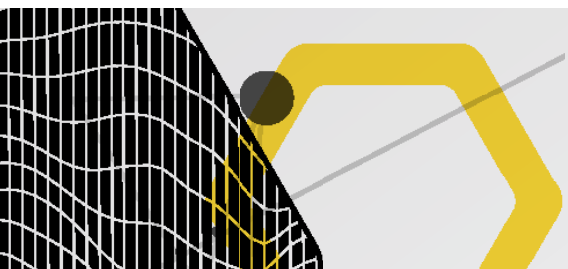
Digital, Media and Information Literacy in Jamaica

Research Report



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Introduction

Digital, Media and Information Literacy Framework

Recent research on the digital skills of the upcoming entrants to the workforce (currently in secondary school) suggests that they do not have the requisite skills to become "citizens who are highly internet-literate, are confident creators and consumers of content, and have the technical and social skills needed to participate in the Fourth Industrial Revolution". Furthermore, according to the Broadcasting Commission of Jamaica (BCJ), many of the current educational systems, legislation, policies and regulations in Jamaica are already obsolete and will not support Jamaica's transition to a digital society

A unified Digital, Media and Information Literacy (DMIL) Framework can inform and guide the design of policy guidelines and tools to better measure, benchmark and support the to meet the new literacy needs of Jamaica across a wide range of public/private sector entities and educational/training domains.

The unified framework will include the competency model, assessment mechanisms and tools, Implementation pathways, and policy recommendations. This document provides an Executive briefing on two of the primary components of the DMIL Framework – the Competency Model and the Assessment Strategy & Tools

01

DMIL Competency Model

The Model of Digital, Media and Information Literacy Competences (hereafter the DMIL Model) is the core component of the National Digital, Media and Information Literacy Framework being developed through the Broadcasting Commission of Jamaica in partnership with UNESCO. Other components in the Framework include Assessment mechanisms and tools, Implementation Pathways, and Policy Recommendations. The aim of the DMIL Model is to meet the new literacy needs of Jamaica and Jamaicans wrought by the ongoing media and technology evolutions (Clayton and Green 2018; Golding 2018; Ojanperä, Graham, and Zook 2019). In this way, the Model along with other Framework components map part of the solution space to particular time-bound, context-sensitive challenges. Given the continuous nature of these changes, the DMIL Model itself will need to be continually updated. This initial version of the Model is intended to not only be responsive to local needs, but to allow global comparability so that Jamaica may better align its education and training efforts to protect and enhance the welfare of the Jamaican people in a globalized knowledge society (Coward and Fellows 2018).

Figure 1

Overview of the DMIL Model Structure

As Figure 1 shows, the DMIL Model has seven Competence Areas which is succinctly outlined by a corresponding Competence Description.

4

Safety

To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies.

6

Career-Related Competences

To operate specialised digital technologies and to understand, analyse and evaluate specialised data, information, media and digital content for a particular field.

5

Problem Solving

To identify needs and problems and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up to date with the digital and media evolutions.

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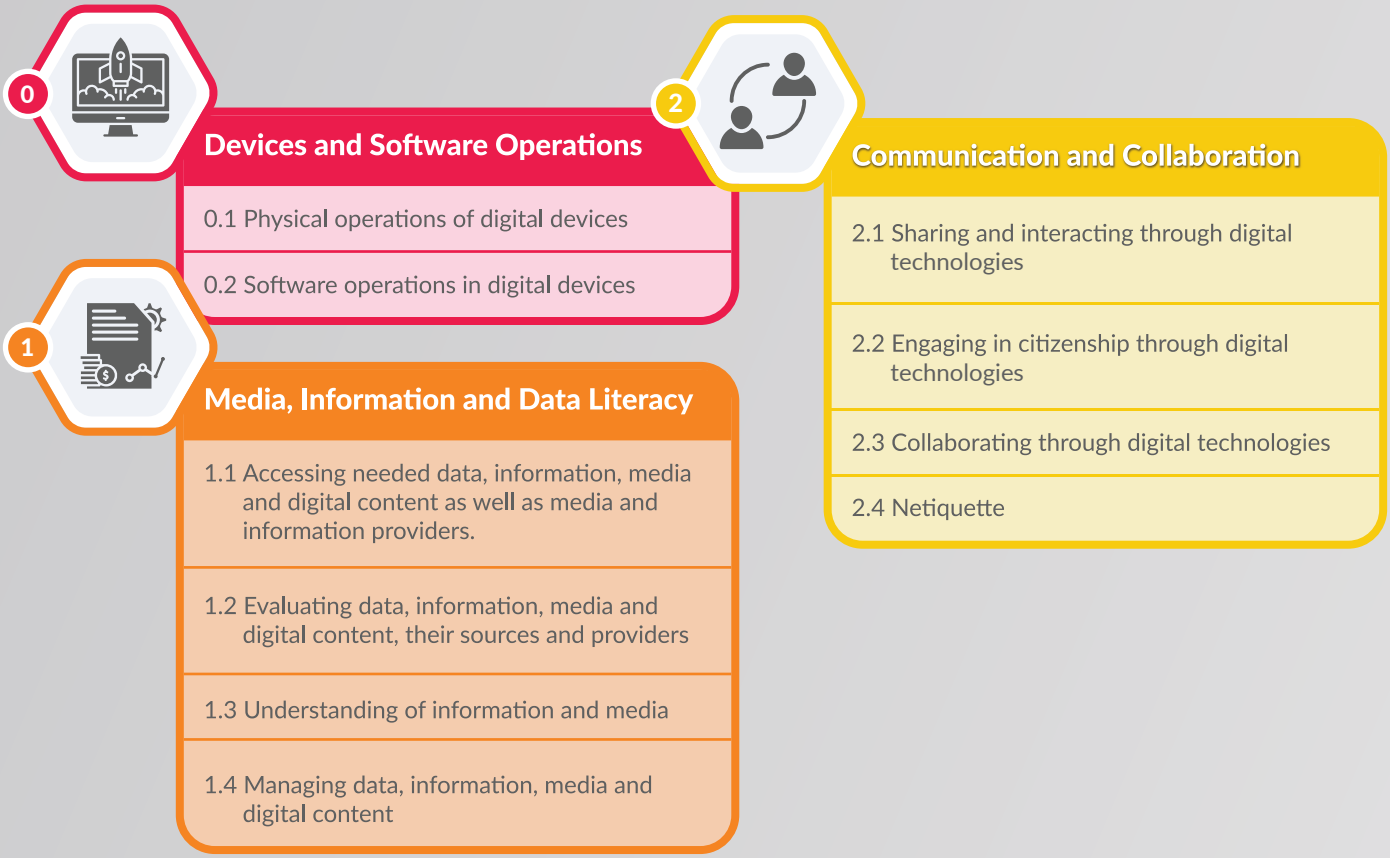
Figure 2

Model of DMIL Competences

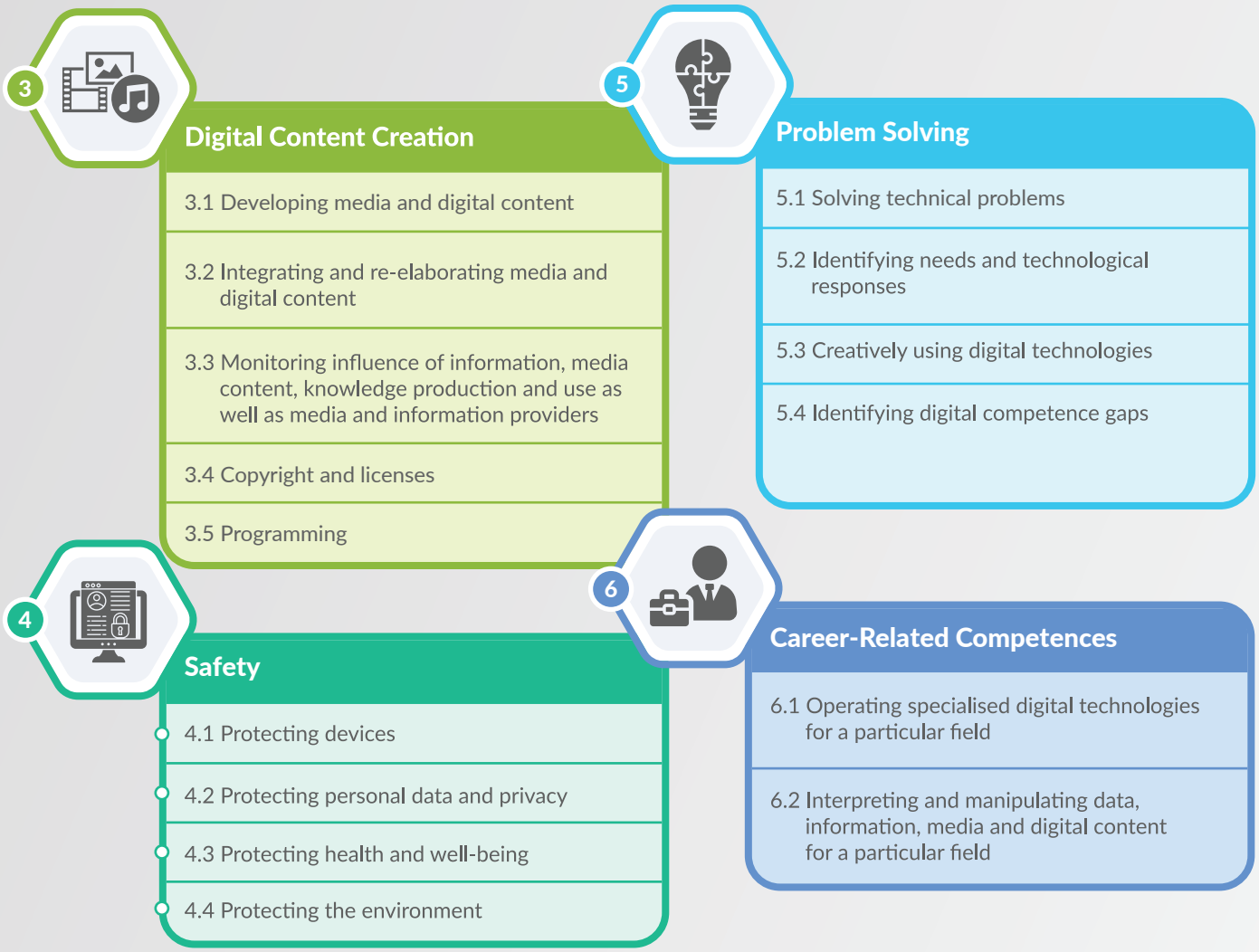
Each Competence Area contains several Competences, ranging from as few as two to as many as five. There are twenty-six Competences each of which is further decomposed into several proficiency levels. These proficiency levels take the form of learning and performance objectives aligned with Bloom's taxonomy, designed to be helpful to teachers, trainers and parents developing learning, training, and assessment materials.



Indicators of Success

More specifically, the DMIL Model is expected to serve as a guide for ministries, departments and agencies across the government, as well as NGOs, international development partners, academia and other elements of civil society, and very importantly, the private sector (both employers and employees). When this Model is successful, one would expect to see:

- government agencies such as JSIF, internationally-funded initiatives such as CSJP, and civil society actors such as the ICD Foundation use the DMIL Model for the design and assessment of learning
- HR departments in Jamaican firms of all sizes from conglomerates to micro, small and medium sized enterprises use the DMIL Model in assessment of new hires as well as training of staff



- education institutions, from basic schools, to prep and primary schools, secondary schools, tertiary and vocational institutions, use the DMIL Model for the development of learning and training materials
- career-specific training institutions for industries as varied as the creative and cultural industries, logistics, transport and trade, agriculture, tourism, manufacturing, retail and wholesale, security, banking and finance, public service, all refer to the DMIL Model in the assessment and training of their staff
- employers and employees, parents, teachers and students, ascribe aspects of their success to learning and training materials guided by the DMIL Model
- members of the private sector, civil society, and academia all call for a review and update so that a new version will be ready in five years.

1.1 - The Development of the DMIL Competency Model

Introduction

One of the goals of the DMIL National Framework initiative is to produce a competency framework that can guide a wide range of public and private sector entities in their own initiatives across the education and training, industry, science and technology sectors to foster the development of Jamaica as a knowledge society and innovation-driven economy (Burbidge, Briggs, and Reiss 2020; European Commission 2020). Therefore, the framework needs to adopt a broad, multidisciplinary approach that makes it easy to use for a wide range of stakeholders (Clayton and Green 2018; Law et al. 2018). One of the techniques employed to fulfil this objective was to identify highly regarded and widely adopted global frameworks for digital, media and information literacy, and to see how they might be combined as a map of extant solutions. UNESCO has already endorsed two such frameworks, and they (the Digital Literacy Global Framework (DLGF) and the Global Media and Information Literacy Assessment Framework (GMIL)) have been used for this purpose (Grizzle et al. 2013; Law et al. 2018).

DigComp

In this regard, the competence framework aimed at, shares the motivation to the European Digital Competence Framework for Citizens, also known as DigComp (Carretero, Vuorikari, and Punie 2017). DigComp was developed by the European Commission's science and knowledge service in response to the 2006 declaration by the European Parliament that digital competence for all European citizens is necessary for personal fulfillment, active citizenship, social cohesion and employability in a knowledge society. In 2018, UNESCO set out to develop a methodology to serve as a foundation for addressing Sustainable Development Goal thematic Indicator 4.4.2 "Percentage of youth/adults who have achieved at least a minimum level of proficiency in digital literacy skills." As a result of their extensive research of regional, national and sub-national frameworks across more than forty countries, with special attention to the needs of developing countries, they decided that an extended form of DigComp would be most appropriate as a global framework (Law et al. 2018).

Table 1 shows the additions to the original DigComp in bold. The Extended DigComp - henceforth referred to as the Digital Literacy Skills Global Framework or DLGF - has seven Competence Areas, two of which are additions ("Devices and Software Operations", and "Career-related Competences"), and twenty-six Competence Titles, five of which are additions. DLGF also inherits from DigComp eight Proficiency Areas per (original) Competence Title for a total one hundred sixty-eight Proficiency Levels. Space limitations do not allow the Proficiency Levels to be included in Table 1. The Proficiency Levels are defined as learning outcomes following Bloom's Taxonomy and are designed to support the development of curricular materials.

This initiative aims to build on the DLGF by further extending it to address media and information literacy.

Table 1:

Overview of Extended DigComp Structure

Note: Extended DigComp extensions listed in bold.

DLGF Competence Area	DLGF Competence Title	DLGF Competence Descriptor
Devices and Software Operations	**0.1 Physical operations of digital devices**	To identify and use the functions and features of the hardware tools and technologies.
	0.2 Software operations in digital devices	To know and understand the data, information and / or digital content that are needed to operate software tools and technologies.
Information and Data Literacy	1.1 Browsing, searching and filtering data, information and digital content	To articulate information needs, to search for data, information and content in digital environments, to access and navigate among them. To create and update personal search strategies.
	1.2 Evaluating data, information and digital content	To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content.
	1.3 Managing data, information and digital content	To organise, store and retrieve data, information, and content in digital environments. To organise and process them in a structured environment.
Communication and Collaboration	2.1 Interacting through digital technologies	To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.
	2.2 Sharing through digital technologies	To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.

Table 1 (cont.):

Overview of Extended DigComp Structure

DLGF Competence Area	DLGF Competence Title	DLGF Competence Descriptor
Communication and Collaboration	2.3 Engaging in citizenship through digital technologies	To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.
	2.4 Collaborating through digital technologies	To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge.
	2.5 Netiquette	To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.
	2.6 Managing digital identity	To create, and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.
Digital Content Creation	3.1 Developing digital content	To create and edit digital content in different formats, to express oneself through digital means.
	3.2 Integrating and re-elaborating digital content	To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.
	3.3 Copyright and licenses	To understand how copyright and licenses apply to data, digital information and content.
	3.4 Programming	To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.
Safety	4.1 Protecting devices	To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have a due regard to reliability and privacy.

Table 1 (cont.):

Overview of Extended DigComp Structure

DLGF Competence Area	DLGF Competence Title	DLGF Competence Descriptor
Safety	4.2 Protecting personal data and privacy	To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy Policy" to inform how personal data is used.
	4.3 Protecting health and well-being	To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.
	4.4 Protecting the environment	To be aware of the environmental impact of digital technologies and their use.
Problem Solving	5.1 Solving technical problems	To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).
	5.2 Identifying needs and technological responses	To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them. To adjust and customize digital environments to personal needs (e.g. accessibility).
	5.3 Creatively using digital technologies	To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.
	5.4 Identifying digital competence gaps	To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.

Table 1 (cont.):
Overview of Extended DigComp Structure

DLGF Competence Area	DLGF Competence Title	DLGF Competence Descriptor
Problem Solving	**5.5 Computational thinking**	To process a computable problem into sequential an logical steps as a solution for human and computer systems.
Career-related Competences	**6.1 Operating specialised digital technologies for a particular field**	To identify and use specialised digital tools and technologies for a particular field.
	6.2 Interpreting and manipulating data, information and digital content for a particular field	To understand, analyse and evaluate specialised data, information and digital content for a particular field within a digital environment.

1.2 - Global Media and Information Literacy Framework

The information and communication technology revolution of the past decades has birthed new opportunities but also widened inequalities within and among countries to engage with media and become part of the global knowledge society. UNESCO has tried to be at the center of international thrusts to ensure that no-one is marginalized and everyone benefits from the recent media and ICT revolution. To serve that goal, UNESCO has promulgated the Global Media and Information Literacy Framework (GMIL). According to UNESCO, GMIL provides a strategic policy framework to ensure all citizens are equipped with media and information competences (Grizzle et al. 2013).

Overview of GMIL Structure

Table 3 shows that at the highest level of GMIL are three Components (“Access and Retrieval”, “Understanding and Evaluation”,”Creation and Utilization”), each of which has a corresponding Competency Element. Each Component / Competency Element is then broken down into four Subject Matters, to yield twelve Subject Matters in all. Each Subject Matter is then broken down into several (varies by Subject Matter) Performance Criteria, to yield one hundred thirteen Performance Criteria. Space limitations allow the distribution of Performance Criteria to be included in Table 5 but not the wording for each of them. The Proficiency Levels are generic to all MIL Components. According to UNESCO, these elements are targeted at all citizens, but in particular teachers in service and in training.

Table 2:

Overview of GMIL Structure

MIL Component	Competency Element	MIL Subject Matters	MIL Performance Criteria	Proficiency Level
Access and Retrieval	Recognizes the demand for, is able to search for, accesses and retrieves information and media content	1.1 Definition and articulation of a need for information, 1.2 Search for and location of information and media content, 1.3 Access to information, media content and media and information providers, 1.4 Retrieval and holding / storage / retention of information and media content	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7, 1.2.8, 1.2.9, 1.2.10, 1.2.11, 1.2.12, 1.2.13, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6, 1.3.7, 1.3.8, 1.4.1, 1.4.2, 1.4.3, 1.4.4, 1.4.5, 1.4.6, 1.4.7	Basic, Intermediate, Advanced
Understanding and Evaluation	Understands, assesses and evaluates information and media	2.1 Understanding of information and media, 2.2 Assessment of information and media content, and media and information providers, 2.3 Evaluation of information and media content, and media and information providers, 2.4 Organization of information and media content	2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.8, 2.1.9, 2.1.10, 2.1.11, 2.1.12, 2.1.13, 2.1.14, 2.1.15, 2.1.16, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.3.1, 2.3.2, 2.3.3, 2.3.4, 2.3.5, 2.3.6, 2.3.7, 2.3.8, 2.3.9, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.7, 2.4.8	Basic, Intermediate, Advanced

Table 2:
Overview of GMIL Structure

MIL Component	Competency Element	MIL Subject Matters	MIL Performance Criteria	Proficiency Level
Creation and Utilization	Creates, utilizes, and monitors information and media content	3.1 Creation of knowledge and creative expression, 3.2 Communication of information, media content and knowledge in ethical and effective manner, 3.3 Participation in societal-public activities as active citizen, 3.4 Monitoring influence of information, media content, knowledge production and use as well as media and information providers	3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7, 3.1.8, 3.1.9, 3.1.10, 3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, 3.2.8, 3.2.9, 3.2.10, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.4.6, 3.4.7, 3.4.8, 3.4.9, 3.4.10, 3.4.11	Basic, Intermediate, Advanced

UNESCO's global reach and organizational partnerships has produced widespread uptake, and makes GMIL (media and information competences) an ideal complement to DLGF (digital competence).

1.3 - Combining DLGF and GMIL

GMIL combines Media Literacy and Information Literacy with Information and Communication Technology (ICT) Literacy and Digital Literacy to empower people to take advantage of a wide range of ICTs and media. From this description there is clearly some overlap with the digital competences targeted by DLGF, necessitating some synthesis and de-duplication to make efficient use of both frameworks.

To combine the two frameworks, the DLGF elements - Competence Title, Competence Descriptor, and Proficiency Levels - are compared with the GMIL elements

- Subject Elements and Performance Criteria - to identify how comprehensively GMIL covers the areas specified by DLGF (see Table 4). This revealed that less than half (twelve) of the twenty-six DLGF Competence Titles were fully covered by GMIL, with the others (fourteen) not covered at all.

Table 3:

Completeness of coverage of DLGF Competences by GMIL

DLGF Competence Area	DLGF Competence Title	GMIL Subject Matter	Coverage
Devices and Software Operations	0.1 Physical operations of digital devices		Almost none
	0.2 Software operations in digital devices		Almost none
Information and Data Literacy	1.1 Browsing, searching and filtering data, information and digital content	1.1 Definition and articulation of a need for information, 1.2 Search for and location of information and media content, 1.3 Access to information, media content and media and information providers	Complete
	1.2 Evaluating data, information and digital content	2.2 Assessment of information and media content, and media and information providers, 2.3 Evaluation of information and media content, and media and information providers	Complete
Information and Data Literacy	1.3 Managing data, information and digital content	1.4 Retrieval and holding / storage / retention of information and media content	Complete
Communication and Collaboration	2.1 Interacting through digital technologies	3.2 Communication of information, media content and knowledge in ethical and effective manner	Incomplete
	2.2 Sharing through digital technologies	3.2 Communication of information, media content and knowledge in ethical and effective manner	Incomplete

DLGF Competence Area	DLGF Competence Title	GMIL Subject Matter	Coverage
Communication and Collaboration	2.3 Engaging in citizenship through digital technologies	3.3 Participation in societal-public activities as active citizen	Complete
	2.4 Collaborating through digital technologies		Almost none
	2.5 Netiquette		Almost none
	2.6 Managing digital identity	3.2 Communication of information, media content and knowledge in ethical and effective manner	Incomplete
Digital Content Creation	3.1 Developing digital content	3.1 Creation of knowledge and creative expression	Complete
	3.2 Integrating and re-elaborating digital content	2.4 Organization of information and media content	Complete
	3.3 Copyright and licenses	2.1 Understanding of information and media	Complete
	3.4 Programming		Almost none
Safety	4.1 Protecting devices		Almost none
	4.2 Protecting personal data and privacy	3.2 Communication of information, media content and knowledge in ethical and effective manner	Incomplete
	4.3 Protecting health and well-being		Almost none
	4.4 Protecting the environment		Almost none
Problem Solving	5.1 Solving technical problems		Almost none

DLGF Competence Area	DLGF Competence Title	GMIL Subject Matter	Coverage
Problem Solving	5.2 Identifying needs and technological responses		Almost none
	5.3 Creatively using digital technologies	3.1 Creation of knowledge and creative expression	Incomplete
	5.4 Identifying digital competence gaps		Almost none
	5.5 Computational thinking		Almost none
Career-related Competences	6.1 Operating specialised digital technologies for a particular field		Almost none
	6.2 Interpreting and manipulating data, information and digital content for a particular field		Almost none

A mapping in the opposite direction was also done (see Table 4). This showed that half (six) of the GMIL Subject Matters seemed completely covered by DLGF, whereas one third (four) of the GMIL Subject Matters posed minor additional requirements and the remaining one sixth (two) of the GMIL Subject Matters would need major additional material.

Table 4:

Completeness of coverage of GMIL Subject Matters by DLGF

GMIL Component	GMIL Subject Matter	DLGF Competence Titles	Coverage
Access and Retrieval	1.1 Definition and articulation of a need for information	1.1 Browsing, searching and filtering data, information and digital content, 1.2 Evaluating data, information and digital content	Complete
	1.2 Search for and location of information and media content	1.1 Browsing, searching and filtering data, information and digital content	Complete

GMIL Component	GMIL Subject Matter	DLGF Competence Titles	Coverage
	1.3 Access to information, media content and media and information providers	1.1 Browsing, searching and filtering data, information and digital content	Incomplete
	1.4 Retrieval and holding / storage / retention of information and media content	1.3 Managing data, information and digital content	Complete
Understanding and Evaluation	2.1 Understanding of information and media	3.3 Copyright and licenses	Almost none
	2.2 Assessment of information and media content, and media and information providers	1.2 Evaluating data, information and digital content	Incomplete
	2.3 Evaluation of information and media content, and media and information providers	1.2 Evaluating data, information and digital content	Incomplete
	2.4 Organization of information and media content	3.2 Integrating and re-elaborating digital content	Complete
Creation and Utilization	3.1 Creation of knowledge and creative expression	3.1 Developing digital content, 5.3 Creatively using digital technologies	Complete
	3.2 Communication of information, media content and knowledge in ethical and effective manner	2.1 Interacting through digital technologies, 2.6 Managing digital identity, 4.2 Protecting personal data and privacy	Complete
	3.3 Participation in societal-public activities as active citizen	2.3 Engaging in citizenship through digital technologies	Incomplete
	3.4 Monitoring influence of information, media content, knowledge production and use as well as media and information providers		Almost none

These mappings suggested that adding GMIL elements into DLGF would require less modification than adding DLGF elements into GMIL and therefore, the decision was taken to adopt the DLGF Competences as the top-level of the putative unified framework.

