Research and Practical Post-Print on Knowledge Distillation Application Frameworks

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Abstract

[Purpose/Significance] Knowledge extraction is the process of distilling knowledge essence, representing an essential path to improving knowledge quality. Mastering the methods and techniques of knowledge extraction constitutes an essential competency for knowledge workers to enhance their comprehensive workplace capabilities. [Method/Process] Based on practical cases of knowledge extraction, we refine the Knowledge Extraction Application Framework (KEAF) model, whose horizontal dimension represents the operational execution process of knowledge extraction, while the vertical dimension represents the content creation process of knowledge extraction. Grounded in different knowledge application scenarios within enterprises, various types of knowledge workers can then conduct practical operations and applications. [Results/Conclusions] The KEAF model exhibits excellent practical value, enabling enterprise knowledge workers to quickly grasp the essentials of knowledge extraction, learn to master its intricacies, and enhance the efficiency and quality of knowledge creation.

Full Text

Preamble

Knowledge Extraction Application Framework Research and Practice

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Abstract

[Purpose/Significance] Knowledge extraction is the process of brewing knowledge essence and the necessary path to improving knowledge quality. Mastering the methods and techniques of knowledge extraction is an essential competency for knowledge workers to enhance their comprehensive professional qualities.

[**Method/Process**] Based on practical cases of knowledge extraction, this paper refines the Knowledge Extraction Application Framework (KEAF) model, where the horizontal axis represents the operational execution process of knowledge extraction and the vertical axis represents the content creation process. Various knowledge workers can then conduct practical operations and applications according to different enterprise knowledge application scenarios. [**Result/Conclusion**] The KEAF model demonstrates excellent practical value, enabling enterprise knowledge workers to quickly get started, grasp the essence of knowledge extraction, and improve the efficiency and quality of knowledge creation.

Keywords: knowledge extraction; experience extraction; application framework; KEAF model; knowledge management
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Everything needs extraction, and everything can be extracted. In the workplace, why do some experts appear so sophisticated whether speaking or writing PPTs? Careful analysis often reveals their ability to distill intellectual essence from complex information. They excel at knowledge extraction, constantly reflect and review, grasp key points, and see through phenomena to the essence. Methods and techniques of knowledge extraction are involved in project summaries, case development, meeting facilitation, experience distillation, thematic research, work reports, patent analysis, paper publication, project proposals, results presentations, strategic reflection, project reviews, and more [1-3].

Knowledge extraction technology is like a special skill for knowledge workers. Mastering this craft enables them to handle speeches, materials, and presentations with ease, and even makes them stand out. Like presentation skills, communication techniques, facilitation methods, and coaching skills, knowledge extraction should become one of the foundational skills for workplace professionals. Outstanding knowledge extraction ability becomes a powerful competitive advantage for knowledge workers.

The concept of knowledge extraction has gradually expanded in practice to include the integration, processing, and refinement of both tacit and explicit knowledge. Extracting experience is the process of making tacit knowledge explicit, while extracting documents is the process of standardizing explicit knowledge [4-6]. Feedback from market users shows that the issues involved are often more complex.

Let us first examine some scenarios faced by Project Director H in the following case:

Company A is an engineering general contractor focusing on power station engineering R&D and design, integrating power station engineering R&D, planning, design, general contracting, operational support, and project supervision. As

Company A undertakes more construction projects, H experiences both joy and pain. After graduating with a master's degree, he joined Company A, starting in technical roles before transitioning to project management and recently being promoted to project director. Looking back, he has been with the company for 15 years. After gaining a comprehensive understanding of the company's projects, H discovered increasingly prominent issues such as insufficient project implementation efficiency and staffing shortages.

Currently, the engineering project department has over 30 project managers, all operating at full capacity. Their workload is enormous—as soon as one project ends, they rush to the next without time for rest, learning, or improvement. Despite everyone's exhaustion, overall project performance remains unimpressive. Although similar projects have been implemented multiple times, the same mistakes are repeated. Average project time and costs have not significantly improved, and customer satisfaction is mediocre.

