

BEST MANAGEMENT PRACTICES TO TRANSFER KNOWLEDGE AND HOW THEY CAN HELP YOUNG ENGINEERS AND THEIR COMPANIES

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SELF-INTRODUCTION

- ▶ Young corrosion and integrity engineer (4 years), Production & Integrity Assurance for Oil and Gas sector.
- ▶ MSc (Eng) in Chemical Technology: Composites and Nanomaterials.
- ▶ Professional Member (MICorr) of the Institute of Corrosion (ICorr), UK.
- ▶ Winner of the Young Engineer Programme 2020 by the ICorr, UK.
- ▶ Industry representative for the Young ICorr, UK.



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- ▶ Importance of Knowledge Transfer
- ▶ Knowledge Transfer – Definitions
- ▶ Knowledge Transfer Plan
- ▶ Approaches to Knowledge Transfer
- ▶ Artificial Intelligence in Knowledge Transfer
- ▶ Advice for Young Professionals
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IMPORTANCE OF KNOWLEDGE TRANSFER

Knowledge is one of the most powerful competitive advantages in today's markets.

Insufficient competent* engineers around the world. * Competency = Qualifications + Training + Experience

Knowledge transfer is particularly important when more senior and experienced personnel are approaching retirement.



IMPORTANCE OF KNOWLEDGE TRANSFER



When skill gaps are expected to occur within organizations
(% of respondents)

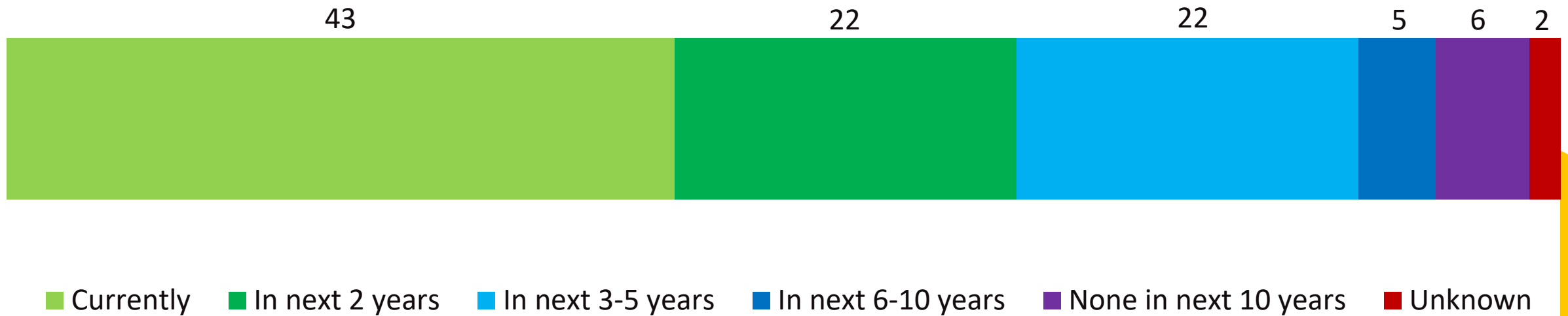


Figure 1: Skill gaps experienced globally by companies.
McKinsey & Company Global Survey (2020)

KNOWLEDGE TRANSFER – DEFINITIONS

- ▶ Knowledge transfer (KT) in the workplace – definitions:

Method of sharing information across different areas in the business.

