



WHITEPAPER

Preserving Knowledge with Generative AI

How technical departments are already using AI to retain expertise

Insights from a live survey at the BEMAS seminar "Knowledge Preservation with AI"

BRIDGE TO SUSTAINABLE ASSET PERFORMANCE

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Executive summary

Industrial organisations face a quiet but far-reaching challenge: the ageing and departure of experienced technicians put years of accumulated expertise at risk. When an experienced maintenance technician leaves, undocumented knowledge about fault analysis, machine settings and “thinking one step further” often disappears — knowledge that rarely finds its way into manuals or the CMMS. The central question at the BEMAS seminar “Knowledge Preservation with AI” was therefore: can Generative AI help preserve this critical knowledge and make it usable?

During the seminar, participants, mainly maintenance and reliability professionals from Belgian industry, were surveyed live through Mentimeter. The results (37 to 42 respondents per question) paint a clear and partly paradoxical picture of current practice.

The four key findings

- 1. AI is widespread, but use remains superficial.** 36 of 39 participants use GenAI regularly, often professionally, but primarily for lighter tasks such as searching and administration.
- 2. Knowledge tools are still maturing.** According to the maintenance professionals surveyed, technicians still mainly rely on traditional information sources when resolving faults. AI-assisted documentation systems score by far the lowest, at 1.2/4.
- 3. The urgency is widely recognised.** Knowledge loss is considered a significant risk (4.1/5), and confidence that AI can help is high (digital twins and AI agents score 4.0–4.5/5).
- 4. There is a gap between ambition and action.** AI agents are considered very useful (4.5/5), but feature much less concretely on company agendas (3.1/5).

The conclusion is unambiguous: the technical sector recognises both the risk of knowledge loss and the promise of AI, yet practical deployment lags behind conviction. This whitepaper examines that gap theme by theme and translates the figures into practical recommendations for maintenance organisations wishing to preserve knowledge.

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1. Context: why knowledge preservation matters now

Maintenance and asset management rely heavily on experiential knowledge. Much of what keeps an installation reliable is not written in procedures but held in technicians' heads: recognising an unusual noise, judging which fault is emerging, or knowing an old machine for which barely any documentation exists. This knowledge is tacit, implicit, personal and difficult to transfer.

As a wave of retirements reaches industry and the labour market for technical profiles remains tight, this dependence becomes a real business risk. Generative AI — large language models able to process and generate text, documentation and conversations — promises a response: capturing expertise, making it searchable and placing it at technicians' disposal on the shop floor when needed.

To assess how far the sector has progressed, BEMAS conducted an interactive survey during the seminar covering four themes: expert knowledge, decision trees, digital twins of expertise, and AI agents as knowledge carriers. The following chapters discuss the results.

About the survey

The figures in this whitepaper come from a live Mentimeter survey held during the seminar. Between 37 and 42 participants responded to each question. This is a snapshot of a self-selected group of professionals interested in the topic; the results are indicative and not statistically representative of the entire sector. Their main value lies in the direction and relative distribution of the answers.

2. Baseline: how AI is used today

2.1 GenAI is no longer a novelty

The first question assessed the general use of GenAI tools such as ChatGPT. The result is clear: for most participants, AI is no longer an experiment at the margins but has become an everyday work tool.

Use of Generative AI tools (n=39)

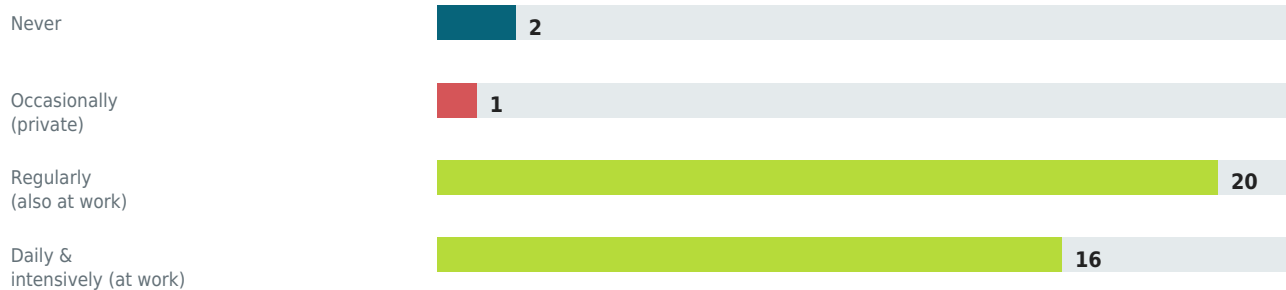


Figure 1. Use of Generative AI tools (n=39)

