Learning Engineering Body of Knowledge

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learning engineering | Learning Engineering Body of Knowledge

A Guide to the Learning Engineering Body of Knowledge (LEBOK Guide), soft-released in December 2025, will be formally released at LERN 2026. This open-source resource does for learning engineering what the Software Engineering Body of Knowledge (SWEBOK Guide) does for software. SWEBOK addresses principles and practices of designing, developing, testing, and maintaining software systems. LEBOK is a guide to the principles and practices of learning engineering. The Guide is released as a Wiki version (lebok.wiki), a PDF, and a machine-readable implementation in IEEE Sharable Competency Definition (IEEE 1484.20.3-2023) format used to link from learning resources, learning event metadata, and digital credentials. The wiki version of the guide is intended to be a platform for iterative community development and vetting, leading to future community-authorized releases. The Guide is currently organized into 12 knowledge areas (KAs) followed by appendices. Within each knowledge area are topics and subtopics.

Introduction

Learning engineering is a multidisciplinary practice and iterative process that applies the learning sciences, human-centered design, engineering principles and data informed decision making to support learners and their development. As the field has matured, a need emerged for a consistent, global view of the profession's core competencies. The Guide to the Learning Engineering Body of Knowledge (LEBOK) was developed to provide an organizing framework for these competencies, recognizing the diverse disciplines that contribute to effective learning engineering.

Other professional domains such as software engineering and project management have authoritative body-of-knowledge guides to help frame the scope and breadth of those professions. These other guides served as a model for LEBOK. And as learning engineering is a multidisciplinary practice that often requires expertise in software and project management, this Guide recognizes the authority of other body-of-knowledge guides including:

The Guide to the Software Engineering Body of Knowledge (SWEBOK) is rooted in work by the Software Engineering Institute (SEI) at Carnegie Mellon University. The SEI published its own technical report in 1999 titled "A Software Engineering Body of Knowledge Version 1.0" (CMU/SEI-99-TR-004). The SEI's work served as a foundational input for what eventually became the official SWEBOK. It was originally developed as a joint initiative between the IEEE Computer Society and the Association for Computing Machinery (ACM) to achieve professional consensus on the core competencies of software engineering. The first official release, SWEBOK 2004, was later adopted as an ISO technical report (ISO/IEC TR 19759:2005). IEEE continued its stewardship after ACM withdrew from the project, releasing Version 3.0 in 2014 to expand the initial 10 Knowledge Areas (KAs) to 15. Most recently, the 2024 publication of Version 4.0 has modernized the guide further, integrating contemporary practices like Agile, DevOps, and Artificial Intelligence to ensure the body of knowledge remains relevant.

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) for the project management profession is published by the Project Management Institute (PMI). Since its first official edition in 1996, the guide has evolved from a collection of generally recognized good practices into a comprehensive framework used by millions of practitioners worldwide. With the release of the Seventh Edition (2021) and the recent Eighth Edition (2025), the guide has shifted from a process-based approach toward a Principle-Based model. This modern version moves away from rigid "recipes" and instead focuses on 12 Principles of project management and 8 Performance Domains, emphasizing value delivery, adaptability, and the integration of Agile and Hybrid methodologies to suit the complexities of the modern digital landscape.

Guide to the Learning Engineering Body of Knowledge (LEBOK) draws from years of work by the IEEE International Consortium for Innovation and Collaboration in Learning Engineering (ICICLE) in defining the practice and process of learning engineering. It also draws from the corpus of knowledge produced by the ICICLE and learning engineering research communities.

Methodology

Our work on an initial “beta version” of the LEBOK Guide was initiated in November 2024, driven by a recognized lack of clarity regarding the broad scope of learning engineering as a process and practice. Learning Engineering Toolkit and the work of the IEEE ICICLE provided a foundational corpus of knowledge and definitions.

The development was inspired by established professional domains, specifically software engineering and project management, which utilize authoritative "Body of Knowledge" guides to frame their respective professions. LEBOK adopts a similar structure as the Software Engineering Body of Knowledge (SWEBOK), utilizing Knowledge Areas (KAs) to categorize areas of professional expertise, and further subdividing the knowledge areas into topics and subtopics.

An initial set of knowledge areas were developed using an iterative process. An AI model was trained with content from key publications recognized by the community, including the Learning Engineering Toolkit: Evidence-based Practices from the Learning Sciences, Instructional Design, and Beyond (Goodell & Kolodner, 2023) and a variety of the author's co-authored papers. The list of knowledge areas were then compared to category lists previously developed by the IEEE ICICLE CCC SIG. The author edited the list of knowledge areas and developed a set of topics and then reviewed the combined lists for gaps. Finally, the previously trained LLM was used to identify potential sub-topic definitions. When available, previously published definitions were used to specify the scope of each subtopic.

