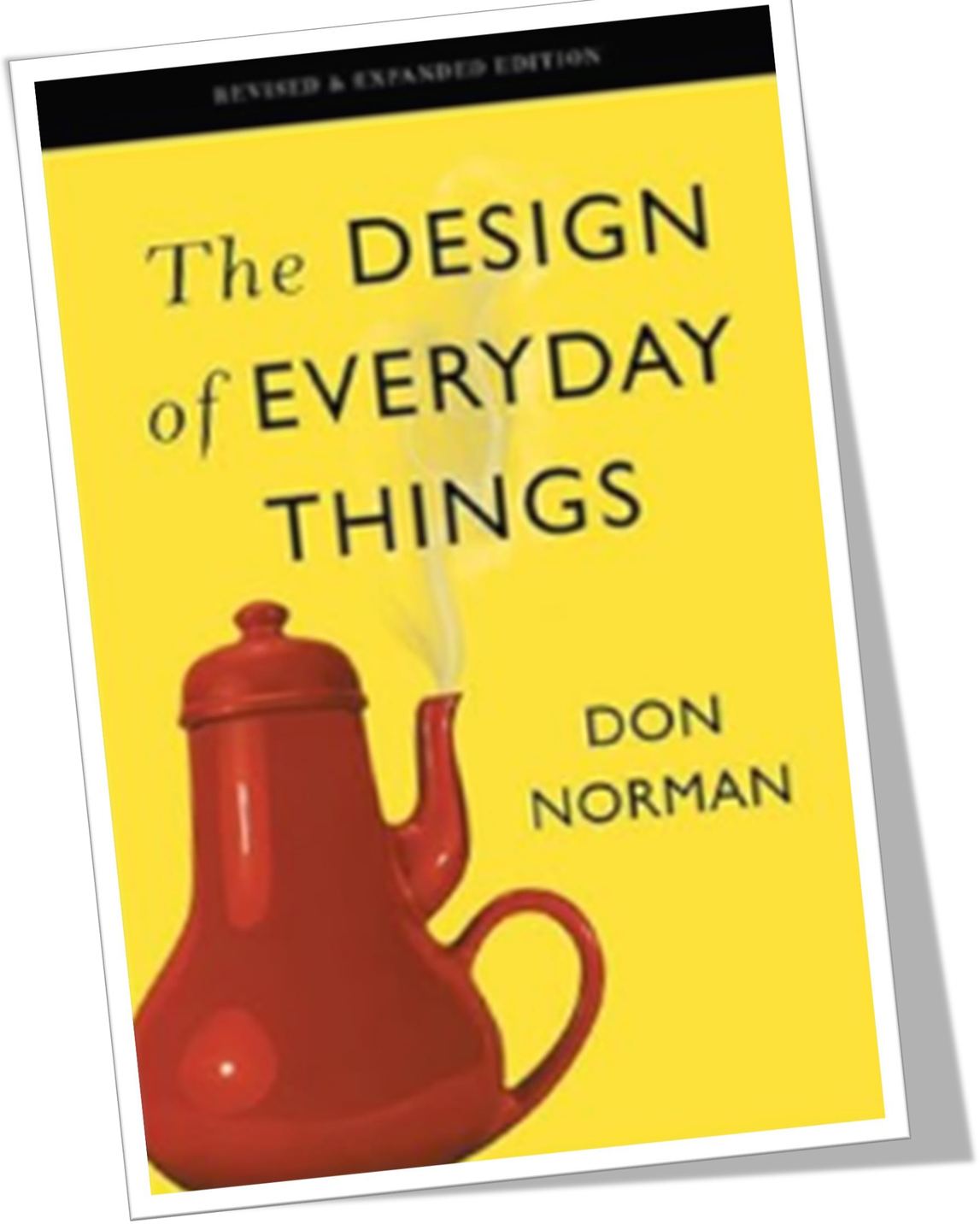
DEMYSTIFYING HUMAN FACTORS

Push? Pull?

SCORPIO


Even though you're a lot smarter,


REVISED & EXPANDED EDITION
The DESIGN of EVERYDAY THINGS
DON NORMAN

What does this make you do?

good
design?