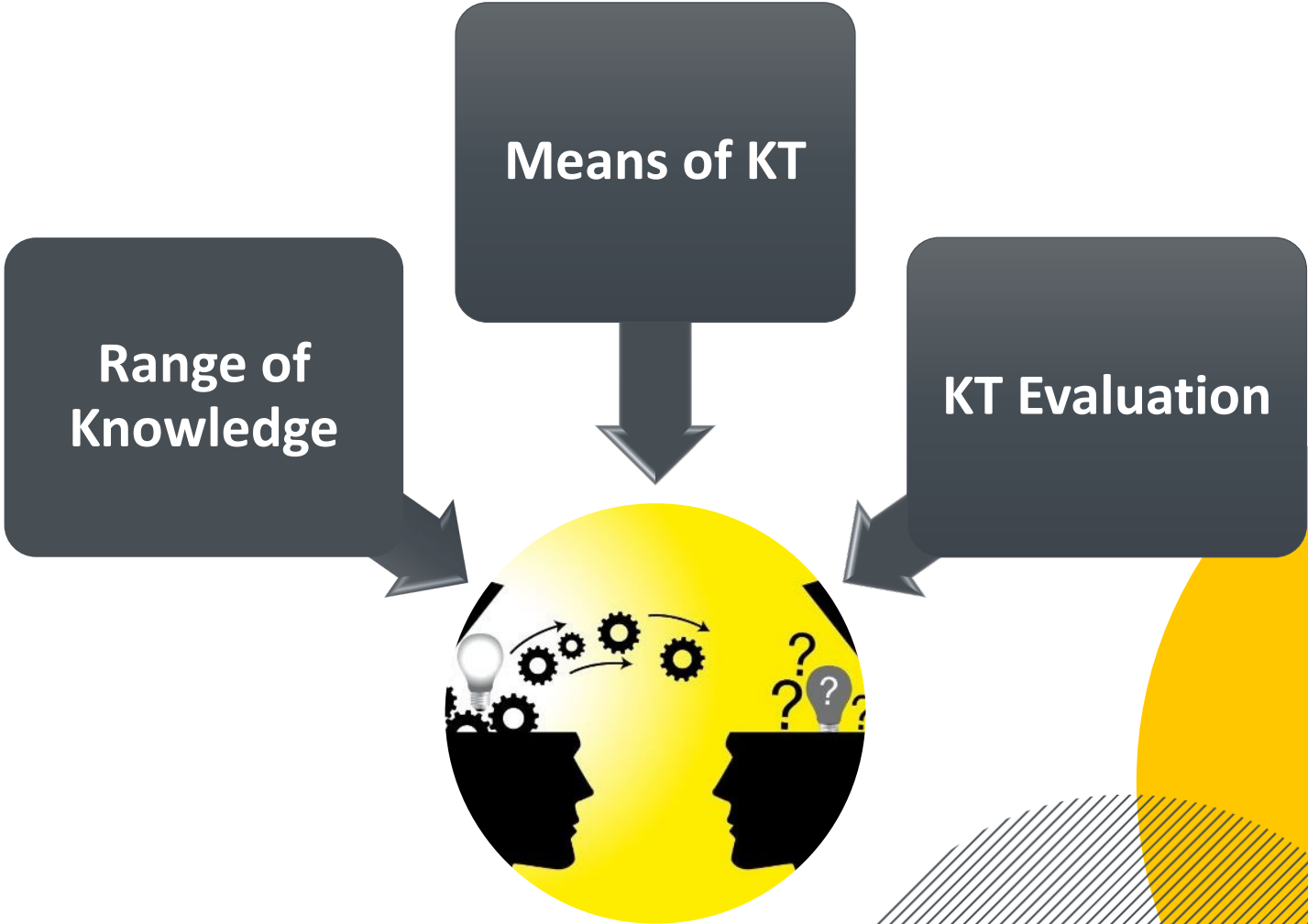
Process by which experienced employees share their knowledge, skills, and behaviours with the employees replacing them.

KT should equip new employees with skills and competencies they need to reach key organisational goals.

- ▶ Knowledge transfer is also about positive engagement of young engineers.



