



European  
Commission

# Digital Skills

## New Professions, New Educational Methods, New Jobs



### FINAL REPORT

A study prepared for the European Commission  
DG Communications Networks, Content & Technology  
by:



BluSpecs

CIVITTA



Universidad  
Politécnica  
de Cartagena

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**CIVITTA**

Civitta UAB



Universidad Politécnica de Cartagena

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# Acronyms

ACRONYM	DEFINITION
AI	Artificial Intelligence
API	Application Programming Interface
ASO	App Store Optimization
BI	Business Intelligence
CEDEFOP	European Centre for the Development of Vocational Training
CRM	Customer Relationship Management
CSS	Cascading Style Sheets
CV	Curriculum Vitae
EC	European Commission
ECTS	European Credit Transfer System
ESJS	European Skills and Jobs Survey
EU	European Union
GDP	Gross Domestic Product
GVA	Gross Value Added
HR	Human Resources
HTML	Hypertext Markup Language
ICT	Information and Communication Technologies
IoT	Internet of Things
IT	Information Technology
KETs	Key Enabling Technologies
LMS	Learning Management System
MOOC	Massive Open Online Course
MOSTA	The Research and Higher Education Monitoring and Analysis Centre
OECD	Organization for Economic Cooperation and Development
ORM	Online Reputation Management
OWASP	Open Web Application Security Program
PHP	Hypertext Preprocessor
R&D	Research and Development
ROI	Return on Investment
RTB	Real Time Bidding
SAT	Scalability Assessment Test

SEM	Search Engine Machine
SEO	Search Engine Optimization
SME	Small or Medium-sized Enterprise
TCP/IP	Transmission Control Protocol/Internet Protocol
UI/UX	User Interface and User Experience
UNDP	United Nations Development Programme
WEF	World Economic Forum



# 1 Introduction

## 1.1 The Digital Transformation of the Economy

The past decade has seen an increase in the intensity in the use of new technologies in social and business contexts. The process through which these technologies impact the way we interact with others and work has become known collectively as Digital Transformation. From ready-for-business tools built on new technological capabilities, such as the deployment of IoT sensors for production or the use of data analytics, to those that are still in the process of being adopted on a large scale, such as blockchain or artificial intelligence (AI), companies and their employees are able to choose from a wide range of technological options that support the way they operate on a daily basis.

Digital technologies have undoubtedly served as a medium to increased global competition, but they also offer an opportunity for companies to rethink existing business models, processes and the way they reach and interact with customers. The World Economic Forum has estimated that the value of Digital Transformation for both society and industry will reach 100 trillion USD (~89,2 trillion EUR) by 2025.<sup>1</sup> The level of digitisation within Europe, however, is estimated to be only at 12% of its potential, compared to 18% for the United States.<sup>2</sup> The reduction of this gap could better position European businesses to capture a greater share of the markets for the products and services of the future.

The Digital Single Market alone could break barriers for many businesses wishing to scale across borders, potentially adding between 375 billion EUR to 415 billion EUR to GDP each year. The longer term accrued benefits, not just in business terms, but also in terms of their impact on societal inclusion, could be much greater if the power of Digital Transformation could be harnessed, not just by corporates, but also by SMEs and the self-employed across Europe. It is in this context that the need to renew and/or acquire digital skills becomes ever more pressing.

## 1.2 New Skills for New Jobs

The digitisation of the economy will affect business in all sectors. A survey by the World Economic Forum (WEF) for The Future of Jobs report, studied the drivers of change across 366 companies in 13 countries covering 13 million employees.<sup>3</sup> These drivers included demographic factors, which were mostly considered to already have had an impact on jobs, but also technological factors, including cloud technologies and artificial intelligence, the impact of which is expected to be seen in the very near future.

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<sup>1</sup> Digital Transformation Initiative (2018) World Economic Forum.

<sup>2</sup> Digital Europe: Pushing the frontier, measuring the benefit (2016) McKinsey Global Institute.

<sup>3</sup> The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution (2016) World Economic Forum.

In fact, around 90% of jobs in Europe are expected to require some kind of digital competence in the near future.<sup>4</sup> Europe's Digital Economy and Society Index 2018 identifies that 43% of citizens, and 35% of European workers currently have insufficient digital skills and establishes a close link between the lack of skills and the degree of employability. This is further reflected in the fact that 40% of workers are worried about not having the digital skills needed to perform their jobs in the future.<sup>5,6</sup>

### Future skills needs



- Growth across the Architecture, Engineering, Computer and Mathematical job families
- Opportunities in Data Analytics and Data Visualisation



- Significant decline in Office and Administrative roles (2 out of 3 jobs lost are expected to be in this area)
- Net employment impact of more than 5.1 million jobs lost to disruptive labour market changes over the period 2015–2020

2

The European Skills and Jobs Survey (ESJS) conducted by Cedefop provides further evidence to highlight the gap between the digital skills needed and those available:

- More than 70% of adult employees in the EU need at least some fundamental ICT level to be able to perform their jobs.
- 43% confirm that they have experienced a recent change in the technologies they use at work.
- About a quarter (26%) of workers in the EU think that it is moderately likely, and one in five (21%) that it is very likely, that several of their skills will become outdated in the next five years.

The gaps between the skills that individuals have and those required to perform their jobs are likely to appear, not only for unqualified workers whose jobs are being automated and who may have to gain at least some basic technological skills, but also for the qualified workforce. According to the ESJS, 29% of respondents working in the ICT services sector believe it is likely that their skills will become outdated in the foreseeable future and the skills of employees in financial, insurance and real estate services (24%) as well as professional, scientific or technical services (23%) are also at high risk of obsolescence.

A further challenge is the degree to which current educational systems prepare school leavers for the workplace: 31% of EU employees who made the transition from school to their first job had lower skills than needed when they started their job.<sup>7</sup> This is mirrored in the World Economic Forum

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<sup>4</sup> Insights into skill shortages and skill mismatch: learning from Cedefop's European skills and jobs survey (2018) Cedefop.

<sup>5</sup> BMC survey of 3,230 respondents in Europe and worldwide. [www.newsroom.bmc.com](http://www.newsroom.bmc.com)

<sup>6</sup> Digital Economy and Society Index (DESI 2018) <https://ec.europa.eu/digital-single-market/en/desi>

<sup>7</sup> Insights into skill shortages and skill mismatch: learning from Cedefop's European skills and jobs survey (2018) Cedefop.

(WEF) "Future of Jobs Report 2018" which finds that by 2022, every working person in the world will need an extra 101 days of learning.<sup>8</sup>

### 1.3 A Pilot Project on Digital Skills

It is in this context that the European Commission commissioned a Pilot Project on Digital Skills: New Professions, New Educational Methods, New Jobs to develop a structured programme for the training of SME employees and unemployed persons to acquire the digital skills that are required in the modern work place. The specific objectives were to:

- 1) Select two regions in the European Union and gather a representative group of experts to:
  - a) Identify the types of digital skills that are highly demanded by SMEs.
  - b) Provide advice and describe in which sectors and industries SMEs are already facing or will be facing a digital skills deficit in the near future.
  - c) Propose short-term training solutions for digital skills for the labour force (both employed and unemployed), taking into account existing initiatives such as the Accelerated Training Programmes, which are effective and scalable to national level, to geographical clusters, or even at EU-level.
- 2) Based on the outcome of the first strand, design a high-quality training programme of a duration no longer than 2 months full-time, 4 months part-time, including a specific curriculum and centred on specific digital skills.
- 3) Organise and implement "pilot" training programmes in the regions for skilling and/or reskilling workers and unemployed to prepare them for digitisation.
- 4) On the basis of the pilot programmes, produce one or several relevant,<sup>9</sup> expandable and replicable blueprints for training, capable being implemented at local, regional or national level.

The work undertaken has been fundamentally empirical in nature, drawing inputs from a wide range of stakeholders, including SMEs and organisations working with the unemployed. This close contact with people, companies and other organisations has been the backdrop against which perceived wisdom, established practice and the starting hypotheses have been tested.

The resulting insights have fed into the Digital Skills Blueprints that are at the heart of this report. They have been developed as aids to support not just planning, but also the implementation of digital skills centred initiatives that are oriented towards those who do not currently have ready access to the means to acquire the digital skills necessary to compete in an increasing digital economy.

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<sup>8</sup> 2022 Skills Outlook (2018) World Economic Forum.

<sup>9</sup> Understood as relevance to a large number of people.

## 1.4 What are Digital Skills?

Given that the precise nature of the digital skills requires changes as different technologies are integrated into the workplace, it is worth starting with a brief description of the digital skills that are within the scope of this report.

The EU's Digital Competence Framework defines digital competence as "Skills needed [which] include the ability to search, collect and process information and use it in a critical and systematic way, assessing relevance and distinguishing the real from the virtual while recognising the links."<sup>10</sup>

The 2017 report on Digital skills in the EU labour market notes that "digital skills encompass a range of basic to highly advanced skills that enable the use of digital technologies (digital knowledge) on the one hand, and basic cognitive, emotional or social skills necessary for the use of digital technologies, on the other hand".<sup>11</sup>

The OECD<sup>12</sup> has differentiated between different levels of digital skills that include the following range:

- **Generic skills:** enable employees to use technologies in their daily work for accessing information online or using commonly available software.
- **Specific skills:** enable the production of ICT products and services, including software, web pages, e-Commerce capabilities, cloud and Big Data and require knowledge of programming, application development and/or network management.
- **Complementary skills:** enable complex information processing, problem solving, etc.

All of these skills levels draw upon foundational skills that include digital literacy but also softer skills such as social skills or creativity.

In the interests of clarity, it is worth noting that for purposes of this study, Digital Skills excludes these basic digital literacy skills such as internet searching and the use of commonly used software packages such as Microsoft Office®. It is also worth noting that increased usability of the technology interface will have an impact on the ability of SMEs to adopt new digital tools. As interfaces become more intuitive, so too will a greater number of employees be able to perform tasks that were previously reserved for highly skilled ICT professionals.

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<sup>10</sup> DigComp: A Framework for Developing and Understanding Digital Competence in Europe, JRC, (2013)

<sup>11</sup> European Parliamentary Research Service (2017) Digital skills in the EU labour market.

<sup>12</sup> OECD. Working Party on Measurement and Analysis of the Digital Economy. Skills For A Digital World. Background Paper for Ministerial Panel 4.2DSTI/ICCP/IIS(2015)10/FINAL

## 2 Designing Training Programmes for Impact

### 2.1 A Tale of Two Regions

The European Union is a diverse territory in geographic, cultural and economic terms. With average estimated GDP growth reaching 2.1% for 2018 and average unemployment rates falling to 2009 levels, both indicators bely the differences that are the mainstay of social and economic reality across the EU.<sup>13</sup>

Even within national boundaries, there is little homogeneity between territories. Larger cities tend to offer greater access to the digital infrastructure that can affect the ability of citizens to access services and employment opportunities. Small companies, and particularly start-ups, find it more difficult to access investment to help their businesses scale and tend to gravitate towards the large urban areas that house the burgeoning ecosystems that bring together key economic players. Equally as important, small businesses find it difficult to access the talent pools that can make them, not just more resilient to the changes that are the inevitable result of digital transformation, but also more able to take advantages of its opportunities.

To represent the diversity within the European Union, two very different European regions, Murcia and Lithuania, have been selected as test beds for the pilot programmes on Digital Skills.

The two regions offer an interesting comparison between a region within a large Member State (the Region of Murcia, Spain) and smaller Member State (Lithuania) that allow for the blueprints to be relevant to multiple socio-economic realities across the EU.

### 2.2 Reference Indicators as a Starting Point

Key business sectors in each region follow the European standard, with 70% of employment being within the services sector. The Region of Murcia in particular, however, has a greater reliance on primary industries, with 13,6% of employees working within the agricultural sector, four-times the EU average. Other key regional sectors are construction and tourism.

The Region of Murcia suffers from one of the lowest rates of educational attainment within the EU. The population with upper secondary education or above is 46,9%, 23 points lower than the national and European averages (74% and 73% respectively) a factor that is also reflected in the high youth unemployment figures:

In comparison, Lithuania's strongest sectors are wholesale and retail trade and manufacturing, accounting for a 32,2% and 19% of the region's total GVA respectively.<sup>14</sup> The Digital Transformation of Small and Medium Enterprises in Lithuania report<sup>15</sup> has found that Lithuanian SMEs are among

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<sup>13</sup> European Commission. Autumn 2017 Economic Forecast: continued growth in a changing policy context.

<sup>14</sup> Eurostat.

<sup>15</sup> Digital Transformation of Small and Medium Enterprises in Lithuania (2016) DeLab, commissioned by Google.

the digital leaders in Europe, a contributing factor to Lithuania having the second highest proportion of high-growth SMEs in the Union. In addition, with just under two-thirds of the Lithuanian population above 35 years old, it is reasonable to assume that the percentage of 18-35 year-olds with digital skills in Vilnius, Lithuania's capital, is greater than the national average 25,6% for the whole of the population.

**Table 1. Comparison of quantitative indicators of Murcia, Lithuania and the EU-28**

	EU-28	MURCIA	LITHUANIA
Unemployment	6,7%	16,3%	6,2%
Youth unemployment	16,6%	40,4%	12,2%
% Immigration	11,2%	9,9%	4,5%
GDP per capita (EUR) PPP	30.000	20.585	14.900
Relative to national	N/A	82,2%	N/A
% High Growth SMEs	18	16*	31
Exporting SMEs	43	48*	53
Early school leavers	10,6%	26,4%	5,4%
Educational attainment (population with education above upper secondary)	83,3%	46,9%	91,3%
Basic Digital Skills	30,4%	26,9*	25,6%
*National Statistics			

Source: Eurostat, Instituto Nacional de Estadística

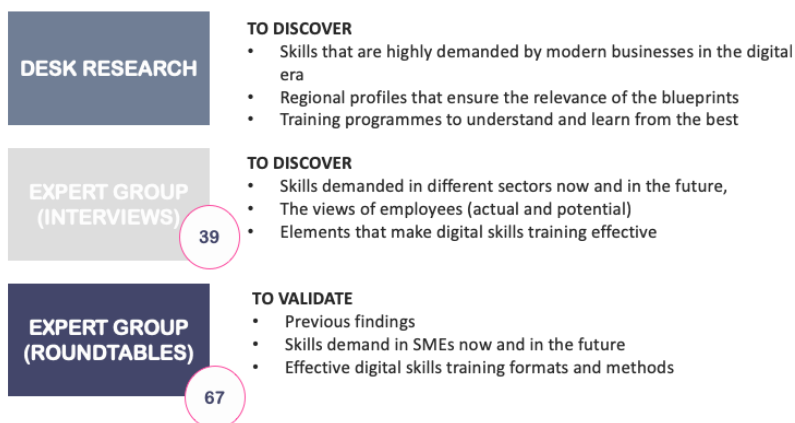
The diversity between the two regions provides a good backdrop against which the relevance of the pilots for SMEs and the unemployed have been put to the test.

## 2.3 User-centred Design

One of the most important inputs for the design of the pilot programmes has been the information gathered from key stakeholders in each of the regions in which the pilots were ultimately deployed. Over the course of 3 months, a total of 34 interviews were conducted across the two regions, with a further 5 interviews conducted with stakeholders from other regions or at European-level. The respondents included:

- Policy-makers with both technological and non-technological briefs
- Intermediaries, such as cluster or industry bodies, with both technological and non-technological briefs
- Training providers, both public training providers and private
- SME, both technologically aware and non-technologically aware
- Employees, skilled and unskilled
- Jobseekers skilled and unskilled

## Discovery



The results of the interviews were further explored in public round-tables with selected experts from a variety of backgrounds. The format of the round-tables varied slightly between the two regions but the discussion was broadly centred on contrasting the perspectives from

the demand and supply side of digital skills:

1. Digital skills within SMEs: covering digital skills training needs now and, in the future, from the point of view of the SME and the participant.
2. Digital skills focused training programmes: exploring the availability and suitability of training content, methods and formats.

### DRIVERS OF DIGITAL SKILLS ACQUISITION IN SMES

It will not come as a surprise to hear that SMEs across Europe have little time or resources to dedicate to non-core business activities. Given this, one of the first questions to establish concerns the drivers which lead SMEs to provide digital skills training to their existing employees. The work with stakeholders in both regions confirmed that SMEs were most likely to invest in training employees when there was an immediate operational need or a business development opportunity, accompanied by a lack of access to external candidates with the required skills. Similarly, SMEs were likely to react to external market forces, such as following competitors which they consider to be leaders in their own sector.



Experts from the Region of Murcia identified the ICT, pharmaceuticals and chemical sectors as being particularly adept at upskilling existing employees. In the former case, market forces require employees to update their knowledge of new programmes and tools, whereas the pharmaceuticals and chemical sectors training responds to mandatory regulatory changes.

Conversely, and notwithstanding its importance for the local economy, the experts considered the tourism and hospitality sector to be a slower adopter of new digital technologies. This is despite the fact that digital skills are now necessary for many occupations in traditional sectors. For instance, working as a waiter or waitress is likely to require the use of computers and tablets to process orders.

The above results were mirrored in the discussions with Lithuanian SMEs, who placed additional importance on the renewal of skills in the ICT sector, as a result of a significant lack of qualified candidates in the labour market. Rapid changes in technology and technological advancements were also cited as significant drivers for training in this sector.

Other external influences that lead an SME to find digital skills include the requirement to adapt to new ways of doing business, whether set by clients or the public sector. One such example in the Region of Murcia was the introduction of mandatory e-administration with digital certificates, a process that had been compulsory for larger organisations, but that had only recently been imposed on all companies.

## Digital skills required by SMEs

 New SMEs	 Advanced SMEs
<ul style="list-style-type: none"> <li>• Digital hygiene: company website, digital design, digital marketing, social networks</li> <li>• Use of tools to increase team efficiency, e.g. Slack, Trello, accounting, Google docs</li> <li>• Routine data gathering and processing.</li> <li>• Use of sector-specific tools</li> </ul>	<ul style="list-style-type: none"> <li>• Use of tools to increase team efficiency,</li> <li>• Interdisciplinary skills</li> <li>• Use of advanced technologies (e.g. automatization of manufacturing, cyber security, e-commerce, cloud technologies)</li> <li>• Skills to manage digital development work (e.g. software projects)</li> </ul>

The focus of digital skills training also changes as the SMEs themselves evolve and grow. Newer companies much focus on the essential digital capabilities, whether it be being able to update the company website or use the one of the many readily available tools to enhance team communication. More advanced SMEs (i.e. those whose core business is attached to the digital economy) may look to more specific and specialised digital competences (e.g. addressing cyber security or seeking to upgrade knowledge on latest trends or languages in software development).

Providing digital skills training is not necessarily the first response of an SME looking to access digital know-how. For many, the preferred option is to seek the services of a specialist company or freelancer. Only when it makes economic sense to bring this capability in-house or where a suitable sub-contractor cannot be found, do SMEs turn to train their own staff to perform the tasks internally.

## BARRIERS TO DIGITAL SKILLS TRAINING IN SMES

From an operational standpoint, the greatest barrier to providing digital skills training for SMEs employees is the lack of time. While SME managers are reluctant to offer training during working hours and lose productivity, employees are understandably reluctant to undergo training outside the normal working day. This obstacle can be overcome if there is a clear business advantage for the SME, but information on the impact on the training from a business perspective tends to be lacking and the cost-benefit analysis partial at best.

Further obstacles relate to the availability of training programmes, with cost, inflexible timetables and distance indicated as the prime obstacles to participation, as well as an inability to fully understand the content of the training from the limited information provided. The distance required to travel to a given training programme increases its cost, but SMEs also require the timetable to be flexible enough to be compatible with the employees' tasks and workload.

From a more strategic perspective, experts point to the lack of a long-term vision and strategy in many SMEs. This would act as a clear driver for identifying the skills needed and, consequently, the training required. Most SMEs are focused on their immediate operations, with little or no resources available to think about their longer-term positioning in the market. This is where the figure of a



digital champion within the company is considered to have the potential to make a significant difference.

## WHAT DIGITAL SKILLS DO SMES NEED?

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The consensus view is that SMEs do not plan for future skills needs. Across sectors, access to short-term training programmes allows them to solve specific urgent problems. At most, in the case of technologically aware SMEs and larger companies, skills requirements are identified around 6-12 months in advance.

Furthermore, SMEs are not always aware of the digital skills they lack. They have limited capacity to explore the opportunities that new technologies and digital tools can bring to their businesses. Traditional SMEs tend to be more reactive, responding to actions of competitors and sector-led transformation, rather than proactively planning for changes in the landscape that might require new skills. This is where the intermediaries, such as cluster organisations or industry bodies, play a particularly strong role, providing a channel through which SMEs can keep up with changes in regulations and the broader business landscape.

Looking at the longer term, SMEs also find it difficult to envisage precisely how the digitisation of the economy will affect them in very concrete terms. The few that do have a view on this say that website development, programming, use of cloud technologies, AI, blockchain, Big Data, UI/UX, cybersecurity, and data protection will become commonly needed skills.

While the detailed needs of each SME and sector may vary, there has been a high degree of consensus on certain digital skills and topics that are required across verticals. The digital skills most consistently mentioned include:

- Digital Marketing
- Social Media
- Web Development
- Control and analysis of data leading to Big Data
- Automation of repetitive tasks, stock management, etc.
- Cybersecurity
- Customer Relationship Management (CRM) software
- Customer behaviour analysis

Digital Marketing, social media, CRMs and web positioning were the most frequently referenced skills required today which are applicable across all sectors and particularly by those wishing to offer services or products beyond their region. Some SMEs also mentioned the need to possess programming capacities in house, rather than just rely on the deployment of third-party tools and platforms. A significant number referred to the need to have a strategic grasp of deep technologies, IoT, AI and Cloud Computing, in order to define how these might be deployed within the company and understand how to manage employees with these profiles or to assess the value of training.

But in addition to hard digital skills, SMEs reported a need for soft-skills, including communication, team-work and emotional intelligence. These are key to the successful integration of technologies into the working environment. Finally, knowledge of the, English language was considered to be a



key enabling skill, opening up access to digital skills training and enabling the exploitation of the skills within a larger international market.

## PROFILING SUCCESSFUL TRAINING PROGRAMMES

The first factor influencing the success of digital skills training in both regions related to the availability of a clear description of the programme, with information on content and methods available to participants from the beginning. The most successful courses focus on learning-by-doing, through task and project-led learning combined with online media, such as videos. Online training is considered to effective reinforcement to the training, rather than an ideal stand-alone method.

