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Digital Skills Gap in Malta

REPORT FOR THE NATIONAL SKILLS COUNCIL

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Acronyms

AI	Artificial Intelligence
CEDEFOP	European Centre for the Development of Vocational Training
CPD	Continuing Professional Development
DevOps	Software Development & Software Operations
DigComp	Digital Competences
EU	European Union
ICT	Information & Communication Technologies
iGaming	Online Gambling
IT	Information Technology
LN	Legal Notice
MCAST	Malta College of Arts, Science and Technology
MOOC	Massively Open Online Course
MQF	Malta Qualifications Framework
NCFHE	National Commission for Further and Higher Education
NSC	National Skills Council
NSO	National Statistics Office
SLP	Short Learning Programme
US	United States

1 Introduction

This report is the output of a subcommittee tasked by the National Skills Council to advise on the digital skills gap in Malta.

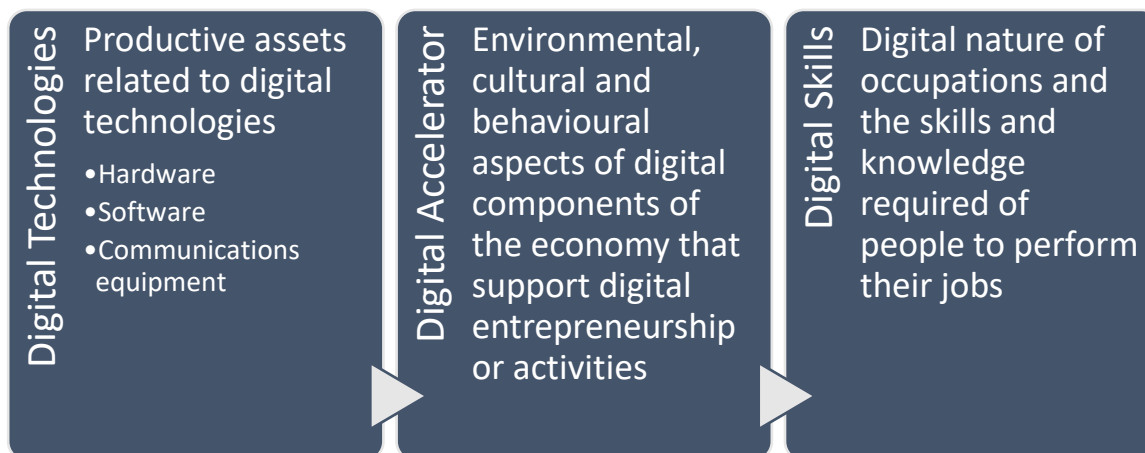
The Terms of Reference included to:

- Review a set of pertinent documentation (see below);
- Where necessary, consult with relevant players in the field, including stakeholders in the EU;
- Identify a workable approach to address identified digital skills mismatches and related issues;
- Draw up a list of priority actions taking into consideration multiple stakeholders including private training providers;
- Develop a report for the NSC with an analysis of the digital skills gap in Malta and a set of recommendations.

2 What are Digital Skills?

2.1 Digital Skills as a Component of the Digital Economy

Accenture (2016) argues that the digital economy has three levers of value:



2.2 Digital Skills

Digital Skills can be broadly divided into two categories:

1. **Generic digital skills**, the acquisition of which will help all citizens thrive in a digital society. Examples include skills such as data literacy, communication, digital content creation, safety and problem solving.
2. **Specialised digital skills**, mainly linked to programming, the acquisition of which are necessary for employment in IT-related professions. Examples include skills such as programming, database administration and network administration.

2.2.1 Digital Competences for Citizens in Europe

The EU's digital competence framework for citizens outlines five competence areas, each with a list of competences, namely (Carretero Gomez, Vuorikari, & Punie, 2017):

Competence area 1: Information and data literacy

- 1.1 Browsing, searching, filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content

Competence area 2: Communication and collaboration

- 2.1 Interacting through digital technologies
- 2.2 Sharing throughout digital technologies
- 2.3 Engaging in citizenship through digital technologies
- 2.4 Collaborating through digital technologies
- 2.5 Netiquette
- 2.6 Managing digital identity

Competence area 3: Digital content creation

- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licences
- 3.4 Programming

Competence area 4: Safety

- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment

Competence area 5: Problem solving

- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- 5.4 Identifying digital competence gaps

Each of the competences is then further described in terms of levels, according to the following schematic:



The EU has additionally released a linked Digital Competence framework for Educators.

