appliedAI
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for europe

Bringing AI Skills into Practice

The AI Skills Framework for the professional use of AI

Contents

Foreword

Artificial intelligence (AI) is no longer a technology of the future, it is already reshaping the structure of work and organizations, and the skills required to operate effectively within them. From our experience of working closely with companies, public institutions, and organisations in the social economy, we have found that a lack of orientation, rather than a lack of willingness, is what presents the greatest obstacle when it comes to engaging with AI. Therefore, it is not surprising that the question we are asked most often concerns the impact of AI on the world of work and the skills that employees need to make this transition.

The appliedAI AI Skills Framework is our response to that question. It is grounded in the conviction that AI skills cannot be reduced to technical proficiency alone, and that they cannot be developed in isolation from the professional domains in which they are applied. The framework's components are grounded both in research and in practical experience, and have been validated by practitioners and experts across sectors. It continues to evolve alongside the technology itself.

The result is a tool designed to help organisations put skills into practice, enabling them to achieve more by deploying AI as a tool that amplifies human skills, judgement and creativity rather than replacing them. In practice, this involves guiding organisations to identify upskilling needs, design targeted development programmes, and build long-lasting AI skills for individuals, teams, and institutions. This publication offers a shared language for this goal, for business leaders, policymakers, or educators alike. The transformation is already underway. The critical question is whether we will shape it deliberately or find ourselves shaped by external forces. We do not take a position of uncritical optimism or of technological fatalism. We are convinced that, with deliberate design of both the technology and the decisions surrounding its deployment, AI can empower workers, raise productivity, and contribute to shared prosperity. However, this outcome is not guaranteed. Above all, it depends on individuals and organisations developing the skills to engage with AI thoughtfully, responsibly, and effectively.

Dr. Frauke Goll
Managing Director
appliedAI Institute for Europe

Executive Summary

AI is reshaping the structure of work and organizations at an unprecedented pace. The World Economic Forum estimates that 86% of employers expect AI to transform their business by 2030, while nearly 40% of the skills currently required across the global workforce will change within five years (World Economic Forum, 2025). Empirical evidence indicates that this transformation is already affecting wages, hiring, and organisational structures across advanced and emerging economies alike (Jaumotte et al., 2026). How these changes will unfold will vary. The consequences depend on whether AI is used to automate or to augment human work and to what extent the tasks of job profiles will be affected. Organisations that implement AI as a transformative tool rather than a means of replicating existing tasks are already achieving measurably higher productivity and wage growth (PricewaterhouseCoopers, 2025).

Against this backdrop, the development of AI skills has become a strategic imperative. The questions organisations most commonly face are practical: what are AI skills, and which ones do our people actually need? While existing international frameworks on AI skills, including those developed by UNESCO, the OECD, and the Alan Turing Institute, have made important contributions, they largely address educational settings or specific national contexts. Until now, a workforce-oriented framework with a European perspective, serving enterprises, public administration, and the social economy, has been absent.

The appliedAI AI Skills Framework responds to this gap. Developed on a rigorous scientific basis, informed by extensive practical experience across sectors, and validated by practitioners and experts, the framework comprises skills spanning the full spectrum of professional engagement with AI. It is organised around four perspectives – using AI, integrating AI, building AI, and framing AI – that, together, provide a common language for describing, assessing, and developing AI skills across individuals, organisations, and institutions. The framework is grounded in the domain-first principle. AI skills create value only when embedded in professional contexts, so generic technical proficiency alone is not enough for meaningful AI adoption.

The framework serves three primary audiences:

- For organisations and business leaders, it enables the identification of upskilling needs, the design of targeted development programmes, and the alignment of workforce strategies with AI adoption.
- For educational institutions and curriculum developers, it provides a structured reference point for designing learning paths that are both rigorous and practically relevant.
- For policymakers and regulators, it offers a concrete instrument for operationalising AI literacy requirements in a consistent and actionable manner.

Designed as a living model, the framework will continue to evolve alongside the technology, the regulatory landscape, and the organisations it serves.

The full version of the framework can be accessed here:
https://appliedai-institute.de/ressourcen/ai-skills-framework

Why AI skills matter and what they are

The demand for AI-related skills is growing, cutting across sectors, firm sizes, and job profiles (PricewaterhouseCoopers, 2025). Harnessing this potential requires more than technological adoption alone. Technical and non-technical employees, as well as decision-makers, must develop a sound understanding of the opportunities, limitations, and ethical considerations of using AI in professional contexts.

Effectively addressing this transformation calls for deliberate and coordinated action at multiple levels, including targeted investment in upskilling and human capital development, equitable access to AI tools and infrastructure, and governance frameworks that prioritize human capability at the centre of technological change (PricewaterhouseCoopers, 2025). Against this backdrop, organisational and policy agendas have become increasingly focussed on what AI skills are, why they matter and how they can be systematically developed.