The flexibility of the training timetable to allow the course to align with the changes in work and personal needs of the employee was frequently indicated as factor of success. Ideally, participants

### Profiling successful training programmes

 <b>JOBSEEKERS</b>	 <b>EMPLOYED</b>
<ul style="list-style-type: none"> <li>• Target specific skills</li> <li>• Individual attention to each participant</li> <li>• Lecturers have practical experience and are close to the market</li> <li>• Offer mentors – both external programmes and programmes developed internally by companies;</li> <li>• Provide practical skills and possibilities to access internships</li> <li>• Offer links to real jobs on completion of training.</li> </ul>	<ul style="list-style-type: none"> <li>• Formal and clearly outlined programmes with visual material</li> <li>• Avoid training in generic topics, which are not associated to clear competences</li> <li>• Target improvements in very specific skills, e.g. how to use the updated software version;</li> <li>• Face to face training (online training is not taken as seriously)</li> </ul>

should work on practical projects solving real problems that are pertinent to their company.

A key success-factor associated with training programmes for the unemployed, was the possibility of accessing employment upon the successful completion.

This requires engagement with companies offering jobs, preparing assignments that are close to the companies' operational reality and working through them through short-term internships or apprenticeships.

It was also noted that unemployed people do not belong to a single homogenous group. Consequently, the content of digital training courses must be designed around the actual skills levels of participants, rather than focusing on their employment status.

## 2.4 Discerning the Jobs of the Future

The work with stakeholder workshops also sought to discover sectoral differences in the digital skills required by SMEs, both now and in the future. The results from this process did not deliver sufficiently detailed information to draw useful conclusions. As a result, a new methodology was developed, based on more quantitative methods that automated data collection from websites that advertise job vacancies.

The results of the analysis indicated that the website with the highest number of users from all EU countries was found to be LinkedIn. With 500 million users as of 1st January 2018, LinkedIn is the largest network for professionals. According to 2016 data, 104 million LinkedIn users were based in

Europe. It also allowed searches to be performed by specific keywords, e.g. cyber security, in a specific country. Filtering allowed for more efficient extraction of relevant results.

The initial skills categories were defined based on desk research into a wide range of sources. The automated data collection exercise then focused on the 10 most relevant digital skills, namely:

- Cloud Computing
- Cyber Security
- Data Science
- Digital Marketing
- Internet of Things
- Machine Learning
- SEO Search Engine Optimisation
- Social Media
- Software Engineering
- UI/UX User Interface/User Experience

The relevance of these categories was then validated using Google Trends service, which indicates how often a given term is searched for by Google users. The data collection on vacancies relating to these skills was carried out twice, once in Summer 2018, resulting in 74,035 data entries, and then again, 90 days later.

The 10 digital skills that appeared most across vacancies were selected for further in-depth analysis. The vacancies in which these digital skills appeared were then sorted by job title and grouped by seniority based on pre-defined list of job titles in each category. The results were compared by country, skill level and with a control group of random job advertisements for each country. The methodology does not allow for filtering for SMEs but nevertheless, the analysis of the data has produced some interesting insights.

## HIGHLY DEMANDED SKILLS

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Jobs requiring software engineering skills were those most in demand across the EU Member States, followed by social media and Digital Marketing, with the majority of vacancies appearing for mid or senior-level positions. While senior-level jobs broadly follow the patterns for all vacancies as a whole, the distribution of vacancies for mid or entry-level jobs varies much more.

Vacancies requiring skills like software engineering, IoT, UI/UX tend to be mid-level positions, while SEO, social media and Digital Marketing skills are sought from entry-level candidates. This suggests that companies are more likely to invest in training for more junior employees but may prefer to recruit new candidates for more senior positions requiring technical skills.

By comparing the total number of vacancies to the number remaining after 90 days, it was also possible to identify the skills that are most difficult to find in prospective candidates. Four groups of skills vacancies appeared within the data with Cloud Computing vacancies proving the most challenging vacancies.

Machine Learning and the Internet of Things have the least number of vacancies open after 90 days compared to the total number. The apparent relative ease of finding both Internet of Things and Machine Learning candidates is unexpected, as the technologies are identified as key drivers of industrial digitisation and transformation and are relatively new skills which therefore should be in

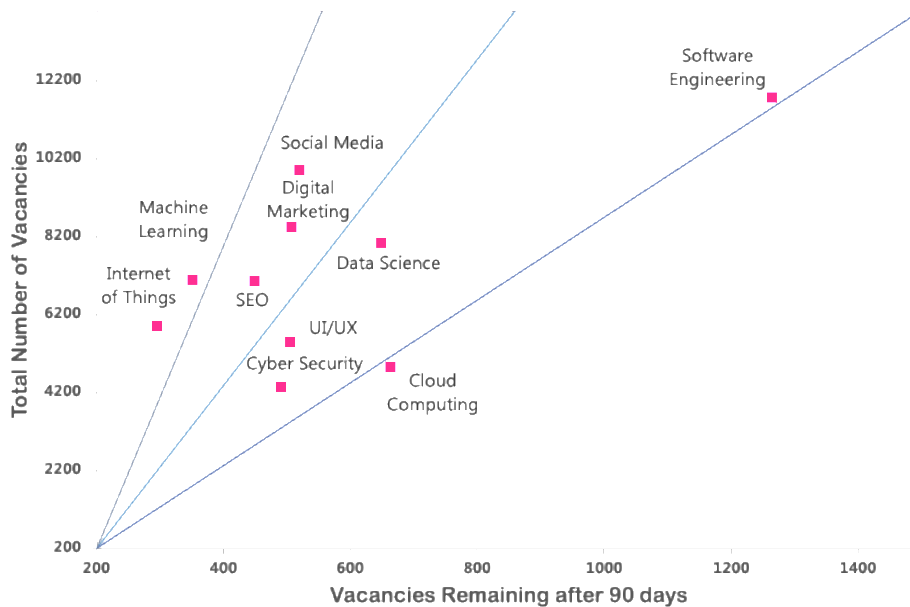
greater demand. But it also possible that skills such as Data Science, Software Engineering or Cloud Computing are within the skills sets required for Machine Learning and IoT.

**Figure 1. Number of vacancies requiring specific digital skills segmented by seniority**

	Entry	Middle	Upper	Top	Total
Software Engineering	847	6.455	3.596	572	11.470
Social Media	2.053	2.277	3.787	1.049	9.166
Digital Marketing	1.353	1.536	3.801	1.335	8.025
Data Science	843	2.957	3.324	599	7.723
Machine Learning	776	2.957	2.743	340	6.816
SEO	1.312	1.611	2.975	677	6.575
Internet of Things	530	3.184	1.654	257	5.625
UI/UX	381	3.455	1.425	109	5.370
Cloud Computing	359	2.647	1.360	290	4.656
Cyber Security	533	2.157	1.172	275	4.137

The second most challenging group of skills to find in the labour market includes Cybersecurity, UI/UX and Data Science followed by Software Engineering. Of these, Software Engineering holds the highest number of skills vacancies, both in overall numbers and after 90 days.

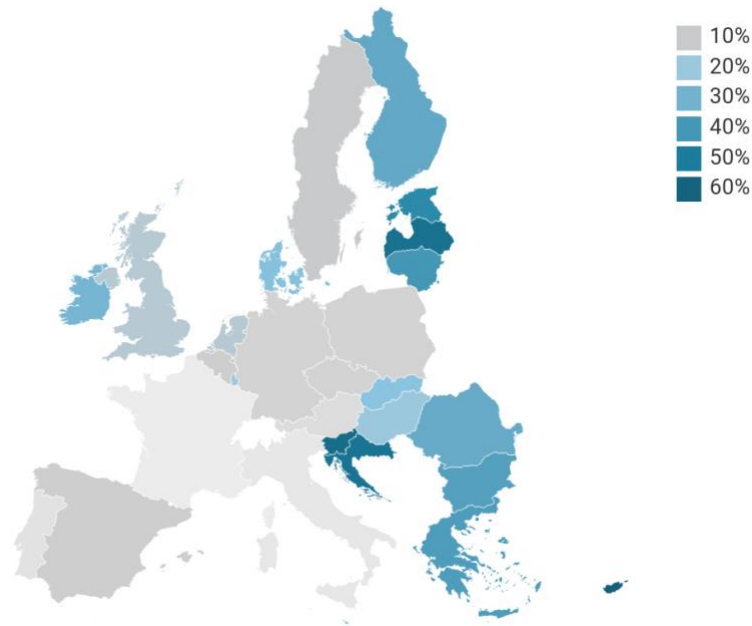
**Figure 2. Vacancies unfilled after 90 days compared to total number of vacancies by digital skill**



Finally, the 'softer', more accessible skills of SEO, Social Media and Digital Marketing form the third grouping which appears to have a more dynamic labour marketplace, with a high number of positions filled after ninety days. The first two groups tend to have a larger proportion of mid-level positions compared to the third group, which is prevalent in a greater number of upper and entry-level positions.

## DIGITAL SKILLS GAPS BY COUNTRY

Figure 3. Percentage of job vacancies requiring digital skills compared to total on LinkedIn



The following table provides an overview of the three top digital skills demanded in each Member State according to LinkedIn:

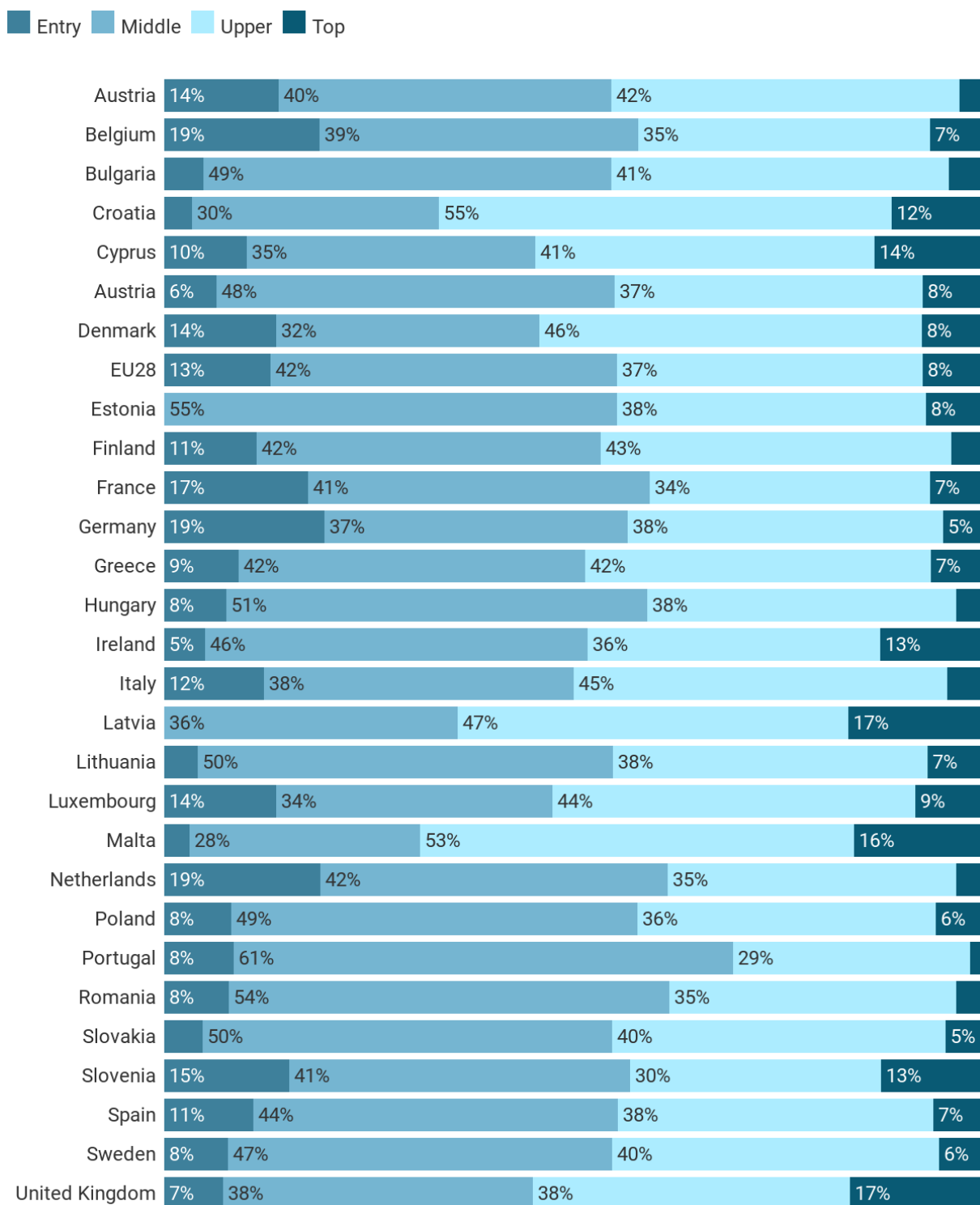
- Software Engineering remains the most in-demand across the Member States, appearing in the top three of 24 Member States.
- Machine Learning, a new skillset, appears as the second most in-demand skill for five Member States (Bulgaria, Greece, Hungary, Lithuania and Luxembourg).
- Digital Marketing, Social Media and SEO appear as number one in seven Member States and in second place for fifteen Member States.
- Some member states like the United Kingdom and Germany share a unique profile requiring UI/UX, Software Engineering and Data Science as the top three digital skills required in the workplace.

In comparing the digital skills vacancies across Member States with the seniority of the positions, the UK, Latvia, Malta, Slovenia, Cyprus and Ireland have the highest proportion of top positions to occupy, while the Netherlands and Belgium offer the most entry-level. The data was compared to rates of foreign direct investment to analyse whether the location of large digital employers had an impact on skills and vacancies across countries, but no significant patterns have emerged.

**Table 2. Top three digital skills in demand in each Member State**

COUNTRY	1	2	3
Austria	Social Media	Software Engineering	Digital Marketing
Belgium	Social Media	Digital Marketing	Software Engineering
Bulgaria	Software Engineering	Data Science	Social Media
Croatia	Social Media	Digital Marketing	Software Engineering
Cyprus	Software Engineering	Digital Marketing	Social Media
Czech Republic	Software Engineering	Machine Learning	Social Media
Denmark	Software Engineering	Digital Marketing	Social Media
Estonia	Software Engineering	Machine Learning	Cyber Security
Finland	Software Engineering	Machine Learning	Internet of Things
France	SEO	Machine Learning	Data Science
Germany	UI/UX	Software Engineering	Data Science
Greece	Software Engineering	Data Science	Machine Learning
Hungary	Software Engineering	Data Science	Internet of Things
Ireland	Social Media	Digital Marketing	Data Science
Italy	Software Engineering	Digital Marketing	Social Media
Latvia	Software Engineering	Social Media	Digital Marketing
Lithuania	Software Engineering	Data Science	Digital Marketing
Luxembourg	Software Engineering	Data Science	Machine Learning
Malta	Social Media	SEO	Digital Marketing
Netherlands	Software Engineering	Social Media	SEO
Poland	Software Engineering	Digital Marketing	Machine Learning
Portugal	Software Engineering	Digital Marketing	Social Media
Romania	Software Engineering	Social Media	Cyber Security
Slovakia	Data Science	Software Engineering	Machine Learning
Slovenia	Software Engineering	Social Media	Data Science
Spain	Digital Marketing	Social Media	Software Engineering
Sweden	Software Engineering	Machine Learning	Social Media
United Kingdom	UI/UX	Software Engineering	Data Science

**Figure 4. Profile of job vacancies requiring digital skills per country based on the seniority of the position**

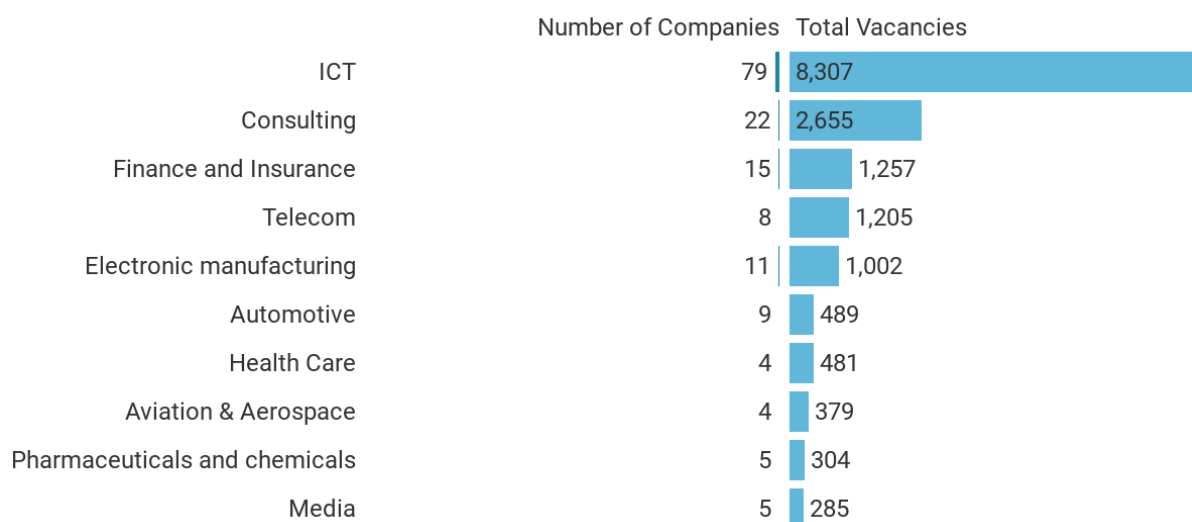


### DIGITAL SKILLS GAPS BY SECTOR

In order to discern any sectoral trends in the data, the top 250 employers were identified, based on the number of advertised job vacancies. Of these, recruitment firms were removed from the dataset, resulting in 177 companies accounting for a total of 17,182 vacancies. These companies were then

manually assigned a sector to provide the top sectors seeking digital skills talent. As could be expected, the top sector for digital skills recruitment is the ICT which includes internet giants such as Google and Microsoft. Multinational consulting companies such as Deloitte, KPMG, Capgemini and Accenture (responsible for 977 of the total 2,655 vacancies), account for more than the combined total of the telecoms and financial sector. This confirms the earlier findings that companies (including SMEs) may prefer to bring in experts with digital skills rather than employing them directly or training their existing employees.

**Figure 5. Top ten sectors for digital skills vacancies**



## 2.5 The Availability of Digital Skills Training

One of the key inputs for the design of relevant blueprints for digital skills training for SMEs and unemployed people is the identification of the channels through which they are currently able to access digital skills training.

To this end, desk research was conducted to identify available training courses that were not associated with formal education. Through the use of online search tools, a total of 71 courses were identified across 24 European countries, along with 13 projects focused on digital skills training. The purpose was not to provide an exhaustive catalogue of all digital skills training courses in Europe, but rather identify the types of course available, their content and delivery mechanisms, with a view to integrating best practice and the state of the art into the proposed blueprints.

The first stage of the research involved the identification of key words that served to filter the most relevant results. Each key word and related variations were used to gather data. At the same time a classification of European countries was developed. A few international training programmes were also considered as relevant and included in the database. This search was carried out in English, as well as in the local language of each country.



The key words are:

- Digital Skills
- Training Course
- eCommerce
- Big Data
- Artificial Intelligence
- Robotics
- Entrepreneurship
- Communication
- Exporting online
- Cloud Computing
- IoT / Internet of Things
- Data Science

The majority of the courses found were run by private training organisations, which presented two obstacles to developing a complete benchmark:

- A lack of availability of statistics on the outputs of the courses
- Pricing information

With regard to the former, only 7 courses provided statistics in the form of either satisfaction ratings by previous participants or the number of participants who have been employed or promoted within the topic of the course, although others do offer some testimonials. Regarding the geographical distribution of the programmes identified, there is a strong tendency to develop the training courses in the larger capital and regional capital cities. Only the online formats are available across locations with lower population density. There is a qualitative and quantitative leap in the variety and range of digital training courses offered in Northern and Western Europe. In particular, the evidence from the research conducted, points to a dearth of digital skills training courses in Central and Eastern Europe (excluding Germany and Austria).

Finally, courses of shorter duration are more popular, which is consistent with the modular nature of life-long learning.

## TRAINING TOPICS

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The training programmes analysed can be grouped in the following categories:

- Management & organisation
- Sales & marketing
- Operational technologies
- Emerging technologies

The most common topics for training courses are IoT, Digital Marketing, e-Commerce and Big Data, correlating to what are considered key enabling technologies for the future and essential for digital businesses. The training available varies from 7 to 80 hours in total, depending on whether it takes the form of a workshop or a course. In general terms, the more practical the content, the longer the course. The average cost per learning hour varies across all the subjects and is affected by courses that are offered at reduced rates or free, by or on behalf of public bodies.

As a general rule, newer or more technologically intensive topics are able to command a higher cost per hour, presumably responding the availability and skills level of the delivery staff. The

highest priced training, both in terms of total cost and cost per hour, was that relating to Big Data. The longest courses were those relating to AI.

**Table 3. Top 7 topics for Digital Skills training**

TOPIC	% TOTAL	AVERAGE COST (EUR)	AVERAGE HOURS	COST PER HOUR (EUR)
IoT	18%	1.525,5	44,6	34,2
Digital Marketing	17%	1.455,3	46,3	31,5
eCommerce	13%	1.520,7	41,7	36,5
Big Data	11%	4.046,7	51,8	78,1
Digital Entrepreneurship	10%	309,4	53,7	5,8
AI	6%	2.019,7	76,5	26,4
Cloud Computing	4%	279,3	28	10



















Source: Own desk research. Total of 71 courses analysed in depth.

### PARTICIPANT PROFILES

The training courses identified were directed at 6 principal participant profiles:

- Directors or SME owners
- Managers
- Technicians, essentially skilled workers with an IT, statistics, maths or engineering background
- Other employees
- Self-employed people, including start-up entrepreneurs, freelancers and sole-traders
- Unemployed people, both skilled and unskilled, and including recent graduates

Most training was directed at Managers, Other Employees and the Self-employed. The majority of courses are directed at two or three profiles.

DIRECTOR/ OWNER	MANAGER	TECH EMPLOYEES	OTHER EMPLOYEE	SELF-EMPLOYED	UNEMPLOYED
 E-COMMERCE	 BIG DATA	 IOT	 DIGITAL MARKETING	 ENTREPRENEUR-SHIP	 BIG DATA
 BIG DATA	 IOT	 AI	 E-COMMERCE	 E-COMMERCE	 PRODUCTIVITY TOOLS
 IOT	 DIGITAL MARKETING	 CLOUD COMPUTING	 IOT	 DIGITAL MARKETING	 WEB DEVELOPMENT

The topics directed at the broadest profiles were IoT, Digital Marketing and e-Commerce. As can be expected, courses directed to technical staff tended to focus on the more advanced topics and skills such as AI, Big Data and Cloud

Computing. Training oriented to directors and manager included a broader range of strategic and practical content.

Interestingly, there were 5 Big Data courses recommended for the unemployed despite the fact that level of numerical skills might in fact be a better way to determine a person's ability to benefit from the course.

## SKILLS REQUIREMENT

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To facilitate further analysis, the training courses were grouped into 3 broad categories based on the skills requirement upon entry:

- **Basic:** requiring basic knowledge of how use of a computer and internet browser.
- **Intermediate:** requiring user-level of social media and knowledge and experience of some tools like website content management systems and cloud storage systems.
- **Advanced:** requiring a knowledge of coding languages and advanced developer abilities, often coupled with an education in maths, computer science or engineering.

