SENSEMAKING AND RESILIENCE IN SAFETY-CRITICAL SITUATIONS: A LITERATURE REVIEW

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Contents

- Motivation and background
- Introducing the project
- Research question
- Methodology
- Findings
- Conclusions

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Motivation and background

- The operation of ships and mobile drilling units are increasingly dependent on ICT based control systems that play a crucial role in the handling of critical situations.
- **Accidents and incidents**, such as the capsizing of the anchor handling vessel Bourbon Dolphin in 2007 and the unintended list of the drilling rig Scarabeo 8 in 2012, **underline the need** for addressing sensemaking in safety-critical situations within the maritime domain.

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How can the ability to deal with safety-critical situations be improved in demanding maritime operations?

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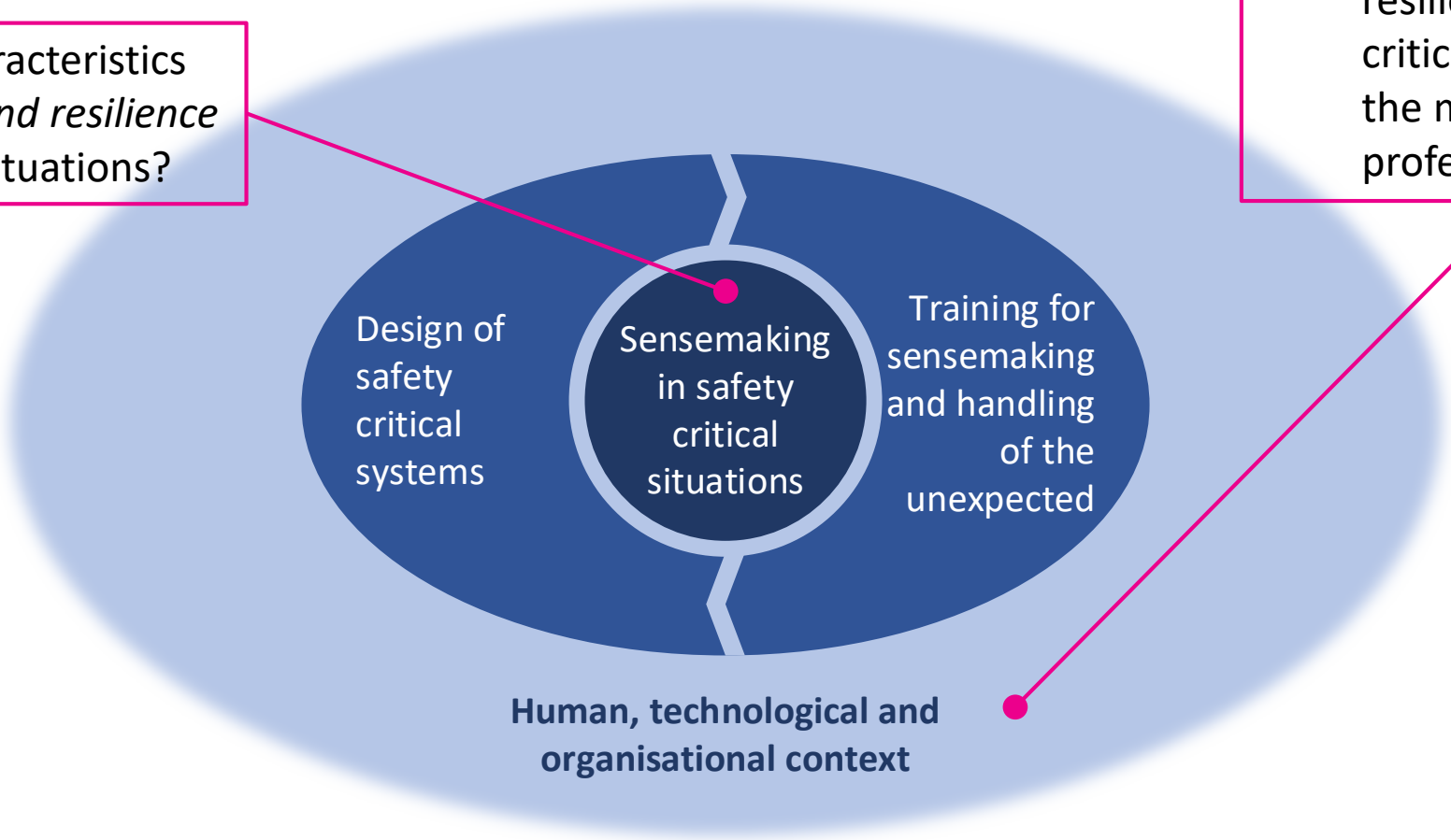
SMACS – The project