Of the 39 respondents, 36 use GenAI regularly or daily, including 16 who use it intensively at work every day. Only 3 participants never use it or use it only occasionally in private. In other words, the barrier to starting with AI has largely disappeared; the question is shifting from “whether” to “for what purpose and how extensively”.

2.2 Where technicians obtain information

Which information sources do technicians consult when resolving a fault? The maintenance and reliability professionals surveyed indicated which sources they believe are used on the shop floor. The results thus provide an indicative picture of the current role of traditional documentation and AI-assisted systems in fault diagnosis.

Where technicians obtain extra information when resolving a fault (n=42)

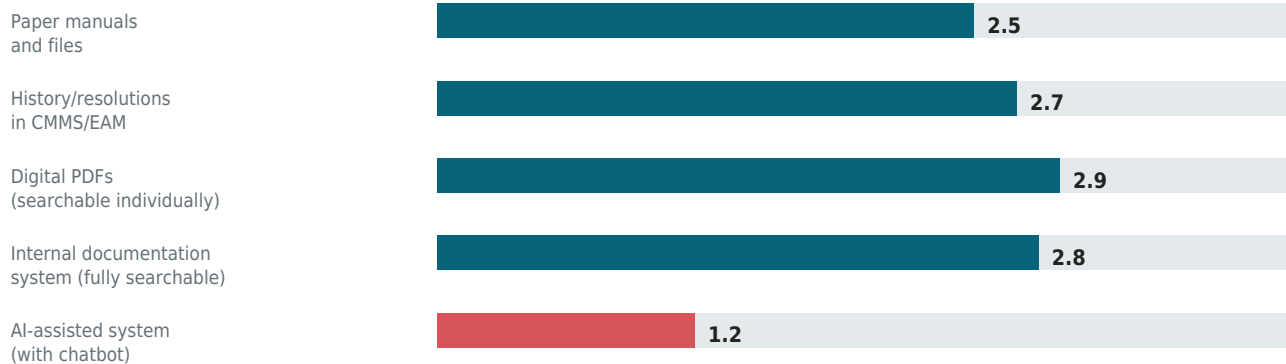


Figure 2. Information sources used when resolving a fault (n=42, scale 1-4)

Traditional sources dominate. Digital PDF manuals (2.9), the internal documentation system (2.8) and the history recorded in the CMMS/EAM (2.7) are the most widely used channels. Even paper manuals score 2.5, well above the AI alternative. The AI-assisted documentation system with chatbot is at the bottom with 1.2/4, suggesting that such systems are either not yet available or not yet trusted in most organisations.

The contrast is revealing: although GenAI is already widely established among the maintenance and reliability professionals surveyed (Figure 1), they estimate that technicians still mainly rely on traditional information sources when resolving faults, such as PDF manuals, internal documentation systems and CMMS histories. This suggests that professional adoption of AI does not automatically translate into widespread use on the shop floor, where technical knowledge is actually needed during fault diagnosis.

2.3 What GenAI is used for in technical departments

A more detailed question mapped the specific tasks for which GenAI is already being used, on a scale from 0 (no use/no plans) to 5 (integrated through Agentic AI in the EAM system).

Extent of GenAI use in technical departments (n=40)

