CONDITION: Competence-retention for non-routine activities in digital work environments - studies based on the professions chemical- and pharmaceutical technician

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- CONDITION: What is the problem? - What are the questions?
- Methodology and current state of project
- Selected results

CONDITION: What is the problem?

1. Digitized automation technology is implemented in companies of chemical and pharmaceutical production to ensure safety and increase economic benefits. It should facilitate the work of the operators and prevent human errors. Nonetheless, non-routine situations (NRS) occur (Bainbridge 1983).

2. Competences neeeded to handle non-routine-situations (NRS) differ remarkably from competences normally needed in the everyday routine at highly automated workplaces (Frank & Kluge 2018)

3. Competences for non-routine-situations are rarely used and therefore prone to decay (Bjork & Bjork 2006).

Research Questions:

1. Does the problem of the automation-related skill decay also exists in the occupational activities of chemical technician and pharmaceutical technician?

2. Which competences are affected?

3. How is the impact of influencing factors such as task characteristics or personal characteristics?

4. What measures are suitable for preventing the automation-related skill decay in the work tasks identified as problematic?
    - Which are already applied?
    - Which are especially suitable for the respective professions?

Methodology

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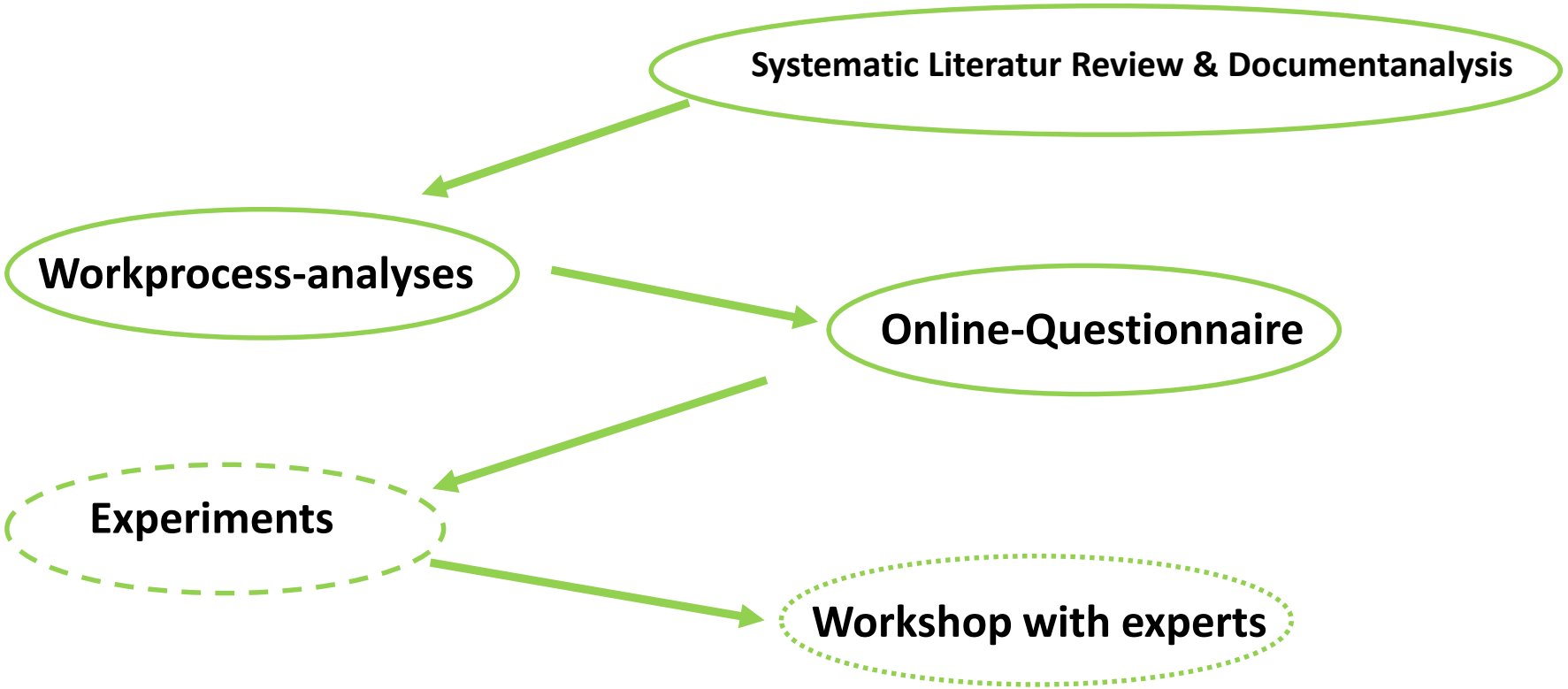

