Exploring HMI concepts for human-line interaction design: the ceramics case study

E. Prati [1,*], M. Peruzzini [1], A. Pollini [2]

[1] Department of Engineering “Enzo Ferrari”, University of Modena and Reggio Emilia, Modena, Italy | [2] BSD Design, Milan, Italy

* elisa.prati@unimore.it

Introduction and study goal

The **User eXperience (UX)** and **Human-Machine Interfaces (HMIs)** play a fundamental role in the industrial sector, especially in complex production lines such as for ceramic slab manufacturing. However, UX and HMI are usually **not properly taken into account** during the production design process, causing problems both in terms of performance, and operators’ physical and cognitive overload. To face this problem, this work proposes a **methodology** to guide the design team in the definition of new concepts for the **UX improvement**.

Methodology

The proposed methodology defines a **set of techniques** to support the definition of **design concept focused on the UX** improvement, and able to raise the production process value and distinguish it on the market. According to the User-Centered Design (UCD) approach, end-users should be involved in the whole design process, however this is not always possible in industry due, for example, to the high level of confidentiality required by clients. For this reason, the proposed methodology is structured in a sequence of techniques (Figure 1) able to fill this lack and focus on the whole UX. In particular, the **stakeholder interviews** technique allows to study the current scenario and indirectly understand the users’ needs, filling in the lack of a direct users involvement; at the same time, the **design thinking workshop** and **idea generation** are key phases to reach innovative design concepts.

Case study and results

Figure 2a shows the **production line of a large ceramic slabs**, produced by an Italian company world leader in the sector. The line is characterized by an **highly-integrated manufacturing synchronization of interconnected machines**, with the engagement of **operators for programming, monitoring, and maintenance tasks.**

Appling the proposed methodology, the current scenario was analyzed identifying different problems (Figure 2a) that guided the definition of the new **Human-Line Interface (HLI)** concept (Figure 2b) as the best solution to improve the current UX and satisfy the user’s needs. The HLI’s structure and page layout were studied developing wireframes (exemples in Figure 3); secondly, visual style study was conducted together with the interactive prototype creation (Figure 4).

Figure 1. UX-based design methodology

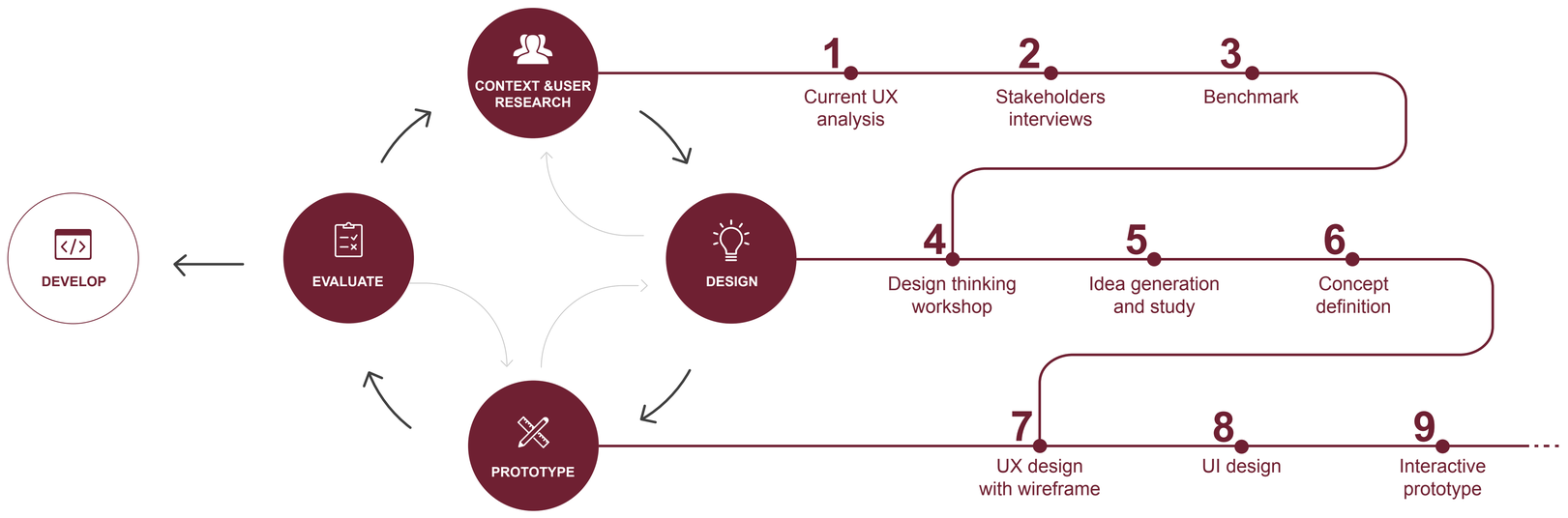


Figure 2. Interaction flow before (on the top) and after (on the bottom) the redesign