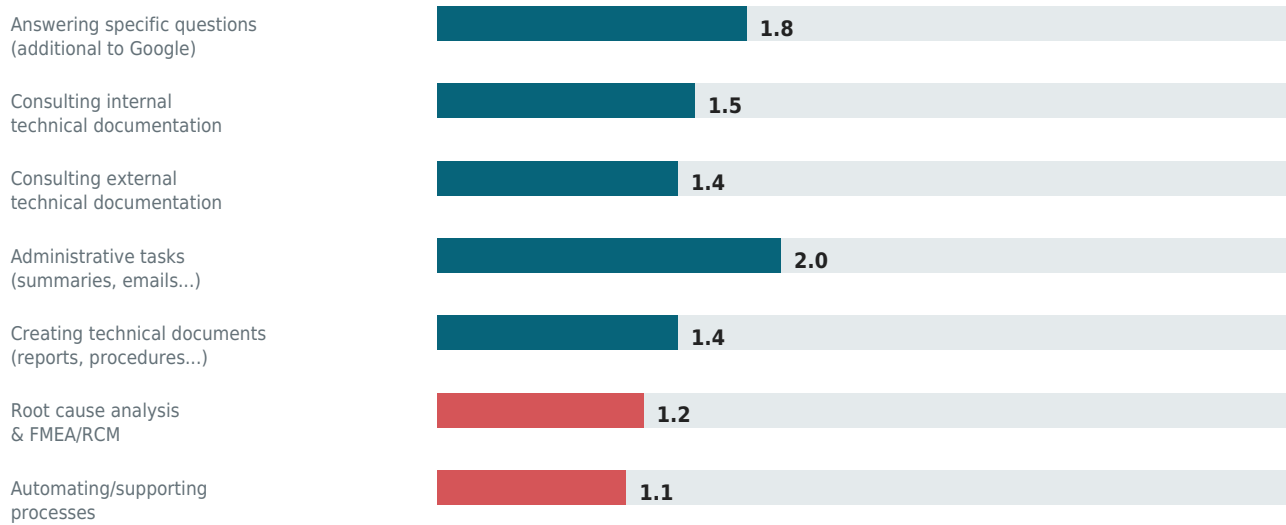


Figure 3. Extent of GenAI use by task type in technical departments (n=40, scale 0-5)

Administrative tasks lead the list (2.0): summarising documents, writing emails and internal communication are the most natural entry points for GenAI. Next comes answering specific questions as a supplement to a Google search (1.8). All other applications — precisely those with the greatest potential value — lag behind:

- Consulting internal and external technical documentation: **1.5 and 1.4**
- Creating technical documents (intervention reports, procedures, manuals): **1.4**
- Root cause analysis and/or FMEA/RCM: **1.2**
- Automating and supporting processes (work preparation, planning): **1.1**

The pattern is consistent: the closer a task is to core technical competence, the less AI is used. Today, GenAI mainly helps with peripheral tasks — the administrative layer surrounding the work — and hardly at all with diagnosis, analysis and knowledge-intensive documentation. Its use is smallest precisely where preserving expertise would provide the greatest benefit.

3. The four themes of knowledge preservation

Alongside the baseline assessment, the seminar explored perceptions and potential across four specific approaches to preserving expertise with AI. Here, the picture changes: while actual practice remains cautious, confidence in the possibilities is remarkably high.

3.1 Theme 1: Expert knowledge

An open question first asked which expert knowledge is at risk of being lost today. The answers paint a rich and recognisable picture of threatened knowledge:

- **Fault analysis and diagnostic expertise:** the experience needed to diagnose a fault quickly and precisely.
- **Undocumented history:** previous root cause analyses and solutions that have never been recorded.
- **Specific machine knowledge:** settings and data relating to old or complex systems with little documentation.
- **Reliability engineering and deep mechanical knowledge:** the ability to “think one step further” rather than simply apply a quick fix.

One participant captured a wider concern: personal technical knowledge risks becoming less developed, much like the effect of using a GPS — the convenience of a tool can displace independent thinking. This is an important warning for every form of AI assistance.

Expert knowledge in technical departments (n=38)



Figure 4. Perceptions of expert knowledge and the role of AI (n=38, scale 1-5)

The figures confirm the urgency. The loss of expert knowledge is seen as a significant risk (4.1/5), while confidence that AI can help make that knowledge usable is also high (3.7/5). The sector therefore sees both the problem and a possible route towards a solution.

3.2 Theme 2: Decision trees

Decision trees organise diagnostic knowledge into a logical “if-then” structure and are an established way of transferring fault-analysis expertise. The question was whether AI could play a role.