Although some courses span two skills groups, for the purpose of this analysis, the higher skill level has been taken as the principal skill level. The distribution of courses available across the different groups of skills is relatively even, accounting for roughly a third each. Regarding the average duration of the courses, those requiring intermediate level of skills are longer, while the basic and advanced courses are on a par. The most accessible courses are Entrepreneurship and Digital Marketing, with the former having less direct digital content despite requiring the use of modern technologies.

Unexpectedly, the e-Commerce courses often worked from the basis of an existing online shop or at least a website and thus required an intermediate level of skills. Other topics such as AI, IoT and Cloud Computing, demanded an advanced skill level with a foundation in programming languages or statistics necessary to broach such subjects.

**Table 4. Distribution of training courses across the required skills group**

SKILL LEVEL	BASIC	INTERMEDIATE	ADVANCED	TOTAL
N° Courses	25	22	24	71
% Courses	35%	31%	34%	100%
Average Duration (hr)	44	55	43	47

## DELIVERY METHODS

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Despite the growth in the available tools and improvements in the general user experience, the in-person classroom setting is the preferred option for delivery (52%), although more providers are offering participants the option to complement their classroom training online.

For some topics (especially those related to IoT) the one-off workshop (7% of total) is popular as an introduction to new skills, tools and future technologies, rather than to acquire in-depth expertise in the subject.

All artificial intelligence (AI) courses were offered exclusively in-person, while subjects like e-Commerce and Cloud Computing were available as online or as blended-learning courses.

In 40% of the courses, some form of certification was provided, with ECTS credits available for only 2 of the 71 courses analysed.<sup>16</sup> While public-sponsored and university-led courses tended to provide certification as standard, not all private providers offered this as option.

The profiles of trainers providing support fell under the three roles of:

- **Coach:** supporting learning and achievement of course objectives.
- **Mentor:** an experienced professional with sector knowledge.
- **Tutor:** academic staff member with subject knowledge.

In terms of the learning methods, a strong practical element was present with the vast majority of courses, being task or project-based. Certain courses (10%) required involvement with external projects as part of the learning process. This involved either working on a project from the participants' own companies or from partner companies of the training provider. Another strong focus was on the use of case-studies, a practice common in MBA programmes.

Other components of note are the participant-led nature of programmes which incorporate the following characteristics:

- The participant sets the pace at which they progress through the material; this is more easily facilitated by online content.
- An entry test to tailor the course content to the skills of the participant.
- A discount applied on the cost of the course dependant on the successful completion.

Beyond the in-depth analysis of these European training programmes, it is also worth noting that 800 universities around the world have launched at least one massive open online course (MOOC). MOOC providers are also partnering with (mostly technology) companies to launch courses. The total number of MOOCs that have been announced stands at 9,400, up from 6,850 last year. Coursera alone has 30 million registered students, edX has 14 million and XuetangX, a Chinese language MOOC platform launched in 2013, boasts 9.3 million.<sup>17</sup>

It is worth noting that while Coursera started as a platform offering free courses to individuals, it now targets learning and development in firms, offering a subscription service that starts at 400 USD per user (about 356 EUR), for a minimum of 5 users.

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<sup>16</sup> European Credit Transfer and Accumulation System (ECTS) credits enables the learners to have their achievement recognised by another higher education institution and contributes towards a diploma, degree or master's programme.

<sup>17</sup> <https://www.class-central.com>.

## 2.6 Training Methodologies

The most effective methods of training employ a combination of formal, non-formal and informal learning methodologies that cover technical digital skills, but also the softer skills that are developed through self-directed and group learning such as planning, communication, collaboration, etc:

- **Formal learning** is organised, structured and has learning objectives. From the learner's standpoint, it is always intentional, i.e. the learner's explicit objective is to gain knowledge, skills and/or competences.
- **Non-formal learning** may occur at the initiative of the individual but also happens as a by-product of more organised activities, whether or not the activities themselves have learning objectives.
- **Informal education** is never organised, has no set objective in terms of learning outcomes and is never intentional from the learner's standpoint. Often it is referred to as learning by experience or just as experience.

**Table 5. Description of the different forms of education**

	FORMAL EDUCATION	NON-FORMAL EDUCATION	INFORMAL EDUCATION
<b>+</b>	Recognised form of education Clear qualification levels Universally recognised credentials Trained teachers	Flexibility in organization and methods Incorporates non-classroom-based learning Easier to adapt content Skills focused Trainers have industry experience	Anywhere and anytime Can take place in almost any location Encompasses a variety of learning methods Lifelong learning Varied inputs Learner led Highly contextual
<b>-</b>	Rigid programmes Classroom-based Follows educational standards Doesn't adapt to students' standards, values and attitudes	Does not lead to a universally recognised qualification Teachers may lack formal training	Tends to be unpredictable Can lead to inconsistency in skills development Lacks academic rigour

Source: Adapted from Trawcoe.com

## 2.7 Hardwiring for Completion

While "hardwiring for completion" may be an overstatement, studies suggest that there are certain ways in which training courses can be designed so as to minimise drop-out rates. Having said this, it should also be borne in mind that, particularly with digital-only formats, there are a number of

reasons for non-completion, some of which cannot be easily influenced by training providers. These include:<sup>18</sup>

- **No real intention to complete:** this includes participants who are interested in finding out more about the content of a particular course and those who may be interested in participating the course as a stop-gap between other activities (e.g. finding a job).
- **Lack of time:** on occasions the participants may underestimate either the time required to complete the training programme or suddenly find that the time they have available to dedicate to the programme is reduced, either for personal or professional reasons.
- **Ability of participant to understand and engage with content:** although it may be possible to filter for the skills and knowledge that are required for a given training programme, the process of onboarding participants necessarily relies on self-assessment. It is only as the course progresses that some participants find that they do not have the necessary understanding of key concepts to progress. This is particularly the case for more technical courses.
- **Lack of digital skills or learning skills:** these reasons particularly effect the remote learning elements of the course as they require the participant to organise their own learning and even access tools and information that are part of a broader process of skills and knowledge acquisition (e.g. perhaps set as part of a task to be completed).

Other reasons that affect completion rates and that were taken into account during the pilot stage include managing participants' expectations, ensuring that they do not miss key parts of the training, which make it difficult to catch up or the use of peer review. In this last respect, some studies have suggested that peer grading has a negative influence on completion. On the other hand, peer grading can be used to further understanding of the material in short tests and can be used as one of several ways in which progress is checked.

## 2.8 Designing for Scalability and Replicability

Prior to their launch, the draft pilot training programmes were assessed for their potential replicability and scalability:

- Replicability refers the fact that it would be relevant and possible to implement the course in different regions and countries of the EU, by different implementers.
- Scalability refers to the characteristics that mean that the course can be easily enlarged to accommodate larger numbers of learners.

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<sup>18</sup> Onah, D.F., Sinclair, J. and Boyatt, R., 2014. Dropout rates of massive open online courses: behavioural patterns. EDULEARN14 proceedings, pp.5825-5834. Some of these reasons have been confirmed through the qualitative research performed in both Murcia and Lithuania (interviews and roundtables).

The Methods Screen technique provided the framework to assess the programme and its preconditions to ensure that it can be replicated. Management Systems International (MSI) has developed the Scalability Assessment Tool (SAT)<sup>19</sup> which has 3 main purposes:

- Helps decide whether scaling up is a viable option
- Assesses whether the scaling up process will be hard or easy
- Identifies ways to improve scalability

SAT is a successful and reliable tool to use as a predictor and scorecard of scalability, adapted by the United Nations Development Programme (UNDP) to assess scalability of innovations.<sup>20</sup> It was used as the basis for the scalability assessment of the pilot training programmes. It should also be noted that this tool also provided a basis for quality assurance of the programme itself as it assessed:

- Credibility of the training programme
- Observability of the results of the training programme
- Relevance of the training programme
- Relative advantages of the proposed training programme in comparison to other existing solutions
- Ease of transfer and adoption of the training programme
- Testability/piloting of the training program
- Financial sustainability of the training programme

A total of 26 criteria were applied across 5 major assessment categories. The full SAT criteria can be found as an annex to this document.

				
CREDIBILITY	OBSERVABILITY	RELEVANCE	ADVANTAGE OVER WHAT EXISTS	TRANSFERABILITY AND ADOPTABILITY

<sup>19</sup> Management Systems International. Scaling Up – From Vision to Large-Scale Change. Tools and Techniques for Practitioners. 2012

<sup>20</sup> UNDP. Scaling-up checklist.

## 3 Delivering the Pilot Training Programmes. Process and Methods

### 3.1 Selecting the Content

The above inputs fed into the design of the four pilot digital skills training programmes that were to be delivered in each of the two regions. The work completed with the stakeholders in both Lithuania and the Region of Murcia informed the selection of topics, which initially included a relatively wide range of subjects that in many respects were interlinked. Further work with stakeholders led to the content being incorporated in the four digital skills pilots.

It is worth noting that the original intention was to deliver a fifth training programme focused on Agile Software Development, a topic that had been mentioned by the most technologically advanced SMEs in the Region of Murcia as being particularly pertinent for developing digital skills. This pilot was eventually dropped. Early signals from the marketing of the pilots indicated that there would be insufficient applicants for the training to provide reliable data for the final blueprints.

#### Planning for different skills & responsibilities

+				
Level of responsibility		Introduction to Data Analytics		
	Digital Sales, Marketing and Cybersecurity	Digital Marketing Strategies for SMEs		
-	Introduction to Full Stack			<i>(Agile Software Development)</i>
	-	Technology- savvy		+

#### INTRODUCTION TO FULL STACK DEVELOPMENT

The Introduction to Full Stack Development course was aimed at participants interested in developing a broader understanding and knowledge of two commonly used website development concepts, front and back end development, to deliver a visually attractive web solution that included functional back end features. This course was suitable for beginners in programming, providing some essential basic technical knowledge and enabling them to gain a rounded view of IT based projects. It was a course suitable both for SME employees and unemployed people, including recent graduates or students still in training.

#### DIGITAL SALES, MARKETING AND CYBER SECURITY (DIGITAL SALES)

The Digital Sales, Marketing and Cyber security course (Digital Sales) was an operational course designed to teach active sales and marketing professionals, as well as students and people currently unemployed, how to develop and design functional project-based websites, apply latest research trends and use available online tools to increase overall workflow performance. It was suitable for beginners with no programming background, helping to lay down technical knowledge and practical application of sales, marketing and cyber security tools.



## DIGITAL MARKETING AND SALES STRATEGY (DIGITAL MARKETING)

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The Digital Marketing and Sales (Digital Marketing) pilot focused on the marketing of products or services using digital technologies across digital media. Digital Marketing included subjects as search engine optimization (SEO), search engine marketing (SEM), data-driven marketing, and social media marketing.

Although it was also hands-on in nature, the primary purpose was to enable SMEs to develop a Digital Sales and Marketing Strategy. The course was primarily directed at people with marketing knowledge but who lacked the digital skills required to use the digital tools and techniques associated to marketing. Some basic digital skills were required.

## INTRODUCTION TO DATA ANALYTICS

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The most digitally advanced of the pilots, Data Analytics, involved learning about the process of examining data sets in order to enable organisations to make informed business decisions. The pilot included a set of methodologies, tools and applications to gather, debug and transform information from a variety of internal and external sources both for direct reporting and to support decision making.

It was directed at decision makers in SMEs interested in the fundamentals, techniques and tools of data analysis and business intelligence, as well as people currently unemployed but who have previously worked in ICT.

The draft blueprints for each of these pilot training courses were drafted on the basis of the following building blocks:

- **Participant profiles:** including a description of the required skills on entry to the programme as well as a clear view on why they should attend.
- **Programme topic:** describing not just the aims and objectives of the training but also the learning outcomes and the core skills developed.
- **Structure:** looking the content modules, the learning methodologies & activities, duration, value-add activities and also potential constraints, such as time, equipment or other resources.

The final blueprints (see Chapters 7 onwards) have been revised on the basis of the empirical observation of what has and has not delivered value.

## 3.2 Delivery Partners, Material and Resources

It is worth outlining that the partners chosen to deliver the training were a private training provider in Lithuania and a public university in the Region of Murcia, both of whom had extensive experience of delivering technical training. The following table outlines the main characteristics of each delivery partner:

**Table 6. Differences in approaches between delivery partners**

	UNIVERSITY	TRAINING PROVIDER
STAFF	Academic staff Industry experts Support staff	Industry experts Coach for participants
EXPERIENCE IN DIGITAL SKILLS TRAINING	Academic courses	Training courses
EXPERIENCE IN WORKING WITH THE TARGET GROUP	Graduates Tech start-ups	SMEs Unemployed Self-employed
TRAINING MATERIAL	Adapted existing material from academic curriculum Complemented with new material developed for courses	Adapted existing material from training courses Complemented with new material developed for courses
CERTIFICATION	Yes	Yes
RESOURCES	Yes	Yes

Each delivery partner selected and briefed their own training and support team. They were also provided with some basic training on the use of the platform.<sup>21</sup> The pilots ran from June to October 2018 with each pilot lasting 10 weeks.<sup>22</sup>

### 3.3 Establishing Metrics

The early metrics established to monitor progress related to recruitment, completion and results were defined to establish interest in the training itself, completion rates and results. The high-level indicators were as follows:

- Number of applications received
- % Invited to interview
- % Acceptance rate
- % Completion rate
- % Satisfaction rating of teaching, learning environment and content
- Average progression in specific digital skills developed
- Perceived increase in employability

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<sup>21</sup> Described at 3.6 below.

<sup>22</sup> The pilots in the Region of Murcia included a summer break over August to allow for both participant and trainer summer leave.

The overall target in terms of number of participants was 100, averaging 25 for each pilot. A key objective was to achieve gender balance, both within each pilot training programme and across the full cohort.

### **3.4 Delivery Platform**

Moodle was selected as the platform to provide the managers, trainers and participants with a single robust, secure and integrated system to create personalised learning environments. It enables:

- Administration: content management system, notifications, CRM features, SCORM, etc.
- Analytics: assessment tracking and reporting, feedback tracking, students tracking, etc.
- Assessment and learning support tools: gamification, conferencing tools, grading, collaboration tools, etc.
- Customisation and integration with other tools.

Moodle is particularly feature-rich, very flexible and highly configurable. In addition, it offered two distinct advantages for its use in the pilot training programmes:

- It was already used and well known by one of the partners and thus required less time to deploy.
- It is open source (distributed under GNU license), free to download and easy to install. Users and organisations are allowed to run, study, share, and modify the software to meet their particular needs.

## 4 The Results of the Digital Skills Pilots

### 4.1 Digital Skills for SMEs

From its inception, the approach to the study has been empirical. The objective has been to design blueprints from the results obtained from the piloting of digital skills training programmes that would enable SMEs, their employees and unemployed people throughout Europe gain skills to take advantage of the opportunities afforded by the digital economy.

The pilots involved over 60 stakeholders in the design, were refined through further workshops focused on the co-creation of content and were finally offered to 114 participants in two very different regions.

The results obtained are analysed with respect to the:

- Recruitment of participants
- Participant profiles
- Motivation to acquire digital skills
- Completion rates
- Skills acquired through the training and,
- Application of skills in the workplace

Reviewing the longer-term impact of the training on the SMEs and on the participants is unfortunately outside the temporal scope of this study but this is something that may be able to be tracked at a future date.

### 4.2 Recruiting Participants

Recruitment for each training course began a minimum of five weeks before the start date. The method for recruitment was devolved to the different regions to allow for cultural differences and the optimisation of the training partners own networks. A total of 589 applications were received across the four pilots, 49% of which were accepted for interview. Of those interviewed, 39% received an offer of a place on the training programme they had selected.

Applicants were required to complete a short application questionnaire followed by a selection interview. In the case of the Training Provider (Lithuania), given the 430 applications received, applicants were required to pass an additional motivation questionnaire before progressing to an interview.

In Lithuania, the recruitment channels employed were more focused compared to those employed by the University in the Region of Murcia. The Training Provider relied on a Facebook campaign, combined with recommendations from their network.

The University, in addition to Facebook, LinkedIn, and Instagram campaigns, took part in various events related to local training, commerce and innovation networks to promote the courses and published the training courses in the newsletters of the regional Chambers of Commerce,

professional organisations, enterprise centres and appeared in local press. They also made direct contact with regional SMEs and relevant contacts in their databases.

Both trainers identified the paid Facebook campaigns as a successful channel for generating a volume of applications, whereas LinkedIn and Instagram were deemed ineffective. Personal recommendations were more likely to be accepted on the courses and to be more likely to complete the full programme.

Within the Region of Murcia, the local employment and enterprise organisations were strong referrers but, despite the variety of networks and channels activated, the Region of Murcia attracted a far lower number of applicants. In addition to conditions relating to the geographical catchment area, it is thought that some of the factors affecting the number of applicants include the course straddling the summer months, as well as the high number of courses (not necessarily digital) already available in the Region.

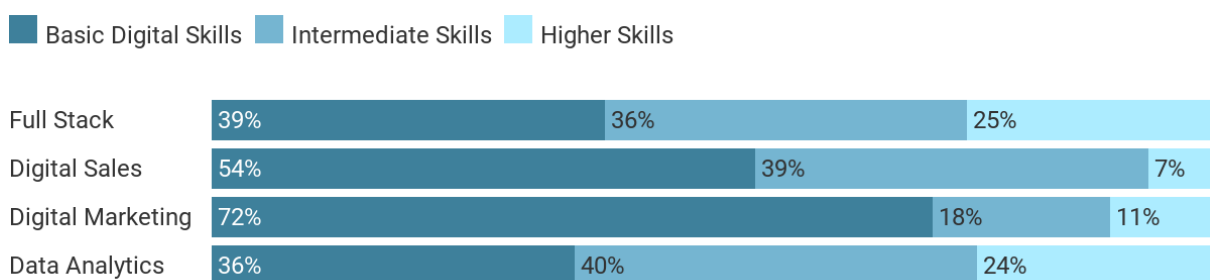
In overall terms, the course that attracted the most relevant applications was the Full Stack Development. The least successful was the Introduction to Data Analytics, perhaps unsurprisingly, given the higher level of digital skills and professional experience required.

**Figure 6. Recruitment flow**

	FULL STACK	DIGITAL SALES	DIGITAL MARKETING	DATA ANALYTICS	TOTAL
Total Applicants	222	208	94	65	589
N° Interviewed	118	90	45	38	291
N° Accepted	25	25	32	32	114

### 4.3 Baseline Digital Skills

**Figure 7. Self-assessed skills level on entry**



In their applications, participants were asked to self-assess their current level of digital skills. The proportion of participants stating that they had higher digital skills was greatest in the Full Stack and Data Analytics courses (25% and 24% respectively).

## 4.4 Participant Profiles

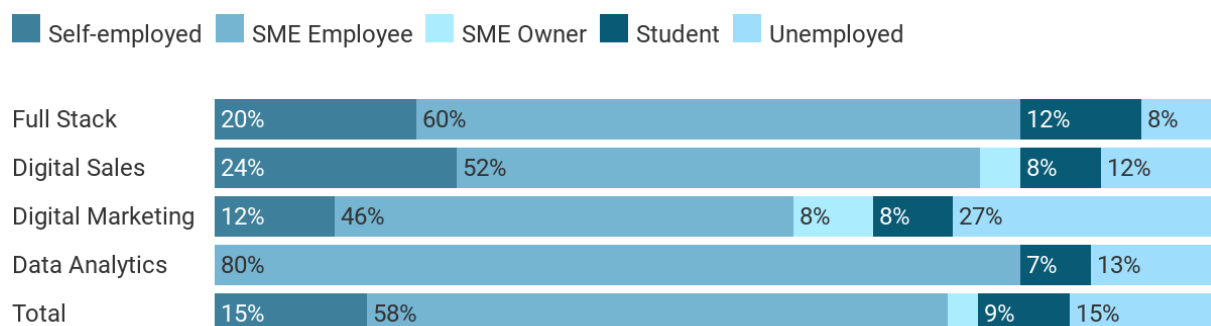
Gender balance was achieved across all pilots with the percentage of women participants ranging from 55% in Digital Marketing to 46% in the Introduction to Data Analytics.

All of the training courses attracted a mix of different employment profiles, Self-employed, Employed, SME owners, Students and Unemployed persons, with some notable differences:

- There were no SME owners in either the Introduction to Full Stack or the Data Analytics course.
- 80% of those on the Data Analytics course were SME employees.
- The highest proportion of self-employed participants were in the Full Stack and Digital Sales courses, both of which were delivered in Lithuania.

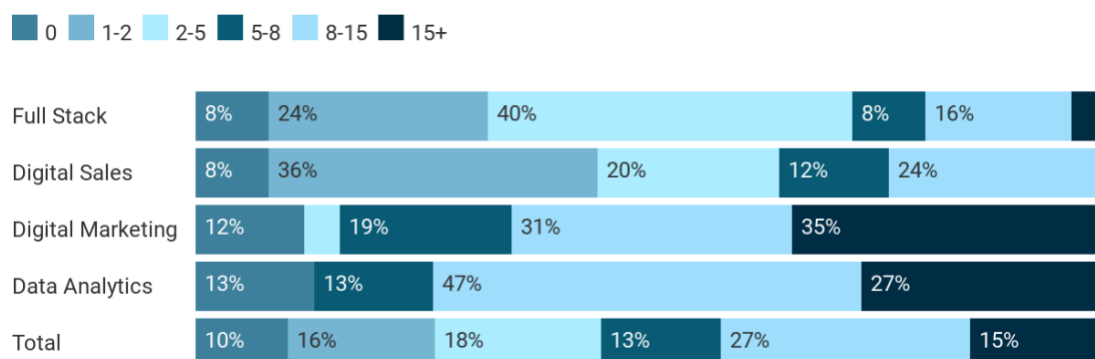
The last point is consistent with the earlier finding reflecting on the low levels of real unemployment and the preference for alternatives to working full-time in more conventional occupations.

**Figure 8. Employment status of participants entering the training courses**



The typical participant was an SME employee with varying levels of experience and a role of either Professional or Manager. In general, the participants from the Region of Murcia had a higher number of unemployed participants, compared to Lithuania, which, as stated earlier, had more self-employed participants.

