iosh Offshore Group & iosh East Anglia Branch

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Human Factors: the Driving Force in Safety Evolution

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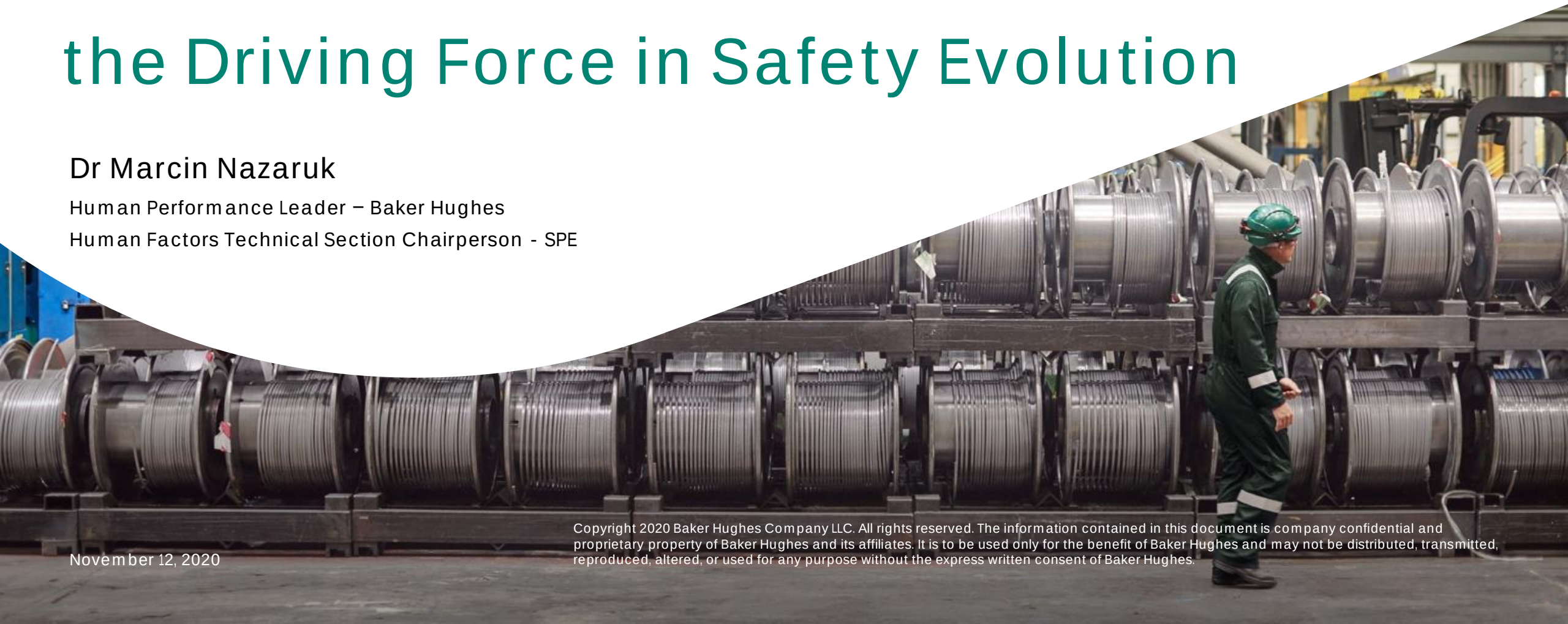