A labour market in transformation

We are currently witnessing another significant phase of creative disruption to the economy, similar to, yet fundamentally distinct from, earlier waves of disruption and technological change (Schumpeter, 2010). Since the 19th century, successive phases of mechanisation, factory automation, and computerisation have reshaped the composition of work, primarily affecting routine and repetitive tasks, both physical and cognitive. AI represents a qualitative departure from this pattern: rather than automating the repetitive and standardized procedures, it is reaching into the cognitive core of knowledge work in ways that few anticipated.

This transformation is unfolding at a considerable scale and speed. The World Economic Forum‘s Future of Jobs Report 2025 estimates that 86% of employers expect AI and information processing technologies to transform their business by 2030, while nearly 40% of the skills currently required across the global workforce will change within five years (World Economic Forum, 2025), affecting wages and hiring (Jaumotte et al., 2026).

But how this happens depends on how AI is used. Organisations that use AI to replicate existing tasks rather than reimagine them risk limiting its potential and, paradoxically, increasing displacement. In contrast, those that approach AI as a transformative tool can unlock new capabilities and business models that did not previously exist. History offers reassurance: two thirds of jobs in the United States today did not exist in 1940, many of which were made possible by technological advances. Current data suggests that organisations are moving in this direction, with job numbers and wages growing across virtually every AI-exposed occupation, including the most automated ones (PricewaterhouseCoopers, 2025).

Small and medium-sized enterprises (SMEs) deserve particular attention. Accounting for over 99% of companies and around 60% of business sector employment across OECD economies, SMEs are the backbone of labour markets. They are particularly vulnerable to labour shortages and skill gaps that hinder their growth prospects, competitiveness, and ability to adapt to change (OECD, 2025). Yet they are the ones who can best absorb new technology and use it to drive innovation (Cohen et al., 1990), which makes them a key stakeholder for upskilling initiatives.

From job profiles to tasks: a new unit of analysis

While public discourse on the future of work, especially regarding the implications of agentic AI, tends to oscillate between narratives of mass displacement and uncritical optimism, both the scientific literature and applied organisational research point to a more differentiated picture. One of the most significant conceptual shifts to emerge from this body of evidence is the move from analysing AI‘s impact at the level of job profiles to analysing it at the level of tasks (Brynjolfsson et al., 2025). Traditional workforce planning, structured around occupational classifications and job titles, increasingly fails to capture how AI reshapes work in practice. Any given occupation, whether financial analyst, marketing manager, or software developer, comprises dozens of tasks, and AI does not affect these uniformly. Within a financial analyst‘s role, data aggregation may be automated while strategic interpretation is left untouched. First drafts of marketing copy may be generated by AI while the importance of brand judgement and audience understanding are elevated.

Research from MIT Sloan shows that when AI can perform the majority of tasks within a role, employment in that role declines by approximately 14%. However, when AI only affects a subset of tasks, employment can grow because workers are freed to focus on activities in which human capabilities remain superior (Hampole et al., 2025). MIT‘s Iceberg Index, which maps over 32,000 skills across 923 occupations, supports this conclusion: the majority of the impact of AI on the workforce remains hidden, concentrated in cognitive and administrative functions that span sectors and organisational levels (Massachusetts Institute of Technology, 2025). The study‘s central recommendation is that workforce transformation should focus on job design rather than job titles.

A key aspect of this perspective on tasks is distinguishing between automation and augmentation. Automation refers to AI directly executing tasks with minimal human involvement; augmentation refers to AI enhancing human capabilities, supporting learning, or improving decision-making with humans remaining meaningfully in the loop. In practice, the relationship between human and machine involvement exists on a continuum: the Human Agency Scale, developed at Stanford, maps this spectrum across five levels from full AI autonomy to tasks where human involvement remains essential (Stanford HAI, 2025). In occupations where AI predominantly automates tasks, early-career employment has declined significantly; in occupations where AI predominantly augments work, employment remained stable or grew (Brynjolfsson et al., 2025). The Anthropic Economic Index, analysing millions of real-world AI conversations, finds that as of late 2025, augmentation slightly exceeds automation at 52% versus 45%, with a notable shift back toward augmentation reflecting growing user sophistication and collaborative human-AI interaction (Anthropic, 2026).

The impact of AI on the economy depends on the specific tasks it augments or automates. When AI takes over routine tasks, it actually increases the value of human experts because they have more time to focus on complex problems. However, when AI starts performing expert tasks, it risks rendering specialised roles less “special”, which could lower their value (Autor & Thompson, 2025). For this reason, the focus of training and policy has shifted: the most important skill one can learn today is not just mastering a specific trade, but also knowing how to use AI to enhance one‘s work rather than replace it.