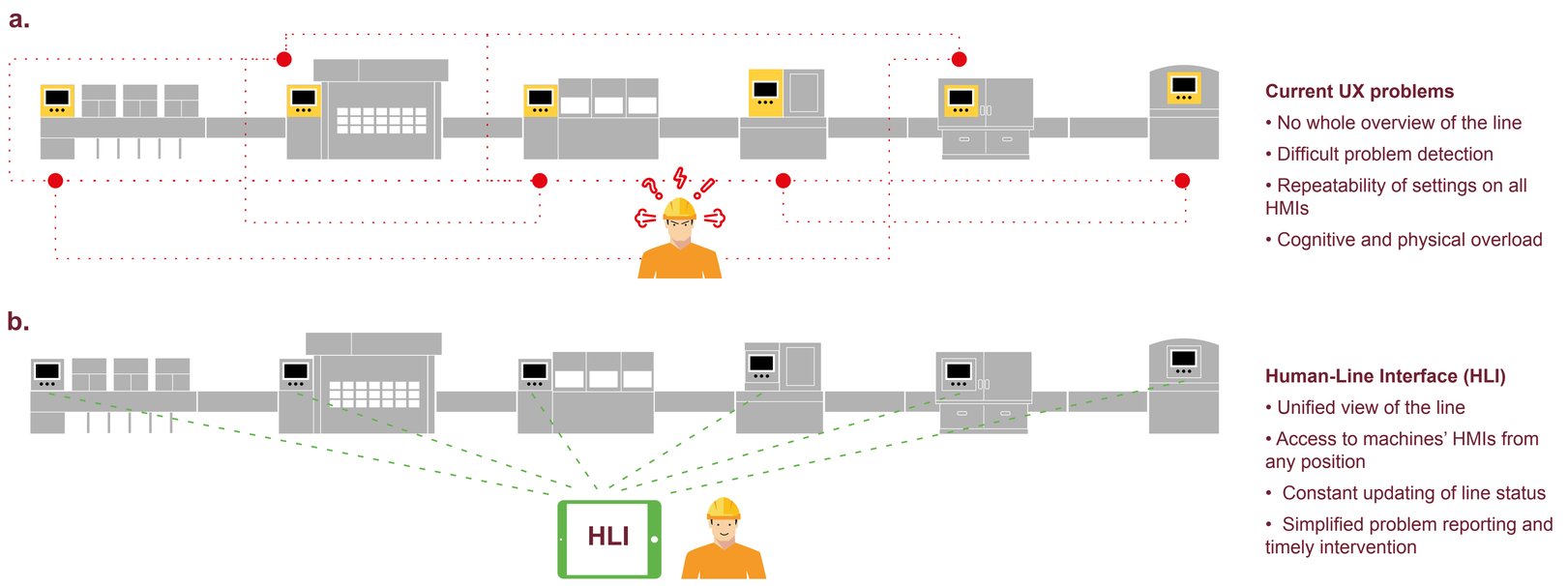


Figure 3. HLI architecture

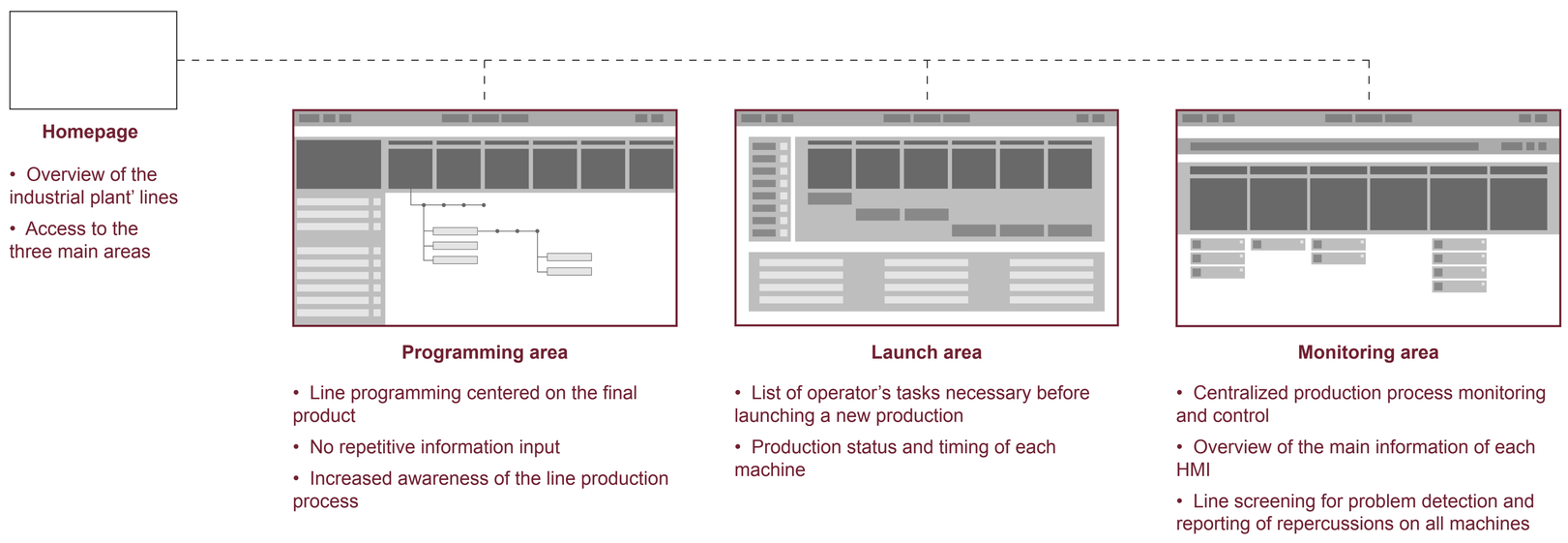
