Building a Common Language for Skills at Work
A Global Taxonomy

January 2021
Preface

The combination of the ongoing COVID-19-related global recession and increased automation in the future of work has led to a large-scale disruption of the jobs and skills landscape. While previous generations of talent could expect linear career progression and engagement in formal learning that decreases over time, the workforce of the future will be required to rapidly learn and relearn new skills as reskilling, upskilling and redeployment define the ‘new normal’ in the future of work.

Current systems of learning and signalling job-fit do not provide the agility that lifelong learners will require, and we find ourselves at a defining moment to make skills the currency of the labour market. Shifting to a skills-based system can not only provide more efficient mechanisms by which employers can identify the talent they need for business to flourish but can also create fairer labour markets where individuals are able to rapidly transition between roles; have greater access to learning opportunities; and be matched to employment through unbiased and skills-based evaluation. Yet many learning providers and employers use their own definitions and standards for skills, creating additional challenges for connecting workers to learning opportunities.

Over the past year, the World Economic Forum has brought together several communities of influential leaders committed to the Reskilling Revolution—an ambitious goal to provide 1 billion people with improved education, jobs and skills by 2030. These communities include Ministers of Education and Labour, Chief Executive Officers, Chief Human Resource Officers, Chief Learning Officers, online learning providers, and key industry and country-level skills experts and leaders—all of which have committed to creating more efficient and fairer labour markets by more closely aligning the supply and demand of learning.

The following proposed framework for a global skills taxonomy is a first step in shifting toward a skills-based labour market. We hope that the principles for implementation herein will serve to further align learning supply and demand around a common language for skills and unlock the Reskilling Revolution. The proposed taxonomy builds on the recognized work taken forward by ESCO (European Skills, Competences and Occupations) and the Occupational Information Network (O*NET) framework by integrating additional emerging skills and attitudes, particularly as they relate to the trends highlighted in the Forum’s ongoing insights on the future of work. It aims to take a matrixed approach that combines skills and occupations.

This taxonomy focuses on the skills that we know to be of growing relevance in a fast-changing labour market, and aims to serve as a “universal adapter” for existing taxonomies across learning supply and demand by allowing users to cross-walk their taxonomy against this framework. It is designed to be used by Chief Learning Officers in developing their learning, reskilling and redeployment strategies; by Chief Human Resource Officers in their practices for hiring incoming talent; by learning providers who design and curate learning materials to be used in the workforce; and by governments who aim to assess skills needs within their economies. The ambition is that—through continuous contributions and consultations with industry and government experts—we continue to build on this framework to ensure it remains agile and adapts to broader disruptions and changing trends in the jobs and skills landscape. This publication complements the global skills taxonomy by providing context and recommendations for how the taxonomy can be deployed by key actors to unlock the Reskilling Revolution.

For more information, or to get involved, please contact the World Economic Forum’s New Economy and Society team at reskillingrevolution@weforum.org.
The COVID-19 pandemic and related ongoing global recession have transformed the global jobs and skills landscape.

These shifts have accelerated the need for reskilling, upskilling, learning and redeployment at scale.

50% of all employees will need reskilling by 2025.

Source

40% of current workers' core skills are expected to change in the next 5 years.

Source
New data-driven methods demonstrate the power of using a skills-based approach to reskill, upskill and redeploy talent. Breaking job roles down into required skill sets can allow employers to better understand viable job transition pathways based on the level of similarity in the skills required for different roles, and can enable employers to make more informed decisions on the kind of reskilling and upskilling required to support those transitions.

Below is an example of viable reskilling pathways for cashiers based on a skills match of at least 85% between potential new professions.

**Cashiers**

Wage: $22,000

Skills similarity

- 92% to Ticket Agents and Travel Clerks (Wage: $38,000)
- 93% to Hosts and Hostesses (Restaurants) (Wage: $21,000)
- 94% to Retail Salesperson (Wage: $27,000)
- 95% to Baristas (Wage: $21,000)

Source

Aligning around a common language for skills can unlock a Reskilling Revolution by enabling more efficient collaboration between learning providers, employers and governments to reskill, upskill and redeploy talent.

This proposed global skills taxonomy consists of:

1. **Definitions**
   A set of definitions and differentiations of commonly used terms

2. **Categorizations**
   A categorization of skills clusters and groupings at various levels of granularity

3. **Recommendations**
   Mechanisms for adoption in assessment, hiring, learning and redeployment practices

4. **Use Cases**
   Examples of how the taxonomy has already been leveraged to lead the Reskilling Revolution
Why Develop a Common Skills Taxonomy?

Aligning on a global skills taxonomy is the first step toward making skills the currency of the labour market, which will pay off for individuals, businesses and governments.

Finding the right talent

Aligning on a common language for skills will enable businesses to more rapidly and effectively identify the right talent to fill emerging roles needed for businesses to flourish. In fact, a study found that using a skills-based approach to hiring predicted job success for entry-level employees five times better than degree requirements.¹

A global skills taxonomy may also enable greater intra- and cross-industry collaboration on redeployment efforts—efficiency that is much needed in the context of large-scale unemployment caused in part by COVID-19. Furthermore, a common taxonomy will enable learning providers to more effectively deliver on training needs to prepare talent for the future of work.