KNOWLEDGE TRANSFER PLAN



APPROACHES TO KNOWLEDGE TRANSFER



70:20:10 Learning and Development Model

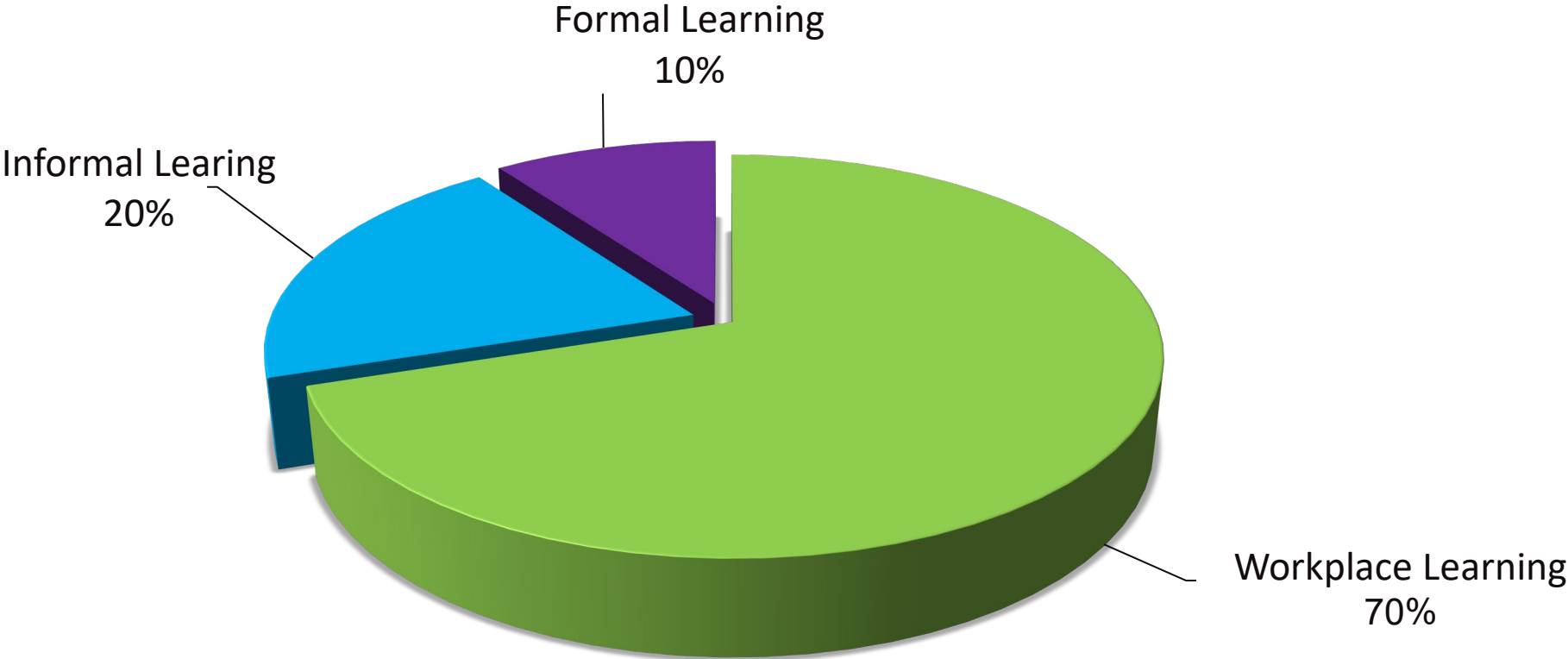


Figure 2: 70:20:10 Model for Learning and Development by Eichinger, R. and Lombardo, M. (1990s)

APPROACHES TO KNOWLEDGE TRANSFER



Work Experience:

- ▶ Projects,
- ▶ Work meetings,
- ▶ Taking notes,
- ▶ Site visits.

Informal Learning:

- ▶ Mentoring,
- ▶ Appraisals,
- ▶ Feedback.

Formal Learning:

- ▶ Technical books,
- ▶ Standards,
- ▶ Training courses,
- ▶ E-learning,
- ▶ Conferences.

