AI Skills for Business Competency Framework

On 30 November 2023 the Dept for Science, Innovation and Technology published a consultation around new draft guidance to support businesses to upskill their workers with the tools they need for jobs alongside AI.

The IET responded to this consultation on the Framework document via the dedicated portal set up for that purpose. The comments below are taken from the IET's responses to the various questions. Most questions also asked for scores to be given on a 1-5 scale (1=strongly disagree, 5=strongly agree). Page references refer back to the Framework.

Learner Personas, P8
To what extent do you agree that this guidance will support employers to understand their organisation's AI upskilling needs and consider associated training needs?

Score
3

Comments
- The idea behind delivering guidance for employers is useful and this first draft provides some good core elements. By its nature this guidance is very generic and high level which enables resonance across different organisational types / industries etc. However, this is also a weakness in that the lack of differentiation and depth makes it difficult for employers to gain more than a general awareness of the need for organisational AI upskilling, as opposed to how to achieve that upskilling.
- Greater granularity is needed around the competences of different roles and the means / a roadmap that different staffing types can use to achieve their required level of competency. By way of example, structures are already in place for classifying the competence of Engineers via the UK Standard for Professional Engineering Competence and Commitment (UK-SPEC). We suggest that AI competency levels could mirror this established process to enhance standardisation and the speed of introduction.
- It would be helpful to include a general awareness of how AI impacts and enables interaction with the outside world.
- It would be helpful to consider AI competences into the context of an enterprise / project domain, and to acknowledge that AI is just one tool that enables an organisation to deliver, a tool that needs to be handled properly. The wider business landscape outside the technology sector is one where AI adopters are currently outnumbered 2:1 by reluctant and wary (R&W) organisations. The R&Ws have varying degrees of exposure / adoption of AI, with concerns primarily around reputational and legal risks [The Economist]. There are uncertainties around the extent that AI will drive structural changes in the labour market, the extent that people's work will be centred around AI, not augmented by it. An important communication piece is needed to create more buy-in so as to break down barriers to AI upskilling for the UK to realise its AI economic ambitions.

To what extent do you agree that this guidance addresses the right learner personas for individuals within an organisation? Are there others that should be considered?

Score
3

Comments
- It's useful to grade different groups of persona with regard to their level of awareness, their usage and responsibility around AI, and hence training needs. There's a risk of categories being too prescriptive, given the overlap and nuances between them, which will be reflected in particular projects / organisations. We have made a number of comments accordingly under the specific questions later on.
- The inclusion of some good examples would help illustrate the different categories to readers and thus aid the understanding of their distinct features.

- Further work will be needed on how to engage with the different personas and who will be responsible for upskilling them. Whilst organisational training is likely to take place at different levels, engagement with AI Citizens is less clear.

To what extent do you agree that the personas below are well defined and represents a useful categorisation for individuals within your organisation?

- **AI Citizen**

<u>Score</u>
4

<u>Comments</u>
- The 'AI Skills' framework (p8) defines AI Citizens as both 'customers to' or 'employees of' organisations using AI. These are very wide categories, which will range from digitally unaware / excluded individuals to competent, general IT users. Neither category needs to understand how AI works to use it effectively. There can't be an assumption that all 'Citizens' would be conversant with foundational data skills.
- To avoid overlap between 'Citizens' and 'Workers', we suggest the former should refer solely to external consumers (ie non-employed) of AI products, whether done so knowingly / unknowingly. This would also validate the exclusion of Citizens from Table 1 (p14).
- Individuals may be unaware of the level of integration of AI in their everyday lives. They may not know if appliances are learning from inputs or how data is being used for training purposes. This lack of awareness of AI data safety / security issues increases the level of risk faced by individuals. In this vein it would be useful to see the information for the AI Citizens section (p9) expanded to include Data Provenance, an awareness of the issues around copyright, privacy, bias, etc. Examples of using but not proactively seeing or interacting with AI are:
    o Photos taken with a phone, which automatically applies AI to improve the image.
    o Games that learn how a user plays and adapts the game to make things more challenging.
    o Website searches which lead the underlying algorithm to make ad recommendations accordingly.

- **AI Worker**

<u>Score</u>
3

<u>Comments</u>
- We suggest that the name of this category is changed so as to avoid confusion with both 'AI Citizen' and 'AI Professional'. The category comprises workers who are using AI tools for business purposes, though without the enabling knowledge or roles to develop such tools. Renaming the category to 'AI Working User' or something similar may make this distinction clearer.
- Increasingly all employees will be using AI in some capacity, knowingly or unknowingly. As such there will be an artificial distinction between the definitions of employees currently depicted under AI Citizens and those under AI Worker. Redefining the 2 personas is needed to provide greater clarity around distinct scopes. Examples of intentional user of AI by AI workers are:
    o The user loads photos into an AI app to improve the image quality.
    o The user logs into ChatGPT to help generate text for a legal document.
    o The user is running a meeting and uses copilot to generate an initial summary that can be amended afterwards to improve it.