 SLOP W COT (P)	 No. 6 W COT (P)	 No. 5 W COT (P)	 No. 4 W COT (P)	 No. 3 W COT (P)
 No. 6 COT (C)	 No. 5 COT (C)		 No. 4 C COT (C)	 No. 3 C COT (C)
 SLOP W COT (S)	 No. 6 W COT (S)	 No. 5 W COT (S)	 No. 4 W COT (P)	 No. 3 W COT (P)

 SLOP W COT (P)	 No. 6 W COT (P)	 No. 5 W COT (P)	 No. 4 W COT (P)	 No. 3 W COT (P)
	 No. 6 COT (C)	 No. 5 COT (C)	 No. 4 C COT (C)	 No. 3 C COT (C)
 SLOP W COT (S)	 No. 6 W COT (S)	 No. 5 W COT (S)	 No. 4 W COT (P)	 No. 3 W COT (P)


Normal
Accidents
Living with High-Risk Technologies
Charles
Perrow

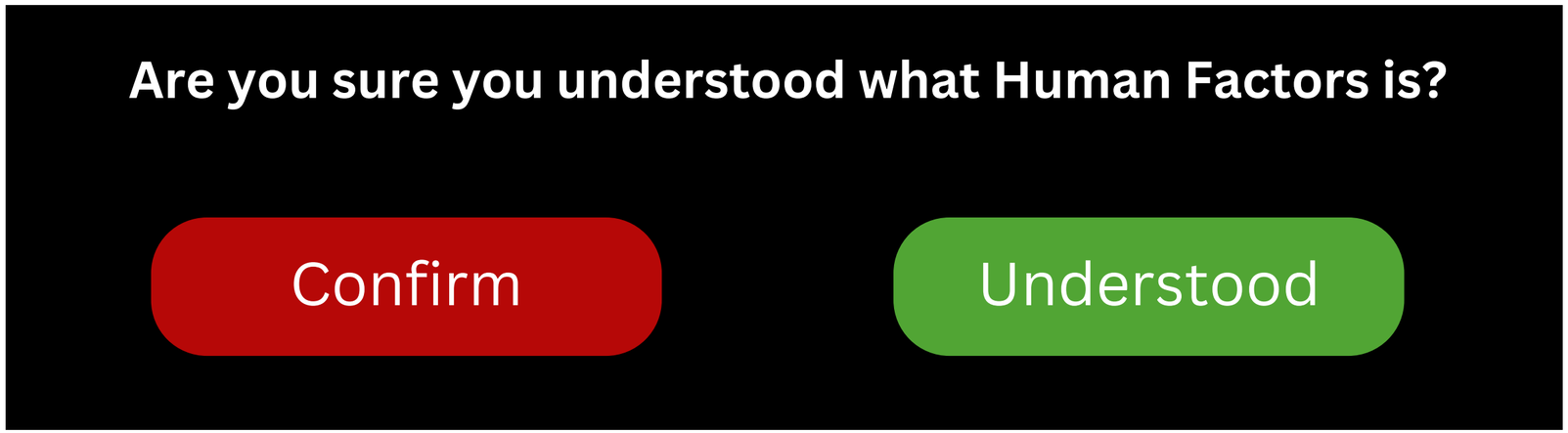
SOURCE: https://uxmag.com/articles/pilot-error-chapanis-and-the-shape-of-things-to-come

SOURCE: Add a lithttps://uxmag.com/articles/pilot-error-chapanis-and-the-shape-of-things-to-cometle bit of body text

Flap

Landing Gear

Made it easier for pilots to do the right thing. And difficult to do the wrong thing


Are you sure you understood what Human Factors is?
Confirm
Understood

Are you sure you understood what Human Factors is?

No

Yes

1940s
Ergonomics emerges as a scientific discipline with the rise in military technology and the recognition that people would only benefit from it if they could understand and use it to its full potential.

1949
Ergonomics Research Society (ERS) formed which becomes the first such professional body in the world.

1953
The European Productivity Agency (EPA) founded; initiated a project entitled “Fitting the Task to the Worker”

1961,
the first meeting of the IEA’s General Assembly was held in Stockholm, Sweden. This meeting formally completed the preparatory phase of the association and started the regular activities of the IEA.