The two mappings were then used to identify overlapping competences that should be unified. Language from either of the two frameworks, or brand new language, was adopted to comprehensively specify each competence that had been described in both frameworks. The language of these new competences were then used to replace the original competences in the DLGF to produce the first draft of the unified framework. All the Performance Criteria from the relevant GMIL Subject Matters were adopted without change.

In the second step, the two GMIL Subject Matters (and their Performance Criteria) that DLGF did not cover, were added into the nascent unified framework. In the final step, the Competence Descriptors and Performance Criteria for each Competence were scrutinized to ascertain whether the Competences were indeed unique or should be amalgamated. On that basis, four Competences were amalgamated into two, so that the final unified model has twenty-six Competences. The fourth and final step was to identify and fill gaps in the Model that did not address digital, media and information literacy problems that had been identified in Jamaica.

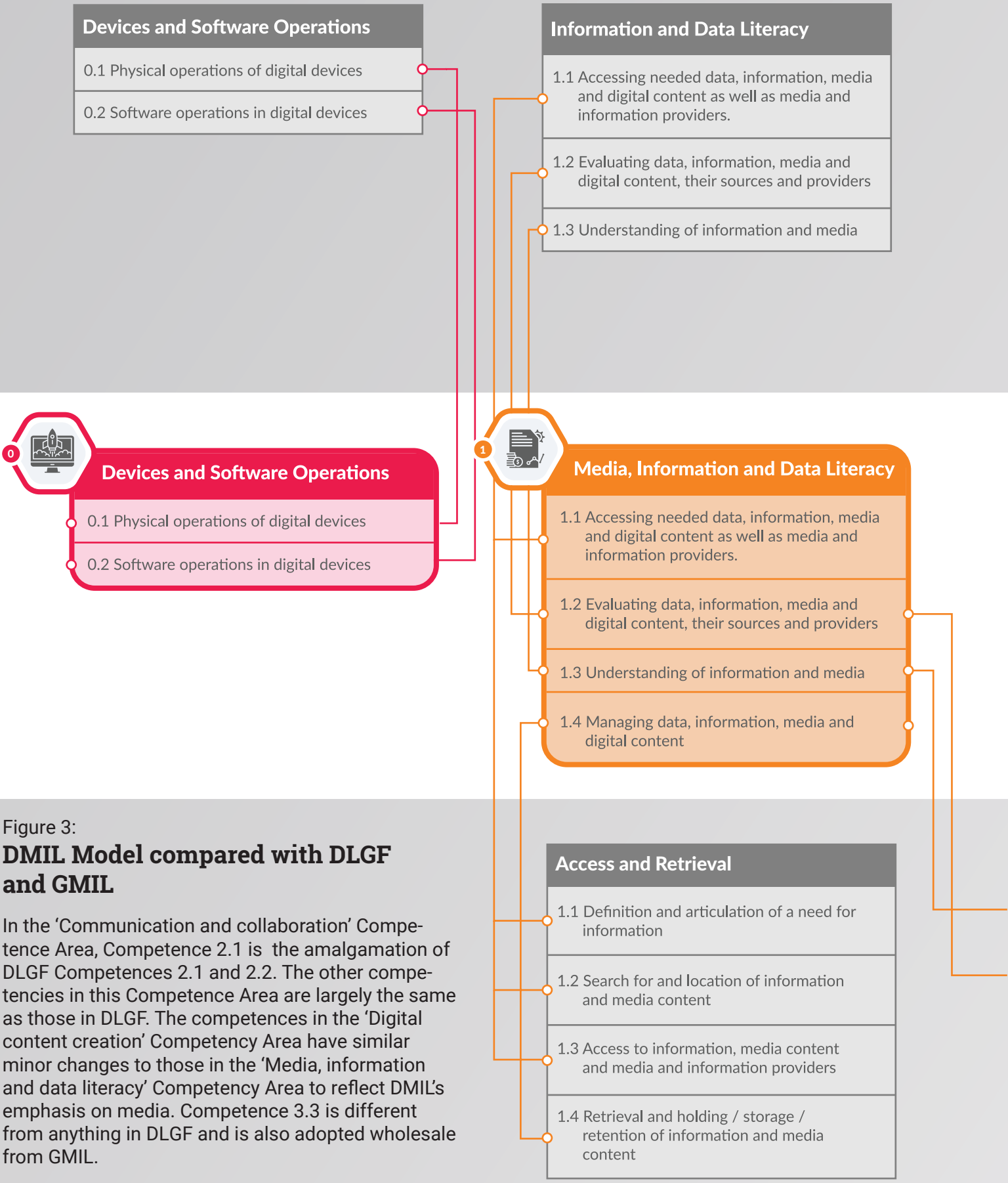


Figure 3:

DMIL Model compared with DLGF and GMIL

In the 'Communication and collaboration' Competence Area, Competence 2.1 is the amalgamation of DLGF Competences 2.1 and 2.2. The other competencies in this Competence Area are largely the same as those in DLGF. The competences in the 'Digital content creation' Competency Area have similar minor changes to those in the 'Media, information and data literacy' Competency Area to reflect DMIL's emphasis on media. Competence 3.3 is different from anything in DLGF and is also adopted wholesale from GMIL.

Communication and Collaboration

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

Digital Content Creation

- 3.1 Developing Digital Content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licenses
- 3.4 Programming

Communication and Collaboration

- 2.1 Sharing and interacting through digital technologies
- 2.2 Engaging in citizenship through digital technologies
- 2.3 Collaborating through digital technologies
- 2.4 Netiquette

Digital Content Creation

- 3.1 Developing media and digital content
- 3.2 Integrating and re-elaborating media and digital content
- 3.3 Monitoring influence of information, media content, knowledge production and use as well as media and information providers
- 3.4 Copyright and licenses
- 3.5 Programming

Understanding and Evaluation

- 2.1 Understanding of information and media
- 2.2 Assessment of information and media content, and media and information providers
- 2.3 Evaluation of information and media content, and media and information providers
- 2.4 Organization of information and media content

Creation and Utilization

- 3.1 Creation of knowledge and creative expression
- 3.2 Communication of information, media content and knowledge in ethical and effective manner
- 3.3 Participation in societal-public activities as active citizen
- 3.4 Monitoring influence of information, media content, knowledge production and use as well as media and information providers

Communication and Collaboration

2.6 Managing digital identity

Safety

4.1 Protecting devices

4.2 Protecting personal data and privacy

4.3 Protecting health and well-being

4.4 Protecting the environment

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

5.5 Computational thinking

Safety

4.1 Protecting devices

4.2 Protecting personal data and privacy

4.3 Protecting health and well-being

4.4 Protecting the environment

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

5.5 Computational thinking

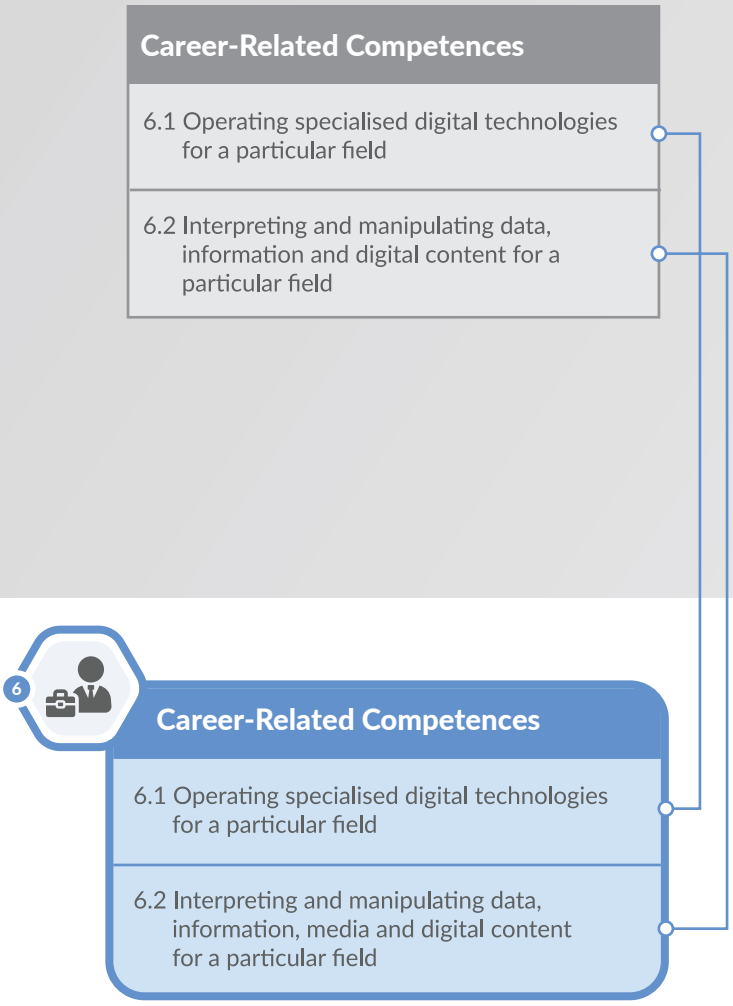
Creation and Utilization

3.1 Creation of knowledge and creative expression

3.2 Communication of information, media content and knowledge in ethical and effective manner

3.3 Participation in societal-public activities as active citizen

3.4 Monitoring influence of information, media content, knowledge production and use as well as media and information providers



Like the 'Communication and collaboration' Competency Area, the 'Safety' Competence Area is almost the same as DLGF with one exception. In DMIL, the 'Managing digital identity' (DLGF Competence 2.6) is subsumed into Competence 4.2 'Protecting personal data and privacy'. The 'Problem solving' Competence Area in DMIL is no different than that in DLGF. In the 'Career-related Competences' Competence Area, the only change is the addition of the word 'media' to one of the two competences.

1.4 - DMIL Model compared with DLGF and GMIL

Given the broad support and adoption of DLGF (and its predecessor DigComp) and GMIL, it is prudent to identify how the DMIL Model maps to these frameworks, to make it easy for organizations that wish to adapt DLGF and GMIL materials for use with the DMIL Model.

Comparison with DLGF

Figure 3 shows that there are substantial similarities between DMIL and DLGF. At the highest level of aggregation, the DMIL Model has six of the same seven Competence Areas that DLGF does, but reflects DMIL's additional focus on media by replacing DLGF's 'Information and Data Literacy' Competence Area with 'Media, Information and Data Literacy'.

This additional emphasis is reflected in other wording changes at the lower level of the Competences in the 'Media, information and data literacy' Competence Area. The wording of Competence 1.1 is almost completely new while Competences 1.2 and 1.4 have a few additional words. Competence 1.3 is different from anything in DLGF and is adopted wholesale from GMIL.

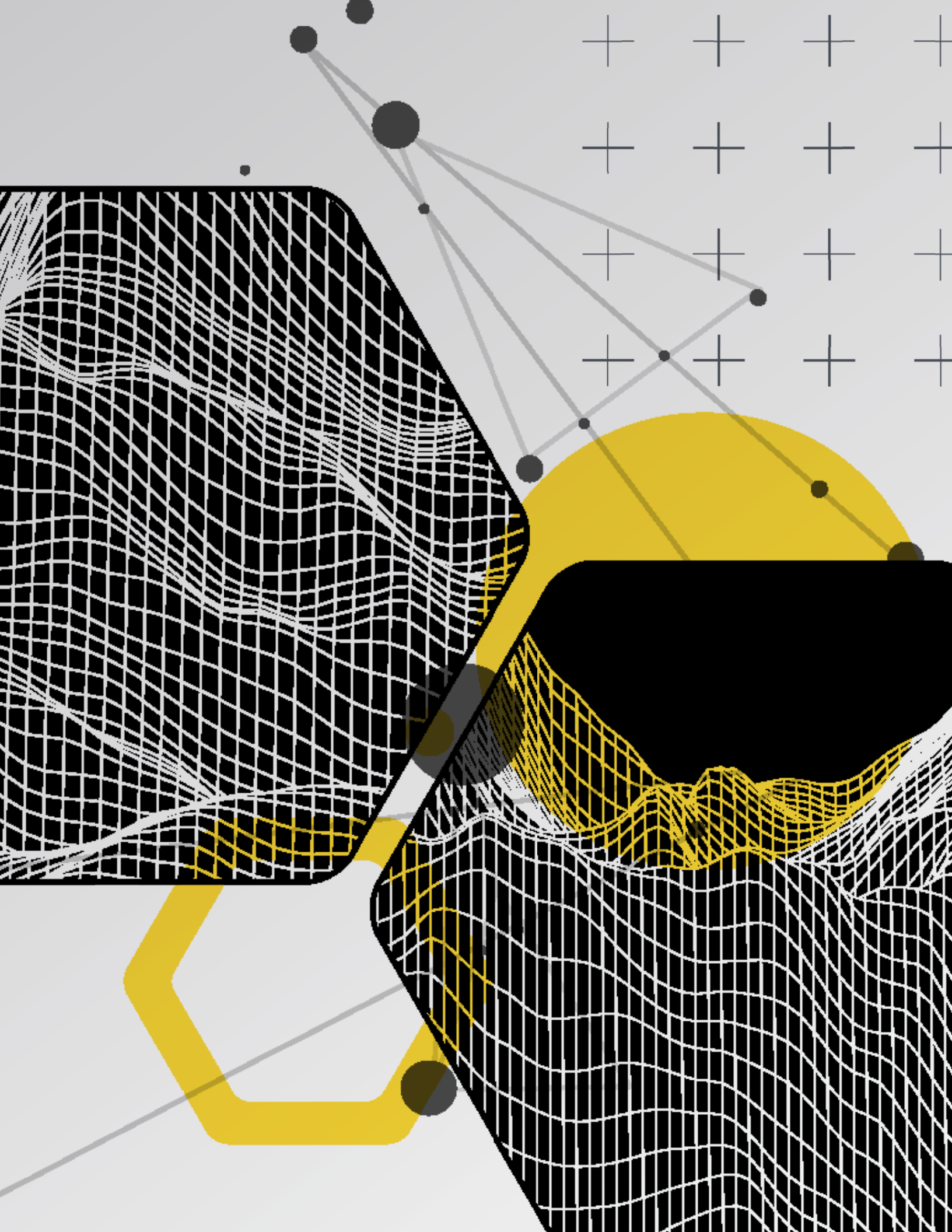
Comparison with GMIL

The top level of the DMIL Model has seven Competence Areas whereas the top level of GMIL has three Components (Access and Retrieval, Understanding and Evaluation, and Creation and Utilization). At the lower level, the DMIL Model has twenty-six Competences while GMIL has twelve Subject Matters. The DMIL Model subsumes the content of all twelve Subject Matters and adopts the wording of two ('Understanding of information and media', and 'Monitoring influence of information…') without modification.

Because the DMIL Model is organized differently from the GMIL at the top level, is is commonly the case that some parts of a GMIL Subject Matter will be included in a DMIL Competence in one DMIL Competence Area, while other parts of that Subject Matter are included in a totally separate Competence Area. One of the consequences is that content that corresponds to Subject Matters under the 'Understanding and Evaluation' GMIL Component are distributed among DMIL Competences in both the 'Media, information and data literacy' and the 'Digital content creation' Competence Areas. Similarly, Subject Matters under the 'Creation and Utilization' GMIL Component are distributed among DMIL Competences in the 'Communication and collaboration,' 'Digital content creation', 'Safety', and 'Problem solving' Competence Areas. The DMIL 'Media, information and data literacy' Competence area includes all the GMIL Subject Matters in the 'Access and Retrieval' GMIL Component, as well as three of the four GMIL Subject Matters (2.1, 2.2. and 2.3) included in the 'Understanding and Evaluation' GMIL Component.

Conclusion

This comparison shows quite clearly that the DMIL Model is a superset of both GMIL and DLGF and therefore that materials that were developed on the basis of those frameworks can be adapted for use with the DMIL Model. Whether for staff assessment or recruiting, education or training purposes, the DMIL Model facilitates the recruitment of the wealth of existing materials.



02

Assessment

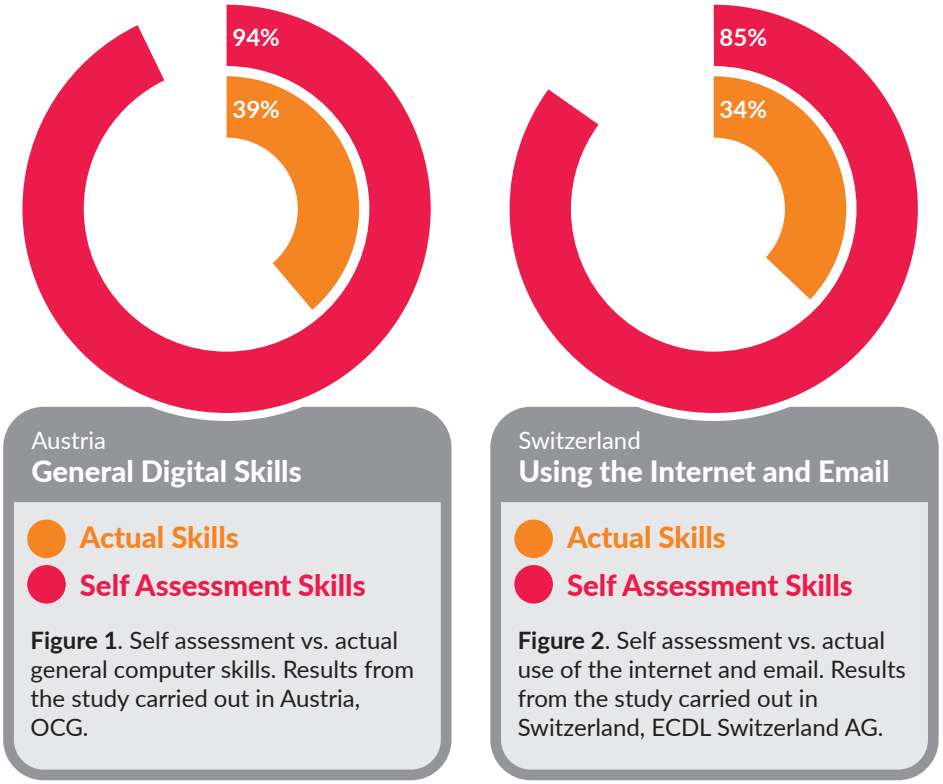
While a competency model establishes what individuals should know how to do, it is equally important to establish some means of assessing whether individuals or groups have achieved some minimum level of proficiency in the specified competences. So important is this that UN SDG Indicator 4.4.2 speaks to the need to ensure that youth and working populations achieve a minimum level of digital literacy. For employers for whom talent for digital transformation is a concern, it may be useful to establish one or more reliable means of determining whether an individual has achieved the desired level of proficiency in several or all of the DMIL competences. In other instances, for example establishing policies or strategies that will affect large groups of residents or citizens, what is needed is some means of ascertaining competence for a group or sub-population. In this section, the discussion will center on assessment methods for both individuals and sub-populations, some example tools used by various jurisdictions, and the accompanying indicators that may be produced from such tools.

Assessment Methods

Competence assessment is about generating data that allows the assessor to make statements of known reliability about the DMIL competence of the assessed individual or group. As part of a review of digital literacy assessment instruments, Carretero et al (2016) identified twenty-two instruments and classified them into four categories: self-assessment, secondary data-gathering, knowledge-based assessment and performance assessment. Different assessment methods are associated with different levels of confidence - confidence in the reliability of the inferences the assessor can make about the competence of the assessed person or group. The discussion assumes that the assessor is only interested in making those kinds of inferences that the specific instrument (that is an instance of the assessment method) was properly designed to facilitate. These four categories provide different levels of confidence about the reliability

Figure 4:

Gap between Self Assessed and Actual Skill Level in Austria and Switzerland



Source: OCG, Austria

Source: OCG, Switzerland

of statements one can make about an individual's competence. Performance assessments directly test an individual's ability to perform the competence being tested, in as realistic a scenario as possible. A well-designed and executed performance assessment usually provides the highest level of confidence about the reliability of any statement about that person's competence. Knowledge assessments require the individual to explain how they would perform a certain task. The data from this kind of assessment provides a lower level of confidence in the reliability of any statement about the individual's competence, but higher confidence than for self-assessment or secondary data-gathering.

A self-assessment is an individual's subjective evaluation of their own competence and may neither accurately convey their knowledge nor their competence. Comparisons of self-assessments and performance assessments by a representative national sample of persons between fifteen and sixty-four years old in Austria and Switzerland found that over fifty percent of the survey respondents over-estimated their digital competences (ECDL Foundation 2018, 7).

When youth (primarily university students) in India, Singapore, Germany, Finland and Denmark were asked to assess their capabilities in using common productivity tools (word processing, spreadsheets, and presentations), almost thirty percent in each country overestimated their capabilities across each tool type (ECDL Foundation, 10). As Figure 2c shows, the level of confidence in the reliability of

inferences made from self-assessment methods may match that from secondary data-gathering, but would not match or exceed that of knowledge-based or performance assessments. Secondary data-gathering is the collection of data not directly related to competence, for example, questions about ownership, accessibility, or use of digital technologies, education levels and job functions. From the answers, inferences may be made about DMIL competence, but understandably with lower levels of confidence in the reliability of any statements about the respondents' competences than knowledge or performance-based assessments. In contrast to the other three assessment methods, secondary data-gathering is not intended to answer questions about the competence of a specific individual, but instead of one or more groups of individuals.

Another relevant dimension of assessment methods is the range of sub-population groups that may effectively be reached. This is largely dependent on the context in which they are usually deployed and the breadth of the national population that is usually reached in those contexts. Performance and knowledge-based assessments are usually deployed in formal education and vocational settings. These assessment modes are most frequently used for gathering data on school-age children (e.g. CSEC IT examinations), and to a lesser extent perhaps those in tertiary education and some occupations (e.g. the Business Process Outsourcing sector). Performance assessments are less frequently deployed because the need to create situations that are as realistic as possible typically makes them more costly to arrange and use. Self-assessment is usually less costly to deploy than either performance or knowledge-based assessments and so can be more widely used. Self-assessment may be deployed via a variety

Table 5:

Gap between Self Assessed and Actual Skill Level in multiple countries

Country	Target Group		Spreadsheets	Presentation	Word
Foundation	First-year University Students	Self-Assessed	**89%**	**84%**	**76%**
		Actual	**57%**	**58%**	**79%**
Finland	First-year University Students	Self-Assessed	**74%**	**87%**	**83%**
		Actual	**37%**	**60%**	**63%**
Germany	First-year University Students and Finaly Year Higher-tier Secondary Education Students	Self-Assessed	**79%**	**81%**	**84%**
		Actual	**38%**	**66%**	**60%**
India	University Students	Self-Assessed	**64%**	**86%**	**85%**
		Actual	**33%**	**60%**	**49%**
Singapore	University and Polytechnic Students	Self-Assessed	**60%**	**66%**	**68%**
		Actual	**35%**	**57%**	**45%**

of means, including web-based, pen and paper, or even reporting over the phone or face-to-face to a survey agent. They may be used by job applicants (e.g. Europass) and in other vocational settings. Secondary data-gathering is carried out by national statistical organizations or similar bodies that have a national or wide sub-national mandate. tends to cover the widest range of sub-population groups, and the largest absolute number of members of the total national population. For these reasons, secondary data-gathering is most frequently used when the goal is to make statements about wide cross-sections of the population, and to compare entire national populations. Compared with web-based self-assessment, secondary data-gathering is likely to be more costly on a per capita basis but can be equal or less costly than the use of survey agents in self-assessment methods.

To cover the widest range of sub-population groups, secondary data-gathering is essential. Self-Assessment methods will reach the second widest range of groups because its relatively low cost allows it to be widely used. However, in order to be able to make very confident statements about the competences of individuals and groups, instruments based on performance assessment is also essential. Assessment Proficiencies.