1. What are the characteristics of *sensemaking and resilience* in safety-critical situations?

2. What are the needed *human, technological and organisational factors* to support sensemaking and resilience in safety-critical situations in the maritime profession?



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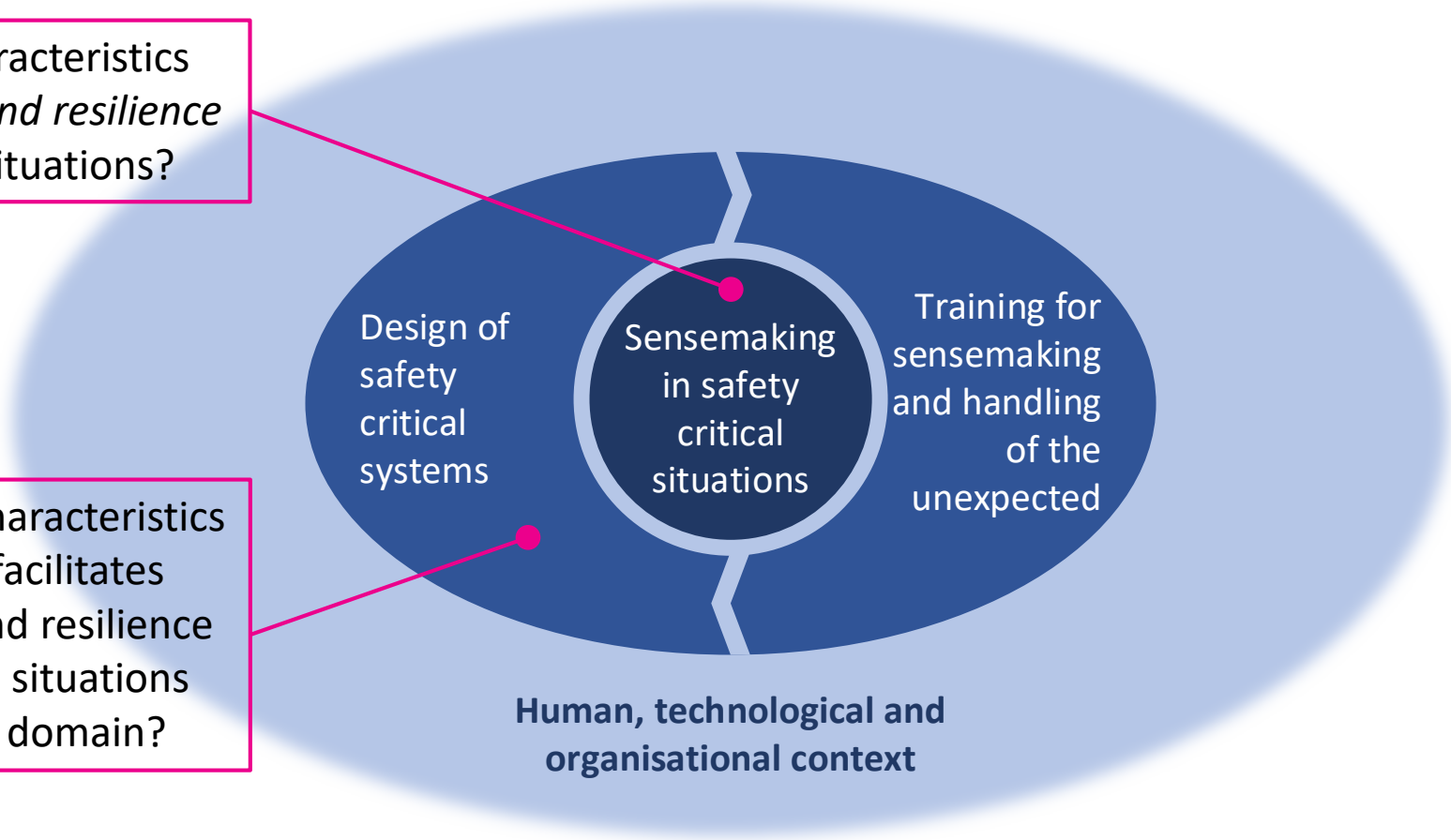
SMACS – The project

