

RELCASI

Volume 10 | Issue 1

Article 4

1-1-2018

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Recommended Citation

Engelbert, Ricardo and Graeml, Alexandre Reis (2018) "Mandatory Technology in Use: a Study of Users' Appropriation Practices," *RELCASI*: Vol. 10 : Iss. 1 , Article 4.

DOI: 10.17705/1relc.00054

Available at: <https://aisel.aisnet.org/relcasi/vol10/iss1/4>

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Mandatory Technology in Use: a Study of Users' Appropriation Practices

Tecnologías Obligatorias en Uso: un Estudio de las Prácticas de Apropiación de los Usuarios

Tecnologias Compulsórias em Uso: um Estudo das Práticas de Apropriação pelos Usuários

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Abstract

This paper analyzes users' practices when they deal with mandatory IT artifacts, many times adjusting them to their own interests. The case study investigates the pattern of adaptations implemented by lecturers (the users) while using an academic portal (the IT artifact) in a university (the mandatory organizational setting). This object was chosen, because different interpretations of the artifact's flexible features allow for the existence of several distinctive patterns of use and adaptation behaviors among system users that were identified and analyzed. As a result, we depict a set of moves by means of which users either complied with the system 'as-is', refuted parts of it while adhering to others, adapted it, replaced components or complemented it, becoming co-developers of their own 'systems in use'. The study was carried out in Brazil and results may reflect the local culture of challenging what is imposed and trying to shift things according to one's own understanding of what is right, but we believe the generated model could help understanding also what happens in organizations in other Latin American countries and around the world, at least in situations where users are more empowered or more proactive, regardless of the reasons for such behaviors.

Keywords: IT acceptance; IT appropriation; IT adaptation; IT spirit; IT negotiation.

Resumen

Este artículo analiza las prácticas de los usuarios para hacer frente a un artefacto informático que les fue impuesto, ajustándolo a sus propios intereses, incluso en situaciones de uso obligatorio. El estudio de caso investiga el patrón de adaptaciones implementadas por los docentes (usuarios) al utilizar un portal académico (el artefacto de TI) en una universidad (el entorno organizacional en el que se da la obligación de uso). Este objeto de estudio (un sistema universitario) fue elegido porque diferentes interpretaciones de las funcionalidades flexibles del artefacto permiten la ocurrencia de diferentes patrones de uso y comportamientos de adaptación entre los usuarios del sistema, los cuales fueron identificados y analizados. Como resultado, se evidenció un conjunto de movimientos por los cuales los usuarios se ajustan al sistema, según lo propuesto por sus desarrolladores, rechazan partes del sistema mientras aceptan otras, adaptan el sistema, reemplazan o complementan sus componentes y se vuelven codesarrolladores de sus "sistemas en uso". El estudio se realizó en Brasil y los resultados pueden reflejar de manera más adecuada

aspectos de la cultura local, que desafían lo que se impone y llevan a los individuos a, siempre que sea posible, tratar de ajustar su entorno a lo que consideran correcto. Pero creemos que el modelo generado puede ser útil para entender qué sucede en organizaciones de otros países de América Latina y del mundo, al menos en situaciones en las que los usuarios se sienten empoderados o son más proactivos, independientemente de lo que los impulse a desarrollar estos comportamientos.

Palabras clave: Aceptación de TI, apropiación de TI, adaptación de TI, espíritu de TI, negociación de TI.

Resumo

Este artigo analisa as práticas dos usuários para lidar com um artefato de TI que lhes foi imposto, ajustando-o aos seus próprios interesses, mesmo em situação de uso obrigatório. O caso de estudo investiga o padrão de adaptações implementado pelos professores (os usuários) ao utilizarem um portal acadêmico (o artefato de TI) em uma universidade (o ambiente organizacional em que se dá a obrigação de uso). Este objeto de estudo (um sistema universitário) foi escolhido porque diferentes interpretações das funcionalidades flexíveis do artefato permitem a ocorrência de distintos padrões de uso e comportamentos de adaptação entre os usuários do sistema, os quais foram identificados e analisados. Como resultado, foi evidenciado um conjunto de movimentos pelos quais os usuários se ajustam ao sistema, da forma como proposto por seus desenvolvedores, rejeitam partes do sistema ao passo que aceitam outras, adaptam o sistema, substituindo ou complementando seus componentes e se transformando em co-desenvolvedores de seus "sistemas em uso". O estudo foi realizado no Brasil e os resultados podem refletir mais adequadamente aspectos da cultura local, que desafiam o que é imposto e levam os indivíduos a, sempre que possível, procuram ajustar o entorno ao que consideram ser certo. Mas acreditamos que o modelo Gerado possa ser útil para compreender o que ocorre em organizações em outros países da América Latina e ao redor do mundo, ao menos em situações em que os usuários se sintam empoderados ou sejam mais proativos, independentemente de o que os leve a desenvolver esses comportamentos.

