

Innocent’s Soft Facades: Rediscovering a Vision for Adaptive and Malleable Interfaces

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Abstract

System-led interface adaptation and user-led tailoring of malleable systems are often treated as conflicting approaches, leading to systems that either overwhelm users with configuration demands or strip them of agency. This division overlooks a rich, integrated history of how these concepts were once envisioned to work together, leaving a gap in our understanding of how to design assistive interfaces. This paper addresses this challenge by revisiting Peter Innocent’s 1982 work on “soft facades” and “self-adaptive interfaces.” It reintroduces Innocent’s vision and illustrates how adaptation can act a mechanism to support user-led tailoring. It thus provides a historical lens how the divide between adaptation and malleability research can be bridged and opens new research avenues into managing the collaborative configuration of malleable systems between a system and its user.

CCS Concepts

• **Human-centered computing** → **HCI theory, concepts and models.**

Keywords

Adaptive user interfaces, malleability, artificial intelligence agents, visions

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1 Introduction

In 1982, Peter Innocent published the paper “*Towards Self-Adaptive Interface Systems*” in the *International Journal of Man-Machine Studies* [2]. It laid out a vision for user interfaces that could adapt to users’ needs and preferences. He captured this idea in the metaphor of a *soft facade*: If a system were a building, the system’s user interface would be its exterior. Typically, that exterior would be built as a

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rigid construction to weather all environmental conditions. Instead, Innocent argued, user interfaces should be flexible and malleable, soft to the touch if you will, but above all changing to the form that was needed.

Innocent’s work was pioneering in its anticipation of the challenges and opportunities in user interface adaptation, malleability, and even human-artificial intelligence (AI) interaction. He started from the premise that the user would control the tailoring of the interface, even when the system initiated adaptations. This notion is prescient for its time but overtly timely today. Yet, Innocent’s work remains severely underdiscussed in historical accounts of interface adaptation and malleability research. It is worth revisiting his ideas to see what they can tell us about effective user interface adaptation and about future directions for human-centered interaction assistance.

2 Soft Facades and Self-Adaptive Interfaces

Innocent’s central thesis contrasts the “classic” design process, where a single configuration is decided upon and deployed universally, with the need to continuously tailor an interface to fit a user’s situational and personal needs. He argued that to function in the dynamic reality of human interaction, a system must offer various ways to reconfigure its user-facing modalities, since people, tasks, and plans are ever-changing.

He further distinguished three sources for this reconfiguration: the designer, the user, or the system itself. He framed system-led adaptation, what we now typically call user interface adaptation, as a means to minimize the effort of tailoring. In his model, the system may steer and guide this process, but the user remains the ultimate locus of control, with adaptation serving as a form of assistance.

3 Why is it relevant today?

Innocent’s distinction between “*designer-modified*”, “*user-modified*”, and “*system-modified facades*” is a remarkable precursor to the research areas of user-centered design, malleable interfaces, and automatic adaptation. He recognized important opportunities, but also challenges, that these strands of research would be facing. For example, he recognized the problem of *co-adaptation*, where system-initiated changes and corresponding user reactions create an unstable feedback loop [1, 3].

More strikingly, however, his distinction appears much less rigid than it does today. For example, Innocent’s work, which emphasizes that systems must accommodate how users dynamically construct and change plans during interaction, aligns surprisingly well with the critique of situated action [5] that informs much of malleability

research, predating Suchman’s landmark analysis by a remarkable five years.

Similarly, he appears to operate comfortably between malleability and adaptation, presenting malleability as a prerequisite to adaptation and adaptation as a means to support the tailoring of malleable software by the user. This is remarkable given that Innocent’s work comes at a time where, as he states, even *“the experimental approach to the design of interactive systems is still in its infancy”*. It shows that, at the very outset of ideas around interface adaptation, there was a clear focus on the user and their agency in shaping interface configurations.

Innocent also proposed new ideas that have not yet come to fruition. For example, he posited that *“agents”* could be dynamically constructed from recognizing stable patterns of user behavior to carry out actions on the user’s behalf. This suggests a form of meta-adaptation, where the system learns when its own adaptive rules should crystallize into stable functions and when they should be relaxed again. This concept has remained unexplored in subsequent human-computer interaction research, although it may offer a mechanism to manage dynamic contexts and co-adaptation.

4 What did he get wrong?

Despite its prescience, Innocent’s work is a product of its time and has its limitations. For example, its focus on terminal-based dialog, which did not anticipate the emergence and dominance of the Graphical User Interface, seems to shape his ideas around adaptation and how *“agents”* could act on the user’s behalf. Although, somewhat ironically, the recent rise of conversational interfaces has made this focus newly relevant again.

Moreover, while conceptually ambitious, his proposed implementation architecture for adaptive interfaces was limited to the heuristics of its era. It stopped short of the mechanisms, such as optimization [4] or machine learning [6], that drive today’s adaptive systems.

Finally, the paper fails to anticipate the critical challenge of how a user might recover from or correct a system’s unhelpful adaptations. This reflects a common blind spot in early AI and adaptation literature, but also highlights a persistent challenge in interface adaptation that is still underestimated today.

5 Conclusion

Revisiting Innocent’s 1982 paper offers several lessons for contemporary human-computer interaction research. His metaphor of the *“soft facade”* endures as a vivid and inspiring vision for adaptive systems, reminding us that compelling images can outlast specific technical implementations. His proposal for dynamically constructed *“agents”*, suggesting a form of meta-adaptation, remains conceptually advanced and worthy of exploration today.

Most importantly, however, Innocent strikes a remarkable and careful balance between system-led adaptation and user-led tailoring. He presents adaptation as a means to lower the effort associated with malleability and to configure an interface to serve its users’ needs, rather than as a way to take away from human agency. This principle is more relevant than ever as human-computer interaction grapples with increasingly dominant autonomous systems. Innocent’s vision thus reminds us that the goal of adaptation should not

be to impose any one interface configuration, but to create flexible systems that empower users to shape their own interactions.

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