Selected results

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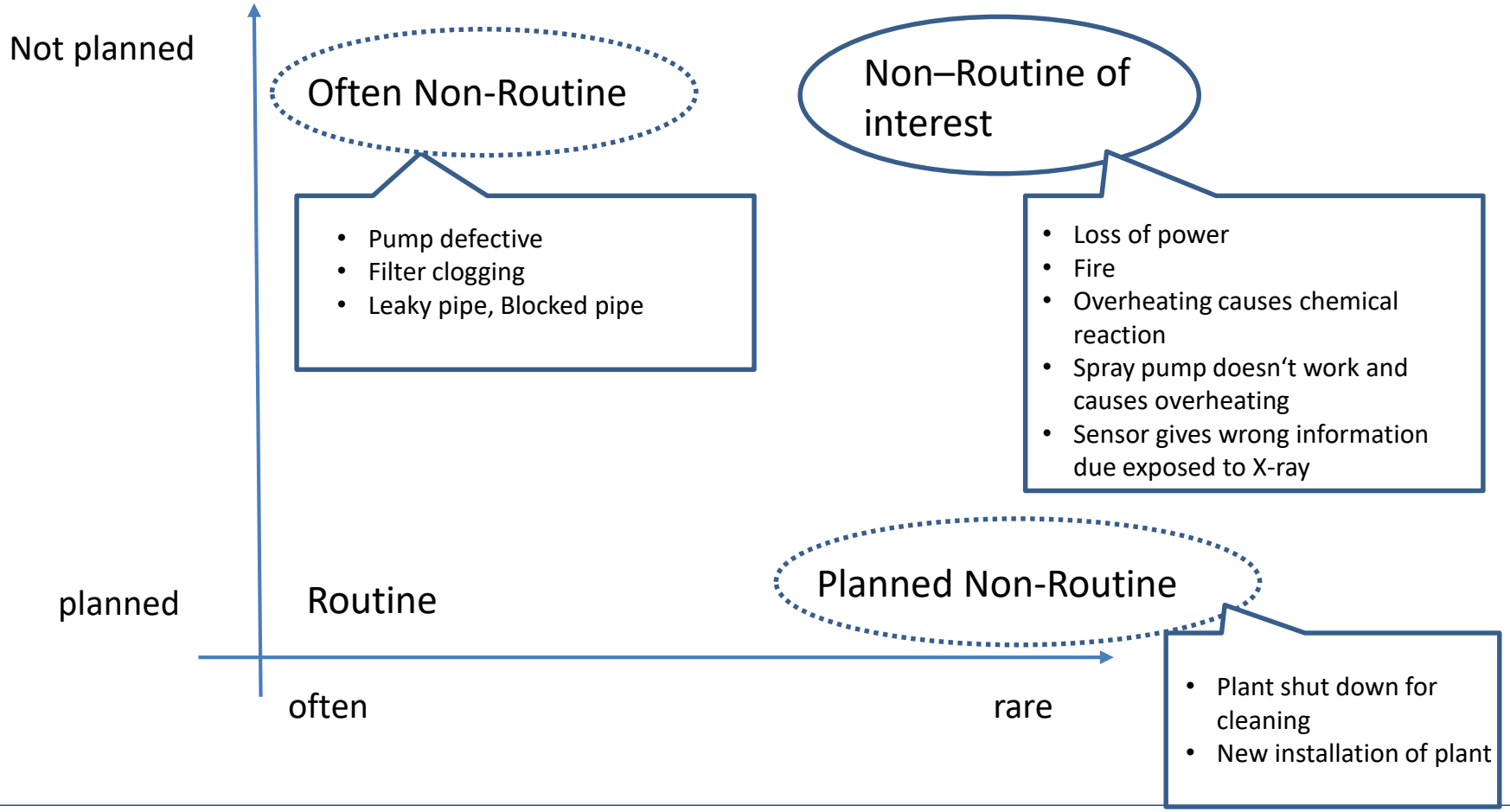
