Appendix 3 – Sample of analytical memo

July 25th, 2019 – analytical memos

- Methodology section: the analysis started with the sensitizing concept of "trace", here is how it is defined in the literature. Within the first round of analysis, we realized that that definition was not going to capture what we were seeing, here is what we added and then based on a more fulsome analysis of the entire data set, and here is the refined.

- Shadow-like traces (instead of left over?): the physical trace is gone but the shadow of the intent remains (purple armband, butterfly)

- Purple armband teaches something important about purpose. A physical trace embodies a purpose but that purpose can come back as another physical trace. You don't always need the same physical trace. A purpose can manifest in other physical traces. Relevant for when you want to retain the purpose but deflect some of the symbolism of the physical trace that became problematic. For example, in the future we might not want to use the purple armband to flag violent patients because that physical trace took on a whole different meaning like patient objectification; instead use the exclamation mark by the door as opposed to put something on the patient.

- To consider… instead of "absence of people" as a trace, maybe label the trace as "change in routine" (families leaving the unit to avoid receiving news, family members standing outside the room vs. inside)

- There seems to be two types: institutionally-sanctioned or formal traces (things we, as an institution, agreed with) and personal or informal traces (things individual people tend to do). It seems that the institutional ones are good to have but less exciting. Do I have personal examples that makes people go, we do that, oh my god why do we do that? What are the unintended consequences of doing that? For the next few interviews, pick a few that get people thinking that way and see what people have to say about it.

- Are there other types of traces than formal and informal?

- Note the contrast of the kinds of situations that people talk about: stable teams vs. high stakes situations

- Relationship between purpose and situation: leaving the patient chart on the bed is efficient because it allows for communicating during asynchronous situations (the nurse doesn't have to be there). Also, putting the medication on the anesthesia tray is for saving face during synchronous situations.

- We need to discuss the theoretical importance of the potential for left over traces given the fact that people guard against that possibility (restrains in the geriatric unit and the physician saying that it is not possible because it would be a huge mistake, hence there are things in place that prevent that from happening). Consider it to be an important part of the definition.

- For the story, I probably need an anecdote similar to Jennifer Clasen's paper. Pick a couple of examples that have safety implications and ask people to think about their effects – that might be a way to find that anecdote!
- For the introduction (BMJ safety): after the P/G/H paragraph, I might need to write a paragraph about the direct communication protocols and how popular they have become. Then a paragraph to say something like "but we understand there is a lot of complexity around these protocols because yes, there are direct communication protocols, but people still do all this other stuff, which sort of confounds the effect of the direct protocols; which might indicate that people are not taking those protocols in the way they were intended to. But more importantly, we haven't looked at the indirect communication systematically to ask the question of what purpose does it serve? What patterns does it have? We can then say, indirect communication is not only unavoidable, but it is also profoundly interfering with our direct protocol interventions, which is where we put 90% of our attention in communication interventions in patient safety. I am neither for nor against indirect communication, but unless we understand it much more systematically than what we do now, we cannot decide either what's its relationship to direct protocols or how to support the good stuff in the indirect and tease out the problematic stuff". Frame the first paper as we know that this part of the communicative landscape, other disciplines/settings (SI in other contexts) have taken it quite seriously and seen how productive and influential it can be, we should use that to at least start exploring what is this phenomenon in healthcare.

June 13, 2019 – analytical memos

- The purple arm band example raises the question of when a person bears the indirect communication of someone else. That's the debacle of the purple arm controversy because the patients don't want to send that message about themselves, they resist that message and it is someone else sending it. The purple arm band also means multiple things to multiple people, for example there might be people who would read it as a violation of human rights, therefore the purple arm signifies "this person has been victimized, therefore I should treat him more carefully".
- The purple arm band is a good example of a trace that can be decoded in multiple ways
- Need to probe for more examples in which the person uses the same trace to communicate different messages to different people
- The multiplicity of meaning in traces is unique to our social settings and sophistication as humans
- Moving forward with data collection, focus on asking questions to refine a definition of a trace in healthcare (follow the process similar to Jennifer's definition of allowing to fail – check it out!). In her case, the definition emerged out of looking at all the examples she collected and then she used the examples to illustrate the dimensions of the definition in the paper.