1977
The ERS evolves to represent the current discipline and becomes the Ergonomics Society (ES)

2000
Defined HF

2009
The ES is renamed the Institute of Ergonomics and Human Factors (IEHF) to reflect the popular usage of both terms and to emphasise the breadth **of** the discipline.

SOURCE: https://iea.cc/about/introduction/

SOURCE: https://ergonomics.org.uk/about-us/our-story.html

A definition

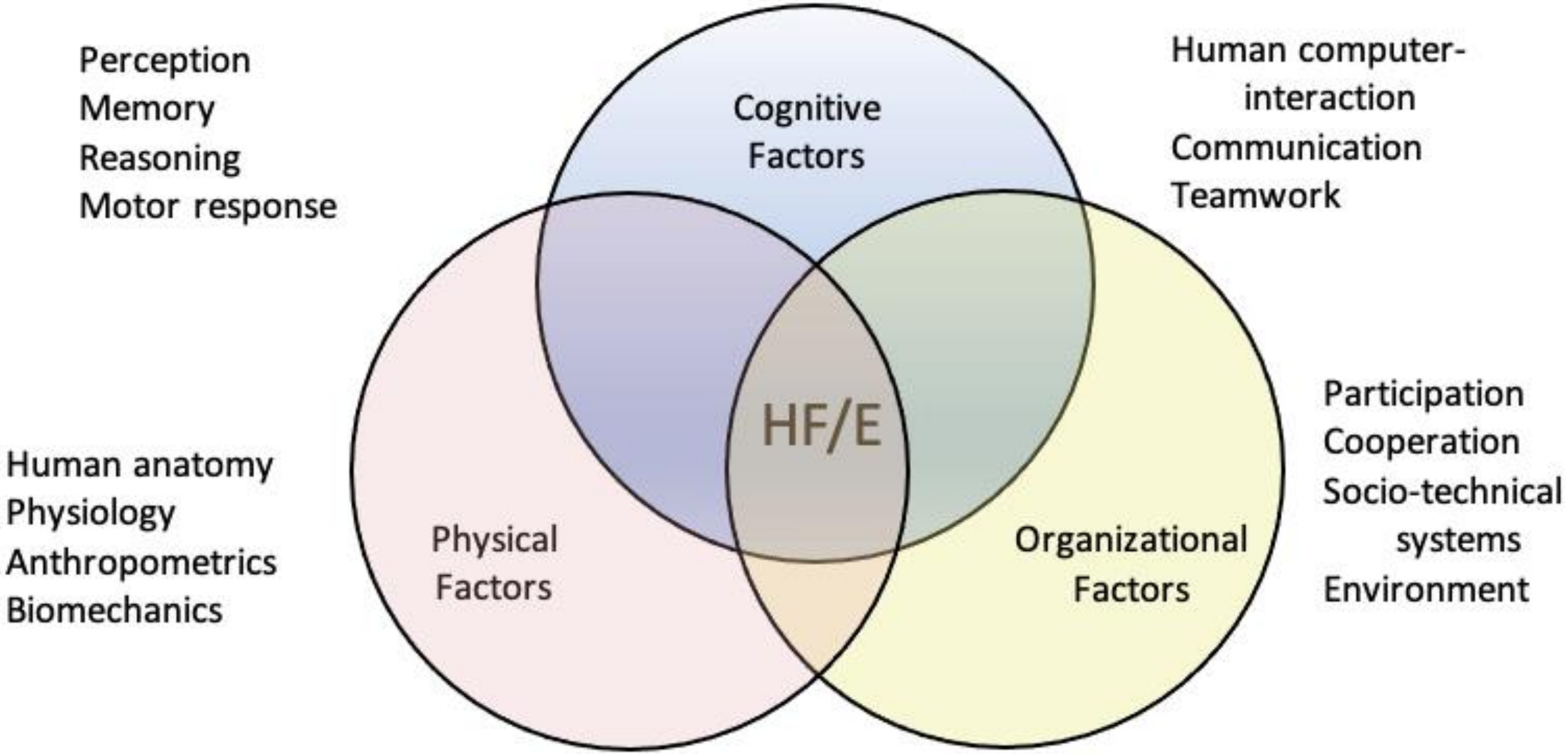
Ergonomics (or human factors) is the **scientific discipline** concerned with the **understanding of interactions among humans and other elements of a system,** and the **profession** that applies theory, principles, data, and methods to **design** in order to **optimize human well-being and overall system performance.**

SOURCE: https://iea.cc/about/what-is-ergonomics/

A difference?