November 12, 2020

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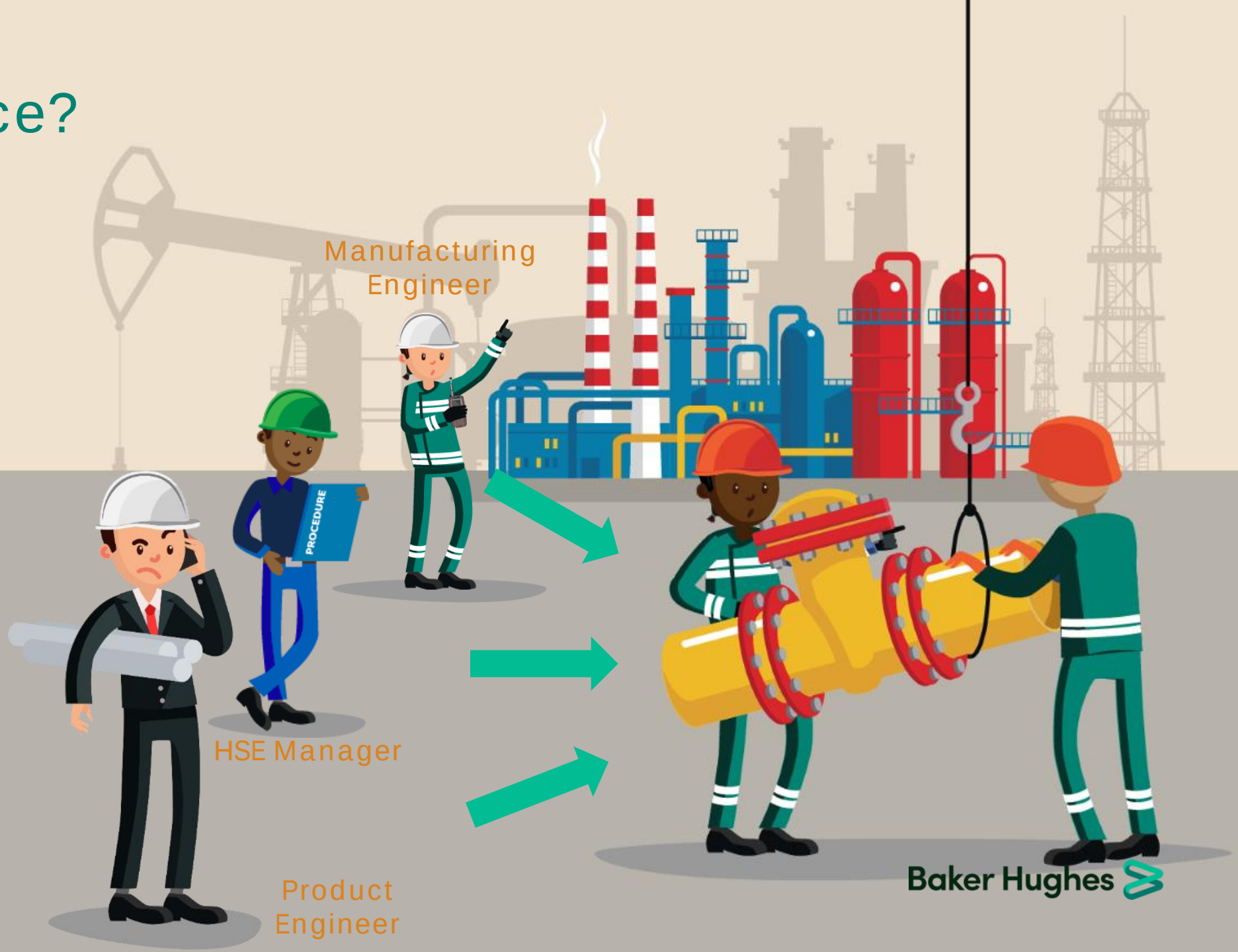
Unsafe Choice?

Lifting Example

Lessons:

1. The work is done under many constraints
2. The constraints in place depend on many people in the organization
3. Constraints determine the choices people have



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What is Human Performance / Human Factors?

Human Performance is about what people do and how they carry out their tasks

What people do is influenced by a range of factors, we call these Human Factors or Error Traps

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What are Error Traps (Performance Shaping Factors - PSFs)?

Every time a task is performed, there is a possibility of human error.

This probability of error may be higher or lower depending on the so-called Error Traps.

An error trap is any condition that makes it more likely that people will make mistakes when carrying out their work.