2.3 The Digital Skills Gap

The **Digital Skills Gap** is the difference between the digital skills currently held by the population, and the digital skills which are required by society now and in the future.

Specific lists of generic and digital skills are provided in 5.

This report is concerned with:

1. Assessing the extent of the digital skills gap in the Maltese islands; and
2. Providing recommendations to government as to how to close the gap, a process known as upskilling.

2.4 Importance of digital upskilling

Digital skills and competences are merely the latest foundational paradigm to guide teaching and learning. Thus, just as productivity growth in the Industrial Age was associated with memorization, specialization and compartmentalization, in the 21st century, where technological development is driven by digital technologies, it is the acquisition of digital skills which are associated with **increased productivity** across a range of activities and industries (Kivunja, 2014).

For individuals, digital skills provide the ability to participate in a digital network society – being able to interact with everything from online shopping to social media to smart mobility allow individuals the opportunity to consume, network and move more efficiently than previously possible (Dijk, 2005). When applied to the workplace, this also means that in most cases, workers with high digital competences extract more **value added** from their labour than workers who lack these competences. Thus, acquisition of digital competence also becomes a tool for upward social mobility.

The corollary to this is that advances in technology, in particular, recent advances in artificial intelligence as well as robotics, are allowing for an unprecedented replacement of human labour by technology. Some studies estimate that up to 47% of occupations in the US are at high rate of automation in the mid-term (Frey & Osborne, 2017). Thus, increased acquisition of digital competence can also be seen as insurance against downwards social mobility caused by technology-induced redundancies.

For companies, the promise of technology continues to be its potential to supplement, substitute and amplify practically **all tasks** currently performed by humans. This means, that firms must achieve significant digital productivity improvements to stay competitive (Makridakis, 2017) – a process which is driven by twin investments in technology and in manpower that can leverage that technology effectively. On the other hand, human needs and desires tend to evolve upwards based on the affordances allowed them by technology (Gagnier, 2000) – meaning that firms can use those same investments technology and manpower investments to feed Research, Development and Innovation pathways to create entirely new products and industries.

Digital competences are also key to several areas of governmental operation:

- Digital citizenship assumes that people will have adequate skills to be able to participate in government and society online (Mossberger, Tolbert, & McNeal, 2007);
- Digital competitiveness assumes that investment in digital competences will raise productivity in the economy as a whole;

- Digital inclusion assumes that all members of society have equitable access to technology as well as to acquire digital skills.

3 Context: Socio-Economic Trends

3.1 Malta enjoys full employment and high labour demand

The Maltese economy is currently enjoying a period of unprecedented growth, with record low unemployment. In fact the registered unemployment rate in April 2017 stood at 1.4% of the labour supply (National Statistics Office Malta, 2018).

