PhD project: User-centred design (UCD) framework for digital manufacturing

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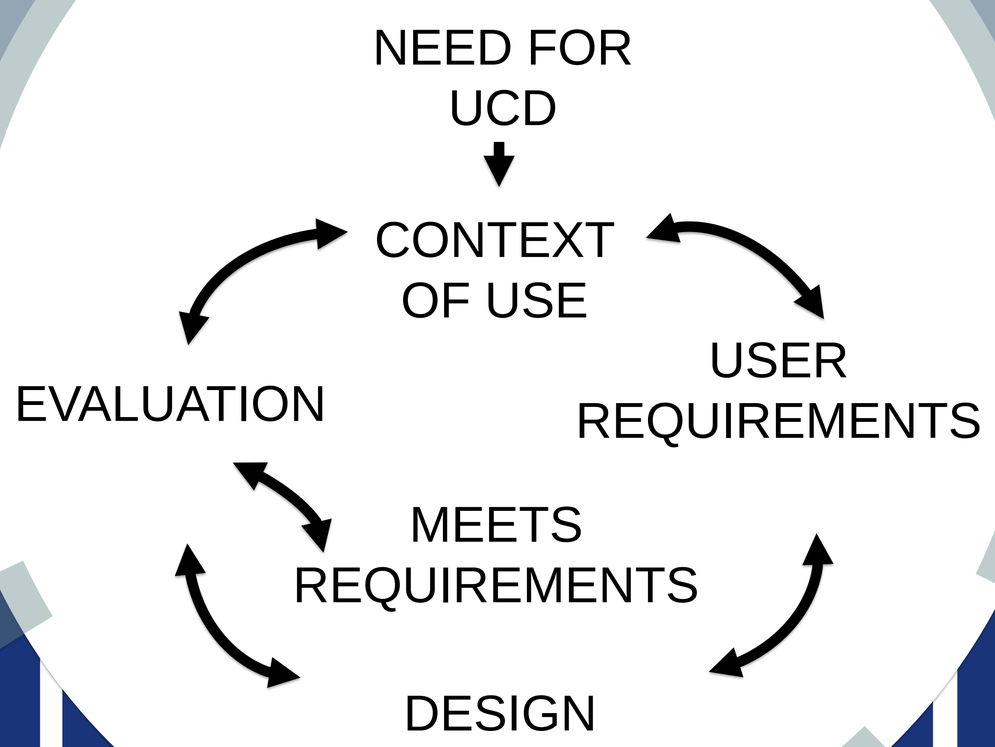
Why is UCD important?

- To **prevent errors** that can arise from design that is inconsiderate to human capabilities and limitations (Endsley and Jones, 2012)
- Satisfied users will be more likely to have **positive attitudes** and accept new technology
- To ensure that systems **help users achieve** their **goals** instead of overcomplicating (Wilson and Sharples, 2015)
- To **consider the situation** in which the designed technology will be used (Boy, 2013) – people working on the assembly line, or in management will have different needs.

How is new technology changing manufacturing industry and should we think about UCD?

Traditional UCD process



Is traditional UCD framework able to meet industry's requirements?

What will be the new technologies brought by Industry 4.0?

- Human-robot collaboration
- Augmented reality (AR)
- Virtual reality (VR)
- Internet of Things (IoT)
- Augmented operator
- Simulation (Digital Twin)
- Big data analysis

The problem?

- Increased **complexity** of the technology and systems, **insufficient** user-centred design **guidelines** and **lack of research** in the area make the design for future smart factories a challenging task.

Is UCD currently used in design for manufacturing?

- The initial qualitative study, conducted as part of this PhD, suggests that there are certain barriers preventing the use of UCD: (a) approach-associated concerns, such as difficulty to set up and lack of flexibility and (b) cultural barriers – focus on efficiency of the production process, instead of human factors.

Areas for further research in this PhD

- **Industry workers' subjective attitudes towards digital technologies**
- **Situation awareness, decision making and the link to design practice**
- **User requirements for multi-modal virtual environment training in industry**
- **User requirements for complex data visualisations**

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References:
Boy, G.A. (2013). *Orchestrating human-centered design / Guy André Boy.*, London.
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Wilson, J.R. & Sharples, S. (2015). *Evaluation of human work / edited by John R. Wilson, Sarah Sharples.* 4th ed., Boca Raton ; London.