**Aggregated Interview Data**

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| **Interview 1** |
| **Setting and participants:** Focus Group Interview with Microsoft Teams (60 minutes), 1. Firefighter and paramedic, age group: 35-52 years, male, dispatcher, basic AI knowledge, 2. Paramedic, age: 35-52, male, no dispatch experience, basic AI knowledge, 3. Emergency Medical Technician, age group: 17-34 years, male, dispatcher, basic AI knowledge, 4. Paramedic, firefighter, age group: 17-34, male, dispatcher, basic AI knowledge, 5. Medical director of an ambulance service, emergency physician, age group: 35-52, male, dispatch experience, basic AI knowledge, 6. Paramedic, age group: 35-52, male, dispatcher , basic AI knowledge |
| **Main findings:** The term AI is known, but there is no deeper understanding. There are hardly any mental models for the practical implementation of AI methods in EMS and dispatch centers. AI is perceived as very theoretical. Problems that the participants expect from a possible AI implementation are only vaguely verbalized. The human perception of what is said between the lines by dispatchers and callers during the call dialog is important and cannot be replaced by AI. Humans are also credited with a gut feeling for the relevance and priority of call content, but not an AI. AI must be transparent and understandable. Some kind of cognitive assistance is described as desirable, which merely supports the dispatcher and points out incongruities, i.e. visual processing of the diverse data input from very different sources. AI is seen as a support tool, but the final decision should lie with the dispatcher. |
| **In-vivo citations:** *“It is clear that artificial intelligence will never be able to replace humans, and it will never come to that” and “We need support in automation, but also in visualization. We are an octopus with 10 arms.”* |
| **Theory development:** Dispatchers have only a basic knowledge of AI, and the practical transfer of this knowledge is difficult. Humanity is emphasized over technology, especially in terms of general performance and empathy. Even if there is a generally positive attitude towards AI on the part of dispatchers, there is only a vague mental model of concrete situations in which AI can provide support. Deployed AI must be easy to use. To explore the opportunities and applications of AI, an executive was recruited for the next interview. |

Table 1. Data aggregation of interview 1.

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| **Interview 2** |
| **Setting and participants:** Expert one-on-one interview with Microsoft Teams (47 minutes), Division head of a dispatch center, age group: 35-52, male, previous experience in ambulance service, no AI knowledge |
| **Main findings:** The work of dispatchers is complex and always under time pressure. One problem for managers is the time-consuming, non-automated scheduling process, some of which is done on spreadsheets, AI should help here. A wide variety of information is displayed on many monitors, forcing the dispatcher to search for the information he needs. An intelligent visualization that reduces the number of monitors and the workload is desirable. The visualization has to be context sensitive, i.e. it has to present only the information that is needed for the task at hand. In the future, dispatch centers must be networked with each other and with other players, and the relevant data must be exchanged automatically. This interoperability is not currently available. Real-time traffic routing integrated into the dispatch system should also be standard. The AI should be able to summarize important key performance indicators and should only support the dispatcher, but does not make any operational decisions itself. For reasons of human empathy, the dispatcher should continue to speak to the caller, not the AI. AI must be transparent and understandable. |
| **In-vivo citations:***“Yes, I think an AI should not talk to the emergency patient if he is already on the phone. And also, this support from person to person should always be done by a person, not by a machine.”* |
| **Theory development:** Compared to the first interview, requests for AI support in the dispatch center were verbalized explicitly and without strong questioning.The intelligent evaluation of key performance indicators should facilitate quality assurance measures. Interoperability between dispatch centers and with other players is a problem. The next three aspects are very similar to the results from interview 1, without this being followed up by the interviewer: 1. Context-sensitive visualization aids based on AI are desirable. 2. The emergency call dialogue must be done by humans. 3. Transparency and understandability are important for all AI procedures. Fears, concerns and ethical challenges were not addressed. To close this gap, we are looking for experts who have in-depth knowledge of ethics and in the research field. In contrast to the first interview, a general overemphasis of human beings is not to be recognized in the interview and is not to be deduced from the position that emergency calls should be answered by human beings. |

Table 2. Data aggregation of interview 2.