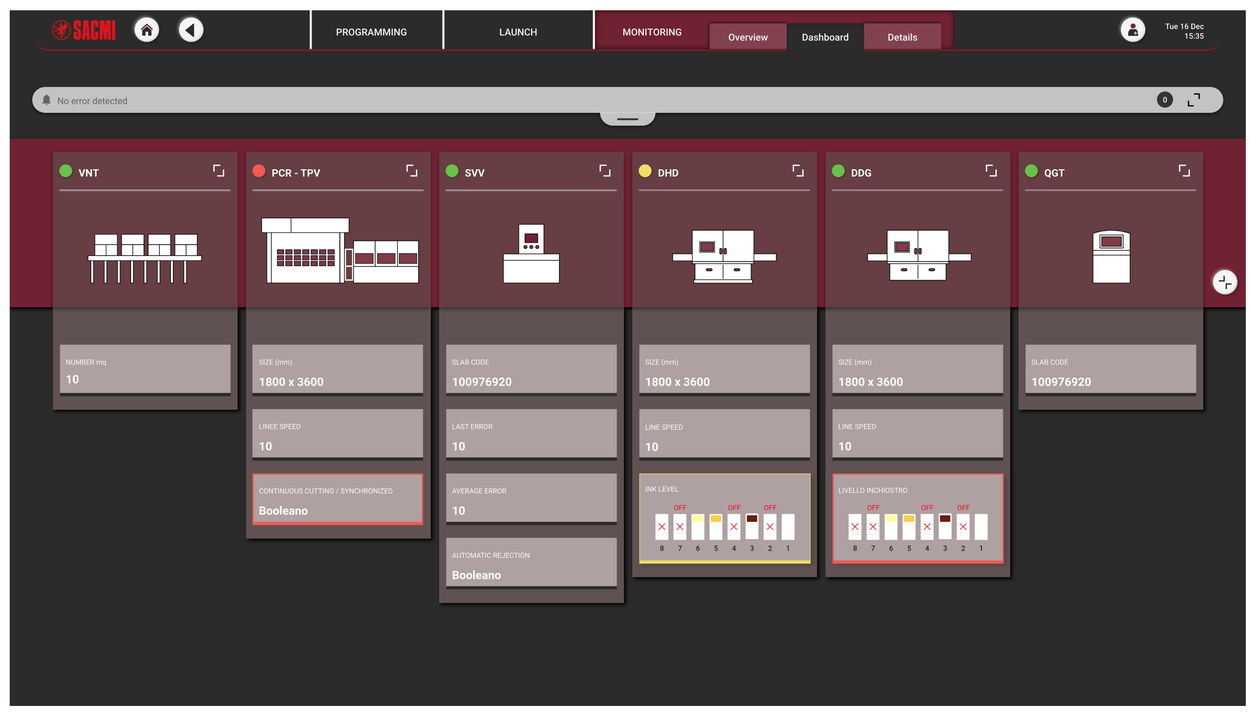


Figure 4. **HLI page example**



SCAN TO INTERACT WITH THE **PROTOTYPE**!