Project team members also seem to have lost their initial passion for work. Power station general contracting projects are relatively complex, demanding high professional and comprehensive capabilities from implementation personnel. H wants to recruit more talent for reserve training, but the company strictly controls headcount. The average training cycle for engineering project implementation talent requires at least two to three years, and even newly recruited personnel cannot be entrusted with important responsibilities immediately. How can the talent development cycle be shortened? Moreover, Project Manager Zhang, whom the company had painstakingly cultivated, was recently poached by a competitor with a high salary. H has a headache just thinking about who can quickly take over Zhang's work.

If you were a corporate consultant, what prescription would you give H?

2. Problem Analysis and Identification

Huawei's founder Ren Zhengfei believes that we now live in an information society where knowledge is crucial. Veterans who have been on the battlefield should be good at writing their experiences into cases. When young people read these cases and compare them with their own battlefield experiences, they achieve sublimation. Huawei encourages experts to share knowledge and experience, enabling every new project and new employee to work based on best practices, delivering more efficient and higher-quality results. As shown in Figure 1 [Figure 1: see original paper], if each completed project can be continuously reflected upon and summarized, with knowledge extracted and applied to the next similar project, the performance of similar projects will improve significantly.

Although H faces numerous issues, the core problems are as follows:

First, project implementation is merely low-level repetition. Company A's engineering projects have decent order intake but poor project performance. Each project merely treads water at the original level, delivering barely adequate

results to customers without significant room for improvement. They neither surprise customers beyond expectations nor excite project members with extraordinary challenges. If Company A does not address this situation, its core competitiveness will inevitably decline, ultimately affecting market sales.

Second, project knowledge extraction is urgently needed. Because Company A has not developed habits of project review and knowledge extraction, no one spends time and energy digging deep into project essence, no one can calmly refine and optimize implementation methods, and no one is willing to widely disseminate project mistakes and lessons. Consequently, everyone is too busy to timely summarize project experiences. As the saying goes, sharpening the axe won't delay the cutting of firewood. When projects conclude, team members should be given one to two weeks of rest for project knowledge extraction.

Third, position-based knowledge extraction must be initiated. The engineering project department's knowledge requires effective identification and systematic organization, classification, and storage. Knowledge maps for key positions must be developed, and a departmental training and development system needs to be established. Only in this way can the talent development cycle be significantly shortened, personnel transfers or departures won't cause knowledge loss and gaps, and existing best practices can be rapidly disseminated, learned, and replicated.

Therefore, how to excavate and extract project success factors and strengthen knowledge and experience inheritance is key for H to turn the situation around and achieve cost reduction and efficiency improvement.

3. Knowledge Extraction Application Framework KEAF

British management scholar Charles Handy once said: Learning occurs when we reflect on past experiences. Scenarios similar to H's case occur in many organizations. Business case writing, business replication and relocation, project knowledge summarization, expert experience mining, courseware development, job task lists, personal article writing, and book publishing [7-9] all require excavating and refining tacit experiences while organizing and processing explicit knowledge.

Is there a universal framework and method for reference? Can we extract knowledge about knowledge extraction? After proposing the PREFS® process method for knowledge extraction in 2016 [4], the author continuously upgraded and optimized it through practical application, forming the enterprise-level Knowledge Extraction Application Framework (KEAF) shown in Figure 2 [Figure 2: see original paper].

In the KEAF framework, specific business functions (such as strategy, marketing, product, R&D, production, procurement, logistics, human resources, finance, etc.) serve as the canvas. Based on different application scenarios, knowledge extraction can be categorized into the following levels:

1. **Enterprise-level knowledge extraction**: Such as corporate cases, business expansion, strategic summaries, and technology conferences.
2. **Thematic-level knowledge extraction**: Such as thematic reports, award applications, best practices, and courseware.
3. **Project-level knowledge extraction**: Such as strategic projects, business relocation, R&D projects, and benchmarking projects.
4. **Team-level knowledge extraction**: Such as position clarification, knowledge mapping, experience summarization, and annual reporting.
5. **Personal-level knowledge extraction**: Such as work summaries, personal resumes, article writing, and book publishing.

Although businesses and specific application scenarios differ, knowledge extraction can follow the same methods and routines—truly "everything can be extracted." Everyone can reference and adapt this framework to their specific contexts.