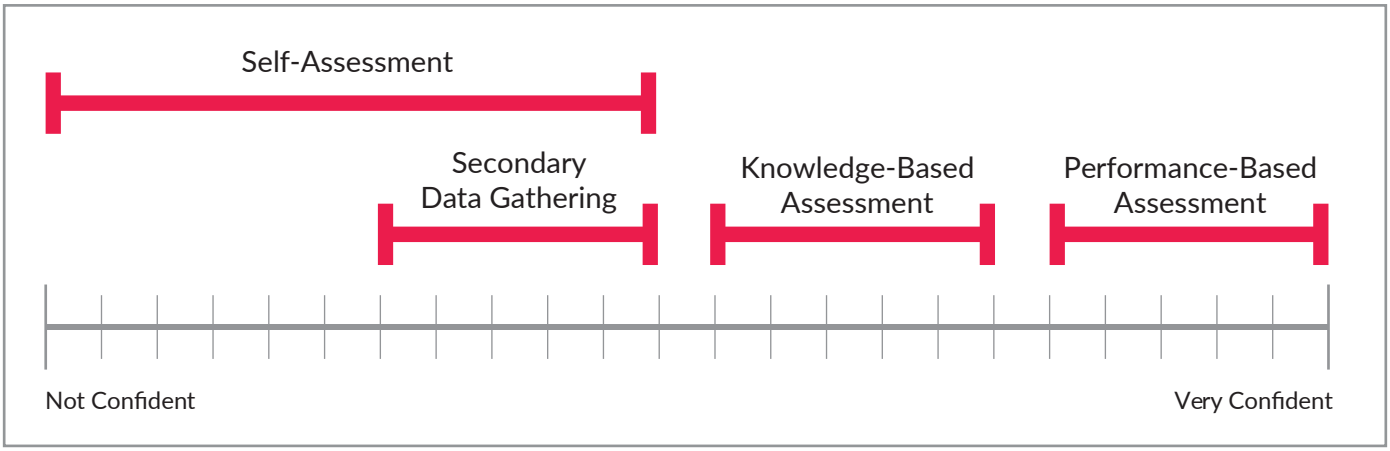
Assessment Proficiencies

Proficiencies speak to the degree of expertise an individual possesses regarding a specific competence. Without the specificity provided by proficiency levels, there is greater potential for confusion about whether someone really possesses a competency. An individual may claim a certain competence which others dispute because they have in mind a different level of proficiency for the competence than the individual making the claim. The absence of proficiency levels can also cause unnecessary difficulty in training situations: individuals who are creating teaching or assessment materials using a competence framework must construct their own understanding of the proficiency levels for each competence and determine at which level they are going to target their instructional or assessment materials. If this is not carefully documented and disseminated, then disagreement may arise about whether the teaching materials adequately address the competence because of differing interpretations of the level of proficiency required for the competence. Given that the UN Sustainable Development Goals Thematic Indicator 4.4.2 speaks to a minimum level of digital proficiency in digital literacy skills, a national competency framework that aims to facilitate international comparisons should include proficiency levels. Human Resource departments and others that find themselves in assessor roles can then specify the proficiency levels which they are interested in for the particular roles they have in mind.

For the above reasons this section reviews the current norms, by referring to the three commercial competence frameworks that enjoy extensive use globally as well as those promulgated by UNESCO and the European Union. The International Computer Driver's License (ICDL) is the most popular commercial framework, having been adopted by thirty-one of the forty-three surveyed countries by UNESCO (DLGF). In the ICDL framework, competences are grouped into courses (called modules) which are marketed in five groupings: Workforce, Professional,

Figure 5:

Level of Confidence in reliability of inferences about DMIL



Insights, Digital Student, and Digital Citizen. There are no proficiencies for each competence within a course, but there are basic and advanced versions of some courses (e.g. presentations, documents, and spreadsheets). According to the ICDL Foundation learners can combine a variety of courses to create Base, Standard and Advanced Profiles. The second most popular commercial framework is the Certiport Internet and Computing Core Certification (IC3) which was adopted in thirteen countries. IC3 provides certification exams (aimed at covering all the relevant competences) at three escalating levels, Level 1 to Level 3. The Microsoft Digital Literacy Standard Curriculum has the smallest market share among the forty-three countries, and although it has been adopted by eleven countries it does not provide proficiency levels.

The two non-commercial frameworks acknowledge the importance of proficiency statements in different ways. UNESCO's Media and Information Literacy framework provides three proficiency levels (Basic, Intermediate and Advanced)

Table 6:

Assessment Methods and the Groups Most Frequenty Reached

	Proformance Assessment	Knowledge-Based Assessment	Self Assessment	Secondary Data-Gathering
General Public				1
Highly Motivated Individuals	1	2	1	
Formal Education (K-16)	2	1	2	1
Profesional Groups	1	2	2	

1 - Most Frequent Targets / Users of this kind of Assessment 2 - Secondary Targets / Users of this kind of Assessment

that apply to each MIL Component (which each contain four competences) for a total of twelve proficiency levels. There are no proficiency levels for each competence. At the opposite extreme from the Microsoft framework is DigComp 2.1. It provides one hundred sixty-eight proficiencies, eight proficiency levels (Foundation, Intermediate, Advanced, and Highly Specialized) for each of the twenty-one competences.

Assessment Tools

With competences and proficiency statements in place, the next piece of the puzzle is instruments with which to assess individuals. Knowing what the norms are can suggest what might be attractive to individuals, what might be cost effective, and what might be logistically feasible. This section reviews some of the most popular assessment schemes, ranging from certification examinations to self-assessments.

ICDL

The ICDL Foundation offers nine courses within its most mature product line, ICDL Workforce Modules. For each of the nine courses, there is a corresponding high stakes performance and knowledge-based examination lasting forty-five minutes. The three examinations based on the productivity tools have thirty-two questions, while the other six examinations have thirty-six questions. All the questions are worth one mark each and the pass mark for each examination is seventy-five percent. (https://icdl.org/icdl-programmes/)

IC3

Certiport's Internet and Computing Core Certification consists of three online performance and knowledge-based tests of increasing complexity that each aim to cover the full range of digital competences required as a technical foundation to advance successfully in post-secondary education and job roles. Each test consists of forty to fifty items to be completed in about fifty minutes, with fifty percent correct answers required to pass. Certificates are given for each level.

Microsoft Digital Literacy Framework

Up to 2018, the Microsoft Digital Literacy framework allowed learners to complete an assessment after completing each of five courses (assumed to be a combination of knowledge-based and performance assessment). Learners could also go on to do a thirty to sixty minute certificate test that consisted of thirty questions covering the competences in all five courses (DLGF 2018, 51). However, Microsoft no longer offers a certificate test or a certificate of achievement. A certificate of completion is available for learners who complete each module (https://www.microsoft.com/en-us/digitalliteracy/faq).

Europass

While high stakes performance and knowledge-based certification examinations are the gold standard of competence assessment, self-assessment schemes are also popular. One of the most popular of these is provided through Europass. Europass is actually a number of different tools aimed at helping to increase the efficiency of matching job seekers and potential employers. It does this by providing one of the most popular CV formats in Europe, the standardized Europass CV format, that helps job seekers to communicate their digital competences in a standardized manner that makes it easy for employers to compare and select suitable employees. Europass provides a self-assessment tool that asks CV creators to declare their level of digital competence (Basic User, Independent User, Proficient User) in each of DigComp's five competency areas. Job seekers can describe digital skills they have developed and used in a variety of contexts, or even digital skills they would like to develop. The European Commission is also developing Europass Digital Credentials Infrastructure (EDCI), which will allow training organizations to issue electronic credentials which job seekers can embed in their Europass CVs and which employers will be able to verify directly. (https://europa.eu/europass/en/how-describe-my-digital-skills; https://europa.eu/europass/en/what-are-digital-credentials)

Population Competences

Three other schemes are worth mentioning. They are not meant to produce reliable statements about the competence of individuals, but of groups.

Through the Global Media and Information Literacy Assessment Framework, UNESCO provides a seven-page model self-assessment instrument meant primarily to be administered to in-service teachers or student teachers. This instrument has sections on 'Professional Experience', 'Media and Information Literacy Policy', and 'Familiarity with media and information facilities'. As part of that final section, the respondent is asked to indicate the level of confidence they have in performing sixteen tasks with a computer.

The European Union's Digital Skills Indicator aims to produce "EU-wide indicators of digital competence and media literacy" (EU for Digital 2015). Each year, the EU conducts a survey of households and individuals in which they collect "information about activities realised during the previous 3 months by internet and

Table 7:
ICDL Courses and Examinations

Course (Module) Name	# of question items	Exam Duration (mins)	Pass Mark (%)
Essential Skills group of courses	36	45	75
Office Applications group of courses	32	45	75
Good Practice Group of courses	36	45	75

computer users" covering the Information and Data Literacy, Communication and Collaboration, Digital Content Creation, and Problem Solving competence areas of the DigComp framework. For each competence area, four to seven activities have been identified to differentiate between those possessing and those lacking the constituent competences. It is assumed that performance of the activities is evidence of the mapped competences. The survey instrument allows the identification of those persons possessing no skills, basic skills, and above basic skills for each competence area, but not the identification of proficiency for individual competences. Each year six indicators are published in the Digital Economy and Society Index (DESI) based on the survey data:

1. percent of EU citizens with at least basic skills
2. percent of EU citizens with above basic skills
3. percent of EU citizens at least basic software skills
4. ICT specialists as a percent of total employment
5. Female ICT specialists as a percent of female employment
6. ICT graduates as a percent of all graduates.

The final scheme is the Individual and Household ICT Use Survey conducted by STATIN in accordance with its commitment to participating in the International

Table 8:

HH9 Indicator data from the STATIN Individual and Household ICT Use Survey for 2015 and 2016

HH9	Internet activities undertaken by individuals in the last three months (from any location):		
	▸ Getting Information about goods and services	33.0	32.0
	▸ Communication	38.2	41.1
	▸ Internet banking	4.4	-
	▸ Purchasing/ordering goods/services	3.9	-
	▸ Formal education/learning activities	22.4	19.4
	▸ Playing/downloading games/music...	24.9	23.2
	▸ Reading/downloading online newspapers, books, etc.	13.9	11.1
	▸ Seeking jobs or participating in professional networks		
	▸ Saving documents or using online editing software		

Telecommunication Unoin's ICT Development Index. STATIN has conducted this survey three times and published reports for 2015 and 2016. Two indicators are particularly pertinent. HH9 reports on Internet activities undertaken by individuals in the last three months from any location. Table n below shows the relevant statistics for 2015 and 2016.

HH15 reports on individuals by type of ICT skills carried out in the last three months. Table nn below shows the relevant statistics for 2015 and 2016.

UNESCO also provides instruments for conducting national and institutional baseline measurements. These baselines are to identify the supportiveness of the context for the development and deployment of digital, media and information literacy competences (UNESCO 2013).

Table 9:

HH15 Indicator data from the STATIN Individual and Household ICT Use Survey for 2015 and 2016

HH15	Individuals with ICT skills, by type of skill (carried out in the last three months):		
	▸ Copying or moving files or folders	48.2	34.6
	▸ Using copy and paste tools to move or duplicate information in documents	46.6	31.4
	▸ Sending e-mails with files attached	49.9	34.4
	▸ Using basic mathematical formulae in spreadsheets	11.1	11.9
	▸ Connecting or installing new software	18.3	15.9
	▸ Finding, downloading or installing new software	22.1	15.8
	▸ Creating electronic presentations with presentation software	10.8	7.0
	▸ Transferring files between a computer and other devices	26.6	17.8
	▸ Writing computer programs using specialized programming language	2.9	-*

*** Only indicators with coefficient of varation (cvs) of 20 per cent or less are reported.**

03

Outcomes and their Measures

This Chapter surveys several global indices which aim to measure various aspects of digitalizing societies and economies. Our purpose is to suggest how the success of the DMIL policy in its second and third order effects on Jamaican society and economy may be measured. While it is clear that a first order effect of the successful implementation of the DMIL policy should be a population that is more proficient in the various aspects of the digital, media and information literacy as outlined in the DMIL Competency Model, it is important to answer the question "what impacts on the society and economy should we expect and how will we measure them?" In this Chapter we try to identify the outcomes, indices, dimensions, and indicators already widely used in other parts of the world to answer that question.

Appropriate indices can function as independent benchmarks and help policy owners measure the relative success of policy implementation. They are also valuable to civil society and other stakeholders for evaluating policy owners' narratives about policy implementation and policy success. Many of the indices are multidimensional (Chakravorti et al. 2020, 16; Dutta and Lanvin 2020, 284; Foley et al. 2020; 6). Sometimes these parts are referred to as dimensions and sometimes as pillars, which themselves may be made up of sub-pillars. At the very base of these dimensions, pillars, and sub-pillars are indicators. In this Chapter we are not concerned with measuring the Digital, Media and Information Literacy of individuals, groups, or populations; those measures are first order indicators. Instead we are interested in measuring the decisions, actions, and attitudes that arise indirectly from the implementation of the DMIL policy; those measures are second or third order indicators, and are sometimes called outcome measures. Whereas first order indicators are a direct result of DMIL policy implementation, outcome indicators speak to the end goals such as global competitiveness or

gender equity, in which DMIL policy implementation activities are one of many contributing factors. Some of these contributing factors may be financial, trade and industrial policies, media regulation, and technology absorption.

This Chapter will survey three indices. The first is the International Digital Economy and Society Index (I-DESI) produced annually by the European Union, and covering forty-five (45) countries. This is a comprehensive index that forms part of a large well-funded multi-year EU-wide strategy designed to help the EU countries maintain their global competitiveness as the advanced economies of the world undergo rapid digital transformation. The Digital Intelligence Index is second. It is produced by a consortium led by The Fletcher School at Tufts University in Massachusetts, USA. It covers 90 countries and makes use of many proprietary data sources to measure the human dimension of the digital transformation process. The final index, the Network Readiness Index was published by the World Economic Forum (WEF), Cornell University and INSEAD until 2016, and since 2019 by the original authors under the umbrella of the Portulans Institute. It is the oldest (originating in 2002) and the most comprehensive (covering 130 countries).

International DESI

The purpose of the International Digital Economy and Society Index (I-DESI) is to help the EU27 countries benchmark their digital competitiveness against a global peer group of eighteen (18) non-EU countries (Foley et al. 2020; 6). It is expected that the comparison will highlight areas for potential investments and policies that will allow countries to improve their digital performance. For the 2020 I-DESI, twenty-four (24) indicators are used covering the four year period 2015 to 2018. These indicators cover five dimensions:

1. Connectivity: the deployment of broadband infrastructure and its quality;
2. Human Capital: the skills needed to take advantage of the possibilities offered by a digital society;
3. Citizen use of Internet: the variety of activities performed by citizens already online
4. Integration of digital technology: the digitization of businesses and development of the online sales channel;
5. Digital public services: the digitization of public services, focusing on eGovernment.

The DMIL policy aims to address the Human Capital pillar directly. Connectivity is largely dependent on the investment decisions of two large telecommunications firms. As these are profit-maximizing firms, the human capital of their captive audience is unlikely to be a significant factor in their investment equations. Similarly, governments have many issues vying for their attention and so the pace of digitization of public services may not be hugely influenced by the DMIL policy implementation. On the other hand, individual citizens, entrepreneurs and the large number of businesses and their employees are likely to decide and act in ways that result in increased “Citizen use of Internet” and “Integration of digital technology.” Table 10 summarizes the suitability of the I-DESI dimensions for monitoring DMIL policy implementation.

Table 10:

Suitability of I-DESI Dimensions for monitoring success of DMIL policy

	Dimension	Applicability
1	Connectivity	-ve
2	Human Capital	first order effect
3	Citizen use of Internet	+ve
4	Integration of digital technology	+ve
5	Digital Public Services	-ve

Digital Intelligence Index

Every three years, The Fletcher School at Tufts University publishes the Digital Evolution scorecard and the Digital Trust scorecard as part of their Digital Innovation Index. The relevance of these scorecards to DMIL is in part, suggested by the goals set by the authors (Chakravorti et al. 2020, 18):

> "The Digital Evolution scorecard captures an economy's state and historical momentum from the physical past to the digital present and Digital Trust is the bridge that connects the journey from the digital present to an artificial intelligence augmented and inclusive digital future."

Given that the DMIL policy framework hopes to prepare Jamaicans to thrive in a digital economy and society, these two scorecards can provide valuable benchmarks and help to identify useful models and comparators. Unfortunately, Jamaica is not one of the countries that has ever been covered by either scorecard, but these scorecards are so influential that Jamaican DMIL policy stakeholders should be guided by the pillars, sub-pillars and suggested indicators that they use and how they use them.

The Digital Evolution scorecard covers 90 digital economies using 160 indicators over the 12-year period 2008-2019. This scorecard comprises four pillars: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. Supply Conditions are largely the result of decisions made by a small number of very powerful actors, for whom the digital, media and information literacy of their captive audience is not likely to be an important investment factor. The Institutional Environment is not likely to be very responsive to DMIL policy implementation because there are so many different issues vying for legislators' and regulators' limited attention and budget. The connection between the DMIL policy framework and the Digital Evolution scorecard is in the Demand Conditions pillar. If the DMIL policy is successfully implemented we would expect Jamaica to continuously improve on the Digital Inclusion sub-pillar, which speaks to the gender, class, and rural digital divides. However, the other sub-pillars are largely dependent on the decisions of a few profit-maximizing firms or the state of the overall economy, both of which are not likely to be significantly affected in the near term by DMIL policy implementation. Table 2 summarizes the suitabil-

ity of the Digital Evolution scorecard elements for monitoring success of DMIL policy implementation.

Table 11:

Suitability of Digital Evolution scorecard for monitoring success of DMIL policy

	Element	Suitability
1	Supply Conditions	-ve
2	Demand Conditions	
2.1	State of the Human Condition	-ve and first order effect
2.2	Digital Payment Uptake	-ve
2.3	Device and Broadband Uptake	-ve
2.4	Digital Inclusion	+ve
3	Institutional Environment	-ve
4	Innovation and Change	+ve

The Digital Trust scorecard covers 42 of the 90 economies from the Digital Evolution scorecard, using 198 indicators. The aim of the Digital Trust scorecard is to "examine the trustworthiness of the digital environment for each economy, the trustworthiness of the experience that users have, attitudes towards key institutions and organizations, and user behavior when interacting with the digital world and what it reveals about their trust in the digital system" (Chakravorti et al. 2020, 16). The scorecard consists of four pillars: Digital Environment, Digital User Experience, Attitudes, and Behaviour.

If the DMIL policy is well implemented we would expect businesses to expertly deploy robust privacy, security and accountability mechanisms to build trust in the environments that their employees and customers use and provide a "seamless experience with proper security protections," (26) corresponding to high scores in the Digital Environment and Digital User Experience pillars of the Digital Trust scorecard. Along with the education and training activities that would form part of a DMIL policy implementation, the trust-building mechanisms businesses deploy should lead to consumers having high levels of trust in digital environments, corresponding to a high score in the Attitudes pillar of the scorecard. By increasing Jamaicans' digital proficiency, the DMIL policy framework aims at increasing Jamaicans' engagement with the digital environment, which

would correspond with the Behaviour pillar of the Digital Trust scorecard. Table 3 summarizes the suitability of the Digital Trust scorecard elements for monitoring success of DMIL policy implementation.

Table 12:

Suitability of Digital Trust scorecard for monitoring success of DMIL policy

	Element	Candidacy
1	Digital Environment	+ve
2	Digital User Experience	+ve
3	Attitudes	+ve
4	Behaviour	+ve

The Network Readiness Index

The Network Readiness Index (NRI) originated in 2002 as part of the Global Information Technology Report (GITR) published by the World Economic Forum, Cornell University and INSEAD. The 2020 edition covers 130 countries and is powered by 60 indicators (Dutta and Lanvin 2020, 283). NRI defines network readiness as a multi-dimensional concept consisting of four dimensions: Technology, People, Governance and Impact. Each of these is further divided into three sub-pillars.

The aim of the NRI is to measure the technology and human dimensions of network readiness and those factors that are key to sustainable digital transformation of the global economy (Dutta and Lanvin 2020, 7). In its aim to address the human dimensions of network readiness, the DMIL policy framework has a significant overlap with NRI, so much so that the NRI Individuals sub-pillar (within the People pillar) includes indicators that measure the intended first order effects of DMIL policy implementation.

Successful DMIL policy implementation would stimulate other changes, which would improve Jamaica's scores in the Content and Future Technologies pillars. We would expect to see more Jamaican entrepreneurs and established businesses adopt (1.3.1) and invest (1.3.2) in emerging technologies. We would expect computer software spending (1.3.4) to increase, more firms to establish websites (2.2.1) and more businesses to use digital tools (2.2.5). We would

also expect greater digital inclusiveness, with higher scores for the availability of local online content (3.3.3) and a reduced gender gap in internet use (3.3.4). Finally, we would anticipate higher labour productivity per employee (4.1.4) and increased prevalence of the gig economy (4.1.5).

Table 13:

NRI Indicators suitable for monitoring success of DMIL policy

ID#	Indicator	ID#	Indicator
1.2.1	GitHub commits	2.1.1	Internet users
1.2.2	Wikipedia edit	2.1.3	Use of virtual social networks
1.2.3	Internet domain registrations	2.2.1	Firms with website
1.2.4	Mobile app development	2.2.5	Business use of digital tools
1.3.1	Adoption of emerging technologies	3.3.3	Availability of local online content
1.3.2	Investment in emerging technologies	3.3.4	Gender gap in Internet use
1.3.4	Computer software spending	4.1.4	Labour productivity per employee
		4.1.5	Prevalence of gig economy

Table 13 summarizes the NRI Indicators suitable for monitoring success of DMIL policy implementation.

04

Research Findings

Summary

This research endeavor seeks to develop a unified Digital, Media and Information Literacy Framework that will inform and guide policy guidelines and tools to benchmark and support the development of DMIL for Jamaica across a wide range of public/private sector entities and educational/training domains.

To better understand the challenges and barriers faced by various groups and stakeholders that can be addressed by DMIL, and to inform the strategies needed for effective implementation, a series of in-depth expert interviews and broader stakeholder constellations, across the private sector, public sector and civil society are underway. This report represents a preliminary analysis of primary qualitative data taken from interviews, focus groups, and meetings/presentations involving a diverse set of stakeholders, as well as the analysis of relevant archival quantitative data. Additional interviews, consultations and rounds of data gathering are planned with the objective of a deeper exploration of the emergent themes proposed in this report.

The qualitative effort spanned nine (7) Key Informant Interviews, where the participants were selected using purposive expert sampling as well as one (1) stakeholder consultation activity and one (1) meeting activity.

Key Informants were:

- Dr. Deborah Hickling-Gordon, Lecturer - Institute of Caribbean Studies, UWI
- Prof. Daniel Coore, Professor - Department of Computing, UWI
- Dr. Lennox Rowe, Senior Education Officer - Core Curriculum Unit, MOE
- Dr. Paulette Kerr, Lecturer - Department of Library and Information Studies, UWI

- Dr. Anthea Henderson, Lecturer - Caribbean School of Media & Communication, UWI
- Roger Williams, National Outsourcing Coordinator, JAMPRO
- Stacey Hines, President - Jamaica Technology and Digital Alliance

The stakeholder consultation consisted of representatives of the National Secondary Students Council (NSSC), the Jamaica Prefects Council and the Institute of Law and Economics. Additionally, the research was presented to and met with the Private Sector Organization of Jamaica's (PSOJ) technology sub-committee. An inception workshop and project oversight committee meeting, provided crucial feedback, discussion and archival content for analysis. These meetings included participants from a number of stakeholder organizations, including (but not limited to):

- Broadcasting Commission of Jamaica
- JAMPRO
- MICO University College
- The Ministry of Education, Jamaica
- University of the West Indies
- Jamaica Technology and Digital Alliance
- Flow/One by One Education

The transcripts generated from these activities were reviewed using a constant comparative method and three (3) resulting major themes and a number of minor were identified:

Learning Environment:

- Focus on higher level critical skills
- Integration of DMIL in teaching practice
- Opportunities for non-consequential assessment and reward-based achievement

Knowledge Standards:

- Clear national goals and objectives
- Investor-attracting aggregate data
- Talent supply
- Agility of institutions

Knowledge Application:

- Utility of DMIL for the student
- Utility of DMIL for the average citizen
- Utility of DMIL for the entrepreneur, especially within the creative and cultural industries

For the quantitative piece of the work priority was given to ensuring that the data was not only accurate but also reliable and generalizable. For this, the services of the well-reputed Market Research and Survey Limited (MRSL) headed by renowned Jamaican pollster Don Anderson were procured.

That team adopted a multi-stage approach to the design of the sample, beginning with an accepted margin of error of approximately 3% and a confidence interval of 95%, leading to a comfortable sample size of 1000 (n=1004) Jamaican households. These parameters mean that the team is almost perfectly certain

that the results are representative and that if another study were conducted within any random sample of Jamaicans matching similar profiles, the insights gleaned would be the same.