Palavras-chave: Aceitação de TI, apropriação de TI, adaptação de TI, espírito da TI, negociação de TI.

1 Introduction

Since the introduction of computers to support organizational functions, which started in the 1950's, the use of information systems increased a lot in organizations (Hirschheim, 2012). However, in spite of all organizational efforts and strategies to make sure users use the technologies their organizations adopt, as planned, users usually follow their own perceptions and interpretations about the technological artifacts that are presented to them and about how to include them in their own work routine.

When analyzing the set of technological artifacts adopted by organizations, we realize that the great majority of these artifacts are presented to their users under mandatory conditions. The artifacts are previously selected and implemented by organizational decision makers with the expectation of achieving positive outcomes, according to their own perspective. Standard workflows, financial procedures, regular reports, supply chain relationships, and other processes intentionally shape the mandatory systems that are adopted by organizations.

We understand that in mandatory settings, where users are obliged to use the technology, IS success will depend much more on 'how the users use it' than 'if they use it'. If not happy about a system, individuals do have the opportunity to use it to a minimal level, just to comply with organizational demands, or to apply different strategies to avoid the system's use at all (Hartwick & Barki, 1994).

Our choice to consider user's perceptions about the outcomes is based on the fact that while "for voluntary systems use is an appropriate measure, [however, when the] system use is mandatory, usefulness is a better measure of IS success than use" (Petter, DeLone, & Mclean, 2008, p. 238). In strongly mandatory situations there are cases where users do not see usefulness neither ease of use in a specific artifact, but, as they have no choice, they cannot opt out.

Users must comply with minimum expectations in using the IT artifact adopted by their organizations. They can, however, follow different strategies in their relationship with the artifact. They can try to adapt themselves to use the artifact as expected by the developers, or they can try to adapt the artifact to meet their personal interests or view of how it should work. This second alternative is the focus of the current study.

This paper analyzes users' practices when they deal with compulsory IT artifacts, many times adjusting them to their own interests. The case study investigates the pattern of adaptations implemented by lecturers (the users), while using an academic portal (the IT artifact) in a university (the mandatory organizational setting).

The study was carried out in Brazil and results may reflect the local culture of challenging what is imposed and trying to shift things according to one's own understanding of what is right, but we believe the generated model could help understanding also what happens in organizations in other Latin American countries and around the world, at least in situations where users are more empowered or more proactive, regardless of the reasons for such behaviors.

2 Theoretical background

Realizing that IT provides structures for organizational change, while, at the same time, the interaction of users with technologies makes other structures to emerge, DeSanctis and Poole (1994) proposed the Adaptive Structuration Theory (AST). This is a particularization of Giddens' Structuration Theory. The intention was to adjust Giddens' original model to better discuss the institutional effects of technology, so that it could be applied to IT studies, emphasizing the role of human actions and interactions in shaping a technology and choosing the ways it is used, arguing that "people generate social constructions of technology" (p. 124), while interacting with the technology and with other individuals.

The social structures of an AIT (Advanced Information Technology), or its *structural potential*, can be described in terms of its *structural features* - "the specific types of rules and resources, or capabilities, offered by the system" (Desanctis & Poole, 1994, p. 126) and the *spirit* of this feature set - "the general intent with regard to values and goals underlying a given set of structural features" (p. 126). This conceptualization of *spirit* and the subsequent clarifications provided by DeSanctis and Poole (1994) show that it is hard to truly assess and measure it, as the *spirit* is neither defined just by the designer's intentions nor by the users' perceptions or interpretations of the technology. DeSanctis and Poole (1994) compare it with the text of a law. The intentions of the creator are meant to be expressed in the text, but the text is not able to express all the creator's intentions. Future users of the law will try to interpret it, but in doing so will be influenced by their own individual and social contingencies that will limit their full understanding of the original intentions, which are not all stated there, anyway.