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| **Interview 3** |
| **Setting and participants:** Focus Group Interview with Microsoft Teams (60 minutes), 1. Head of a ambulance station, Diploma in Philosophy, specialized in ethics, age group: 35-52, male, dispatch experience, advanced knowledge of AI, 2. Professor of Philosophy, specializing in machine ethics, age group: 53-75, female, no dispatch experience, advanced knowledge of AI, 3. National level EMS director, 35-52 years old, male, expert knowledge of AI, 4. Psychologist, Postdoc at a psychology department, specialized in human-machine interaction in digital health areas, volunteer Emergency Medical Technician (EMT), 35-52 years, female, expert knowledge of AI |
| **Main findings:** Fears and anxieties are directly proportional to gaps in knowledge about the respective object and correlate negatively with dispatch beliefs. Fears and anxieties are always context- and time-bound. It is therefore hardly surprising that people can often deal with intelligent smartphones without criticism, but that AI in a still unknown area causes fear. The less people know about how AI works, the more they feel uncomfortable. A particular concern seems to be the fear that AI will simply take over processes in which many colleagues see the human element, such as providing psychological first aid to distressed callers. The professional information offered, outside of strong scientific journals, is still rare. There needs to be more communication with the people who will later have to work with AI. The fear of replacing people with job losses should be honestly addressed in the public discussion. There is an urgent need to improve public outreach and to demonstrate developments where the dispatchers are. A technology impact assessment that addresses ethical issues is essential. It should always be kept in mind that technologies, people and society are in a reciprocal relationship. |
| **In-vivo citations:** *"The mental models of how things work, but also the opportunities and risks, are a black box for many colleagues in EMS. What exactly is going on is unclear, and that makes people afraid and leads to reservations.”* |
| **Theory development:** The assumption from Interview 1 that there are severe information deficits among dispatchers towards AI is supported by these data. Fears and reservations are time- and context-bound and are closely linked to prior knowledge. One existing fear lies in the takeover of "human processes" and job loss using AI. A technology impact assessment is essential before developing AI. There are still gaps when it comes to the opportunities, benefits and risks of AI. More data is needed on the opportunities, capabilities, benefits and risks of AI in dispatch centers. Therefore, with interview 4 a focus group with experts from the field will be conducted. |

Table 3. Data aggregation of interview 3.

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| **Interview 4** |
| **Setting and participants:** Focus Group Interview with Microsoft Teams (73 minutes), 1. Dispatch center manager, firefighter, age group: 35-52 years, male, basic AI knowledge 2. Researcher in the field of computer science, especially AI in dispatch centers, age: 35-52, female, no dispatch or EMS experience, expert knowledge in AI, 3. Head of a paramedic school, age group: 35-52 years, male, advanced knowledge of AI |
| **Main findings:** Some good AI-based software tools already exist, but they are not integrated into the operations dispatch system and must be accessed individually. The individual pieces of information, which are still disjointed, must first be brought together by the dispatchers. Due to the mass of tasks and information, this leads to a high cognitive load for dispatchers. A context-sensitive and resource-saving visualization of the information currently required would be important for the future. Information that is not needed now should be suppressed. The routing of rescue vehicles must be improved through real-time traffic data, better connection of points of interest (POIs) and better graphical representation. The interoperability of dispatch centers is rudimentary and must be carried out analogously by the dispatchers in the background. In future, treatment capacities, such as available hospital beds, are to be automatically transferred to the operations dispatch system and intelligently visualized. The entire prehospital rescue system needs more diversification. Currently, dispatchers can often only send an ambulance, even though outpatient psychosocial help would be indicated, for example. Diagnostic tools are needed that perform an automated analysis during the emergency call dialog, for example by analyzing environmental sounds and breathing sounds, as well as simultaneous text-to-speech translation tools. |
| **In-vivo citations:***“We have a lot of great individual systems; I think we have over 20 web-based applications running in addition to our dispatch system.”* |
| **Theory development, research gaps and further sampling:** While there are already good software solutions, these are too little integrated into the dispatching system and must be put together under high mental stress. So far, it has been shown that managers, researchers and other experts have a much more accurate picture of KI in dispatch centers and provide more differentiated arguments than the dispatchers themselves. The improvements mentioned refer mainly to the integration of a context-sensitive visualization of data and the lack auf interoperability. This supports the theory from previous interviews: In addition, there is a need for simultaneous translation of foreign languages, as well as the integrated display of treatment capacities and diagnostic support. To test the theory so far, the next section will interview the head of a new and modern dispatch center. |

