Building a Generative AI Toolkit for Leveraging Knowledge Processes: The GAIK Project Report

Dmitry Kudryavtsev[1], Umair Ali Khan[1], Janne Kauttonen[1], Timo Kaski[1], Jukka Remes[1], Anne Wuokko[1], Roman Yangarber[2], Lidia Pivovarova[2], Yiheng Wu[2], Marko Seppänen[3], Jussi Myllärniemi[3] and Krista Sorri[3],

[1]Digital Transition and AI, Haaga-Helia University of Applied Sciences, Helsinki
[2]Department of Digital Humanities, University of Helsinki, Helsinki
[3]Information and Knowledge Management, Faculty of Management and Business, Tampere University, Tampere

dmitry.kudryavtsev@haaga-helia.fi
UmairAli.Khan@haaga-helia.fi
Janne.Kauttonen@haaga-helia.fi
Timo.Kaski@haaga-helia.fi
jukka.remes@haaga-helia.fi
Anne.Wuokko@haaga-helia.fi
Roman.Yangarber@helsinki.fi
lidia.pivovarova@helsinki.fi
yiheng.wu@helsinki.fi
marko.seppanen@tuni.fi
jussi.myllarniemi@tuni.fi
krista.sorri@tuni.fi

Abstract: While Generative AI (GenAI) has the potential to transform knowledge work, its proper application in business remains a challenge. To obtain benefits from GenAI, companies must navigate a complex landscape of technologies and best practices for their implementation. The selection, integration, and implementation of specific GenAI solutions are complex, particularly for small and medium-sized enterprises. To address this issue, we have launched a research and development project named GAIK (Generative AI-enhanced Knowledge Management) to develop a business-oriented GenAI toolkit to improve three processes: knowledge capture, synthesis, and access. The toolkit will include software components (modules and code libraries), guidelines, process models, templates, and reusable knowledge models, enabling companies and technology providers to develop easy-to-deploy knowledge management solutions using business data. This paper describes the envisioned toolkit, its potential use cases, and the required research activities to develop and apply it.

Keywords: Knowledge management, Generative AI, Toolkit, Software product lines, Design science research

1. Problem

GenAI is transforming how individuals and organizations create, capture, and access knowledge. It significantly boosts productivity across a wide range of knowledge-intensive tasks. For example, according to the US National Bureau of Economic Research, GenAI systems can increase productivity by 14% on average (as measured by issues resolved per hour), and by 34% for novice and low-skilled workers (Brynjolfsson et al, 2023). Industry and academia see a significant potential of GenAI for streamlining knowledge processes (Alavi et al., 2024; Murphy, 2023; Pimentel & Veliz, 2024).

While businesses recognize the potential of GenAI to empower employees and enhance the customer experience, the diverse range of GenAI solutions and the complexity of integrating AI into organizational products and processes present significant challenges. Companies struggle to leverage AI effectively due to concerns over data privacy and confidentiality, transparency in operations, and the accuracy of knowledge capture, synthesis, and access. While several existing GenAI solutions, such as Microsoft Co-pilot, attempt to address the challenge of precise knowledge access across scattered business documents, they often fall short in providing a tailored, customized, and holistic approach that meets the unique and rapidly evolving needs of modern businesses. These solutions typically offer broad functionalities but lack the specificity required to handle the nuanced and domain-specific KM needs of small and medium-sized enterprises (SMEs). In addition to these issues, businesses also face difficulties in developing and deploying complex GenAI solutions due to a lack of expertise and uncertainty about the appropriate level of AI integration. This challenge is particularly acute in SMEs, which often possess vast amounts of data but lack the specialized expertise to implement effective

knowledge management (KM) solutions. This gap results in underutilized data, inefficiencies, and missed opportunities to leverage information and drive business growth and innovation.

2. Expected Solution and Project Results

To address these challenges, we have launched a research and development (R&D) project named GAIK (Generative AI-enhanced Knowledge Management) to create a GenAI-based business-oriented toolkit for SMEs supporting knowledge capture, synthesis, and access processes. This toolkit will enable businesses to develop and implement company-specific GenAI solutions by customising reusable components, helping companies manage their information more efficiently and effectively.

The toolkit for GenAI-enhanced KM will comprise software components (customized products, code libraries), method components (guidelines, process models, templates), and content components (reusable knowledge models). This toolkit will help companies develop and implement GenAI-based solutions for creating, capturing, and accessing their knowledge within the selected use cases: 1. GenAI assistant (conversational agent) to talk to business data and systems for enhancing the knowledge access process, 2. GenAI assistant for creating reports and documents for enhancing the knowledge synthesis process, 3. GenAI assistant for converting speech into structured documents for enhancing the knowledge capture process.