- **AI Professional**

Score
4

Comments
- We feel that this category is well defined, appropriate and is clearly distinguished from the other roles.
- It would be helpful to include reference to systems engineering which is integral in AI development and which reflects the skill in putting data together within the context of a system. Some examples could include:
  - AI for data analysis
  - AI for Machine Learning
  - AI for autonomous vehicles

- **AI Leader**

Score
4

Comments
- We broadly agree with the definition given, though the term 'AI Leader' implies hierarchical expertise around AI, a point that we also cover under the Dimensions. The AI Leader is accountable for AI-related governance and strategic decision-making, together with overarching safety and security. AI Leaders need good awareness and understanding of the implications of AI integration / usage in the organisation. They need to know where they can get good technical advice and how to apply it. However, they do not need AI expertise themselves – that is the domain of the AI Professional, in particular the CTO.
- Leaders would set and steer the project strategy, and be aware of what AI can do but wouldn't usually be hands on e.g. they wouldn't be AI Program managers. A group leader (perhaps a Profit & Loss owner) could set a vision of what should be done too.

Dimensions

To what extent do you agree that each dimension has been accurately articulated and contains the set of skills you would expect in the category?

- **Dimension A: Data Privacy and Stewardship**
P16

Area	AI Worker	AI Professional	AI Leader
Dimension A: Privacy and Stewardship • Ensuring the protection of personal and sensitive data • Managing sensitive data • Data stewardship and standards	Working	Practitioner or Expert	Expert

Score
3

Comments
- There's a mismatch between the three criteria featured in the table on p14 and the five criteria on p16. We recommend the wording on both should be identical.
- As mentioned under 'Persona', we suggest that although an AI Leader needs to be able to call on expertise and make decisions based on the evidence presented, AI expertise would be drawn from amongst the AI Professionals.
- Ethics are mentioned in the text supporting Dimension A. However, given its importance (and a Leader's accountability in this area) it would be helpful to make explicit reference to AI Ethics in the sub-bullet on the legal and regulatory environment (p16).
- The bullet point relating to sensitive data (p16) is more than a risk management concern. It also comprises ensuring that the model behaves in expected ways (within bounds), that it doesn't produce unwanted outputs, that it is protected from adversarial inputs and that it avoids hallucinations. Human-AI interaction is needed to protect against such risks.

- **Dimension B: Definition, acquisition, engineering, architecture storage and curation**
P17

Dimension B: Specification, acquisition, engineering, architecture, storage and curation • Data Collection and Management • Data Engineering • Deployment	Awareness or Working	Working, Practitioner or Expert	Working, Practitioner or Expert

Score
3

Comments
- Although this section relates predominantly to data, it is not used in a systemic context. We recommend that the role of Systems Engineering is included. We also suggest that AI specification and infrastructure, including the algorithmic context, arrangements and roles, are present as they are key to delivering the appropriate AI solution.
- The text should include details around the control of data, including the risks around data sharing. It also should include details on the implications of data use for training purposes.
- It would be beneficial to give greater prominence to the AI system lifecycle and AI optimisation in this section. This can be done via graphical representations.

- **Dimension C: Problem definition and communication**
P19

Dimension C: Problem definition and communication • Problem definition • Relationship Management	Awareness or Working	Practitioner-Expert	Expert

Score
3

Comments
- Problem definition covers a number of relevant key areas. Definition should take account of additional criteria such as economic and social perspectives. Sustainability will become an increasingly important consideration, given its growing carbon footprint with technological advances.
- With regards to Relationship Management, it's important to identify the principal stakeholders and then establish how such key relationships are best managed.

- **Dimension D: Problem solving, analysis, modelling, visualisation**
P20

Dimension D: Problem solving, analysis, modelling, visualisation • Identifying and applying technical solutions and project management approaches • Data preparation and feature modelling	Awareness or Working	Working, Practitioner or Expert	Working, Practitioner or Expert
• Data Analysis and Model building • Artificial Intelligence			

Score
3

Comments
- We suggest greater balance is needed in this section which is heavily focused around data.
- At the building and integrating levels a strong understanding of open source components is important. This awareness can enhance the ability to problem-solve. However, professional knowledge of and the implications

relating to the use of appropriate tools in the right way in compliance with legal, ethical and regulatory requirements need to be considered.

- Accountability likewise needs to be clarified at user / coder / provider or regulator levels.
- The framework as a whole relates to AI. As such, the use of a sub-dimension entitled 'Artificial Intelligence' is confusing. We recommend that the criteria is renamed the 'Basis for specific domain decision-making' which encompasses algorithmic performance and behaviour.