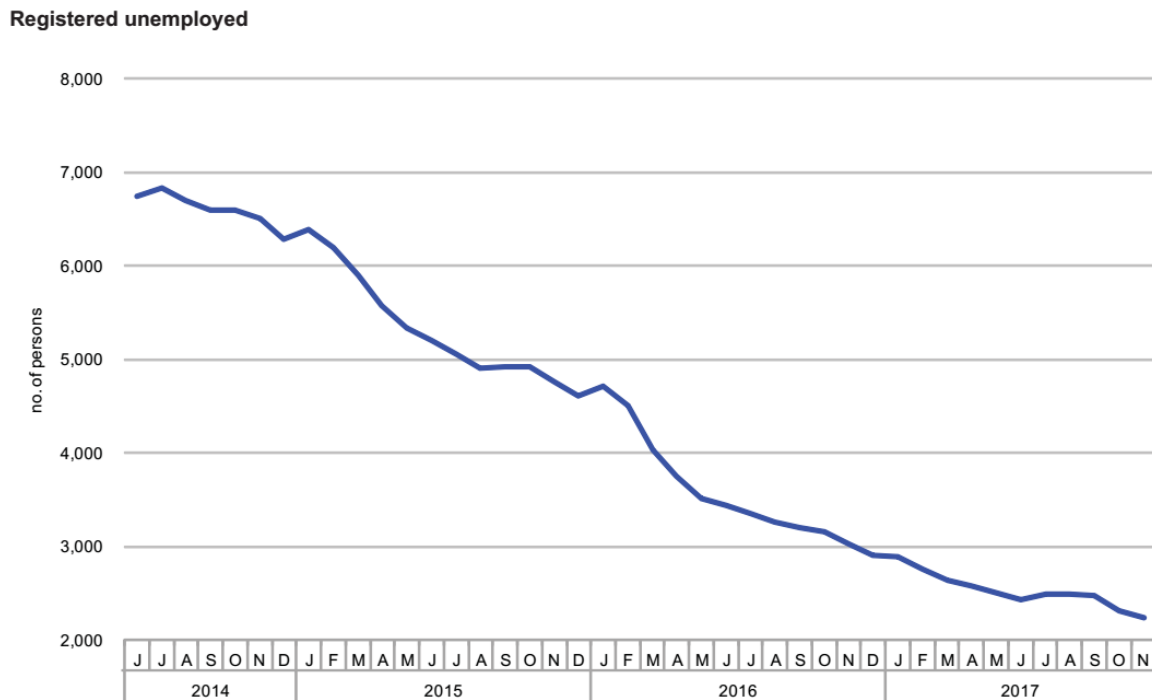


Figure 1: Persons Registering as unemployed in Malta (2014-2017) Source: NSO (2017)

The labour supply in April 2017 increased by 4.4 per cent year on year, reaching 190,554. This was mainly attributed to a year on year increase in the full-time gainfully occupied population (9,188) and further complimented by a drop in registered unemployment (1,174). Labour requirements are so high, that government is setting up a specialised unit within JobsPlus to attract foreign labour from third countries (Martin, 2017).

3.2 Industry as a whole is suffering a significant skills gap

Practically all local companies need to enhance the general ICT competences of their staff to increase productivity and maintain competitiveness. Additionally, Malta has set itself up as a specialised hub for activities linked to internet gaming and fintech, both areas which require large supplies of graduates with high levels of ICT skills. Surveys show that there are over 600 ICT vacancies in Malta across all industries, and that employers are having significant problems filling these kinds of positions, to the point that they are limiting overall growth of the economy (Mahoney et al., 2016).

Disciplines with significant vacancy levels include (Davitt, Hesnan, & Ryan, 2017):

1. Programming/Development Methodologies
2. Mobile Technology/Development Platform
3. Web Development/Technologies
4. Software Development Tools & Methodologies
5. Cloud Computing
6. Platform Administration
7. DevOps
8. Networking Technologies
9. Big Data
10. Enterprise Applications
11. E-Business/Digital Marketing
12. Call Centre/Contact Centre Support
13. Digital Skills Media
14. Games Development
15. Project Management

3.3 Malta has uneven participation in employment and higher education

Malta's tertiary educational attainment (age 30-34) was only 27.8% in 2015 – compared with an EU average of 38.7%. Additionally, foreign-born persons were much more likely to have attained tertiary education (35.1 %) compared to native-born persons 27.1 %. (Directorate-General for Education, Youth, Sport and Culture (European Commission), 2017). Overall this leads to a shortage of IT professionals across the board, while skilled IT jobs are likely to disproportionately fall to foreign-persons, (whether raised in Malta or migrating for jobs). Within digital-heavy industries such as iGaming, Maltese nationals mostly occupy entry roles, with C-suite roles generally occupied by foreigners.

For low and mid-skill jobs, Malta's full employment situation hides regional and gender disparities. Thus, there are large differences in unemployment statistics across Maltese regions, with a particular spike in the inner harbour regions (National Statistics Office, 2016), while labour force participation for women in 2016 was only 55.5% compared to 80% for men (Eurostat, 2016).