These dynamics extend beyond individuals to organisations themselves. With the emergence of agentic AI systems capable of autonomous, multi-step task execution, established hierarchies and role compositions are under pressure in ways that are still unfolding. What is already clear, however, is that skills development can no longer be conceived as a linear progression along a fixed career ladder. It must instead be understood as a dynamic process across changing task bundles, hybrid human-AI team configurations, and evolving organisational forms.

appliedAI Institute – Insights from Practice

The empirical findings presented above are reflected in appliedAI Institute's own research practice. As a recognised partner for organisations navigating AI-driven workforce transformation, the Institute conducts proprietary analyses of job profiles and task compositions across companies in business, public administration, and the social economy. Using a structured methodology developed in-house, these analyses map existing roles against AI exposure at the task level – identifying where automation risk is concentrated, where augmentation potential is highest, and where skills gaps are most acute.

The insights generated through this work flow in two directions. On the one hand, they continuously inform and refine the appliedAI AI Skills Framework, ensuring that its components reflect the realities of professional AI adoption in European organisations rather than theoretical models alone. On the other hand (and more importantly for the organisations we work with) the framework itself serves as a practical instrument: it enables companies to identify upskilling needs at the individual, team, and organisational level, and to design targeted development programmes that equip their workforce for the specific demands of AI-augmented work in their domain.

The domain-first principle: why generic AI skills are not enough

Addressing these changes effectively will require a fundamental rethinking of how AI skills are developed and taught. Institutions around the world are trying to understand how tasks are changing, and which skills are required to navigate these shifts within their respective ecosystem. Since acquiring skills takes time and misaligned investments in reskilling and upskilling are difficult to correct, the decisions made now will have lasting consequences (Hidalgo, 2024).

In response, a wave of international initiatives has sought to define what AI skills professionals and learners need. In 2024, UNESCO published AI Competency Frameworks for students and teachers, structured around four dimensions: human-centred mindset; ethics of AI; AI techniques and applications; and AI system design (UNESCO, 2024a; 2024b). The European Commission and the OECD have developed the AILit Framework for primary and secondary education. The final version is expected in 2026 and will inform the PISA 2029 Media and AI Literacy assessment (OECD & European Commission, 2025). In the United Kingdom, the Alan Turing Institute's AI Skills for Business Competency Framework (Version 3, December 2025) provides a role-aligned structure targeting four personas: AI citizens, AI workers, AI professionals and AI leaders (Alan Turing Institute, 2025).

Two observations emerge from this. The first is that there is a growing academic consensus that distinguishes between AI literacy (which is a foundational conceptual understanding focused on knowledge, critical thinking and ethical awareness) and AI competency (which is the capacity to apply AI-related knowledge effectively and responsibly in professional settings) (Chiu et al., 2025). Second, most existing frameworks either address educational settings or they are geographically and institutionally specific. A workforce-oriented framework with a European perspective, one that serves enterprises, public administration, and

the social economy, remains absent until now.

For such a workforce-orientation, a domain-first principle is needed. No general-purpose technology, such as electricity or AI, creates value in isolation. An electrical current has no economic utility until it powers a specific application, for example, a street lamp. AI follows the same logic. There is no such thing as an „AI-only" product, because AI creates value only when it is embedded in a professional domain and applied to domain-specific challenges.

Turning a general-purpose technology like AI into successful domain-specific applications and products requires three distinct types of skills working together. While "pure AI skills" such as data cleaning are essential, they aren't enough on their own. Success also depends on "transversal" skills, which are used across domains (Hosseinioun et al., 2025; Weber et al, 2025). Collaboration, critical thinking, and communication, for example, are indispensable when executives integrate an AI narrative into corporate strategy.

Over time, when pure AI skills and transversal skills are applied in a given context, they create the "implicit expertise" that AI finds difficult to master. This is deep, context-specific knowledge that is path-dependent and cannot be captured and copied easily (Hidalgo et al., 2007). Just as nations struggle to develop new products without adjacent expertise in related fields, AI expertise builds on accumulated experience with data, processes, and domain-specific constraints. It is precisely this combination of technical capability, transversal competence, and implicit domain knowledge that distinguishes meaningful AI adoption from superficial tool use.