To further ensure the representativeness of the sample, additional measures were taken, such as:

- Determining the sample size for each parish, the primary sample unit (PSU) using the population proportionate to size (PPS) methodology. Here, the sample size in each parish was determined by using the parish's population proportion to determine the parish sample proportion.
- The sample size in each PSU was then further broken down into rural vs urban samples according to the parish's population profile, that is, the population of residents in rural vs urban towns and districts.
- Once the sample size and structure (rural vs urban) in each PSU was determined, the total number of sample points/enumeration districts (EDs) was then determined, with a maximum sample size of 10 being established for each ED.
- The selection of the EDs was randomly done using STATIN's list of rural and urban EDs.
- Demographic (gender and age) and Socio-graphic (social class) quotas were also assigned to each PSU using the national average.
- The selection of households from which the respondent would be chosen was also randomly done by assigning a start point in each ED for the data collectors. Data collectors then followed a random walk process throughout each ED featuring counting three houses in the more densely populated areas and two clear houses in less dense areas, after achieving a successful interview.
- The respondent in each household was determined according to the demographic and socio-graphic quotas set for each parish.

The result of this sampling technique is represented in Table 1 below, where a comparison of the sample used in this study is matched to the latest national data provided by the Statistical Institute of Jamaica (STATIN) for 2019.

Having taken the necessary steps to ensure that the sample was nationally representative, the field work commenced. In order to remain as empirical and scientific as possible, and to remove any inherent bias created by technology, the fieldwork was carried out through a series of Face-To-Face interviews using a structured questionnaire. The questionnaire was made digital and the interviewers trained in the delivery of computer aided personal interviews (CAPI). This enhanced the efficiency of data capture throughout the process. The final safeguard for data efficacy was a pilot test, which was conducted and based on the findings lead to the adjustment of the tool (questionnaire) in order to ensure comprehension of the question items.

Table 14:

Representativeness of the Sample

Demographic Parameter	2022 BCJ DMIL Study	2019 STATIN National Data
Gender – Male	45.3%	49.5%
Gender – Female	54.7%	50.5%
Age – 18 - 24	22.8%	13%
Age – 25 - 34	23%	17%
Age – 35 - 44	19.3%	13%
Age – 45+	34.9%	30%
Location – Kingston and St. Andrew	27.8%	24%
Location – Clarendon	8.4%	9%
Location – Hanover	2.4%	3%
Location – Manchester	7.3%	7%
Location – Portland	3.2%	3%
Location – St. Ann	6.5%	6%
Location – St. Catherine	17.8%	19%

In keeping with MRSL's quality standard, no single interviewer was allowed to do more than 3% of the total sample, thereby a team of 35 data collectors worked on this survey. Additionally, the collected data was validated to ensure accuracy. This involved a random selection of a minimum of 30% of each interviewer's submitted questionnaires

As a note, the sampling frame was limited to Jamaicans above the age of 18. This decision was grounded in considerations of ethics (extracting data from a minor) and logistics (language as well as process), and how involving this age group would affect the time and budget of the exercise.

4.1 - Detailed Qualitative Analysis

The qualitative analysis employed a series of steps in keeping with the constant comparative technique. After all transcripts were coded, computer-assisted word frequencies and other analyses were used to identify patterns and finalize the themes emerging.

The word cloud in Figure 6 demonstrates the centrality of training, development and services within the response of the experts interviewed. These terms guided the identification of the final three major themes identified from the transcripts. Though mutually exclusive, these themes are deeply related to each other and form a complex of factors describing the current DMIL landscape in Jamaica.

Major Theme: The Learning Environment

Gaps In The Kind Of Training Offered

In examining “training” the team found that across all interviews there was express concern regarding the way people were educated and the resulting absence of mature critical thinking skills and deep integration of ICTs.

In one interview it became obvious that while the National Standards Curriculum documents for each subject and each grade level includes generic advice in most modules to help students develop DMIL competences (ICT Attainment Standards), this advice lacks the kind of granularity or specificity to be useful to a teacher preparing lesson plans for the coming week’s classes. For that purpose there remains a need for the inclusion of more specific guidance to teachers on how to implement these standards in their course delivery and with specific teaching and learning activities that illustrate how the ICT attainment targets would be reached. This guidance would not just include how technology would

be included in the delivery of course material, but also what kind of technology supported activities students would be expected to perform.

The effects of this stretch into the employability of the graduates as the local BPO industry has identified a talent gap that is so debilitating that and in order to increase their level of competitiveness they have begun investing in their own "Talent Development". Larger BPO's will identify online courses aligned with industry standards and certification, such as a Google or Amazon certified course, and will treat it as an investment of time and money in the standard maintenance of their employees. While smaller BPO's who may not have the capacity to train staff will instead have requirements of academic or professional certification when searching for new hires, limiting the pool of applicants from which they can select.

Intervention at a national level is needed to create a larger pool of eligible candidates, easing the burden on the Private Sector in having to develop basic levels of capacity among new and potential hires. This would allow employers to focus on recruitment and building higher level skills within their inhouse talent.

Gaps In The Training Of The Trainers:
Resource-strain to complete training of training

In speaking with representatives from the MOE and the UWI it was quickly ascertained that there are not enough resources within the institutions with oversight to adequately monitor the integration of DMIL-focused tools and techniques across the spectrum of training. Trainers that instruct teachers discuss the activ-

Figure 6:

Word Cloud based on Words in Codes in Transcripts

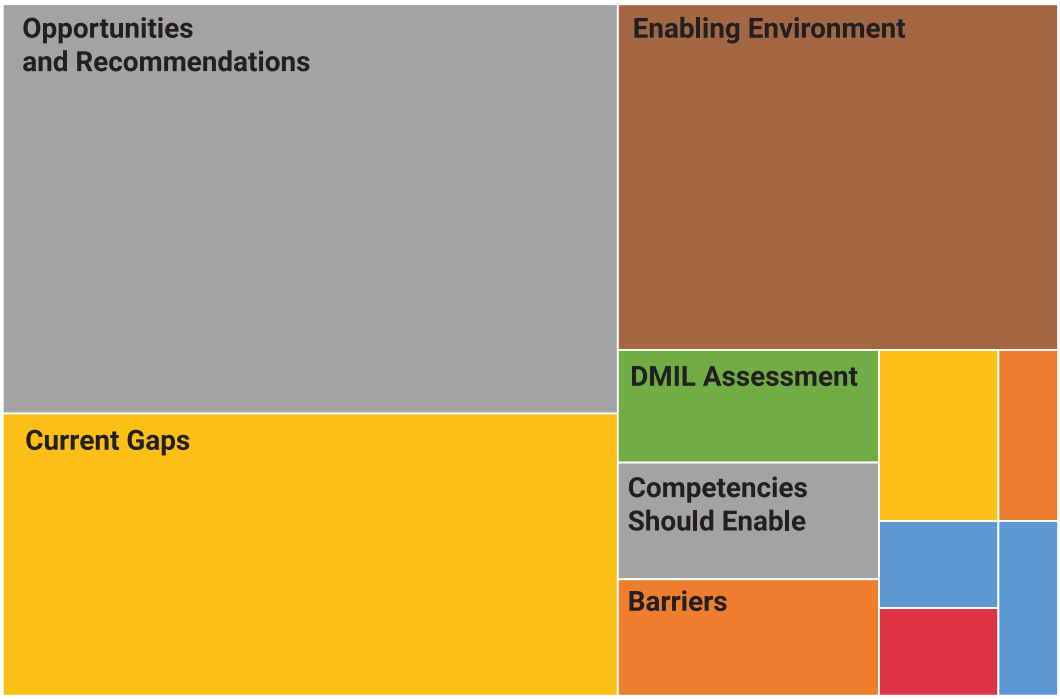
ities but do not demonstrate them. Neither do they use DMIL-focused tools and techniques in that training. This perpetuates a culture where DMIL is acknowledged as necessary but never translated into practical and demonstrable practices within the learning experience.

The shortage of resources is not only people-centred, as many schools are unable to equip their teachers, classrooms or students with the requisite tools to participate in DMIL-focused training activities. Together these realities reduce the current standards and guides to books on shelves that only those with institutional memory of their creation access and reference.

Lack Of Demonstrative Techniques In The Training Of The Trainers
As noted above, another gap quickly identified was focused on the space between the establishment of a framework on the successful sustainable execution and implementation of the same within the curricula.

It was discovered that teachers have only been exposed to a small amount of training focused on the ICT attainment standards, with each teacher receiving less than an estimated 4 hours of training per year on how to integrate ICTs in their teaching practice. Thus violating the premise that teachers should not only be equipped with the necessary skill and knowledge to implement these standards, these standards should be used in the training of teachers both in professional development workshops as well as teacher training institutions. Similarly, not much has been done to monitor the effectiveness or adherence of the MOE's ICT integration standards in the delivery of the curriculum and while Professional Development workshops/seminars are offered a few times per year, topics covered in these sessions typically focus on lesson planning and other teaching

Figure 7:
Tree map of Codes in Transcripts



principles rather than ICT tools and techniques for integrating the same into the learning experience.

As a final omission, despite the drafting of these ICT integration standards, there has not been a focus on training teachers already in the field. The earlier mentioned Professional Development workshops do however represent an opportunity to develop the DMIL competencies of teachers already in the field. These workshops are often well attended each summer and there will likely be a great deal of interest in techniques for increased technology use in course delivery as well as teaching and learning activities. Additionally there are discussions underway to make the workshops mandatory for teachers as it will be part of a certification process led by the Jamaica Teaching Council. Teachers will be required to complete various seminars, workshops and short courses each year to maintain their teaching certification.

Gaps In The Student Experience

Though the pandemic has forced many schools and teachers to embrace the use of technology in the delivery of their course material, there still is a considerable gap between the use of ICTs and the empowerment of students through the use of ICTs and therefore the achievement of the defined ICT attainment standards.

A commonly raised example from student stakeholders was that of teachers using PowerPoint presentations in the delivery of their lectures as a digitization of the usual “chalk and talk” method, where the student is only spoken to and does not feel engaged. So that even though the technology is in play, the goals of interaction, engagement, and ultimately curiosity and empowerment are not achieved.

Students reported feeling relatively confident in the use of digital devices and tools in their daily lives to communicate and consume content, however when required to perform tasks using tools such as Microsoft Word or Excel they expressed a great deal of hesitancy as they felt as if they were not adequately prepared to use these tools despite having been taught how to in their focused IT classes. For most students their IT class represents the only opportunity they have to interact with computers and software such as Microsoft Word or Excel in a teaching and learning environment. Therefore the knowledge and skills they are acquiring in their IT class is not being utilized or reinforced in other subjects.

The observation was also made that instruction for ICTs and DMIL must extend beyond the classroom and class time. The actions involved in interacting with DMIL tools are often highly repeatable and the tools themselves are growing in accessibility to students outside of the classroom (often the classroom becomes a student-accessed ICT tool e.g. laptop for online class). Therefore, when exploring topics related to technology there is the growing importance for teachers to ensure that lessons are also grounded in practical examples that students can replicate on their own. Students must be empowered to independently explore and reinforce the lessons learned in class, if not there is the growing tendency for those students to lose trust in that particular source of knowledge and disengage from that particular teaching and learning experience entirely.

Based on the commonality of education and training across these minor themes, they were combined into the major theme “Learning Environment”. It is important

to note the homogeneity of the responses reviewed despite the varying perspectives of the interviewees. This "sameness" despite the distinct differences in the sources brings a distinct gravity to the issue – i.e. the policy implementers, the teachers, the students and the employers all expressed similar concerns about Jamaica's current learning environment and its inadequacies for the future and the sustainable growth of the nation and its citizens.

Major Theme: Knowledge Standards

Separate from the gaps in education and training, but closely related to that theme were notions around what the requisite knowledge should be and how it should be accessed and serve the nation. The strong sentiment was that education should not happen in a vacuum nor should the institutions of the same become so monolithic that a disconnect from employability emerges and is sustained. Instead, education should serve to bolster the nation's competitiveness and create a viable supply of talent for the nation's innovators and businesses.

Establishing the right standards

It is acknowledged the proposed ICT Integration Standards, drafted by the Core Curriculum Unit in 2015 seeks to guide the integration of information and communication technologies throughout the delivery of the Ministry's curricula. The objective of these standards is to enable students to themselves become effective communicators through the utilization of media and technology, to empower them to design and create digital media, to be effective critical thinkers and independent researchers, and ultimately become responsible digital citizens.

However, one core line of argument that was put forward – especially by the Private Sector experts, was the idea that standards must be in place, but that these standards must be grounded in the increased employability of the new workforce. It is felt that intervention at a national level is needed to create a larger pool of eligible candidates, easing the burden on the BPO's (and other employers) to develop basic levels of capacity among new and potential hires. This would allow employers to focus on recruitment and building higher level skills within their inhouse talent.

In the absence of a nationally structured effort, local BPO's have started investing in capacity building efforts, often working alongside their clients to do so. Many of these companies rely heavily on a digitally literate workforce and so are willing to work with the nation's institutions to identify the nuances and appropriate weightings of various DMIL knowledge areas. This serves to highlight that complementary competencies are also desirable, where technical skills such as software development are combined with user experience research and various soft skills. This line of thought posits that DMIL competency should not solely focus on the individual's skills and capacity, but also their ability to abstractly view the tools and techniques and position themselves as the "other" so as to arrive at a more robust solution, moving beyond just having the technical knowledge or skills to execute a solution, but also the right attitude and critical skills needed in approaching the problem itself.

Of note, with these standards in place and executed, a widely available set of DMIL assessment tools presents an opportunity as such tools can support the various industries.

Ensuring global-ready and shareable performance

The hit to competitiveness and profitability faced by the local BPO sector as a result of the talent gap is exacerbated by their inability to demonstrate to potential clients and investors alike that Jamaica is on a path to the resolution of that problem. While it is reassuring that the MOE's ICT Integration standards were influenced by and designed to be aligned with the International Society for Technology Education's (ISTE) standards, and the currently proposed DMIL framework pulls on the established DigCOMPII and GMIL frameworks, the absence of monitoring and evaluation mechanisms for the nation's school-leaver's baseline competence is problematic.

Remaining adaptive

Routine, low-skill jobs are being eliminated as emerging automation and artificial intelligence technologies have begun to provide better service delivery and many cases removes the need for such jobs. This has shifted the need for human intervention towards complex, non-traditional, non-routine, "sticky" problems. Cognizant of this, it was expressed that we disenfranchise a great deal of society through not adequately preparing them for emerging knowledge intensive jobs, and it is likely that there will come a time when all jobs will require some sort of knowledge base. Employers are actively seeking to hire entry level staff who can effectively communicate, and possess problem solving skills and the capacity for analytical and critical thinking.

It is believed that technology and knowledge intensive industries (like the BPO sector) evolve very quickly as the needs of clients change rapidly and clients expect that their service providers can and will adapt quickly to those changes. Therefore training curricula cannot be static, as the knowledge and skills required for BPO's to meet their client's needs, so should the learning objectives and content of the training programs. This also places a great deal of importance on the need for critical thinking and problem solving among BPO staff, as it speaks to their ability to rapidly adapt to new circumstances and challenges.

Major Theme: Knowledge Applications

Responding to the "Why?" of learning

There is a growing perspective that there has been a decline in the critical thinking skills of students at the secondary and tertiary levels, where their ability to make logical inferences from the combination of two or more points of information is lacking. However, there also seems to be a shift among students as to why education is important. Rather than holding to the perception that education is a conduit to the transferring of competence that will lead to employment, instead students pursue education in response to social convention. This leads to a disconnect, where the acquisition of academic certification is only means to an end.

Students need to be convinced of the importance of the knowledge and competence that they are building through establishing a direct link to their future employment and career. Most students, once convinced that certain competencies as well as methods of assessment are sought after and utilized by industry, will appreciate the teaching and learning process and become more engaged.

Building out a digital culture

As the other minor themes were considered, an insight became clear: with all stakeholders noting similar complaints, the one thing that is undoubtedly absent from the environment is a clear and shared sense of digital culture. Instead, Jamaica is stuck on the analog side of the transition with a few stakeholders trying to motivate her transition to digital. This absence of the "digital culture" does not create the cultural imperative to acquire knowledge beyond that which is necessary to communicate - and so interaction with e-services; sharing opinions; and generalized content creation become skills that are only developed as necessary. Service and product providers remain unchallenged by a digitally unsophisticated consumer pool and so never innovate as well as remain generally hesitant to offer digital services. This is proffered as the reason the COVID-19 pandemic has had such a grave impact on the Jamaican standard of living.

Baseline AS WELL AS Specialized Knowledge

There is a perceived unevenness to the digital literacy of many entrants into the labour pool. While they have a great deal of comfort with social media and instant messaging platforms and applications such as WhatsApp and Facebook, most have little to no exposure to or expertise with Microsoft Office 365 and other business applications. This underscores the need for higher order competencies especially as emerging technology eliminates the need for humans in lower level tasks. Higher order skills are considered as: data analytics; SEO management; user experience analysis; and to name a few.

Vulnerable groups are put further at risk as they do not have the competencies to navigate this new digital and information dependent environment. Furthermore they will remain at risk as not enough has been done to empower them.

Of substantial note were the interviews conducted with Ms. Andrea Dempster Chung and Mrs. Maria Thompson-Wlaters. From these interviews of highly respected individuals within the cultural and creative industries and public sector respectively, the previously identified themes were not only ratified but strengthened, through quotes such as:

> "...language literacy is not a barrier to digital literacy"
>
> - Andrea Dempster Chung

> "...we found is that persons in the public sector tend to think of digital literacy as the ability to use the computer, to know where to go to do what, but for us it goes beyond that. So it's more around the effectiveness of technology and operating effectively in the digital space. Which [are things such as:] understanding when you're putting your organization at risk; understanding how to use data - not just to have all this data, but how to actually use the data and to put data into a format that is consumable that makes sense that can inform policy. …what we have found for us is that getting the public sector to a place where they understand the effectiveness of being digitally literate is an essential ingredient if we are going to transform the public sector."
>
> - Maria Thompson-Walters

4.2 - Detailed Quantitative Analysis

Univariate Findings of the Baseline Study

Demographics

Of the sample of 1004 Jamaicans spanning the 14 parishes of Jamaica, 45.3% were male with 54.7% being female. The average age of the sample was between 25 years and 34 years (23%), with an additional 22.8% falling into the 18 years through 24 years age group. Of the remaining members, 47.3% of the sample was between 35 and 64 years and 6.9% of the sample was 65 years or older. The youngest member of the sample was 18 years old, with the most mature respondent being 84 years old. The sample was distributed in a representative manner across Jamaica (as shown in Table 1), with Kingston and St. Andrew accounting for the highest concentration of respondents with 27.8% of the sample (n=1004) and St. Catherine following immediately with 17.8%. St. Mary contributed the lowest concentration of responses, accounting for only 2.2% of the sample, with Hanover (2.4%), Portland (3.2%), and St. Thomas (3.3%) and Trelawny (3.3%) comprising the lowest tier of contributors.

Most of the sample (51.7%) had achieved formal education equivalent to grade 10/11 (or NCTVET L1 or L2), 18.9% had grade 9 or lower through to no formal education, while 12.4% had attained at least a first degree.

60.6% (n=1004) of the respondents were gainfully employed, with another 5.2% being students. 23% were unemployed and 4.9% were retired. 83% (n=610) noted their jobs as full-time, while 17% (n=610) were part-time employed. Of note, 39.7% (n=603) of the employed individuals who offered a response described their employment status as “self-employed” while 59.5% (n=603) described themselves as employees.

Of interest, based on self-report, 53.5% of the respondents (n=765) were members of families whose total monthly income after taxes was JMD $100,000 or less. The highest 10% of earners accumulated at least JMD $250,000 per month, with the highest 5% earning at least JMD $350,000 per month and the highest 1% earning over JMD $500,000 per month. These figures take on additional significance when it is considered that the average household in the sample (n=988) consisted of 3 people (with a standard deviation of approximately 2.1). Notably, while the smallest household comprised the single individual interviewed, the largest was recorded as being up of 20 people.

An examination of the socio-economic categorizations across the sample (n=1004) revealed that 63.6% would be categorized as Low and Middle Income (DE), while 31.9% were middle (C2) and only 4.5% would be classified as High and High Middle (ABC1). Additional observations showed that average monthly grocery bills of respondents (n=906) ranged from as little as JMD $2,000 to as much as JMD $335,000 per month. Accounting with these seeming outliers in place, the mean grocery bill per month was JMD $30,781.19 with a standard deviation of plus or minus JMD $25,268.88. This was a notable departure from the modal value of JMD $20,000 as well as the median value of JMD $25,000, suggesting a significant skew in the data distribution.

Practices and Competencies

So far as owning and accessing the tools that facilitate Digital Media and Information Literacy, it was found that 51.3% (n=967) neither owned nor had access to a computer (desktop or portable), and that while most people (60.8%, n=932) did not own or have access to a feature phone, 91.4% (n=1002) owned a smartphone. while 42.2% reported owning a tablet device, 44.8% (n=977) of the sample reported having no access to the Internet using this type of device.

When accessing the Internet, 59% of respondents (n=977) did not use a computer (desktop or portable), and further, 81.7% (n=956) did not use a feature phone nor did 53.3% (n=975) use a tablet. However, the smartphone was used by 92.4% (n=1002) of the sample to access the Internet.

69.5% (n=1002) did not make online purchases, nor did they (68.8%, n=1001) carry out transactions with the Government. Notably, though the overwhelming majority (88.2%, n=1002) sends and receives SMS and MMS messages and even install software/apps (60.8%, n=998), many of the respondents did not engage in tasks such as copying or moving files between folder and/or devices (58.4% did not engage in this; n=1002). Further examination of what would be considered “Productivity” oriented tasks revealed that, in the last three months, only 49.1% (n=1000) had used word-processing software and 33.1% (n=992) has used spreadsheet software at the basic levels – this fell to 21.6% (n=991) when the advanced use of spreadsheets to organize and structure data was considered.

Most Jamaicans (80%, n=1002) access the Internet and generally they do so to:

- listen to music and watch films (87.4%, n=1003)
- access social media networks (83.3%, n=1002)
- contact friends and acquaintances via web chat and instant messengers (75.8%, n=1004)
- send and receive emails (72.8%, n=1003)

- store photos, documents or other files in the cloud (67.2%)
- find information about goods and/or services (65.1%, n=1003)
- to share multimedia (58.6%, n=995)
- search for and consult information for personal and professional use (57.3%, n=1000)
- do video-conferencing (59.9%, n=1001)
- seek health related information (56.3%, n=1001)
- download multimedia content (55%, n=994)

On the other hand, Jamaicans are less likely to use the Internet to:

- sell goods or services via a website or app (17.3%, n=1002)
- take part in public opinion polls and/or online surveys from public and/or private institutions (21.5%, n=1001)
- do an online course leading to any kind of qualification (24.7%, n=1002)
- report situations or submit complaints (27.6%, n=1000)
- actively participate in forums and/or message boards (33.3%, n=993)
- communicate with public and/or private organizations to express an opinion/idea (38.2%, n=998)
- manage bank accounts and financial operations (38.5%, n=1000)
- manage a personal website (38.6%, n=1003)
- use online learning material for any other reason (43.4%, n=997)
- work with others (46.9%, n=1000)

The continued examination of the data revealed that 64.4% of Jamaicans (n=1004) felt it was a relatively easy task to adjust privacy settings on their devices. 69.9% knew how to change settings on the operating system of computers and 73.8% (n=1004) felt the same way about turning off the location settings on their mobile devices.

Despite 68% (n=1004) expressing similar ease with connecting devices via Bluetooth and other wireless technologies, there was a noticeable fall-off when Jamaicans were asked about the ease with which they were able to recognize where a Wi-Fi network was safe and secure, with only 47.2% indicating more ease than difficulty in completing the task.

Regarding behaviour within digital spaces, and most significantly behaviour on the Internet, the great majority (89%, n=983) of Jamaicans noted that they: were polite and respectful during online communications; reread messages to ensure the recipient could understand before sending (81.9%, n=992); were aware if the socially accepted “codes of conduct” online (67.3%, n=996). Some (70.2%, n=993) were even practicing techniques to keep themselves aware of the advantages and risks relating to exposing their identity on the web and manged their public online profile in accordance with their needs and in protection of their digital identity (69.8%, n=996) – though when it concerned managing multiple different profiles, 39.6% admitted that they were not capable of such a feat.

There were some behaviours that did not garner as much attention. For example, only 54.1% (n=986) kept up-to-date on how to avoid causing harm to others through their own use of the Internet; but fortunately 72.9% were aware of the health risks associated with the inappropriate use of devices including the computer, tablet and even mobile phone.