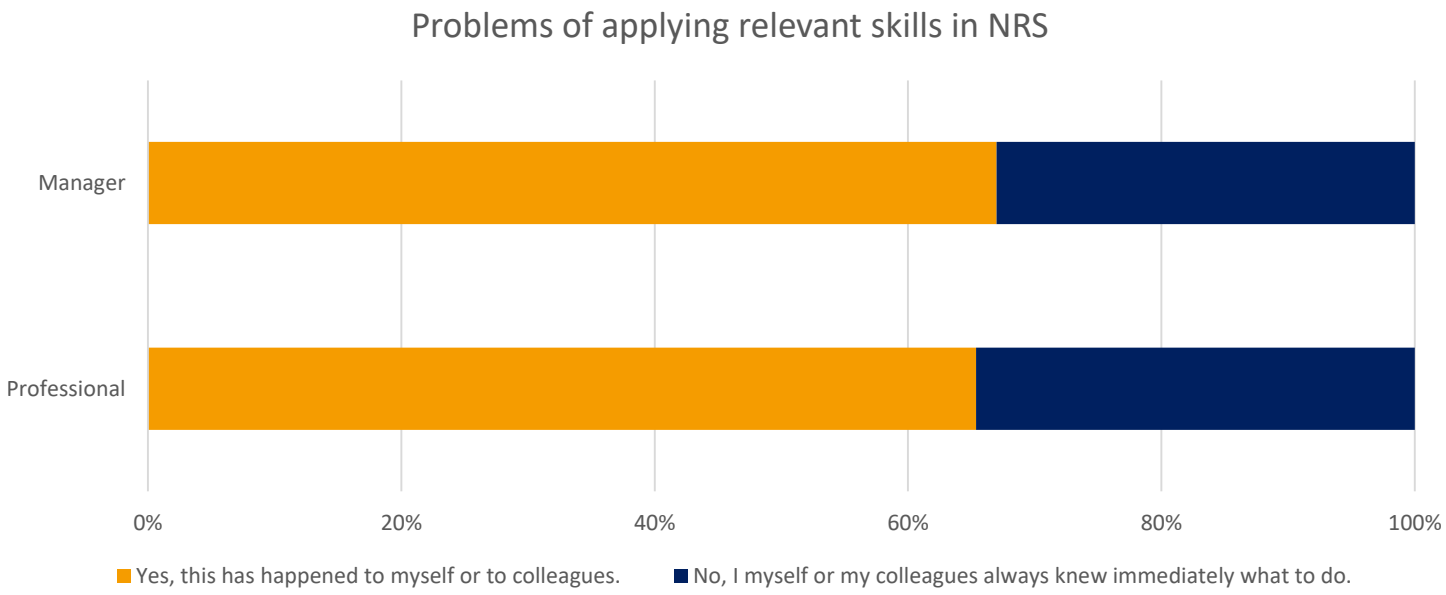
The problem of automation-related loss of competence also exists in the chemical and pharmaceutical production