Building fairer, more diverse labour markets

Traditional degree-based hiring practices can potentially exclude diverse and relevant talent from the workforce. Aligning on a common language for skills will enable employers to better understand workforce needs and hire based on skills acquisition, rather than on social factors such as networks and access to recognized institutions. Further, taking a skills-based approach can help reduce bias in hiring practices and enable new pathways to employment by allowing nontraditional candidates to be considered for employment. This approach can in turn boost an organization’s talent pool diversity, which many studies have linked with increased innovation.

¹ A study found that using a skills-based approach to hiring predicted job success for entry-level employees five times better than degree requirements.
1 Definitions

Aligning on a common set of definitions and differentiations of terms used to describe skills is a critical first step in building a global skills taxonomy. Shared terminology reduces inefficiency when matching the supply and demand of competencies, and provides a framework by which specific skills, knowledge, attitudes and abilities may be categorized. The proposed definitions of key terms are based on a comprehensive literature review that is informed by key skills experts. These definitions form the foundation for the taxonomy framework. Given that the taxonomy is to be used in the context of jobs, skills and knowledge have been combined for this framework. Further skills definitions can be found in the appendix.

Competencies — Collection of skills, knowledge, attitudes and abilities that enable an individual to perform job roles

Skills and Knowledge

Skills are the capabilities needed to complete a task, and therefore a job.

Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge.

Attitudes

Learned behaviours, emotional intelligence traits and beliefs that individuals exhibit that influence their approach to ideas, persons and situations.

Abilities

Possession of the physical, psychomotor, cognitive and sensory means to perform a job.
Clustering skills at various levels increases the taxonomy’s efficacy and reach by enabling employers and learning providers to map their own taxonomies against the global framework. Using data-driven and qualitative methods, skills may be clustered according to similarity. Granularity increases with each level, with levels 1-3 remaining constant as the foundational framework; level 4 providing opportunities for adding skills as the skills landscape continues to transform; and level 5 being determined by the end user of the taxonomy (i.e. employers, learning providers and governments). Users can essentially “plug in” their own taxonomy at level 5. The following is an example of what clustering may look like for digital and technology skills. The full proposed taxonomy can be found here.
3 Recommendations

While this taxonomy is meant to be a living document that is continuously updated to reflect the transforming nature of today’s labour markets, its implementation can and should be immediate to deliver on the urgent needs of the global labour market.

The following is a set of recommendations aimed at individuals, employers, learning providers and governments for adopting this global skills taxonomy for use in hiring, learning, development and redeployment practices.

Commit
Build the case among business and government leadership, understand current skills gaps, set targets and communicate the benefits of adopting a common skills taxonomy.

- Ensure buy-in at the top
- Assess skills needs
- Communicate your rationale

Embed
Embed change by adopting new skills-based hiring, learning and development practices, and by creating opportunities for individuals to take ownership of their skills-based lifelong learning journeys.

- Rewrite job descriptions
- Adopt new hiring practices
- Create skills-based progression opportunities
- Adopt new learning and development practices

Mainstream
Mainstream skills-based practices across industries, countries and globally by raising awareness among the general public of the benefits of aligning around a common taxonomy.

- Leverage new technologies
- Partner with vocational training and higher education institutions
- Adopt within public-sector institutions
Ensure buy-in at the top

Leadership buy-in is a key component in the successful adoption of the global skills taxonomy. Employers, learning providers and governments should become champions of mainstreaming a common language for skills, setting the tone for their organizations, employees, and economies, and demonstrating their commitment to building fairer labour markets. Champions can show their commitment to skills-based labour markets by describing the skill set that enables them to be successful in their roles.

Assess skills needs

Leverage the common skills taxonomy to understand the skills gaps within your company or economy. Partner with skills assessment platforms to track and measure skills trends in line with the taxonomy. Map out specific learning needs within your company or economy against specific business and economic strategic priorities.

Communicate your rationale

A study found that using a skills-based approach to hiring predicted job success for entry-level employees five times better than degree requirements. Yet many employers shut out candidates based on their chosen education pathways, creating a biased labour market in favour of those with access to prestigious education institutions rather than individuals with the necessary skills. Skills-based hiring and learning is not yet a mainstreamed concept for individuals, employers, learning providers and governments. The business and the ethical cases for skills-based hiring must be widely communicated and understood among the broader public in order to encourage everyone to adopt a common language for skills.
Rewrite job descriptions

The taxonomy should be leveraged to update job descriptions to ones that advertise bundles of skills, rather than roles with specific degree requirements. The same should be done for existing employees to assess whether those in their current roles are best placed to complete the tasks in their roles. Employers should determine the proficiency level required for each skill to complete work-related tasks.

Create skills-based progression opportunities

Skills should be continuously and precisely assessed in order to reduce bias in progression and remuneration opportunities and provide tailored, unbiased and skills-based feedback for employees. Employers may keep track of skills development via company-level skills passports based on the global skills taxonomy.