These generic solutions address the needs of SMEs that were identified during the preparatory project and will be tested within company-specific use cases. Working demos/prototypes of GenAI tools for company-specific use cases will be deployed to test and evaluate our toolkit and generic solutions. Fig. 1 depicts a high-level view of the project results.

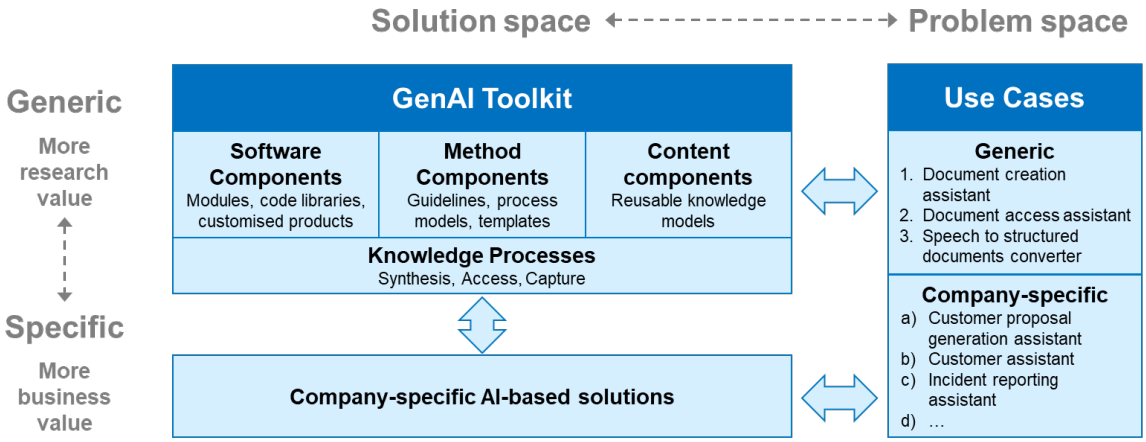

Figure 1: Overview of the project results: GenAI-enhanced KM toolkit and its applications

The project employs the action design research methodology (Sein et al., 2011) to develop and evaluate IT-based artifacts, specifically the toolkit. The project is a cooperation between industry and academia: the consortium includes 3 academic partners and six companies from Finland. The companies provide the use cases and testbeds for the R&D activities (Kudryavtsev et al, 2025).

From a theoretical perspective, the toolkit implements the idea of knowledge and software reuse, which entails leveraging existing knowledge and systems to create new solutions (Sandkuhl, 2015; Barros-Justo et al, 2019). More specifically, the concept of software product lines (Clements, Northrop, 2002; Pohl et al., 2005; International Organization for Standardization, 2015) and component-based software engineering (Tiwari, Kumar, 2021) will be used. A software product line is “a set of software-intensive systems that share a common, managed set of features satisfying the specific needs of a particular market segment or mission and that are developed from a common set of core assets (artifacts) in a prescribed way” (Clements, Northrop, 2002). Software product line engineering has proven to enable companies to develop a diversity of similar systems at a lower cost, in a shorter time, and with higher quality compared to the development of unique systems (Pohl et al., 2005; International Organization for Standardization, 2015). Component-Based Software Engineering (CBSE) is a software development paradigm that emphasizes the construction of systems through the assembly of pre-existing software units, or components (Tiwari, Kumar, 2021). While software product lines and Component-Based Software Engineering are primarily applied to software systems, we plan to use these approaches for a type of socio-technical system, more specifically, knowledge management systems (ISO 30401, 2018; Carlucci et al, 2022) by complementing them with knowledge reuse methods (Sandkuhl, 2015).

3. Use Cases and Expected Benefits for Companies

The identification of business needs and use cases for the toolkit is described in more detail by Kudryavtsev et al. (2024). The toolkit will address the needs of SMEs, which were clarified through interviews and co-creation workshops with over 20 companies. For knowledge access, companies need AI assistants to support the employees' interaction with the company's knowledge and systems, providing flexible chatbot-style access to company-specific manuals, documentation, learning content, and software services. For knowledge synthesis, tools are needed to generate customer proposals and various reports. For knowledge capture, speech-to-structured-document conversion tools are required for automated reporting of work-related incidents and similar tasks. Table 1 describes generic and company-specific use cases. We are currently updating and elaborating these use cases with companies.

