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Methods and Tools for KM

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Overview of KP Methods and Tools

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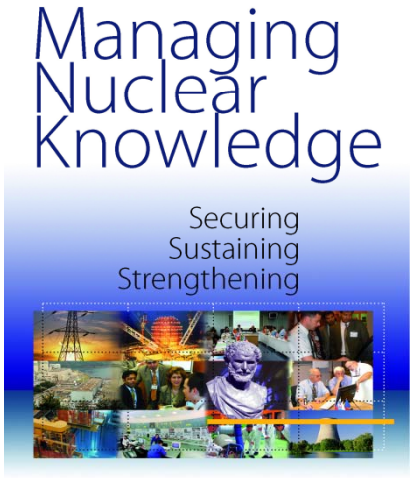
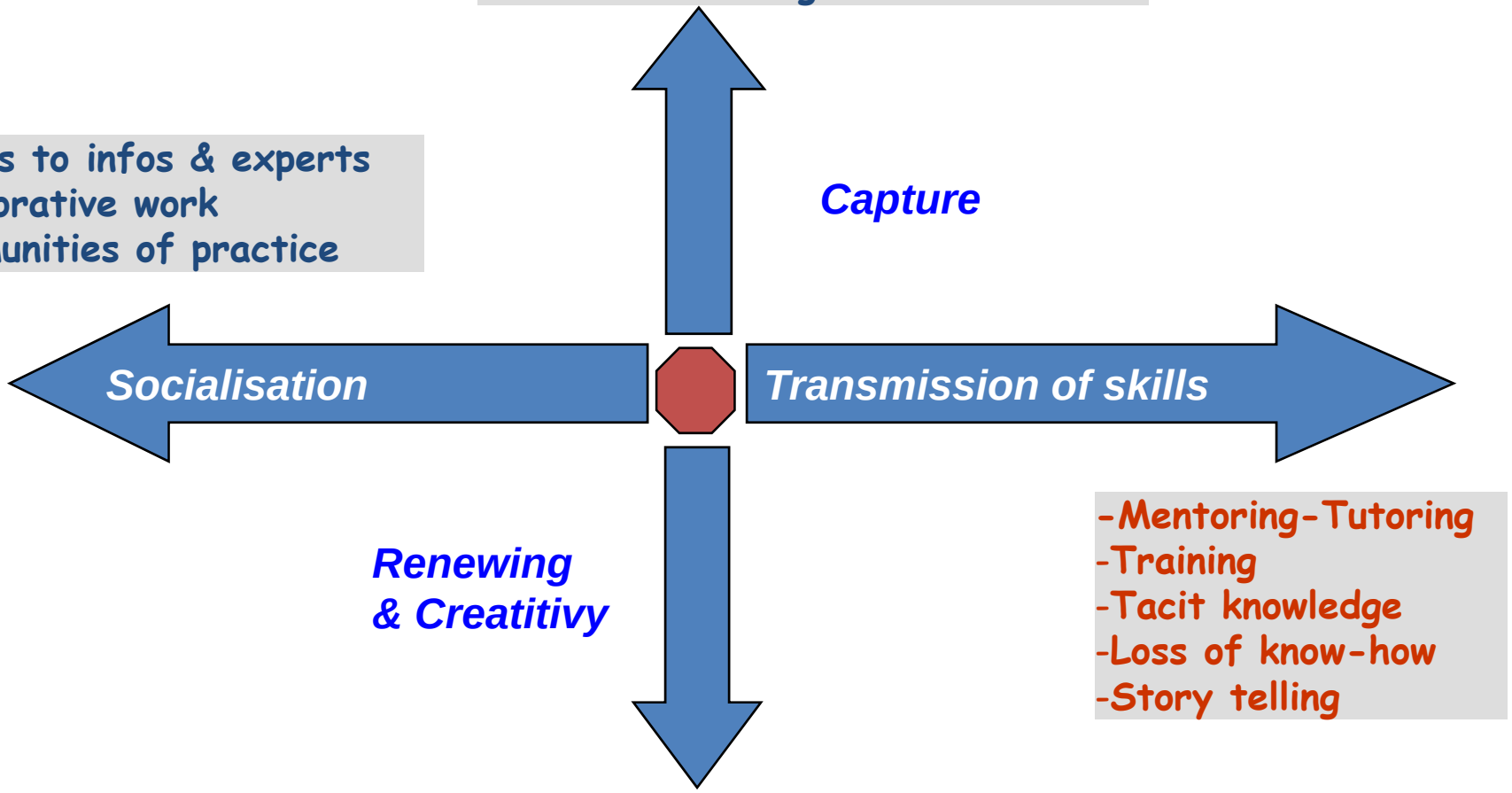


Knowledge Management Objectives

- Maintaining Competency
- Capturing / Preserving Existing Knowledge
- Advancing Nuclear Technology
- Maintaining R&D Capability

NKM Model

-Document Management Systems
-Return on experience process
-Best practices
-Rare events & signals…