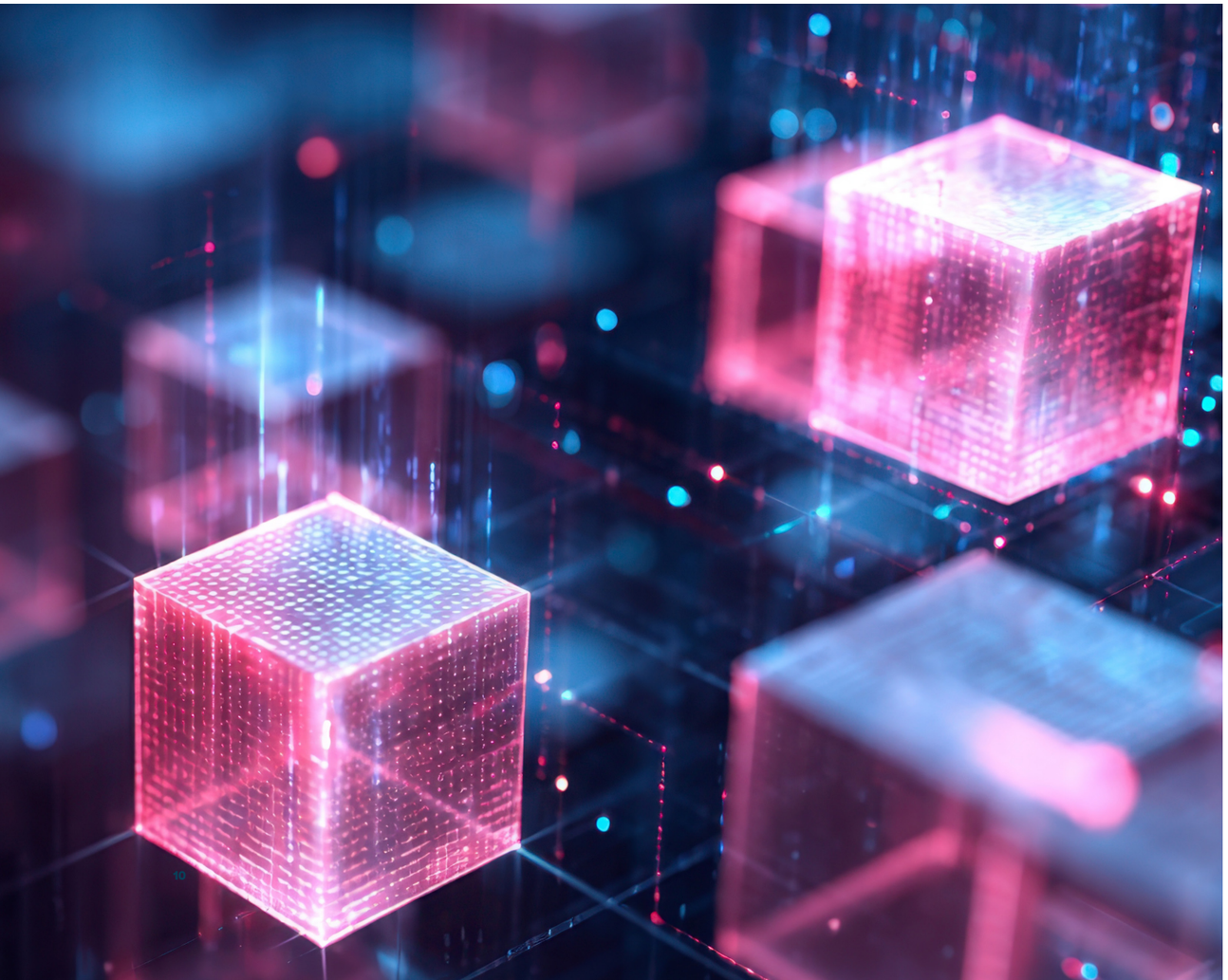
The economic multiplier between domain knowledge and AI skills can be extraordinary, especially regarding productivity and innovative capacity within ecosystems. Just as the Industrial Revolution demonstrated that modern tractors could cultivate 450 times more land than oxen could in 1800, AI systems such as AlphaFold have shown that manual work that would have taken one billion years can be completed in one year using a domain-specific AI model.

This is the essence of the domain-first principle when discussing AI skills: the real challenge of AI adoption lies not in learning to code or mastering prompt engineering in isolation, but in understanding how to transform products, processes, and decision-making by embedding AI skills within domain-specific value chains. Generic technical proficiency, without contextual grounding, rarely translates into meaningful organisational impact.

A concrete illustration of this "multiplier" effect between a domain and AI skills can be found in the field of AI-driven cutting assistants in the German industry. Traditionally, achieving a perfect metal cut required experienced operators to manually tune complex gas and pressure settings using their "feel", meaning their tacit knowledge. By embedding decades of proprietary material science data into an AI model, this process has been transformed: a specialist can now photograph a cut and the AI will instantly prescribe the exact physics-based adjustments needed. This shift turns a slow, expert-dependent process into one that delivers enormous gains in terms of speed and quality, with a level of industrial "DNA" that software-only competitors simply cannot replicate.