1. What are the characteristics of *sensemaking and resilience* in safety-critical situations?

3. What are the characteristics of an *HMI* that facilitates sensemaking and resilience in safety-critical situations in the maritime domain?



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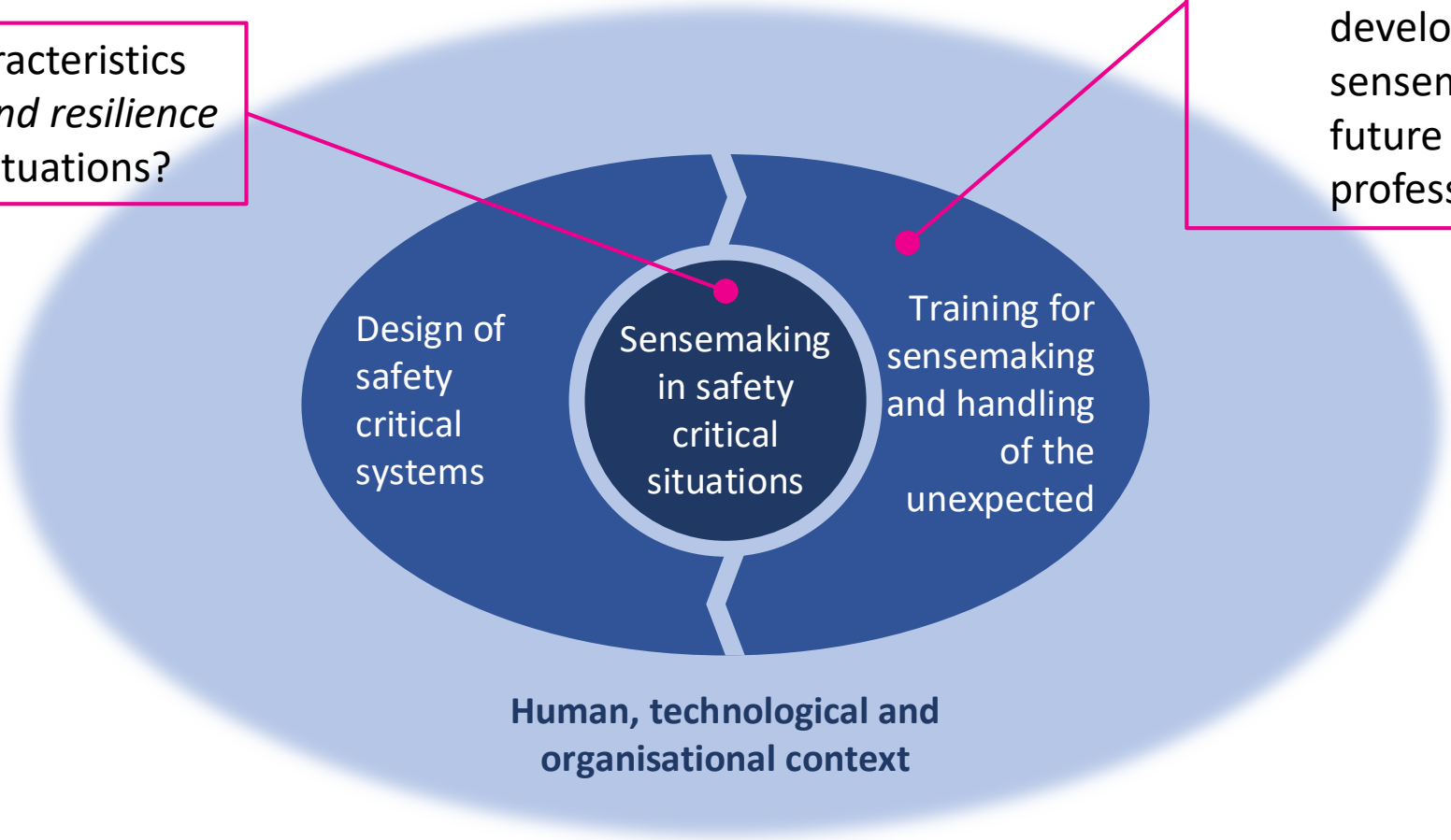
SMACS – The project