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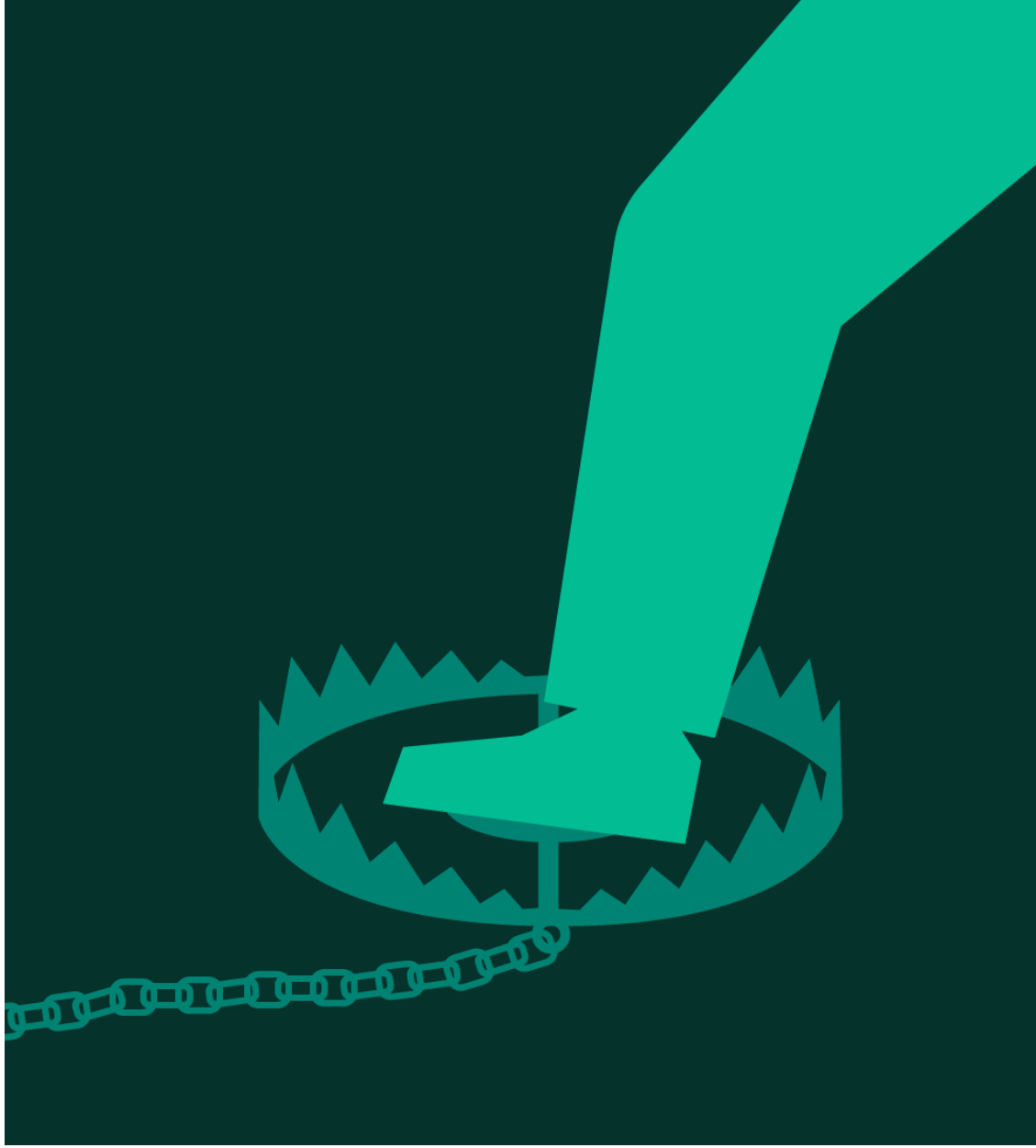
Examples of Error Traps

- Complex or badly presented procedures.
- Poorly designed equipment.
- Unusual, infrequent, unfamiliar or novel situations.
- Difficult system or equipment interface, labelling, controls, alarms.
- Boring, trivial or repetitive actions.
- Steps where there might be insufficient time available.
- Unclear signs, signals, instructions or other information.
- Difficult working environment (noise, heat, cramped conditions, lighting, ventilation, ease of access).
- Potential for interruptions or distractions.
- Multitasking.
- Fatigue, stress, workload.
- Competency, knowledge of rules etc



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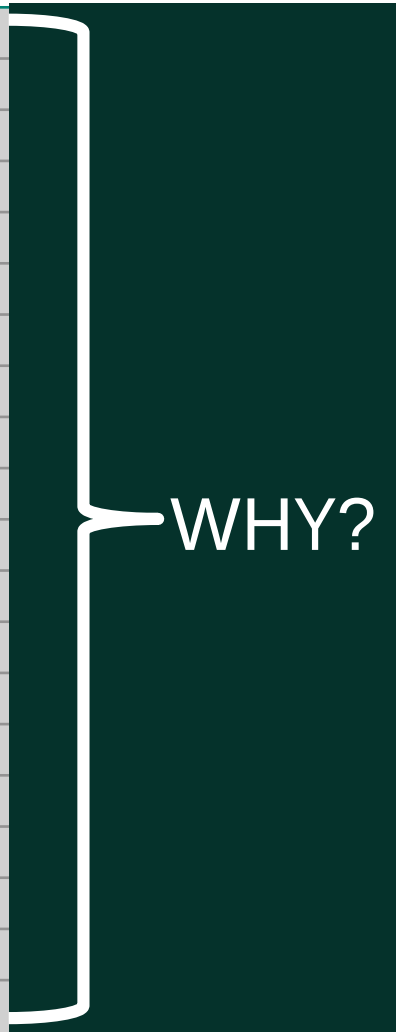
Reasons Why People Don't Follow Procedures

