SunSet: Scrub Nurse Non-technical Skills Training System

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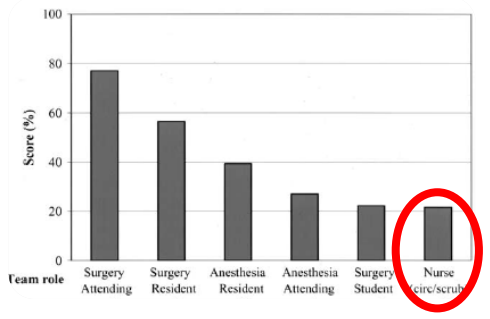
CONTEXT & OBJECTIVES

- Develop and assess a new generation of immersive virtual reality based training system for non-technical skills
- Assess Situation Awareness (level 1), a most critical NTS for accurate decision, efficient communication and appropriate leadership [1]

Category	*Element*
Situation awareness	• Gathering information • Recognising and understanding information • Anticipating
Communication and teamwork	• Acting assertively • Exchanging information • Coordinating with others
Task management	• Planning and preparing • Providing and maintaining standards • Coping with pressure

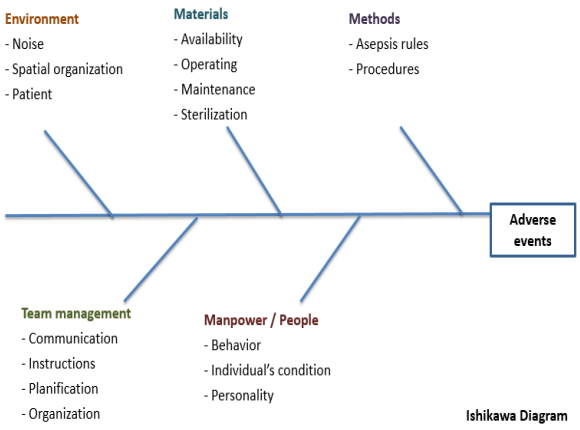
Scrub nurses non technical skills [2]



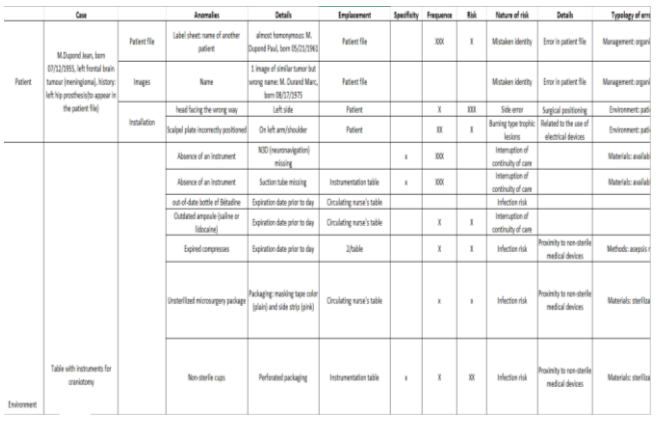
Situation awareness in the OR [3]

PROGRESS

- Create NTS based training scenarios :
  - **Operating room (OR) of errors**
- Perform experiments
  - Conduct simulation sessions with scrub nursing students
  - Protocol (2 conditions): low vs high mental load
- Mental load induced by the noise level in the operating room, increased by the time pressure induced by the presence of a timer



Analysis: typology of errors



Scenario: selection of errors

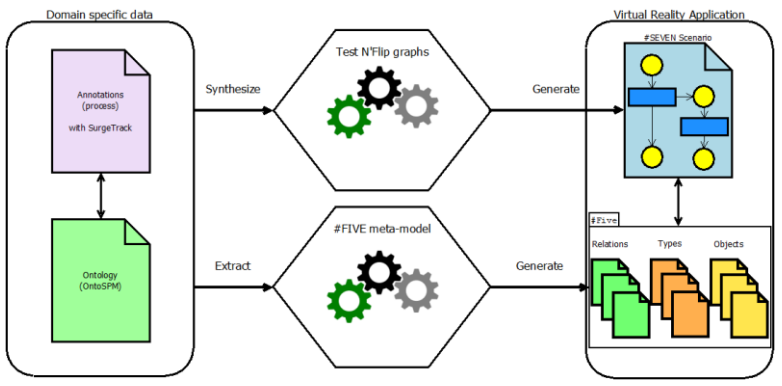
VIRTUAL REALITY APPLICATION

- Controlled dynamic environment (background sound, clock)
- Multi VR platform application (from HMD to large immersive screens)
- Interaction with each object in the environment (assemble, fill, unpack, cut, …)
- Virtual collaborators can interact with the user or the environment
- Integrated in-application assistance
- Demonstration mode with video recording
- Application based on our own interactions engine #FIVE[4] and scenarios engine #SEVEN[5]

Application: immersive interactions

NEXT STEPS

- Develop a second scenario to develop and assess social skills (communication or teamwork)
- Metrics for automatic/semi-automatic performance evaluation
- Based on ontology and process annotations, automatic generation of #SEVEN scenario using Test N'Flip graphs and #FIVE interactions using SPARQL queries and a #FIVE meta-model
- Maintaining link between ontology and annotations in the virtual reality application for logging and reporting.



Synthesize Virtual Reality application from domain specific data

1. Flin, R., Youngson, G. G., & Yule,S. (2015). *Enhancing Surgical Performance: A Primer in Non-technical Skills*. CRC Press
2. Mitchell, L., Flin, R., Yule, S., Mitchell, J., Coutts, K., & Youngson, G. (2012). Evaluation of the Scrub Practitioners' List of Intraoperative Non-Technical Skills (SPLINTS) system. *International Journal of Nursing Studies, 49*(2), 201-211
3. Guerlain, S., Adams, R. B., Turrentine, F. B., Shin, T., Guo, H., Collins, S.R., & Calland, J.F. (2005). Assessing team performance in the operating-room: Development and use of a « black-box » recorder and other tools for the intraoperative environment. *Journal of the American College of Surgeons, 200*(1), 29-37.
4. Rozenn Bouville, Valérie Gouranton, Thomas Boggini, Florian Nouviale, Bruno Arnaldi. #FIVE : High-Level Components for Developing Collaborative and Interactive Virtual Environments. *Proceedings of Eighth Workshop on Software Engineering and Architectures for Realtime Interactive Systems (SEARIS 2015), conjunction with IEEE Virtual Reality (VR)*, Mar 2015, Arles, France. 〈hal-01147734〉
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