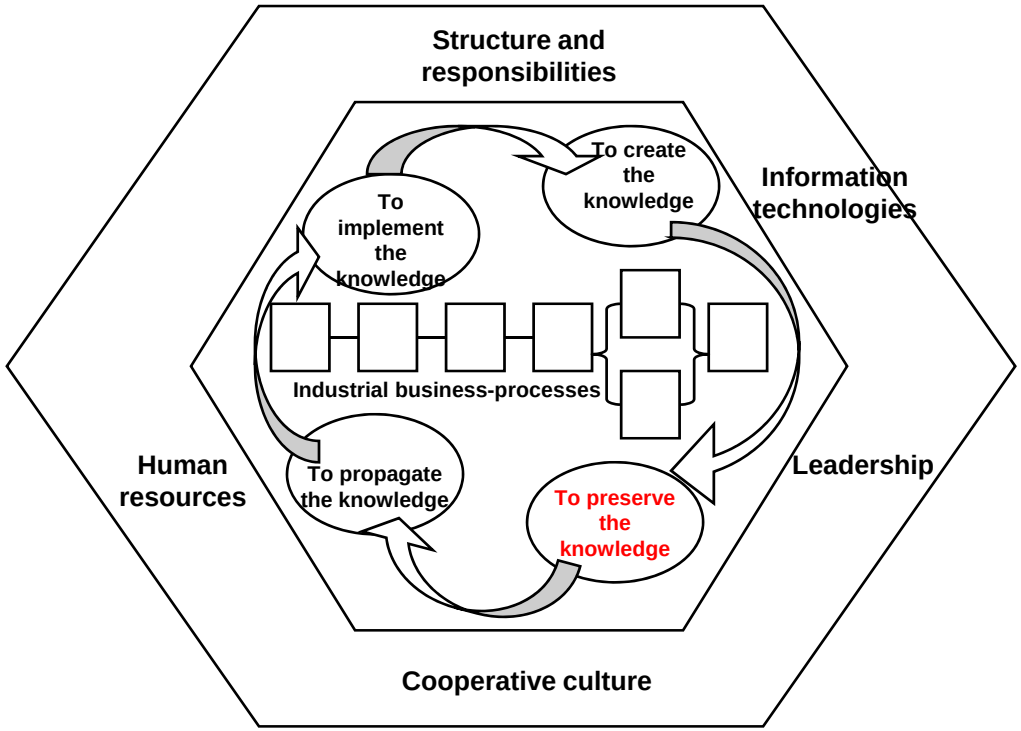


-Access to infos & experts
-Collaborative work
- Communities of practice

-Mentoring-Tutoring
-Training
-Tacit knowledge
-Loss of know-how
-Story telling

- Performance Indicators
- « Good ideas »
- Industrial watch

Knowledge Management Model



Three basic processes to manage organizational experiences for the future:

- **select, from the large number of organizational events, persons or experts and processes, only those that are worth preserving;**
- **store their experience in a suitable form;**
- **ensure the setting up and operation of the organizational memory.**

Contents

1. Need in Knowledge Preservation

Is Loss of Valuable Knowledge at Your Facility Viewed as a Problem?

- **Is expert knowledge expected to be lost really valuable?**
- **How do you capture valuable knowledge?**
- **How do you organize captured knowledge, make it readily available to others, and enable others to make it their own?**

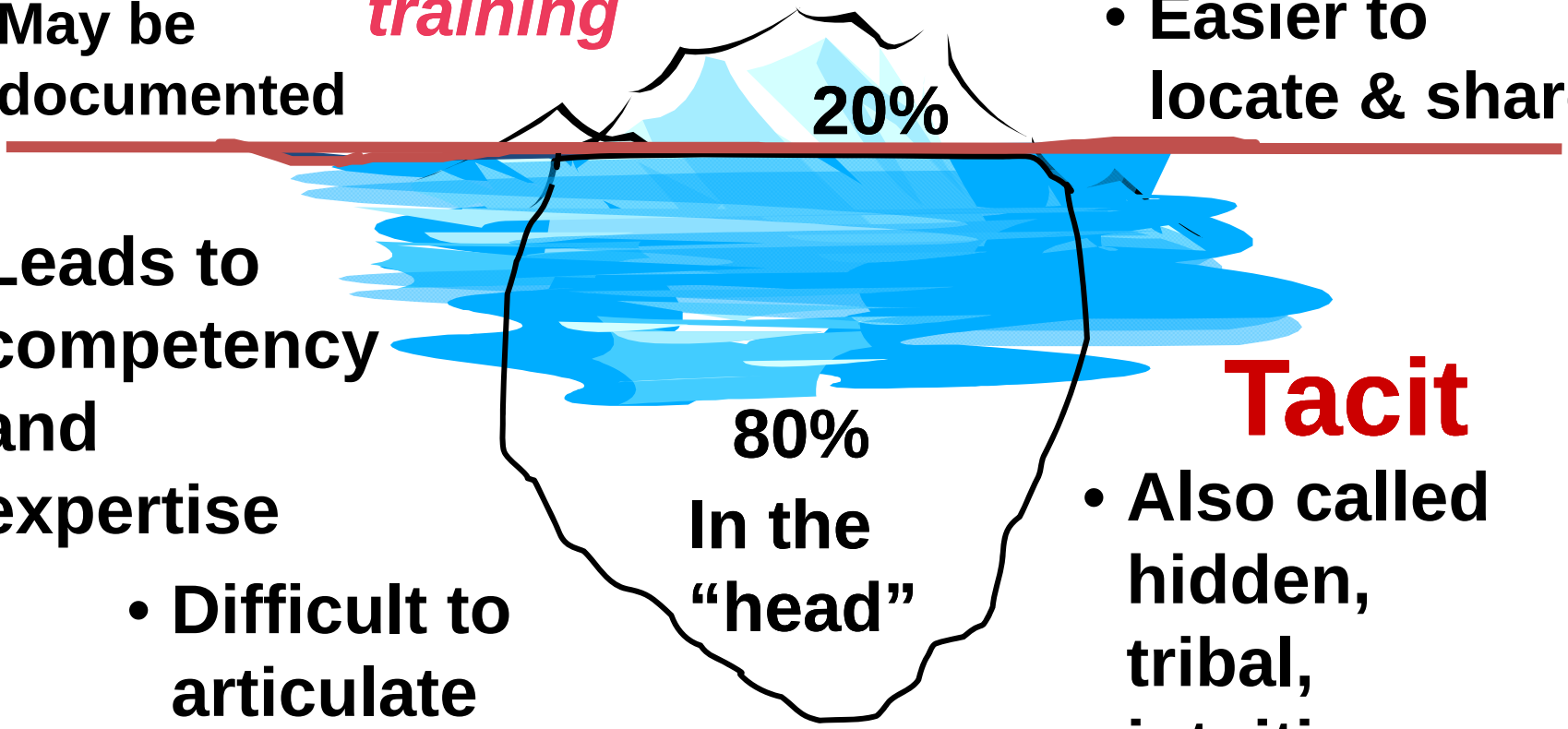
The Nature of Knowledge, and Why Unavailability of Experts is a Problem