Europe, and Germany in particular, holds a structural advantage in this domain-first transition that is rarely articulated. While large-scale foundation models are predominantly developed in the United States and China, the competitive differentiation of European economies lies elsewhere: in the depth of domain-specific expertise embedded in their industrial, healthcare, and public sector ecosystems. Germany ranks sixth on the Economic Complexity Index, a measure of the specialised, latent know-how embedded in a nation's industrial DNA (Harvard Growth Lab, 2026). This knowledge is the fuel for the next generation of AI that is unique for our ecosystem. Within each of Germany's economic domains, there are thousands of activities that could be transformed with AI. For example, we could develop turbine blades co-created with generative AI that understands complex physical constraints, or identify cellular patterns in pathology that the human eye might miss.

Realising this potential requires mastering what the appliedAI Institute terms the new alphabet of AI skills: not in isolation, but as building blocks within core and niche professional domains. Equally important is ensuring that this transition preserves what makes work meaningful. AI should support human brilliance rather than diminish professional agency: the goal is not to reduce skilled professionals to passive prompt-writers, but to equip them with the skills to direct, evaluate, and collaborate with AI in ways that amplify their expertise and keep their work both productive and engaging.



An overview of the AI Skills Framework and how it works

It is against this background that the appliedAI Institute for Europe presents the AI Skills Framework. The framework comprises more than a hundred skills designed to capture the spectrum of professional engagement with AI. It is grounded in the empirical evidence that AI's workforce impact operates at the task level and requires differentiated competency responses rather than binary categorisations of "AI-literate or not". It reflects the domain-first principle that AI skills create value only when embedded in professional contexts, and responds to the regulatory requirements of the EU AI Act by providing a structured basis for demonstrating and developing AI skills across organisations.

Designed for use rather than reference, the framework addresses the practical challenges organisations face in AI adoption. It spans the full spectrum of professional AI engagement, from developing and deploying AI systems, to ensuring their responsible use, to integrating them meaningfully into organisational structures and processes. By focusing on the skills that matter for professionals, the framework was designed to support organisations with common challenges of AI upskilling, such as scouting of developments and needs, supporting employees with their individual upskilling, assessing their capabilities, or helping them to navigate the fragmented landscape of educational offerings.

Key Concepts: AI Literacy, AI Competency, and AI Skills

These three terms are often used interchangeably in public discourse, but they refer to distinct levels of engagement with AI.

AI Literacy refers to a foundational conceptual understanding of AI, what it is, how it works, and what its societal and ethical implications are. An AI-literate person can engage critically with AI-related topics, evaluate claims about AI, and understand its opportunities and limitations. AI literacy is primarily knowledge-oriented and does not necessarily imply the ability to apply AI in practice.

AI Competency refers to the capacity to apply AI-related knowledge effectively and responsibly in professional settings. An AI-competent professional can integrate AI into organisational workflows, evaluate AI outputs critically, and make informed decisions about AI deployment. Competency implies both understanding and the ability to act but remains relatively context-independent.

AI Skills are the granular, practised capabilities that enable professionals to perform specific AI-related tasks within their domain. Skills are acquired through deliberate practice and experience, are demonstrable, and are context-dependent. They form the operational foundation of AI competency.

Who the AI Skills Framework is for

The AI Skills Framework is designed for four professional audiences, each defined by their mode of engagement with AI: people using AI, building AI, framing AI, and integrating AI.

Using AI refers to the skills professionals use when applying AI tools in their everyday work. They adapt their tasks, workflows and decision-making processes in order to incorporate AI into existing practices across a range of sectors.

Integrating AI covers the skills of organisational leaders and practitioners who introduce AI into organisational structures and business processes. They make decisions about adoption, oversee change management, and ensure that AI becomes an integral part of everyday operations.

Building AI describes the skills of the engineers, researchers, and developers who are responsible for creating AI systems. Their work involves designing, training, and deploying models, requiring technical expertise as well as an understanding of real-world applications.

Framing AI covers the skills of policymakers and regulators, who determine the broader conditions under which AI is developed and applied. These individuals establish the rules, standards and policies that determine the contribution of AI to society and the economy.

The core principles of the AI Skills Framework Skill components

At the heart of the framework are the so-called „skill components," which are the specific, honed capabilities that underpin professional AI work. These are not abstract units of knowledge, but concrete skills that require deliberate practice, repetition, and cognitive effort to master. These are the kind of capabilities that can be demonstrated, assessed, and developed systematically, and that professionals would list on a CV or be asked to demonstrate in a job interview.

While the framework aims to define skill components as distinctly as possible, some degree of overlap is inevitable and should be understood not as a limitation, but as a reflection of the fluid boundaries inherent in an emerging field. Rather than pursuing taxonomic perfection, the framework prioritises practical guidance: providing professionals and organisations with a structured yet adaptable basis for identifying, assessing, and developing the skills needed for effective AI practice.