We take ergonomics and human factors to **mean the same thing**. One of the two terms may be used more in certain contexts or sectors. For example, 'ergonomics' tends to be used more in regard to offices and 'human factors' in the healthcare, defence and energy sectors.

SOURCE: Ahttps://ergonomics.org.uk/learn/what-is-ergonomics



SOURCE: https://iea.cc/wp-content/uploads/2021/03/Figure-1-1.jpg

It is about making it easy to do the right thing and difficult to do the wrong thing

Fitting the Worker to the Work

Safety I to Safety II

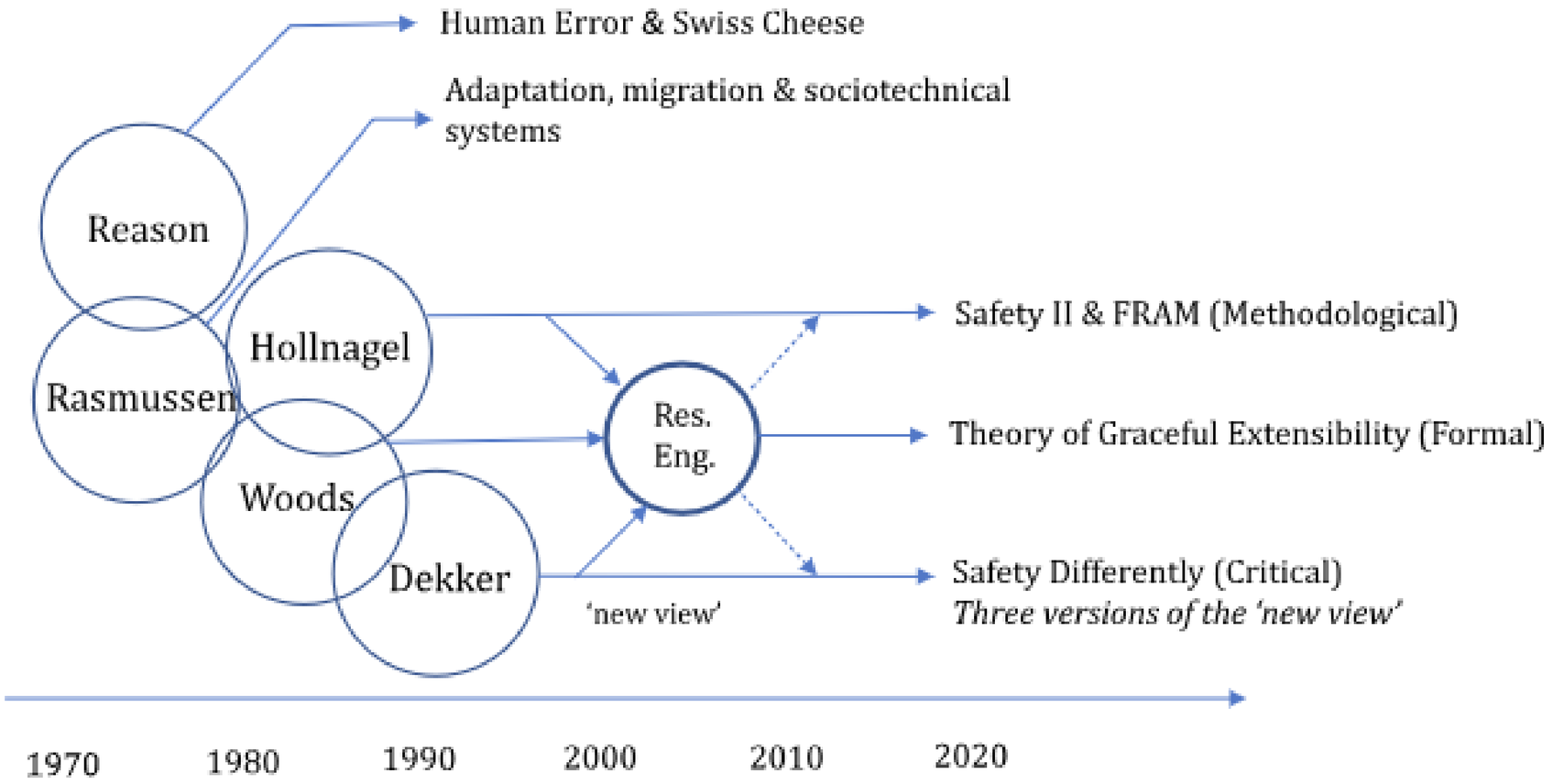


Fig. 1. Reason and the authors of the CSE and RE school.