3.4 Malta's Digital Jobs ecosystem is heavily tilted towards iGaming

iGaming in Malta consists of around 11000 employees, with around 40% of them being Maltese nationals – making it by far the largest employer in the ICT sector. While iGaming is a critical source of tax revenue and of employment in the Maltese economy, it exists to service clients outside Malta, thus generating little social value. On the other hand, local ICT companies are increasingly having to bring on lower skilled staff and train them up, only to have those employees absorbed by the iGaming sector. This in turn limits the development of non-iGaming digital sectors such as digital games (Mahoney et al., 2016).

4 Recommendations

The following recommendations represent a menu of options for decision-makers in upskilling. The recommendations come from various sources including:

- Review of the recommendations made in existing national skills reports in particular the Malta ICT Skills Audit and the Digital Education Report by the Malta Digital Skills Gap Board;

- A review of typical actions undertaken in international skills reports;
- Recommendations from the Digital Skills Sub-Committee;

4.1 Implement National Strategy for Digital Upskilling

ANALYSIS:

It is not clear that the objective of a digital upskilling strategy should simply be to “increase the digital skills of the Maltese population / workforce”. In the current socio-economic context, the most direct method to address such an objective would be to simply import the necessary workforce from other countries producing such skills. This would risk creating a high-skilled expat community who simply reside in Malta, without forming any real connection to the country, or contributing to the social and economic development of the country, except through the payment of taxes. Such a scenario is also high-risk, as such a community could be quickly lured away by any country offering better residence / employment incentives.

Digital skills have significant potential to enhance social mobility, as well as to seed new native industries.

SPECIFIC RECOMMENDATIONS:

A national strategy for digital upskilling should be adopted, with the following aims at its core:

- Enhance the basic digital competences of all citizens, to enable full participation in a democratic e-society;
- Leverage digital upskilling as a tool for social mobility across the Maltese population, with a focus on disadvantaged groups;
- Encourage the growth of home-based companies and industries, and encourage digital entrepreneurship

4.2 Implement changes to primary, secondary and tertiary education to address skill needs in the mid- to long-term

As a services-based economy, it is essential to Malta’s long-term economic health to have a strong native digital skills base, to ensure that it can participate fully in emerging sectors, and in modernised traditional sectors. To this end, policymakers should enact measures to:

4.2.1 Improve acquisition of digital skills in compulsory education

ANALYSIS:

The Maltese National Minimum Curriculum does teach both ICT and Educational Technology at primary level, while ICT and Computer Science are taught in middle and secondary schools. However, these approaches tend to be limited to teaching “computational thinking” and “computing”. Additionally, digital competences are considered to be an ‘add-on’ subject, rather than a core subject – thus, at primary school they are not examined, while at middle and secondary schools they consist of optional subjects. Furthermore, qualification as a teacher does not require significant levels of digital competence.

SPECIFIC RECOMMENDATIONS:

All learners in primary, middle and secondary schools should be required to acquire a minimum level of digital competence, broadly in line with those suggested by the EU Digital Framework for Citizens. Achieving this will require:

- Revise curricula in compulsory education to teach digital skills within existing subjects, as part of transversal skill acquisition (vide DigLit);
- Additionally, increase the percentage of the school-year spent specifically teaching digital skills as subjects in and of themselves;
- Introduce a comprehensive assessment (formative and summative examinations) of digital skills within all levels of compulsory education;
- Introduce catch-up classes for digital skills, with the explicit aim of avoiding digital divides;
- Establish a minimum digital competence level for teachers – this should be integrated into qualification exams to enter the profession, and should be integrated into mandatory CPD over a 3-5 year to period;

4.2.2 Increase pipeline of students obtaining high-order digital competences

Analysis:

University and MCAST both claim that they have an insufficient intake of students to meet the supply of places in courses they have available which teach high-order competences. Thus, upskilling the population in the mid to long term at the high end must involve creating incentives for students to shift more strongly towards these subjects.