Table 4. Data aggregation of interview 4.

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| **Interview 5** |
| **Setting and participants:** Expert one-on-one interview with Microsoft Teams (37 minutes), Emergency physician, university lecturer, former medical director of emergency services, now research fellow, age group: 53-75, male, advanced knowledge of AI |
| **Main findings:** The individual experience of dispatchers is not always sufficient, a validation of decisions in the sense of support for the dispatcher is missing. The Cognitive load on dispatchers is high, which is why they need automated, intelligently visualized decision support. Part of a better visualization can be data glasses, also called Augmented Reality. In the future, it should be possible to use drones to reconnaissance obscure locations. AI should be able to find and visualize safe corridors for evacuation. In general, more digital data must be available to minimize the time-consuming verbal exchange via radio, including treatment capacities. Germany is still stuck in the 90s when it comes to routing emergency vehicles, and digital maps are only partially managed. The digital networking with other actors (i.e. police) must be established. The financing of research projects and the practical implementation of intelligent solutions is already a problem today and will be even more so in the future. New applications must go hand in hand with broadband internet or satellite connections. TETRA, the current radio system, is not broadband enough to handle future data flows in the context of AI processes. |
| **In-vivo citations:** Regarding wishes for the future*: “A dispatch center that is equipped with a variety of AI support systems and provides optimum support for the existing staff positions and does so in a context-sensitive manner. Ideally, it should also be able to anticipate future developments and issue warnings based on past experience.”* |
| **Theory development, research gaps and further sampling:** The theory can be supported by the following aspects: Here, again, the expert believes that intelligent visualization and interoperability among dispatch centers and with third parties are important, and he speaks of a high psychological workload on dispatchers. In contrast to previous interviews with dispatchers, he directly links this stress with the need for greater automation. As an interim conclusion it is noticeable that although various experts and specialists from different fields were included, people whose main occupation is exclusively dispatcher were hardly considered. These people, however, have the most difficulty making clear and concise comments about the concrete implementation of AI in dispatch centers. Despite an increasing satisfactory theoretical saturation, there could be gaps here due to a sampling bias. To prevent this bias, the next data collection will only include people who are mainly dispatchers on duty. |

Table 5. Data aggregation of interview 5.