The horizontal axis of the KEAF framework represents the operational execution process of knowledge extraction, divided into five steps:

1. **Planning and Topic Selection**: Knowledge extraction should begin with purposeful planning and topic selection based on organizational strategy, business, and project requirements. Only by determining the extraction theme can we focus our efforts. Resources and personnel within the organization are then matched accordingly.
2. **Review and Retrospection**: This stage requires extensive collection and organization of materials, as well as reviewing the extraction theme through storytelling, interviews, retrospection, field research, and group discussions. The goal is to reconstruct the original scenario as much as possible to discover underlying causes and patterns.
3. **Refinement and Processing**: This stage involves understanding and digesting the collected materials and information, analyzing first-hand materials from the review stage, and extracting useful essence through refinement and processing.
4. **Prototyping and Finalization**: The final knowledge extraction deliverable is produced, presented through text in the form of reports, manuals, guidebooks, cases, articles, or courses, or through multimedia interactive formats such as audio, video, or virtual reality.
5. **Spiral Ascension**: Proactively identify target audiences and application scope for the knowledge product, and conduct precise promotion. Additionally, apply craftsman spirit to continuously optimize versions of knowledge extraction deliverables, achieving spiral ascension through iteration.

Beyond operational execution, special attention must be paid to how extraction results are created. In the KEAF framework, the vertical axis represents the content creation process of knowledge extraction, divided into four components:

1. **Mindset**: Mindset is the soul of knowledge extraction. Consciously accumulate, learn, and hone different thinking methods. For example, regu-

larly alternate between left-brain and right-brain thinking, integrate structured thinking—the pyramid principle—into every aspect of content creation, and consciously exercise both sponge thinking and gold-panning thinking.

2. **Conception**: Conception is the spirit of knowledge extraction, referring to ideas, intentions, motivations, and main viewpoints. Conception should generally meet requirements of being correct, clear, focused, profound, and novel, while being positive and spreading positive energy.
3. **Structure**: Structure is the skeleton of knowledge extraction, referring to frameworks, skeletons, contexts, and logic. Writing has its introduction, development, transition, and conclusion; stories have their beginning, development, climax, and ending; layouts have parallel, contrastive, progressive, and 跳跃 (leaping) patterns; logic follows time, place, causality, and emotion.
4. **Content**: Content is the flesh of knowledge extraction. Articles are written word by word, with the power to startle wind and rain and move spirits to tears, demonstrating the power and beauty of written content. Videos are composed frame by frame, creating dream spaces and visual arts that open worlds and explore inner selves with powerful 感染力 (infectiousness).

4. Specific Practical Application

After careful consideration, H in the previous case decided to immediately launch project-level knowledge extraction. At Company A, he first selected "high-impact, high-promotion-effect, high-personnel-willingness" projects—the so-called "three-high projects"—for knowledge extraction. At key project milestones and upon overall project completion, he specifically allocated more time for team members and invited external knowledge extraction consultants to introduce project knowledge harvesting and AAR (After Action Review) methods. By creating a knowledge co-creation field and employing multiple methods to excavate and capture tacit experiences and explicit knowledge within projects, the captured content was processed, organized, extracted, and disseminated.

Project-level knowledge extraction results also provide raw materials for business-level knowledge assets (such as solutions, processes, tools, templates) or best practices (including cases), ensuring knowledge is effectively applied across the company. Understanding the KEAF framework and grasping the essence of knowledge extraction allows for adaptation to different enterprise environments.

In this case, the specific project-level knowledge extraction process is shown in Figure 3 [Figure 3: see original paper]:

1. **Select and determine the knowledge extraction project list**: Review the organizational project list, establish organizational criteria (such as strategic significance, promotion effectiveness, personnel willingness) to evaluate all projects, and select strategic projects that require

organizational-level focus and knowledge extraction.

2. **Prepare and launch a specific project knowledge extraction**: Hire external consultants, determine objectives, scope, responsible persons, participants, schedules, and other resources for a specific knowledge extraction project, collect comprehensive background materials, and formally initiate the project.
3. **Implement and execute the project knowledge extraction**: Through storytelling, interviews, review, field research, group discussions, and other methods, guide personnel to systematically extract tacit and explicit knowledge from projects, reconstruct scenarios as much as possible, discover causes and patterns, and ultimately produce and review project knowledge extraction results.
4. **Update and enter into organizational knowledge assets**: After determining the refresh scope of organizational knowledge assets, assemble teams to batch-upload extracted experiences and documents into the organizational knowledge repository, formally transforming them into organizational knowledge assets. Knowledge extraction deliverables can be further optimized through iteration for spiral improvement.
5. **Transfer knowledge to potential user groups**: Identify potential target scopes and audiences for newly uploaded knowledge assets, and proactively organize knowledge transfer activities by knowledge management personnel to ensure appropriate knowledge reaches suitable audiences.