Le Coze's *The 'new view' of human error. Origins, ambiguities, successes and critiques* , 2022

Dekker

- Explicit formulation of an 'old' versus a 'new view' (first version)
- Radical version of the new view against the 'mainstream' (Reason) in HF&SS (second version of the 'new view')
- Drift into failure & just culture
- Resilience Engineering -> Safety Differently (third version of the 'new view')

Reason

- A taxonomic view of human error
- Unsafe acts (slips, lapses, mistakes, violations)
- Swiss Cheese model, latent and active causes, sharp-blunt end
- Safety Culture (including just culture)

Critical of

Woods

- Distributed cognition, beyond cognition 'in the head'
- Ethnography of experts in the real world
- Behind human error and a new approach (versus a conventional one)
- Resilience Engineering -> Theory of Graceful Extensibility

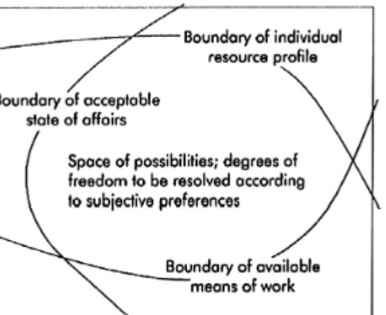
Rasmussen

- Ecological view of cognition
- Degree of freedom, self-adaptation and migration
- Sociotechnical system view
- Subjective analysis of retrospective observers, stop rules

Hollnagel

- Beyond sequential and linear information processing metaphor of cognition
- Contextual Control Model of cognition (COCOM)
- Methodological developments of CREAM then FRAM
- Resilience Engineering -> Safety II

Fig. 2. 'New view' origins and ambiguities.



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SAFETY I

That as few things as possible go wrong

Learning from what goes wrong

Humans are predominantly seen as a liability or hazard. They are a problem to be fixed.

Accidents are caused by failures and malfunctions.
The purpose of an investigation is to identify the causes.

