Reality-Based Interaction for Control Rooms

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Control Rooms now and then

Manipulation of process variables -such as temperature, pressure or speed- is a major task of control room operators. When digital technology found its way into the domain, interaction with these variables changed fundamentally: virtual control elements on computer screens no longer provided the sensory qualities of the physical actuators. Additionally, virtual control elements no longer provide the meta-coordinative features of physical control elements as they are no inherent part of the interior design. As a consequence the awareness for ongoing processes decreased which at the same time fostered the loss of the „big picture".

Evolution in operators' work environment: from manual and physical control (left) to digital and virtual control (right).
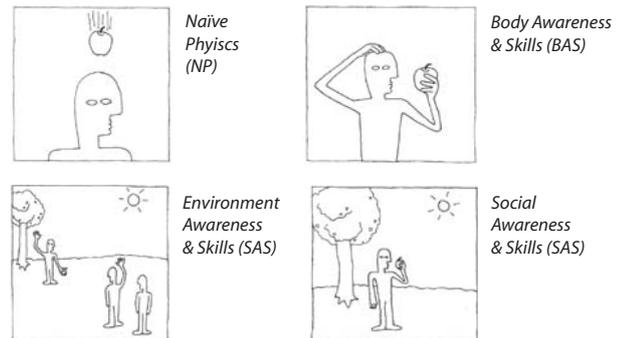
The balance of physical and virtual representation

While digitalization gave control rooms more processing power, it also abandoned former interaction qualities that were strongly related to real world phenomena. With respect to these qualities we consider hybrid surfaces as a potential candidate to address the identified shortcomings: they allow to combine the power of the digital world with the interaction qualities of the real world.
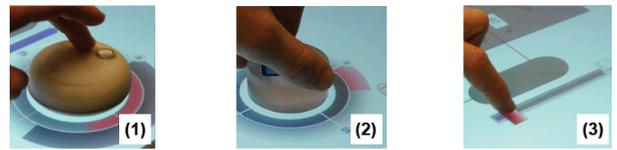
Categorization of hybrid surface interaction according to the balance of physical and virtual representation.

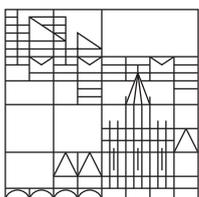## Study: Hybrid Surface Interaction in Control Rooms?

In order to determine the suitability of hybrid surface interaction in control rooms and to achieve a well-considered balance of virtual and physical representation, we applied the Reality-Based Interaction (RBI) Framework. RBI presumes that building interaction upon informal real world knowledge reduces the required mental efforts. Jacob et. al. identify four themes (RBIT) that make use of real world knowledge for better interaction. At the same time context-specific requirements may exist which limit the degree of reality and require to add digital functionality. In a focus group of usability experts (N=5) of the domain we discussed these power vs. reality tradeoffs to gain insights into the balance of both representations.

Naïve Phyiscs (NP)

Body Awareness & Skills (BAS)

Environment Awareness & Skills (SAS)

Social Awareness & Skills (SAS)

Jacob, R. J. K. et. al. Reality-based interaction: a framework for post-WIMP interfaces. In Proc. CHI ´08 (2008), ACM Press, 201-210

Key Findings

- All participants argued for token-based interaction scenarios as they provide the sensory qualities of real world physics (*NP*) and collaborative features such as informal (location-based) clues, e.g. responsibilities for ongoing processes (*EAS & SAS*).

- Physical constraints have been considered necessary to allow both, bimanual manipulation (*BAS*) and/or synchronous multi-user manipulation (*EAS & SAS*).

- With respect to the given task the efficiency requirement was defined as a matter of speed, accuracy and memorability.

- Operational-safety has been identified as the major requirement. As an impact on the design, tokens would need to be equipped with an extra confirm button to reduce the risk of maloperation.