Adopt new hiring practices

Degree requirements could be entirely removed as prerequisites for interviewing potential candidates. Instead, employers could partner with skills assessment platforms to evaluate potential candidates based on their specific skill sets. Employers may leverage the proficiency levels outlined in the taxonomy.

Adopt new learning and development practices

Chief learning officers and other leaders responsible for curating learning may leverage the taxonomy to identify learning content that is aligned with their reskilling, upskilling and broader learning needs. Definitions can be leveraged to efficiently communicate needs to learning providers in order to curate learning experiences that address skills gaps within organizations.
Mainstream

Leverage new technologies
A host of platforms are emerging within the education technology sector that enable faster and more accurate skills assessment, hiring and talent-matching. These new technologies should be aligned to the common taxonomy and could be leveraged to support efforts to mainstream skills-based systems.

Partner with vocational training and higher education institutions
TVET (Technical and Vocational Education and Training) and higher education institutions could leverage the taxonomy in partnership with employers to ensure that incoming talent is prepared with the specific skills needed to be successful in the labour market. Curricula and learning pathways could be adapted to focus on specific skills development rather than being geared toward roles and degrees.

Adopt within public-sector institutions
Primary and secondary education institutions should refer to the taxonomy when developing curricula to ensure that childhood learning is aligned to future employment skills requirements. Similarly, employment agencies and other public-sector institutions designed to support unemployed workers should leverage the taxonomy to match workers to potential employment opportunities.
Use Cases

The following is a set of examples of how the taxonomy has been leveraged to support reskilling, upskilling and redeployment efforts at the company, industry, and country levels. We hope that these may serve as concrete examples of how the taxonomy could continue to support scaling of the Reskilling Revolution.

Forecast global, country, industry and job skills trends

The taxonomy has been leveraged to forecast skills trends at the global, country and industry levels through both data-driven and qualitative efforts. At the global level, the taxonomy formed the basis of analysis for The Future of Jobs Report 2020. At the industry level, companies have leveraged the taxonomy to align on top emerging skills by industry. Alignment on these skills is supporting broader intra- and inter-industry reskilling and redeployment efforts.

Set common standards

Industry-level communities have leveraged the taxonomy to define proficiency levels for top emerging digital and technology skills. Such alignment has supported their intra- and inter-industry efforts around reskilling, upskilling and redeployment, and enables them to more accurately assess skills and learning needs.

Create a common mapping of online learning

The taxonomy is currently being leveraged by communities that are part of the Forum’s Reskilling Revolution initiative to map learning opportunities against learning needs. The mapping is based on specific skills as categorized in the taxonomy and allows employers and governments to easily understand offerings based on their skills needs.
Forecast Global, Country, Industry And Job-Specific Skills Trends

The taxonomy can be leveraged to provide forecasts for emerging skills. The following show skills trends projected through to 2025 at the global, country and industry level. These skills forecasts can inform decision-making around reskilling, upskilling and redeployment. The taxonomy may also be leveraged to understand how skills are changing within specific jobs. Here, for example, you will find a breakdown of emerging skills within the Data and AI job cluster.

**Global Top 5 skills of 2025**

1. Analytical thinking and innovation
2. Active learning and learning strategies
3. Complex problem-solving
4. Critical thinking and analysis
5. Creativity, originality and initiative

**Country Profile: Canada’s Emerging Skills**

1. Analytical thinking and innovation
2. Active learning and learning strategies
3. Technology design and programming
4. Critical thinking and analysis
5. Complex problem-solving

**Industry Profile: Consumer Industry’s Emerging Skills**

1. Complex problem-solving
2. Analytical thinking and innovation
3. Active learning and learning strategies
4. Creativity, originality and initiative
5. Technology use, monitoring and control

**Data and AI**

**Emerging Jobs**

1. Artificial Intelligence Specialist
2. Data Scientists
3. Data Engineer
4. Big Data Developer
5. Data Analyst

**Top 5 Skills**

1. Data Science
2. Data Storage Technologies
3. Development Tools
4. Artificial Intelligence
5. Software Development Lifecycle (SDLC)
Set Common Standards

The taxonomy may be used to define proficiency levels for emerging skills, which can enable individuals, employers and learning providers to better assess skill levels and gaps, and help learning providers better align content to talent needs. The following proposed proficiency levels for Machine Learning was developed in collaboration with employers and key skills experts.

<table>
<thead>
<tr>
<th>Skill Name</th>
<th>Machine Learning (level 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Descriptor</td>
<td>Designing systems that learn from data and apply learning to new contexts</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Skill Descriptor by Proficiency Levels</th>
<th>Foundational</th>
<th>Experienced</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Understanding and classifying the type of problem and potential techniques</td>
<td>– Identifying problems, recommending hypotheses and potential solutions</td>
<td>– Synthesizing business insights to define problem areas and potential hypotheses</td>
<td></td>
</tr>
<tr>
<td>– Processing data by collecting, cataloguing and validating data and sources</td>
<td>– Reviewing data set to ensure that data is sufficient and meaningful</td>
<td>– Defining the data engineering approach and guidelines based on data and business context</td>
<td></td>
</tr>
<tr>
<td>– Selecting and implementing appropriate algorithms and models</td>
<td>– Designing and building machine learning models based on problem statements</td>
<td>– Spearheading development of new models or techniques to improvise existing models</td>
<td></td>
</tr>
<tr>
<td>– Conducting training tests and executing training data to validate model</td>
<td>– Designing and adapting training data sets to validate and improve the models</td>
<td>– Establishing training, testing and evaluation guidelines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Providing recommendations from analysis gathered</td>
<td>– Establishing model evaluation protocols, evaluating model results and ascertaining model deployment decisions</td>
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</tr>
</tbody>
</table>
Create A Common Mapping of Online Learning