Although the initial "beta" edition used some aspect of the learning engineering cycle as defined in the learning engineering process (Kessler et al, 2023), it primarily represented iteration within cycles of the Creation stage of the process. The intent is that the wiki can support additional nested iteration as a "team sport" by the learning engineering community. We expect that the complexity and breadth of the learning engineering knowledge areas can be addressed through modularization (Barr, 2022) and nested cycles of iteration (Craig, 2024). And that the wiki interface can be further iterated upon using human-centered design (Thai, 2023) for enhanced usability.

12 Knowledge Areas (KAs)

The "Beta" edition of the LEBOK Guide is organized into 14 distinct Knowledge Areas, reflecting major themes from the IEEE definition of learning engineering and the Learning Engineering Toolkit.

- KA 1: Learning Engineering Basics: Defines the scope, professional disciplines, and the necessity of cross-domain collaboration.
- KA 2: Human-Centered Design Foundations: Covers empathy-driven research, prototyping, and iterative design.
- KA 3: Learning Sciences Foundations: Explores cognitive, social, and motivational aspects of learning, as well as domain-specific pedagogy.
- KA 4: Engineering Foundations: Focuses on systems thinking, control theory, and empirical methods like A/B testing.
- KA 5: Learning Engineering Models and Methods: Discusses agile development, data-informed design, and design patterns.
- KA 6: The Learning Engineering Process: Outlines the lifecycle from challenge identification to implementation and feedback.
- KA 7: Data Instrumentation: Details the infrastructure for collecting learning event data and interoperability standards.
- KA 8: Learning Analytics: Covers predictive modeling, AI, machine learning, and ethical considerations.
- KA 9: Lean Agile Methodologies: Applies frameworks like Scrum and Kanban to learning engineering projects.
- KA 10: Operations & Project Management: Addresses budgeting, scaling, and resource management for complex learning projects.
- KA 11: Professional Practice: Outlines certification pathways, key competencies, and ethics.
- KA 12: The Learning Engineering Enterprise: Focuses on shifting organizational structures from traditional L&D to learning engineering.

Technical Implementation and Standards

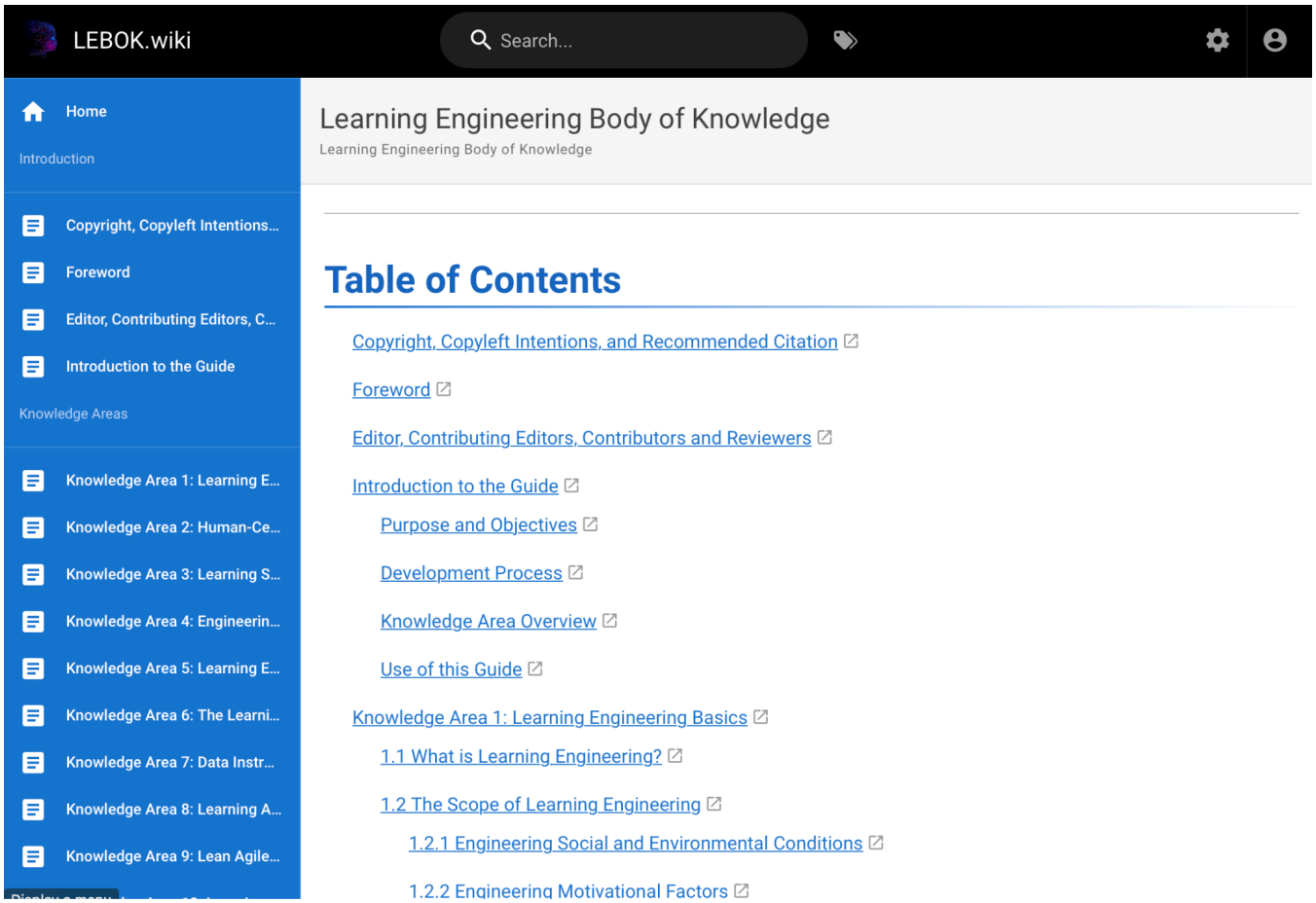
To ensure the Guide is functional within the modern digital ecosystem, it is released in several formats:

