CIGRE Study committe B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG B3.70

NAME OF THE CONVENOR
Okada Akira (JAPAN)

TITLE
Guidelines for the Use of Advanced Technologies for Information and Knowledge Management in Substations

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THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION
3 / Digitalization

POTENTIAL BENEFIT OF WG WORK
2 / potential interest from a wide range of stakeholders
3 / likely to contribute to new or revised industry standards
6 / work likely to contribute to improve safety

STRATEGIC DIRECTION
1 / The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-ofthe-art technological advances

SUSTAINABLE DEVELOPMENT GOAL
9 / Industry, innovation and infrastructure

BACKGROUND :
The retirement or early departure of experienced veteran employees poses a risk of losing their individual experience and knowledge (tacit knowledge). It is imperative to get feedback from them and utilize their knowledge. Meanwhile, the desire to quickly train young and mid-career employees is hampered by the difficulty of securing manpower and time for education. Additionally, the vast amounts of internal documents make it challenging for inexperienced employees to identify and utilize the necessary information. TB898, "Knowledge Transfer of Substation Engineering and Experiences," introduces various models for knowledge transfer. Recent technological advancements, exemplified by generative AI like RAG (Retrieval-Augmented Generation),virtual and augmented reality(AR/VR) have significantly enhanced and streamlined traditional knowledge transfer and human resource development, enabling the creation of new knowledge.

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

Establish guidelines for utilizing Advanced Technologies, such as AI and AR/VR, to preserve and enhance knowledge, and process vast amount of information allowing organisations to redefine the approach to knowedge management.

This work demonstrates how Advanced Technologies can be used for knowledge creation, sharing, and processing of large amounts of information. By using Advanced Technologies, organizations can convert and share implicit knowledge, making it accessible to the whole team. Below is an outline of the four stages in Advanced Technologies driven knowledge utilization. Through these processes, it accelerates knowledge sharing and skill development, making organizational operations more agile and efficient.

- **Converting Tacit to Explicit Knowledge (Externalization):** By leveraging it's support,the tacit knowlede and experience held by skilled workers can be transformed into concrete rules and algorithms ,enabling efficient support and improving work quality.
- **Integrating Explicit Knowledge (Combination):** it quickly combines data from different sources to generate new insights. For instance, it can analyze past cases to suggest optimal solutions for new projects, saving time and minimizing mistakes.
- **Internalizing Knowledge as Tacit Skills (Internalization):** it supports skill acquisition by providing real-time guidance during tasks, allowing employees to efficiently integrate documented knowledge as tacit skills and grow their expertise faster.
- **Sharing Tacit Knowledge (Socialization):** It helps transfer experiential knowledge by simulating veteran guidance for new employees, enabling them to make better decisions and avoid errors, thereby becoming effective more quickly.

SCOPE :

Synergistic Effects of Tacit and Explicit Knowledge by using Advanced Technologies

This work focuses on preserving and utilizing knowledge and expertise throughout the entire lifecycle of substations, covering planning, design, procurement, construction, implementation, maintenance, decommissioning, troubleshooting, and human error prevention. Special emphasis is placed on meeting the evolving needs related to reliability, safety, environmental impact, and cost optimization. Key areas of focus include:

- **Accelerated Development of New and Mid-career Employees:** Enhancing the speed and effectiveness of training for young and newly recruited employees to ensure they quickly reach a high level of competence.
- **Effective Utilization of Veteran Employees' Knowledge and Experience:** Leveraging the expertise and insights of experienced employees to benefit the organization and transfer their knowledge to others.
- **Creation of New Knowledge Using Existing Internal Resources:** Utilizing existing internal documents and resources to foster the generation of innovative insights and solutions.
- **Effective Training, On-the-Job Training (OJT), and Strategic Idea Development:** Establishing effective training programs and OJT to continuously improve skills while also fostering strategic thinking and innovative ideas within the workforce.

In addition to the above, this working group will conduct surveys and gather case studies in partnership with companies and manufacturers to evaluate the current use of cutting-edge technologies, knowledge management practices, existing challenges, and potential solutions.

Contents outside the scope:

- Theories and mechanisms of state-of-the-art technology.
- Detailed analysis of the ethical aspects and social impacts of AI introduction.
- Survey and evaluation of the electricity market and economic impact.
- Professional discussion of ICT infrastructure and security issues.

Remarks: References and standards

- CIGRE TB898 : "Knowledge Transfer of Substation Engineering and Experiences"
- ISO 30401:2018 "Knowledge Management Systems"

DELIVERABLES AND EVENTS

Deliverables Types
Annual progress and activity report to Study Committee
CSE
Electra report
Technical Brochure and Executive Summary in Electra
Tutorial
Webinar

Time schedule

Q3 2025 · Recruit members (National Committees, WiE, NGN)

Q1 2026 · Develop final work plan

Q3 2027 · Draft TB for Study Committee Review

Q3 2027 · Final TB

Q4 2027 · Tutorial

Q4 2027 · Webinar

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:
Rannveig S. J. Loken
July 14th, 2025