Although Table 1 associates each company-specific case with one generic use case and knowledge process, it often happens that one company-specific case requires several knowledge processes. For example, customer experience reporting and incident reporting require not only knowledge synthesis but also knowledge capture from different sources and formats. In such cases we highlighted the leading generic use case and knowledge process for a company-specific use case.

Table 1: Generic and company-specific use cases

Generic use cases and k-process	Company-specific use cases
1. From speech, images and texts to structured documents Knowledge capture	Gen-AI assistant for extracting and translating transcripts from learning video and audio content GenAI-assistant for safety observations Gen-AI assistant for generating structured construction project diaries from speech, images and text Building inspections report creation assistant
2. Report and document creation assistant Knowledge synthesis	Customer proposal/quotation generation assistant Sales order processing assistant (will convert customer order into structured data for the ERP system) Gen-AI assistant for automatic incident reporting Customer experience reporting
3. AI assistant to talk to your company data and systems Knowledge access	Customer support assistant, Q&A based on the ticket history Customer guidance system based on the company's guides and instructions GenAI-based assistant on top of the existing scheduling/optimization software (platform)

Below are the expected project outcomes, along with approaches for their qualitative and quantitative verification. The results of verification experiments can be widely used to assess the impact and profitability of GenAI improvements in KM processes. The toolkit and GAIK project, in general, aim at improvements in the following knowledge process areas in business:

- Efficient Knowledge Capture: The project will enhance the accuracy and efficiency of capturing knowledge by automating the conversion of speech to structured documents. This includes tasks such as incident documentation and extracting transcripts from learning videos, which makes the documentation process faster and more reliable.
- Improved Knowledge Synthesis: By developing automatic report and document generation tools, the project will simplify the creation of various business documents such as quotations, sales orders, and project summaries. This will reduce the time and effort required to produce these documents, resulting in cost and time savings.
- Enhanced Knowledge Access: The project will improve the way employees access information by integrating AI assistants that provide GenAI-based conversational interactions with company knowledge and systems. This enhancement will streamline the process of finding relevant information, making it faster and more efficient.

4. Research Agenda in the GAIK Project

The aim of creating the GenAI toolkit raises many research questions that cover managerial and technological domains. These questions guide our research plans.

One main area of interest is understanding how GenAI enhances knowledge management and improves knowledge-related processes in organizations. We will identify the factors that contribute to the successful use of GenAI, along with the challenges related to these factors. Addressing ethical considerations in the implementation of GenAI is another important aspect of our research.

From a business perspective, we are examining how to ensure the adoption of GenAI solutions and how to integrate these solutions into existing organizational processes. We also aim to assess the business value that GenAI brings, ensuring that its impact can be measured and evaluated.

On the technological side, we are focused on determining which GenAI frameworks and models are most suitable for the toolkit and company-specific solutions. We will evaluate the accuracy and reliability of GenAI solutions in real business settings. The adaptation of solutions to data variability (structured/unstructured, various modalities) will be explored to ensure the toolkit's applicability to diverse cases. We will also consider how to ensure these solutions are understandable and transparent.

To understand how to assemble the reusable building blocks into the toolkit, we are analyzing best practices for reusing knowledge in software and solution development (including software product lines methods).

Overall, our research aims to bridge the gap between organizational needs and the capabilities of GenAI technologies, ensuring that these tools can be implemented in ways that are effective, ethical, and beneficial for knowledge management.

5. Conclusions

This paper has outlined the development and intended outcomes of a Generative AI-enhanced knowledge management toolkit to address current key KM challenges faced by businesses. The toolkit offers a flexible and modular solution, allowing both technical and non-technical users to create customized GenAI-based knowledge management (KM) solutions. Non-technical users can quickly implement their specific use cases, while technical users, such as AI programmers, benefit from the toolkit's flexibility to further customize or enhance the use cases according to their needs. While the identified use cases reflect the contemporary KM needs, they also serve as test cases to demonstrate the toolkit’s functionality. However, future steps will involve evolving the current company-specific use cases into a generalized architecture, ensuring broader applicability to current KM demands in various business contexts. The creation of the GenAI toolkit not only requires the development of software and methods but also raises several research questions spanning both managerial and technological domains. These questions form the foundation of our research agenda, which was also described in the paper.

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AI Declaration: An AI tool was used for rephrasing and summarizing some parts of the paper with careful validation.

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