1. What are the characteristics of *sensemaking and resilience* in safety-critical situations?

4. What are the characteristics of *training methods* that promote the development of sensemaking in the future maritime profession?



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SMACS – The project

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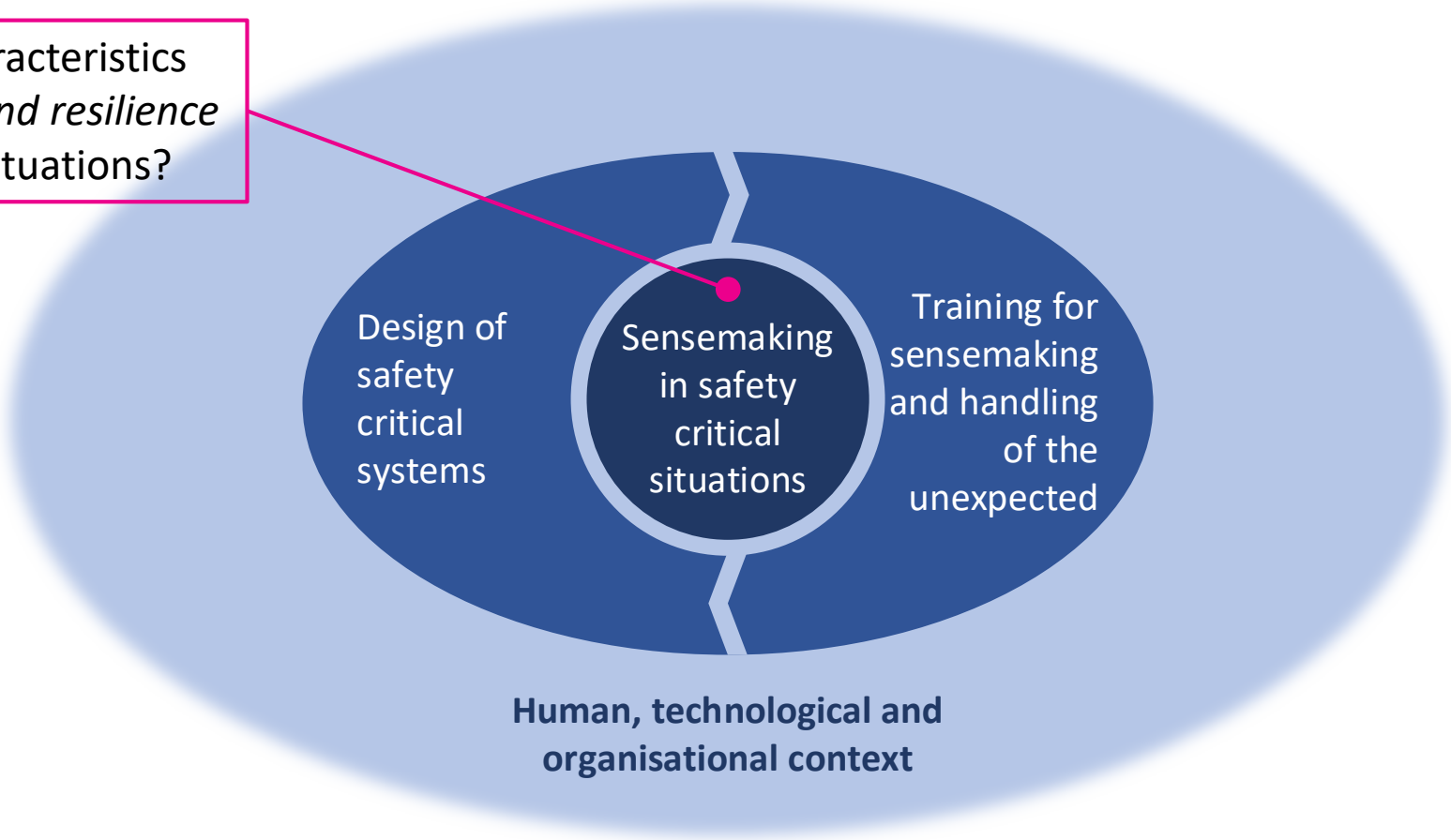