Other skills investigated included the ability to:

- synchronize documents, contacts or apps across devices: 44.3% (n=1004) found this very easy
- delete the record of sites visited in the past: 54% (n=1004) found this very easy
- protect a device with a PIN or other security: 62.5% (n=1004) found this very easy
- store photos and other files in the cloud: 55.1% (n=1004) found this very easy
- use private browsing: 35.4% (n=1004) found this very easy
- block unwanted pop-ups and ads: 51.2% (n=1004) found this very easy
- use any programming language: 34.4% (n=1004) thought this was not easy at all and 19.9% did not even understand what the question meant
- choose the best keywords for searches online: 46.4% (n=1004) found this very easy
- find a website they had previously visited: 55.3% (n=1004) found this very easy
- find information on a website despite its design: 40.3% (n=1004) found this very easy
- use the advanced functions of a search engine: 37.8% (n=1004) found this very easy
- check the veracity of information found online: 37.7% (n=1004) found this very easy
- figure out If a website can be trusted: 32.9% (n=1004) thought this was not easy at all
- understand the iconography of apps and websites: 47% (n=1004) found this very easy
- identify the appropriate tools for communication (Whatsapp vs email vs a call): 60.9% (n=1004) found this very easy
- determine when to mute yourself and/or disable other online interactions: 57.3% (n=1004) found this very easy
- block messages from chosen people: 63.3% (n=1004) found this very easy
- determine which images of yourself are OK to share online: 58.8% (n=1004) found this very easy
- use appropriate emoticons: 62% (n=1004) found this very easy
- report negative content to authorities: 41.1% (n=1004) found this very easy
- recognize when someone is being bullied: 49.9% (n=1004) found this very easy
- create something that combines different digital media: 42.3% (n=1004) found this very easy
- edit existing digital images and other media: 45.3% (n=1004) found this very easy
- ensure the high visibility of content you post online: 53.3% (n=1004) found this very easy
- change content posted online based on how people react to it: 52.6% (n=1004) found this very easy
- distinguish between sponsored and non-sponsored content: 34.4% (n=1004) found this very easy
- use reference content covered by copyright within the legal allowances: 30.1% (n=1004) found this very easy

In closing the analysis of the univariate findings, the design of the instrument allows for the calculation of Jamaican digital literacy using the Eurostat metrics for Information Skills, Communication Skills, Problem-Solving Skills (Digital) and Software Skills. Further the overall Digital Skills Index is computed from these four indicators. The individual indicators measure skills using three (3) levels: "No skills/skills too low to be measured"; "Basic skills" and "Above basic skills". Isolating these, it was found that most Jamaicans (70.9%) have above basic skills in information management and manipulation. The concentration of Jamaicans having "above basic skills" remained true for technology-driven communication skills (76.8% had above basic skills) and the two remaining domains despite there being a large fall-off in the proportions of the latter two. Jamaicans holding above basic skills in Problem-Solving Skills (Digital) fell to 48.2% (n=1004) while for Software Skills the mode fell to 37.8% with above basic skills.

When the calculations were completed to examine how the Jamaican population rated on the Eurostat overall digital skills index, it was found that of the 1004 respondents, 7.5% had "no skills", 26.4% had "low skills", 39.3% had "basic skills" and 26.8% had "Above basic skills".

Additional Insights

- Based on the findings above, the following statements may be used to create the baseline profile of the average Jamaican:
- The average Jamaican does not own or have access to DMIL facilitating devices except for the smartphone
- The average Jamaican accesses and makes use of the Internet from a smartphone
- Communication, social interaction and entertainment drive the engagement in practices dependent on DMIL
- The average Jamaican scores as having "basic skills" on the Eurostat digital skills indicator

Multivariate Findings

Table 15a:

Chi-Square results across multiple suspected factors (ownership and access)

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Ownership of/access to							
Desktop/Portable	p > 0.05	p < 0.001 r = 0.312 n = 1004	p < 0.001 r[1] = 0.427[2] n = 967	p < 0.001 r = 0.307 n = 967	p = 0.036 r = 0.120 n = 588	p < 0.001 r = 0.323 n = 967	p < 0.001 r = 0.307 n = 967
Feature Phone	p > 0.05	p = 0.012 r = 0.176 n = 932	p = 0.009 r = 0.211 n = 967	p > 0.05	p > 0.05	p < 0.001 r = 0.349 n = 932	p > 0.05
Smartphone	p > 0.05	p < 0.001 r = 0.281 n = 1002	p < 0.001 r = 0.300 n = 1002	p = 0.007 r = 0.187 n = 1002	p > 0.05	p < 0.001 r = 0.330 n = 1002	p > 0.05
Tablet	p < 0.001 r = 0.154 n = 963	p < 0.001 r = 0.290 n = 1004	p < 0.001 r = 0.337 n = 963	p = 0.008 r = 0.189 n = 963	p = 0.035 r = 0.121 n = 582	p < 0.001 r = 0.315 n = 963	p = 0.002 r = 0.145 n = 963
Access the Internet using							
Desktop/Portable	p > 0.05	p < 0.001 r = 0.266 n = 977	p < 0.001 r = 0.383 n = 977	p < 0.001 r = 0.264 n = 977	p = 0.009 r = 0.009 n = 592	p < 0.001 r = 0.239 n = 977	p < 0.001 r = 0.208 n = 977
Feature phone	p > 0.05	p > 0.05	p < 0.001 r = 0.170 n = 956	p > 0.05	p > 0.05	p < 0.001 r = 0.296 n = 956	p > 0.05
Smartphone	p = 0.022 r = 0.072 n = 1002	p < 0.001 r = 0.321 n = 1002	p < 0.001 r = 0.297 n = 1002	p < 0.001 r = 0.233 n = 1002	p > 0.05	p > 0.05	p > 0.05
Tablet	p < 0.001 r = 0.108 n = 975	p < 0.001 r = 0.259 n = 975	p < 0.001 r = 0.260 n = 975	p < 0.001 r = 0.187 n = 975	p = 0.008 r = 0.109 n = 593	p < 0.001 r = 0.207 n = 975	p > 0.05

[1]The correlation coefficient used is the Contingency Coefficient for Chi-Square

[2]Only significant relationship with r >= 0.3 are highlighted

Table 15b:

Chi-Square results across multiple suspected factors (DMIL-based activities)

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Made online purchases in the last 12 months	p > 0.05	p < 0.001 r = 0.260 n = 1002	p < 0.001 r = 0.365 n = 1002	p < 0.001 r = 0.221 n = 1002	p < 0.001 r = 0.158 n = 609	p < 0.001 r = 0.242 n = 1002	p < 0.001 r = 0.253 n = 1002
Carried out online transactions with the government in the last 12 months	p > 0.05	p < 0.001 r = 0.197 n = 1001	p < 0.001 r = 0.374 n = 1001	p < 0.001 r = 0.196 n = 1001	p < 0.001 r = 0.162 n = 1001	p < 0.001 r = 0.282 n = 1001	p < 0.001 r = 0.264 n = 1001
Engaged in – sending and receiving SMS/MMS	p = 0.013 r = 0.078 n = 1002	p < 0.001 r = 0.152 n = 1002	p < 0.001 r = 0.188 n = 1002	p > 0.05	p > 0.05	p < 0.001 r = 0.192 n = 1002	p = 0.047 r = 0.078 n = 1002
Engaged in – copying/ moving files between folders and devices	p > 0.05	p < 0.001 r = 0.317 n = 1002	p < 0.001 r = 0.378 n = 1002	p < 0.001 r = 0.250 n = 1002	p = 0.003 r = 0.122 n = 609	p < 0.001 r = 0.231 n = 1002	p < 0.001 r = 0.201 n = 1002
Engaged in – the installation of software and apps	p = 0.009 r = 0.009 n = 998	p < 0.001 r = 0.391 n =998	p < 0.001 r = 0.314 n = 998	p < 0.001 r = 0.279 n = 998	p > 0.05	p < 0.001 r = 0.205 n = 998	p = 0.017 r = 0.017 n = 998
Used basic word-processing in the last 3 months	p > 0.05	p < 0.001 r = 0.368 n = 1000	p < 0.001 r = 0.394 n = 1000	p < 0.001 r = 0.277 n = 1000	p > 0.05	p < 0.001 r = 0.220 n = 100	p < 0.001 r = 0.195 n = 1000
Used basic spreadsheet functions in the last 3 months	p > 0.05	p < 0.001 r = 0.277 n = 992	p < 0.001 r = 0.409 n = 992	p < 0.001 r = 0.289 n = 992	p = 0.021 r = 0.094 n = 600	p < 0.001 r = 0.263 n = 992	p < 0.001 r = 0.240 n = 1000
Used advanced spreadsheet functions in the last 3 months	p > 0.05	p < 0.001 r = 0.203 n = 991	p < 0.001 r = 0.351 n = 991	p < 0.001 r = 0.206 n = 991	p = 0.034 r = 0.086 n = 604	p < 0.001 r = 0.329 n = 991	p < 0.001 r = 0.197 n = 991

Table 15c:

Chi-Square results across multiple usage factors (activities while online)

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Use the Internet							
to on your desktop or mobile	p > 0.05	p < 0.001 r = 0.339 n = 1002	p < 0.001 r = 0.277 n = 1002	p < 0.001 r = 0.179 n = 1002	p = 0.009 r = 0.106 n = 609	p < 0.001 r = 0.204 n = 1002	p > 0.05
to listen to music and watch films	p > 0.05	p < 0.001 r = 0.348 n = 1003	p < 0.001 r = 0.283 n = 1003	p < 0.001 r = 0.220 n = 1003	p > 0.05	p = 0.018 r = 0.154 n = 1003	p = 0.038 r = 0.080 n = 1003
to access social media networks	p > 0.05	p < 0.001 r = 0.364 n = 1002	p < 0.001 r = 0.340 n = 1004	p < 0.001 r = 0.191 n = 1002	p < 0.001 r = 0.155 n = 1004	p < 0.001 r = 0.222 n = 1002	p = 0.003 r = 0.109 n = 1002
to contact friends/ acquaintances through	p > 0.05	p < 0.001 r = 0.327 n = 1004	p < 0.001 r = 0.328 n = 1004	p < 0.001 r = 0.219 n = 1004	p < 0.001 r = 0.186 n = 610	p < 0.001 r = 0.239 n = 1004	p < 0.001 r = 0.117 n = 1004
to send and receive emails	p > 0.05	p < 0.001 r = 0.390 n = 1003	p < 0.001 r = 0.369 n = 1003	p < 0.001 r = 0.245 n = 1000	p < 0.001 r = 0.161 n = 610	p < 0.001 r = 0.217 n = 1003	p < 0.001 r = 0.153 n = 1003
to store photos, documents and files in the cloud	p > 0.05	p < 0.001 r = 0.328 n = 996	p < 0.001 r = 0.315 n = 996	p < 0.001 r = 0.239 n = 996	p > 0.05	p < 0.001 r = 0.192 n = 996	p < 0.001 r = 0.125 n = 996
to find information about goods/services	p > 0.05	p < 0.001 r = 0.361 n = 1003	p < 0.001 r = 0.370 n = 1003	p < 0.001 r = 0.245 n = 1003	p < 0.001 r = 0.163 n = 609	p < 0.001 r = 0.188 n = 1003	p < 0.001 r = 0.137 n = 1003
to share multimedia	p > 0.05	p < 0.001 r = 0.304 n = 995	p < 0.001 r = 0.297 n = 995	p < 0.001 r = 0.170 n = 995	p = 0.037 r = 0.085 n = 605	p < 0.001 r = 0.271 n = 995	p < 0.001 r = 0.148 n = 995
to search for/consult information	p > 0.05	p < 0.001 r = 0.294 n = 1000	p < 0.001 r = 0.348 n = 1000	p < 0.001 r = 0.201 n = 1000	p < 0.001 r = 0.147 n = 606	p < 0.001 r = 0.298 n = 1000	p < 0.001 r = 0.165 n = 1000
to do video-conferencing	p < 0.001 r = 0.130 n = 1001	p < 0.001 r = 0.246 n = 1001	p < 0.001 r = 0.335 n = 1001	p < 0.001 r = 0.198 n = 1001	p < 0.001 r = 0.192 n = 607	p < 0.001 r = 0.220 n = 1001	p < 0.001 r = 0.176 n = 1001
to seek health related information	p = 0.020 r = 0.074 n = 1001	p < 0.001 r = 0.224 n = 1001	p < 0.001 r = 0.261 n = 1001	p < 0.001 r = 0.187 n = 1001	p > 0.05	p < 0.001 r = 0.226 n = 1001	p < 0.001 r = 0.153 n = 1001
to download multimedia content	p > 0.05	p < 0.001 r = 0.325 n = 994	p < 0.001 r = 0.301 n = 1004	p < 0.001 r = 0.225 n = 994	p = 0.030 r = 0.088 n = 605	p < 0.001 r = 0.291 n = 994	p < 0.001 r = 0.164 n = 994

Table 15c (cont.):

Chi-Square results across multiple usage factors (activities while online)

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Use the Internet							
to manage bank accounts and finances	p > 0.05	p < 0.001 r = 0.266 n = 1002	p < 0.001 r = 0.385 n = 1000	p < 0.001 r = 0.235 n = 1000	p < 0.001 r = 0.144 n = 608	p < 0.001 r = 0.244 n = 1000	p < 0.001 r = 0.267 n = 1000
to sell goods/services	p > 0.05	p < 0.001 r = 0.165 n = 1002	p < 0.001 r = 0.194 n = 1002	p < 0.001 r = 0.152 n = 1002	p > 0.05	p < 0.001 r = 0.227 n = 1002	p < 0.001 r = 0.164 n = 1002
to do an online course for qualification	p > 0.05	p < 0.001 r = 0.227 n = 1002	p < 0.001 r = 0.317 n = 1002	p < 0.001 r = 0.290 n = 1002	p = 0.019 r = 0.094 n = 609	p < 0.001 r = 0.264 n = 1002	p < 0.001 r = 0.187 n = 1002
to use online learning material (non-qualification)	p = 0.008 r = 0.084 n = 997	p < 0.001 r = 0.293 n = 997	p < 0.001 r = 0.346 n = 997	p < 0.001 r = 0.231 n = 997	p = 0.024 r = 0.092 n = 607	p < 0.001 r = 0.302 n = 997	p < 0.001 r = 0.168 n = 997
to actively participate in forums/message-boards	p > 0.05	p < 0.001 r = 0.155 n = 993	p < 0.001 r = 0.293 n = 993	p < 0.001 r = 0.172 n = 993	p = 0.002 r = 0.126 n = 603	p < 0.001 r = 0.269 n = 993	p < 0.001 r = 0.197 n = 993
to work with others	p > 0.05	p < 0.001 r = 0.275 n = 1000	p < 0.001 r = 0.336 n = 1000	p < 0.001 r = 0.219 n = 1004	p < 0.001 r = 0.129 n = 608	p < 0.001 r = 0.338 n = 1000	p < 0.001 r = 0.213 n = 1000
to manage a personal website	p > 0.05	p < 0.001 r = 0.201 n = 1003	p < 0.001 r = 0.282 n = 1003	p = 0.004 r = 0.138 n = 1003	p = 0.022 r = 0.092 n = 610	p < 0.001 r = 0.287 n = 1003	p < 0.001 r = 0.145 n = 1003
to express ideas/ opinions to private/ public orgs	p > 0.05	p < 0.001 r = 0.200 n = 998	p < 0.001 r = 0.281 n = 998	p = 0.005 r = 0.136 n = 998	p = 0.008 r = 0.107 n = 606	p < 0.001 r = 0.298 n = 998	p < 0.001 r = 0.163 n = 998
to report situations and submit complaints	p > 0.05	p < 0.001 r = 0.184 n = 1000	p < 0.001 r = 0.213 n = 1000	p < 0.001 r = 0.149 n = 1000	p > 0.05	p < 0.001 r = 0.301 n = 1000	p < 0.001 r = 0.134 n = 1000
to participate in polls/ surveys	p > 0.05	p < 0.001 r = 0.183 n = 1001	p < 0.001 r = 0.241 n = 1001	p < 0.001 r = 0.182 n = 1001	p > 0.05	p < 0.001 r = 0.307 n = 1000	p > 0.05

Table 15d:

Chi-Square results across multiple behavioural characteristics while operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Do you							
communicate in a polite and respectful manner to avoid offensive expressions	p > 0.05	p < 0.001 r = 0.283 n = 983	p < 0.001 r = 0.262 n = 983	p < 0.001 r = 0.215 n = 983	p < 0.001 r = 0.223[4] n = 592	p < 0.001 r = 0.254 n = 983	p > 0.05
reread messages (once of several times) to ensure clarity and accuracy before sending	p > 0.05	p < 0.001 r = 0.285 n = 992	p < 0.001 r = 0.263 n = 992	p < 0.001 r = 0.152 n = 992	p < 0.001 r = 0.168 n = 597	p < 0.001 r = 0.265 n = 992	p > 0.05
keep up-to-date with issues relating to how to avoid causing harm to others through your use of the Internet (e.g. doxxing, cyber-bullying, etc)	p > 0.05	p < 0.001 r = 0.241 n = 986	p < 0.001 r = 0.224 n = 986	p = 0.009 r = 0.130 n = 986	p = 0.015 r = 0.132 n = 593	p < 0.001 r = 0.283 n = 986	p < 0.001 r = 0.122 n = 986
know how to change the settings of your device's operating system	p > 0.05	p < 0.001 r = 0.441 n = 999	p < 0.001 r = 0.358 n = 999	p < 0.001 r = 0.308 n = 999	p < 0.001 r = 0.271 n = 600	p < 0.001 r = 0.282 n = 999	p < 0.001 r = 0.160 n = 999
make yourself aware and take into consideration the socially accepted "codes of conduct" regarding Internet use	p > 0.05	p < 0.001 r = 0.348 n = 996	p < 0.001 r = 0.317 n = 996	p < 0.001 r = 0.244 n = 996	p < 0.001 r = 0.166 n = 598	p < 0.001 r = 0.316 n = 996	p < 0.001 r = 0.130 n = 996
make yourself aware of the advantages and risks relating to exposing your identity on the web	p > 0.05	p < 0.001 r = 0.347 n = 993	p < 0.001 r = 0.311 n = 993	p < 0.001 r = 0.232 n = 993	p < 0.001 r = 0.213 n = 596	p < 0.001 r = 0.281 n = 993	p < 0.001 r = 0.117 n = 993
know how to manage your public online profile in accordance with your need to protect your digital identity	p > 0.05	p < 0.001 r = 0.423 n = 996	p < 0.001 r = 0.358 n = 996	p < 0.001 r = 0.262 n = 996	p < 0.001 r = 0.264 n = 598	p < 0.001 r = 0.244 n = 996	p < 0.010 r = 0.096 n = 996

Table 15d (cont.):

Chi-Square results across multiple behavioural characteristics while operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Do you							
believe you are capable of managing several different digital profiles in accordance with situation or context (work vs personal)	p > 0.05	p < 0.001 r = 0.391 n = 983	p < 0.001 r = 0.341 n = 983	p < 0.001 r = 0.276 n = 983	p < 0.001 r = 0.261 n = 592	p < 0.001 r = 0.303 n = 983	p < 0.001 r = 0.165 n = 983
make yourself aware of the health risks associated with improper use of computer, tablets and other digital devices	p > 0.05	p < 0.001 r = 0.330 n = 1000	p < 0.001 r = 0.350 n = 1000	p < 0.001 r = 0.188 n = 1000	p < 0.001 r = 0.190 n = 601	p < 0.001 r = 0.321 n = 1000	p = 0.001 r = 0.116 n = 1000

Table 15e:

Bivariate results across relative ease of operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
How easy is it for you to							
adjust the privacy settings on your devices	p > 0.05	p < 0.001 r = -0.198[3] n = 1004	p < 0.001 r = 0.107 n = 1004	p < 0.001 r = 0.309[4] n = 1004	p = 0.002 r = 0.235[4] n = 603	p < 0.001 r = 0.441[4] n = 1004	p > 0.05
turn off the location settings on mobile devices	p = 0.014 r = 0.118 n = 1004	p = 0.002 r = -0.098 n = 1004	p = 0.010 r = 0.081 n = 1004	p < 0.001 r = 0.331[4] n = 1004	p = 0.004 r = 0.229[4] n = 603	p < 0.001 r = 0.487[4] n = 1004	p > 0.05
recognize whether a WiFi network is safe and secure	p > 0.05	p = 0.001 r = -0.102 n = 1004	p = 0.002 r = 0.099 n = 1004	p < 0.001 r = 0.305[4] n = 1004	p > 0.05	p < 0.001 r = 0.454[4] n = 1004	p = 0.005 r = 0.089 n = 1004

Table 15e (cont.):

Bivariate results across relative ease of operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
How easy is it for you to							
connect devices to each other using Bluetooth or wireless connections	p < 0.001 r = 0.142 n = 1004	p < 0.001 r = -0.200 n = 1004	p < 0.001 r = 0.160 n = 1004	p < 0.001 r = 0.335[4] n = 1004	p = 0.007 r = 0.223[4] n = 603	p < 0.001 r = 0.450[4] n = 1004	p = 0.023 r = 0.072 n = 1004
synchronize documents, contact or apps on al devices you use	p > 0.05	p < 0.001 r = -0.123 n = 1004	p < 0.001 r = 0.126 n = 1004	p < 0.001 r = 0.346[4] n = 1004	p = 0.012 r = 0.218 n = 603	p < 0.001 r = 0.425[4] n = 1004	p = 0.023 r = 0.072 n = 1004
delete the record of sites you have visited before	p = 0.017 r = 0.116 n = 1004	p < 0.001 r = -0.161 n = 1004	p < 0.001 r = 0.160 n = 1004	p < 0.001 r = 0.288[4] n = 1004	p < 0.001 r = 0.249[4] n = 603	p < 0.001 r = 0.430[4] n = 1004	p > 0.05
protect a device with a PIN or other digital security	p = 0.026 r = 0.112 n = 1004	p < 0.001 r = -0.160 n = 1004	p < 0.001 r = 0.120 n = 1004	p < 0.001 r = 0.340[4] n = 1004	p = 0.005 r = 0.227[4] n = 603	p < 0.001 r = 0.485[4] n = 1004	p > 0.05
store photos, documents or other files in the cloud	p > 0.05	p < 0.001 r = -0.172 n = 1004	p < 0.001 r = 0.140 n = 1004	p < 0.001 r = 0.291[4] n = 1004	p = 0.006 r = 0.225[4] n = 603	p < 0.001 r = 0.438[4] n = 1004	p = 0.045 r = 0.063 n = 1004
use private browsing	p = 0.005 r = 0.128 n = 1004	p < 0.001 r = -0.115 n = 1004	p < 0.001 r = 0.137 n = 1004	p < 0.001 r = 0.302[4] n = 1004	p < 0.001 r = 0.308 n = 603	p < 0.001 r = 0.418[4] n = 1004	p = 0.019 r = 0.074 n = 1004
block unwanted pop-up messages or ads	p = 0.029 r = 0.111 n = 1004	p < 0.001 r = -0.137 n = 1004	p = 0.005 r = 0.088 n = 1004	p < 0.001 r = 0.276[4] n = 1004	p < 0.007 r = 0.224 n = 603	p < 0.001 r = 0.438[4] n = 1004	p > 0.05
use any programming language	p > 0.05	p > 0.05	p > 0.05	p < 0.001 r = 0.264[4] n = 1004	p < 0.030 r = 0.206 n = 603	p < 0.001 r = 0.515 n = 1004	p > 0.05
choose the best keywords for online searches	p = 0.045 r = 0.106 n = 1004	p < 0.001 r = -0.152 n = 1004	p < 0.001 r = 0.137 n = 1004	p < 0.001 r = 0.324[4] n = 1004	p < 0.001 r = 0.243 n = 603	p < 0.001 r = 0.457[4] n = 1004	p > 0.05
find a website you have visited before	p = 0.014 r = 0.119 n = 1004	p < 0.001 r = -0.153 n = 1004	p < 0.001 r = 0.181 n = 1004	p < 0.001 r = 0.295[4] n = 1004	p < 0.001 r = 0.243[4] n = 603	p < 0.001 r = 0.463[4] n = 1004	p > 0.05

Table 15e (cont.):