The taxonomy may also be used to map online learning opportunities and better facilitate the matching of learning supply and demand. The following is a sample of what such a mapping could look like, highlighting one example course per learning provider currently part of the Forum’s Skills Consortium. A more comprehensive mapping could help employers and governments understand the opportunities for rapidly addressing skills gaps.

<table>
<thead>
<tr>
<th>Taxonomy Level 2</th>
<th>Taxonomy Level 3</th>
<th>Taxonomy Level 4</th>
<th>Product Development Roles</th>
<th>Data and AI Roles</th>
<th>Care and Healthcare Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital and Technology and Skills</td>
<td>Technology Design and Programming</td>
<td>Artificial Intelligence</td>
<td>Build and Secure Networks in Google Cloud (Grow with Google)</td>
<td></td>
<td>AI for Healthcare (Udacity)</td>
</tr>
<tr>
<td>Computer Hardware &amp; Networking</td>
<td>Cybersecurity and Application Security</td>
<td>Mobile Development</td>
<td>Become an Android Mobile App Developer (LinkedIn)</td>
<td>Introduction to AWS Identity and Access Management (IAM)</td>
<td></td>
</tr>
<tr>
<td>Web Development</td>
<td>Human-technology Interaction</td>
<td>UX Design Fundamentals (Coursera)</td>
<td>Build Your First Web Pages With HTML and CSS (OpenClassrooms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Science and Analysis</td>
<td>Technology Use Monitoring and Control</td>
<td>Software &amp; Programming Languages</td>
<td>Beginner Python &amp; Math for Data Science (Kaplan Professional)</td>
<td>Data Science: Machine Learning and Predictions (EdX)</td>
<td>Healthcare Payor Data Warehousing and Analysis (Infosys Wingspan)</td>
</tr>
<tr>
<td>Scientific Computing</td>
<td></td>
<td></td>
<td>Introduction to Python Programming (Edraak)</td>
<td>Scientific Computing and Python for Data Science (WorldQuantUniversity)</td>
<td></td>
</tr>
</tbody>
</table>
Appendix: Creating a Global Skills Taxonomy

Over the past several years, the World Economic Forum has convened experts and leaders to discuss trends in the future of work and catalyse industry- and country-level partnerships for reskilling, upskilling and talent redeployment. One of the key challenges confronted by these groups as they seek to scale impact on these topics is the lack of coordination across actors in relation to how skills are defined, especially in the context of new and emerging skills. This misalignment has led to inefficiencies in providing the right training to workers, redeploying talent within and across sectors, and assessing broader skill needs.

While several organizations have developed taxonomies for the purposes of research and labour market analysis, few have considered the practical functionality for end users such as job seekers, employers and learning providers. Over time, World Economic Forum communities have demanded an adaptive taxonomy that complements existing efforts, but that also considers newer and more industry-specific skills that have not yet been captured in other efforts.

Thus began an extensive consultation with Chief Learning Officers, Chief Human Resource Officers, online learning providers and skills and data experts in the Forum’s New Metrics Network to understand the strengths and limitations of existing taxonomies; collect recommendations and suggestions for what particular skills require urgent alignment for industry and country-level efforts; and categorize skills according to what would be the most functional for the end user.

This taxonomy is also supported by a comprehensive review of existing frameworks, in particular the Occupational Information Network (O*NET) content model, the ESCO (European Skills, Competences and Occupations), and those developed by members of the World Economic Forum’s Skills Consortium and Preparing for the Future of Work Industry Accelerators. Efforts were made to ensure that the global taxonomy leverages the most comprehensive elements of each individual taxonomy, while keeping user-friendliness at the core of the final product. In cases where differing definitions were provided for similar competencies, a synthesized definition was developed based on feedback from end users in the Forum’s communities of employers and learning providers. While less comprehensive than other taxonomies in this initial phase, the Forum’s taxonomy does aim to cover the latest emerging skills, with a view to continuously update and expand coverage as the skills landscape continues to transform.

The need for such a taxonomy was conceptualized in the World Economic Forum’s 2019 report Strategies for the New Economy: Skills as the Currency of the Labor Market. In addition, this taxonomy is further informed by the World Economic Forum’s Towards a Reskilling Revolution: A Future of Jobs for All report and the 2020 Future of Jobs Report, which follows an adapted and synthesized version of the Occupational Information Network (O*NET) taxonomy for its categories of analysis for skills based on feedback and insights from New Metrics collaborators, as well as the data and research-driven methodology that was used in the World Economic Forum’s Jobs of Tomorrow: Mapping Opportunity in the New Economy report to identify emerging occupations based on skills clusters. The methodology used in the Jobs of Tomorrow report was developed in collaboration with Burning Glass Technologies, Coursera and LinkedIn, which provided further insight into emerging skills categories and clusters. Insights from those collaborations have been integrated into the structure of the skills taxonomy presented in this report.
### Level 1 Definitions

**Skills and Knowledge:** Skills are the capabilities needed to complete a task, and therefore a job. Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge.