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Research question

1. What are the characteristics of *sensemaking and resilience* in safety-critical situations?

- Sensemaking in safety-critical situations
- Sensemaking and resilience
- Sensemaking in relation to training or human-machine interaction

Methodology

- Literature review
- Scopus, Web of Science, Google Scholar, Oria
- Papers, articles and theses
- Discussions with and input from the project group

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Findings

- 33 documents
  - Most of which were articles published in peer-reviewed scientific journals
- Relatively recent
  - All except 3 publications were published in the period 2009-2018
- Often cited key research also included

Use of the term *sensemaking*

"(…) people can make sense of everything. This makes life easy for people who study sensemaking in the sense that their phenomenon is everywhere"
(Weick, 1995, p. 49)

- The concept of sensemaking does not have one single definition

Use of the term *sensemaking*

- Sensemaking is often used without any associated definition
  - when definitions are provided there are a variety of meanings asserted to it
- Most provide definitions or references based on Weick
  - i.e. describing sensemaking as a social process, involving the extracting of cues and enactment to create meaning to events
- Others describe sensemaking as a more cognitive process
  - referring to Klein's macro-cognitive/data-frame model
- Some describe sensemaking as a process building and supporting situational awareness

Use of the term *sensemaking*

- The concept of sensemaking has traditionally been described as retrospective in the sense that we make sense of our actions and experiences after they have occurred
  - Most of the literature in this review uses the notion of sensemaking accordingly
  - Only a few of the authors use the term in a more future-oriented sense

Sensemaking in safety-critical situations

- In the context of a safety-critical situation one might expect characteristics of sensemaking other than or more prominent than the characteristics of every-day sensemaking
- However, the literature found in this review did not discuss such characteristics explicitly

Sensemaking in safety-critical situations

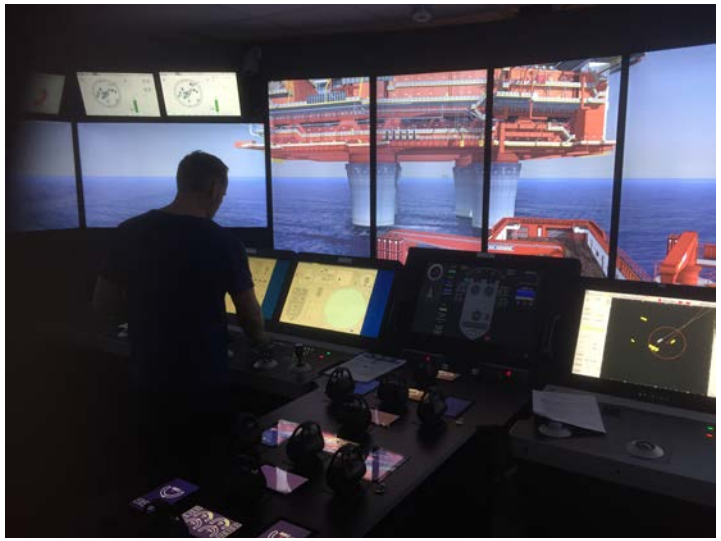
- Busby & Collins (2014) categorised the many ways of acting through which informants made sense of the risk control task
- The authors provide explanations to each of their 32 categories, but elaborate on the five more commonly used:
  1. being circumscribed (constrained, realistic, moderate)
  2. being engaged (closely involved, concerned)
  3. being resolute (rapid, and consistent in acting)
  4. being socialised (social outcomes and systems of social obligation)
  5. being solicitous (seeks opinion and external references)