Procedures Are Not Used Because:

Accuracy	They are inaccurate
	They are out of date
Practicality	They are unworkable in practice
	They make it more difficult to do the work
	They are too restrictive
	Too time consuming
	If they were followed to the letter, they could not get done in time
Optimization	People usually find a better way to do the job
	They do not describe the best wary to carry out the job
Presentation	It is difficult to know which is the right procedure
	They are too complex and difficult to use
	It is difficult to find the information you need in the procedure
Accessibility	It is difficult to locate the right procedure
	People are not aware that a procedure exists for the job they are doing
Policy	People do not understand why they are necessary
	No clear policy on when they should be used
Usage	Experienced people don't need them
	People resent being told on how to do their job
	People prefer to rely on their own skills and experience
	People assume they know what is in the procedure



There is no process in place to:

- Monitor the use of procedures and provide feedback
- Systematically evaluate error traps in procedures
- Promptly redesigning or scrapping bad or superfluous rules

The software used doesn't allow for quick finding the needed procedure.

Workers don't receive training and feedback on how to use the procedures.

The use of procedure is not part of competency verification.

Workers are not involved in writing procedures.

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SOURCE: Embrey, D. (2000). Preventing human error: developing a consensus led safety culture based on best practice. *Human Reliability Associates Ltd. 14p.*

Effectiveness of Improvement Actions, per EI

ANALYSIS				MORE EFFECTIVE DEPTH
Level 1	Level 2	Level 3	Level 4	Level 5
Operator is to blame for reaching into the machine whilst still switched on. ✖	Operator believed that lifting the guard would disable the machine. ✔	Operator had already received training; the machine used in training was interlocked. ✔	The machine was not fully tested before being put to use. ✔	The machine was needed quickly; the procurement process did not require the machine purchased to have a safety interlock. ✔
FOCUS OF RECOMMENDATIONS				**MORE EFFECTIVE IN PREVENTING REOCCURRENCE**
Discipline the operator. ✖	Re-train the operator in all aspects of operating the machine. ✖	Operator training should be completed on the specific machine they will be expected to use on site. ✔	Amend the procedure for introducing new equipment into the workplace to include provision for pre use testing and safety checks. ✔	Amend the procurement procedure to include a thorough risk assessment process for equipment selected for purchase. ✔

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Source: Energy Institute, (2008), Guidance On Investigating and Analysing Human and Organisational Factors Aspects of Incidents and Accidents, see also more recent IOGP report 621: http://bit.ly/2JaBh9T

Choices in Event Causation

	Traditional view	Modern view
Unspoken Assumptions / Beliefs	Unsafe choices of individual workers cause accidents.	Constraints in place determine what choices people have.
	Focus on People	Focus on constraints, organizational factors and proactive learning