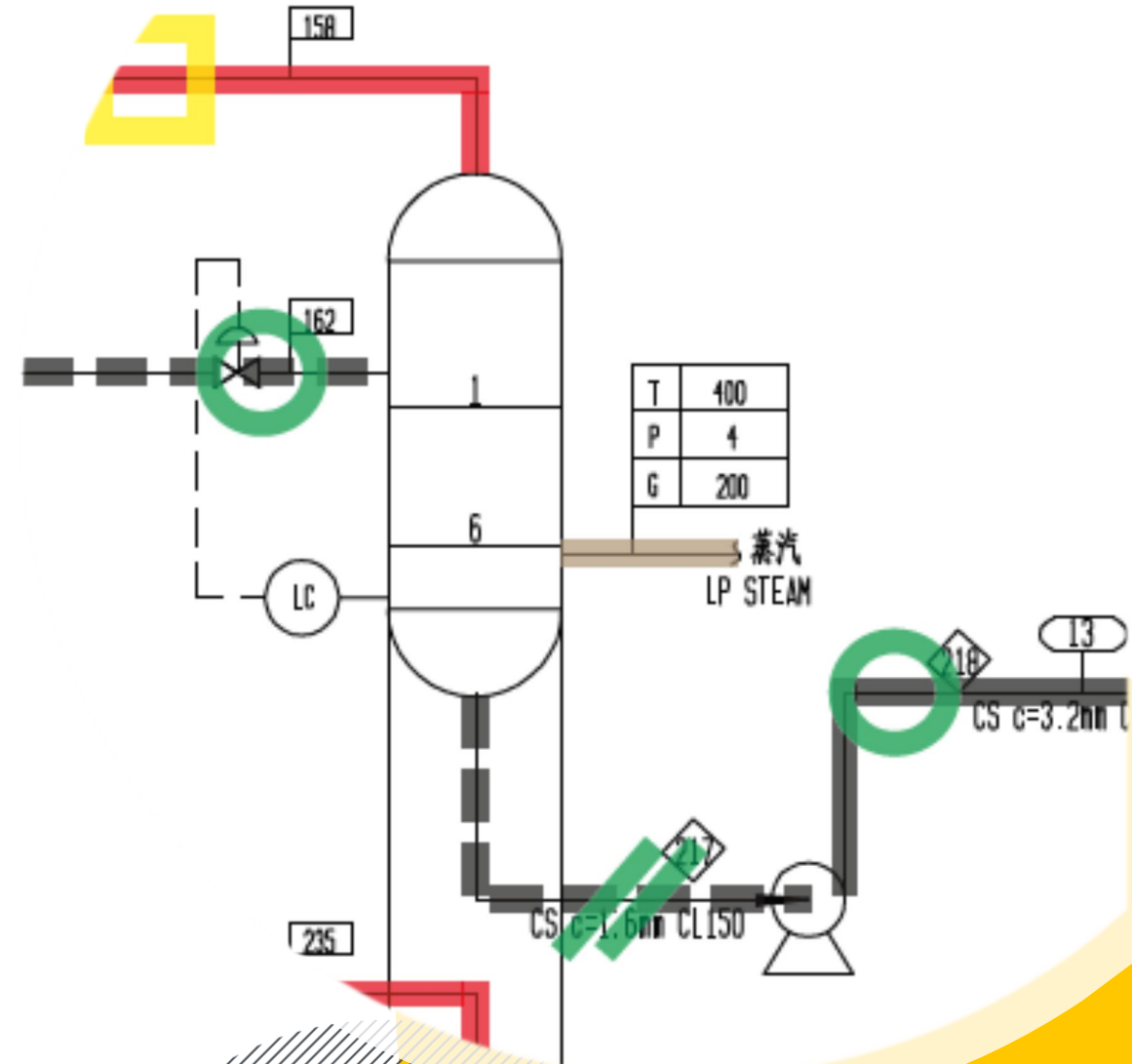
WORK EXPERIENCE

- ▶ Knowledge gained through experience over time.
- ▶ Taking challenges and stepping outside your comfort zone – the best way to learn and grow.
- ▶ Appropriate technical support from more experienced work colleagues is critical.
- ▶ Taking notes – good practice.
- ▶ Diverse work experience can provide varied perspectives on many business processes.
- ▶ **Appraisals** – evaluation of professional development.



WORK EXPERIENCE – PERSONAL EXAMPLE

- ▶ Projects for oil and gas pipelines:
 - Fitness-for-Service (FFS), Life Extension Assessment (LEA),
 - Hydrodynamic studies and corrosivity assessments,
- ▶ Projects for oil and gas production and process plants:
 - Material Selection Audit (MSA),
 - Corrosion Risk Assessment Study (CRAS),
 - Corrosion loops mark-ups,
 - Corrosion Management Manual (CMM).
- ▶ Corrosion modelling – various industry standard models,
- ▶ Assisting in writing updated oil & gas industry handbooks,
- ▶ Project management,
- ▶ Internal safety walks,
- ▶ Site visits, e.g., to onshore oil production facilities and chemical plants.



MENTORING



- ▶ Mentor matched with development needs of mentee.
- ▶ Clearly defined schedule, regular meetings.
- ▶ Customised subject-based curriculum.
- ▶ Mix of technical presentations, discussions using sketches and images, talks about problems and solutions.
- ▶ Sharing experience-based knowledge is important.
- ▶ Mentor's support, including discussions about issues related to ongoing projects.
- ▶ **Evaluation of KT**, e.g., presentations on agreed mentoring subjects given to the company's staff.

A	B	C
SUBJECTS		
Downhole & reservoirs		Oil&gas processing facilities
Flow lines, gathering lines, trunk lines		Water injection systems
Main oil lines		Legislation
Main gas lines		Corrosion mechanisms
DOWNHOLE AND RESERVOIRS	ROUGH % COMPLETION OF BASIC INTRODUCTION	TOPIC
Oil & gas reservoirs	90	sandstone / carbonaceous
Offshore production	90	types of installation:
Onshore production	50	types of installation:
Production types	90	primary
Well tubulars	90	purpose
Well casing	90	purpose
Xmas trees	90	purpose



BOOKS AND STANDARDS

- ▶ Should supplement workplace KT.
- ▶ Senior, more experienced staff to recommend technical standards and literature necessary for tasks completion or further project understanding.
- ▶ Technical books that might be useful at work to broaden technical knowledge.
- ▶ Standards curriculum in place – helpful tool.