Sensemaking and resilience

Weick (1993) states that the Mann Gulch fire disaster was produced by the interrelated collapse of sensemaking and structure, and he proposes four potential sources of resilience that "make groups less vulnerable to disruptions of sensemaking" (p.628).

Takeda et al. (2017) argue that a greater attention to resilience in the disaster management process could be achieved through a focus on the development of sensemaking and heedful interrelating.

Other findings

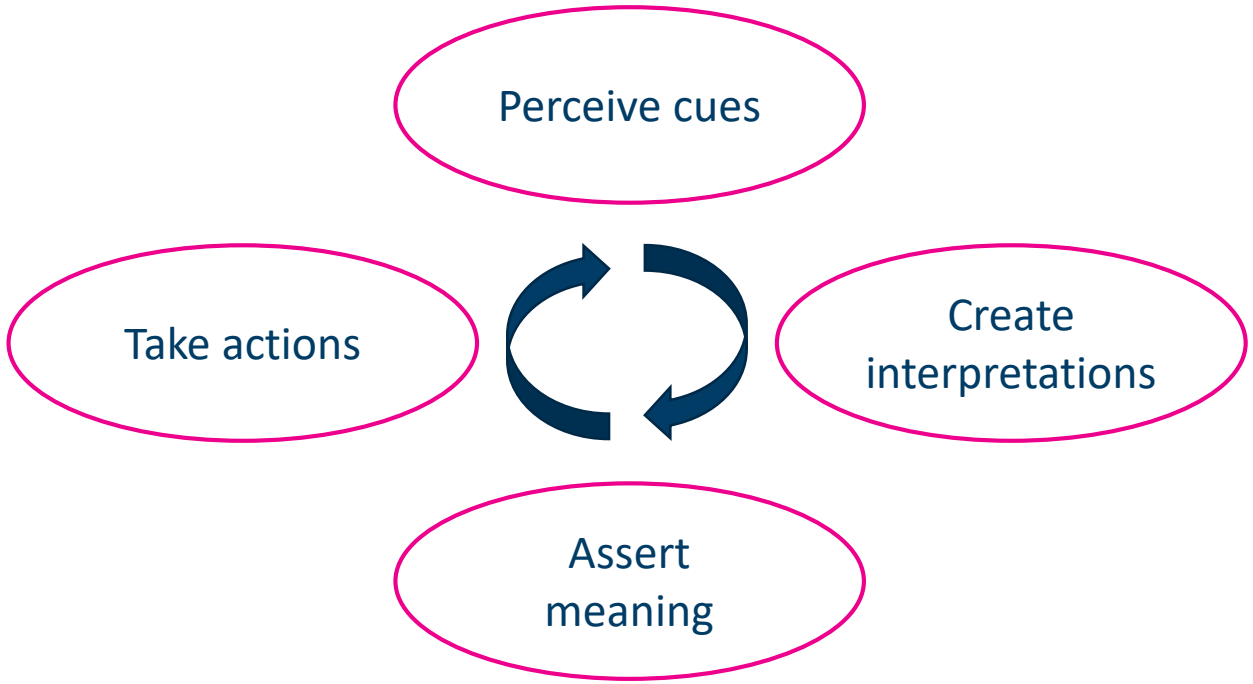


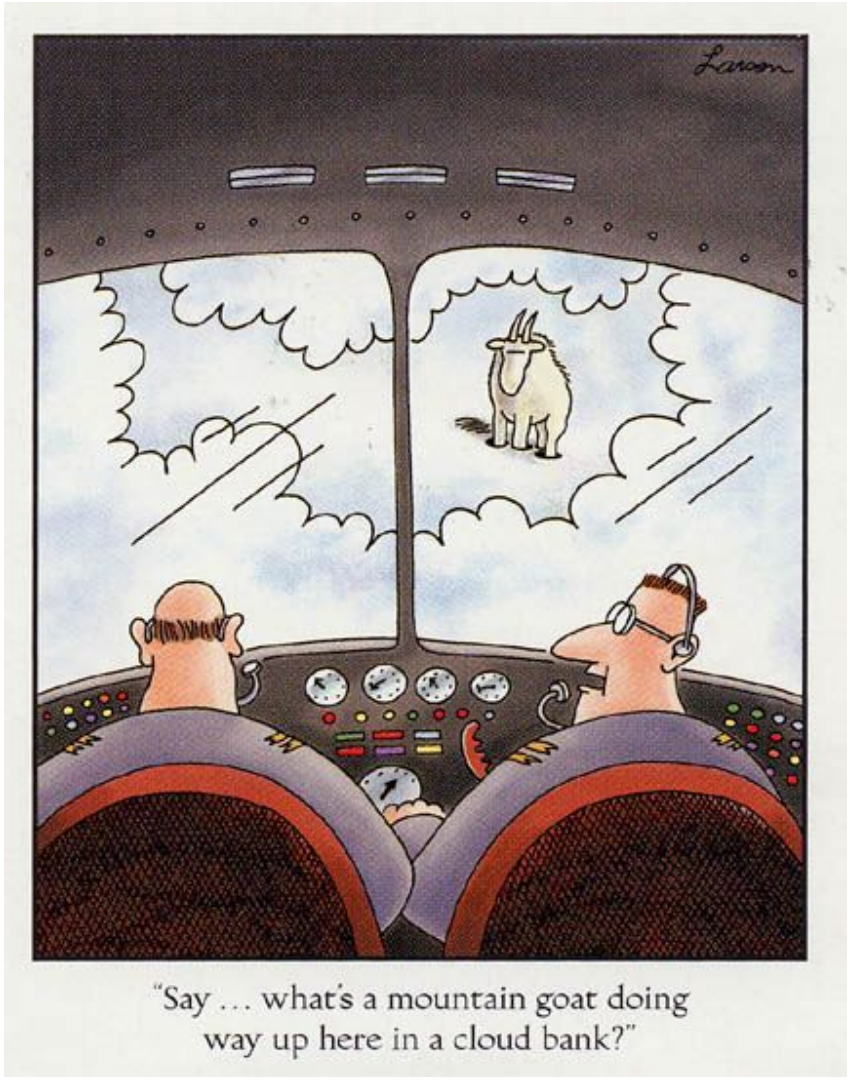
- Sensemaking supports innovation and creativity
- Has often been limited to an organisational context
  - Seldom discussing issues such as system design
- Sensemaking is a key process for learning
  - one challenge is to use new information, not engaging in sensemaking based on prior beliefs
- Lack of literature that also addresses training, HMI or the maritime domain

Conclusions

- The majority provide definitions of sensemaking based on Weick's work, describing sensemaking as a social process
- Few provide descriptions that characterise sensemaking in the context of safety-critical situations
- Sensemaking and resilience were found to be described as related
- There is a lack of literature on sensemaking in safety-critical situations that also concern aspects of training, human-machine interaction or the maritime domain

Further research





Larson, Gary: Far Side

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Weick, K.E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative science quarterly*, 628-652.

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Thank you for your attention!

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