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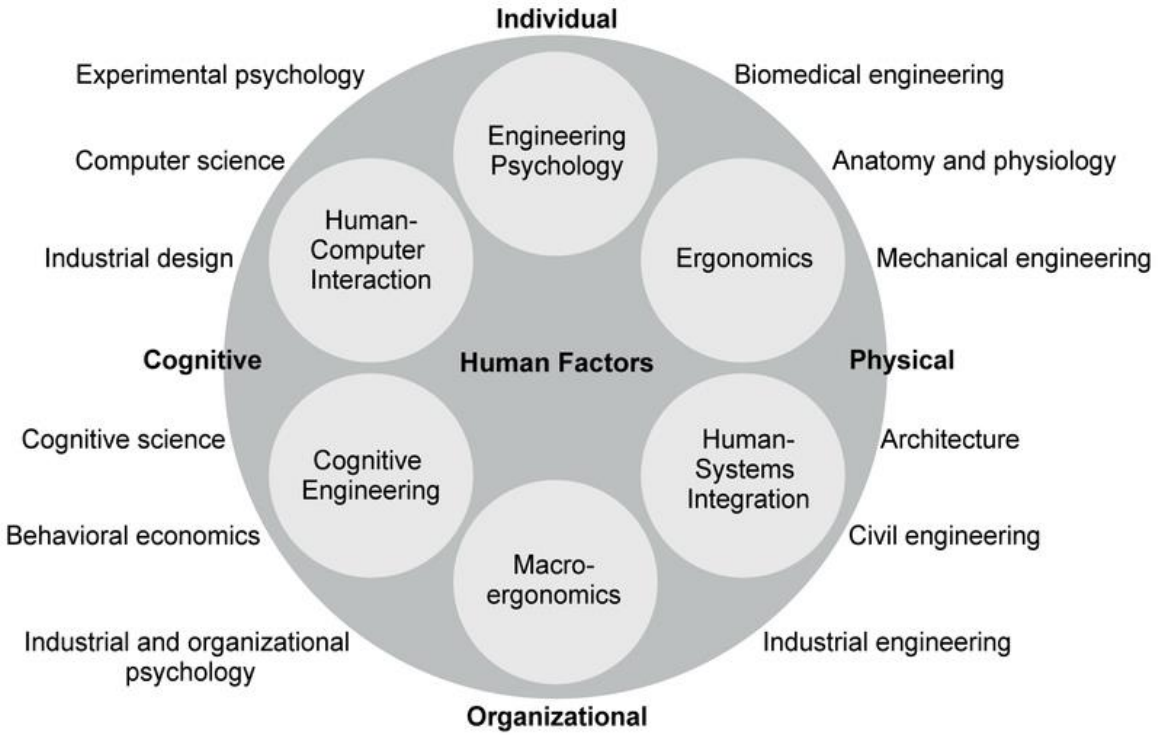
Human Factors Discipline



- Scientific discipline
- Certificates, degrees, doctorates
- Professional bodies
- Started during 2nd World War
- Focused on integration with design of work, equipment & processes. Not a separate initiative.

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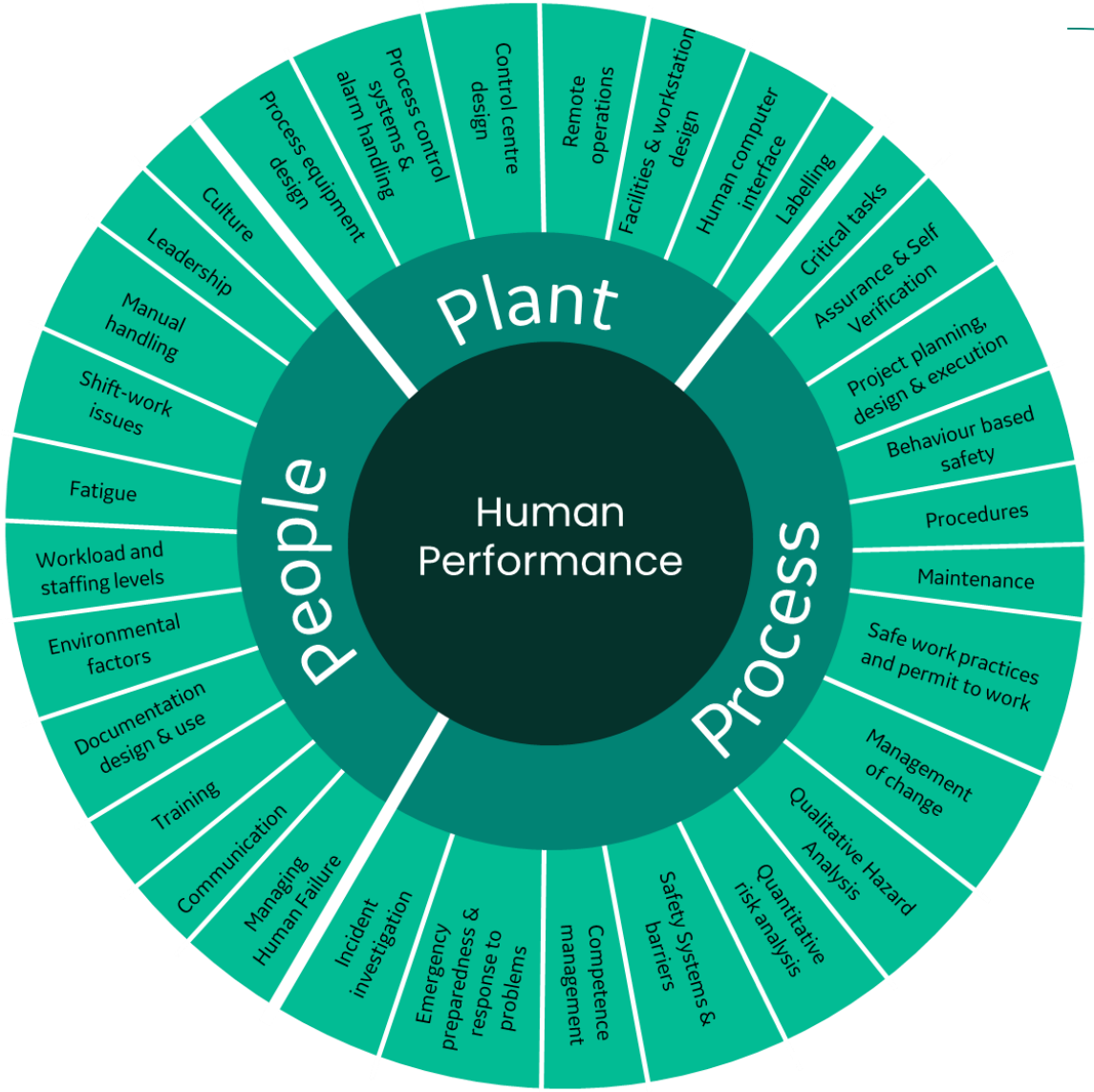
Human Performance Wheel (as per CCPS)