**Figure 9. Professional experience of participants entering into the training courses**

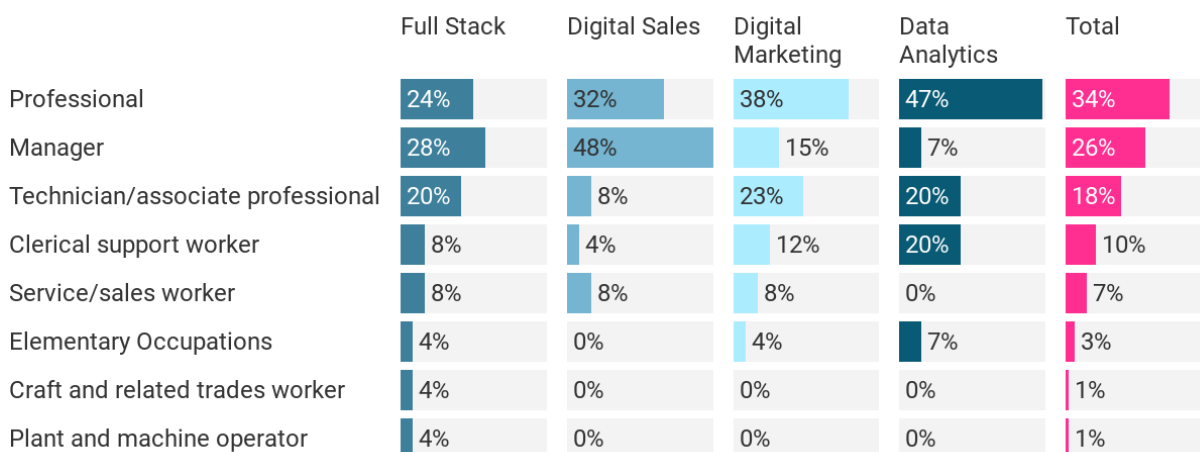


There were some differences between the two regions with regard to the participants' years of professional experience. This was much higher in the courses offered in the Region of Murcia, and

particularly in the Data Analytics course. In contrast, 68% of the participants in the courses in Lithuania had less than 5 years' experience.

The training courses were most popular among professionals followed by managers and technical staff.

**Figure 10. Job profiles of participants entering training courses as a percentage of course total**



In terms of the profiles attracted to the training programmes, it is likely that language also had a strong role to play in attracting participants with greater or lesser levels of experience. In Lithuania, the courses were delivered in English, whereas in the Region of Murcia the courses were delivered in Spanish. This would have lowered the participation barriers for older (and consequently more experienced) participants.

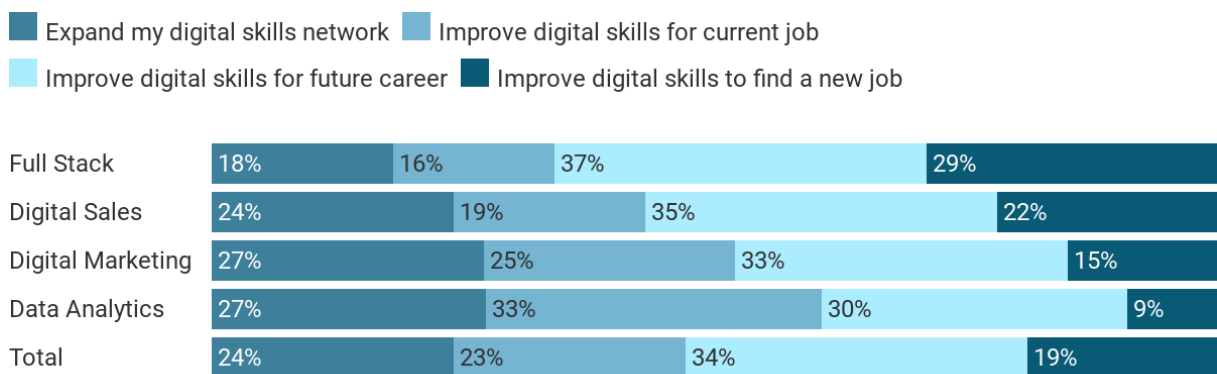
#### 4.5 Why Seek Digital Skills Training?

The main motivation which attracted participants to the training courses was the desire to gain new skills for the future (two-thirds of the total). Participants on the Full Stack course were more likely to be signing up to retrain, while the Introduction to Data Analytics course attracted people who wished to increase their skills for their current job.

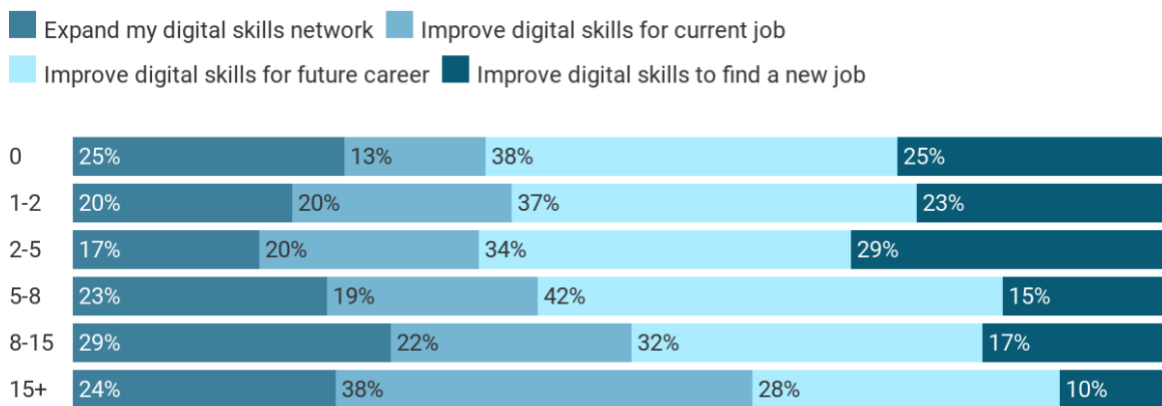
In general:

- Approximately one in five participants (19%) wished to improve their digital skills to find a new job.
- One in four wanted to expand their digital skills network or improve their digital skills for their current job (24% and 23% respectively).
- One in three (34%) wanted to improve their skills with a view to their future careers.

**Figure 11. Personal motivation across training courses<sup>23</sup>**



**Figure 12. Personal motivation segmented by professional experience (years)**



In relation to the reasons for acquiring digital skills training according to the participants years of experience:

- More experienced participants (>15 years) were almost twice as likely to be improving their skills for their current position, compared to those with little or moderate experience (38% -v- 20%).
- Those at a mid-point in their careers were more likely to be improving their digital skills for their future career.
- Those just starting out or with under 5 years' experience were looking to improve their digital skills either to find a new job or to improve their skills for a future job.

## 4.6 Completion Rates

The different profiles of those who started the training courses and those who completed them were compared. No significant difference was observed in the distribution between Employed, Unemployed, Self-employed, Students and SME owners, or between genders. Participants with no

<sup>23</sup> Percentages may not add up to 100 due to rounding.



professional experience, as well as those between 5-8 years' experience were less likely to complete, while those with 1-5 years of experience were more likely. No difference was observed based on personal motivations.

During the delivery of the training courses, two participants changed jobs and four previously unemployed people found positions; one person received a promotion.

**Table 7. Global Key Performance Objective by pilot**

INDICATOR	FULL STACK	DIGITAL SALES	DIGITAL MARKETING	DATA ANALYTICS
Number of applications received	222	208	94	65
Invited to interview	118	90	45	38
Acceptance rate	11%	12%	34%	49%
Completion of group/individual projects	68%	76%	46%	31%
Completion rate	68%	70%	46%	31%
Satisfaction rating of teaching and learning methods	83%	79%	83%	82%

The two courses delivered in the Region of Murcia achieved lower completion rates than their Lithuanian counterparts. The University in the Region of Murcia made a conscious decision to accept more people onto the courses, 32 instead of the recommended 25 to allow for possible drop-outs. However, this choice had an impact on the completion rate as less committed participants were accepted onto the course. This resulted in a number of non-attendees to the first face-to-face session and a further drop-off after the first or second face-to-face session. In the case of the Data Analytics, only 15 participants completed the first assignment on the Moodle platform, while for Digital Marketing it was 22.

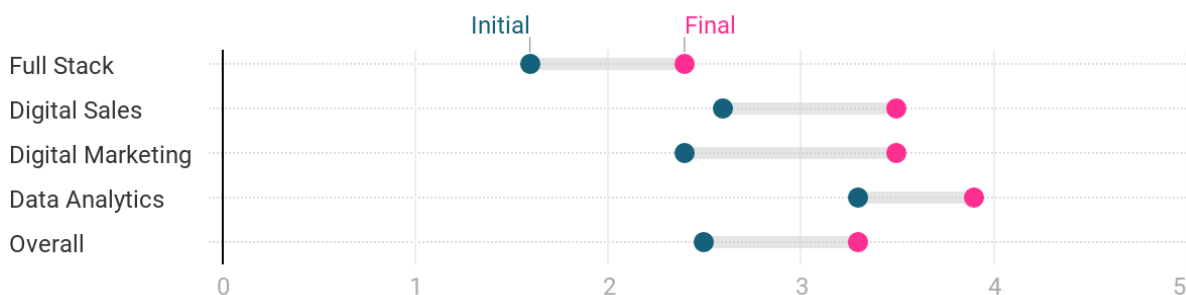
## 4.7 Digital Skills Acquisition

Upon entry to the course, participants were required to complete an initial baseline questionnaire to establish their self-assessed skills level for each learning outcome. Participants rated their level on a scale of 1 to 5, where 1 was no knowledge of the particular learning outcome and 5 was expert. Upon completion, the participants repeated the exercise to enable the assessment of the improvement of specific digital capabilities developed through the training programmes.

### 4.7.1 Digital Skills learning across courses

From the perspective of the participant, the training course which showed the greatest progress in skills acquisition was Digital Marketing, while the least progress was found in the Introduction to Data Analytics. Data Analytics had the most advanced starting group leading to smaller gains, a trend observed across the individual skills progress of each course: the higher the initial level of digital skills, the lower the progress of learning as a result of the training programme.

**Figure 13. Differences in participants skills acquisition by course**



**Table 8. Difference in average skills level at entry and completion of pilots on a 5-point scale**

TOTAL	FULL STACK	DIGITAL SALES	DIGITAL MARKETING	DATA ANALYTICS
0,9	0,9	0,9	1,1	0,6

The average progression per course is useful as an initial indicator to gauge an overview of the relative results of the pilot training programmes but is an unweighted average for all learning outcomes: the lower the level of digital skills at the outset, the greater the perception that digital skills have been acquired. Acquiring basic levels of digital skill in any area is relatively easy. Improving and gaining proficiency becomes much harder as the subject matter becomes more complex due to issues such as integration in a business environment, interoperability between systems, regulatory compliance or security, to name a few.

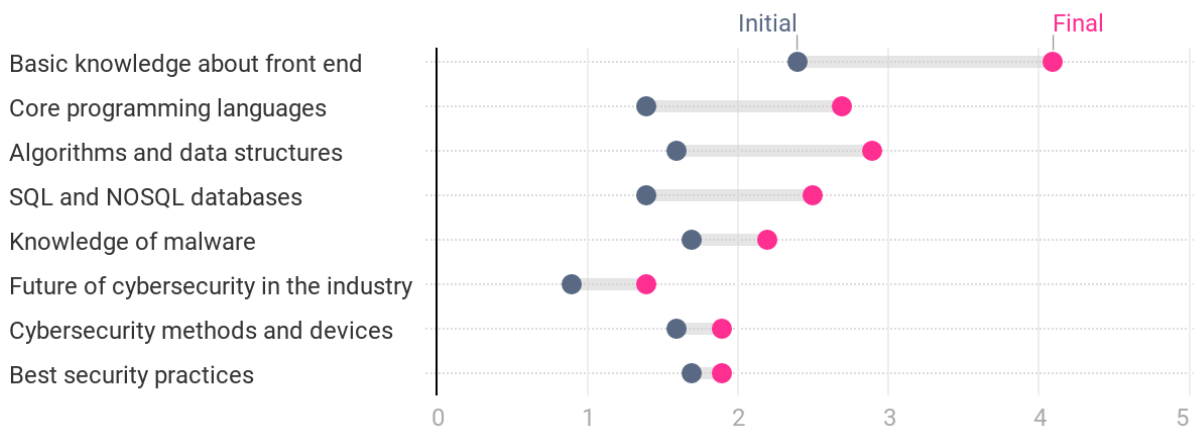
As will be further outlined below, a more nuanced analysis is required, taking into account the different outcomes within each training programme and the participants own feedback. Within each individual pilot, ways in which the course could have added more value to the participants were identified and these have been incorporated into the blueprints.

## INTRODUCTION TO FULL STACK DEVELOPMENT

The Introduction to Full Stack Development course was aimed at participants interested in programming, providing some essential basic technical knowledge and enabling them to gain a rounded view of IT based projects. Most participants in the Full Stack pilot started with little or no knowledge of the subject and progress to the level of 2,4 out of 5, where 5 is expert.

It is evident from the figure below that the progression in the learning outcomes directly related to development languages and tools was far greater than those relating to cyber security. In terms of course structure, the cyber security elements were integrated within each activity and may explain why the participants themselves did not see their own progression without a dedicated module. If the learning outcomes related to malware, cyber security and best practices are removed, the progression increases to an above average difference of 1,4, with the greatest progress being seen in the area regarding front-end development.

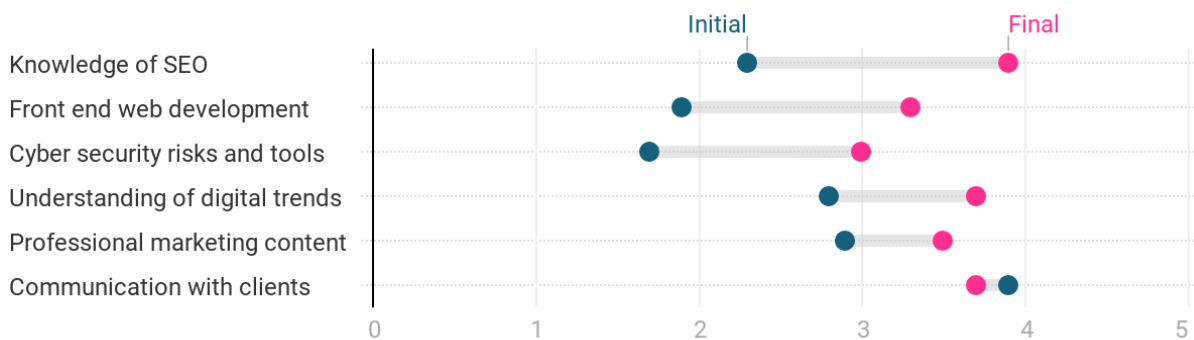
**Figure 14. Progression in skills for each learning outcome in Full Stack Development**



### DIGITAL SALES, MARKETING AND CYBER SECURITY

The Digital Sales, Marketing and Cyber security course was designed to teach sales and marketing professionals how to develop and design functional project-based websites and use tools to increase overall workflow performance. It was suitable for beginners with no programming background.

**Figure 15. Progression in relation to each learning outcome in Digital Sales**



The progress across most learning outcomes of the Digital Sales, Marketing and Cyber security for SMEs course was very positive with a large progression in SEO, front end and cyber security risks and tools. Unlike with Full Stack, the course provided dedicated modules on the area of cyber security for 3 out of the 10 weeks, which resulted in a similar progress to the other ‘hard skills’ learning outcomes.

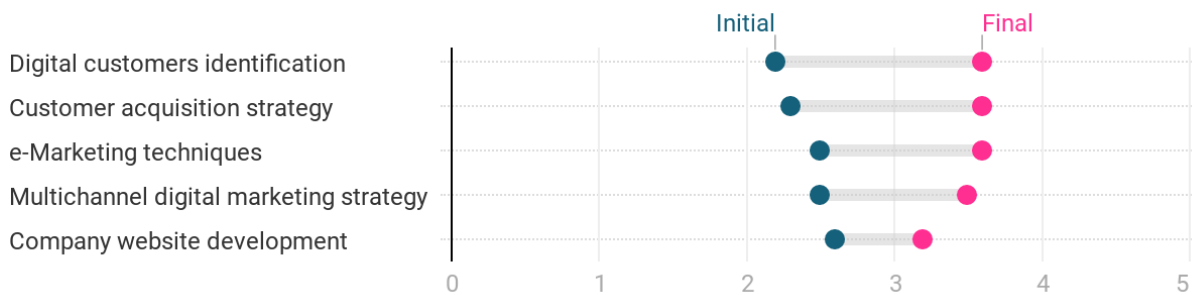
SEO, or Search Engine Optimisation is a key skill for placing websites in higher positions in the internet-based searches. It is particularly important for SMEs wishing to expand their markets.

There was room for improving marketing content development and especially client communications. In the latter there was negative progress, although by a minor difference of -0,14 within statistical margins which would indicate no progression as opposed to regression per se.

## DIGITAL MARKETING AND SALES STRATEGIES FOR SMES

The Digital Marketing and Sales pilot focused on provision of skills that would enable participants to define and implement a digital marketing and sales strategy for an SME. The course was directed at people with marketing knowledge and some level of basic digital skills but who lacked the skills required to use the specific digital tools and techniques associated to marketing.

**Figure 16. Progression in relation to each learning outcome in Digital Marketing**



This pilot course was the most successful in terms of progression, with participants reporting the greatest difference in knowledge and expertise between entering and completing. The average starting value was the third lowest and finished with the second highest.

The company website development performed the weakest; reviewing the content, it centred around creating a Wordpress site and Prestashop online store which provides people without the understanding of HTML and CSS, an independent way to establish their businesses online. Some of the participants were already familiar with these tools which is reflected in the mode of the final skills level (4) being much greater than the average (3,1).

The greatest progression was in relation to being able to identify digital customers and developing an appropriate customer acquisition strategy.

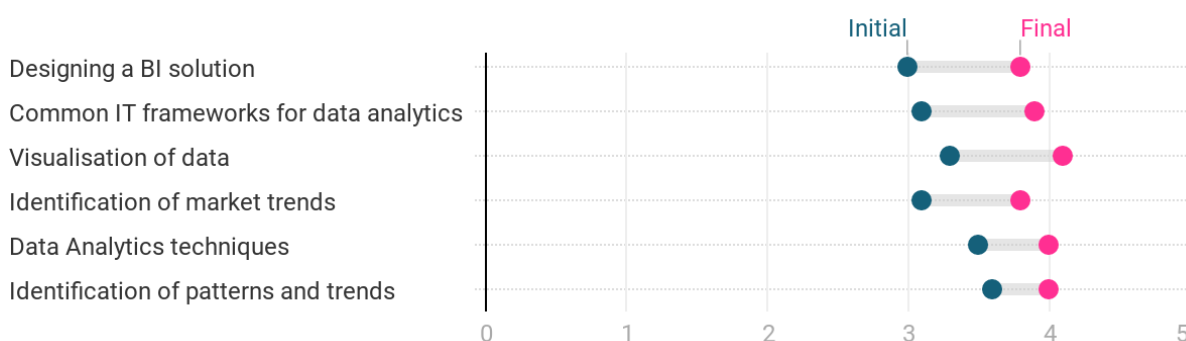
## INTRODUCTION TO DATA ANALYTICS

The pilot was focused on providing decision makers in SMEs or unemployed people with ICT backgrounds with skills relating to Data Analytics concepts and the tools that would enable them to better understand the data generated within their business and take decisions based on that data.

The Data Analytics course had the most digitally advanced participants but also demonstrated the least progress in relation to their starting point. Generally, progress across the outcomes was uniform, with a slightly weaker improvement in the skills relating to the identification of patterns and trend and data analytics techniques.

All participants reported a notable progression toward being at expert level in the visualisation of data, knowledge of data analytics technique and the identification of patterns and trends.

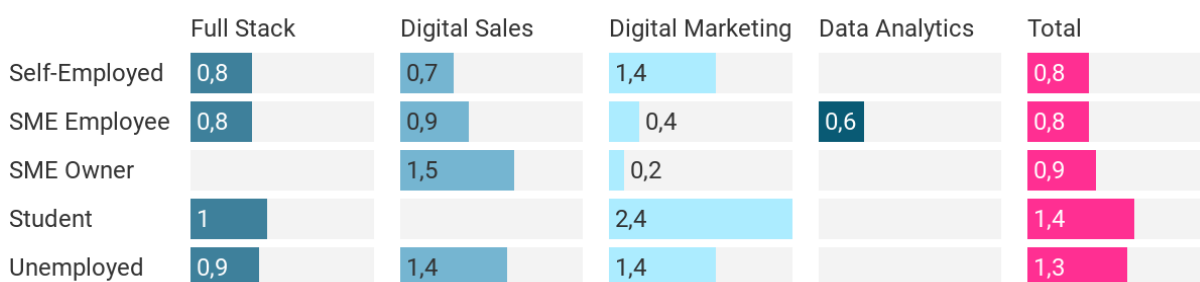
**Figure 17. Progression in relation to each learning outcome in Introduction to Data Analytics**



#### 4.7.2 Differences in progression

Within each course, progress was variable across profiles but on the whole specific profiles progressed further than others.<sup>24</sup> SME owners progressed more in the Digital Sales & Marketing course, which was more tactical in nature than the others. SME employees, on the other hand, fared better in the strategic Digital Marketing course.

**Figure 18. Progression in relation to each course by employment**



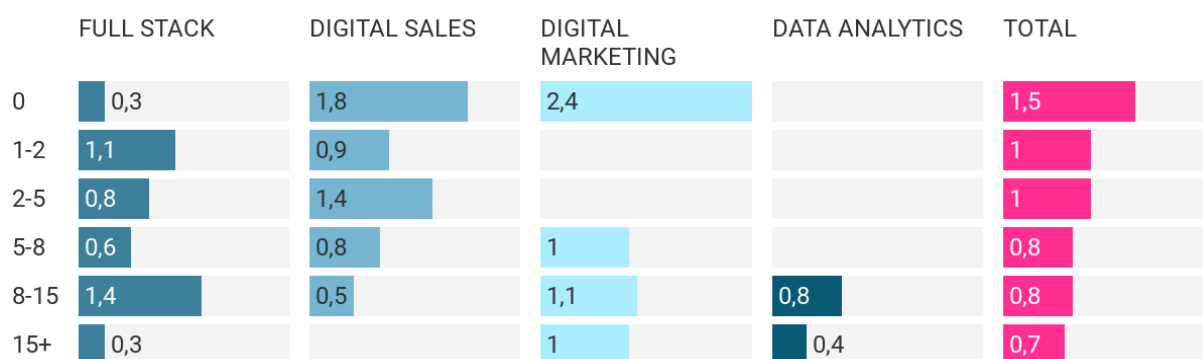
Aside from in the Digital Sales course, women reported to a greater degree than men that they have increased their skills levels, especially in the case of Full Stack.

In relation to the increase in digital skills on the basis of experience, the group that has benefited the most from the training is that with no work experience. It is, however, interesting to note that the Full Stack course, perhaps one of the courses with the highest proportion of programming content, developed the skills of those with over 8 years-experience the most.

By occupation, the most significant progress was achieved by sales and services workers on both the tactical and the strategic Digital Sales and Digital Marketing pilots, but it is interesting to note that Managers progressed furthest in the Full Stack course. Professional profiles on the other hand were able to benefit the least.

<sup>24</sup> Progression measures the difference between the participant's self-assessment of skills levels at the start and end of the course.