Decision trees for technical departments (n=38)

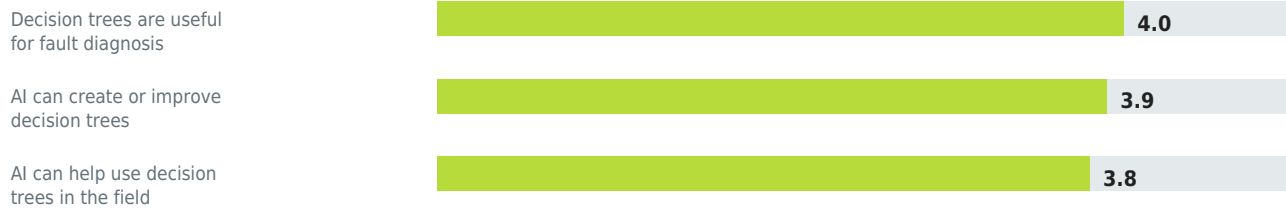


Figure 5. Perceptions of decision trees and AI support (n=38, scale 1-5)

The three statements all score remarkably highly and close together. Decision trees are considered useful for fault diagnosis (4.0), and there is strong confidence that AI can help create or improve them (3.9) and make them easier to use in the field (3.8). This makes the theme one of the most concrete and feasible candidates for an initial AI application: the method is familiar, its usefulness is proven, and AI can accelerate both development and accessibility.

3.3 Theme 3: Digital twins of expertise

A digital twin is a digital copy — not only of a physical installation but, in this theme, also of documentation and even human expertise. The survey assessed the value of three types of twins and confidence in AI to make them possible.

Value of digital twins of expertise (n=37)



Figure 6. Value of digital twins of expertise and AI support (n=37, scale 1-5)

This theme shows the clearest consensus. All four statements score around 4.0–4.1/5. Notably, a digital twin of human expertise (4.0) is considered almost as valuable as a twin of the physical installation (4.1) or its documentation (4.1). The group also firmly believes that AI can realistically support such a digital twin of expertise (4.1). The idea of “duplicating” not just machines but also knowledge clearly resonates.

3.4 Theme 4: AI agents as knowledge carriers

AI agents go a step beyond chatbots: they are systems that autonomously perform tasks, consult sources and take actions. In the context of knowledge preservation, they can serve as an “experienced colleague” who is always available.

AI agents as knowledge carriers (n=38)



Figure 7. Perceptions of AI agents as knowledge carriers (n=38, scale 1-5)

AI agents are regarded as the most valuable application of all: 4.5/5 for the statement that they could be useful in technical departments, the highest score in the entire survey. At the same time, the group indicates that Agentic AI is much less firmly on company agendas (3.1/5).

This creates the largest gap between what is considered valuable and what is actually being planned: a difference of 1.4 points.

4. The common thread: a gap between belief and practice

Looking at the results side by side, one central pattern emerges. Perceived value and urgency are consistently high (scores between 3.7 and 4.5), while actual use in fault-resolution processes remains low (1.1 to 2.0). The figure below summarises this.

Gap between perception and practice (scale 1-5)