SAFETY II

Most things go right

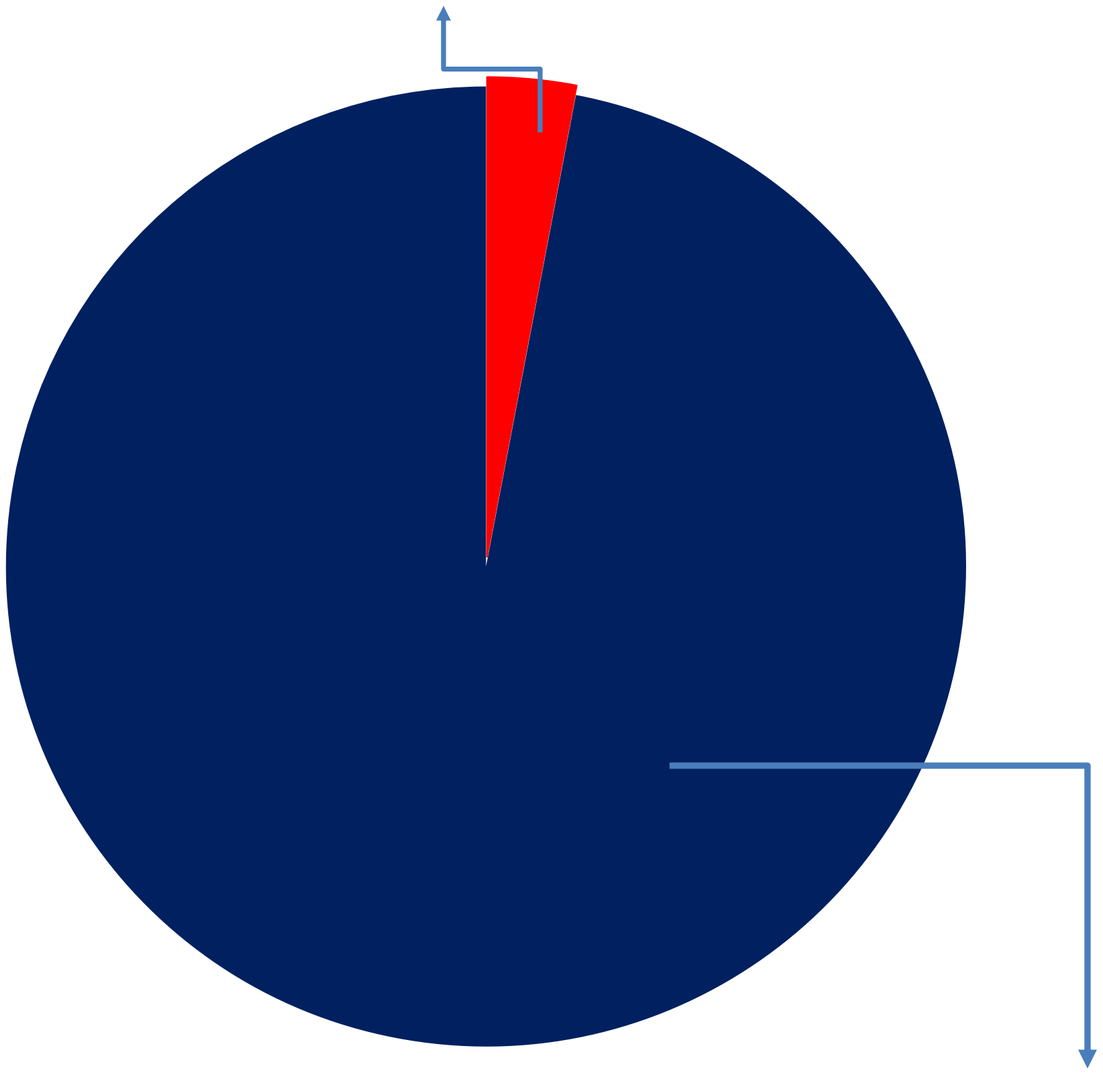
Learning from everyday work – what goes right

Humans are seen as a resource necessary for system flexibility and resilience.
They provide flexible solutions to many potential problems.

Accidents are caused by combination of many factors, the conditions at the workplace
The purpose of an investigation is to understand conditions

Source: My summary from a Safety-I to Safety-II: A White Paper, Professor Erik Hollnagel

S-I Learning from what goes wrong



SII- Learning from everyday work – what goes right

What are we learning from

Local Rationality: People do things that make sense to them given their goals, understanding of the situation and focus of attention at that time

ETTO: Efficiency Thoroughness Trade-off. People can’t be efficient and thorough at the same time. People make trade-offs.

Five Principles of Human and organisational Performance

Source: The 5 Principles of Human Performance: Todd E. Conklin, Ph.D. 2019

People Make Mistakes

Blame Fixes Nothing

Learning is Vital

Context Drives Behaviour

How you respond matters

“Placing a priority on learning made it clear that information was the currency of safety, and it was important to facilitate the flow of information.”

Self-Designing Safety Culture: A Case Study in Adaptive Approaches to Creating a Safety Culture
Ivan Pupulidy *ACS Chemical Health & Safety* **2020** *27* (1), 24-33

"Unless the mistrust of the workforce can be overcome, then even the most well-intentioned and sophisticated management initiatives will be treated with cynicism and undermined"

Gunningham & Sinclair (2012) Australian National University,

TRADITIONAL LENS

- People *must not* make mistakes. Sees human error as unacceptable
- Focusses on reducing mistakes by improving people. Fixing people.
- Accountability is about taking an account- blaming
- Human Error appears sufficient,
- Tells them what to do
- Asks:

  Why did you not report in time?

  Who did not report?
- Solution is

  Asking people to be more careful. Be better next time.

HOP LENS

- Recognises that it is human to make mistakes.
- Understand how people's actions made sense to them. Focuses on reducing chance of a mistake.
- Accountability is about giving an account - hearing their story
- Human error seen as a symptom of deeper causes
- Asks them what they want
- Asks:

  What were the conditions that led to this event? What made it difficult?