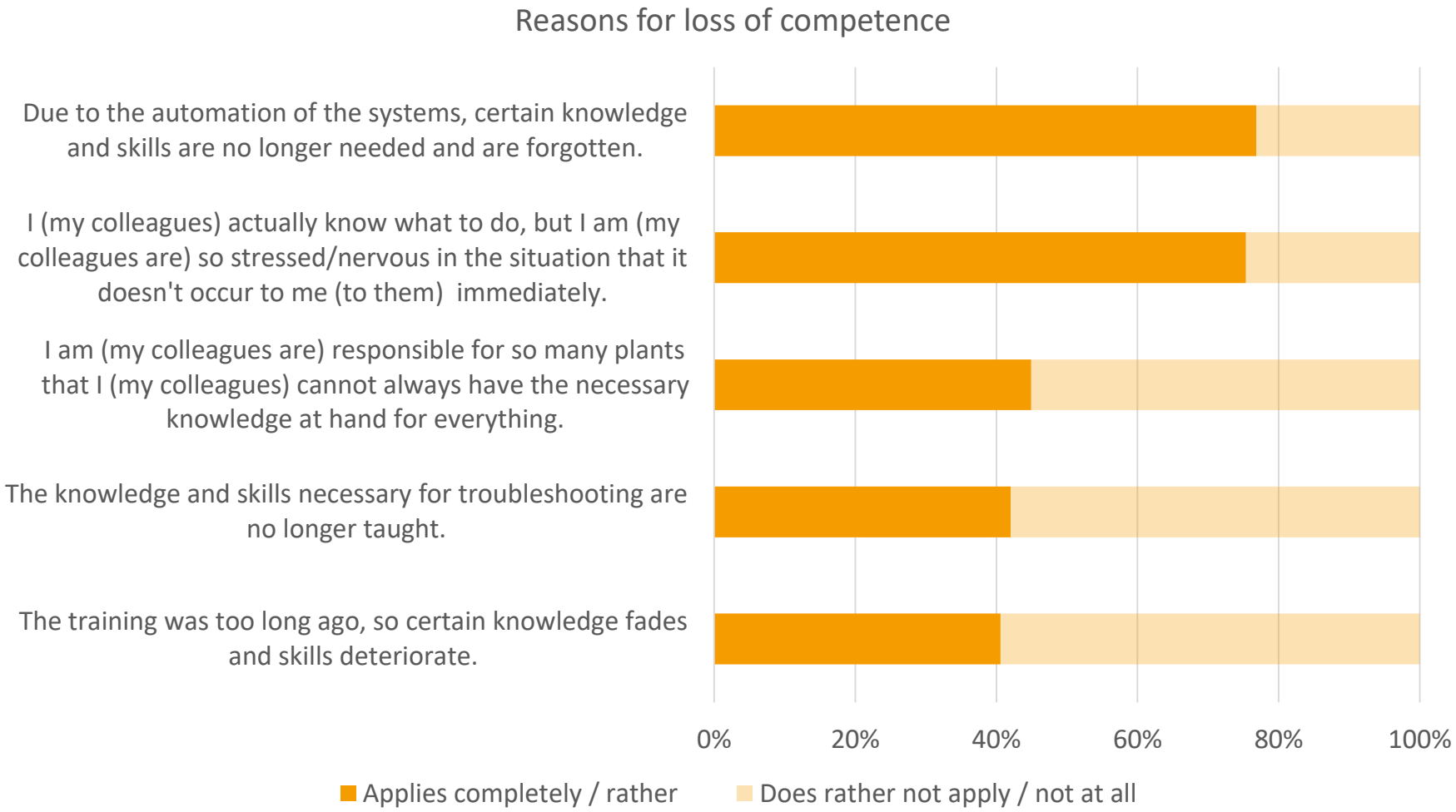


Skill decay happens



Question: „In the past, have you or a colleague ever been in a rare non-routine situation where you or a colleague did not immediately know what to do?“ Managers n=80, Professionals n=26

Automation as a reason for skill decay



Question: „You have just stated that you or your colleagues sometimes find it difficult to recall certain knowledge or apply skills in non-routine situations. What reasons do you see for this? Please indicate to what extent the following reasons apply.“ n = 69