Bivariate results across relative ease of operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
How easy is it for you to							
find information on a website irrespective of the design	p = 0.025 r = 0.112 n = 1004	p < 0.001 r = -0.163 n = 1004	p < 0.001 r = 0.159 n = 1004	p < 0.001 r = 0.312[4] n = 1004	p < 0.001 r = 0.243[4] n = 603	p < 0.001 r = 0.447[4] n = 1004	p = 0.007 r = 0.084 n = 1004
use advanced search engine functions	p < 0.001 r = 0.143 n = 1004	p < 0.001 r = -0.160 n = 1004	p < 0.001 r = 0.118 n = 1004	p < 0.001 r = 0.283[4] n = 1004	p < 0.001 r = 0.249 n = 603	p < 0.001 r = 0.447[4] n = 1004	p > 0.05
check if the information found online is true	p > 0.05	p < 0.001 r = -0.136 n = 1004	p < 0.001 r = 0.120 n = 1004	p < 0.001 r = 0.285[4] n = 1004	p = 0.028 r = 0.207 n = 603	p < 0.001 r = 0.457[4] n = 1004	p > 0.05
determine if a website can be trusted	p = 0.003 r = 0.131 n = 1004	p < 0.001 r = -0.107 n = 1004	p < 0.001 r = 0.143 n = 1004	p < 0.001 r = 0.283[4] n = 1004	p = 0.023 r = 0.210 n = 603	p < 0.001 r = 0.452[4] n = 1004	p = 0.014 r = 0.078 n = 1004
understand the meaning of icons commonly used on apps or websites	p = 0.033 r = 0.109 n = 1004	p < 0.001 r = -0.136 n = 1004	p < 0.001 r = 0.115 n = 1004	p < 0.001 r = 0.290[4] n = 1004	p < 0.001 r = 0.258[4] n = 603	p < 0.001 r = 0.446[4] n = 1004	p > 0.05
identify which tools or media to use to communicate with someone appropriately (call vs WhatsApp vs email)	p > 0.05	p < 0.001 r = -0.112 n = 1004	p < 0.001 r = 0.135 n = 1004	p < 0.001 r = 0.320[4] n = 1004	p = 0.002 r = 0.234[4] n = 603	p < 0.001 r = 0.471[4] n = 1004	p > 0.05
determine when to mute yourself and/or disable video in online transactions	p = 0.046 r = 0.105 n = 1004	p < 0.001 r = -0.143 n = 1004	p < 0.001 r = 0.114 n = 1004	p < 0.001 r = 0.312[4] n = 1004	p = 0.009 r = 0.221[4] n = 603	p < 0.001 r = 0.456[4] n = 1004	p > 0.05
block messages from someone you don't want to hear from	p > 0.05	p < 0.001 r = -0.133 n = 1004	p < 0.001 r = 0.108 n = 1004	p < 0.001 r = 0.298[4] n = 1004	p < 0.001 r = 0.247[4] n = 603	p < 0.001 r = 0.443[4] n = 1004	p > 0.05
determine images and information of yourself it is OK to share online	p = 0.039 r = 0.107 n = 1004	p < 0.001 r = -0.157 n = 1004	p < 0.001 r = 0.104 n = 1004	p < 0.001 r = 0.315[4] n = 1004	p = 0.032 r = 0.206[4] n = 603	p < 0.001 r = 0.477[4] n = 1004	p > 0.05
use appropriate emoticons	p = 0.009 r = 0.123 n = 1004	p < 0.001 r = -0.146 n = 1004	p = 0.039 r = 0.065 n = 1004	p < 0.001 r = 0.341[4] n = 1004	p < 0.037 r = 0.204[4] n = 603	p < 0.001 r = 0.480[4] n = 1004	p > 0.05

Table 15e (cont.):

Bivariate results across relative ease of operating within the DMIL space

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
How easy is it for you to							
report negative content relating to yourself (or a group to which you belong) to the relevant authorities	p > 0.05	p < 0.001 r = -0.139 n = 1004	p = 0.097 r = 0.002 n = 1004	p < 0.001 r = 0.285[4] n = 1004	p = 0.016 r = 0.214[4] n = 603	p < 0.001 r = 0.442[4] n = 1004	p > 0.05
recognize when someone is being bullied online	p > 0.05	p < 0.001 r = -0.107 n = 1004	p < 0.001 r = 0.104 n = 1004	p < 0.001 r = 0.299[4] n = 1004	p = 0.040 r = 0.203[4] n = 603	p < 0.001 r = 0.461[4] n = 1004	p > 0.05
create something that combines different digital media	p > 0.05	p < 0.001 r = -0.183 n = 1004	p = 0.011 r = 0.080 n = 1004	p < 0.001 r = 0.337[4] n = 1004	p = 0.012 r = 0.218[4] n = 603	p < 0.001 r = 0.479[4] n = 1004	p > 0.05
edit existing digital images, music and videos	p > 0.05	p < 0.001 r = -0.142 n = 1004	p = 0.010 r = 0.081 n = 1004	p < 0.001 r = 0.291[4] n = 1004	p = 0.002 r = 0.235[4] n = 603	p < 0.001 r = 0.431[4] n = 1004	p > 0.05
ensure that many people will see the content you post online	p > 0.05	p < 0.001 r = -0.150 n = 1004	p < 0.001 r = 0.111 n = 1004	p < 0.001 r = 0.301[4] n = 1004	p = 0.002 r = 0.238[4] n = 603	p < 0.001 r = 0.4324 n = 1004	p > 0.05
change things you put online dependent on how people react	p > 0.05	p < 0.001 r = -0.159 n = 1004	p = 0.003 r = 0.094 n = 1004	p < 0.001 r = 0.299[4] n = 1004	p = 0.003 r = 0.233[4] n = 603	p < 0.001 r = 0.466[4] n = 1004	p > 0.05
distinguish between sponsored and non-sponsored content	p = 0.017 r = 0.116 n = 1004	p < 0.001 r = -0.118 n = 1004	p < 0.001 r = 0.129 n = 1004	p < 0.001 r = 0.281[4] n = 1004	p > 0.05	p < 0.001 r = 0.488 n = 1004	p = 0.007 r = 0.084 n = 1004
reference and use content covered by copyright within legal allowances	p = 0.038 r = 0.108 n = 1004	p < 0.001 r = -0.100 n = 1004	p < 0.001 r = 0.145 n = 1004	p < 0.001 r = 0.285[4] n = 1004	p = 0.004 r = 0.229 n = 603	p < 0.001 r = 0.492 n = 1004	p = 0.035 r = 0.066 n = 1004

3. The correlation coefficient used to examine relationships with Age, Education and SEL status was the Spearman's Rho

4. Greater than 30% of cells have an expected count less than 5. This result is seen as skewed and not reliable. Cells not highlighted for this reason.

Table 15f:

Chi-Square results across Eurostat Indicators (ownership and access)

Dependent Variables	Independent Variables						
	Sex	Age	Education	Employment		Location	SEL Status
				Status	Type		
Information skills domain	p > 0.05	p < 0.001 r = 0.409 n = 1004	p < 0.001 r = 0.376 n = 1004	p < 0.001 r = 0.278 n = 1004	p < 0.001 r = 0.286 n = 603	p = 0.002 r = 0.216 n = 1004	p < 0.001 r = 0.138 n = 1004
Communication skills domain	p = 0.005 r = 0.101 n = 1004	p < 0.001 r = 0.434 n = 1004	p < 0.001 r = 0.420 n = 1004	p < 0.001 r = 0.239 n = 1004	p < 0.001 r = 0.283 n = 603	p < 0.001 r = 0.234 n = 1004	p = 0.001 r = 0.133 n = 1004
Problem-Solving skills domain	p > 0.05	p < 0.001 r = 0.462 n = 1004	p < 0.001 r = 0.440 n = 1004	p < 0.001 r = 0.340 n = 1004	p < 0.001 r = 0.346 n = 603	p < 0.001 r = 0.271 n = 1004	p < 0.001 r = 0.200 n = 1004
Software skills domain	p > 0.05	p < 0.001 r = 0.467 n = 1004	p < 0.001 r = 0.396 n = 1004	p < 0.001 r = 0.295 n = 1004	p < 0.001 r = 0.307 n = 603	p < 0.001 r = 0.332 n = 1004	p < 0.001 r = 0.155 n = 1004
Overall Digital Skills	p > 0.05	p < 0.001 r = -0.477[3] n = 1004	p < 0.001 r = 0.453[3] n = 1004	p < 0.001 r = 0.346[4] n = 1004	p < 0.001 r = 0.348 n = 603	p < 0.001 r = 0.350 n = 1004	p < 0.001 r = 0.173[3] n = 1004

Differences arising from Gender

Gender was generally not correlated with many of the micro-indicators. However, it did return below notable relationships loosely with the concepts surrounding:

- Ownership and/or access to devices
- Devices used to access the Internet
- Communication practices via the Internet

Differences arising from Age Group

While the statistical relationships generated from the differences in age group were consistently valid across the majority of the factors under study (second only to the consistency of education-based differences), the effects were most evident when considering the Eurostat measurement of skills. The data in those cases present a case for a significant age-related gap in digital skills which – based on the other relationships found – may begin with a lack of ownership and access to the tools through which digital is experienced.

Employment-Based Differences

A reliable correlator with the DMIL variables, the employment status of the individual consistently returned a wide array of statistically significant relationships. Notably, the only one of these relationships to achieve the threshold of a correlation coefficient value equal to or greater than 0.3 (and remain valid) was with

relation to the ownership or access to a personal computer.

An additional note must be made that though skewed and considered not reliable, employment was the only demographic variable to return a relationship with the ease with which someone was able to use any programming language (including HTML).

Location-Based Differences

The differences are arguably the third most consistently significant observed differences. Despite the frequency with which significant relationships were observed, they rarely achieved the intensity to crest the 0.3 threshold. Further, while this cascade of relationships may support many assumptions around the presence and effect of "digital" in areas of high population density and metropolitan-type development – it must be noted that this study is unable to confirm same as a measure dedicated to urban vs rural spaces was not considered, but instead incorporated into the sampling method.

The most notable of these are in relation to:

- The ease with which using a programming language is considered
- The Eurostat overall digital skills assessment
- Generalized online behaviours with a focus on social skills
- Ownership and access to computers and digital devices

SEL-Based Differences

As with employment status, socio-economic class was also correlated with a wide number of indicators, but only had one relationship surpass the threshold of a correlation coefficient value equal to or greater than 0.3 - the ownership or access to a personal computer.

Education-Based Differences

The highest level of education achieved by the respondent returned a statistically significant relationship with every indicator it has been tested against thus far, making it arguably the most reliable contributor to DMIL across the study.

The strongest relationships observed were in relation to:

- Ownership and/or access to a personal computer
- The use of word-processing and spreadsheet software (basic and advanced)
- The use of the Internet to manage personal financial matters

Of note, when activities are grouped into their likely intent (shown in Table 3), it may be surmised that it is nearly equally likely for a Jamaican to engage the Internet for entertainment as it is for them to engage for social reasons, however, it is approximately 1.5 times more likely for them to engage for either social or entertainment reasons than for productive ones.

Recommended Baseline Profile

The average Jamaican is a 25- to 34-year-old female with a full-time job and an education level equivalent to grade 10/11 (or NCTVET L1 or L2). She is categorized as lower to lower middle class and lives in a 3-person household which has a total monthly income of maximum $JMD 100,000 of which approximately $31,000 is spent on groceries.

She owns a smartphone and accesses the Internet using that device, but neither owns nor has ready access to a personal computer (desktop or portable) or tablet. Her consumption patterns favor lifestyle (social and entertainment) activities rather than "productive" ones (see Table 3), so much so that she is unlikely to have used word-processing or spreadsheet applications within the last three months.

Her DMIL is more likely related to her education level rather than any other single demographic parameter – however, her age, parish of residence and employment status may also contribute heavily to her engagement in DMIL related activities.

Table 16:

Comparative Uses[5] of the Internet by Group

Social Uses	%	Entertainment Uses	%	Productivity Uses	%
access social media networks	83.3	listen to music and watch films	87.4	send and receive emails	72.8
contact friends and acquaintances via web chat and instant messengers	75.8	store photos, documents, or other files in the cloud	67.2	store photos, documents, or other files in the cloud	67.2
send and receive emails	72.8	to share multimedia	58.6	find information about goods and/or services	65.1
store photos, documents, or other files in the cloud	67.2	download multimedia content	55.0	do video conferencing	59.9
do video conferencing	59.9			search for and consult information for personal and professional use	57.3
actively participate in forums and/or message boards	33.3			work with others	46.9
				use online learning material for any other reason	43.4
				manage a personal website	38.6
				manage bank accounts and financial operations	38.5
				communicate with public and/or private organizations to express an opinion/idea	38.2
				report situations or submit complaints	27.6

Table 16 (cont.):

Comparative Uses[5] of the Internet by Group

Social Uses	%	Entertainment Uses	%	Productivity Uses	%
				do an online course leading to any kind of qualification	24.7
				take part in public opinion polls and/or online surveys from public and/or private institutions	21.5
				sell goods or services via a website or app	17.3
Average	65.4	Average	67.1	Average	44.2

5. The non-mutually exclusive nature of activities was recognized and accounted for by counting some activities across multiple purposes (e.g. doing video-conferencing). Further, special considerations such as using social media for business, were accounted for through related concepts i.e. selling goods online through a website or app

4.3 - Summarizing Insights Arising from the Findings

Curiosity and self-driven "scientific exploration," the driving forces behind innovation and the "digital lifestyle" lag behind drastically, with 43.4% pursuing learning material for a reason outside of qualification, and approximately 27% engaging in the activity for qualification. The fact that only 33% of the nationally representative sample would have used a word processing software in 3 months leading up to the survey coupled with the moderate statistically significant relationships discovered between that usage and age as well as education tell a story that supports the qualitative themes surrounding Knowledge Applications.

Further, while the qualitative findings point directly to a framework of learning, exposure and practice that is currently too weak to properly understand and facilitate the appropriate digital growth of its constituents, the quantitative findings point to a constituency that does not see the need for engagement in that system beyond what is traditionally seen as the "required formal education" (i.e. grade 10/11) and what is popularly deemed "street smarts" (i.e. the need to communicate and socialize digitally). These findings highlight the priority of designing curricula which require higher-order digital skills earlier in education.

Finally, the profile generated from the results of the baseline survey force policy-makers to explore questions regarding the depth of DMIL expertise attainable by the average Jamaican, whose ownership and/or access to digital devices is limited. How will exposure much more expertise be attained? ...and if we are to follow the prevailing accessibility to digital devices, what is the impact of only ever accessing and consuming the Internet through a touch-based interface that is heavy not in text, but iconography?

As noted, these analyses bear out the need for primarily a new approach to education and training. The case for the structured, monitored and deep integration of DMIL-focused knowledge and the creation of a learning environment defined by the same is clear. Based on these findings the recommendations arising at this juncture are:

Create a national standard which has industry-specific sub-standards

There is a need for a national standard for digital and media information literacy so that a baseline mastery may be attained and expected. As the nation continues to become a part of the global knowledge economy, specific industries should be prioritized and specific DMIL standards developed in collaboration with industry stakeholders.

This may be achieved by:

- Adoption of the DMIL framework proposed in the work herein
- Adaptation of the current set of standards existing within the MOE to be guided by the new DMIL framework

- Establishment of public-private committees to collaborate on the creation of industry-specific standards based on the DMIL framework

Enable the integration of DMIL into secondary schools through enabling teachers as a priority

Policy should address the resource strain on both the Ministry of Education as well as the public secondary school system by prioritizing the training and equipping of teachers. By exposing Jamaicans to DMIL during their secondary school education they arrive at labour-force entry age with at least the skills necessary to work as a digital native.

This may be achieved by:

- Establishing a 5-year long task force with the mandate to ensure and monitor the integration of DMIL-focused teaching techniques and technologies in secondary schools (funding split across: UNESCO, USAID, IADB)
- Dedicate a percentage of the project funding to the procurement and installation of DMIL teaching technologies, including but not limited to: multimedia projectors, TVs, electronic whiteboards,

Develop open assessment tools (based on the standards) should be and make the same available for adoption by public and private sector alike

The need for the learner to be able to test themselves in a low-risk environment order to create an urgency to learn as well as to prove to themselves the utility of their knowledge; as well as the need for the private sector to better recruit individuals from the labour pool

This may be achieved by:

- Publishing the rubric for each facet of DMIL mastery as per the adopted DMIL framework
- Development of knowledge-based question banks to allow for random testing/quizzing and feedback
- Development of knowledge-based question banks and allow for corporate access to the same for the rapid development of their own testing

Complete more frequent review of the standards put in place and the success of their implementation and integration.

In order to gain the agility necessary for national DMIL, major reviews of the articulated standards should be conducted in tandem with changes in the global DMIL landscape or should occur at least once every 3 years; while minor reviews to industry specific sub-standards should occur annually.

This may be achieved by integrating this review into the duties of the aforementioned task force and industry committees.

05

DMIL Implementation Strategy

The previous chapter addressed the outcomes that we hope to see when this policy is successfully implemented and the relevant indicators that may be tracked. Earlier chapters have also outlined the Competency Model that we believe will address the needs of the Jamaican stakeholders, and the means for measuring the relevant competences at the level of both the individual and the population. What remains is to indicate more fulsomely who is to be involved with implementation of the policy, their interests, and potential roles. That is the subject matter of this chapter.

Credentialing Mechanisms

DMIL is important for a very wide group of stakeholders, almost everyone in the country. To reach so many people, in such diverse circumstances, we need very flexible pathways to allow persons to start and stop their learning journey as their circumstances allow. For this reason, we recommend micro-credentialing or 'stackable badges' to track what elements of the DMIL model someone has already mastered. For example, someone could use their lunch time over the course of a week to complete the online coursework and exam to earn a badge for DMIL Competence 1.1, Level 5. Over the course of a quarter the person could earn all the badges in DMIL Competence Area 1 at Level 5, and get one badge that says that. The badges for DMIL Competence Area 6 would be even more specialized. For example, because the specialized digital tools and technologies used in banking can be so different from those used in a hospital, one ought to be able to earn a badge that says Banking, DMIL 6.1, Level 5, and another that says Healthcare, DMIL 6.1, Level 2. This design is similar to the Europass Digital Credential Infrastructure that allows workers to carry their credentials with them from one school or employer to another, and to HEART NSTA's approach as well ("What Are Digital Credentials | Europass" n.d.).

Stakeholder Analysis

Singapore, the European Union, and some members of the global South, have developed comprehensive plans for digital transformation to include the upskilling of their populations (Chuen 2020; "Digital Agenda Scoreboard 2015" 2015; Adinde et al. 2019). Those plans suggest that a comprehensive stakeholder analysis is critical to successful policy implementation (Perez 2002; 2021). The stakeholder analysis should reveal who is to be involved, the existing organizational structures that might be used to coordinate their involvement, and what capabilities and capacities already exist.

Four broad non-exclusive categories of stakeholders have been identified:

1. Public Service
2. Formal Education and Training
3. Indsutry
4. Community

Training Capability

Two variables were found to be most salient in arriving at these stakeholder groupings. First, is the notion of training capability. The stakeholder groupings should make it relatively simple to indicate to every resident of Jamaica at least one entity they can approach for digital training. Each of these stakeholder groupings are made up of multiple organizations which have a track record of designing, developing, and executing transformational training programmes. It is almost always the case that some of the component organizations are much stronger than others, and some are quite weak. But the grouping will include organizations whose practices can be adapted for use by other peer members of that grouping.

An example from the Community grouping is the identification, targeting and training of residents of inner-city communities in downtown Kingston to grow ornamental fish for export. The HOPE project and JSIF have also executed place-based community training programmes in recent years. From these examples, useful lessons can be gleaned to be put in place in other place-based communities across Jamaica. There are numerous examples from Industry. For members of the cultural and creative industries, Kingston Creative has provided training in creating and selling non-fungible tokens (NFTs). For farmers and food handlers, the Bureau of Standards Jamaica has provided training and certification in food safety and handling, and UWI faculty have provided training to farmers of pineapple and ginger. In the Public Service, in recent years extensive training has been provided in procurement and project management. These examples suggest that each grouping has a variety of models that can be adapted and activated for providing digital skills training for their members.

Training Capacity

One way to assess the country's capacity to upskill the workforce is to review the stakeholders currently involved in workforce training (see Table 17 below).

Table 17:

Stakeholders in Workforce Training and their Potential Roles in DMIL Upskilling

Stakeholder Group	Potential Role
Industry groups e.g. JMEA, IMAJ, CIC, JAS, JHTA, JBA, BPIAJ, JTDA, PSOJ	These groups are central to providing rich knowledge of the local industries, and direction to the Industry Panels.
Professional associations e.g. ICAJ, HRMAJ, IIBA, PMI	These associations are particularly important to inform the third segmentation step, as their deep knowledge of the professions in each industry is critical to inform curricular decisions. Many of these associations also have training arms that can provide industry-specific training in DMIL Competence Area 6.
Government departments and agencies supporting industry e.g. JAMPRO, JBDC, SRC, BSJ, RADA	These entities may have research departments and access to knowledge at the frontier of the industries that they support. They are important to providing direction to the Industry Panels, and also may have training arms that can provide industry-specific training in DMIL Competence Area 6.
Technical and vocational education providers e.g. Manpower & Maintenance Services Ltd	Many of these are market-oriented firms that provide training demanded by individual workers aiming to upgrade themselves, or companies seeking training for their employees. Some of these firms offer HEART NSTA accredited training. They should play a significant part in delivering training in DMIL competences, especially Competence Areas 0 - 5. They may also partner with industry experts to deliver training in Competency Area 6.
Executive Education / Continuing Education Providers e.g. JSE e-Campus, MSBM Professional Services Unit	Many of these are academic institutions (e.g. universities, community colleges, teachers' colleges) and market-oriented firms that provide non-formal education and training demanded by individual workers aiming to upgrade themselves, or companies seeking training for their employees. Some of these firms offer professional training that is internationally accredited. They should play a significant part in delivering training in DMIL competences, especially Competence Areas 0 - 5. They may also partner with industry experts to deliver training in Competency Area 6.
Third sector entities e.g. churches, civil society organizations, community-based organizations, cooperatives and other institutions for the differently abled.	These entities play an essential role in providing education and training to various groups on society's margins. Involving them can engage an enormous capacity to develop and deliver training that is inclusive, and helps to bridge social, economic, and digital divides.
Adult correctional facilities and third sector entities that work with their populations	Official announcements from the government now state that part of the strategy in dealing with crime and violence will be to provide more economic opportunities to divert persons from criminal activities. Engaging with the correctional facilities to provide DMIL training for convicts may help to reduce the rate of recidivism, and channel valuable talent into industry.

Table 17 (cont.):

Stakeholders in Workforce Training and their Potential Roles in DMIL Upskilling

Stakeholder Group	Potential Role
Credential providers e.g. CSEC, HEART NSTA, City & Guilds, Axelos	If these entities can be persuaded to quickly develop new credentials aligned with the DMIL Model, this may catalyze both demand and supply. This may accelerate the pace at which workforce upskilling takes place, as well as the quality of offerings.
Accreditation bodies e.g. UCJ, HEART NSTA, CAAM	If these entities can be persuaded to incorporate the DMIL Model into the accreditation criteria for various educational offerings, then this may improve the sustainability of the workforce upskilling, as well as the quality of offerings.

This preliminary analysis of the stakeholder groups suggests that there is a rich ecosystem of training providers operating with different incentives, capabilities, and governance structures. The Industry Panels should aim to harness as much of the existing capacity as possible to maximize the inclusiveness of DMIL upskilling. To do this, it is essential that as many as possible of the stakeholders are identified on a parish by parish basis, and that their capabilities, capacities, governance structures and other relevant characteristics are elicited and properly documented.

It will be particularly useful to identify those entities that are already involved in the provision of education and training for DMIL Competences. Some of these such as the Caribbean School of Data, 1on1 Educational Services, and iCreate are digital natives, and operate across the Caribbean. Properly harnessed they can have an enormously positive effect on the implementation.

Identity

Identity, is the second variable that is salient to arriving at the Stakeholder groupings. The stakeholder groupings recognize that many persons see themselves as belonging to multiple groups or put another way, have multiple identities. Some persons may perceive digital literacy as primarily relevant to their identities that are strongly related to their career, vocation or profession. If so, these persons may want to pursue training through the relevant Industry grouping. The Industry grouping is expected to welcome not just current practitioners within that Industry but also persons who may be interested in joining that Industry at some point. Other persons may perceive digital literacy - or some of its competences - as primarily relevant to their identities as residents of a particular geographical community or a civil society group. If so, these persons may want to pursue digital literacy education and training through the Community grouping. The Community grouping is expected to include not just geographically-defined communities, but communities of interest such as the digital horde, environmental and social justice advocates. The Public Service and Formal Education and Training groupings have well-defined, commonly understood, pre-existing boundaries which are accepted for this framework.

Given that persons have multiple identities, it is also predictable that some will want to pursue some of their digital education and training with one Stakeholder grouping and other aspects with another Stakeholder grouping. This flexibility is desirable, not just for the sake of convenience of the learner, but to support another very important pedagogical goal. While learning has to occur at the level of the individual, for the whole-of-society transformation that Jamaica wants, this learning will be most effective within socially and culturally self-aware contexts where the participants discuss and decide for themselves as individuals, as groups, and as a society how they wish to use these technologies and to what ends. In other words, the learners' knowledge ought to be socially constructed and congruent with their multiple identities. The Stakeholder groupings are intended to be Learning Communities (LCs) that provide effective mechanisms for learners to develop new understandings of their roles and responsibilities in a world undergoing digital transformation, and to acquire the knowledge, tools and techniques to carry out those roles and responsibilities.

Social Construction of Knowledge

This social construction of knowledge is essential to reduce the tendency to think that the technology has a mind of its own and a predetermined way of affecting the economy and the society. This notion, technological determinism, which is widely held among many groups in many countries, can be exploited by different companies, organizations, and persons to justify their own selfish agendas at the expense of the common good.

When persons in their community-based organizations, their civil society groupings, professional associations or work settings, realize that the impact of technology depends on social and political decisions made by themselves, their employers, elected and unelected politicians, then they have less reason to feel threatened by the technology itself. In a low-trust society with declining levels of participation in the electoral processes, using learning communities to foster knowledge acquisition is an important pedagogical strategy which can be expected to increase learner motivation and resilience.