- Easier to replicate
- May be documented

May be >20% due to use of procedures & training

Explicit

- Easier to locate & share



- Leads to competency and expertise
  - Difficult to articulate

Tacit

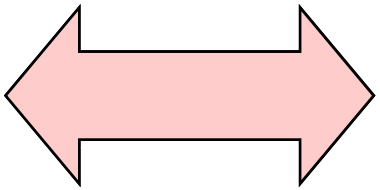
- Also called hidden, tribal, intuitive

Risks may come in the form of:

- **Loss of tacit knowledge**
- **Danger of competent staff leaving the organization**
- **Loss of documents (hard copies)**
- **Loss of data and electronic documents**

Knowledge Transfer: Tacit to Tacit

Tacit Knowledge residing in People

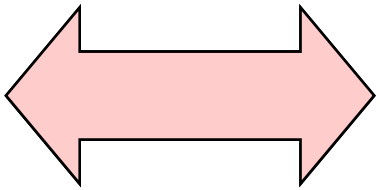


Tacit Knowledge residing in People

- **Transfer of knowledge between people**
- **Through meetings and social interactions**
- **Use of technologies like web conferencing and electronic meetings**

Knowledge Transfer: Explicit to Explicit

Explicit Knowledge in physical form



Explicit Knowledge in physical form

- **Transfer of knowledge from one physical form to another.**
- **Through text search, queries and document categorization.**
- **Use of technologies like search tools, query languages and databases.**

2. Preserving Tacit and Explicit Knowledge

IAEA COORDINATED RESEARCH PROJECT ON COMPARATIVE ANALYSIS OF METHODS AND TOOLS FOR NUCLEAR KNOWLEDGE PRESERVATION, 2006 - 2009

COMPARATIVE ANALYSIS OF METHODS AND TOOLS FOR NUCLEAR KNOWLEDGE PRESERVATION

New IAEA Nuclear Energy Series Report (NG-T-6.7), 2011

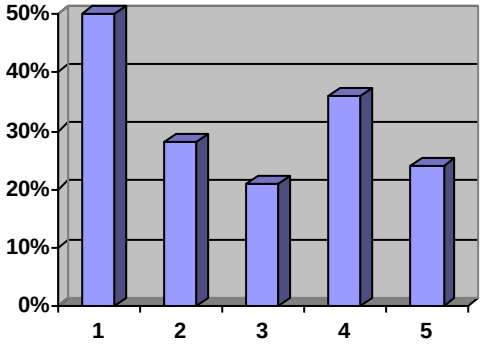
Knowledge Preservation Definition

The IAEA definition of knowledge preservation:
a process of maintaining an organizational system of knowledge and capabilities that preserves and stores perceptions, actions and experiences over time and secures the possibility of recall for the future.

IAEA Survey on Current Status of Knowledge Preservation in Nuclear and Supporting Organisations (25 counties)

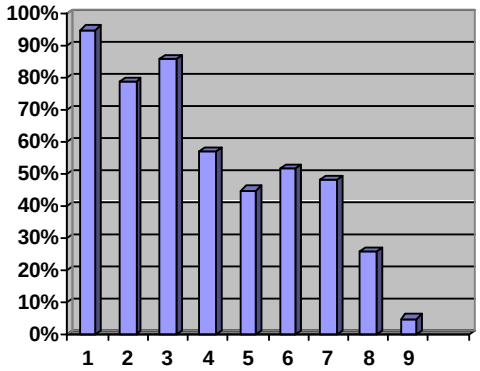
Tools and methods used in organisations to capture:

Tacit knowledge



1 - employee interview;
2 - questionnaire;
3 - knowledge mapping;
4 - photo and video;
5 - other.