### Level 2 Definitions

**Business:** Management and communication of activities.


**Resource Management and Operations:** Capacity to allocate resources efficiently and effectively, and manage activities that businesses engage in daily to gain value from physical or intangible assets.

- Source: O*NET Resource Center, The O*NET® Content Model, "resource management skills", [https://www.onetcenter.org/content.html#cm2%20(see%20%E2%80%99%E2%80%99Resource%20management%20skills%20%E2%80%99)].

### Level 3 Definitions

**Management of Personnel Resources:** Capacity for gathering personnel resources to achieve tasks, including how human capital will be allocated to get the work done, identifying talent, and accounting for expenditures and returns.

- Source: European Commission, ESCO (European Skills/ Competencies, Qualifications and Occupations), Skills/Competencies, "personnel management", [https://ec.europa.eu/escoportal/skill; O*Net Resource Center, The O*NET® Content Model, "management of personnel resources", [https://www.onetcenter.org/content.html#cm2%20(see%20%E2%80%99%E2%80%99Resource%20management%20skills%20%E2%80%99)].

**Coordination and Time Management:** Capacity to manage one’s time and planning in tandem with others.

- Source: O*NET Resource Center, The O*NET® Content Model, "time management", [https://www.onetcenter.org/content.html#cm2%20(see%20%E2%80%99%E2%80%99Resource%20management%20skills%20%E2%80%99)].

**Management of Financial and Material Resources:** Capacity for gathering resources to achieve tasks, including how money will be spent to get the work done, obtaining equipment, facilities, and materials, and accounting for expenditures.

- Source: O*NET Resource Center, The O*NET® Content Model, "management of financial resources" and "management of material resources", [https://www.onetcenter.org/content.html#cm2%20(see%20%E2%80%99%E2%80%99Resource%20management%20skills%20%E2%80%99)].

### Level 4 Definitions

**Project Management:** Capacities to lead the work of a team to identify, select and implement the appropriate changes, tools, and improvements to achieve and deliver a defined goal.

- Source: edX, Project Management Courses, [https://www.edx.org/learn/project-management---what%20is%20project%20management%20and%20why%20is%20it%20important%20for%20businesses%20to%20learn%20project%20management?&project%20is%20something%20that%20speaks%20to%20everyone%20who%20wants%20to%20be%20a%20leader%20in%20their%20field%20and%20improve%20their%20skills%20in%20project%20management%20and%20time%20management%20and%20analytics%20and%20more](https://www.edx.org/learn/project-management---what%20is%20project%20management%20and%20why%20is%20it%20important%20for%20businesses%20to%20learn%20project%20management?&project%20is%20something%20that%20speaks%20to%20everyone%20who%20wants%20to%20be%20a%20leader%20in%20their%20field%20and%20improve%20their%20skills%20in%20project%20management%20and%20time%20management%20and%20analytics%20and%20more).
### Level 1 Definitions

**Skills and Knowledge:** Skills are the capabilities needed to complete a task, and therefore a job. Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge.

### Level 2 Definitions

- **Business:** Management and communication of activities.
  
  **Marketing:** Capacity to promote and sell products or services.
  
  **Sales, Communication and Marketing of Products and Services:** Capacity to identify and shape effective value propositions for products and services, as well as to sell products on that basis.
  
  **Customer Experience:** Capacity to manage positive interactions between an organization and its customers.
  
  **Innovation and Creativity:** Thinking of novel ideas, improvements and solutions by combining ideas or information and making connections between different fields and perspectives.

### Level 3 Definitions

- **Problem-Solving:** Capacity to determine the source of a problem and find an effective solution.

### Level 4 Definitions

- **Analytical Thinking:** Capacity to break down concepts and complex ideas into basic or fundamental principles.
  
  **Creative Thinking:** Capacity to bring a new idea or concept into existence through imagination and to imagine something that does not exist.

- **Critical Thinking:** Capacity to analyse and interpret facts and information to make sound judgements.