A	B	C	D	E
USEFUL STANDARDS AND APPLICATIONS				
STANDARDS ORGANISATION	STANDARD NUMBER	STANDARD TITLE		SPECIFIC SUBJECTS
API				
	5CT	Steel pipes for uses as casing or tubing for wells (ISO 11960)		Material grades Ch
	5L	Specification for line pipe		Material grades Ch
	510	Pressure vessel inspection code: in service inspection, rating, repair, alteration		Inspection plans RE

TRAINING COURSES

- ▶ Should supplement workplace KT.
- ▶ Correctly chosen training course can:
 - help filling the gaps in specific knowledge area or skills,
 - boost performance at work,
 - improve productivity and time management,
 - encourage to take on more responsibility,
 - improve communication skills = improve KT,
- ▶ Internal (in-house project-related, workshops).
- ▶ External (organised by professional bodies).
- ▶ In person and e-learning platforms.



TRAINING COURSES



► Challenges:



Trainee's motivation



**Lecturers' experience
in supervising**



**Creditability of lecturers'
knowledge**



Training course interactivity

► Solutions:

- clearly communicated aims and benefits of the course,
- accredited supervisory courses based on instructors,
- courses including breakout groups and action learning.

MEETINGS AND CONFERENCES

- ▶ Supplement workplace KT.
- ▶ Excellent opportunity for networking.
- ▶ Other benefits of attending technical meetings are:
 - learning about problems and solutions from experts,
 - hearing about the latest industry trends and developments,
 - improvement of the cross-cultural adaption,
 - communication skills development (i.e., when presenting),
 - building relationships with existing clients or finding new.



ARTIFICIAL INTELLIGENCE IN KNOWLEDGE TRANSFER

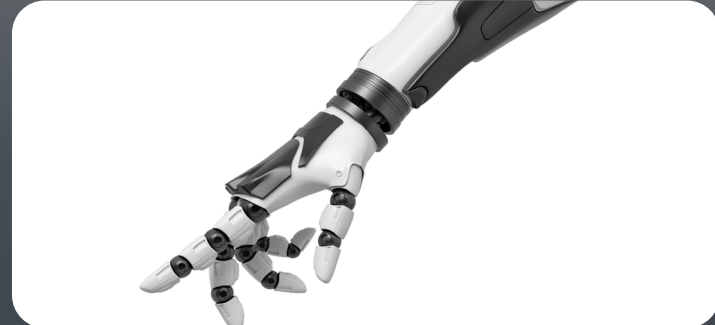
- ▶ Artificial Intelligence (AI) simulates human intelligence processes by machines (i.e., computer systems).
- ▶ Potential KT tool.
- ▶ ChatGPT:
 - AI-based advanced software,
 - 1st million users in less than week,
 - lately, the most significant technological development,
 - capable of answering practically any user's question.

How AI can impact traditional KT and professional development?

What are the associated benefits and risks?



ARTIFICIAL INTELLIGENCE IN KNOWLEDGE TRANSFER



AI Pros:

- ▶ reduction of time and effort for many written tasks,
- ▶ efficient data management,
- ▶ increased creativity,
- ▶ solution for employees with communication difficulties.

AI Cons:

- ▶ information can be inaccurate,
- ▶ recent knowledge of the world is limited,
- ▶ occasional harmful instructions or biased content,
- ▶ **learning process disruption.**