Every skill component can be described across five levels of mastery. At the zero level, a person is entirely unfamiliar with a skill; we call this stage "unknown." From there, the first level of expertise begins with "know about," where a person is aware of the concept but cannot yet apply it in practice. The next step is "use it," where the skill can be applied in simple or familiar situations, often with some guidance. With more experience, individuals can "adapt it" to new or complex contexts, showing flexibility and independence. At the highest level, they "live it," applying the skill naturally, combining it with others, and even teaching or mentoring peers. This progression illustrates how skills develop from unfamiliarity to full mastery.

Know about	Use it	Adapt it	Live it
Design human-in-the-loop workflows for AI applications	Evaluate generative model outputs for coherence, safety, relevance and decision making	Design and optimize prompts for AI interactions	Design AI literacy and education programs for organizational transformation
Assess AI model transparency, interpretability and explainability for regulatory compliance	Select and evaluate appropriate generative AI models for specific use cases and applications	Apply AI tools effectively within professional domain workflows	Continuously re- and upskill existing workforce based on corporate AI readiness and implementation
Implement data versioning and management systems for ML pipeline reproducibility	Train deep learning models	Assess data quality and fitness for AI applications	Create data visualizations that communicate complex findings effectively to stakeholders
Deploy and monitor models in production to ensure reliability, detect data drift and enable continuous improvement	Assess AI talent acquisition and development strategies for organizational readiness	Evaluate data source credibility and relevance for AI use cases	Perform exploratory data analysis to uncover patterns, trends and actionable insights
Employ model interpretability and explainability techniques to increase transparency of prediction behavior	Document and maintain datasets and metadata within data catalog systems	Translate business problems into well-defined ML tasks	Design and deploy interactive dashboards and automated reporting solutions for business intelligence
Refactor legacy codebases to improve maintainability and performance standards	Use transfer learning and pre-trained models to accelerate development	Perform statistical analysis and hypothesis testing to validate data-driven conclusions	
Create comprehensive code and system architecture documentation for clarity, usability and knowledge transfer	Evaluate and validate models using robust metrics to ensure accuracy, reliability and generalization	Develop and implement machine learning and deep learning models following supervised, unsupervised, self-supervised and reinforcement learning paradigms	
Optimize code for runtime performance and memory efficiency through analysis	Enhance model performance through hyperparameter tuning, architectural choices and regularization strategies	Process and extract structured information from multimodal unstructured data sources	
Preventively monitor AI systems for unintended consequences with negative human impact	Use version control systems effectively including branching and collaborative workflows		
Detect and mitigate unfair algorithmic bias	Write clean, readable, maintainable code following best practices		
Integrate the ethical framework into the AI development lifecycle			
Develop CI/CD pipelines and automated deployment workflows for software delivery			
Implement containerized applications using Docker and Kubernetes for deployment			

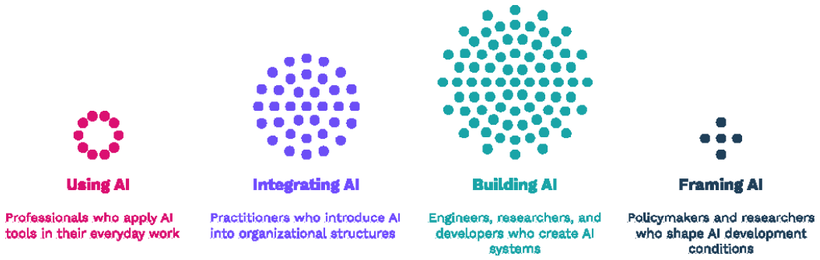
Purpose per skill component:

USING AI | INTEGRATING AI | BUILDING AI | FRAMING AI

Note: An exemplary individual AI skill profile, grouped by self-assessed proficiency level for each skill component, of an AI education expert with a background in data science.

Beyond levels, each skill component can be further described through additional criteria, such as sub-skills elements or units of knowledge that enable it, or the tools commonly used with it. These details are inherently context-dependent and therefore may vary considerably across organizations, roles and sectors. Yet they remain crucial for learners, educators, and professionals who want to guide their development in a systematic and targeted way.