- **Systems Thinking:** Capacity to understand how concepts work together, what is the bigger whole of which something is a part, and how to identify patterns over time.
<table>
<thead>
<tr>
<th>Level 1 Definitions</th>
<th>Level 2 Definitions</th>
<th>Level 3 Definitions</th>
<th>Level 4 Definitions</th>
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| **Skills and Knowledge**: Skills are the capabilities needed to complete a task, and therefore a job. Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge. | **Digital and Technology**: Effectively and responsibly designing and using technology.  
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**Source**  
World Economic Forum, Schools of the Future: Defining New Models of Education for the Fourth Industrial Revolution, 2020; DQ Institute, What is the DQ Framework? Global Standards for Digital Literacy, Skills, and Readiness, https://www.dqinstitute.org/dq-framework/. | **Technology Design and Programming**: Capacity to use programming to design machines or technological systems which fit user needs. In addition, understanding how others use tools, determining the cause of operating errors and fixing them.  
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**Source**  
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**Source**  
Industry and learning provider consultations |
| **Computational Thinking**: Looking at real-world scenarios and creating models that can be processed by a computer.  
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**Source**  
Industry and learning provider consultations | **Computer Hardware and Networking**: Setting up a connected network of computing devices, such as laptops, desktops, servers, smartphones, tablets, and IoT devices that communicate with one another.  
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**Source**  
Industry and learning provider consultations |
| **Cybersecurity and Application Security**: Using technologies, processes, and practices to protect computers, networks, programs and data from unauthorized access or attacks that are aimed for exploitation.  
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**Source**  
Industry and learning provider consultations | **Data Science and Analysis**: Organizing and systematically analysing structured or unstructured data to create insights.  
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**Source**  
Industry and learning provider consultations |
| **Mobile Development**: Developing applications for mobile devices.  
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**Source**  
Industry and learning provider consultations | **Human-Technology Interaction**: Designing computer technology focused on the interfaces between humans and computers.  
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**Source**  
Industry and learning provider consultations |
| **Web Development**: Building and maintaining websites.  
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**Source**  
Industry and learning provider consultations |
### Skills and Knowledge

**Level 1 Definitions**

<table>
<thead>
<tr>
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<td>Skills and Knowledge: Skills are the capabilities needed to complete a task, and therefore a job. Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge.</td>
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<td>Digital and Technology: Effectively and responsibly designing and using technology.</td>
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**Source**

<table>
<thead>
<tr>
<th><strong>Level 3 Definitions</strong></th>
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<tbody>
<tr>
<td>Technology Use, Monitoring and Control: Capacity to select the right tools needed to perform tasks, use those tools and set up and operate technology.</td>
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</table>

**Source**

<table>
<thead>
<tr>
<th><strong>Level 4 Definitions</strong></th>
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<tbody>
<tr>
<td>Installation: Installing equipment, machines, wiring or programs to meet specifications.</td>
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</tbody>
</table>

**Source**
- Industry and learning provider consultations

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<tr>
<th><strong>Collaboration and Productivity Software</strong>: Using software designed to help get work done faster and more efficiently.</th>
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**Source**
- Industry and learning provider consultations

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<tr>
<th><strong>Machining and Manufacturing Technologies</strong>: Using technologies that assist in industrial production and manufacturing processes.</th>
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**Source**
- Industry and learning provider consultations

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<th><strong>Cloud Computing</strong>: Delivering computing services over the internet.</th>
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**Source**
- Industry and learning provider consultations