5.1 -The Public Service

The public service is the single largest employer in Jamaica, employing nearly 120,000 persons in over 200 ministries, departments, agencies (MDAs) ("Human Resources Management Transformation Programme in the Public Sector" 2021). Collectively, they comprise the government of Jamaica. For many aspects of Jamaica's society and economy, they are the human infrastructure on which the country runs. They are responsible for designing and implementing policies and services that affect the well-being of citizens and the effective operation of economic players. Singapore's Smart Nation plan states that "Digital Government will provide the environment and drive the enablers to shape the Digital Economy and a Digital Society" (Chuen 2020, 6). Therefore, to see a step change in the effectiveness and efficiency of so many areas of life in Jamaica, the members of the public service, from the front-line to the board rooms, need to acquire digital, media and information literacy.

A digitally literate public service is one in which the employees at all levels identify when they need additional information, know how to go about finding that information, and are able to effectively and efficiently use that information for daily tasks as well as for less frequent design activities. An urgent problem facing many Jamaican MDAs is that they are unaware of how immature their practices are compared with global best practices, and how far from the global production frontier their capabilities are compared with best-in-class examples (Freeman and Shaw 2009; Bloom and Van Reenen 2010; The World Bank 2020). One of the benefits of the DMIL upskilling of public servants, will be that even in the absence of conscious organizational re-design and business process re-engineering, the digitally literate individual worker will be a better problem solver and more effective and efficient in dealing with citizens and economic players on a daily basis. Individual supervisors, managers, and leaders at all levels, will

be better equipped to use data, digital tools, media and information, to formulate small and big initiatives to continually improve the processes within their scope of control and influence. This is continuous improvement through incremental digital innovation.

The Transformation Implementation Unit, MIND, the Planning Institute of Jamaica, the Ministry of Finance and the Public Service are some of the important stakeholders in this process. The Government of Jamaica must be bold in its actions, and not wait on any other sector to determine the speed of its upskilling. Here Singapore, as a global leader in digital competitiveness, is a useful example. Since the early 1980s, the government of Singapore has led two successful whole-of-nation transformations to "upgrade the skills of citizens especially the workforce, improve service standards, and attract knowledge-intensive activities" (Chuen 2020). Perhaps counterintuitively for some, in each case Singapore began by upskilling and transforming the public service, and then extended their attention and training investments to the private sector. In its most recent Digital Government Blueprint, Singapore has established a goal of having all public servants upskilled to be "digitally confident" by 2023, and 20,000 trained in data analytics and data science (Chuen 2020, 12). The government of Jamaica needs to be even bolder in its goal setting.

Carlota Perez, a global leader on the economics of technological revolutions, has made another critical argument for starting with the government. First, she has pointed out that technologies are not deterministic, but rather that social and political decisions determine their impact. Second, she has shown that in each of the four previous technological revolutions since 1797, governments were critical in directing the deployment of the technologies so that the benefits of the technological revolution are widely spread and therefore multiplied throughout the society for businesses as well as the ordinary citizen (Perez 2020). The implication is that if Jamaica is to participate fully in the current technological revolution, then the public service must develop a deep understanding of these technologies and how they may be harnessed for the good of the society and the economy.

Formulating a Training Plan

The training plan implementation at the level of a specific agency should begin with a comprehensive baseline of the DMIL competences of the employees of the agency. That together with the top management team's own assessment of the entity's organizational maturity and the kind of strategy that it is pursuing at the time could then be used to craft a training strategy (Kirkpatrick 1998; 2006).

Here is a very simple approach. Let us say the entity in question is GoJ1. GoJ1's top management team decides to let each functional manager determine with their team which Competence Area to focus on during each quarter. Each functional manager reports this to the central Training Team within HR which keeps track of progress across the whole organization. Within each functional manager's team, each employee commits to achieving a certain Level by the end of each fortnight, and the team discusses their learnings and how they might use it to improve the team's operations during their regular team meetings. At the end of the quarter, the manager and their team discuss which Competence Area to move to next, or whether to spend another quarter gaining further mastery of this Competence Area. By mon-

itoring progress from month to month with each employee, discussing it with the team, and with other managers, the managers within GoJ1 should begin to identify patterns that allow the firm to accelerate the rate of its learning and how to use that learning to make organizational improvements.

An alternate approach is more top-down, mechanistic, plan-driven and requires more managerial competence at all levels for it to work. Let us say the entity in question is GoJ2. GoJ2's top management decides that the training plan should be integrated with the strategic plan. In this integrated plan, different functional units e.g. IT, Accounting, Marketing, HR, and Operations, will work on different Competence Areas in each quarter to develop capabilities that they will need for their role in the strategic plan in successive quarters. This plan is a lot less flexible and less responsive to the needs of individual employees or individual units. The inherent complexity makes it less resilient to failures of any kind, and the reduction in employee / learner autonomy is likely to lead to lower intrinsic motivation and deep learning, regardless of learner completion rates. Even so, in organizations peopled by highly motivated staff who are very well-supported by the organization and their home lives in focusing their attention on learning, this approach can lead to rapid, sustained organizational successes.

There are many other approaches. Each entity's Human Resources and Training teams should be able to advise their top management teams of what is appropriate for the specific entity. Regardless of which approach is taken we recommend that one aspect shared by both of the approaches outlined above be strongly considered: they are cohort-based. This means that employees who work together, learn together. This approach harnesses the social support of work colleagues to mitigate the drop-out rates observed in massive open online courses (MOOCs), ensures that the whole team concurrently acquires new concepts and a shared new language for discussing their work, and reinforces the responsibility of the manager for supporting his team's learning and transforming those learnings into organizational improvements (Crane and Comley 2021). Similarly, regardless of which approach is taken, the HR department should work with managers and the relevant labor unions to adjust employees' job descriptions and appraisal instruments to incentivize and reward appropriate use of the DMIL competences.

Guidance for the Project Team

Outcome Challenge
The implementation of the DMIL national policy framework intends to see a Public Service that:

1. embraces regulations that support and encourage the adoption and adaptation of emerging technologies and innovative practices with strong cybersecurity and data privacy guard rails
2. works extensively with local startups and established industry players to learn about and incubate new technologies and innovations
3. that aggressively adopts digital technologies and innovative practices with strong cybersecurity and data privacy guard rails

4. works continuously to develop, recognize, and promote the innovative capacity of civil servants
5. work continuously to build citizens' trust
6. participates extensively in the international governance of digital technologies
7. embraces practices that ensure the public service is continually becoming more inclusive and efficient.

Progress Markers

Expect to see

- work with training partners to deploy extensive digital training for all members of the public service, beginning with line managers and HR teams

Like to see

- each MDA develop a digital transformation plan
- each MDA develop a roadmap of digital services
- each MDA develop a roadmap of legislation and regulations to be updated as part of digital transformation

Love to see

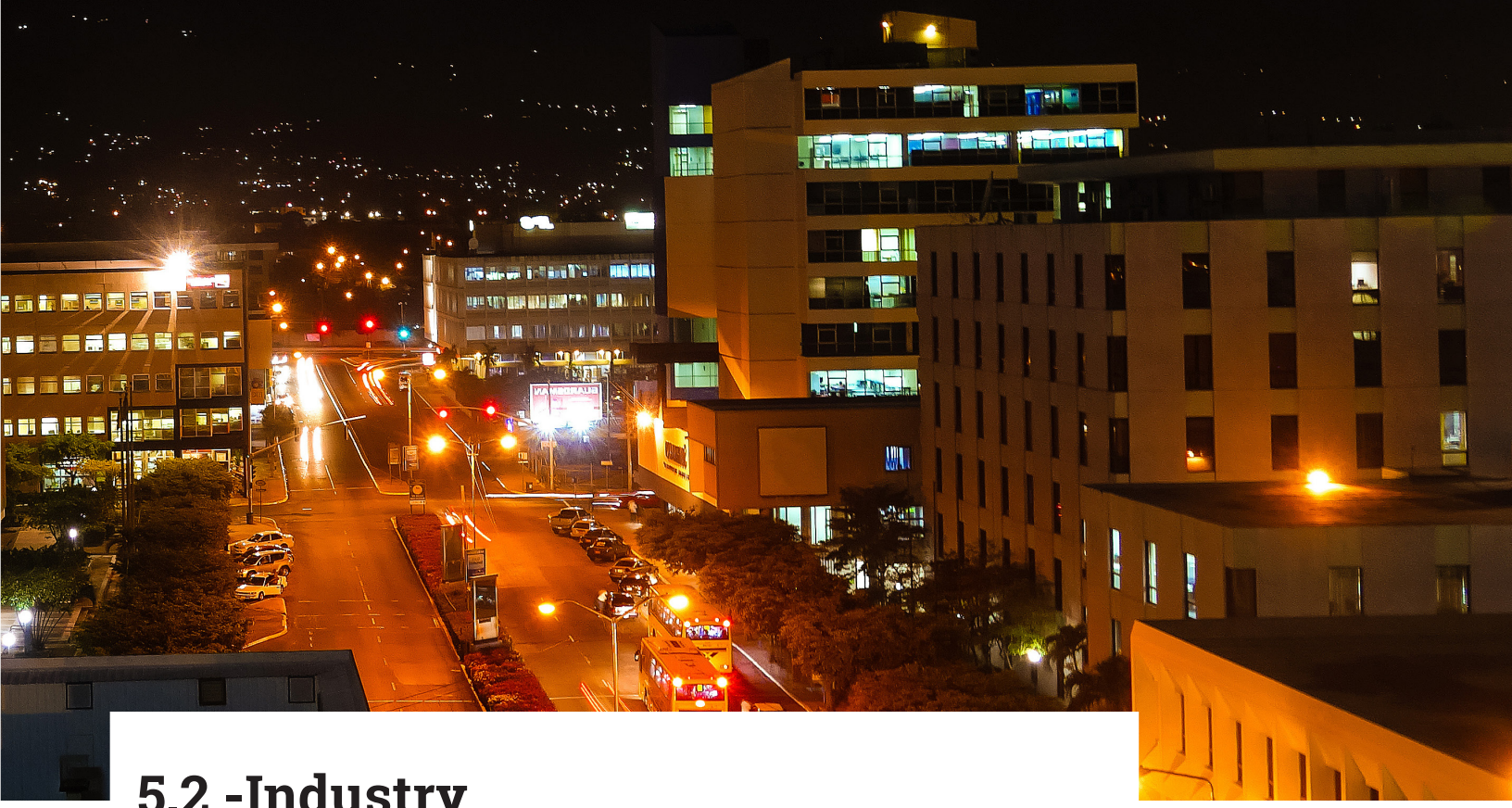
- each MDA execute partnerships with local startups and established firms to incubate new technologies and innovative practices
- each MDA establish public fora in which they solicit the input of citizens into local and international governance issues

Table 18:

Strategy Map: Public Sector

I-1	New laws and regulations to improve internet governance in the areas of cybersecurity, ICT regulatory environment, legal framework's adaptability to emerging technologies	
	Champion:	ICT Advisory Committee
	New regulatory structure to support the development of joint ventures and partnerships between startups or other businesses and MDAs	
	Champion:	ICT Advisory Committee, eGov
I-2	Delivery of digital literacy training to managers, HR & Training teams	
	Champion:	MIND
	Delivery of digital literacy training to all public service employees and contractors	
	Champion:	MIND
I-3	Online network of mentors and coaches to support digital transformation	
	Champion:	Transformation Implementation Unit and eGov

E-1	New government policy to increase the digital literacy competences of public sector leaders and HR teams	
	Champion:	Transformation Implementation Unit
	New government policy to increase the digital literacy competences of all public sector employees	
	Champion:	Transformation Implementation Unit
	Requirement for each MDA to create a digital transformation plan	
	Champion:	Transformation Implementation Unit
E-2	Media campaign to highlight the digital services and regulations road-maps being produced by each MDA	
	Champion:	Transformation Implementation Unit
E-3	Online peer network to support digital transformation	
	Champion:	Transformation Implementation Unit and eGov



5.2 -Industry

The upskilling of the workforce (outside of the public sector) is important to improving the productivity of Jamaican firms, so that whether through improvements that lead to greater efficiencies or new product and service innovations, they create greater wealth and well-being for the Jamaican people (Downs 2003; Tennant 2014; Ministry of Labour and Social Security - Jamaica 2018). It is estimated that this grouping includes approximately 1.3 million persons, and is therefore the single largest fraction of the Jamaican population to be upskilled (Statistical Institute of Jamaica 2021; FHI 360 2017).

The approach we recommend for upskilling the workforce is by industry, as Singapore has done (Chuen 2020; McKinsey & Company 2020; McKinsey Global Institute 2018). The Vision 2030 Secretariat within PIOJ has Industry Panels, which ought to represent the breadth of stakeholders in each industry in Jamaica (Planning Institute of Jamaica 2018). We recommend that the existing industry panels serviced by the PIOJ Vision 2030 Secretariat be asked to take on, with HEART NSTA, the responsibility of developing and coordinating DMIL Industry Training Plans. Singapore has created 23 Industry Transformation Plans since 2017.

The Industry Panels with HEART NSTA are best placed to perform two activities that are essential to creating Training Plans that are highly relevant to each local industry. First, the Industry Panels need to specify the specialized digital tools and technologies, data, information, media and digital content for that industry, which will be targeted under the Career-related Competences in the DMIL Model. Second, the Industry Panels need to identify for each of the jobs within the industry, the degree to which they are likely to be replaced or transformed by information technologies such as machine learning (Frank et al. 2019).

To begin the process, the Industry Panel should coordinate a benchmarking exercise to determine the current level of DMIL competences within the industry, and collect appropriate data on job characteristics and employee personal characteristics (Jashari et al. 2021; Kirkpatrick 2006). In considering who is in the industry, we include persons who are open to work in the industry, seeking work in the industry, gig economy participants in the industry, those employed in informal firms in industry, and those employed in formal firms within the industry. As used here, employed includes those who are permanent, on contract, or even on paid internships / apprenticeships. Bearing in mind that in 2015, 35% of youth 15 – 29 years old were neither employed nor in school, we also recommend that the survey includes those of working age who are unemployed or have stopped looking for work (and so may no longer be counted in the workforce), as upskilling may convince these persons to re-engage in the workforce (FHI 360 2017). The results of the benchmarking exercise should then be used to design appropriate cohorts, and develop training plans to guide the evolution of the industry.

Cohort Design

One of the goals of the Industry Training Plans should be to create cohorts of students who will advance through the learning experiences together and support each other's learning (Crane and Comley 2021). The learning will be most meaningful for the individual and transformative for each industry if it is socially constructed and situated within the realities of Jamaican industry.

Some of the personal characteristics which should be ascertained by survey include:

- the amount of time a person is willing to commit to upskilling
- the educational technologies available and accessible to them
- the current levels of their DMIL competences.

Some of the job characteristics that should be ascertained by survey include:

- whether the job is part-time or full-time
- whether the job is shift based
- the amount of physical labour involved
- minimum education requirements
- how much travel may be required as part of the job
- how much technology individuals are currently required to use in each role
- the degree to which the job is likely to be replaced or transformed by technology
- salary ranges
- level of responsibility.

This survey information is combined with other information available via the Industry Panels to segment the learners and inform the Industry Training Plan in a 4-step algorithm outlined below.

How will training for the learner be organized and coordinated?

The first step is to determine whether the individual learner will be accessing training that is controlled by their firm. Some firms, especially those in the formal sector, may have sophisticated Training Units which want to synchronize the training strategy for their employees with their firm's idiosyncratic strategy. They should be allowed to make their own arrangements for the training of their staff. These firms are likely to be able to implement training faster than the overall industry and develop their own innovative approaches, both to the content and to the delivery. This is likely to be beneficial to the industry as a whole, and ought to be encouraged and supported for those firms that are capable enough. One example may suffice to make this concrete: AmberConnect has partnered with HEART / NSTA with funding from the NCB Foundation to train hundreds of disadvantaged youth for whom it will guarantee jobs when they graduate. This is clearly a win for the industry as a whole. Almost everyone else – the nearly eighty-two percent of private sector employees who work in the micro, small, and medium enterprises – will benefit from more centralized support (FHI 360 2017).

The output of this step is two categories: learners whose training will be organized and coordinated by their companies and those whose training will be organized and coordinated by HEART NSTA or another entity authorized by the Industry Panel.

How will the priorities for who should be trained be determined?

The second segmentation step relies on the degree of transformation of the individual's existing job or career path. We suggest just two groups: those jobs which are expected to be more than or equal to fifty percent transformed by technology, and those which are less. At the level of the individual, we believe that this variable will influence the degree of learner motivation, and at the level of the industry, we believe that this variable addresses the urgency with which the industry must evolve. Therefore, this variable is used to prioritize learners for upskilling. The output of this step is two sub-categories of each category coming out of step one above. One sub-category is for those whose training will be fast-tracked because their jobs are on the transformation frontline, and a second sub-category whose training is not being fast-tracked because their jobs are less threatened (McKinsey Global Institute 2018; Ministry of Labour and Social Security - Jamaica 2018; HEART / NSTA Trust 2020).

How will the content be customized?

The third segmentation step relies on job families (Brynjolfsson, Mitchell, and Rock 2018). The content for DMIL Competence Areas 0 to 5 are not customized. However, the content for DMIL Competence Area 6, Career-related Competences, should be customized by job families within the industry. These job families are probably clustered around the main academic disciplines such as HR, Accounting and Finance, Marketing, Operations, IT, and so on. No doubt some are industry specific. The courseware customizations are based on the following insights: 1) disciplinary practices within an industry benefit from digital tools and technologies, data, information, media and digital content specialized for that industry, and 2) within a single industry different disciplines or functions benefit from digital tools and technologies, data, information, media and digital content specialized for that discipline. For example, accounting practices in the shipping

industry are enhanced by digital tools and information sources that are irrelevant in banking, and irrelevant to the marketers in the shipping industry (Dean Panton, Group Chief Accountant, Kingston Wharves Limited in discussion with Craig Perue, 21-August-2021).

The output of this step is a variable number of sub-sub-categories that depend on the nature of the industry, and thus cannot be pre-determined. It is desirable to keep the number of job families and therefore sub-sub-categories small to try and minimize the coordination complexity, but this has to be balanced against the decline in relevance of the learning content if the content is not specialized to the individual's occupational role.

How will the cohorts be scheduled?

The final step in the algorithm is scheduling: providing classes at times, durations, and via modes that are convenient to different groups of learners. The number of groups here will be determined by the capacity of the training organizations involved.

The DMIL Industry Training Plans should aim to provide a variety of entry and exit points for learners, and modalities ranging from face-to-face to fully virtual, should be considered. Persons who start their training while employed in the formal sector should be able to continue their training even if they become unemployed and move into the "open to work" category.

As Singapore's experience has demonstrated, the upskilling of the workforce is likely to transform not just the economy, but also the society. It will take an enormous concerted effort by hundreds of thousands of actors, but the anticipated outcome - a much brighter future for all Jamaica - is worth it.

Guidance for the Project Team

Outcome Challenge

The implementation of the DMIL national policy framework intends to see Industries that:

- continuously train their leaders, HR teams, and entire labour force to develop their innovative capacity
- train their labour force in digital technologies and innovative practices
- embed continuous improvement within all organizational functions
- commit funds and personnel to R&D and innovation management.

Progress Markers

Expect to see

- deploy extensive digital training and continuous improvement for all staff members
- develop a digital transformation plan

Like to see

- deploy training in R&D and innovation management for leaders and HR teams
- develop a roadmap of new digitally-enabled products and services

Love to see

- develop and implement data protection and cybersecurity processes to build trust along their entire supply chain
- pursue partnerships with other ecosystem members to incubate new technologies and innovative practices

Table 19:

Strategy Map: Industry

I-2	Delivery of digital literacy training to managers, HR & Training teams	
	Champion:	HEART NSTA Industry Panels
	Delivery of digital literacy training to all potential employees and contractors	
	Champion:	HEART NSTA Industry Panels
I-3	Online network for each industry with coaches and mentors	
	Champion:	Development Bank of Jamaica, JAMPRO
E-1	New regulations to support industry members' investment in R&D and the adoption of new technologies and innovative practices	
	Champion:	Ministry of Finance
	Ecosystem Assessment and development of Industry Digitalization Roadmaps	
	Champion:	Vision 2030 Sector Panels
	Government policy to increase the digital literacy competences of leaders and HR teams in industry	
	Champion:	HEART NSTA Industry Panels
	Government policy to increase the digital literacy competences of all (potential) employees	
	Champion:	HEART NSTA Industry Panels
E-2	New media campaign to highlight innovation of all kinds in industries all over Jamaica	
	Champion:	Broadcasting Commission of Jamaica
E-3	Online network for each industry	
	Champion:	Development Bank of Jamaica, JAMPRO

5.3 -Formal Education & Training

There are approximately 1.1 million Jamaicans between the ages of 3 and 24 years old, the age cohorts associated with formal initial education (United Nations Department of Social and Economic Affairs Population Division 2019). There are a variety of reasons that make this sector essential to DMIL policy implementation. First, the only population sector that is larger than the education sector is the private sector workforce (FHI 360 2017). Second, this sector is particularly vulnerable to many of the challenges to which DMIL is a response, such as cyber-bullying, cyber-addiction, and commercial or political online manipulation (Golding 2018; Office of the Children's Advocate 2018). Third, the school system is a convenient and direct route to access these persons which can make their education simpler and more cost-effective than other sub-groups (UNESCO 2013). Fourth, educating the future workforce in DMIL is projected to yield very positive benefits for innovation, problem-solving, and global competitiveness in the medium to long-term (Adinde et al. 2019). Finally, so important is this stakeholder group in UNESCO's decades long experience with media and information literacy projects worldwide, that UNESCO recommends schools and teacher training institutions should be the primary vector of media and information literacy policy implementation.

Table 2, which provides an overview of the composition of this sector shows that while the government provision for education is substantial with nearly one thousand unique government-funded institutions, ranging from early childhood institutions that accept four year olds to tertiary institutions that offer bachelors, masters and doctoral degrees, it is not exclusive. The available evidence suggests that the private sector dominates the early childhood level with hundreds of basic schools across the island, makes very significant impacts at the primary level with very highly regarded 'prep' schools, and while its contribution at the

lower secondary level appears to be quite small, it dominates the upper secondary through remedial / second chance classes and post-secondary non-tertiary. Unfortunately, high quality data on the private sector provision is very difficult to come by because despite the enormous efforts of the Ministry of Education year after year, private institutions see very little incentive to respond to the Ministry's data collection efforts. Instead, the magnitude of the private sector contribution becomes evident only when students have to sit state-administered examinations to transition from one education level to the next. For example, while only 31 institutions reported to the Ministry of Education that they provide secondary education, over 300 private examination centers presented more than half of the 70,000 plus students as independent candidates for the CSEC examinations each year from 2007 to 2014 (author's unpublished analysis). Additionally, there are digitally native education startups such as EduFocal and 1on1 whose commercial activities with primary and secondary level schools and individual households prior to and during Covid have attracted national acclaim. The breadth and depth of private sector involvement in education provision is also evidence that important population segments are willing to pay for education and training. All these data strongly suggest that the private sector should be considered an essential stakeholder in DMIL policy implementation activities targeting formal initial education.

Table 20:

Overview of the Formal Education Sector (Ministry of Education Youth & Information 2019)

ISCED Level	School Type	Typical Age (years old)	Relevant age population (in '000s as at 201907)	# of public institutions (AY2018-19)	Private
	Special Education	14-19		23	13
0	Early childhood	3-5	140	344 infant departments, 47 infant schools	1,816
1	Primary	6 - 11	277	760	161
2	Lower Secondary	12 - 14	137	182	31
3	Upper Secondary	15 - 18	197	170	31
4	Post-secondary non-tertiary	19 - 24	314	18	
5	Short-cycle tertiary	19 - 24		17	
6-7	Bachelor degree granting entities	19 - 24		13	

At each education level, the private sector contribution to education is a market-oriented response which is frequently interpreted as inadequate provision by the state. However, the state influences the quality of the market-oriented education provisions through several mechanisms that are rarely mentioned.

First, by virtue of employing over 25,000 teachers and therefore being the largest single employer of teachers by far, the state sets a floor for teachers' salaries in the private sector. Up to 2010, public school teachers had lobbied the government to be paid eighty percent of the market rate for their services. However, in 2010, the state negotiated and paid public school teachers' salaries that exceed those offered in the private sector. This had the immediate unintended effect of causing many preparatory schools to shut down as they were unable to pay salaries on par with the public school teachers' salaries and their most qualified teachers moved into public school jobs. Subsequently, a tracer study of graduates of the Mona campus of The University of the West Indies revealed that teaching is the second most highly paid field of study after medicine. (Public school teachers now lobby to be paid more relative to their counterparts in wealthy countries such as the USA, UK, and Canada.) It has been said that "no education system has ever outperformed the quality of its teachers." The salaries that the state pays to public school teachers significantly affects the quality of tertiary students who will be attracted into teacher training programmes and teaching whether in public or independent schools. The salaries the state sets will affect the quality of teachers available to teach DMIL in Jamaican schools.