- Diverse and not owned by one discipline
- Years / Decades of International Research
- Industry Standards
- Tools and Methods
- Best Practice Examples
- Evidence of Improved Human Performance if robustly integrated with SMS

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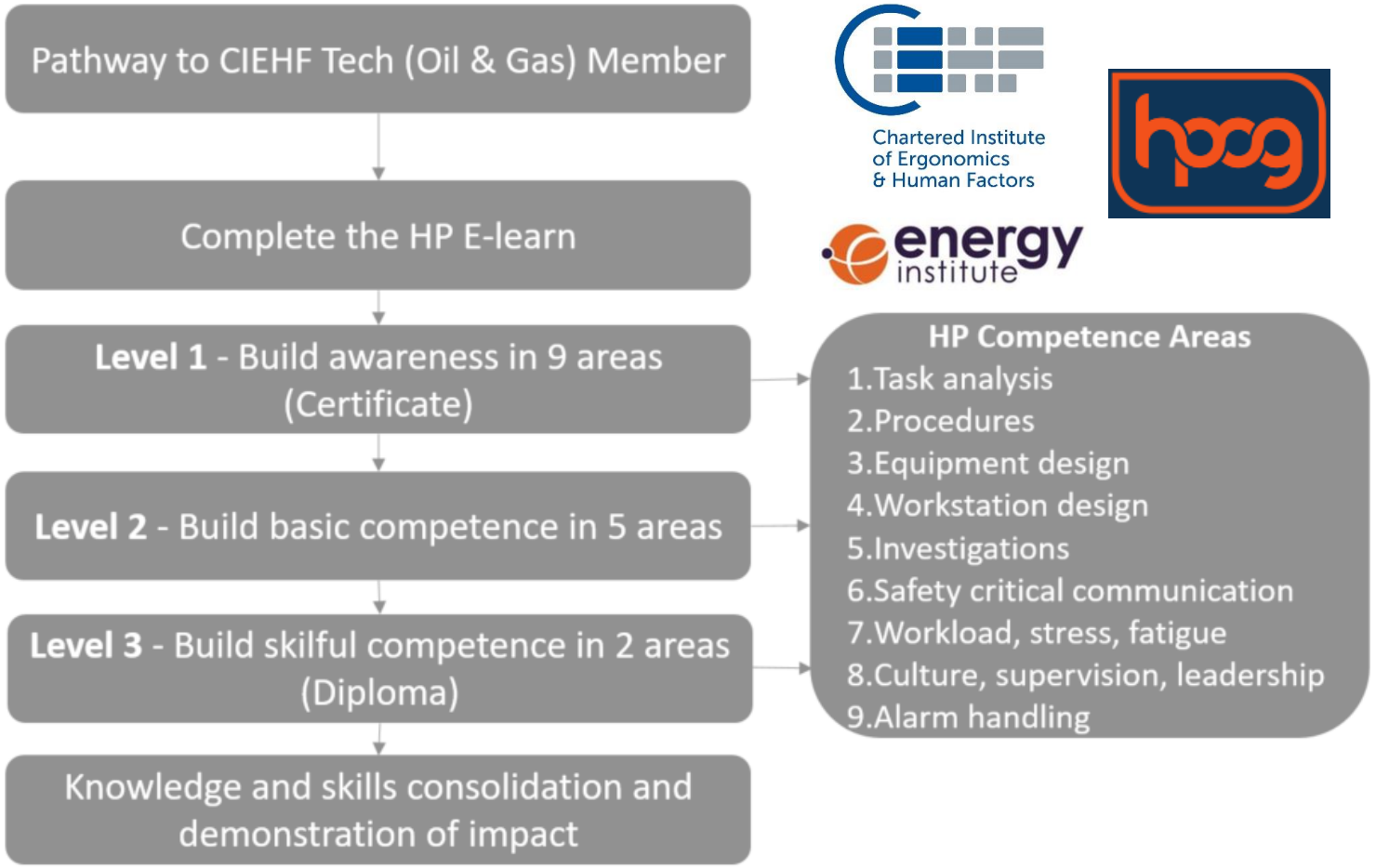
Based on: Crowl, D. (2007), Human Factors Methods For Improving Performance in the Process Industries. Center for Chemical Process Safety. Wiley-Interscience.