Interactive Wiki:

The wiki platform allows for quick reference of a single KA, Topic, or Subtopic. The platform hosted at lebok.wiki also will support continuous community review and iterative development.

Figure. 1.

LEBOK.wiki was soft-released in December 2025.



Machine Readable Format (IEEE 1484.20.3-2023):

The Guide is implemented in a machine-readable format (IEEE Sharable Competency Definition). This will allow the body of knowledge to be linked directly to learning resources, digital credentials, and job descriptions with a globally unique identifier and return machine-readable data objects for use in these systems.

PDF Publication:

The human readable downloadable PDF provides a portable and printable representation of the Guide.

Open Source Software Tools:

The author and software development partner also released the software developed to populate the wiki as open source under an Apache 2.0 license at https://github.com/jgoodell2/LEBOK.

Ethical Considerations

The LEBOK Guide places a heavy emphasis on ethical practice (11.2 Ethical Considerations in Learning Engineering), particularly regarding data privacy and the responsible use of data (8.5 Ethical Considerations in Learning Analytics) AI in

learning analytics (8.5.3 Responsible Use of AI in Learning Analytics).

Sustainability and Future Considerations

The initial development and hosting of the LEBOK Guide Wiki was supported by an author-initiated GoFundMe campaign (Goodell, 2025). The funding pre-paid hosting costs through 2026.

Future versions of the Guide are intended to be community-maintained with the goal of a community-vetted release in 2027. The wiki currently supports features for commenting and discussions, however, before turning on those features, to maintain site fidelity, a governance and discussion moderation process will need to be established. Additional funding could support development of a sustainable community governance model, recruiting volunteer knowledge area editors and community moderators, and initial community facilitation towards a community-vetted and improved future release.

The author is exploring models of sustainable funding to keep the resource free and open indefinitely. For example, the site hosting could be sponsored by programs that offer education, training, and certification of learning engineering in exchange for listing ads for their programs on the site. Premium sponsors could be prominently placed on as an ad rotation on the main landing page or on targeted knowledge area, topic, and subtopic pages. Companies that offer tools and services to learning engineering professionals could likewise promote their offerings on the site.

Conclusion

The Guide to the Learning Engineering Body of Knowledge represents a significant milestone in the professionalization of learning engineering. By establishing an initial framework of knowledge areas, topics and subtopics for further development through interdisciplinary collaboration, it provides the learning engineering academic and professional communities with a tool for further defining learning engineering as a professional practice. It may be used to define training and credentialing of learning engineering professionals. In addition to human-readable definitions, the machine-readable resources support direct linking metadata from training offering metadata, learning resources, and digital credentials, including links to skills definitions and rubrics.

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