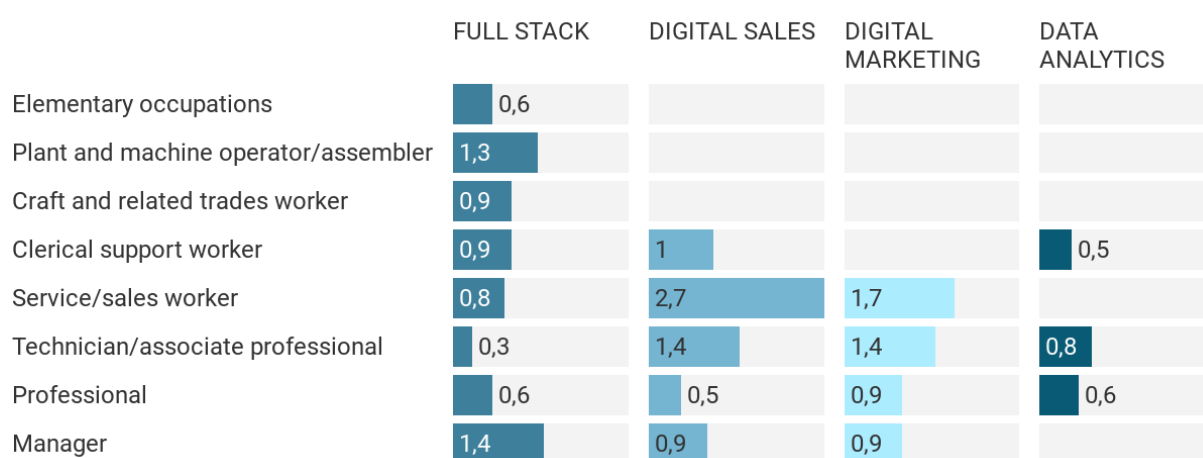
**Figure 19. Progression in relation to each course by experience**



The trainers did not note significant differences in the levels of engagement of the participants, either in terms of employment status or occupation, although some noted that those who had more professional experience were also more likely to be more prepared and cover the required reading and exercises outside of classes and tutorials.

The most significant factor affecting engagement was the degree to which participants were able to focus on a specific goal for their project, be it an internal company project or a personal start-up idea.

**Figure 20. Progression in relation to each course by occupation**



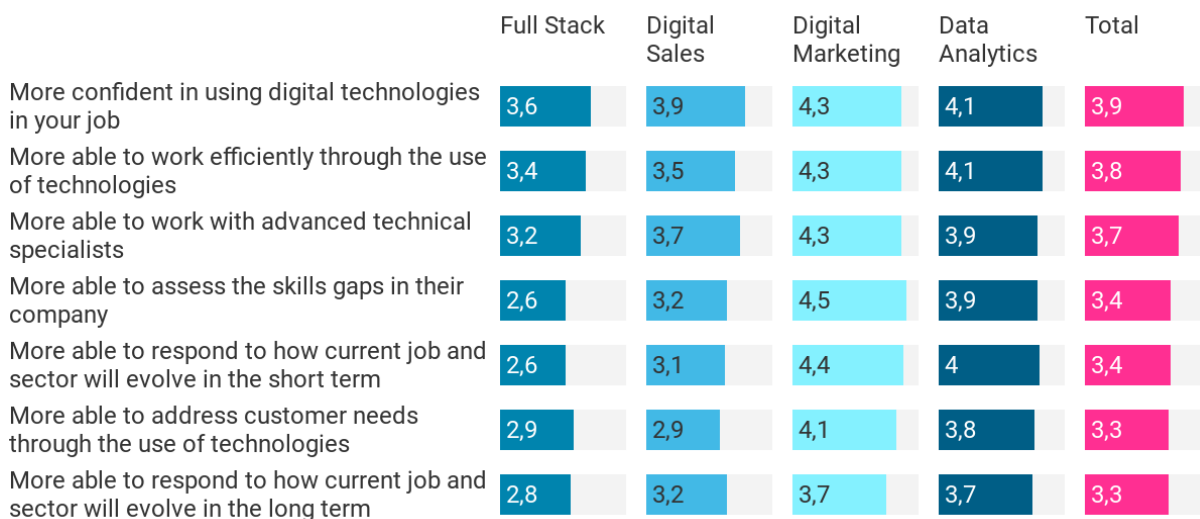
## 4.8 Applying the Skills Acquired

On completion, participants were asked to assess the degree to which they felt that the course had helped to be able to apply the skills gained against certain workplace specific outcomes.

It is interesting to note that there is no correlation between the degree to which the pilots enabled participants to learn hard skills and the degree to which they impacted on their ability to perform better in the workplace. Whereas from purely skills-acquired perspective, the Full Stack course was the one in which participants progressed the most, from a broader business perspective, the Data Analytics and the Digital Marketing course has clearly more direct applicability in terms of providing

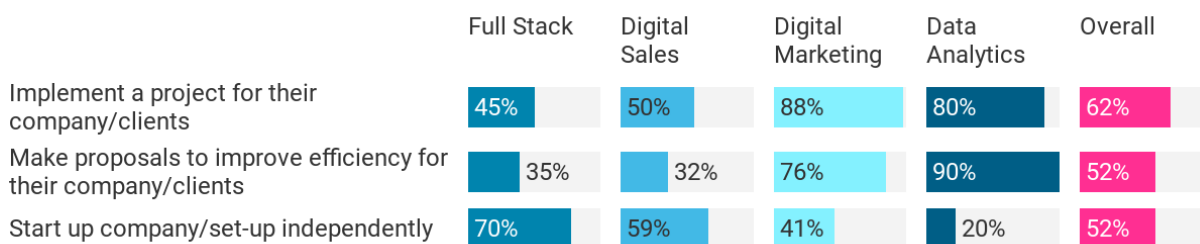
participants with greater confidence in using digital technologies in their job, enabling them to work with advanced technical specialists and enabling them to assess the skills gaps in their own organisations.

**Figure 21. Applying skills to the workplace (av. score on scale of 1 to 5)**



In relation to the future application of the digital skills acquired, there would appear to be differences that can be explained by the employment status of the different cohorts. The Full Stack and Digital Sales pilots delivered in Lithuania had a higher percentage of self-employed participants. This explains the higher number reporting the intention to establish their own company or work as a freelancer using the skills acquired representing 70% and 59% of each course respondents.

**Figure 22. Future applications of their newfound digital skills (% of total respondents)**



## 4.9 Training Methods

The different training methods employed by each training courses varied slightly: in Lithuania, the in-person classes took place on the weekend and a single evening; the University in Region of Murcia did not set group projects nor individual learning plans and only one course provided a guest speaker.

**Table 9. Engagement of specific training methods by course**

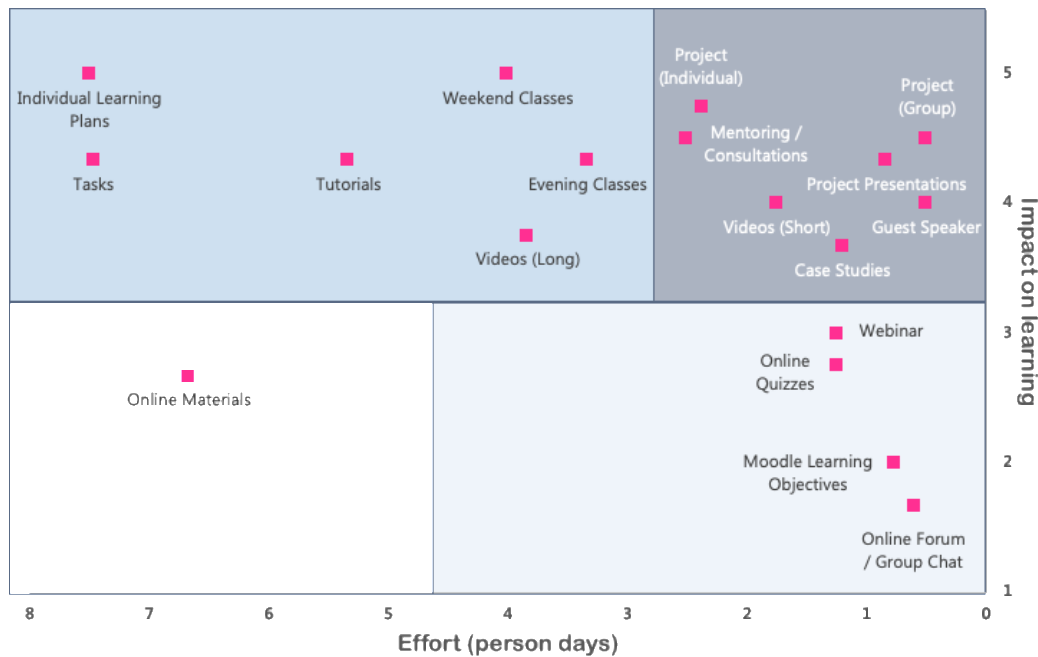
METHOD	FULL STACK	DIGITAL SALES	DIGITAL MARKETING	DATA ANALYTICS
Case Studies			●	●
Classes	●	●	●	●
Evening Classes	●	●	●	●
Weekend Classes	●	●		
Guest Speaker		●		
Individual Learning Plans	●	●		
Mentoring / Consultations	●	●	●	●
Moodle Learning Objectives	●	●	●	●
Online Forum / Group Chat		●	●	●
Online Materials		●	●	●
Online Quizzes	●	●	●	●
Project (Group)	●	●		
Project (Individual)	●	●	●	●
Project Presentations		●	●	●
Tasks		●	●	●
Tutorials		●	●	●
Videos (Long)	●		●	●
Videos (Short)		●	●	●
Webinars	●	●	●	●

#### 4.9.1 Relative impact of methods

The different training methods were compared by the relative impact they had over participant progression on a five-point scale. This was then divided by the number of person-days required for the preparation and delivery of that method for each course to provide an indicator of the methods that had most impact on the learning experience.



Figure 23. Relative impact-to-effort of the various training method employed



There are four clear categories of methods based on their impact-to-effort ratio. In the top right quadrant are the most effective methods which include projects, presentations, guest speakers and mentoring having high impact, low effort. Projects, practical tasks and respective presentations are core methods for facilitating a learning-by-doing approach required in skills development and providing a greater differentiation; allowing each learner progress or develop based on their individual skills level and experience as well as developing softer skills of time management, problem solving, decision-making and communication.

Participants who were working on their own projects, either for the company by whom they were employed, or for a company they wished to establish, were more determined and excelled beyond the expected achievements in the courses.

Careful curation of these projects should take place at an early stage to ensure the scope and relevance match the learning outcomes of the training course. Where a person was unemployed or self-employed or could not provide a project of their own, a project was defined with the trainer. In the case of the Digital Marketing pilot, the trainers even facilitated accessed to their own online shops and to anonymised real customer data.

The creation of instructional videos was a new concept to many of the trainers and was initially resource-intensive as they tackled the editing, becoming defter each time. The short video format was considered the most effective, with high interaction rates from participants.

Tutorials were valued as an opportunity to practise problem-based learning, consolidating knowledge and dealing with individual difficulties. The platform provided a function that permitted the participants to arrange their own tutorial slot, increasing the effectiveness. Tutorials were provided as sessions with between 1-5 participants either online or in-person and was also an

opportunity to develop relationships with the learners and understand their individual needs and challenges.

The relatively low impact-to-effort ratio of the classes does not suggest their lack of effectiveness; their lower position on the impact-to-ratio scale merely reflects the intensiveness of the effort required for their preparation and delivery compared to other methods. It was reported by the trainers that the participants preferred activities that were face-to-face.

In the Digital Marketing course in the Region of Murcia, the trainers found that webinars were a particularly effective method, with a higher contribution rate from participants than in in-person classes, suggesting the webinars provided a forum for more hesitant or shy participants to be more active.

#### 4.9.2 Participant evaluation of training methods

With some variation across the different courses and locations, participants perceived the face-to-face classes to be the most instrumental in their digital skills acquisition, followed by individual assignments (projects).

**Figure 24. Participation evaluation of effectiveness of methods (av. score on scale of 1 to 5)**

	Full Stack	Digital Sales	Digital Marketing	Data Analytics	Total
Face-to-face classes	4,75	4,64	4,31	4,2	4,53
Individual assignments	4,7	3,9	4,31	4,4	4,31
Online Material	4,3	3,91	4,41	4,2	4,19
Videos	3,8	4	4,31	4,8	4,13
Group assignments	4,05	3,73	3,21	3,29	3,67
External guest speakers	3,41	3,39	4,29	3,63	3,65

In contrast to the perception of the trainers, the participants valued the online material highly. In the Data Analytics course, the use of videos was very highly valued as a method with an average score of 4,8 out of 5, this is followed by the classes in Full Stack Development. What is also true, is that a good mix of approaches is required to ensure acquisition of skills to cater for the range of learning styles of the participants, as well as their ability to commit to face-to-face content.

#### 4.9.3 Moodle platform

The Learning Management System (LMS) chosen for the training courses was the open source Moodle which was adapted using the default template with the Big Blue Button integration to provide audio-visual communication for tutorials and webinars. The Moodle platform was hosted and managed by the university.

**Table 10. Overview of platform requirements**

ELEMENT	VALUE	COST (LESS VAT)
Template	Default	0 EUR
Theme	Boost	0 EUR
Hosting	6 GB SSD 120 GB monthly traffic Cent OS	9 EUR per month
Big Blue Button integration	40 GB SSD 100 users OS Odoo 12 (Debian 9)	39,5 EUR per month
Other	Domain	9,90 EUR per annum

The platform was highly rated by both the participants and the trainers:

- There was a total of 23,532 logins over the 10-week period, 80% of which were from participants; this amounts to over 320 logins per participant.
- 88% of learners reported that they found the platform easy to use and commented positively that it was simple and intuitive, it facilitated the individuals measuring of progress, provided a good structure and provided good accessibility to content and materials across devices.
- The trainers found that, like all new tools, it required a small amount of effort at the beginning but was productive in facilitating communications with the learners, scheduling tutorials, managing learner progress and tasks through the assignment management tools and in general boosted productivity and personalisation.

Some difficulties were experienced with the Moodle platform:

- The platform was unable to handle the large file sizes of the content prepared by the trainers.<sup>25</sup>
- On occasions, the resolution of the video conferencing was poor.
- Bulk reviewing of assignments was cumbersome.

Trainers would benefit from receiving instruction in how to make the most of the platform, taking advantage of the automatic functions and statistics and prevent duplication of work. Many of the challenges faced can be overcome with different templates, configuration and increased hosting power. The use of Moodle is highly scalable to a large number of users and courses and provides a foundation to the courses, anecdotally, many of the participants have expressed concern at losing access to the platform in the future.

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<sup>25</sup> While possible, a limit of 100MB is applied to file uploads, it is inefficient to host large videos on the platform as the quality would decrease proportionally to the number of viewers, it is more effective to make use of other platforms such as YouTube or Vimeo and include the links within the modules.

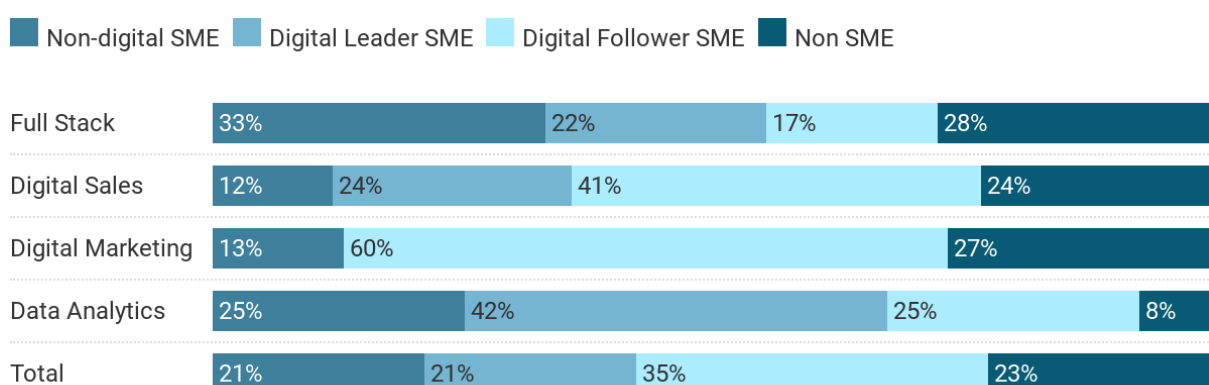
**Table 11. Moodle platform statistics from 1st June 2018 to 1st November 2018**

	FULL STACK	DIGITAL SALES	DIGITAL MARKETING	DATA ANALYTICS	TOTAL
Total logins	7.530	4.527	7.322	4.153	23.532
Student logins	7.372	4.099	4.944	2.555	18.970
Content views	362	2.886	2.246	1.874	7.368
Completed quizzes	2.944	3.516	626	63	7.154
Webinar/tutorials	0*	5*	47	22	74
Nº Attendees	0*	25*	286	136	447
Tutorials scheduled	*	*	386	7*	390
Forum views	246	374	991	650	2.261
*Trainers used alternative methods or tools					

## 4.10 Company Profiles and Outcomes

The majority of SMEs who were engaged in the course participation were keen to understand how the new skills could affect their business and increase the level of digital skills internally. To assess the impact of the training on the SMEs, employed participants were asked to classify their companies according to whether they were non-digital SMEs, SME digital leaders, SME digital followers or non-SMEs, the latter being larger companies or public sector organisations.

The Digital Marketing courses had a higher proportion of digital follower SMEs among the employed participants with the non-digital SMEs more involved in the hard-skilled Data Analytics and Full Stack programmes.

**Figure 25. Profile of companies employing participants<sup>26</sup>**

<sup>26</sup> Responses from unemployed and self-employed are excluded

The most common reason for wanting to attend the course was to gain a better understanding of how digital skills can benefit the business, followed by a desire to increase the level of digital skills available within the company:

**Figure 26. Company reasons for encouraging employees to acquire digital skills<sup>27</sup>**

	SME Digital Leader	SME Digital Follower	Non-digital SME	Non-SME	Total
Increase internal level of digital skills	5	6	4	3	18
Understanding how digital skills can benefit the business	6	12	8	7	33
Initiate a new project/line of business which requires digital skills	0	3	0	1	4
Bring in external expertise but needs knowledge to manage adequately	0	5	2	1	8

Almost every sector was represented in the four courses, although there are some regional differences. Companies from the Region of Murcia tended to be from the ICT and Human Health and Social Services sectors, whereas those in Lithuania were from Finance, Insurance and Real estate and Education. The Full Stack course had the greatest diversity of sectors among employed participants.

#### 4.10.1 SME outcomes

When attempting to perform a follow-up with the employers of the participants, a difficulty was encountered for the courses delivered in Lithuania. Many of the contacts provided by the participants appeared to be pseudonyms and attempts to contact the SMEs was difficult. In fact, the SMEs interviewed were unaware or uninvolved in the participation of their employee in the training courses. This suggests that the participants did not want to make their employer aware of their training, despite the fact that they did not indicate that the reason for joining the course was to gain new skills to find a new job.

The follow-up was performed with a sample of the SMEs through a telephone survey with a manager within the SME at a minimum of five weeks after course completion. A total of 11 responses were recorded, 3 from Lithuania and 8 from the Region of Murcia.

#### DECISION TO APPLY

In the Lithuanian SMEs surveyed, the employee themselves was responsible for finding the course and applying however training is normally decided by the company/department. In contrast the course in the Region of Murcia had a much greater involvement with HR or a manager encouraging

<sup>27</sup> In the initial questionnaire to participants entering the course, 55 respondents (out of a total of 91) identified as themselves as employees or company owners; of these 52 provided the company motivations for attending the training.

the employee to participate. The selection of the courses was left to the employees in the majority of circumstances, with some reporting an alignment with existing projects or business strategy.

### **SUPPORT AND PRODUCTIVITY**

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SMEs provided different levels of support to employees to facilitate their participation which centred around time and schedules:

- Providing leave to complete the main project
- Creating flexibility in working hours
- Providing time-off on afternoons without the requirement to make it up

None of the SMEs reported a major reduction in the employee's productivity during the courses.

### **IMPACT OF THE DIGITAL SKILLS TRAINING ON THE SMES**

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The qualitative data shows that almost all of the employers surveyed reported a noticeable increase in the skills of the employee, of that a third reported that it was significant. Employers reported that the employee demonstrated a greater understanding of concepts and a proactivity in proposing new methods or tools to employ in the company.

In the majority of cases, the employee has already implemented the skills learned with reported initiatives including the development of marketing campaigns, generation of new large data reports; two reported having more customers as a result of the project work done in the Digital Marketing pilot. Others plan to engage the new capacities in the short-term, while an equal amount will wait and see.

## 5 Rising to the Challenge of Providing Digital Skills Training for SMEs

### 5.1 Do SMEs Need Digital Skills?

The world is clearly in midst of a process of digital transformation that is powered by the availability of new foundational technologies, ranging from the Internet of Things to AI. These technologies can drive business growth, through gains in efficiency or enable the development of new products and services across sectors. They give rise to new firms and are having an impact on the way business is conducted, work is organised, and life is lived.

To a certain degree, the new digital economy has become a leveller of opportunities. Anyone anywhere can access basic technological tools to access new markets or run their businesses. But while many SMEs across Europe are aware of the general trend towards digitisation, understanding how this trend affects them in concrete terms is much more challenging. This is confirmed in the 6-point digitisation gap between Europe and the US mentioned in existing studies. It has also been confirmed in the evidence gathered from the empirical work with SMEs and grassroots stakeholders in the two regions chosen as the backdrops to test the digital skills pilot training programmes: Lithuania and the Region of Murcia.

The difference in the profile of both regions is stark. Lithuania's proportion of high growth SMEs, doubles that of the Region of Murcia. Its youth unemployment rate is 12,2% whereas the Region of Murcia's is 40,4%. The Region of Murcia's economy is built on Tourism and Construction, Lithuania's on Industry. Nevertheless, and despite some notable differences relating to the labour market, it is clear that SMEs across different sectors, as well as across different geographies, face very similar challenges in relation to acquiring digital skills.

1. **Planning ahead:** when it comes to allowing for future skills needs, SMEs tend not to plan ahead. Resource and time constraints force them to focus on the immediate needs of the business, rather than spend time on planning human resource needs. Training needs in general are planned 6-12 months in advance, at most.
2. **Engaging in digital skills training:** SMEs will provide digital skills for existing employees when they are:
  - a. Required by a specific business opportunity (e.g. customers demand the ability to purchase online, data analytics are required as an add on to existing machinery sold).
  - b. Unable to hire new people with the skills they need locally.
  - c. Forced to comply with new procedural requirements (e.g. adapting to new invoicing tools required by clients, complying with obligatory e-administration procedures set by government).

3. **Digital leaders-v-digital followers:** linked to the above point, in any ecosystem, there are firms that act as the bellwethers for change and innovation. SMEs know who the industry leaders are, whether large or small, and tend to follow them closely to monitor industry evolution. The concept of first mover advantage does not apply to most SMEs.
4. **Access to quality digital skills training programmes:** across the board, access to training is an issue. Good programmes are not necessarily available locally and travel has financial resources implications, both directly, in terms of cost of transport, and indirectly, in terms of lost productivity.
5. **Buy or build:** with more advanced or specialised digital skills, SMEs prefer to access external expertise. By contracting externally, they are able to contain the cost and maximise the benefit in a shorter period of time. The economic rationale for training internally or hiring for a skill is not necessarily immediately there.