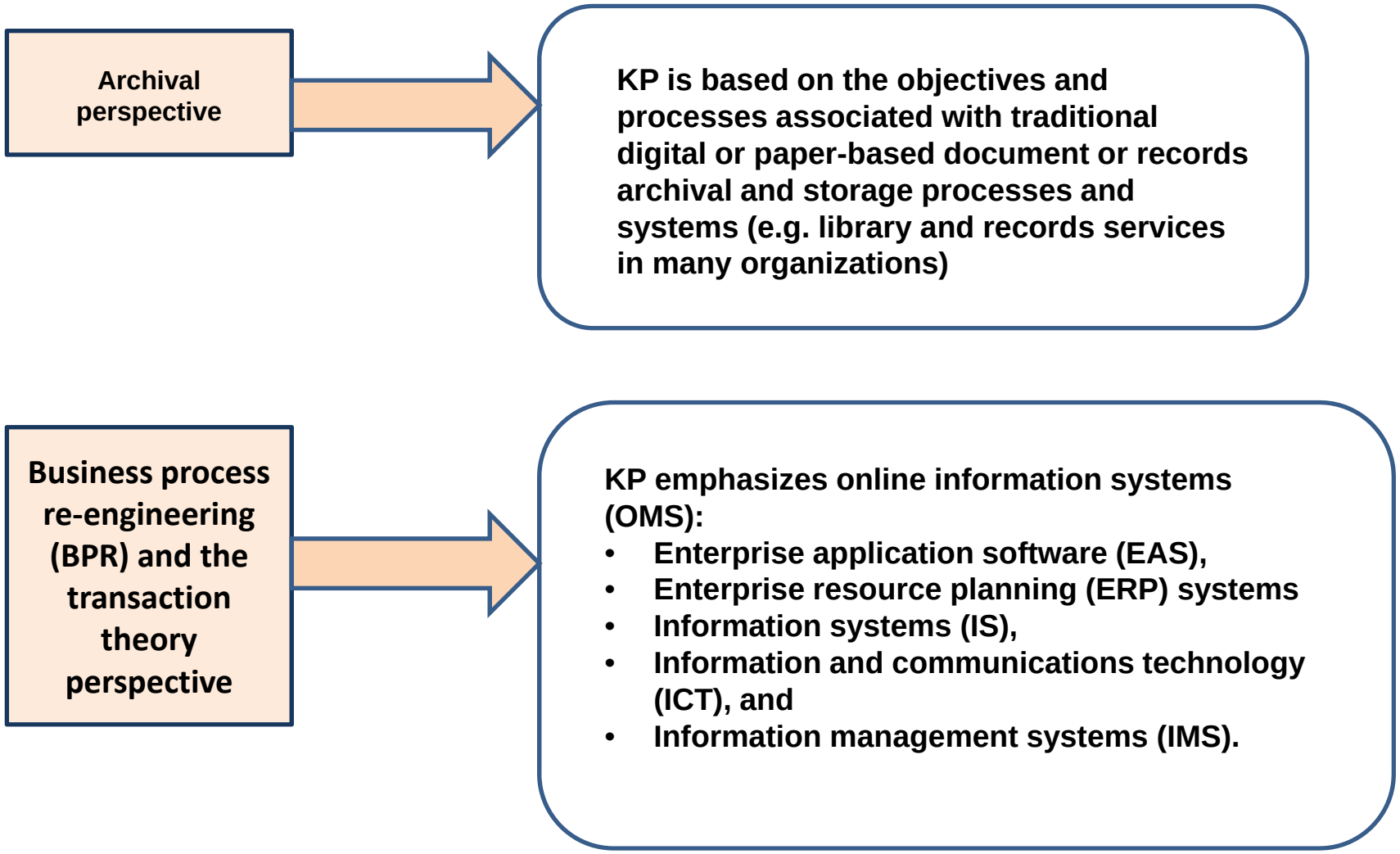
Explicit knowledge



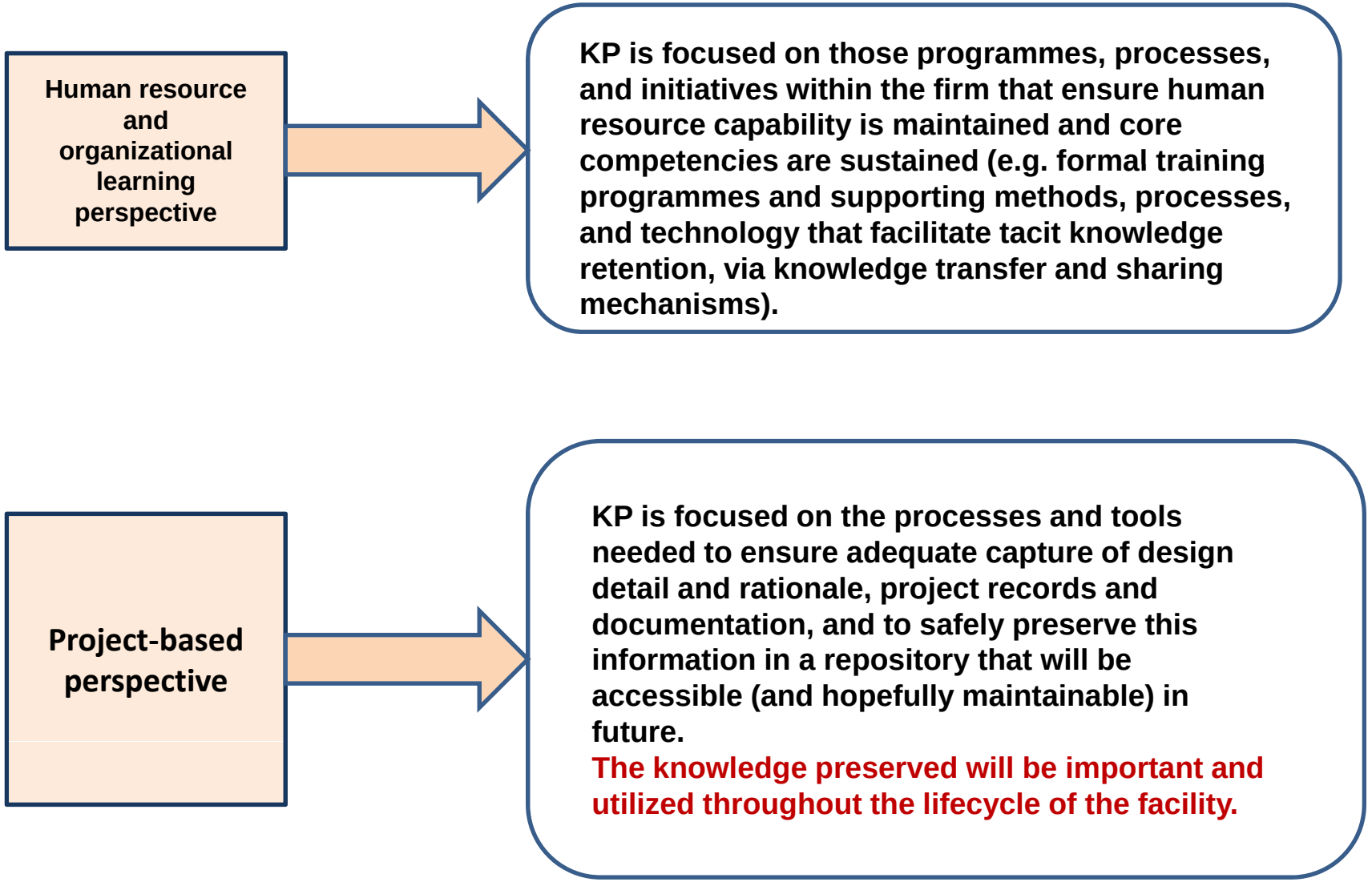
1 - hard copies; 2 - digitization;
3 - databases; 4 - photo;
5 - video; 6 - models and simulations;
7 - editable source files; 8 - 3D models; 9 - decision support systems as a tool