- Craft a potential definition based on the examples I have and then ask myself the question of what would the components of the definition of a trace be? Potential dimensions of the definition: promoting indirect communication, prompting action, intentionality, multiplicity of meanings which could be used on purpose (people can see it in multiple ways), failed traces
- Another consideration for future interviews: the fact that really good clinicians read traces from patients better than other clinicians. Example from Mark on when he knows that the patient is ready to go home because when he comes to see them on day 9, they have their hair done and the lipstick on. For him it prompts the action of talking about discharge. Are there traces that they are trained to read as part of their diagnosis and management process? Ask Mark for more examples such as this one!
- Also explore further the idea of *successful* and *failed* traces (use the Bromiley's case an example), as well as the idea of *resisted* traces, which begs the question of whether there is a broader array of traces.
- Thinking about a potential taxonomy then we can ask what kind of trace is it?: Is it physical? Is it technological? And then what's the effect of the trace?: is it the desired effect? A different effect? No effect (when it is ignored)?
- An interesting way of doing the taxonomical description could be by mapping out the social life of a trace from creation to expiration: how is it placed? What's its nature? What actions or response does it provoke? What are all the variations that a trace can take in its life (e.g., the purple band took a life on its own from being a trace to becoming a movement)? What's the expiration of a trace in our context?

Insights to consider for discussion:

- Double-barreled traces highlights the importance of context because on a busy day you might use traces more than during a not busy day. And also that traces indicate more than action, they are often for-action but most times, they indicate more than that.
- Revision for the hook: if we understand more the role of indirect communication, then rather than just advocating for direct, can we advocate for productive combinations. Therefore if we can find a way to advocate for certain forms of indirect communication. For examples in situation where there is no time for a conversation or when people work asynchronous and they cannot be together?
- There is strong overlap with sociomateriality but it's not a reason to worry but need to acknowledge and need to articulate what's unique to the swarming perspective: **I am interested in traces for the collective communication purpose**. Sociomateriality is interested in objects for other reasons, not necessarily for teamwork. My specific angle is the teamwork and swarm aspect. **What's unique might be the intentionality** part (i.e., the leaving of the coat). I am not interested just in the coat as a sociomaterial artefact, I am interested in the intentionality behind the artefact. **It is about the potential of traces for improving interaction.** My focus is still on the social with humans using

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objects intentionally for interaction purposes, not that objects have agency. In sociomateriality, objects and humans are equally important (MacLeod 2019).

- Although we are good at understanding the meaning of a trace in a context, we don't necessarily recognize it as a *message*

- Co-existance of different meanings in the same trace in the same situation depending on who is "reading" the trace

- Can stigmergy help us think differently about the challenge of negotiating the definition of the problem? by directing attention to the traces of work that signal other people's definitions of the problem and building/acting on it to create our own definition of the problem? Even though each person acts individually, I am thinking that the "traces" of their definition of the problem might be part of what makes the team to define the problem collectively. Currently, because of our strong reliance on leaders and scopes of practice, I am not sure that team members are attuned/aware to perceive other people's traces or whether they only perceive the "trace" left by others like them, not the traces left by people in different roles? And even further, I am not sure to what extent they are empowered to enact their self-determination in response to perceiving the "traces" of others?

- Direct vs. indirect communication in humans is not black and white, same as explicit vs. implicit – will have to discuss this issue!: Given the complexity of human culture and engagement, traces can have different meanings to different people in different situations, indicating that for the most part, we use traces as an implicit form of communication (ants use traces as explicit communication!)

- Traces blend into our day-to-day without our notice, but once one begins looking, they seem to crop up all around and in every situation. E.g., a practice common in Italian espresso bars where waiters place empty saucers on the counter next to the espresso machine which communicates to the barista that these are to be filled with cups of coffee.

- A few participants have brought up the idea of how the word "swarming" or "swarm intelligence" has been taken up in medicine literature as "all come together quickly to solve a problem (e.g., cardiac arrest)" and that the way I am describing it (I prefer "swarm intelligence") seems to entail a more complex set of concepts behind. This makes me realize that one of the purposes of this paper is also to move the notion of "swarm intelligence" from its colloquial uptake to positioning it as a scientific term. Might need to do a quick search of literature to see the trend of colloquialism of the term. *Swarm intelligence systems are typically made up of a population of simple agents interacting locally with one another and with their environment. The agents follow very simple rules, and although there is no centralized control structure dictating how individual agents should behave, local interactions between such agents lead to the emergence of intelligent collective behaviour.*

- High level explanation of SI diagram: The principles of communication (**solidarity and stigmergy**) are possible because of the **awareness** and **self-determination** of individual members. The most important feature of swarm intelligence is that the behaviours of individual swarm members do not determine how the swarm functions, rather their

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ability to perform distributed work (i.e., similar tasks are accomplished by different members of the system). In human societies, specialization (i.e., role separation) has shaped our history in important ways however with swarm intelligence, distributed work has proved extremely effective. Because there is no division of labor, individuals are interchangeable and an individual currently performing one task can replace another individual performing another task. In this way, the collective exhibits **self-healing** behaviour by becoming very robust to the loss of individual swarm members because no member is irreplaceable. Swarm intelligence principles allow for problems to be solved in a bottom-up way – the collective is a **self-organizing system** – with no central controller or leader.