It is also worth noting that in relation to broad digital skills, it has been difficult to find needs that vary between sectors. Specific skills relating to the use of robotics, specific software or other highly technological machinery may be sector specific, whereas IoT, Data Analytics, Cloud Computing and other skills are more transversal in nature and can be applied within almost any industry.

## 5.2 The Limitations of User-Centred Design

The empirical work undertaken with the target groups for each of the blueprints also points to a disconnect between the timescales required by policy makers to plan adequately for future skills needs for an ever-more digital economy and the planning cycles for SMEs.

To paraphrase Donald Rumsfeld, SMEs are not generally able to decipher unknown unknowns. Put another way, they do not know what they do not know and therefore expectations regarding detailed inputs in future (medium and longer term) digital skills needs need to be tempered against the policy implementation timeframe.

There are SMEs which are led by founders/owners/managers who do understand that the digital economy is a disruptive force for business as they know it, and, consequently, they are more able to understand the need to upskill employees. Inputs from these SMEs are useful for gathering signals on the timescales for mass adoption of certain digital technologies. They can also be used for preparing training according to these adoption scales.

It can also be said that, generally, the greater the technological content, the smaller the target group of SMEs that will feel the training to be relevant to their immediate needs. The planned course on Agile Software Development, a clear demand from more technologically advanced SMEs had to be dropped due to lack of applications. Nevertheless, as user interfaces for more advanced technologies become simpler (e.g. machine learning becomes more of a plug and play proposition), so may digital skills training evolve to include greater levels of technological content.

This notwithstanding, the evidence shows that all SMEs, regardless of the degree of their technological maturity, are able to contribute to the design of programmes in terms of the methods and delivery mechanisms. This is where user-centred digital skills policy making can really make an



impact. In the context of the pilot training programmes delivered over the past few months, SMEs require digital skills training to:

1. **Fit in with “business as usual”:** under normal circumstances, SMEs are fully focused on running operations that are quite lean in terms of human and other resources. This means that any training, digital or otherwise, must fit around the natural workflow of the company or sector. Training programmes that are modular in nature are much easier to fit around the operational needs of SMEs.
2. **Be directed:** any training must be clearly directed to a target audience: what skills levels are required? What are the professional profiles of attendees? Are there any occupations for which the training is particularly relevant?
3. **Be specific:** training must refer not just to the entry skills required for the course, but also the levels to which new skills are developed. The best way in which this can be communicated refers to concrete outputs of the course (e.g. being able to develop a fully functional and secure website or build a Digital Marketing strategy for the company) and to jobs or tasks that the employee will be able to perform.

### 5.3 Availability of Digital Training for SMEs

Online training providers (MOOCs)<sup>28</sup> are now partnering with companies (mostly technology) to offer courses to employees. The total number of MOOCs has risen by 50% in the course of the last year alone. Coursera, perhaps one of the most popular and well-known providers, boasts 30 million registered students. Once accessed directly by individuals, they are now being curated and offered directly to companies to incorporate into learning and development at a subscription that starts at \$400 per user (~356 EUR), for a minimum of 5 users.

But access to much digital knowledge is facilitated on having a reasonable grasp of the English language. While SMEs and unemployed people in Lithuania did not find this a barrier, this was considered to be a significant obstacle in the Region of Murcia, particularly among more traditional SMEs and older employees.

In addition to the work with stakeholders, the design of the pilot training courses involved the prior in-depth analysis of existing digital training programmes directed at SMEs. A total of 71 course were studied across a variety of technological areas, countries and delivery mechanism. As a summary of the in-depth analysis is worth noting that:

1. **Private:** the majority of the digital training courses were private; accordingly, many lacked data on pricing or on the impact of the training, as can perhaps be understood as this would be commercially sensitive information.
2. **In larger cities:** training programmes tended to be located in larger cities; programmes directed at participants from smaller towns or rural areas tended to favour online formats.
3. **Concentrated in Northern and Western Europe:** there was a much greater availability of digital skills training courses in Northern and Western Europe.

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<sup>28</sup> Massive Open Online Courses

4. **Short over long:** there was a marked preference for offering short courses and workshops over longer formats.
5. **Physical presence:** just over half the courses required a physical presence, with one in five offering the option to train either in person or online; in general terms, the more complex the course, the greater the possibility that it will have an in-person component.
6. **Wide range of costs:** the cost of the courses ranged from courses that were free to those that could command prices of just over 4.000 EUR; the more specialised the course, the greater the cost.
7. **Certification is a requirement for publicly funded training:** although only 40% of the courses studied offered some form of certification, all of those that were publicly funded were certified.

One of the key findings from the analysis is that digital skills courses are directed at participants with similar skills levels on entry, rather than those that belong to specific sectors or occupations. It was also interesting to note that different courses had different profiles of trainers, ranging from the more traditional tutors, to coaches whose role is to support learning objectives

A further point relates to the factors affecting completion rates of training courses. While there are extraneous factors affecting completion rates over which training providers have no control, such as participants who may be trying the course out of curiosity or those who lack the skills to learn, there are others that could be addressed. These include managing participants' expectations and ensuring that they do not miss key parts of the training which might make it difficult to follow subsequent programme modules.

## 5.4 Profiling Regions by their Skills Needs

During the earlier stages of the study, a cluster analysis had been performed with a view to finding a suitable categorisation of regions according to their digital skills needs. This analysis was based on a selection of weighted indicators, drawing on published statistical data but it did not yield any reliable or relevant insights. The reality is that within any given region there are SMEs who understand and embrace the opportunities afforded by the digital economy, whereas others are more focused on immediate business concerns.

Stakeholders interested in promoting digital skills probably need to develop initiatives directed at different levels of digital acumen.

## 5.5 Blueprints for New Skills, New Jobs?

As mentioned earlier, around 90% of jobs in Europe are expected to require some kind of digital competence in the near future. The term digital competence, however, is broad and all encompassing. It includes skills that facilitate the use of digital technologies of varying complexity.

The analysis of job vacancies indicates that employers may be more willing to train entry level staff in the digital skills needed to perform their jobs (hence the lower levels of published vacancies) although other hypotheses include a reluctance to use LinkedIn to recruit for more junior roles and/or the preference for other methods of recruitment (such as direct university channels). There

are currently close to 12.000 vacancies that require software engineering as part of the skills required, with over 1.200 of these vacancies unfilled over a period of 3 months or more. Digital Marketing, social media and data science (a term that encompasses data analytics) are also skills much in demand across Europe.

The blueprints developed in the chapters below, which are a close match for some of the most demanded skills, can be used to programme or structure digital skills training for SMEs. While it is clear that a 10-15-week course will not lead to expertise, the blueprints will provide a good grounding for not just SME employees, but also self-employed and unemployed people to continue to deepen their skills level as they require.

## 5.6 Focus on Skills Development, not Employment Status

The training programmes delivered in the context of this study required applicants to possess certain levels of digital skills. Employment status was not a factor taken into account for acceptance onto the course but was considered for the mandatory project work: while SME employees were asked to work on projects that related to their own companies, unemployed participants were given case studies or sample datasets on which they could apply the knowledge gained.





It is also worth noting that unemployed people may not be completely free to participate in full-time training programmes. Much as is the case with those who are employed, many unemployed people have other commitments that must be dealt with or, perhaps more realistically, worked around.

And there is a further benefit to providing training that does not take into account the employment status of participants. Mixed groups enable unemployed people to network and find opportunities to engage with potential employers.

## 5.7 Challenges Related to Delivery of the Pilot Programmes

The delivery of the four pilot programmes brought to light a number of challenges, some of which relate to providing training SME more generally, while others are specifically or more acutely evidenced in relation to one or more of the courses. In all cases, the learning points from the challenges have been incorporated into the blueprints below.

### CHALLENGE 1. MOTIVATION

INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			


**Description:** All trainers reported lower motivation compared to similar programmes that had a cost for participants (i.e. charged a training fee).

**Intervention:** The tactics employed to counter this included:

- The introduction of a learning coach to support individual participants.
- Continuously monitoring engagement through automated tools and prompting participation through calls and emails.

**Comment:** Further tactics to drive increased motivation may include involving employers, although this is probably only feasible in larger SMEs. Another possibility may be to introduce small fees for the training. But while it may be possible to ask that SME employees and the self-employed pay an initial sign-up fee that could be refundable, the tactics used to filter for motivated unemployed participants would have to be different.

## CHALLENGE 2. HIGH INITIAL DROP-OUT RATE





INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** High abandonment rate in the Data Analytics course before course start and after first in-person session.

**Intervention:** The content provided at the start of the course was considered by participants to be too theoretical. The trainers adjusted the content to provide a more balanced curriculum and succeeded in maintaining participation after the initial drop-outs.

**Comment:** Better pre-course intervention could have prevented the mismatch between expectations and learning outcomes to a certain degree. In any case, for more advanced digital skills, training providers should aim for quality of participants over quantity.<sup>29</sup>

## CHALLENGE 3. WIDE RANGE OF SKILLS LEVELS

INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** High level of heterogeneity in the skills and experiences of the participants.




**Intervention:** Trainers adjusted the content to participants' differing skills levels, pace and needs and provided assignments with different degrees of complexity.

**Comment:** One possibility is to offer a pre-course to develop the capacities to a minimum standard which would help to ensure more efficient delivery and progress. As noted, assignments remain the

<sup>29</sup> Understood as participants who are able to engage with and benefit from the course.

key method to achieving differentiation among participants, allowing more advanced participants to work on more complex problems.

#### CHALLENGE 4. ONLINE ENGAGEMENT



INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** Poor transition from in-person attendance to online content and tasks. In the more technical courses, when content became more complex and difficult, the online content was not sufficient to maintain participant engagement.<sup>30</sup>

**Intervention:** Trainers contacted participants to find out the causes of the drop-in engagement and scheduled a greater number of in-person classes than originally anticipated in the draft blueprints. Additional webinars were provided to help participants get back on track with course content.

**Comment:** Increasing the proportion of individualised support to generic online content gave rise to greater number of touchpoints for the trainers, which in turn led to increased activity completion rates.

#### CHALLENGE 5. INDIVIDUAL TASK COMPLETION

INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** Participants would attend courses and tutorials but would not complete assigned tasks and homework. In particular, as the Full Stack course progressed, some participants felt they had fallen too far behind to continue.


**Intervention:** A number of different tactics were employed to encourage completion of the non-classroom-based tasks:

- Firstly, trainers limited access to subsequent modules until all due tasks were completed.
- Participants were contacted by the learning coach to encourage completion.
- For the technical courses, trainers provided alternative summative assessment means (additional tasks/tests) for learners to demonstrate skills and extended deadlines to allow them to complete missing modules.

<sup>30</sup> In some cases, course engagement dropped by 50% on transition to the pure online content

**Comment:** The interventions, especially the individual follow-up with the learning coach had an impact but did not solve the challenge completely. Similarly, the summative assessments merely provided an alternative method to reinforce the knowledge gathered but did not result in higher task completion.

### CHALLENGE 6. WORKLOAD


INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** The weekly workload of 20 hours a week was unsustainable after the first week.

**Intervention:** The weekly workload was reduced to 10 hours a week.

**Comment:** Although the estimated workload was reduced to 10 hours per week, the more successful participants would still dedicate 15-20 hours a week to the individual and group assignments.

### CHALLENGE 7. NON-CONTINUOUS TIMETABLE



INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** A loss of participants after the August break with only 15 participants returning to the course.

**Intervention:** Trainers managed to recover 10 back but this was an extremely resource intensive process.

**Comment:** The timing of the courses seemed to work for some participants, who reported that their holidays enabled them to catch-up on the course content and their project. Others found it difficult to manage the change in routine associated with summer.

### CHALLENGE 8. USE OF PLATFORM

INTRO TO FULL STACK	DIGITAL SALES	DIGITAL MARKETING	INTRO TO DATA ANALYTICS
			

**Description:** Trainers were unfamiliar with the platform and struggled initially to make use of all features available, such as the function enabling automatic analysis of the progress of each student.

**Intervention:** With support, continued use of the platform meant that trainers were better able to identify aids to course management, including scheduling content and making the availability of modules dependent on task completion.

**Comment:** Training of the trainers would increase efficiency of the online course and increase their ability to focus on offering a more personal learning experience rather than spending time on administrative tasks related to the management of the course.

## 6 Considerations for Stakeholders

### 6.1 Clear Objectives for Digital Skills Training

The evidence gathered during the course of this pilot programme points to a potential disconnect between the temporal scope of public policies and the needs of SMEs on the ground. While public policy necessarily has to be forward looking to prepare society and business now for the challenges of the future, the vast majority of SMEs find it difficult to look beyond the immediate future.

In any event, when planning for digital skills training for SMEs, the following points should be taken into account:

- Digital skills training must be very clear in terms of the audience it is targeting; this is less about sector and more about job functionality and responsibility within the company.
- The training content must be specific, clearly identifying not only the skills that will be acquired, but also what new tasks or functions will be able to be performed as part of the training (e.g. identify new leads on the basis of data analytics).
- The training must be practical, providing a balance between the theoretical content, necessary for gaining knowledge of key concepts, and the content that enables the participant to link the skills to their own work environment.
- The schedule for delivering the training programme content has to be well designed and fit in with “business as usual”.

Stakeholders can offer a taste of a wide range of digital skills to raise interest and awareness in newer technologies. The format for the introduction to these is probably less structured training and more event based, perhaps combined with opportunities to hear about industry trends, as well as from experts.

In any case, for each initiative, it will be important to clearly define its ultimate aim, as well as primary and secondary learning objectives.<sup>31</sup> These secondary learning objectives can be particularly useful for introducing harder technological concepts and skills (such as cyber security) or tools (such as Slack) in a learning-by-doing environment.

### 6.2 Making Business Sense

There has to be economic rationale for an SME to train employees. On occasions it may make economic sense to hire external experts that already have the skills required, rather than spend time and effort on finding courses and investing the time in allowing the employees new found digital skills to reach operation-ready levels. On other occasions it may make business sense to do both.

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<sup>31</sup> Primary learning objectives are those that are the direct focus of the training and tend to relate to hard skills. Secondary learning objectives are those that are achieved normally through the choice of training methodologies and tend to refer to softer skills.



While there are digital leaders (see next point), the digital skills programmes that are most likely to be of interest to the majority of SMEs are not those that are most associated with emerging or new foundational technologies, such as blockchain, artificial intelligence or even IoT. Although SMEs may be interested to hear about these, they are unlikely to release their staff to attend training focused on these topics as they are too far removed from immediate business needs.

Rather, it is the digital skills that have an immediate and direct application that are much more likely to attract, not just SMEs but also the self-employed, freelancers and people who are currently without a job and are looking to refresh or expand their skills base. This has implications for policy makers and other digital skills stakeholders, as more traditional employer-employee relationships give way to on-demand models where expertise is brought in as and when needed.

It is also worth noting that less business-ready technologies or subjects that may be not esteemed to be critical by SMEs but are nevertheless important (e.g. cyber security) can be woven into courses and become secondary learning objectives.

### **6.3 Harnessing the Power of Digital Leaders**

Much as bloggers are now influencing what and how consumers buy and the brand value of products ranging from soap to cars, the credibility of digital leaders in the SME community can do much to drive digital skills acquisition. The Digital Skills and Jobs Coalition can be a driving force for this, identifying local digital leaders, providing a platform to amplify the initiatives they are involved in and the impact they achieve within their own companies. The focus moves away from training providers, which become channels and facilitators of digital transformation, and on to digitally leading SMEs.

Even within more traditional firms, the identification of digital champions within SMEs can be used to leverage involvement with digital skills initiatives. These are people with the vision and the credibility to help drive the company's strategy and ensure its success, working across departments. Galvanising their involvement in events can also help define initiatives that are well suited to the local ecosystem.

### **6.4 Defining Target Audiences**

Successful training focuses on the skills profile of the participants and the competencies developed, rather than their employment status. The most important criterion has been proven to be the starting level of digital skills of the participants.

There is an opportunity to include placements in SMEs for those participants in digital skills training that are unemployed. These placements would be focused on a specific task that would be performed for the company, for example, the development of a webpage, which would give the participant practical experience in the skill in question, but also provide a benefit to the hosting SME.

Digital skills stakeholders should be wary of introducing artificial segregation in digital training programmes. This approach denies those people who are not in work the opportunity to expand their business networks and SMEs the opportunity to find potential digital talent.

Finally, the definition of the target audience may also have an impact on the delivery of the course. Two of the training programmes were designed to not overlap with work hours. Interviews with participants revealed that that vast majority of employed participants did not disclose to their employer that they joined training program. Being able to attend courses outside working hours gave participants more independence and the ability to explore new skills.

## 6.5 Engagement. Developing Digital Skills for Different Profiles.

The danger of losing participants is highest during the first two weeks of a programme. Some of the ways in which engagement can be enhanced include:

- Dedicating time to the admission process so participants are as aware as possible of what they can expect from the training
- Early direct intervention with drop-outs
- Limiting passive learning
- Scheduling weekly touchpoints with either the trainer
- Actively monitoring the LMS to detect inactivity

Engagement can also be increased through learner-led activities. These might require trainers to adjust the content or the duration of certain modules on the basis of what participants agree as a group.<sup>32</sup> Nevertheless, it should also be remembered that some of the drop-outs can be attributed to extraneous causes and are unlikely to be impacted by any of the measures above.

## 6.6 Personal Goals and Gamification

The empirical work undertaken confirms once more that face-to-face classes followed by practical assignment are the best way to teach digital skills. Participants who invest additional time and experiment with own projects that are relevant to them, accessing additional online training and support as necessary report greater benefits than their peers who do not work on project-based assignment. Internships, mentorships, apprenticeships are also effective ways to teach employment-ready digital skills, as the majority of digital skills are practical in nature.

The focus on the practical should not come at the expense of enjoyment. Put another way, finding ways to gamify the training will increase engagement of participants, reduce the drop-out rate and improve the learner experience. Gamification techniques include score-boarding, providing virtual rewards or providing competitive tasks that pit teams of participants against others. The use of

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<sup>32</sup> This was particularly successful in the Introduction to Full Stack course.

nudge theory principles can also be used to maintain interest and stimulation progression through the programme.<sup>33</sup>

## 6.7 Reinforce Relevance

Digital skills can only be truly acquired if the principles are applied in a practical setting. Any programme must have a heavy focus on practical tools currently available in the market and enable participants to become familiar with the concepts and language commonly associated with the specific digital domain. Even participants with advanced formal education may lack practical knowledge of the digital tools that can make them more effective in the workplace. Particularly for those that are not currently employed, it is useful to understand:

- How the digital skills are applied in different jobs
- What employers expect
- What are the first steps to take to pursue a career in which the specific digital skills are required
- In which occupations or domain requiring those digital skills do job vacancies arise most often

The more novel the technology or the more technical the content, the more valuable participants find this type of market-focused content. This content is generally driven by the trainers, who are also able to follow up with one-to-one sessions with individual participants. It is in this type of value-add activity that the trainers' own practical experience in the field comes into play, enabling them to share examples, cases, stories from drawn from their own experience to illustrate best and worst practice.

## 6.8 Less is More

Evidence points to employees finding it difficult to dedicate more than 12 hours a week to the training. Even in the case of people who are unemployed, workloads should not exceed 20 hours a week. One option is to make the courses less intense, spreading the work required of participants over a slightly longer period of time, while ensuring the touchpoints are there to avoid drop-outs. The ideal length of course was found to be between 10 and 15 weeks.

Being able to plan for non-classroom-based work is essential. There are several ways in which planning can be supported including the:

- Provision of clear structure for the delivery that is repeated across modules
- Organisation of content into modules of similar length and requiring similar amounts of individual work
- Use of techniques that unlock content as the participant completes the tasks assigned (see also the recommendations on gamification above)

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<sup>33</sup> Small actions to influence behaviour that are inexpensive and easy to implement.

Employed participants also find that too many face-to-face sessions on consecutive days made it more difficult to reconcile the training with their day to day work. Face-to-face sessions are therefore most useful at the beginning of each module, with an even distribution across the course.

## **6.9 From 0 to 60**

It will never be possible to adapt the intensity of programmes to suit all participants. Regardless of their employment status, they are likely to progress at different speeds according to the content being delivered. Although managing this is a challenge from the perspective of the trainer, automated technological tools facilitate the process and can draw the trainers' attention to participants who are struggling at any point in time.

Of course, this will be much easier to manage in smaller, rather than larger groups. There are also implications for employment and training policies which tend to focus on managing large numbers of people and applying a one-size fits all approach to training the unemployed.

## **6.10 Developing Other Skills**

Digital skills do not just include hard technology focused skills, but also the softer skills that are necessary to apply those hard skills in the workplace. All programmes must therefore incorporate ways in which problem solving, analysis and teamwork, to name a few, can be also developed by participants in programmes. Some problem solving and analytical skills can be developed through individual tasks. For the activities that involve a team-based approach, initial face-to-face sessions are required to allow participants to understand each other's working styles, as well as strengths and weaknesses.

## **6.11 A Word on Inclusivity**

It is still necessary to make explicit reference to ensuring that the training programmes are gender neutral and that any bias is rooted out as early as possible. The evidence from the pilot training programmes is clear: women are equally as interested as men in participating in digital skills training. There are no significant differences in either completion rates or skills acquisition.

## **6.12 To Free or Not to Free?**

The final consideration relates to the thorny issue of whether digital training programmes should be provided free of charge. As unpopular as it may be, the evidence shows that providing training completely free of charge has a negative impact on participant commitment to completion and engagement. It is a human trait to associate cost with value.

While this may not be an option for those who are unemployed, one possibility could involve the allocation of tokens. In this scenario, unemployed people would be awarded a certain number of tokens that they would be free to "spend" on training programmes of their choice. This element of personal choice, combined with the assignation of a notional value embodied in a token, could increase engagement and lead to higher levels of digital skills acquisition.

## 7 Blueprints for Digital Skills Training

### 7.1 General Considerations for Blueprints

Before going into the detail of each of the blueprints for digital skills training that have been developed, tested and revised during the course of the empirical study, it is worth offering an overview of the main characteristics, namely:

- Their target audience
- Duration and training format
- An indication of the softer skills developed
- The appraisal and certification process
- A summary of the cost of delivery

#### 7.1.1 Target audience

The programmes proposed below can be accessed by participants who are either employed, self-employed or unemployed. Some of the content may be adapted to suit their employment status. The courses are relevant for SMEs in any sector.