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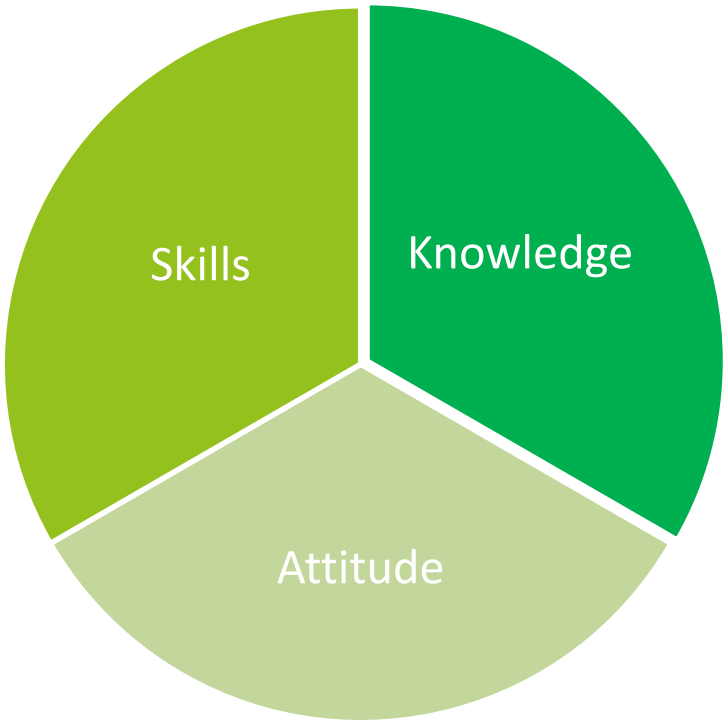
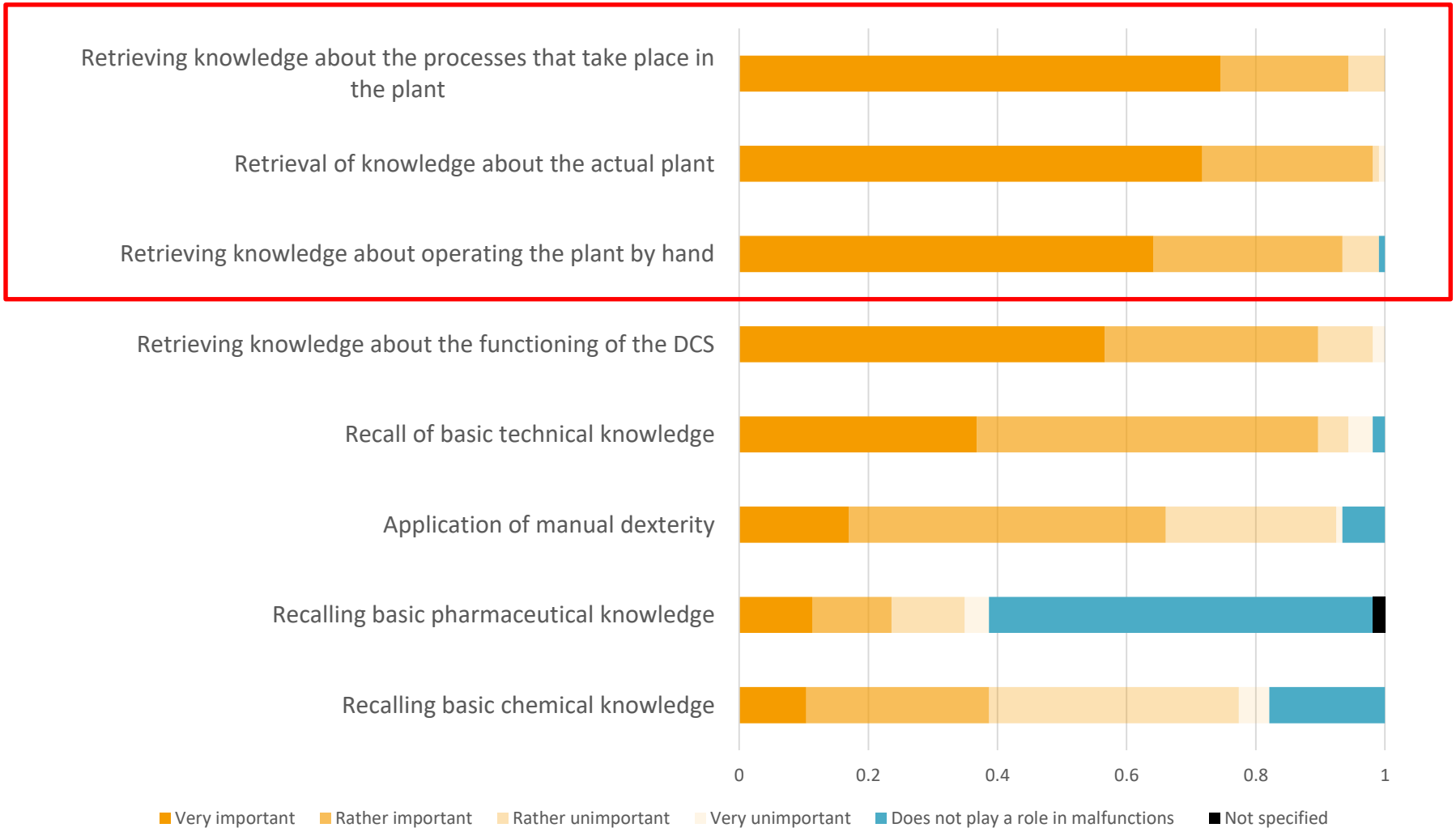
Relevant competences can be identified which are necessary to cope with the NRS

