Learning about Appropriation from Information Systems Research

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Abstract
Despite overlapping appropriation-related interests, there is very little awareness within Human–Computer Interaction (HCI) and Computer-Supported Cooperative Work (CSCW) research about the understanding of appropriation within Information Systems (IS) studies. This paper reviews the findings on appropriation and creative use within IS from the viewpoint of their implications to HCI, CSCW and interaction design.

Keywords
Appropriation, Information systems, Individual user characteristics

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; H5.3 Group and Organization Interfaces: Computer-supported cooperative work.

General Terms
Design, human factors, theory

Introduction
In recent years, users' creative discoveries, emergent use practices as well as open and flexible user interfaces have received increasing appreciation as central elements of successful system design. All these concepts are related to appropriation of technology – a concept used within HCI literature to refer to topics

such as unexpected ways of use and adaptations of systems for novel technology ecologies (e.g., mashups, hacking and end-user design). The increasing awareness of appropriation as a pervasive phenomenon of all computer use has spurred HCI researchers' interest in related topics in Science and Technology Studies (e.g., interpretive flexibility) and sociology of consumption (e.g., domestication). However, much less attention has been paid to another neighboring field of research, namely Information Systems (IS), especially its quantitatively oriented approaches.

The lack of appropriation-related knowledge transfer between IS and HCI may be due to the differences in the origins of these two fields. HCI was fully established quite late, in early 80s by psychologists who soon were joined by computer scientists [3]. Since 80s, also social scientists, artists, designers, among others, have joined in. IS, on the other hand, has roots in management and organizational science. Most IS papers aim to contribute to managerial understanding on the factors that affect successful integration of new information systems into corporate work practices. As a result of this, IS research tends to favor findings that show homogeneous and predictable adoption patterns across the user population. Emergent practices, flexibility and other appropriation-related factors have been often in the periphery of attention.

This does not however mean that appropriation would have been ignored in IS research. It has been a subject of central attention especially in ethnographically oriented IS research. In some other cases it has been studied using different terminology than that in HCI. "Appropriation" is often used in the meaning of practices that are "faithful" to managers' intentions (e.g., [12]) Appropriation in the sense of HCI is often called "reinvention" [11] or "creative use" [6].

While HCI-based appropriation research is stronger in aspects related to design, human-human cooperation and concrete use events, IS research can increase our understanding on how individual user characteristics, manager–worker dialogue and company-level support can suppress or foster appropriation.

Work structures and technology adaptation

Ethnographically conducted studies within IS have drawn a lot of influence from theory of structuration. Its technology-focused version called Adaptive Structuration Theory seeks to explain how three important social "structures" of work – the organizational environment, the group structure and the technology – are shaped and redefined in social interaction [2][9]. Managers and workers may have different opinions on how a system fits to the work practice, or the technology is incompatible with the other structures in general. Such discrepancies force the structures to change: the organizational policy may be adjusted, work group may reorganize its tasks, or the technology may be reconfigured or reprogrammed [10]. Discrepancies provide "windows of opportunity" for also bigger reorganizations. Appropriations are especially likely to happen at such moments [5][15].

Organizational structures that increase awareness of potential ways to apply new technology (e.g., IT steering committees, task groups and planning teams) reinforce workers' exploration intentions. On-site support (e.g., user forums, user labs and customer support) encourages their exploration abilities [7].

These findings exemplify the benefits of flexibility in structuration. Regarding the technological structure, solutions to support bottom-up innovation have already been presented in HCI and CSCW. Technology can be made adaptable and technologically savvy people such as tinkerers [4] and gardeners [8] can propagate novel uses of technology at workplaces. The task, then, has been to design technologies with which other users' inventions are easy to adopt and modify further.

The issue of timing (i.e., when technological structures should be adjustable) in relation to other structures has however been less acknowledged within HCI. Should continuous modifiability be supported, so as to maximize the opportunities for appropriation? Or does it increase volatility to the extent that shared frames of reference and benefits of established work structures are lost? This raises a challenge to balance freedom for experimentation and "creative destruction" with support for stabilizing stable and efficient work practices in also on a system level.

The creative individual users: who are they?

Many studies within IS are quantitative. While most studies on computer use have focused on use as a whole and paid little or no attention to the variety of use purposes [13], some studies have addressed more heterogeneous and creative uses as well.

User's self-efficacy (i.e., belief in one's capabilities) and the breadth of computing knowledge have been identified as important for creative computer use [6]. In addition, playful style of use increases ability to make one's work routines compatible with the tools at hand, but does not seem to affect perceived usefulness, ease of use or intentions to increase use of the tools [1]. Playful style of use also increases ease of learning, satisfaction and sense of control during use [16].

In our ongoing research [14] we have found that with personal technologies (e.g., digital cameras), learning novel uses on one's own is slightly more common than learning them from others. Users seem to be divided into individual appropriators and social learners; it it rare to learn some uses individually and other uses socially. Technological understanding and the frequency use contribute best both to the ability to discover new uses and to the adoption of uses to long-term practice. We have not found similar connections between reflective, spontaneous, goal-driven or social styles of use with appropriation or adoption of novel uses.

These findings show that the efforts within HCI to support learning through experimentation have been correct, but they also emphasize the importance of technological understanding as a requisite of active appropriation. In addition, there seem to be users that do not appropriate but actively learn all novel uses from others. Considering that previous HCI research has supported diffusion of appropriation through shareable scripts and end-user programming [4][8], this is helpful only for the tech-savvy users, who are likely to discover many of the uses on their own. The benefits of scripting are suboptimal for the socially learning user group. In addition, scripting only supports technology-changing appropriations, leaving "camera as a scanner" style appropriations unsupported. Therefore, more attention should be placed on supporting non-techy social learning that also increases users' computer self-efficacy. In addition, for all users, making the inner workings of technology more easily observable would be beneficial.

Conclusions

The strength of HCI lies in its connection to design practices and ability to try out ideas in practice. This paper has briefly reviewed appropriation-related research within IS and has pointed out some implications of that research to HCI. These and other findings in IS literature can serve as empirically grounded starting points for developing more easily appropriable technologies.

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