The final results were impressive: After completing knowledge extraction for the first project, H smiled at the extracted knowledge 成果 (achievements)—42 experiences, 16 lessons, 58 recommendations, and 75 core documents. After expert review, 80% could be reused in similar future projects and specifically implemented in project methodologies and service processes.

Project team members also achieved the following through this extraction:

1. **Effective knowledge collection and 沉淀 (precipitation)**: Project-level knowledge extraction effectively collects, 沉淀 (precipitates), and excavates knowledge from projects, organizing and extracting mistakes, difficulties, and successful experiences into the organization's most valuable project knowledge assets.
2. **Team member self-development**: Project-level knowledge extraction accelerates team member maturity, avoiding low-level project repetition. By promoting project knowledge assets to similar projects and standing on the shoulders of giants, future projects can continuously improve quality, efficiency, and cost-effectiveness.
3. **Teaching fishing rather than giving fish**: Through this project's practice and 历练 (tempering), a set of project-level knowledge extraction methods suitable for the organization was developed, enhancing internal knowledge managers' professional capabilities and gradually building a team capable of promoting and expanding project knowledge extraction within the organization.

However, this is only the beginning. H actually feels considerable pressure about whether this can be sustained, as dissenting voices have emerged within the company, arguing that project knowledge extraction is purely a waste of time—requiring additional resources and consuming precious time from already overstretched project personnel on "useless" activities. Some believe this is merely H's attempt to grandstand, a fire lit by a new official taking office.

H remains vigilant, believing Company A must be prepared for danger in times of safety. By using points to influence the surface, knowledge extraction can revitalize and effectively utilize Company A's entire knowledge asset base while serving customers with more innovative thinking. Only by truly strengthening internal capabilities can Company A achieve long-term stability and future leadership.

Beyond continuing to accumulate data to prove knowledge extraction's contribution to project performance, H feels it's time to organize presentation materials and have a serious conversation with the VP to vigorously secure support from senior management.

5. Summary and Outlook

It is particularly important to note that experience often exists as tacit knowledge in people's minds. If knowledge extraction can make experience explicit and form case 沉淀 (precipitations), it becomes easier to inherit, reference, and create more value. From this perspective, experience can be imitated and replicated. Of course, experience needs to be deepened into methods and elevated to theory. After years of knowledge accumulation and extraction, a large number of guidance manuals and methodology systems will gradually form within the company. When fed back to employees, these can ensure the company's overall capability remains at a high level.

Knowledge extraction involves the tacit knowledge of each project individual. The key to successful, high-quality knowledge extraction lies in constructing a trustworthy, safe, and sharing creative field where mutual care, love, trust, and commitment are demonstrated. Face-to-face empathy between individuals is crucial for tacit knowledge transfer and transformation. Therefore, deep knowledge extraction in key situations is best facilitated by experienced knowledge extraction teachers using team co-creation methods, sharing experiences, feelings, insights, and realizations at all project levels, using each other as mirrors to 洞察 (gain insight into) and excavate deep-level tacit connotations.

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Abstract: [Purpose/significance] Knowledge extraction is a process that brews knowledge essence and is the necessary path to improving knowledge quality. Mastering the methods and techniques of knowledge extraction is a basic ability for knowledge workers to improve their comprehensive quality in the workplace. [Method/process] Based on practical cases of knowledge extraction, the Knowledge Extraction Application Framework (KEAF) model has been refined, in which the operational procedure of knowledge extraction is represented horizontally and the content creating process of knowledge extraction is represented vertically. It can be used for practical application according to different knowledge application scenarios. [Result/conclusion] The KEAF model has excellent practical value, which can make enterprise knowledge workers quickly start, learn the essence of knowledge extraction, and improve the efficiency and quality of knowledge creation.

Keywords: knowledge extraction; experience extraction; application framework; KEAF model; knowledge management

Note: Figure translations are in progress. See original paper for figures.