Our competence construct:



Relevant knowledge and skills



Question: „Imagine that you or your colleagues are confronted with such a non-routine situation at your current workplace. What is important or unimportant and what is easy or difficult for you or your colleagues in this situation?“ n=106

Retrieval of knowledge about the actual plant, its dimensions and processes

"And that is, I think, actually elementarily important, that people have an orientation of their plant, they have to know their plant. And you can't just do that in the control room at the process control system. I should say, yes, that is absolutely not enough. That is the experience we have made, that it is extremely important that people manage this link with outside and inside" (Manager).

Attitudes suitable for handling NRS

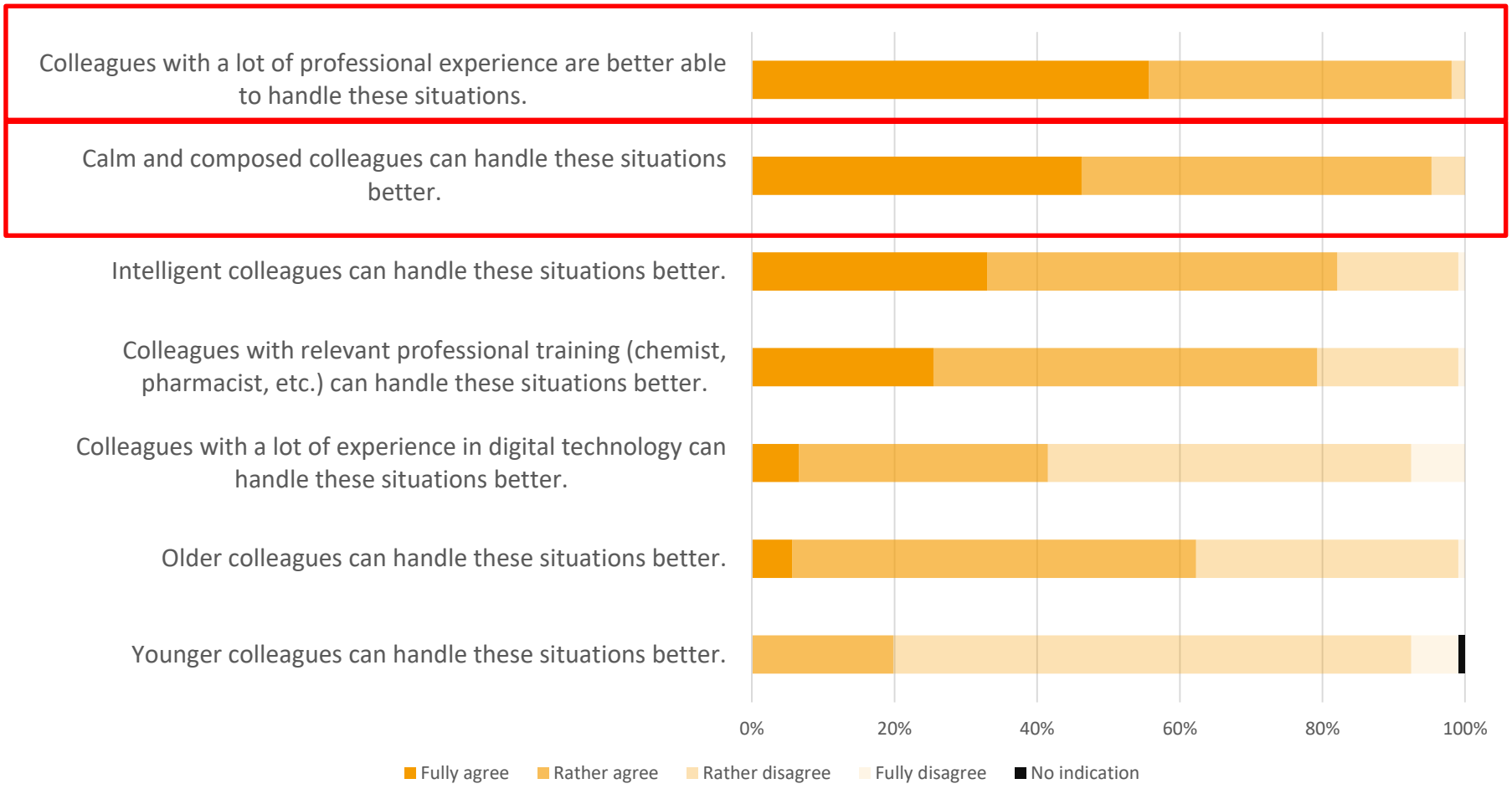
In the situation……

“But when you are in such a facility and you hear this monotonous operating noise, suddenly you hear a "BRRRRrrrrrrrr" and it gets quiet. That's a worst-case scenario where I say: "Boah. Olli Kahn once said: You need balls for that” (Manager).

Beforehand….

“Yes, that's how it is. You have to be interested in the system, you also have to be interested in the failure. That's what happens when you come back on shift, oh, they're running again, how did you manage that? Or not, thank goodness, they're running again” (Manager).

Attitude and experience are key factors



Question: „People deal with such non-routine situations in very different ways. Based on your own experience, how do you agree with the following statements?“ n=106

Experience as key factor for handling NRS

"In the past, when the plant was started up, I went outside and it was running visually well inside, and then I walked around outside, and it wasn't just a matter of walking around and looking to see if something was splashing around or something, but you go into the plant and it's like a concert. Every piece of equipment makes a sound and the whole system is like a concert, so everyone plays their part. And if someone plays the wrong note, you have to hear it" (Manager).

"Yes, you can't run the control room if you don't know what's going on outside. That is already an important point. You have to understand the procedure and know what is important, what you need to do outside and what you are not allowed to do." (Manager).

In addition to the individual loss of competence, there is also a generation-related one.

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Then, of course, the employees got to know the plant in a less digitalized state, (...). Younger employees lack exactly this knowledge, so of course, people who have been there longer and know the old state can react better to such disturbances.

Thank you for you attention!

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