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<th><strong>Customer Relationship Management Software</strong>: Using technologies to manage client relationships.</th>
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<th><strong>Scientific Computing</strong>: Using computers to effectively solve scientific problems.</th>
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<th><strong>Digital Marketing</strong>: Using the internet, mobile devices, social media, search engines and other online channels to reach consumers.</th>
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<th><strong>Software &amp; Programming Languages</strong>: Using software and programming languages.</th>
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<tr>
<td>Skills and Knowledge: Skills are the capabilities needed to complete a task, and therefore a job. Knowledge is the body of facts, principles and theories that are related to a field of work or study, and that can be further split into dependent knowledge (practical and procedural) and context-independent or theoretical knowledge.</td>
<td>Languages: Communicating through reading, writing, speaking and listening in a mother tongue and/or in a foreign language.</td>
<td>Multi-lingualism: Capacity to communicate through reading, writing, speaking and listening in a mother tongue and/or in a foreign language.</td>
<td>Indo-European: Family of languages spoken in most of Europe, areas of European settlement and much of Southwest and South Asia.</td>
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<td>Sino-Tibetan: Family of languages that includes Chinese and Tibeto-Burman languages.</td>
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<tr>
<td>Afro-Asiatic: Family of languages spoken in the northern part of Africa, the Arabian Peninsula and some islands and adjacent areas in Western Asia.</td>
<td></td>
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<tr>
<td>Austronesian: Family of languages spoken in most of the Indonesian archipelago; all of the Philippines, Madagascar and the island groups of the Central and South Pacific (except for Australia and much of New Guinea); much of Malaysia; and scattered areas of Viet Nam, Cambodia, Laos, and Taiwan, China.</td>
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<td>Japonic: Family of languages spoken in the main islands of Japan.</td>
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<tr>
<td>Niger-Congo: Family of languages spoken by 85% of the population in Africa.</td>
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<td><strong>Multi-lingualism</strong>: Capacity to communicate through reading, writing, speaking and listening in a mother tongue and/or in a foreign language.</td>
<td><strong>Dravidian</strong>: Family of languages spoken predominantly in South India and Sri Lanka.</td>
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<td><strong>Industry-Specialized</strong>: Specialized industry skills are specific to the field of the professions in question, such as Documentation, in Cloud Computing; Video and Editing, in Marketing, Sales and Content; or Radiation Oncology, in the Care Economy professional cluster. The cluster excludes skills related to the operation and design of digital technologies.</td>
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<td><strong>Attitudes</strong>: Consistent behaviours, emotional intelligence traits and beliefs that individuals exhibit that influence their interpersonal interactions and their approach to ideas, persons and situations. Attitudes are learned and often a big part of the driving force of learning and the approach to doing tasks.</td>
<td><strong>Working with People</strong>: Behaviours and emotional intelligence that enable individuals to complete tasks and jobs in a pleasant, cooperative way that is sensitive to others.</td>
<td><strong>Active Listening, Communication and Information Exchange</strong>: Paying attention to what others say and understanding points being made, establishing rapport, adjusting the register, and respecting the intervention of others.</td>
<td><strong>Asking Questions</strong>: Listening carefully to what other people say and asking appropriate questions to gain better understanding.</td>
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<td><strong>Teaching and Training</strong>: Facilitating the acquisition of new knowledge and skills. Leading and guiding individuals and groups through a process in which they are taught the necessary skills and knowledge for life, future learning or for a particular job or set of jobs.</td>
<td><strong>Receiving Feedback</strong>: Reacting to valid and well-reasoned opinions and directions about one’s work in a positive manner.</td>
<td></td>
<td>Source European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, “teaching and training”, <a href="https://ec.europa.eu/esco/portal/skill">https://ec.europa.eu/esco/portal/skill</a>.</td>
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<td>Source European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, “gather feedback from employes”, <a href="https://ec.europa.eu/esco/portal/skill">https://ec.europa.eu/esco/portal/skill</a>.</td>
<td><strong>Service Orientation</strong>: Actively looking for ways to help others as well as to make them feel attended to and welcome.</td>
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<td><strong>Following Instructions and Procedures</strong>: Following instructions given verbally or in writing and following standard or agreed procedures.</td>
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<td><strong>Assisting and Supporting Co-workers</strong>: Assisting and supporting colleagues, managers, volunteers and other co-workers in the performance of their tasks or in the operations of a business unit.</td>
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<td>Source European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, <a href="https://ec.europa.eu/esco/portal/skill">https://ec.europa.eu/esco/portal/skill</a>.</td>
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<td><strong>Attitudes</strong></td>
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<td><strong>Leadership and Social Influence</strong>: Having an impact on others in the organization and displaying energy and leadership.</td>
<td><strong>Empathy</strong>: Capacity to understand the feelings and point of view of others.</td>
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<td>Consistent behaviours, emotional intelligence traits and beliefs that individuals exhibit that influence their interpersonal interactions and their approach to ideas, persons and situations. Attitudes are learned and often a big part of the driving force of learning and the approach to doing tasks.</td>
<td>Behaviours and emotional intelligence that enable individuals to complete tasks and jobs in a pleasant, cooperative way that is sensitive to others.</td>
<td>Leadership is defined as a quality that can be possessed by anyone, regardless of their function within an organization.</td>
<td>Source: Miller, C., <em>&quot;How to Be More Empathetic&quot;</em>, The New York Times, <a href="https://www.nytimes.com/guides/year-of-living-better/how-to-be-more-empathetic">https://www.nytimes.com/guides/year-of-living-better/how-to-be-more-empathetic</a>.</td>
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<td><strong>Leadership and Social Influence</strong>: Having an impact on others in the organization and displaying energy and leadership. Leadership is defined as a quality that can be possessed by anyone, regardless of their function within an organization.</td>
<td><strong>Persuasion and Negotiation</strong>: Persuading others to change their minds or behaviour as well as bringing them together and trying to reconcile differences.</td>
<td>Source: European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, &quot;Leadership&quot;.</td>
<td><strong>Persuasion and Negotiation</strong>: Persuading others to change their minds or behaviour as well as bringing them together and trying to reconcile differences.</td>