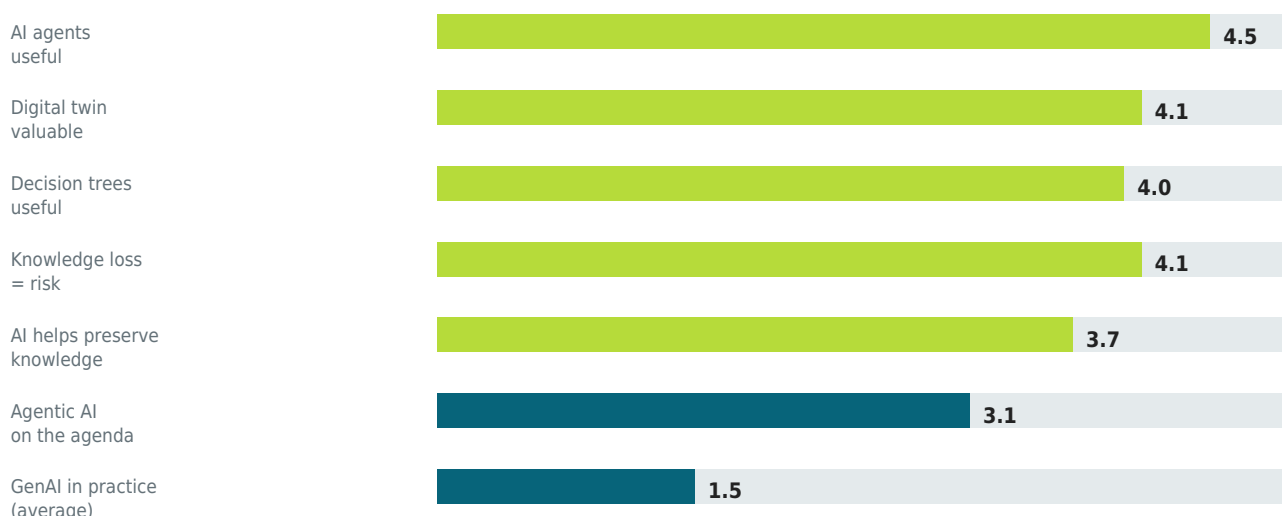


Figure 8. Synthesis: strong belief, limited operational use (all scores on a 1-5 scale)

4.1 Three tensions to bridge

Tension 1: Adoption versus depth.

GenAI is well established among the professionals surveyed, but their organisations mainly use it for administration and answering questions. Applications in diagnosis, RCA and technical documentation remain far less developed.

Tension 2: Recognising risk versus having the tools.

Knowledge loss is widely recognised as a risk (4.1), yet the most suitable tool to counter it — an AI-assisted, searchable knowledge system — is currently the least widespread (1.2).

Tension 3: Ambition versus the agenda.

AI agents are rated as very valuable (4.5), but feature far less concretely on company agendas (3.1). The willingness exists; the organisational embedding does not yet.

Key message

The technical sector is convinced of the value of AI for knowledge preservation and is ready to act. What is missing is not belief, but its translation into concrete, integrated applications at the heart of the maintenance process.

5. Recommendations for maintenance organisations

The survey points to a logical development path. Organisations do not need to introduce the most advanced agentic systems immediately; the figures suggest a natural progression from quick wins to strategic ambition.

5.1 A four-step development path

- 1. Start with proven benefits.** Administration and answering questions already work (2.0 and 1.8). Build on this by training teams and sharing effective prompts and use cases, allowing adoption to broaden and deepen.
- 2. Make documentation searchable with AI.** The largest gap in practice is the AI-assisted documentation system (1.2). Invest in opening up existing PDFs, CMMS histories and manuals through a reliable, searchable knowledge system.
- 3. Pilot decision trees.** This theme combines high usefulness (4.0) with feasibility. An AI-assisted decision tree for a common fault is a concrete, well-defined project that can deliver visible results quickly.
- 4. Put knowledge preservation on the strategic agenda.** Narrow the gap between ambition and agenda for agentic AI (4.5 vs 3.1) by explicitly including knowledge preservation in the digitalisation roadmap, with ownership and budget.

5.2 Two prerequisites

Safeguard human expertise.

The “GPS warning” from the survey is real: AI should support independent thinking, not replace it. Combine AI tools with deliberate knowledge transfer between experienced and younger technicians.

Ensure data quality and trust.

An AI knowledge system is only as good as the data that feeds it. The low score for AI sources (1.2) is partly related to trust: invest in accuracy, source references and expert validation to encourage adoption.

6. Conclusion

The survey at the BEMAS seminar “Knowledge Preservation with AI” portrays a sector at a turning point. Generative AI is no longer a distant prospect: the vast majority of participants already use it, and belief in its value for knowledge preservation is widespread and strong. Digital twins of expertise (4.0–4.1), decision trees (3.8–4.0) and especially AI agents (4.5) are considered highly valuable.

At the same time, the survey clearly shows that operational reality still lags behind that belief. At the heart of the maintenance process — diagnosis, root cause analysis and technical documentation — AI use remains low, while the most suitable knowledge tools are the least established.

That gap is not a weakness but an opportunity. The foundations — support, a sense of urgency and basic skills — are already in place. Organisations that now move from isolated AI experiments to structured, integrated knowledge preservation can turn years of accumulated expertise into a sustainable, shareable and future-proof business asset. In the words of BEMAS, they thereby help build a bridge to sustainable asset performance.

About BEMAS

BEMAS, the Belgian Maintenance Association, is Belgium’s knowledge network for maintenance, asset management and reliability engineering. Through seminars, training courses, webinars and learning communities, BEMAS helps technical professionals and organisations progress towards sustainable asset performance.

Find out more: www.bemas.org