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| **Interview 6** |
| **Setting and participants:** Individual interviews with six dispatchers, face-to-face in the dispatch center: (Overall 219 minutes, min. 29 minutes, max. 55 minutes), 1. Dispatcher, paramedic, age group: 17-34 years, male, basic AI knowledge, 2. Dispatcher, paramedic, age group: 35-52 years, male, basic AI knowledge, 3. Dispatcher, paramedic, age group: 17-34 years, male, basic AI knowledge, 4. Dispatcher, paramedic, age group: 17-34 years, female, basic AI knowledge. 5. Dispatcher, paramedic, age group: 35-52 years, male, basic AI knowledge, 6. Dispatcher, paramedic, age group: 35-52 years, male, basic AI knowledge |
| **Main findings:** High workload, especially at peak times. Automated routing of ambulances is not always reliable and sometimes takes a long time. Humans have experience and are faster, but in the future, it is conceivable that machines will be faster at routing than humans. AI can certainly improve quality, e.g. through a context-sensitive display of the emergency call dialogue. In future, it should be possible to access patient history, e.g. electronic patient files. Foreign language skills are important for dispatchers, a simultaneous translator would be important. With text-based tools (e.g. Google Translator) this is difficult, because the language must be recognized and typed by the person. Easy-to-use technology is essential for good dispatching. There is no unanimous opinion on the use of standardized emergency call scripts. Two directions are emerging: 1. While the rigid structure of a standardized query is helpful for new and inexperienced dispatchers, it slows down experienced dispatchers. This is a burden. For this reason, the standardized structure is perceived as a hassle, and is sometimes bypassed and filled out after the alarm, which is faster. For experienced dispatchers, standardized dispatching is only advantageous in extreme situations. Without the structure, experienced dispatchers work faster and better. 2. The standardized query should always be used and is a quality criterion because it ensures that nothing is forgotten. An AI tool for break and duty scheduling would be nice. The treatment capacity display should be integrated into the dispatch system. If AI was better, which would have to be proven, it would be accepted as a dispatcher. It is striking that there are few ideas about what AI could do in dispatching. The future ideas and wishes expressed regarding a networked, intelligent dispatch center of the future are therefore very thin on the ground. Dispatchers must sometimes rely on their own notes, such as which emergency medical service, police or psychiatric hospital is responsible for the area. Some of these notes are kept in Excel and stored locally. |
| **In-vivo citations:** *“I always say. In the old days, we did just as good a survey as we do today with the standardized emergency dialogue. Nevertheless, fewer people died back then, on the contrary. Ambulances were on the road faster than today, where all this, let me call it bureaucracy, has to be dealt with before a ambulance can roll"; "I also always say that I can manage without a system, I know where my cars are"; "Whereby, as I said, I am no computer scientist, but I imagine it to be very utopian and futuristic, that the current traffic situation, the afternoon traffic, will be included in the resource proposal, then the resource proposal will probably take even longer until I get a result"* |
| **Theory development, research gaps and further sampling:** Dispatchers are not generally dissatisfied with their work. However, when it comes to specific wishes, they are similar to managers in that they would like to see scheduling tools, intelligent visualization, and more automation to reduce the high mental workload. The perception of rigid and highly standardized structures is very heterogeneous and there is disagreement among the dispatchers. Otherwise, there are some similarities to the previous interview, especially in terms of content. Theoretical saturation is increasingly achieved through overlapping content. The perception of the controversially discussed standardized emergency call query schemes should be further researched. In addition, the individual medical perspective has so far mainly been represented, but not the large-scale emergency. |

Table 6. Data aggregation of interview 6.

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| **Interview 7** |
| **Setting and participants:** Expert one-on-one interview with Microsoft Teams (34 minutes), PhD in engineering with management experience in a large professional fire department, ministerial management activities, expert in strategic emergency response and hospital crisis teams, own experience on site during disasters, age group: 53-70 years, male, advanced AI knowledge |
| **Main findings:** In general, Germany has too many dispatch centers and they are poorly networked. This problem also needs to be addressed by political actors. The networking of dispatch centers with the smart devices of the citizens is necessary, but not given. This would help with mass events, for example, because the number of SmartDevices and their movements within the geofences could be used to make precise statements and plans. If AI methods are used in the future, we can expect acceptance problems and technical setbacks, especially at the beginning. This needs to be communicated. Predictive analyses are necessary, e.g. of emergency focal points. In the future, it will also be necessary to analyze exactly what dispatchers should and can do. It is doubtful whether new specializations, such as drone operators, can realistically be taken on in addition to the current, extensive tasks in high quality. Data from disasters such as the flood in the Ahr valley must be better utilized to learn for future situations. Knowledge management is still not developed enough. Dispatchers must be involved in all processes, as they determine the acceptance of a new technology. |
| **In-vivo citations:** *"Germany is still in its infancy, a developing country, as far as the networking of dispatch centers is concerned"; "Whoever operates emergency dispatch centers today without networking them with neighboring dispatch centers is acting in a way that can almost be considered organizational failure".* |
| **Theory development, research gaps and further sampling:** Here, the insufficient interoperability is also addressed, but also the poor connection of smart devices of citizens, the lack of predictive analysis based on big data and the lack of knowledge management based on data from past catastrophes. It is clearly stated that dispatchers must be centrally involved in developments and integrations and that communication must also be directed at them. As yet unknown changes to the profession and job losses due to AI are worrying. Information for dispatchers is limited. A technology impact assessment is essential before developing AI. There are still gaps when it comes to the opportunities, benefits and risks of AI. The gaps from interview 6 still exist, so the next interview will again rely on dispatchers. |