Specific Recommendations:

Increasing the pipeline of students going into digital subjects must involve a multi-prong approach:

- Identifying and nurturing students who are likely to thrive in digital subjects. This would involve:
 - Using aptitude tests (linked to the formative assessment tests described above) to identify which students have suitable skills to continue with digital subjects;
 - Setting up a system of targeted guidance interviews with students who show the right aptitude;
 - Creating ‘nurseries’ for identified students, whereby they can come to summer schools, evening-trips, competitions or similar at university and/or MCAST to familiarise themselves with the institutions
- Creating an appropriate guidance infrastructure to support these activities by creating supporting material for guidance teachers including:
 - Appropriate skills inventories;
 - Aptitude assessments;
 - Guidance information on the range of educational pathways, together with employability options and wages at the end of each pathway;
- Creating concrete incentives to nudge students into digital education subjects. Such incentives might include:
 - Establishing digital subjects as “prescribed courses” in terms of the Students Maintenance Grants Regulations (LN 308 of 2016). Further increase the grants for

- students following prescribed courses¹, possibly in conjunction with a lowering of supplementary grants for students following non-priority courses;
 - Establishing cooperation between digital education institutions and enterprises such that all students who pass the examinations will be guaranteed a job offer in their field;
- Increasing the attractiveness of digital education subjects as a whole. This could be achieved through a mixture of:
 - a multi-year public multi-channel advertising campaigning aiming at increasing attractiveness of digital careers;
 - outreach campaigns organized by tertiary institutions at lower levels through activities such as hackathons, computer clubs etc;
 - providing funding for student associations and for upgrading facilities, so as to provide an enhanced social life and status for students following digital subjects
- Focusing on under-represented regions (in particular Gozo and the south of Malta) and groups (in particular women) by (Tupan-Wenno, Camilleri, Fröhlich, & King, 2016):
 - creating targeted versions of the initiatives above for the underrepresented groups;
 - identifying role models following digital pathways which come from the same under-represented groups, and using guidance interviews and media campaigns to get them in contact with students at risk;
 - providing in-person individual coaching, small-groups tutorials and other methods of extended interaction for students with promise from under-represented groups.

4.2.3 Encourage independent educational institutions to take greater cognisance of digital skills

Analysis:

Public institutions in Malta account for nearly the entirety of the tertiary education sector, due to their free provision of education. These institutions are funded on the basis of annual grant-allocations from government, calculated from needs-estimates provided by these same institutions. While institutions do share the aim to develop skills, such as digital skills, that are essential to the economy, in an environment where their student cohort and funding have been increasing annually for years, there is no particular urgency to do so. While government has some say in the management of institutions through its representatives on government boards, the principle of academic autonomy dictates that at tertiary level, government should not interfere in the running of academic institutions.

Specific Recommendations:

The challenge in this area is to nudge institutions to give teaching digital skills higher priority, without encroaching upon their academic autonomy. Such nudges might come from:

- tweaking quality assurance and accreditation criteria for further and higher education institutions in Malta, to:
 - take into account accessibility of education to adult learners, through the provision of flexible learning pathways comprising different modalities;
 - give higher importance to teaching transversal competences, in particular digital competences;

¹ In our view an appropriate incentive level here would be to at least match the SMG with the minimum wage, so as to ensure that students are not tempted to go straight to employment rather than upskill.

- take into account responsiveness² to the needs of the labour market and overall contribution to social priorities.
- creating a special 'digital disciplines' fund with the explicit aim of incentivising institutions to attract students to high importance digital disciplines. Such a fund would:
 - provide funding to institutions based on the number of students they attract, and who then complete the course;
 - be targeted at all tertiary education providers, whether private or public,
 - be calculated at a rate that would allow for institutions to make a profit per student
 - include financing from industry
- set up and/or strengthen Departments for Learning Innovation within the major educational institutions, with the combined aims of:
 - supporting academic staff in modernising curricula;
 - providing support for e-learning initiatives;
 - providing pedagogical support.

4.3 Introduce Programmes to increase the digital skills of the current population and work-force in the short-term

As discussed above, Malta is currently suffering from an acute digital skills shortage, which, if not addressed in the short-term, will continue to put breaks on the economy's competitiveness, and hinder Malta's opportunities at further developing as an international digital hub. In the short-term, the most immediate way to address this skills shortage is through importing labour, a measure which is outside the scope of this report to discuss.

Additionally, a significant percentage of the population can be upskilled on a 1 to 5 year period, through the implementation of the following recommendations:

4.3.1 Facilitate re-entry to tertiary education for purposes of digital upskilling

Analysis:

In an environment of full employment and of labour shortage, it is unrealistic to imagine that sufficient numbers of workers will be able or willing to take sabbaticals from work to pursue full-time higher education opportunities. Yet the large majority of courses teaching high-order digital skills offered by public institutions are offered as full-time or part-time (day) courses.