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<td>Source: O<em>Net Resource Center, The O</em>NET® Content Model, &quot;interpersonal orientation&quot;.</td>
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<td><strong>Liaising and Networking</strong>: Developing alliances, contacts or partnerships, and exchanging information with others.</td>
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<td>Source: European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, &quot;leadership&quot;.</td>
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<td><strong>Empathy</strong>: Capacity to understand the feelings and point of view of others.</td>
<td><strong>Demonstrating Consideration</strong>: Acting in an understanding and supportive manner that is sensitive to others’ needs and feelings.</td>
<td><strong>Ethical Leadership</strong>: Carrying out workplace activities according to accepted principles of right and wrong, including fairness, transparency and impartiality in work practices and conduct towards other people.</td>
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<td><strong>Ethical Leadership</strong>: Carrying out workplace activities according to accepted principles of right and wrong, including fairness, transparency and impartiality in work practices and conduct towards other people.</td>
<td><strong>Building Trust</strong>: Creating a culture that enables team members to rely on each other.</td>
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<td><strong>Attitudes</strong>: Consistent behaviours, emotional intelligence traits and beliefs that individuals exhibit that influence their interpersonal interactions and their approach to ideas, persons and situations. Attitudes are learned and often a big part of the driving force of learning and the approach to doing tasks.</td>
<td><strong>Self-Management</strong>: Controlling one’s thoughts, feelings and actions.</td>
<td><strong>Initiative</strong>: Willingness to take on responsibilities and challenges.</td>
<td><strong>Working Independently</strong>: Developing one’s own ways of doing things, motivating oneself with little or no supervision, and depending on oneself to get things done.</td>
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<tr>
<td><strong>Self-Awareness</strong>: Seeing one’s own values, passions, aspirations, fit with environment, reactions (including thoughts, feelings, behaviours, strengths and weaknesses), and impact on others, as well as understanding how one is perceived by others, in terms of those same factors.</td>
<td><strong>Internal Self-Awareness</strong>: Understanding one’s own values, passions, aspirations and reactions.</td>
<td><strong>Time Management and Prioritization</strong>: Organizing one’s own time to be able to deliver on commitments and responsibilities.</td>
<td>— Source Eichich, T., “What Self-Awareness Really Is (and How to Cultivate It)”, Harvard Business Review, 4 January 2018.</td>
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<td><strong>Self-Management</strong>: Controlling one’s thoughts, feelings and actions.</td>
<td><strong>Active Learning and Learning Strategies</strong>: Understanding the implications of new information for both current and future problem-solving and decision-making.</td>
<td><strong>Curiosity</strong>: Showing a lively interest in novelty and an openness to experience, finding subjects and topics fascinating, actively exploring and discovering new ideas.</td>
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<td><strong>Adaptation to Change</strong>: Altering one’s attitude or behaviour to accommodate modifications in the workplace.</td>
<td><strong>Willingness to Learn</strong>: Showing a positive attitude towards new and challenging demands that can only be met via lifelong learning.</td>
<td><strong>Meeting Commitments and Deadlines</strong>: Performing one’s tasks in a self-disciplined, reliable and goal-oriented manner, and ensuring that operative processes are finished at a previously agreed time.</td>
<td><strong>Assuming Responsibility</strong>: Accepting responsibility and accountability for one’s own professional decisions and actions, or those delegated to others.</td>
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<td><strong>Attention to Detail, Trustworthiness</strong>: Dependability, commitment to doing the job correctly and carefully, being trustworthy and accountable, and paying attention to details.</td>
<td><strong>Managing Quality</strong>: Pursuing excellence in workplace processes, products and activities.</td>
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<td><strong>Attitudes</strong></td>
<td><strong>Self-Management</strong>: Controlling one’s thoughts, feelings and actions.</td>
<td><strong>Resilience, Stress Tolerance and Flexibility</strong>: Maturity, poise, flexibility, and restraint to cope with pressure, stress, criticism, setbacks, and personal and work-related problems.</td>
<td><strong>Frustration Management</strong>: Handling challenges, disruption and change, and recovering from set-backs and adversity.</td>
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<td><strong>Social Justice</strong>: Taking a conscious and active approach to building inclusivity and fairness across wealth, privilege and opportunity, and addressing biases in one’s community, workplace, etc.</td>
<td>Source: Industry and export consultations.</td>
<td><strong>Persistence</strong>: Sticking to one’s tasks in spite of fatigue or frustration.</td>
<td>Source: European Commission, ESCO (European Skills/Competencies, Qualifications and Occupations), Skills/Competencies, <a href="https://ec.europa.eu/esco/portal/skill">https://ec.europa.eu/esco/portal/skill</a>.</td>
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<tr>
<td><strong>Technology Awareness</strong>: Being mindful of how technology is impacting societies, and understanding the responsible use of technology.</td>
<td>Source: Industry and export consultations.</td>
<td><strong>Environmental Awareness</strong>: Being mindful of the impact of humans and human activity on the planet.</td>
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<td><strong>Abilities</strong>: The range of physical, psychomotor, cognitive and sensory abilities to perform a job role.</td>
<td><strong>Physical</strong> (includes Psychomotor): Abilities that influence strength, endurance, flexibility, balance and coordination (plus abilities that influence the capacity to manipulate and control objects).</td>
<td><strong>Manual Dexterity, Endurance and Precision</strong>: Abilities related to the capacity to manipulate and control objects, strength, endurance, flexibility, balance and coordination.</td>
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<td><strong>Cognitive</strong>: Abilities that influence the acquisition and application of knowledge in problem-solving.</td>
<td><strong>Memory, Verbal, Auditory and Spatial Abilities</strong>: Abilities that influence the acquisition and application of knowledge in problem-solving.</td>
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<td><strong>Sensory</strong>: Abilities that influence visual, auditory and speech perception.</td>
<td><strong>Visual, Auditory and Speech Abilities</strong>: Abilities that influence visual, auditory and speech perception.</td>
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</table>
References and Further Reading


Duckworth, A., Character Lab Playbooks (Curiosity; Creativity; Self-Control; Emotional Intelligence), https://characterlab.org/playbooks/.

Encyclopedia Britannica, Languages (Indo-European; Sino-Tibetan; Austronesian; Afro-Asiatic; Niger-Congo; Dravidian; Turkic; Uralic), https://www.britannica.com/browse/Languages.


ESCO (European Skills, Competences and Occupations), Skills, https://ec.europa.eu/esco/portal/skill.


Notes

2. Ibid.
Acknowledgements

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