  How can we improve our system?
- Solution is:

  What can we do to help change conditions at work?

Source: From Safety-I to Safety-II: A White Paper, Professor Erik Hollnagel

Ask Different Questions!
Be empathetic!
Build Trust!

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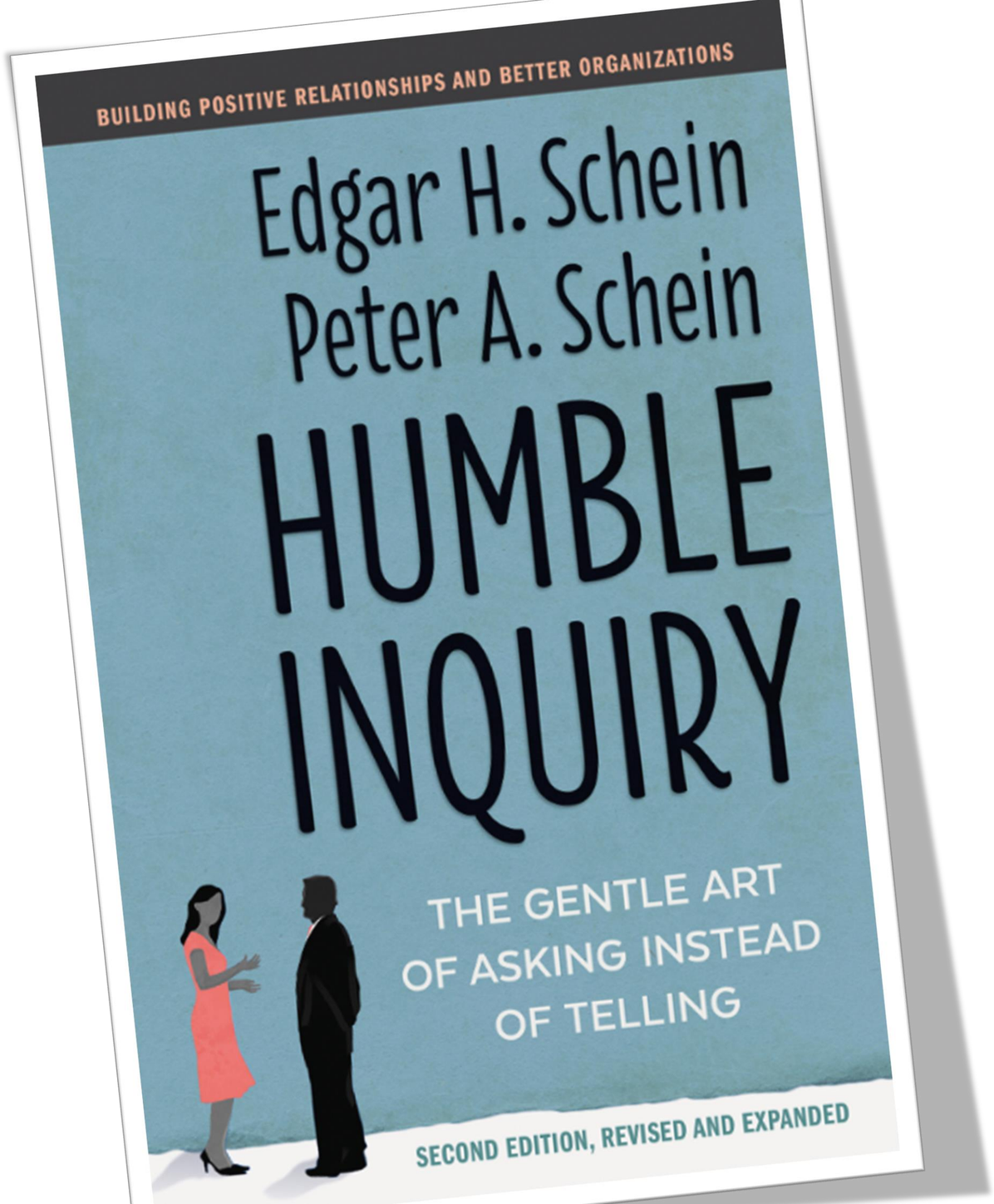
BUILDING POSITIVE RELATIONSHIPS AND BETTER ORGANIZATIONS