The concept of 'spirit', presented in AST (Desanctis & Poole, 1994), can be compared to the concept of 'inscription' as defined by Akrich (1992), when talking about innovation networks and the actor-network theory. The term 'inscription' refers to "the way technical artifacts embody patterns of use, including user programs of action, [and] the innovators' beliefs, social and economic relations, previous patterns of use, legal limits, and assumptions as to what the artifact is about" (Faraj, Kwon, & Watts, 2004, p. 189). When an organization adopts an IT artifact to be applied in a process, it defines a 'program of action'. The planned tasks and the selected technology will form and inform the means to be applied to obtain the desired goals, as intended by the organization's decision makers. Users can refuse to conform to the designed 'program of action' and adapt it to their own interests, conditioned to the limits imposed by the organization to this 'flexibilization', based on the level of control it has on people and processes. Although Faraj *et al.* (2004) analyze technology evolution through this perspective, they consider the technology in use mainly as a source of information that allow designers to review an artifact's features and design changed new versions of it, in an evolving process. This is clear in the historical research they carried out about the evolution of web browsers, using the actor-network approach (Faraj, Kwon, & Watts, 2004). Their approach is very similar to Carroll's (2004), theorizing about the technology appropriation cycle, also based on an adaptive structuration perspective. The author's conceptual model also considers the technology in use as an input used by the designer to improve the IT artifact in the next development cycle.

When examining resistance to technology, Markus (1983) also referred to "the intentions of system designers" (p. 432) as the 'system purpose'. She proposed this concept to classify information technologies applied to organizations. Without clearly affirming that the artifact is interpreted by users, Markus (1983) claimed that the system, here meaning IT artifact, "can be viewed from many angles, and users may

describe a system's purpose differently than designers" (p. 432). Working on the Rational Theory of Management, that holds that "organizations have goals and that they behave in ways that are consistent with achieving these goals" (p. 432), Markus (1983) classifies the purposes attached to technology as 'rational' and 'non-rational'.

System purposes that are consistent with the Rational Theory are: to rationalize work (achieve predictable outputs with consistent units of input), to enhance managerial decision-making and planning, to control and motivate the performance of employees toward agreed-upon goals, and to improve communication and coordination among people in the organization or between the organization and its environment (customers, suppliers, competitors etc.) (p. 432).

Non-rational purposes of adopted IT artifacts involve: (1) changing the power balance inside the organization, (2) gaining control over a process, or (3) reducing dependence on members of a group of users (Markus, 1983).

Markus (1983) defines resistance as "behaviors intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives" (p. 433). She makes some distinctions about levels of resistance considering that resistance is a relative behavior, rather than an absolute one. If the decision about 'not using a specific feature' does not affect others, it cannot be considered as resistance in Markus' view. Another issue is that resistance cannot be anticipated as good or bad, unless the judge favors the implementors or the users. Markus' perspective about resistance does not consider the 'accommodation' of the artifact in use, resulting from a change in the artifact or the user, which could avoid resistance to happen. The way the organization informs the implementation of the artifact plays a major role in avoiding resistance. It is possible that, if users evaluate and accept the rational reasons provided by the organization, they will apply more effort to use the system.

This 'accommodation' of the artifact is present in the appropriation process proposed by DeSanctis and Poole (1994) whom define appropriation as "the immediate, visible actions that evidence deeper structuration processes (p. 128)". "The appropriation concept includes the intended purposes, or meaning, that groups assign to technology as they use it" (p. 130). However, when defining appropriation, Chin, Gopal and Salisbury (1997) warn us that sometimes the actions are not so visible and, in fact, there are two dimensions to define the *spirit*: a subjective and an objective one.

The term objective relates to explicit signs that represent the 'correct' way the technology should be used. The objective spirit is presented to users by experts in manuals and training materials. It represents an "externally imposed conception of the spirit" (Chin, Gopal, & Salisbury, 1997, p. 345).

The subjective dimension represents the construction of the *spirit* in the mind of the individual. Based on explicit and implicit available information about the technological artifact, the individual will form an internal and subjective interpreted *spirit* for the artifact. Individuals and groups, when exposed to a technology, will start making judgments about it and "whether to use or not use certain structures" (Desanctis & Poole, 1994, p. 129). That happens until a stabilization level is achieved in a group. This is very similar to the concepts of interpretive flexibility, stabilization and closure applied in SCOT's approach (Bijker, 1997).