COMMON PERSPECTIVES ON KNOWLEDGE PRESERVATION (1)

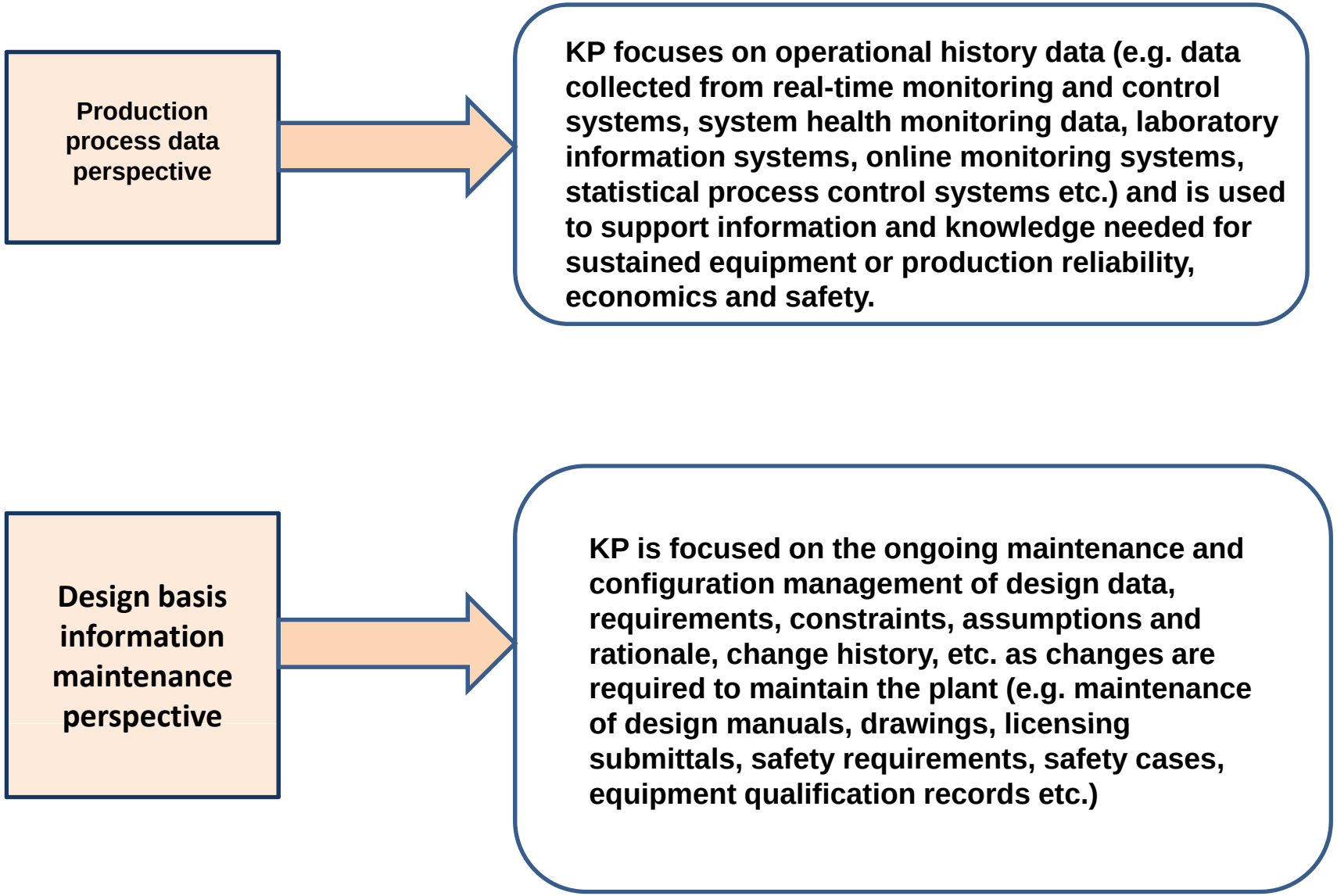
- **Different KP processes that can be identified in most organizations**
- **Formalized KP strategy or programme can be in place or not**