**Table 12. Target audience for the blueprints**

COURSE	OCCUPATION
Full Stack	Beginners in programming
Digital Sales, Marketing and Cyber security	Sales and marketing professionals SME employees in general
Digital Marketing for SMEs	Sales and marketing professionals SME employees in general
Introduction to Data Analytics	Managers

#### 7.1.2 Duration and format

The blueprints are designed to fit the SME business environment but have also been proven to be effective for people who are unemployed. The courses are designed to be delivered over a 10-15 week period, combining face-to-face content with online and theoretical knowledge with practical, project-based work. In general terms, the blueprints follow the following distribution:

- 50 hours of face-to-face lectures, guest tutorials, online tutorials and presentations. Face-to-face activities are distributed throughout the courses.
- Up to 150 hours of online tutorials and individual activities. These activities are concentrated in the second half of the course, after students already have enough knowledge to work independently.

The methodology is based on a blended-learning approach:

- On-site face-to-face classes are reduced to those subjects that require frequent interactions with trainers and classmates.
- Webinar, personal and group tutoring are used extensively.
- Participants must collaborate to develop business relevant projects.
- Participants will have to interact online and face-to-face with each other to develop their own projects, as well as with the trainers, who will aid and assess them throughout the course.
- Resources will be made available online.

The following template can be used as a guide to plan the content according to the delivery components and formats:

**Table 13. Sample timetable template**

FORMAT	ACTIVITY	TIMING	WEEK											
			1	2	3	4	5	6	7	8	9	10		
Face-to-face	Evening classes	3 x week												
	Guest tutorial				x			x				x		
	Presentations		x			x			x				x	
Online	Online tutorials	On-demand												
Independent	Group project		x	x	x	x	x	x						
	Individual project									x	x	x	x	
On-demand, up to 15 hours a week														
Face-to-face, 3 hours a week														
Face-to-face, 10 hours a week														

### 7.1.3 Soft skills development

Companies, large and small, confirm that digital skills are useful competences to have only when they are accompanied by the soft skills necessary to operate within a business environment. The blueprints have therefore been designed to improve a range of soft skills that include:

- **Teamwork:** the blueprints include assignments designed to be worked on by a small group within the training. They also include defined projects that will require external inputs.
- **Communication:** linked to the above, the ability to communicate both in technical and non-technical terms is one of the key skills to be developed. Participants need to communicate internally in non-technical terms, but they also need to source and manage external technical providers.
- **Work Planning:** the content is accessible 24/7 on the Moodle platform; nevertheless, whether they are in full-time employment or not, participants will still need to complete their assignments on time to be able to fully keep up with the schedule.

- **Autonomy and problem solving:** the participants will be presented with tasks that are related to real business challenge, which they must address using the knowledge and tools provided during the course.

#### 7.1.4 Appraisal and certification

Appraisal processes for participants across the training programmes are similar and involve the following:

- Continuous assessment on a weekly basis;
- Periodic reviews on the use of the content available on Moodle to ensure ongoing engagement;
- Assessment of classroom and project work performed individually.

In terms of certification, the University was able to provide certification for the courses, whereas the Training Provider awarded a diploma but not a universally recognised qualification.

#### 7.1.5 Summary of blueprint costs

Table 14. Cost of blueprint training courses for 25 participants

COURSES	DURATION	TRAINER HOURS	PERSONNEL COSTS	TOTAL COST COURSE
Full Stack	10 weeks	300	9.000 EUR	19.500 EUR
Digital Sales	10 weeks	300	9.000 EUR	19.500 EUR
Digital Marketing	15 weeks	429	18.025 EUR	21.725 EUR
Data Analytics	12 weeks	259	10.150 EUR	14.350 EUR

Table 15. Cost of blueprint training courses for 15 participants

COURSES	DURATION	TOTAL HOURS	TRAINERS, MENTORS SPEAKERS	TOTAL COST COURSE
Full Stack	10 weeks	240	6.000 EUR	12.300 EUR
Digital Sales	10 weeks	240	6.000 EUR	12.300 EUR
Digital Marketing	15 weeks	359	11.215 EUR	13.515 EUR
Data Analytics	12 weeks	217	6.490 EUR	9.090 EUR

## 8 Blueprint 1: Introduction to Full Stack Development

### 8.1 What is Full Stack Development

This Full Stack course is designed for entry level participants who are interested in developing a broader understanding and knowledge of two commonly used website development concepts to deliver a visually attractive web solution that includes functional back end features.

The course is also designed as an entry for ICT career, as it helps participants to understand concepts and find a specialisation that suits them.

#### 8.1.1 Target Audience

This course is most suitable for beginners in programming, laying down technical knowledge and better understanding of IT based projects and ecosystem itself. This course is suitable both for SME employees and unemployed people, including recent graduates or students still in training.

SME MANAGERS	EMPLOYEES	SELF-EMPLOYED	UNEMPLOYED
			

#### 8.1.2 Required skills on entry

The following skills are required for entry onto the course:

- Basic computer literacy
- User-level of English

Previous programming language experience is a bonus.

#### 8.1.3 Commitment required

TOTAL PARTICIPANT WORKLOAD	FACE-TO-FACE CLASSES, LABS & WORKSHOPS	WEBINARS	PERSONAL ASSIGNMENT
220 HOURS	75	0	145

### 8.2 Syllabus

This course is designed to improve digital skills for a well-rounded website development. The course includes both back-end and front-end website development skills:

- Global digital skill and trend review
- Front-end web development and webpage administration



- Back-end based on PHP

### 8.2.1 Learning outcomes

- General view about the future of digital jobs, technology trends and skills required for progressive career development.
- Basic knowledge about front-end, its main features and role in web development process:
  - Understanding and applying principles of Visual Design.
  - Adding dynamic graphics to a web page using Canvas.
  - Creating a valid HTML document and using CSS to format the appearance of an HTML document.
  - Using the Document Object Model (DOM) to access the HTML elements on the page dynamically.
  - Using JavaScript objects effectively, including the window object and the navigator object.
  - Debugging JavaScript code and best practices.
- Knowledge about PHP back-end structure and role in developing back-end solutions:
  - Understand all standardized PHP programming concepts and structures.
  - Understand and build well designed databases.
  - Connect to MySQL database and perform Error Checking.
  - Use PHP to Interact with a MySQL database, web hosting & domains.
  - Use tools to create and effectively manage web pages and related databases.
  - Understand advanced PHP topics and apply the knowledge to complete task.

### 8.2.2 Core skills developed

- HTML
- CSS
- JavaScript
- MySQL
- PHP

### 8.2.3 Project based learning

Learning activities revolve around a short project, which is the backbone of the training programme. The project consists of designing and implementing a website, starting from its conception, which gives participants the opportunity to delve into the front-end and back-end elements.

### 8.2.4 Summary of content

The following table provides a broad overview of the course and the methodology applied to each of the elements.

CONTENT MODULE	METHODOLOGY AND FACE-TO-FACE ACTIVITIES
1. Introduction to the course <ul style="list-style-type: none"> <li>• Future digital skill and global trend review</li> <li>• Introduction to HTML and CSS</li> <li>• Web hosting and domains</li> <li>• Growth hacking</li> </ul>	38 hours - Face-to-face classroom 2 hours – Project presentation 60 hours - Personal work: reading materials, tutorials, videos, etc.
2. Back-end intro to PHP <ul style="list-style-type: none"> <li>• Introduction to PHP syntax</li> <li>• Arrays, loops, key values, databases</li> <li>• PHP to MySQL database</li> <li>• PHP security and the web</li> </ul>	25 hours - Face-to-face class on facilities 40 hours - Personal work: reading materials, tutorials, videos, etc.
3. Further topics in PHP <ul style="list-style-type: none"> <li>• Manipulating data</li> <li>• Registration (auth0)</li> </ul>	30 hours - Face-to-face classroom 25 hours - Personal work: reading materials, tutorials, videos, etc.

For the purpose of simplifying the content and avoiding unnecessary repetitions, following terms and abbreviations are used in the Implementation section:

ABBREVIATION	TERM
TR/H	Trainee hours
INS/H	Instructor hours
V	Venue
TP	Training platform
WS	Work station(s)

## 8.3 Implementation

The following tables provide the adjusted framework for the implementation digital skills training in this topic. The content can be adapted to that available to the particular provider, the structure will enable policy makers and other stakeholders to plan and resource digital training initiatives. The total number of trainer hours required is 300.

### 8.3.1 Week 1. Presentation of core content, team formation and kick off

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction into the course. Future digital skill and global job trend review	V: Classroom with projector and screen TP: documents, presentations and links	Online Face-to-face	8	8

Introduction to current and near-future impact of blockchain, artificial intelligence, data footprint management, growth hacking and creative work approach Short review of tools we are going to explore	WS for students			
Projects presentation and projects kick-off	V: Classroom with projector and screen TP: documents, presentation, and links	Online Face-to-face	2	2
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc.	TP: documents, presentations and links	Independent work	15	N/A
Content, preparation and marking, etc.			N/A	14
			25	24

### 8.3.2 Week 2. Introduction to front-end

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to front-end development, HTML and CSS	V: Classroom with projector and screen TP: documents, presentations, and links. WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	19
			25	34

### 8.3.3 Week 3. Developing and managing a website

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Web Hosting & Domains. WordPress websites (may be another CRM) Personal project presentation (research, goals, milestones)	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	15	N/A

Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	19
			25	34

### 8.3.4 Week 4. Introduction to Java

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to JavaScript variables, data types (arrays, objects, strings, numbers), function structure DOM (events, properties) Presentation of a functional pilot website	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links.	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	20
			25	35

### 8.3.5 Week 5. The back-end

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Intro to PHP Syntax (tags, echo, comments) Web Hosting & Domains Introduction to MySQL Databases	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	5	5
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	20	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			25	22

### 8.3.6 Week 6. SQL and CRUD

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
SQL Injection - How to prevent it Password encryption CRUD (Create, Read, Update, Delete) Introduction to HTTP Requests and more	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	5	5
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	20	0
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			25	22

### 8.3.7 Week 7. Sessions

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Sessions Storing information during session About Cookies in PHP (Setting & Reading Cookies)	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	9	9
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, and links	Independent work	N/A	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	15
			9	29

### 8.3.8 Week 8. Further back-end topics

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Using MySQL workbench to create database schemes Registration possibilities (auth0, Oauth2) Using Facebook and similar services for registering	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	8	8

Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	16
			8	29

### 8.3.9 Week 9. APIs and junctions

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
APIs and their uses Json tokens and jsonencode, modern usage of data (CORS) between servers Junctioning front-end and back-end with json	V: Classroom with projector and screen TP: documents, presentations, and links WS for students	Online Face-to-face	8	8
Mentoring and online support.	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	13
			8	26

### 8.3.10 Week 10. Digital Marketing, social networks

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Project development	TP: documents, presentations, and links	Personal work	25	N/A
Final assessment Personal work of teachers	Review works and reporting teams		N/A	25
Content, preparation and marking, etc.			N/A	20
			25	45

## 8.4 Assessment of progress

The guidelines for assessing progress are as follows:

	TOPICS	INDIVIDUAL WORK	ASSESSMENT
Week 1	Introduction of future skills and global trends	Group project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 2-4	Front-end web development, and webpage administration		

Week 5-7	Back-end introduction to PHP	Group project  Individual project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 8-9	Further topics in PHP	Individual project	Online face-to-face webinars Online tutoring (aid and assessment)
Week 10	Final project	Presentation	Intensive workshop for final achievements and assessments. It complements face-to-face work.

## 8.5 Teaching resources required

For this course, trainers preferably should be middle or senior level developers, who are selected based on the following criteria:

- Level of experience working on a variety of projects in their respected fields of expertise;
- Theoretical knowledge, their ability to clearly communicate it and any relevant experience teaching;
- Core trainers
  - Front-end developer
  - Server back-end developer
- External expertise
  - Guest speakers: Full Stack developer, web hosting engineer, Big Data analyst

## 8.6 Other resources

- Digital literacy examination and assessment platform such as Codility or coding games
- PHP storm license
- Adobe photoshop and illustrator
- Local host server (XAMPP)
- Premium online tool subscriptions e.g. STREAK, SimilarWeb, Calendly, etc.
- Lab with 25 work stations for students and projectors or large screens
- LMS platform

## 9 Blueprint 2: Digital Sales, Marketing and Cyber security

### 9.1 What is Digital Marketing?

This Digital Sales, Marketing and Cyber security course is designed to teach sales and marketing professionals how to develop and design functional project-based websites, apply latest research trends and use available online tools to increase overall workflow performance.

The course focuses on practical skills required in modern workplace:

- Improving work efficiency by using automated tools;
- Understanding Digital Marketing tools and impact monitoring;
- Efficient use of Digital Marketing and e-Commerce tools.

The course is developed as a package and it is not advised to remove any content modules.

#### 9.1.1 Target Audience

This course is suitable both for SME employees and currently unemployed, including recent graduates or students still in training, however at least some background in marketing is strongly suggested. It is designed to train current and future SME employees carrying out sales and marketing functions.

SMES MANAGERS	EMPLOYEES	SELF-EMPLOYED	UNEMPLOYED
			

#### 9.1.2 Required skills on entry

The following skills are desirable, rather than mandatory as they can mostly be acquired during the course:

- Understanding of key concepts in marketing and sales
- Basic computer literacy

#### 9.1.3 Commitment required

TOTAL PARTICIPANT WORKLOAD	FACE-TO-FACE CLASSES, LABS & WORKSHOPS	WEBINARS	PERSONAL ASSIGNMENT
200 HOURS	76	0	124



## 9.2 Syllabus

This course covers the key issues related to Digital Marketing, including:

- Introduction to Digital Marketing and sales implementation
- Front-end development and webpage administration
- Search Engine Optimization (SEO) and Digital Marketing tools
- Cyber security

### 9.2.1 Learning outcomes

- Understand the latest global trends in Digital Marketing and how these trends are shaping the world.
- Understand fundamental principles of front-end website design to improve own companies' digital presence or for further work with external Digital Marketing professionals.
- Understand how SEO works, how it is applied and what tools are used to measure effect.
- Understand cyber security risks and know tools for management of these risks.
- Work on practical assignments and personal projects related to the topics listed above.

### 9.2.2 Core skills developed

- Front-end website development
- SEO integration
- Understanding of digital sales and marketing
- Broader understanding of digital trends and practical application of new technologies and solutions
- Digital skills, digital tools for sales and marketing
- Understanding of cyber security
- Business management and project management
- Teamwork and presenting
- Client communication and professional marketing content
- Time planning and resource management

### 9.2.3 Project based learning:

Learning activities revolve around a group and individual projects. The projects will consist of developing their own e-shops, simulating the effect of marketing campaigns and analysing competitors. Throughout the rest of the course, participants will continue to develop their businesses.

### 9.2.4 Summary of content

The following table provides a broad overview of the course and the methodology applied to each of the elements.

CONTENT MODULE	METHODOLOGY AND FACE-TO-FACE ACTIVITIES
<p>1. Introduction to the course</p> <ul style="list-style-type: none"> <li>• Future digital skills and global job trend review</li> <li>• Introduction: current and near-future impact of blockchain, artificial intelligence, data footprint management, growth hacking and creative work approach</li> <li>• Short review of tools we are going to explore</li> </ul>	<p>8 hour - Face-to-face classroom 2 hour – project presentation 15 hours - Personal work: reading materials, tutorials, videos, etc.</p>
<p>2. Front-end development and website administration</p> <ul style="list-style-type: none"> <li>• The basic elements and principles of Visual Design</li> <li>• HTML Fundamentals, first webpage</li> <li>• Introduction and intermediate CSS</li> <li>• Gathering tools for development</li> <li>• Hosting and domains</li> <li>• Using CRM</li> <li>• JavaScript variables</li> </ul>	<p>30 hours - Face-to-face class on facilities 45 hours - Personal work: reading materials, tutorials, videos, etc.</p>
<p>3. SEO and Digital Marketing tools</p> <ul style="list-style-type: none"> <li>• Introduction to SEO</li> <li>• Identification and location of target audience</li> <li>• SEO tools</li> <li>• On-page, off-page SEO</li> <li>• Google and Bing tools and algorithms</li> <li>• Ethical hacking</li> <li>• Extensions, graphic design and productivity tools</li> </ul>	<p>10 hours - Face-to-face classroom 40 hours - Personal work: reading materials, tutorials, videos, etc.</p>
<p>4. Cybersecurity</p> <ul style="list-style-type: none"> <li>• Network and data security</li> <li>• Practical skills to ensure network security</li> <li>• Basics of information security management</li> </ul>	<p>25 hours - Face-to-face classroom 25 hours – Individual project development</p>

### 9.3 Implementation

The following tables provide the adjusted framework for the implementation digital skills training in this topic. The content can be adapted to that available to the particular provider, the structure will enable policy makers and other stakeholders to plan and resource digital training initiatives. The total number of trainer hours required is 300.

### 9.3.1 Week 1. Presentation of core content, groups formation and projects kick off

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Future digital skill and global job trend review Introduction to current and near-future impact of blockchain, artificial intelligence, data footprint management, growth hacking and creative work approach Short review of tools we are going to explore	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	8	8
Projects presentation and projects kick-off	V: Classroom with projector and screen TP: documents, presentations and links	Online Face-to-face	2	2
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc.	TP: documents, presentations and links	Independent work	15	N/A
Content, preparation and marking, etc.			N/A	14
			25	24

### 9.3.2 Week 2. Introduction to front-end

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to front-end development, HTML and CSS	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc.	TP: documents, presentations and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	14
			25	24

### 9.3.3 Week 3. Developing and managing a website

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Web Hosting & Domains Introduction to MySQL Databases	V: Classroom with projector and screen	Online Face-to-face	10	10

WordPress websites (maybe another CRM) Personal project presentation (research, goals, milestones)	TP: documents, presentations and links WS for students			
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	19
			25	34

### 9.3.4 Week 4. Online sales techniques

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to JavaScript variables, data types (arrays, objects, strings, numbers), function structure DOM (events, properties) Presentation of a functional pilot website	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	10	10
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	15	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	20
			25	35

### 9.3.5 Week 5. SEO and Digital Marketing tools

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction into SEO Find your targeted audience On-page optimization for Your websites	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	3	5
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	13	N/A

Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			16	22

### 9.3.6 Week 6. Tools and algorithms

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Keyword Research, link building Google and Bing Webmaster tools Google Analytics Guide to Google algorithms; Panda and Penguin	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	4	5
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	13	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			17	22

### 9.3.7 Week 7. Graphic design

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Ethical hacking Graphics tools Chrome extensions and AI chatbots	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	4	5
Trainees personal work: readings, review of materials, use of training platform, work on group project, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	13	N/A
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	12
			17	22

**9.3.8 Week 8. Cybersecurity**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Network and data security Practical skills for protecting for threats Cybersecurity tools	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	18	10
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	18
			18	33

**9.3.9 Week 9. Increasing hits and position**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Fundamentals of information network security management	V: Classroom with projector and screen TP: documents, presentations and links WS for students	Online Face-to-face	7	10
Mentoring and online support	TP	Independent work	N/A	5
Content, preparation and marking, etc.			N/A	14
			7	29

**9.3.10 Week 10. Digital Marketing, social networks**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Project development	TP: documents, presentations and links	Personal work	25	N/A
Final assessment Personal work of teachers	Review works and reporting teams		N/A	25
Content, preparation and marking, etc.			N/A	20
			25	45

## 9.4 Assessment of progress

The guidelines for assessing progress are as follows:

	TOPICS	INDIVIDUAL WORK	ASSESSMENT
Week 1	Introduction of future skills and global trends	Group project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 2-4	Front-end web development, and webpage administration		
Week 5-7	SEO and Digital Marketing tools	Group project  Individual project	Individuals access to the online resources Tests and exercises Online face-to-face webinars Online tutoring (aid and assessment) Attendance
Week 8-9	Cyber security	Individual project	Online face-to-face webinars Online tutoring (aid and assessment)
Week 10	Final project	Presentation	Intensive workshop for final achievements and assessments. It complements face-to-face work.

## 9.5 Teaching resources required

For this course, trainers preferably should be middle or senior level developers, who are selected based on the following criteria:

- Level of experience working on a variety of projects in their respected fields of expertise;
- Theoretical knowledge, their ability to clearly communicate it and any relevant experience teaching;
- Core trainers
  - Front-end developer
  - Digital Marketing specialist
- External expertise
  - Guest speakers working with cyber security, hosting, Big Data analysis

## 9.6 Other resources

- Digital literacy examination and assessment platform such as Codility or coding games
- PHP storm license
- Adobe photoshop and illustrator
- Local host server (XAMPP)
- Premium online tool subscriptions e.g. STREAK, SimilarWeb, Calendly, etc.
- Lab with 25 work stations for students and projectors or large screens
- LMS platform



# 10 Blueprint 3: Digital Marketing Strategies for SMEs

## 10.1 What are Digital Marketing Strategies?

Digital Marketing is the positioning of products or services using digital technologies on any digital medium. Effective Digital Marketing requires knowledge of search engine optimization (SEO), search engine marketing (SEM), data-driven marketing, and social media marketing, among other techniques and tools.

The aim is to provide participants with enough knowledge and skills regarding Digital Marketing concepts and the tools that support them to enable them to define and implement a Digital Marketing strategy for their businesses.

### 10.1.1 Target Audience

The course is aimed at a general audience but is particularly well-suited to people with a knowledge of marketing who lack the digital skills required to use the digital tools and techniques associated with marketing.

SMES MANAGERS	EMPLOYEES	SELF-EMPLOYED	UNEMPLOYED
			

### 10.1.2 Required skills on entry

The following skills are desirable, rather than mandatory as they can mostly be acquired during the course:

- Understanding of the company's customers and market positioning
- Some knowledge of how to perform a basic market analysis and draft marketing plan
- User level digital skills, such as the use of text editors
- Intermediate level of understanding of English, as most of the tools available are in English
- No programming skills are necessary

### 10.1.3 Commitment required

TOTAL PARTICIPANT WORKLOAD	FACE-TO-FACE CLASSES, LABS & WORKSHOPS	WEBINARS AND ONLINE	PERSONAL ASSIGNMENT
151 HOURS	25	13	113

## 10.2 Syllabus

This course covers the key issues related to Digital Marketing, including:

- Introduction to Digital Marketing
- Company Web Page and digital market
- Search Engine Marketing (SEM) and Search Engine Optimization (SEO) techniques and tools
- Managing social networks. Design essentials and Analytics Tools. Digital Advertising
- Personal Marketing and Direct Marketing. Digital Brand Development

### 10.2.1 Learning outcomes

- Understanding of the main issues involved in setting up and maintaining a company web page.
- Identification and application of the basic principles of marketing and of Digital Marketing.
- Understanding of the main Digital Marketing tools and what they enable, as well how to use them.
- Collaborative use of tools to work in teams, bringing together marketing experts, web designers and programmers.
- Use of digital tools to identify and on-board potential customers including e-Commerce, content, social networks, positioning techniques, etc.
- Positioning of web pages and customer engagement. Use of analysis tools, SEO skills and the quality of content.
- Definition and implementation of a Digital Marketing strategy for the businesses.