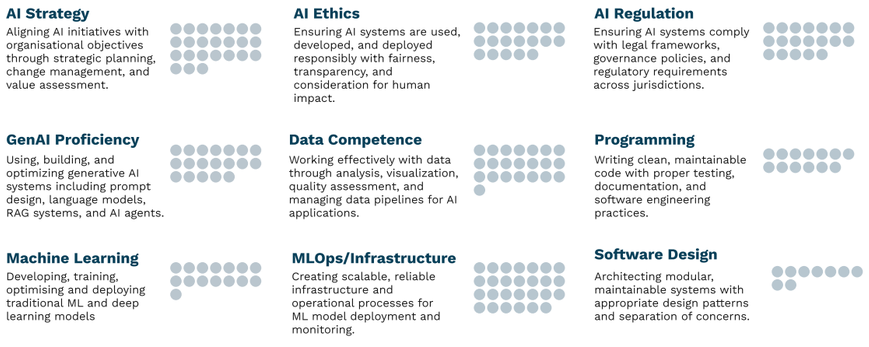
Projections of skill components



Complex professional tasks rarely depend on a single skill component. Rather, they draw on characteristic combinations of skills, and particular roles can be understood as distinctive patterns of these combinations. The difference between a data scientist and a machine learning engineer, for instance, can often be traced back to the distinct sets of skill components they have acquired and emphasized in their work. In this sense, the framework not only defines individual skills but also makes visible how skills combine into professional profiles.

To make these patterns visible, skill components can be projected across different dimensions. One key dimension is purpose, which demonstrates the professionals primary mode of engagement with AI: why are you engaging with AI? Are you building AI systems, using them, integrating them within an organisational context, or framing their broader direction and governance?

Another projection visualises **domains**, that is, the fields in which someone operates, such as AI strategy, ethics, regulation, data competence, software design, programming, machine learning, GenAI, or MLOps/infrastructure. A data scientist, for example, will typically be competent in areas such as data competence, programming and machine learning. By contrast, an ML engineer will often focus on machine learning, software design, and MLOps/infrastructure.



Further projections are possible, for instance based on roles or prototypical AI systems, such as the skill profile required to develop and maintain a chatbot based on Large Language Models (LLM). These projections enable skills to be clustered and compared in different ways, supporting the assessment and development of individuals, teams and institutions. They also provide users of the framework with clear, practical entry points into an otherwise complex skills landscape.

Putting the framework to use

The AI Skills Framework is designed as a living model. Given the pace at which AI technologies, roles, and regulatory requirements are evolving, any static depiction of AI skills would quickly become outdated. The appliedAI Institute is therefore committed to continuously refining the framework, guided by new empirical evidence, practitioner feedback, and emerging professional requirements. A versioning system ensures transparency and consistency, providing users with a reliable and up-to-date single source of truth.

In its current form, the framework comprises skill components and projections of purpose and domain. Over time, it will be enriched with additional layers of detail including, for example, question banks for individual skill components, tool recommendations, and dependency graphs mapping the co-occurrence and sequencing of skills. The ambition is to evolve the framework from describing the „what“ of AI skills to providing a practical instrument for navigating the „how“: how to assess, develop, and deploy AI skills effectively within any professional context.

> “The AI Skills Framework developed by the appliedAI Institute for Europe provides us with a modern framework for making training more transparent, flexible, individualised and targeted. It helps us to better reach diverse target groups, identify micro-learning formats and plan training programmes with precision using AI.”
>
> **Marc Brandt**
>
> Senior Detective Superintendent, IT Lecturer
> Deputy Head of the Cybercrime and Digital Traces Department,
> Institute for Further Education, Police University of Baden-Württemberg
> *Note: Translated from the original German using DeepL Translate.

Along this path, the framework offers numerous possibilities for use and its applications span the full talent lifecycle. In recruitment, for instance, it supports the drafting of precise job descriptions by identifying the exact skill components required for a given role. In capability assessment, it enables organisations to audit existing AI skills within the workforce, providing a structured basis for identifying gaps and evaluating where new talent or development investment is most needed.

„As part of the Community of Practice on Artificial Intelligence, the Heilbronn Employment Agency was able to familiarise itself with the tool during the trial phase. It helps companies to identify their AI-related training needs quickly and in a structured manner. This allows us to develop targeted training programmes for the region.“

Johanna Bursac-Reinhart
Team Leader Employer Services
Heilbronn Employment Agency
*Note: Translated from the original German using DeepL Translate.

In the field of upskilling, the framework addresses one of the most persistent challenges organisations face: ensuring that development initiatives target the right skills rather than generating irrelevant or misaligned knowledge acquisition. By mapping skill components to specific roles, tasks, and domains, the framework helps organisations design targeted learning pathways that are both efficient and practically relevant.

- Individuals can use the framework to identify skills that are just within their reach, helping them determine exactly what they need to learn next to build or operate specific AI systems. Once the skills are connected in a knowledge graph, learners can navigate along the graph systematically to master a specific field of AI.

- Organizations can use the framework to design learning paths for different roles within their company. A framework enriched with formative assessment questions could provide an end-to-end learning solution, helping individuals to grasp the key concepts of a learning path through an intelligent tutoring system.

- Educational Institutions can use the framework to develop and/or update AI curricula, ensuring they cover the latest AI skills.

The framework also holds potential for the research community. As a structured and versioned standard for AI skills, it provides a basis for tracking how professional requirements in AI evolve over time. Researchers can apply it to scientific publications, job market data, or organisational surveys to quantify the shifting landscape of AI competency demands and to examine how skills are distributed across roles, sectors, and geographies.