- **Dimension E: Evaluation and Reflection**
P22

Dimension E: Evaluation and Reflection	Working	Practitioner-Expert	Expert
• Project Evaluation • Governance • Knowledge of data provenance processes • Sustainability and Best Practices • Reflective Practice and Ongoing Development			

Score
3

Comments
- The table on p15 should include 'Transparency and Explainability' so as to correlate with the p23 criteria.
- The mention of ethics is welcome, though we suggest it, together with equality, diversity and inclusion criteria should feature more prominently in the framework.
- Governance should feature verification and validation criteria.

To what extent do you agree that the five dimensions of the framework address the right skills and values related to AI projects? Are there others that should be considered?

Score
3

Comments
- Table 1 grades the personas as 'working', 'practitioner' or 'expert'. However, despite the broad definitions on pp12-13 of the Framework, the boundaries of competence between those areas across a range of industries could lead to significantly differing interpretations. As with the potential competence misunderstandings associated with the persona title 'AI Worker', there are likely to be a range of views around the competence level 'working'. We suggest replacing 'working' with a more fitting depiction, such as 'using' which doesn't have connotations around capabilities to develop and modify AI systems. 'Practitioner' and 'Expert' likewise must be defined more closely, and this could be done by drawing on and adapting existing competence criteria from other fields, such as the UK-SPEC defined competence standards relating to TechEng, IEng and CEng. We also see the AI Leader as having a level of competence more akin to 'using' standards (CTO excepted). Organisation

C-Suite managers draw on guidance from subject experts in the formulation, delivery and oversight of strategy; they don't need to possess the expertise themselves in order to deliver their roles effectively.

- We agree that the five dimensions broadly address the right skills areas. There should be an explicit mention of performance monitoring of the AI system that has been developed and its continuous improvement. This includes greater mention of relevant metrics to assess performance. The document would also benefit from detailed descriptions of Operational, Strategic and Existential risks to show who, at what level, is responsible for being aware of, identifying and controlling them.
- The document implies that the AI development lifecycle ends at the conclusion of the project. However, it should continue throughout its operational use and ultimate decommissioning.
- The criteria are very much focused on data science. We suggest a greater focus on systems engineering, given its importance in the development of AI models.
- There's a need for a narrative about how the dimensions work together across the personas. This is relevant for their role in the decision-making process in organisations, and how organisations can use the information to improve performance and impact.

Are there any similar initiatives in your sector which we should be aware of?

Comments
- The IET has produced a summary guide to support decision-making on the use of AI in safety-related systems. A fuller guide is being published in February 2024.
- The Engineering Council manages the UK Standard for Professional Engineering Competence and Commitment (UK-SPEC), as mentioned earlier in the response. This model and related training can be adapted for use with AI.
- The IET has also produced a Guidance Framework for Competence Management (e-book), which complements UK-SPEC. The Guidance can have broader practical application and its contents reflect the point that competence involves much more than technical training ie it considers attitude and behavioural characteristics along with experience and knowledge. The emergence and rollout of AI means that all organisations will inevitably use AI-based tools and, as such, need to employ people that can put AI into its correct context whether as developers, integrators, users or maintainers. We suggest the Framework takes such aspects into consideration.
- The standards under development at ISO/IEC JTC 1/SC 42 - Artificial intelligence include several that cover topics mentioned within the competency framework – governance, management systems, safety, use of data, social and ethical concerns.

Please provide any other comments or feedback not already covered above.
- The categorisation of the different levels under different persona is very broad and may vary considerably within and between organisations. This is acknowledged by the use of competency levels 'X or Y' on several occasions in Table 1. As mentioned, to form judgements for AI Professionals, we suggest drawing on established, granular competency criteria with appropriate roadmaps such as already established in the engineering sector. This could include details of recommended online/university courses, and examples of activities to improve AI competency. Business leaders should be able to read this document and have a clear idea of how to develop the AI competency of their employees and senior managers. To maintain value for employees / employers in this rapidly changing field will require ongoing, regular competency updating and the dedicated allocation of resources.
- The framework would benefit from greater clarity over the difference between narrow, specialist v general purpose AI tools and their uses by different groups of persona.
- There is benefit in bringing awareness of this framework and its benefits to Finance managers and others who are responsible for the release of funding for training competence.

About the Institution of Engineering and Technology (IET)
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We welcome the introduction of AI guidance to support the upskilling of workers so as to boost business productivity and UK economic growth. The IET and its expert engineering and technology volunteers would be very pleased to participate further in this and future related DSIT initiatives to maximise the business potential of AI. We would welcome the opportunity to meet with you to discuss these issues further. Please contact policy@theiet.org accordingly.