Specific Recommendations:

Providing such flexible forms of education would involve the provision of far more part-time (evening and weekend) courses, as well as a significant expansion in distance learning opportunities. Methods of encouraging this would include:

- commissioning a study to determine demand for various subjects offered in such flexible modalities;
- providing funding for extra staff required to cover the extra teaching hours;
- requiring a needs analysis to be commissioned before launching any new programmes, including an assessment of the most appropriate modality for offering the course based on demand;

² Responsiveness to the labour market is measured in terms of factors such as availability of structured consultation fora with the labour market, labour market input into curriculum design, number of joint projects etc.

- providing specific project-based funding to convert high-priority courses to e-learning.

4.3.2 Vastly Increase Supply of Apprenticeships at MQF levels 5-7

Analysis:

Apprenticeships are an effective way to ensure that persons can upskill, without needing to exit the labour market. The term apprenticeships can be taken to mean (Camilleri et al., 2017):

- Curricular apprenticeships – which usually take place during a study programme, and where responsibility for the students is shared between them;
- Professional apprenticeships – which usually take place after a study programme has finished, and bear no relation to previous academic studies of the apprentices. The responsibility for these apprenticeships is solely of the companies that offer them.

Apprenticeships in Malta currently suffer from low participation from students and from employers, mainly due to the fact that companies have trouble in recouping investment made in training apprentices, especially in the case of small and medium enterprises, which complain that trained apprentices usually move on to better paid positions in larger companies (CEDEFOP, 2015).

Specific Recommendations:

To ensure a healthy ecosystem for apprenticeships in digital skills, we recommend:

- further increasing the emphasis on apprenticeships for digital skills within MCAST at MQF levels 5-7, ranging from 6 month short apprenticeships, to full 3-year dual education programmes³;
- setting up an government-industry initiative, whereby companies who require digital skills make pledges to supply appropriate training placements – such an initiative would:
 - bring together the largest number of companies possible from the outset;
 - strongly encourage companies to make equitable pledges, in proportion to their size and capacities;
- lowering the cost of apprenticeships to companies through:
 - tax-breaks to social contributions and income tax for apprentices;
 - tax-breaks or grants to companies offering apprenticeship positions;
- mandating that companies who wish to import non-EU labour must also provide apprenticeships aimed at the local market.

4.3.3 Improve Access to Short Courses for upgrading specific skills

Analysis: Two-thirds of available ICT vacancies in Malta require entry-level / competence skills (Davitt et al., 2017). Short-courses are ideally for upskilling to such entry-level competences. Entry-level competences are also relatively standardised globally, meaning that in most cases curricula for them already exist, making their provision a straightforward affair.

³ MCAST has re launched the apprenticeship scheme around 4 years ago. There was a good uptake from companies but in the Software Development industry, but industry realised that the students at level 4 (in the Software Development stream) would not be proficient enough to give any value to the company but on the contrary, the company was supposed to support the student. We have excluded MQF level 4 from the recommendation since experience shows that the Software Development industry is not ready to take such apprenticeships. On the other hand, internships at level 6 did become very popular due to two facts, one is that the student has a solid background due to the number of years studying and secondly, these students can be kept part-time for a year until they graduate and hopefully be retained within the company.

Specific Recommendations:

Maltese educational institutions already offer a significant number of such short courses. Increasing access to these courses involves increasing the variety, flexibility and modalities of such courses.

Thus, to complement existing approaches, we recommend:

1. creating a Maltese MOOC & SLP portal – such a portal would bring together a selection of key upskilling courses (with assessment possibilities) from Maltese educational institutions as well as online providers globally. Such courses would be:
 - 1.1. selected by a specific committee within the NSC;
 - 1.2. registered on the MQF directly by the NCFHE;
2. work with industry to pool resources to create and fund short-courses that will match their emerging skill needs. Such short-courses might be provided by existing educational organizations, but include a guarantee of job offers from participating companies (who would therefore get priority access to graduates)
3. attract specialist boot-camp style course providers to Malta to share expertise with local industry providers on how to organize such initiatives.

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