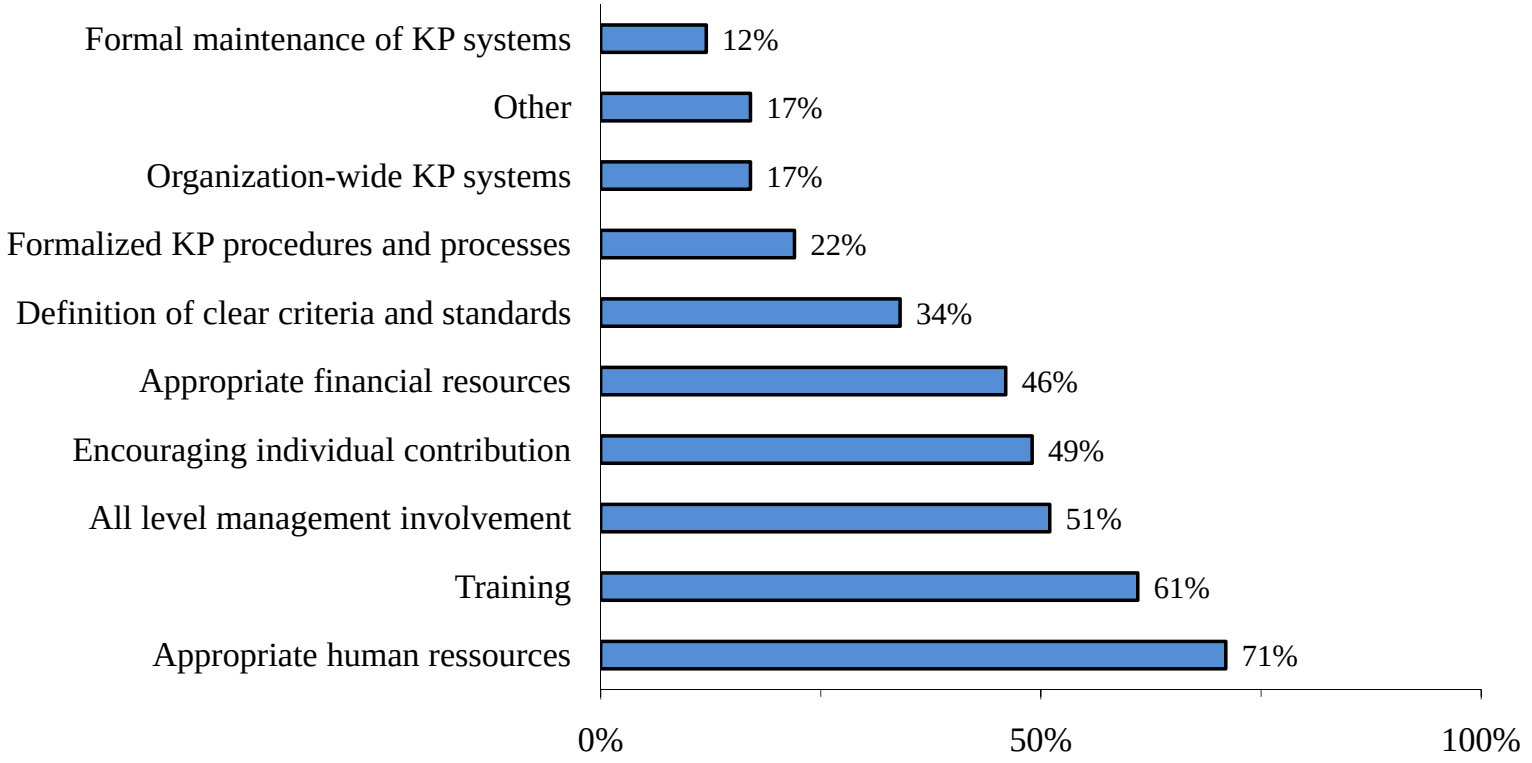
COMMON PERSPECTIVES ON KNOWLEDGE PRESERVATION (2)



COMMON PERSPECTIVES ON KNOWLEDGE PRESERVATION (3)



Approaches applied to achieve the KP objectives



KP Basic Processes

- **Identification;**
- **Capture;**
- **Generation or Creation;**
- **Processing and Transformation;**
- **Storage and Retention;**
- **Search and Retrieval;**
- **Representation;**
- **Transfer and Exchange;**
- **Maintenance and Updating.**