ARTIFICIAL INTELLIGENCE IN KNOWLEDGE TRANSFER

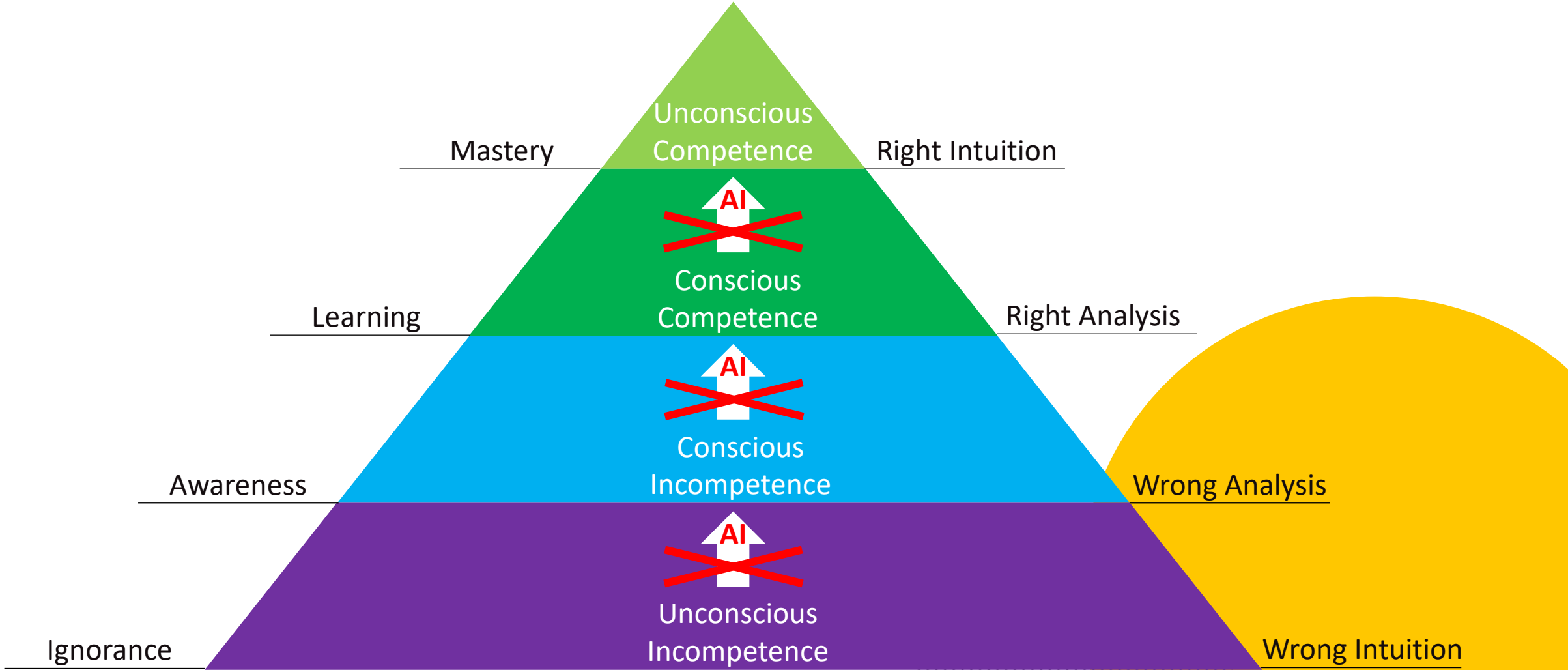


Figure 3: The Four Stages of Competence Model by Burch, N. (1970s)

ARTIFICIAL INTELLIGENCE IN KNOWLEDGE TRANSFER

- ▶ Safe use of AI in KT processes – potential solutions:
 - discussions about acceptable AI use in a workplace,
 - key decisions at work should not be based on AI,
 - sharing only non-sensitive information with AI,
 - limited use of AI for learning and work,
 - regular review of company's position and policy,
 - **prohibition** of AI use, blocking access from company's devices and networks. **(short-term solution)**



ADVICE FOR YOUNG PROFESSIONALS

Make notes from the projects you are involved in.

Seek technical support when stuck during project execution.

Familiarise yourself with recommended standards and technical books.

Ask for a mentorship opportunity.

Get involved in training courses offered by your company.



SUMMARY

- ▶ Knowledge transfer (KT) should equip new employees with the skills and competencies they need to reach key organisational goals and for professional development.
- ▶ Effective KT needs a good plan addressing:
 - what knowledge should to be transferred,
 - what are the available KT tools,
 - how KT can be evaluated.
- ▶ KT processes include:
 - work experience (e.g., projects, work meetings, site visits),
 - informal learning (e.g, mentoring, feedback),
 - formal learning (e.g, standards, books, courses, conferences).



SUMMARY

- ▶ Artificial intelligence (AI), a relatively new KT tool, should be used with caution and according to workplace policy.
- ▶ Further research is needed to establish the usefulness, safety, and effectiveness of using AI for KT purposes.
- ▶ In order to increase the work output:
 - be proactive and do not be afraid to ask for help and support,
 - integrate all of the different available KT methods and tools,
 - remember that work experience is the main source of learning.





Thank you for your attention.

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