

PRODUCT DEVELOPMENT BASED ON HUMAN BEHAVIOUR.

FUSE 9/23 2016 | J NILSSON AUTOMOTIVE UX LEAD

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USER CHALLENGES IN AUTONOMOUS DRIVING

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- User challenges and **HUMAN BEHAVIOR**
- What does **HUMAN COMPLEXITY** stand for in a safety context?
- What do we need to **UNDERSTAND** to assign responsibilities to human users?
- Consider this **FOOD FOR THOUGHT**

ROLES & & SYMPATHETIC COOPERATION



CBS NEWS / December 11, 2013, 11:38 AM

Asiana crash hearing focusing on role of pilots, automation



“The pilots may have not fully understood the workings of the automation.”

“Lack of confidence makes us reluctant to intervene quickly or effectively enough when the automation isn't doing what it should.”

- CAPT. CHESLEY SULLENBERGER, AVIATION AND SAFETY EXPERT

SIMILARITIES TO AVIATION

* Billings, C. E. [1991].

Human-centered aircraft automation:

A concept and guidelines.

- A vast majority of "human error" airplane crashes are a result of **MODE CONFUSION**
- Unlike airplanes, we don't have **PROFESSIONAL** drivers in cars,
we might even have drivers with degraded performance due to automation

STIMULATION & VIGILANCE

“If you build a system where people are rarely required to respond, they will rarely respond when required.”

- Hancock, P.A. [2013]. Automation: how much is too much? In: Ergonomics, vol. 57, nr. 3, p. 449-454.

- Users have to **MONITOR** the automated systems while few things are happening
- We're not that good at remaining **VIGILANT** in the long run, whilst monitoring systems; partly due to **UNDER-STIMULATION**

RESILIENCE & FLEXIBILITY OVER TIME

- Will users behave the same **OVER TIME** ?
- Resilient or flexible enough to **FACILITATE CHANGE** over time



BALANCING ON A THIN PLANK

- We constantly make decisions based on **CONTEXT, FEEDBACK, CULTURE, STRESS, WORKLOAD, PERCEPTION, EXPECTATIONS, TRAINING, FEELINGS** etc.
- We don't always behave "**LOGICALLY**" or "**RATIONALLY**" from an engineer's point of view
- We can't develop systems according to how humans behave under **IDEAL CIRCUMSTANCES**

RATIONAL & IRRATIONAL BEHAVIOR

- Can a user do something **WRONG** ?
- We need to account for all different ways of “**MISUSE**”
- Systems/standards/regulations/rules/guidelines shall not **CONTRADICT** human behavior

SITUATION AWARENESS

- One major factor is how well we **KNOW** what is going on, so that we can **FIGURE OUT** what to do
- A user is **IN-THE-LOOP** when involved in driving, aware of the status, and actively making decisions
- In various modes of automation, user involvement decreases, causing **OUT-OF-THE-LOOP** performance

SYMPATHETIC HANDOVER BETWEEN AD/MD

- Lower SA [passive understanding] is extra problematic when **TRANSITIONING** from a higher level of automation to a lower one
- Not only do we need to make sure to have a **SYMPATHETIC COOPERATION** between the driver and the vehicle, we also need to make sure that it covers all situations and all **DIFFERENT UNPREDICTED BEHAVIORS**
- If we ask users to take over in a out-of-the-loop state, it might work, but it's definitely **NOT OPTIMAL**