – considering SMEs' preparation for ECOMMERCE support. • **New Zealand**: Tourism Recovery Initiative - includes support for SMEs' uptake of digital tools and systems; links to existing digital enablement initiatives. • **Nordic countries** (Iceland, Faroes, Greenland and Finland): Digital Toolbox for SMEs.
Other policy reforms
• **Germany**: Federal Competence Center for Tourism career campaign "#richtiggemacht" • **Hungary**: National Tourism Data Supply Centre (NTAK) system for digitised data on accommodation ("My Guest Room" app in NTAK helps to digitize micro-enterprises). • **Italy**: National Innovation Fund (*Fondo Nazionale Innovazione*) in Tourism Strategy of *Cassa Depositi e Prestiti SpA* has invested in a small number of pathfinder star- up firms specialising in process digitalisation for the sector

Source: OECD, Survey on 'Preparing the Tourism Workforce for the Digital Future', July-Aug. 2020

Table A.2. Summary of identified cross-sector policy responses accessible to tourism enterprises and providers

Identification of skill digitalisation shortages/gaps
• NB. Many countries have ad hoc or established mechanisms for identifying skills gaps and corresponding adjustments to IVET/CVET systems/standards. These mechanisms have not been included unless providing evidence of specific relevance to digitalisation or associated skills needs in tourism.
Digitalisation stimulus or support
• **Brazil**: Brazilian service of assistance to micro and small enterprises (SEBRAE) has developed training projects across Brazil on digital understanding (and transformation) for entrepreneurs. • **France**: Cross-sector 'France Num' initiative by government to support SMEs with digitization including raising awareness and collective enterprise support involving digital diagnosis and associated training-actions. Includes a cross-sector audit and support for SMEs with a first level of digital maturity has been organised to review AI potential and needs. • **Iceland**: Digital Iceland Project Center (Digital Iceland) – digitalisation of public bodies; included support to the Icelandic Tourist Board for digitised licences and COVID-19 domestic travel vouchers. • **Iceland**: VR Union's use of Digital Competence Wheel (Center for Digital Dannelese) to self-assess digital competences.
Skills adjustment: Enhanced/reformed digital or associated skills at workplace
• **Greece**: Organisation for Labour Force Employment offers an digital economy e-learning programme for the unemployed or temporarily unemployed on e-commerce, digital marketing, digital customer service, digital project management and digital exports. • **Greece**: A specific programme is also offered by the Organisation for Labour Force Employment in collaboration with Google Hellas for young people (>29 years) on digital marketing. • NB. Many countries have ad hoc or established mechanisms for identifying skills gaps and corresponding adjustments to IVET/CVET systems/standards. These mechanisms have not been included unless providing evidence of specific relevance to digitalisation or associated skills needs in tourism.
Digitalisation or skills supply support specific to SMEs
• **Austria**: "KMU.DIGITAL 2.1" (Federal Ministry for Digital and Economic Affairs), supporting SME digitalisation (www.kmudigital.at/). • **Austria**: "R&D Competences for Industry" (Austrian Research Promotion Agency), target group are SMEs (www.ffg.at/en/program/migriert-rd-competences-industry). • **Germany**: Mittelstand-Digital" (Federal Ministry of Economic Affairs & Energy) supporting SME digitalisation. • **Germany**: "Go-digital" modules "Digital Business Processes", "Digital Market Development"; "IT Security" and since COVID-19 "home office workplaces". • **Germany**: Digital Now ("Digital jetzt"): Investment programme for technology solutions and employee training • **Slovenia**: All-sector Digitalisation and Digital Transformation programme providing funded vouchers to SMEs for digitalisation developments including up front strategy formation. • **Slovenia**: All-sector Digital Transformation one-stop-shop (DIH Slovenia) provides guidance on processes, raised digital competencies of employees, digital strategies and skills for digital marketing.

Source: Survey on 'Preparing the Tourism Workforce for the Digital Future', July-Aug. 2020