Second, the state partially funds teacher training institutions which collectively graduate nearly five times as many teachers each year as leave the public school system (two thousand versus 400). This surplus of trained teachers moderates the wages that teachers can demand from independent schools while serving as an invaluable resource for industry. The teacher training institutions are an effective mechanism for achieving national scale. Therefore, integrating DMIL into the curriculum and content of the teacher training institutions is likely to be an effective mechanism for producing a large number of appropriately trained teachers whose impact will be felt through both the public and independent schools.

Third, through the Joint Board for Teacher Education (JBTE) which sets the standards and curricula for teacher training programmes in Jamaica, the state ensures a minimum quality of training for teachers. For example, the decision was taken in the last decade to upgrade the minimum qualification of a 'trained teacher' from a three-year diploma to a full degree. The implementation of this decision was effected through a partnership between the Ministry of Education (the prime payer), the JBTE (standards setter), and the teachers' colleges. So while the state does not dictate the minimum qualifications that independent schools should demand when hiring their own teaching staff, it effectively sets the standards for the public and private sectors of the industry. This power is primarily relevant to ensuring that teachers-in-training receive sufficient exposure to DMIL. Past efforts to utilize the convening power of the JBTE to upgrade teacher training standards have demonstrated that a great deal of persistence and tenacity is required. However, JBTE support of the DMIL policy is critical to the sustainability of DMIL programming in public and private provisioned initial formal education.

While the public school system absorbs between 400 and 500 new teachers each academic year, at any one time there are about 25,000 public school teachers in employment. To upskill these teachers requires coordinated effort among multiple arms within the Ministry of Education. The National College for Educational Leadership (NCEL) should be called upon to develop programmes

to help principals, subject leaders, and other school leadership personnel learn how to design, implement, and monitor comprehensive DMIL programmes in their schools. The Jamaica Teaching Council (JTC) has the power to develop or accredit courses for the professional development units that teachers will need to maintain their teaching licenses. Each summer many teachers flock to JTC approved courses to build their CVs. If the JTC directs teachers' attention to DMIL, this can be a powerful incentive for teachers to develop the needed skills. The Core Curriculum Unit (CCU) often works with the JTC on these courses, and their mandate to develop curricula, lesson plans and content makes them extraordinarily well-placed to help schools integrate DMIL into their classrooms. The CCU has already integrated ICT Attainment standards into the National Standards Curriculum (NSC) targeted at Grades 1 - 9. The CCU is in the perfect position to guide a national initiative to develop lesson plans and content based on the DMIL Model that teachers can use off-the-shelf with minimum to moderate modification. The Media Services Unit (MSU) and the CCU have the experience of working together on successful multi-year programmes that lifted the literacy of students in public schools from Grade 1 to Grade 11. In a similar fashion to the partnership with which they implemented the Literacy 1-2-3 and Literacy 4-5-6 models, these two units are a natural fit for DMIL implementation in the public school system. To ensure that DMIL is fully integrated into primary level schools, it is critical that it become an integral part of the primary level exit examinations.

Risk Management, Monitoring & Evaluation

If the goal is for all Jamaicans to develop digital, media and information literacy, then the most likely hurdles to an inclusive implementation need to be identified and guarded against. What follows is a discussion of some endemic challenges to education in Jamaica and an after action review of several relevant projects.

Endemic Challenges in Jamaican Education

The Jamaican education system is highly stratified. The top quintile of parents (by socioeconomic status) enrol their three year old or four year old children in very costly kindergarten and preparatory schools. Those who cannot afford those schools enrol their children in basic, infant and primary schools. Students who attend the preparatory schools are almost always better prepared to perform in the primary-level exit examinations than their public school counterparts, and are awarded places in secondary schools according to their scores. Secondary school principals have the discretion of determining who to accept for up to five percent of each Grade Seven cohort. Because there are relatively few private secondary schools and very few public secondary schools have a reputation of preparing students well for the end of secondary level examinations, there is intense competition at the primary level to secure one of the coveted places at the secondary level. Arising at least partly from this, the primary level is where parents are most willing and used to spending large amounts of money on their children's education. Given that the state's financial resources for DMIL implementation are likely to be limited, we propose that DMIL materials developed for the public schools be made available for purchase by all parents and schools. The Ministry of Education would then be able to use the revenue generated to subsidize the provision for those households that cannot afford the materials and the public schools attended by the children of those households.

While the first level of stratification is by ability to pay, the level of stratification at the secondary level is almost entirely by level of preparedness to take advantage of secondary level education. Schools with the best reputations tend to attract the most highly qualified candidates whose scores fall within a very narrow band, while schools with the worst reputations receive candidates whose scores vary quite a bit but are all low. For all those schools that the National Education Inspectorate has said have acceptable management teams in place, per capita resource allocation for DMIL implementation should be inverse to the median PEP scores of their Grade 7 classes. This is an effort to ensure that those who need the resources the most get it.

Since 1955, female participation in the primary and secondary school system has been greater than male participation, and in more recent decades female performance has been much greater than male performance. One of the most important factors is the much greater responsibility that males have to economically support themselves and their families from as early as fourteen years old. In situations where resources are scarce, Jamaican families will almost always choose to funnel resources into the education of girls over boys. The rationale is that girls need to go on to get a tertiary education to protect themselves, but boys can go out and earn a living when necessary. This reveals itself in the subject choices that students make at the end of Grade Nine. A much larger proportion of boys choose the technical and vocational subjects that aim to equip them to make a living immediately upon finishing secondary school, as compared to girls who overwhelmingly choose the general academic subjects which prepare students for tertiary education. Further, while the tertiary matriculation standard is five CSEC subjects including Mathematics and English, only about forty-three percent of each Grade 11 cohort register to sit any five subjects in any exam year. This means that the majority of Grade 11 students do not intend to proceed directly into higher education. If DMIL is to be seen as relevant to the lives of most secondary school students it should be pitched as a body of knowledge and skills that are immediately useful and economically relevant to youth entering the workforce. There are a small number of secondary schools whose students almost universally expect to proceed directly into tertiary education, and in those settings DMIL can be pitched as part of general education. The state's priority should be the majority, where they are now.

Education is frequently promoted as a national investment which will yield future benefits. Many educational policy decisions are made with a view to producing a workforce that will transform the economy. Unfortunately, this model of the education system pushing the economy to transform rarely (if ever) works (Clayton). Authors of Jamaican science policy have pointed out the flaws in this kind of thinking which is pervasive in Jamaica (Martin Henry, Clayton). Jamaican employers have repeatedly said in the World Bank's Enterprise Surveys that they have access to sufficient numbers of sufficiently qualified employees. Producing more general academic secondary school graduates than the tertiary sector or the economy can absorb leads to more dissatisfied, unemployed and unemployable secondary school graduates (Chen, JEF Report). Far more successful is when the economy pulls the skillsets it needs from the education system. This is why the DMIL policy recommends that policy implementation begins with work-

force training, and follows with a vocationally oriented DMIL programme at the upper secondary level.

After Action Review of Select Projects

iSchool - Media Literacy Project for Jamaican Primary and Junior High School Students

In 2007, the Broadcasting Commission of Jamaica initiated a Media Literacy Project funded by UNESCO and dubbed the iSchool project. The Media Services Unit of the Ministry of Education helped to design the project, and the Joint Board for Teacher Education was a major partner as were personnel from the Institute of Education at The University of the West Indies. The live testing of the videos, teacher and student workbooks, and curricular integrations with teachers colleges and several public schools were so successful, that the JBTE asked that the project target group be expanded from Grades 4 - 6 to include all of Grades 1 - 9. A practical component for the establishment of low power radio stations in five schools was also designed. Although this project had the blessing of the Minister of Education and senior technocrats within the Ministry, and ran from 2007 - 2012, the curriculum and materials were never deployed nation-wide.

The project was successful in developing the desired outputs, so why were the expected benefits not realized? Any response at this time - nine years after the project ended - is necessarily uncertain. The authors are relying primarily on a review of the project documentation that was made available to see what lessons may be learned from this project. Every effort seems to have been made to involve a wide group of relevant stakeholders, and the depth and range of technical expertise applied to the project seem worthy of emulation.

Two reasons may explain why the project never expanded beyond the pilot. The first is that the primary Ministry of Education Unit responsible for scaling up such a project is the Core Curriculum Unit (CCU), and the documentation does not suggest they were a major partner in this project. Instead the JBTE which is responsible for the curriculum in teacher training institutions was the curricular lead. Not having the right stakeholders on board can be fatal. Unfortunately, even if the CCU had been directed to engage with the iSchool project, it is doubtful whether the outcome would have been very different, because in 2012, the Ministry's policy priority - led by the CCU - was the development of the National Standards Curriculum (NSC) for Grades 1 - 9. It is very likely they would have insisted that Media Literacy be subsumed within the overall curriculum overhaul, and that the iSchool deployment schedule would have to wait on the NSC.

DMIL is an even more ambitious project than iSchool being conceptualized in an even more tumultuous period - a once in a century pandemic. For DMIL to be successful in schools, a major effort to explain it and promote it to a very broad range of stakeholders will be essential. We think it is very important to get parents and students to expect and demand DMIL. Engagement with the National Parent Support Commission, the National Parent-Teachers Association of Jamaica, and the National Secondary Students Association are important. As previously mentioned it is also critical to begin workforce training before the education push, so that parents are exposed to the importance of DMIL for their children's economic future in a very sustained and concrete manner.

Within the Ministry of Education, there is an opportunity for DMIL implementation to support the CCU's ongoing mandate to develop and deploy lesson plans and other teaching-learning materials in support of the NSC roll-out. The CCU should be engaged to update the ICT Attainment Standards within the NSC with the DMIL Model, and a web based application be provided for the CCU to manage the crowdsourcing and quality control of lesson plans and other teaching-learning materials. The other Ministry of Education departments and agencies, including the JTC, NCEL, JBTE, HEART NSTA, should also be engaged with a view to identifying how DMIL implementation can be fashioned to promote their own success. With a national budget second only to the Ministry of Finance, the Ministry of Education is complex, and sustained engagement to achieve and maintain stakeholder alignment will be critical to the success of DMIL implementation.

USF Community Access Points & E-Learning Project

The Universal Service Fund was established in 2005 to use the levy on internationally inbound calls to ensure universal access to information and communications technologies. Its mandate was broadened in 2012 to include "the facilitation of lifelong learning and the creation of a knowledge-based society." This is clearly very well-aligned to the intention of the DMIL policy, and so it may be useful to reflect on the successes and failures of the USF over the last fifteen years.

One of the most visible activities of the USF has been the establishment of over four hundred Community Access Points across the country (Universal Service Fund 2020). Community Access Points are essentially community-based and operated internet cafes. Entities, especially community-based organizations, are free to apply to the Universal Service Fund year-round for funding computers and ICT equipment to set up an internet cafe. In their application, these entities are required to justify the need for such a cafe, and a review of the applications received in 2019/2020 showed that the most frequent reason posited is to support homework and other educational activities of school children and youth. Unfortunately, 15 years after the USF began operations approximately 120,000 students have reportedly not been able to access online education during the Covid pandemic.

Two reasons partially explain this. First, the USF does not operate on the results of a comprehensive survey to stratify communities by the degree of their need for CAPs, nor do they consult with the other state entities that should have some of the relevant information. The Social Development Commission, a state entity, has officers assigned to the over 800 communities across Jamaica charged with strengthening community-based organizations and developing Jamaica's communities. They should have intimate knowledge critical to scoring the communities' needs and capacity to manage a CAP. The Ministry of Education and the Early Childhood Commission both have dozens of Education Officers who are assigned to schools from the infant to secondary level. These officers also have intimate knowledge of the communities in which they work, and could help score the communities' needs and capacity to manage a CAP. The USF does not relate to Parish Development Committees either. Instead, what the USF relies on is a site visit by one of its Kingston-based officers. Consequently, the USF rarely has

high quality qualitative or quantitative data to score the CAP applications by degree of need and assess the degree toward which their work has moved Jamaica towards universal access.

The second reason relates to the high rate of abandonment and mismanagement of these CAPs. Of the 314 audited in 2019/2020, only sixty-two percent were deemed functional (Universal Service Fund 2020). While the USF allocates funding and applies its own technical know-how to ensure that the CAP is equipped with networked computers, it has not deployed automated monitoring tools to ensure that the computers are being used. In general, the monitoring and evaluation by the USF has not been appropriate to the level of initial investment, and so the hoped for benefits are rarely realized.

The other major project funded by the USF has been the High Schools Project executed by the e-Learning Jamaica Company (e-Learning Jamaica Company Limited 2021). This project was largely successful in ensuring that public secondary schools were connected to the Internet, and had at least one properly wired and equipped computer laboratory for student use. Unfortunately, monitoring and evaluation during implementation was also inadequate and in some cases, computers sent to schools were stored in boxes in store rooms to protect them from students, until the computers were obsolete.

Both the CAPs and High Schools Project demonstrate that procuring equipment and installing facilities is not enough to ensure that students and citizens have reliable, high quality access to the Internet. For the DMIL policy implementation, it is essential that suitably qualified monitoring and evaluation staff are hired and empowered, and other appropriate resources are budgeted for so that progress towards the intended benefits can be monitored and the needed corrections made in a timely manner.

Guidance for the Project Team

Outcome Challenge

The implementation of the DMIL national policy framework intends to see a Formal Education and Training sector that:

1. ensures that teacher educators have significant training in digital literacy techniques and pedagogies, and appropriate equipment and materials to integrate digital literacy into their teaching
2. ensures that teachers in training receive significant exposure to and practice with digital literacy techniques and pedagogies, and are equipped to use digital technologies extensively and artfully in the classroom
3. ensures that teachers in service receive significant continuing education in the use of digital literacy techniques and pedagogies in their individual subjects
4. provides teachers in service with overwhelming support, including materials, lesson plans, IT staff support, and peer-to-peer networking, for integrating digital literacy into their classes

5. provides students at all levels and in almost all subjects with numerous opportunities to practice and hone their digital literacy skills, to see how the skills are used by adults in a wide variety of economic, social and cultural situations, and to assess their progress regularly

6. ensures that teacher educators, teachers-in-training, and teachers-in-service all learn how to integrate continuous improvement and innovation into their teaching practice.

Progress Markers

Expect to see

- digital literacy training for teachers-in-service
- more digital tools deployed to schools

Like to see

- a system of badges / micro-credentials in digital literacy approved and implemented by the Jamaica Teachers' Commission to encourage and support the upskilling of all in-service teachers
- digital upskilling for teacher educators

Love to see

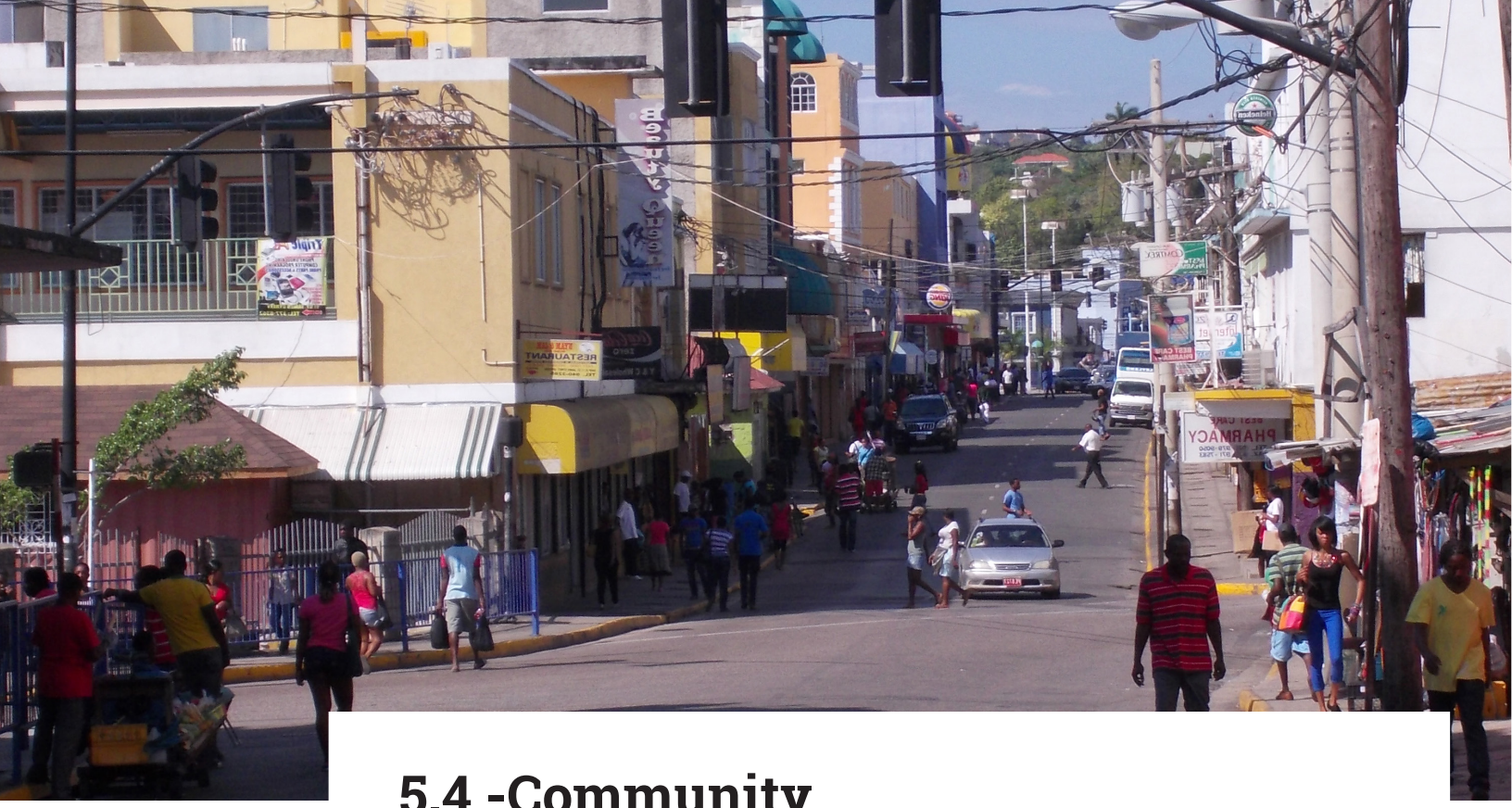
- annual national assessments of students' digital literacy at various grade levels
- development and dissemination of lesson plans and materials that integrate digital literacy into the National Standards curriculum
- widespread implementation of digitally-enhanced curricula for all subjects in all teacher-training institutions
- in-service teacher portfolios and evaluations that emphasize continuous improvement and innovation in teaching

Table 21:

Strategy Map: Formal Education and Training

I-1	Development and dissemination of lesson plans and materials that integrate digital literacy into each subject and grade level of the NSC.	
	Champion:	MoE Core Curriculum Unit
	Installation of equipment and maintenance contracts for digital teaching and learning.	
	Champion:	E-Learning Jamaica

I-2	Development and delivery of courses on digital academic leadership for principals, school leaders, and Education Officers.	
	Champion:	National College for Educational Leadership
	Development and delivery of digital literacy courses for the continuing education and licensure of in-service teachers	
	Champion:	Jamaica Teachers' Commission
	Development and delivery of new digital literacy curricula for each subject and specialization in teacher-training institutions.	
	Champion:	Joint Board for Teacher Education
I-3	Provision of an online network where Education Officers and Core Curriculum Officers provide support for the digital journeys of JTC-licensed teachers (public and private schools).	
	Champion:	Core Curriculum Unit
	Annual national assessments of students' digital literacy at appropriate grades.	
	Champion:	Champion: MoE Student Assessment Unit
E-1	Requirement for Principals to submit annual digital literacy school improvement plans.	
	Champion:	MoE Schools Operations
E-2	Implementation of a media campaign to help parents, children and teachers realize the broad applicability of digital literacy skills in various careers and social roles	
	Champion:	MoE Guidance Unit & Career Counsellors Association
E-3	Provision of an online network for JTC-licensed teachers to co-develop lesson plans and materials, exchange ideas, and solve teaching and learning issues together.	
	Champion:	MoE Regional Offices, Quality Education Circles



5.4 -Community

The high level of informality in Jamaica's economy, the high rate of secondary school drop-outs and persons not in education, employment or training (NEET), as well as the long history of the involvement of the Church and the more recent development of environmental groups across the breadth of Jamaica, makes engagement through Civil Society an important channel for DMIL Implementation. Major groupings within Civil Society are non-governmental organizations (NGOs) and community based organizations (CBOs). NGOs (e.g. Jamaicans For Justice (JFJ) and the Jamaica Environmental Trust (JET)) typically have broad reach (sometimes national reach), are formally organized and may have international funding. CBOs typically have deeper roots in specific communities than NGOs but more limited breadth of reach, more tenuous funding, and less well-developed management structures.

Sustainable Livelihoods Approach

Identification of the sampled households is based on the sustainable livelihoods approach (SLA). As per IFAD's web page on SLA (http://www.ifad.org/sla/index.html), "the SLA is a way to improve understanding of the livelihoods of vulnerable groups. It draws on the main factors that affect poor people's livelihoods and the typical relationships between these factors. The two key components of the SLA are: (1) a framework that helps in understanding the complexities of poverty, (2) a set of principles to guide action to address and overcome poverty". Karfakis, 2011, p2

Libraries and Librarians

The Jamaica library system has two assets that will be very valuable in a whole-of-society DMIL Implementation.

1. There is a well-developed library system including libraries in all parishes of Jamaica. These buildings can be outfitted with new digital technologies and transformed into Maker spaces or Innovation Centers for their communities.
2. Tertiary educated Librarians are already exposed to many of the DMIL Competences and can impart their skills to their community populations.

Jamaica has a well-developed library system, including parish libraries and school-based libraries. Library and Information Studies includes the study of many of the information literacy competences that are included in the DMIL Competency Model (see spreadsheet; essentially we postulate that librarians have the competences specified in GMIL). In particular, we believe that librarians already have much exposure to almost all of the competences in DMIL Competence Area 1 (Media, Information and Data Literacy), half of the competences in DMIL Competence Area 2 (Communication and Collaboration), and half of the competences in DMIL Competence Area 3 (Digital Content Creation). Given their disciplinary backgrounds, tertiary educated librarians are well-equipped to develop many of the DMIL competences to which they have not already been exposed.

Guidance for Project Teams

Outcome Challenge

The implementation of the DMIL national policy framework intends to see Communies that:

1. seek to identify the digital literacy needs of all community members, especially those from vulnerable groups (e.g. youth not in employment, education or training; the disabled; Rastafarians; elderly; children)
2. provide safe, hospitable environments for members to learn and practice digital skills, to be innovative and entrepreneurial, especially within the context of projects that help to transform the community into a smart community
3. interact with the local government, central government, schools, telecom services providers, media firms, other businesses and organizations to advocate for the well-being of the community
4. organize to acquire the municipal and digital infrastructure they want to transform their communities into smart, sustainable communities
5. guide and support the development of local inclusive digital ecosystems
6. attend to the question, “what can we do to make our communities better places for us to live together in harmony with ourselves and the environment?”

Progress Markers

Expect to see

- create (electronic) registers for persons to indicate their interests and needs, with the option to indicate which of several marginalized groups they may belong to.
- maintain a list of learning, training, practicing, and funding opportunities for community members
- appoint designated community members to answer questions about opportunities
- publish phone numbers, email addresses, WhatsApp / Instant Message handles to respond to questions

Like to see

- set up a community center with facilities for persons to come together physically and digitally to learn, practice, and make, whether individually or in groups
- provide regularly scheduled training sessions in digital, media and information literacy
- have regular meetings in which they prepare positions to be put to the central and local government representatives in the appropriate fora
- have regular meetings in which they prepare positions to be put to schools, telecom services providers, media firms and other organizations

Love to see

- publish local media content
- develop projects and funding proposals to upgrade the traditional and digital infrastructure of the community
- set up and support social businesses

Table 22:

Strategy Map: Community

I-2	Training of parish councilors, other elected and local government officials on how to develop smart, sustainable communities.	
	Champion:	Min. of Local Government
	Training and certification of community leaders and social entrepreneurs to deliver smart and sustainable community products and services.	
	Champion:	Social Development Commission
I-3	Online network of social entrepreneurs and community leaders with support from mentors who are experts in U4SSC and Inclusive Digital Ecosystems	
	Champion:	Social Development Commission

E-1	Identification of the needs of the most vulnerable communities	
	Champion:	Community Renewal Programme
	Identification of funds to support entrepreneurial activities that will develop communities' digital capacity.	
	Champion:	Community Renewal Programme, Development Bank of Jamaica
E-2	Media campaign to promote the value of U4SSC and Inclusive Digital Ecosystems	
	Annual conference on Smart Cities at the UWI Western Jamaica Campus	
	Champion:	Western Jamaica Campus, The University of the West Indies.
E-3	Online network of social entrepreneurs and community leaders	
	Champion:	Social Development Commission