### 10.2.2 Core skills developed

- Understanding of the main issues involved in setting up and maintaining a company web page
- Use of e-marketing tools
- Application of e-marketing techniques in the company
- Ability to manage content and web resources to support e-marketing strategies

### 10.2.3 Project based learning

Learning activities revolve around a short project, which is the backbone of the training programme. The project will consist in designing and implementing a digital business, starting from its conception, which gives participants the opportunity to delve into general marketing concepts. Throughout the rest of the course, participants will continue to develop their businesses working in teams.

The project assignment provides an opportunity to bring all course content together and applying the skills acquired.

### 10.2.4 Summary of content

The following table provides a broad overview of the course and the methodology applied to each of the elements

CONTENT MODULE	METHODOLOGY AND FACE-TO-FACE ACTIVITIES
<p>1. Introduction to the course</p> <ul style="list-style-type: none"> <li>• Course learning objectives, overall organisation, resources, training platform and assessment techniques</li> <li>• Teachers, tutors and mentors, Trainees and trainees' expectations</li> </ul>	<p>1 hour - Face-to-face classroom presentation</p>
<p>2. Developing a company website</p> <ul style="list-style-type: none"> <li>• Web site set up: CMS (WordPress) set-up, page design and creation, blogs, posts, portfolios</li> <li>• Essential Tools: search optimization, web positioning, WP themes, web maintenance, specific plugins</li> <li>• Cybersecurity basics</li> </ul>	<p>4 hours - Face-to-face class on facilities  1.5 hours – Personal tutoring  1 hour – Webinar  6.5 hours - Personal work: reading materials, tutorials, videos, etc.  13 hours - Short project  4 hours - Short evaluation task and materials review</p>
<p>3. Selling online</p> <ul style="list-style-type: none"> <li>• Introduction to e-Commerce.</li> <li>• Tools for e-shops (PRESTASHOP)</li> <li>• Preparing the ground: managing Front End &amp; Back End</li> <li>• Cybersecurity basics</li> </ul>	<p>4 hours - Face-to-face class on facilities  1.5 hours – Personal tutoring  1 hour – Webinar  6.5 hours - Personal work: reading materials, tutorials, videos, etc.  13 hours - Short project  4 hours - Short evaluation task and materials review</p>
<p>4. Digital Marketing, SEM and SEO.</p> <ul style="list-style-type: none"> <li>• Introduction to Digital Marketing</li> <li>• Web sites and Digital Marketing</li> <li>• Key channels and tools</li> <li>• SEO techniques: Web positioning, key words, content optimization, SEO off-pages, measuring results</li> <li>• SEM techniques: Fundamentals, AdWords campaigns (Facebook, YouTube)</li> </ul>	<p>4 hours - Face-to-face class on facilities  1.5 hours – Personal tutoring  1 hour – Webinar  6.5 hours - Personal work: reading materials, tutorials, videos, etc.  13 hours - Short project  4 hours - Short evaluation task and materials review</p>
<p>5. Digital Marketing, social networks</p> <ul style="list-style-type: none"> <li>• Introduction to social networks</li> <li>• YouTube channel, Twitter profile, Facebook</li> </ul>	<p>4 hours - Face-to-face class on facilities  1.5 hours – Personal tutoring  1 hour – Webinar</p>

<ul style="list-style-type: none"> <li>page, Instagram account</li> <li>• Hootsuite: publication plans</li> <li>• Designing a Digital Marketing strategy using social networks</li> <li>• Direct marketing: e-mailing techniques and tools</li> </ul>	6.5 hours - Personal work: reading materials, tutorials, videos, etc. 13 hours - Short project 4 hours - Short evaluation task and materials review.
6. Digital brand <ul style="list-style-type: none"> <li>• Digital brand and personal brand</li> <li>• Developing a personal brand</li> <li>• LinkedIn</li> <li>• Final Project</li> </ul>	4 hours - Face-to-face class on facilities 1.5 hours – Personal tutoring 2 hour – Webinar 8 hours – Project preparation 6.5 hours - Personal work: reading materials, tutorials, videos, etc. 4 hours – Project presentation 4 hours – Face-to-face project presentation

### 10.3 Implementation

The following tables provide the adjusted framework for the implementation digital skills training in this topic. The content can be adapted to that available to the particular provider, the structure will enable policy makers and other stakeholders to plan and resource digital training initiatives. The total number of trainer hours required is 394.

#### 10.3.1 Week 1. Presentation of core content, groups formation and projects kick off

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to course Objectives, organisation, resources, training platform, assessment, teachers, tutors and mentors	TP: documents, presentations and links Domains, hosting, licenses	Classroom face-to-face	1	1
Domains, content management systems and templates	TP: documents, presentations and links	Classroom and Lab. face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	20
			11	25

**10.3.2 Week 2. Website design elements**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on design elements	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task.	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	13,5
			10	27

**10.3.3 Week 3. Website customisation**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online group tutoring (groups of 5 students). Font-end editing	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents and links	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	20
			10	25

**10.3.4 Week 4. Online sales techniques**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to eCommerce, tools for online sales, managing front-end and back-end	TP: documents, presentations and links	Classroom and Lab. face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: documents, presentations and links	Independent work	2	N/A

Content, preparation and marking, etc.			N/A	20
			10	24

### 10.3.5 Week 5. Positioning and promotion

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on positioning of items	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links.	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials.	Independent and team work	5	N/A
Evaluation and materials review	TP: task.	Independent work	1	10
Content, preparation and marking, etc.			N/A	3,5
			10	27

### 10.3.6 Week 6. Social networks and Digital Marketing

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online group tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents and links.	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	20
			10	25

### 10.3.7 Week 7. Digital Marketing, SEM and SEO.

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Digital Marketing techniques, SEO (web positioning, key words) and SEM (AdWords campaigns), developing a Digital Marketing strategy	TP: documents, presentations and links.	Classroom and Lab. face-to-face	4	4

Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links.	Independent work	4	N/A
Evaluation task and materials review	TP: task.	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	20
			10	24

### 10.3.8 Week 8. SEM campaigns

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on running and measuring an AdWord campaign	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	10
Content, preparation and marking, etc.			N/A	3,5
			10	27

### 10.3.9 Week 9. Increasing hits and position

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online group tutoring (groups of 5 students)	TP	Online Face-to-face	1	12,5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Content, preparation and marking, etc.			N/A	20
			11,5	25

**10.3.10 Week 10. Digital Marketing, social networks**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Creating a social presence (YouTube channel, Twitter profile, Facebook page, Instagram account). Hootsuite: publication plans. Designing a Digital Marketing strategy using social networks	TP: documents, presentations and links	Classroom and Lab. Face-to-face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: task	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	20
			10	24

**10.3.11 Week 11. Selling and gaining customers through social**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on social selling	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	3,5
			10	27

**10.3.12 Week 12. Multinetwork campaigns**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online group tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A



Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	20
			10	25

### 10.3.13 Week 13. Digital branding

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Creating and developing your personal brand and company branding	TP: documents, presentations and links	Classroom and Lab. Face-to-face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: documents, presentations and links	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	20
			10	24

### 10.3.14 Week 14. Personal content

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on LinkedIn performance	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	10
Content, preparation and marking, etc.			N/A	3,5
			10	27

**10.3.15 Week 15. Final Presentations and assessments**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online group tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents and links	Independent work	1	N/A
Preparation of presentation	TP: documents and links	Independent work	4	N/A
Final Project Presentation		Face-to-face session at facilities	4	4
Content, preparation and marking, etc.			N/A	16,5
			10	38

**10.4 Assessment of progress**

The guidelines for assessing progress are as follows:

	TOPICS	INDIVIDUAL WORK	ASSESSMENT
Weeks 1-3	Professional Website	Group project + Individual tasks	Individuals access to the online resources Tests and exercises Online face-to-face webinars and Online tutoring (aid and assessment)
Weeks 4-6	Selling online		
Weeks 7-9	Digital Marketing, SEM and SEO		
Weeks 10-12	Digital Marketing, Social Media		
Weeks 13-14	Personal and company branding		
Week 15	Presentations and final assessment	Individual project	Intensive workshop for final achievements and assessments. It complements face-to-face work.

## 10.5 Teaching resources required

- Core Trainers
  - 1 trainer. Expertise in the subject
  - 1 tutor per team (he/she can be the trainer or other person). Expertise in the subject
- External expertise
  - 1 mentor per team

## 10.6 Other resources

- Classroom for face-to-face classes, provided with projector and screen, tables for small group works. Assuming 2 half-day sessions.
- Computer lab with at least 20 computers. Assuming 6 half-day sessions.
- Working material (canvases, markers, pens, highlighters, post-it, etc.) for workshops
- Training platform maintenance and updating (across all programmes)
  - 1 technician, 2 hours a week, for 10 weeks: 20 hours. Estimated 30 EUR/hour
  - Set-up costs are not included. It will be set up in the project and will be ready for next courses.
- Adaptation of content, customization of projects, configuration and maintenance of tools and platforms according to students and trainer needs
  - 1 technician (programmer), 60 hours. Estimated 30 EUR/hour
- Domain and hosting: 100 EUR per unit, one a group
- WordPress theme, annual license 100 EUR per unit, one a group
- Use of platforms including WordPress, PrestaShop, CANVA, YAMM, Google Analytics, Google Drive, Gmail, Mailchimp, mailRelay, etc.
- Communication tools: Moodle platform forums, Big Blue Button integration

# 11 Blueprint 4: Introduction to Data Analytics

## 11.1 What is Data Analytics?

Data Analytics (DA) is the process of examining data sets in order to enable organisations to make more-informed business decisions. It includes a set of methodologies, tools and applications to gather, debug and transform information from a variety of internal and external sources (ERP and CRM, web, statistics, public repositories, etc.) and formats (structured and unstructured), both for its direct exploitation (reporting, analysis - OLAP, alerts, etc.) and for its analysis and conversion into knowledge to support decision making.

The aim is to provide participants with enough knowledge and skills about Data Analytics concepts and the tools that support them to enable them to understand business opportunities and make decisions, as well as report on them.

### 11.1.1 Target Audience

The course is aimed at professionals who have a basic knowledge of business management and statistical concepts, as well as some skills to treat and analyse data. It is particularly well-suited to employees who handle large volumes of data and need it to inform, make decisions and act accordingly.

SMES MANAGERS	EMPLOYEES	SELF-EMPLOYED	UNEMPLOYED
			

### 11.1.2 Required skills on entry

The following skills are recommended for participants to have on entry

- Knowledge or experience of business management concepts
- Basic knowledge of statistical concepts
- Capacity to treat and analyse data, e.g. manipulation with Excel

No programming skills are necessary. Participants must have basic computer literacy.

### 11.1.3 Commitment required

TOTAL PARTICIPANT WORKLOAD	FACE-TO-FACE CLASSES, LABS & WORKSHOPS	WEBINARS AND ONLINE	PERSONAL ASSIGNMENT
121 HOURS	21	10	90

## 11.2 Syllabus

This course covers some of the key issues surrounding the use of Data Analytics. The syllabus includes:

- Introduction to Data Analytics, tools and techniques, introduction to Power BI.
- Data gathering, cleaning and modelling. ETL processes: extract, transform and load.
- Data visualization. OLAP cubes. Reporting.
- Dashboard, KPIs and decision-making.

Microsoft Power BI will be the tool suite used for examples and exercises. Some examples will be presented using other tools, so students can see differences and similarities.

### 11.2.1 Learning outcomes

- Ability describe the role of business intelligence in the management of companies
- Use of BI tools and platforms in order to:
  - Collect data from different sources and discriminate between different data sources
  - Interpret and give meaning to data
  - Identify patterns and trends in large and diverse datasets
  - Visualise data in a meaningful way and use them for reporting
  - Identify market trends and use them to make decisions
- Ability to go beyond obvious assumptions regarding data and gain more meaningful and accurate insights
- Ability to put into practice all the acquired skills to design a data analytics solution for a business problem

### 11.2.2 Core skills developed

- Identification and understanding of the use of different Data Analytics techniques.
- Know and be able to select and use the tools offered by common IT frameworks for Data Analytics.
- Basic skills for designing a business intelligence solution for a business problem.
- Be able to communicate business decisions based on Data Analytics.

### 11.2.3 Project based learning

Learning activities revolve around short projects for each module culminating in a final project, which is the backbone of the training programme. The project will consist of the definition of new business strategies using real or provided high-volume datasets. Throughout the rest of the course, participants will continue to develop their models and visualisations working in teams.

The project assignment provides an opportunity to bring all course content together and applying the skills acquired.

### 11.2.4 Summary of content

The following table provides a broad overview of the course and the methodology applied to each of the elements:

CONTENT MODULE	METHODOLOGY AND FACE-TO-FACE ACTIVITIES
1. Introduction to the course <ul style="list-style-type: none"> <li>• Course learning objectives, overall organisation, resources, training platform and assessment techniques</li> <li>• Teachers, tutors and mentors, Trainees and trainees' expectations</li> </ul>	1 hour - Face-to-face classroom presentation
2. Introduction to data analytics, key tools and techniques <ul style="list-style-type: none"> <li>• Introduction to Data Analytics</li> <li>• BI in a nutshell</li> <li>• Use cases</li> <li>• Installation of the software</li> <li>• Introduction to tool capabilities and characteristics</li> </ul>	4 hours - Face-to-face class on facilities 2 hours – Personal tutoring 2 hour – Webinar 6,5 hours - Personal work: reading materials, tutorials, videos, etc. 11,5 hours - Short project 4 hours - Short evaluation task and materials review
3. Data gathering, cleaning and modelling <ul style="list-style-type: none"> <li>• Data collection</li> <li>• Data modelling</li> <li>• Cleaning data</li> </ul>	4 hours - Face-to-face class on facilities 2 hours – Personal tutoring 2 hour – Webinar 6,5 hours - Personal work: reading materials, tutorials, videos, etc. 11,5 hours - Short project 4 hours - Short evaluation task and materials review
4. Visualising data <ul style="list-style-type: none"> <li>• OLAP (Online Analytical Processes) cubes</li> <li>• Visualisation techniques and tools</li> <li>• Report design and strategy</li> </ul>	4 hours - Face-to-face class on facilities 2 hours – Personal tutoring 2 hour – Webinar 6,5 hours - Personal work: reading materials, tutorials, videos, etc. 11,5 hours - Short project 4 hours - Short evaluation task and materials review
5. Dashboards, KPIs and decision making <ul style="list-style-type: none"> <li>• Creating dashboards</li> <li>• Selecting relevant and measurable KPIs</li> <li>• Decision-making processes and tools</li> </ul>	4 hours - Face-to-face class on facilities 1,5 hours – Personal tutoring 2 hour – Webinar 6,5 hours - Personal work: reading materials, tutorials, videos, etc. 6 hours – Project preparation

	3 hours - Short evaluation task and materials review. 4 hours – Project presentation 4 hours – Face-to-face project presentation
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### 11.3 Implementation

The following tables provide the adjusted framework for the implementation digital skills training in this topic. The content can be adapted to that available to the particular provider, the structure will enable policy makers and other stakeholders to plan and resource digital training initiatives. The total number of trainer hours required is 238.

#### 11.3.1 Week 1. Introduction to Data Analytics

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to course Objectives, organisation, resources, training platform, assessment, teachers, tutors and mentors	TP: documents, presentations and links Domains, hosting, licenses	Classroom face-to face	1	1
Introduction to data analytics, familiarization with tools	TP: documents, presentations and links	Classroom and Lab. face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: task	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	11
			11	16

#### 11.3.2 Week 2. Introduction to business intelligence

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on PowerBI basics	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A

Evaluation and materials review	TP: task	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	24,5

### 11.3.3 Week 3. Early analysis

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc. Semi-collaborative	TP: documents, presentations and links	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	10
			10	15

### 11.3.4 Week 4. Data collection

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to data collection, gathering and cleaning methods	TP: documents, presentations and links	Classroom and Lab. face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: task	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	11
			10	15

### 11.3.5 Week 5. Data cleaning

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on cleaning and normalizing	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5



Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	24,5

### 11.3.6 Week 6. Presenting clean and comparable datasets

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	16

### 11.3.7 Week 7. OLAP Cubes

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Introduction to OLAF cubes and data visualisation methods	TP: documents, presentations and links	Classroom and Lab. Face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: documents, presentations and links	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	11
			10	15

### 11.3.8 Week 8. Data visualisation

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on visualisation techniques	TP	Online	1	1

		Face-to-face		
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	24,5

### 11.3.9 Week 9. Report preparation

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Project development	TP	Independent and team work	8	N/A
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	16

### 11.3.10 Week 10. Dashboards and metrics

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Development of dashboards, selecting KPIs and metrics, tools to support data-based decision-making	TP: documents, presentations and links	Classroom and Lab. Face-to face	4	4
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	4	N/A
Evaluation task and materials review	TP: documents, presentations and links	Independent work	2	N/A
Content, preparation and marking, etc.			N/A	11
			10	15

**11.3.11 Week 11. Dashboards**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Webinar on complex dashboards	TP	Online Face-to-face	1	1
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	2,5	N/A
Short project development	TP: forum, videos, materials	Independent and team work	5	N/A
Evaluation and materials review	TP: task	Independent work	1	N/A
Content, preparation and marking, etc.			N/A	11
			10	24,5

**11.3.12 Week 12. Supporting decisions – final presentation**

ACTIVITIES	RESOURCES	NATURE	TR/H	INS/H
Online tutoring (groups of 5 students)	TP	Online Face-to-face	1	5
Online tutoring (individual)	TP	Online Face-to-face	0,5	12,5
Trainees personal work: readings, review of materials, use of training platform, etc.	TP: documents, presentations and links	Independent work	1	N/A
Preparation of presentation	TP: documents, presentations and links	Independent work	4	N/A
Final Project presentation		Face-to-face session at facilities	4	4
Content, preparation and marking, etc.			N/A	11
			10	32,5

**11.4 Assessment of progress**

The guidelines for assessing progress are as follows:

	TOPICS	INDIVIDUAL WORK	ASSESSMENT
Weeks 1-3	Introduction to data analytics	Group project + Individual tasks	Individuals access to the online resources Tests and exercises Online face-to-face webinars and Online tutoring (aid and assessment) Attendance
Weeks 4-6	Data collection and cleaning		
Weeks 7-9	Data visualisation, OLAP cubes		
Weeks 10-11	Dashboards and metrics		
Week 15	Presentations and final assessment	Individual project	Intensive workshop for final achievements and assessments. It complements face-to-face work.

## 11.5 Teaching resources required

- Core Trainers:
  - 1 trainer. Expertise in the subject.
  - 1 tutor per team (he/she can be the trainer or other person). Expertise in the subject.
- External expertise:
  - 1 mentor per team.

## 11.6 Other resources

- Classroom for face-to-face classes, provided with projector and screen, tables for small group works. Assuming 2 half-day sessions.
- Computer lab with at least 20 computers. Assuming 4 half-day sessions.
- Working material (canvases, markers, pens, highlighters, post-it, etc.) for workshops.
- Training platform maintenance and updating (across all programmes):
  - 1 technician, 2 hours a week, for 10 weeks: 20 hours. Estimated 30 EUR/hour.
  - Set-up costs are not included. It will be set up in the project and will be ready for next courses.
- Adaptation of content, customization of projects, configuration and maintenance of tools and platforms according to students and trainer needs.
  - 1 technician (programmer), 60 hours. Estimated 30 EUR/hour.
- Microsoft PowerBI desktop, Tableau.
- Communication tools: Moodle platform forums, Big Blue Button integration.

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# Annexes

## Annex 1: Scalability Assessment

QNS	A	SCALING-UP IS EASIER	B	SCALING-UP IS HARDER
A. Is the digital skills training programme credible?				
1		Needs-based design		Little or no solid evidence that the programme is relevant
2		There is evidence that the training programme works in diverse contexts		There is no evidence that the training programme works in diverse contexts
3		Current solutions for this issue are considered inadequate		Current solutions are considered adequate
4		Superior effectiveness to current solutions is clearly established		Little or no objective evidence of superiority to current solutions
B. How observable are the results?				
5		Evaluation mechanisms form part of the programme		Unable to be tested without complete adoption at a large-scale
6		Modifications to be made easily		Modifications are costly or cumbersome
7		The impact is very visible to casual observation, tangible		The impact is not very visible, not easily communicated
8		Clearly associated with the aims and objectives		Not clearly associated with the aims and objectives
9		Evidence of results and documentation exists		Little or no evidence of results exists
C. How relevant is the content?				
10		Recruitment for the courses will be easy		Recruitment for the courses will be hard
11		Addresses an objectively significant, persistent problem		Addresses a problem which affects few people or has limited impact
12		Addresses an issue which is currently high on the agenda		Addresses an issue which is low or invisible on the agenda
13		Addresses a need which is sharply felt by potential beneficiaries		Addresses a need which is not sharply felt by potential beneficiaries
D. How easy is the digital skills training programme to transfer and adopt?				
14		Implementable within existing systems, infrastructure		Requires new or additional systems, infrastructure or human resources
15		Contains a few components easily added onto existing programmes		Is a complete or comprehensive package of multiple components

16		Small departure from current practices and culture of adopting organisations	Large departure from current practices and culture of adopting organisations
17		Few decision makers are involved in agreeing to adoption of the training programme	Many decision makers are involved in agreeing to adoption
18		Demonstrated effectiveness in diverse organizational settings	Demonstrated effectiveness in only one/ pilot organizational setting
19		Low complexity, simple with few components and easily added on the existing systems	High complexity with many components, integrated package
20		Includes little supervision and monitoring	Includes substantial supervision and monitoring for implementation
21		Superior cost-effectiveness to existing or other solutions clearly established	Little evidence of superiority in terms of cost-effectiveness
22		Requires a large commitment of funds at scale	Requires a small absolute commitment of funds at scale
23		The training programme itself has its own internal funding (e.g., co-funding of training fees)	No internal funding, the training programme is dependent on external funding source
TOT			

Source: Adapted from the Scalability Assessment Tool developed by Management Systems International.

## Annex 2: Key words and filters for identifying most sought-after skills

Table 16. Key words and filters applied

SKILL	CATEGORY		LEVEL	LOCATION
Cloud Computing	Administrator	Manager	Entry	Austria
Cyber Security	Analyst	Marketer	Middle	Belgium
Data Science	Architect	Officer	Upper	Bulgaria
Digital Marketing	Assistant	Other	Top	Cyprus
Internet of Things	Associate	Partner	Other	Croatia
Machine Learning	Chief	Post-Doctoral		Czech Republic
SEO	Consultant	Recruiter		Denmark
Social Media	Content Creator	Representative		Estonia
Software Engineering	Coordinator	Researcher		Finland
UI/UX	CS/Care	Scientist		France
	Employee	Senior		Germany
	Designer	Senior Manager		Greece
	Director	Specialist		Hungary
	Editor	Strategist		Ireland
	Engineer	Student		Italy
	Executive	Supervisor		Latvia
	Expert	Technician		Lithuania
	Graduate	Tester		Luxembourg
	Head	Trainee		Malta
	Internship	Trainer		Netherlands
	Junior	Vice President		Poland
	Leader	Webmaster		Portugal
	Lecturer			Romania
	Legal			Slovakia
				Slovenia
				Spain
				Sweden
				United Kingdom



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