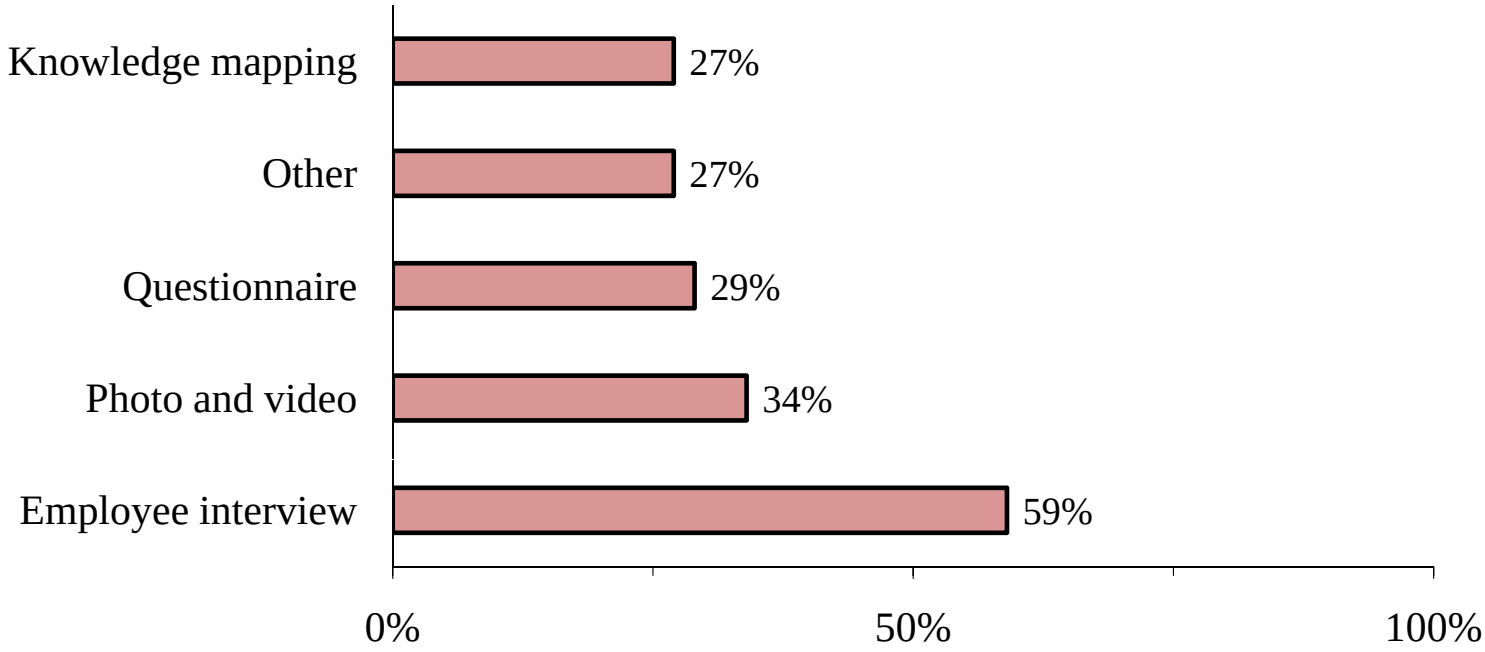
KEY KNOWLEDGE PROCESS ATTRIBUTES

- **Multilingualism - ability to support cross language information retrieval**
- **Quality assurance - reliability and integrity of data, information, and knowledge**
- **Security - protection of knowledge from unauthorized, intentional, unintentional or malicious access, distribution, alteration, corruption or loss from asset protection perspective.**
- **Safety - protection of knowledge from unauthorized, intentional, unintentional or malicious access, distribution, alteration, corruption or loss from nuclear and industrial safety protection perspective**
- **Version control - ability and/or need to uniquely identify and control access to or alternation of each and every revision of explicit data or information**

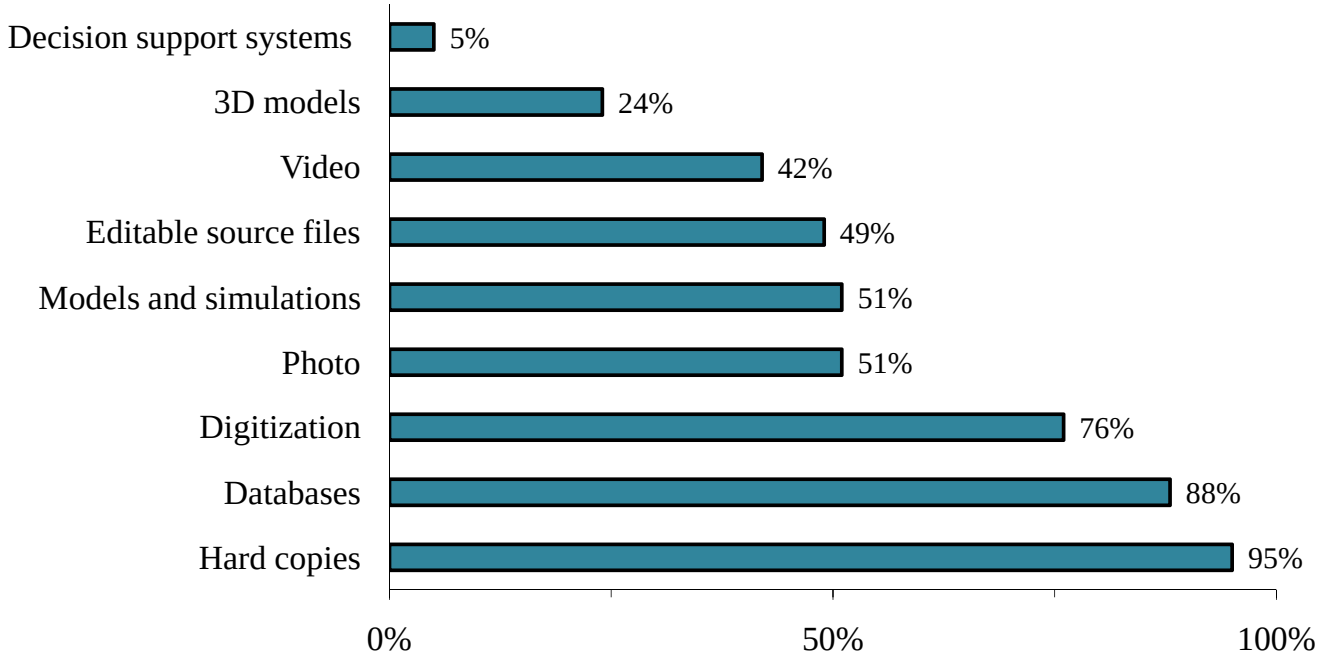
Categorizing KP Methods and Tools

- **Nature of knowledge being preserved (i.e. tacit, implicit, explicit).**
- **Level of knowledge domain (i.e. individual, group, organizational, or industry).**
- **Range or focus of knowledge domain (i.e. processes/methodologies, product/design, project, t echnology).**
- **Stage in KM life-cycle phase (i.e. knowledge identification, capture, processing, etc.).**
- **Application or usage (e.g. supply chain management, HR or personnel data, etc.).**
- **Time horizon (short, medium, or long-term).**