The applications outlined above offer only a glimpse into the possibilities. Ultimately, the appliedAI AI Skills Framework is more than a catalogue of existing skills. We are building a practical foundation for helping professionals and organisations navigate the tasks of developing, assessing, and applying AI skills effectively. Designed to evolve alongside the field it describes, it is a tool built not for today alone, but for the ongoing journey of AI adoption.

appliedAI Institute – Insights from practice

The appliedAI Institute for Europe hosts a regular Community of Practice in collaboration with the Agentur für Arbeit Heilbronn and the KI Campus, bringing together enterprises from the Heilbronn region to foster structured dialogue around AI implementation. In its most recent edition, the AI Skills Framework was applied as a shared analytical instrument: participating organisations used it to map their AI skills needs against concrete use cases they had prepared in advance. This exercise yielded value at two distinct levels. At the organisational level, each participating company gained a focused view of the skills most relevant to their context – spanning task owners, technical teams, and leadership – providing a practical foundation for skills gap analyses and targeted upskilling or hiring strategies. At the regional level, aggregating the results across all 18 participating organisations offered an empirical glimpse into the collective upskilling needs of the broader Heilbronn community, grounding regional workforce development priorities in lived organisational realities rather than assumptions alone.

Methodology

The development of the framework began with a deep review of existing research and skills frameworks in the field of AI. This analysis provided the foundation for the work and helped identify both overlaps and important gaps in current approaches. Building on these insights, the framework was then developed through a structured, multi-step process that combined expert judgment with input from and discussion with Large Language Models (LLMs). The goal throughout was to generate a set of skill components that are comprehensive, practically relevant, and applicable across diverse professional contexts.

An expert group of five defined the primary domains of the framework. For each domain, 15 candidate skill components were generated using Claude Sonnet 4 and 15 using GPT-4o, resulting in a total of 30 proposed components per domain. A comparative analysis prompt was used to identify commonalities and differences between the two sets of outputs, reducing redundancy and highlighting complementary elements.

The combined lists were subsequently reviewed in expert discussions, supported by model-assisted feedback. This stage consolidated the initial proposals into a refined set of approximately 15 skill components per domain. Each skill component was then mapped to one of the four interest projections: building, using, implementing, or framing AI systems.

Validation occurred in two stages. First, domain experts engaged in a structured review of the skill components, during which they proposed improvements in wording, identified gaps, and suggested clustering where appropriate. Second, the refined set underwent final validation by the core expert group of five, resulting in the definitive list of skill components.

This methodology ensured that the framework was both evidence-informed and systematically validated. The combination of expert knowledge and large language model support enabled the creation of a framework that reflects the complexity of AI skills while remaining practical for educational, organizational, and regulatory applications.

Conclusion

The rapid mainstreaming of AI has made it clear that AI skills are no longer optional; they are foundational for meaningful participation in the economy and society. From framing AI narratives, to integrating systems into organizations, to building technical solutions, and using AI in everyday practice, professionals across all sectors must develop some level of mastery in AI. The AI Skills Framework presented in this paper offers a structured and comprehensive response to this challenge.

By defining the skill components needed for the professional use of AI, the framework provides a common language that bridges the needs of policymakers, educators, employers, and professionals. It enables individuals to assess their own capabilities, organizations to align their workforce strategies with AI adoption, and governments to operationalize regulatory requirements. In doing so, it addresses gaps left open by earlier literacy and skills initiatives, which often failed to capture the full range of professional AI applications in a workforce context.

Moving forward, three priorities emerge. For policymakers, the framework offers a reference point to ensure that AI skill requirements are applied consistently and fairly across different contexts. For educators and curriculum developers, it creates a roadmap to design learning paths that are both rigorous and relevant. For employers and HR leaders, it provides a tool to identify skill gaps, foster organizational readiness, and support continuous professional development.

AI will continue to evolve, and so must our understanding and the frameworks we use to make sense of the skills it requires. The appliedAI AI Skills Framework is designed precisely for this reality: built to be continuously refined, validated, and adapted as technologies, roles, and regulations develop. Even in its current form, it provides a foundation for action: a way to make AI upskilling more targeted, more practical, and more impactful.

Ultimately, the success of AI adoption will depend not only on technological breakthroughs but on our collective ability to equip people with the skills to use, build, integrate, and frame these systems responsibly. The AI Skills Framework is a step toward ensuring that this transition is inclusive, strategic, and sustainable.

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Declaration of AI Use

The authors employed generative AI to assist with literature search, structural outlining, and linguistic refinement of this manuscript. All AI-generated suggestions were critically reviewed and edited by the authors, who maintain full responsibility for the content and integrity of the final work.

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