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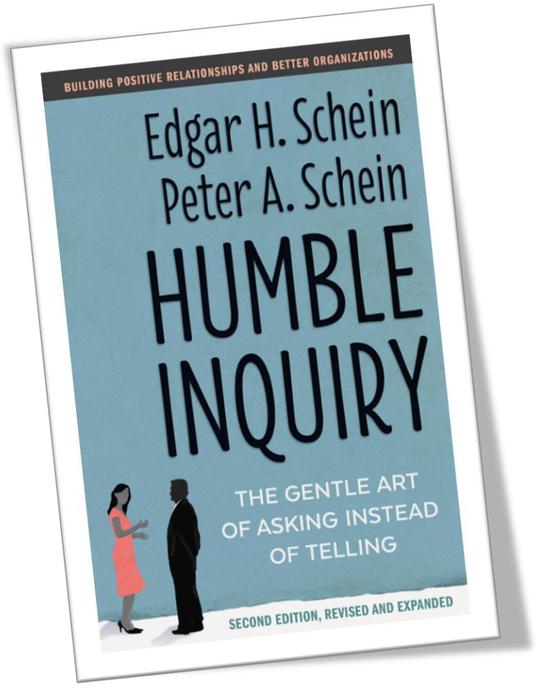
HUMBLE INQUIRY
THE GENTLE ART OF ASKING INSTEAD OF TELLING
SECOND EDITION, REVISED AND EXPANDED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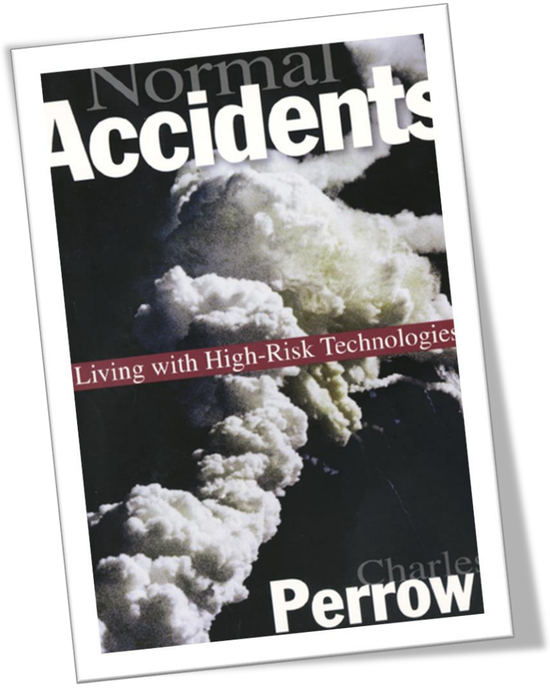
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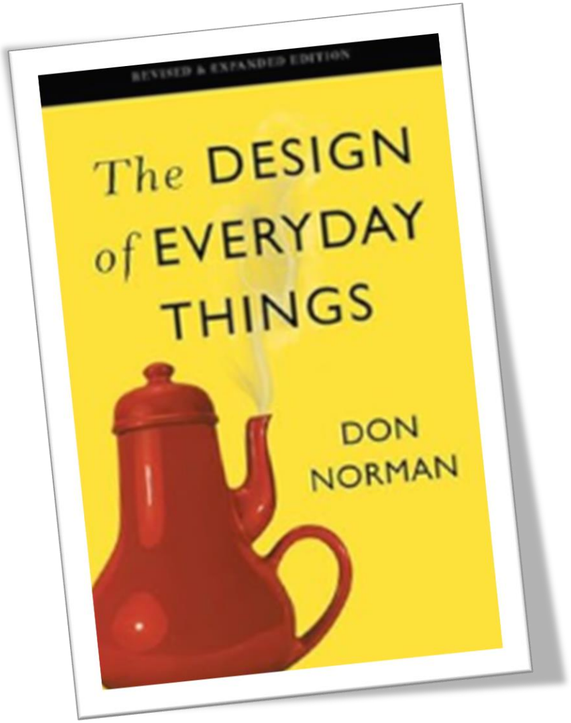
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