Methods and tools for capturing tacit knowledge



Methods and tools for capturing explicit knowledge



Development of KP strategy

Typical elements

- **Improving human performance;**
- **Succession planning;**
- **Developing methods and tools for knowledge preservation;**
- **Making KP a part of organizational culture;**
- **Investment in information system technology;**
- **Formal (mandatory) KP procedures;**
- **Informal (voluntary) KP practices.**

KP Strategic Plan

- SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis.
- Identification of KM challenges and risks.
- Formulation of the KM vision and mission statements.
- Defining the drivers and strategic levers based on the institution vision and mission.
- Defining the strategic KM objectives. These objectives should be SMART (systematic, measurable, achievable, relative, and time bound).
- Defining of the key performance indicators (KPI) of the strategic KM objectives.
- Risk assessment and management plan.
- Development of KM implementation action plan.
- Assessment, monitoring and evaluation for the effectiveness of the plan implementation.

3. KP Methods and Tools

Methods for KP

KP Methods	Knowledge Type			KP Processes							Level				Focus		
	Tacit	Implicit	Explicit	Identification	Capture	Processing & transformation	Storage and retention	Search & retrieval & representation	Transfer & exchange	Maintenance & updating	Individual	Group / department	Organization	Industry	Project	Design / technology	Process
Action reviews, pre/post job reviews	X	X	X		X		X		X		X	X			X		X
Coaching and mentoring	X	X							X		X						X
Computer based training (CBT)		X	X	X	X	X	X	X	X	X	X	X					X
Concept maps, knowledge maps, ontological models		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Cross-functional teams, team learning approaches	X	X	X		X				X	X		X			X	X	X
Decision summaries (analysis, rationale and assumptions)		X	X	X	X		X	X	X		X	X			X	X	X
Design basis information management			X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Good practices to capture tacit knowledge

- **The use of photography and video recording in capturing actual activities conducted by experts, such as in workshops, seminars, lectures, experiments, etc.**
- **Conduct exit interviews of employees leaving the organization on how they carry out their tasks and duties.**
- **The conduct of mentoring/coaching by experts or senior personnel to younger or new personnel.**
- **Encourage informal communication between experts and novices in the organization.**
- **Implement the culture of working in teams inside the organization.**
- **Conduct self-assessment by each staff's achievements.**
- **Collaboration with communities of practice.**
- **Implement online collaborations, where the conduct of researches or projects is done through e-workgroups and where procedures are available online.**

Good practices to capture explicit knowledge

- **Digitization of hard copies.**
- **Use of knowledge bases.**
- **Use of relational databases.**
- **Storage of photos and/or sound and/or video files in databases.**
- **Development of models and simulations running on computers.**
- **Creation of editable source files available to concerned personnel, like wikis.**
- **Creation of 3-D models.**
- **Document management.**
- **Use of decision support systems as a tool, like data mining.**

IMPLEMENTATION OF KNOWLEDGE PRESERVATION METHODS AND TOOLS

Implementation criteria:

- **Method required expert to implement (Yes vs. No)**
- **Complexity to implement method (High, Med, Low)**
- **Duration needed (Hours, Days, Months, Years)**
- **Budget required in (High, Med, Low)**
- **Potential area of impact (Safety or Effectiveness)**
- **Potential benefits (High, Med, Low)**
- **Potential adverse effects of not implementing (High, Med, Low)**
- **One-time, Periodic, or Continuous initiative**
- **Risk of implementation problems (High, Med, Low)**
- **Changes to methods procedures (Yes, No)**
- **Changes required to culture (Yes, No)**
- **Level of management support required (High, Med, Low)**

Table

4. Conclusions and Recommendations

CONCLUSIONS

- KP in nuclear organizations has not yet reached a level of maturity.
- Barriers for a sustainable KP culture could be lack of staff motivation and trust, limited time or other organisational factors.
- KP is important – losses of critical knowledge.
- The implementation and interaction of explicit and tacit KP as an integrated process is vital to achieve an overall KM objective.
- KP is vital to achieve the overall objective of optimal and sustainable knowledge processes such as organisational memory and information flows.
- Many cost-effective methods and tools are available to support KP in nuclear organizations.
- To facilitate effective generational knowledge transfer, it is important for management to motivate the experts by providing recognition and rewards to share their tacit knowledge.

RECOMMENDATIONS

- Nuclear organizations should make efforts to be fully aware of their on-going and future reliance on core nuclear knowledge and expertise.
- In organizations where no formal KP programme has been introduced, it is recommended that a knowledge loss risk assessment be conducted from a KP perspective.
- Nuclear organizations should ensure appropriate management awareness and the presence of an organizational culture that recognizes KP as an important on-going requirement.
- Appropriate policy and procedures should exist in the organization to establish what KP measures are needed and ensure that they are implemented as a standard practice.
- At a minimum, basic KP measures should be taken in nuclear organizations to ensure that key tacit and explicit knowledge is identified and retained.

Thank You !

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