Human Factors Competencies



HF EXPERT
- University Degree
- Practical Experience
- Professional Development
- Professional Certification

EXAMPLES OF SKILLS
- Anthropometry, Physiology & Psychology
- Cognitive Task Analysis
- Workload Analysis
- Human Centred Design
- User Testing

Sources:
1. HP Pathway description: https://bit.ly/38IvK5B
2. HP e-learn and pathway access: http://bit.ly/2wmw8Yt
3. List of HF competencies for CIEHF chartered status: https://bit.ly/35zGqUj

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Elements of Organisational HF Capability (as per UK HSE)

Key element	Capability elements	L1	L2	L3	L4	L5
Policy	1. Policy and strategy on HF					
	2. Investment in HF					
Organising	3. Training on HF					
	4. Availability of HF qualified staff					
Planning and implementation	5. HF integrated into operational plans					
	6. HF risks systematically assessed					
Measuring	7. HF Targets / KPIs					
Auditing and Reviewing	8. Effectiveness of HF activities are evaluated and learnings implemented					

Based on: HSE (2002) Framework for assessing human factor capability: https://bit.ly/3lA5ShX

Additional Resources on Human Performance

Human Performance e-learning via Energy Institute (recommended)

- https://lms.i-cab.org/Energy/HumanPerformance

Human Performance Oil & Gas (HPOG)

- http://www.hpog.org

SPE Human Factors Technical Section

- https://connect.spe.org/hfts/home

Human and Organizational Factors - Energy Institute Website

- https://www.energyinst.org/technical/human-and-organizational-factors

introductory articles on HF:

- A Brief history of HF and HP - http://bit.ly/2SFLpLA
- Why people don't follow procedures - http://bit.ly/2RB51AZ
- Why people don't see hazards - https://bit.ly/3bSH3IG
- SPE JPT article on the current state of HF in the O&G industry: https://bit.ly/2GVqySu

Professional bodies:

- Human Factors and Ergonomics Society (US): https://www.hfes.org/home
- Chartered Institute of Ergonomics and Human Factors (UK): https://www.ergonomics.org.uk/
- International Ergonomics Association: https://iea.cc/

Selected Industry Guidance:

- Human Factors and Ergonomics in Offshore Drilling and Production: The Implications for Drilling Safety: https://bit.ly/3lAwgZl
- Human factors performance indicators for the energy and related process industries: https://bit.ly/2H3BRYS
- COMAH Competent Authority Inspecting Human Factors at COMAH Establishments (Operational Delivery Guide): https://bit.ly/3kwnieh
- Human factors engineering in oil and gas--a review of industry guidance: https://bit.ly/35ajTx2
- IOGP Report 621 – Demystifying Human Factors: Building confidence in human factors investigation: http://bit.ly/2JaBh9T

Books:

Human Factors in the Chemical and Process Industries: Making It Work in Practice https://bit.ly/35BfUty

The Field Guide to Understanding Human Error: https://amzn.to/3kxD20p

Human Factors Methods for Improving Performance in the Process Industries: https://bit.ly/2HbcCEg

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