Table 7. Data aggregation of interview 7.

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| **Interview 8** |
| **Setting and participants:** Focus Group Interview with Microsoft Teams (89 minutes), 1. Dispatcher, paramedic, age group: 35-52 years, male, no AI knowledge at all, 2. Dispatcher, paramedic and professional fire fighter, age group: 35-52 years, male, basic AI knowledge, 3. Dispatcher, paramedic, age group: 53-70 years, male, no AI knowledge at all, 4. Dispatcher, paramedic, age group: 17-34 years, female, basic AI knowledge, 5. Dispatcher, EMT and professional fire fighter, age group: 17-34 years, female, basic AI knowledge, 6. Dispatcher, EMT and professional fire fighter, age group: 53-70 years, male, no AI knowledge at all, 7. Dispatcher, EMT and professional fire fighter, age group: 17-34 years, male, basic AI knowledge, 8. Dispatcher, paramedic, age group: 53-70 years, female, basic AI knowledge, 9. Dispatcher, paramedic, age group: 53-70 years, male, no AI knowledge at all |
| **Main findings:** Dispatchers are not being educated about AI and innovations. If they are not interested in it and do not inform themselves about it, there will be gaps in their knowledge. Dispatchers perform at a high level and their experience cannot be replaced by technology. Humans can empathize with the callers, recognize emotions and respond to them, an AI cannot. This is important. Not all dispatch centers use a pre-defined query structure for calls, the picture is very different in Germany. The perception of fixed call query structures is heterogeneous. For inexperienced, new dispatchers, they are helpful and important. For experienced dispatchers, however, the perception is different and sometimes ambivalent. On the one hand, the group agrees that a rigid structure may have advantages for everyone, but that this must be judged individually. On the other hand, experienced dispatchers perceive the structure as a kind of bureaucracy. An own mental image of the call situation is sometimes disturbed or not possible by the fixed query. Even supporters of a rigid structure admit that it often leads to redundant questions, because the caller may have given the information much earlier, but the input mask was not yet at this point. A flexible query structure that allows a standardized query of all important information, but in a flexible order, would be desirable. In relation to this flexible query structure, an easy-to-understand visualization is desired. The term "AI" does not appear in this context. Overall, it is often said that technology cannot replace people. The dispatchers fear to be replaced by technology. Despite the skepticism towards AI, the fear and uncertainty of future AI-driven changes in the workplace is discussed. |
| **In-vivo citations:***“* *I have been doing this job here for 15 years. I have seen and heard a lot. I need to be shown that an AI can do my job.”* |
| **Theory development, research gaps and further sampling:** The perception of a rigid dialogue structure is mixed. The consensus is for software-based flexibility of the query with a simple visualization. Overall, ambivalent impressions remain. On the one hand, people are skeptical about new technologies, including AI, but would like to see methods that can be solved primarily by AI. |

Table 8. Data aggregation of interview 8.