In this negotiation process involving the definition of such purposes and meanings, participants can take a set of appropriation moves: "(a) directly use the structures; (b) relate the structures to other structures (such as structures in the task or environment); (c) constraint or interpret the structures as they are used; or (d) make judgments about the structures (such as to affirm or negate their usefulness)" (Desanctis & Poole, 1994, p. 129).

The result of this negotiation determines the type of appropriation that is obtained. A *faithful appropriation* is "consistent with the spirit and structural feature design, whereas unfaithful appropriations are not. Unfaithful appropriations are not 'bad' or 'improper', but simply out of line with the spirit of the technology" (Desanctis & Poole, 1994, p. 130).

Frequently, in the specification of the concept of *spirit*, AST researchers refer to *the designers* as those responsible for the technology's first definition and construction. A clarification is needed, here, though, to understand the meaning of *designers* that we use in this work and how we interpret the concept from the theory. We agree with Orlikowski (2008, p. 409) that "from the point of view of users, technologies come with a set of properties crafted by designers and developers". However, we would like to clearly include, as part of the set of designers, the organizational decision makers, who decided on the implementation of a particular technology. They operate in what Orlikowski (1992) calls the *design mode of interaction*. When

As the technology structures are appropriated, individuals and groups display attitudes that indicate: (a) comfort – “the extent to which groups are confident and relaxed in their use of the technology”; (b) respect – “the extent to which groups perceive the technology to be of value to them in their work”; and (c) challenge – “their willingness to work hard and excel at using the system” (Desanctis & Poole, 1994, p. 130).

Although the appropriation concept goes further in trying to explain how users deal with technology, there is a focus on how users change and adapt technology. An example is the appropriation cycle proposed by Carroll (2004) and presented in Figure 2. The way users adapt the technology and convert it in a ‘technology in use’ (which means appropriation) represents a valuable feedback to the designing process.

We also agree with Faraj *et al.* (2004) when they say that researchers neglected the study of how technology development occurs. There are many discussions about how new technologies come into existence but the studies about how technologies evolve are too focused on the designers’ perspective and do not pay enough attention to how users transform technologies while using them.

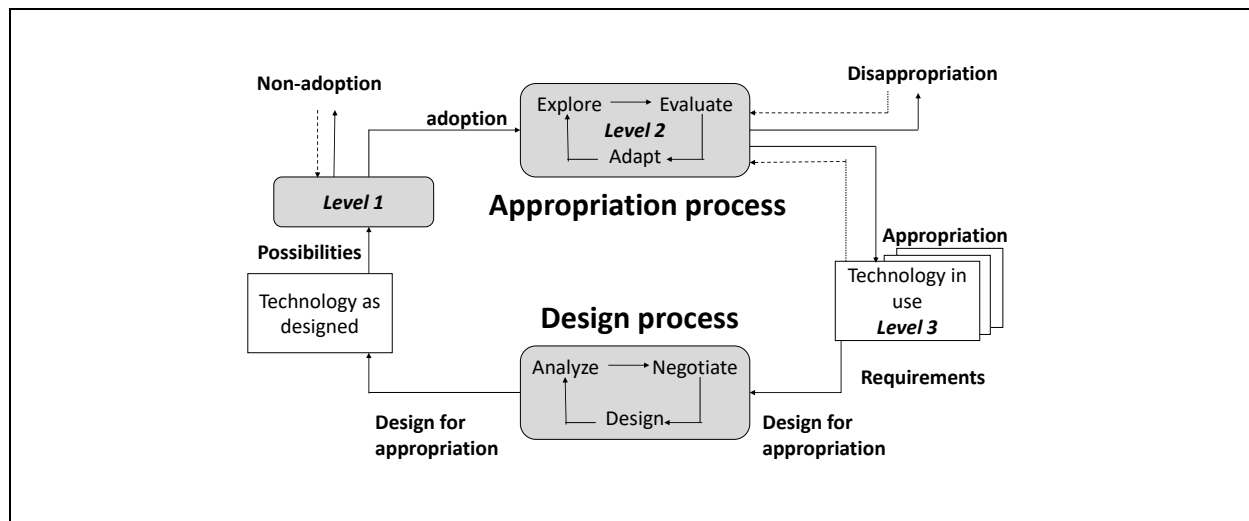


Figure 2. The technology appropriation cycle (Carroll, 2004, p. 5)

The designers try to optimize fit based on the knowledge that they have about the tasks and the potential users involved in the process where the artifact will be applied. When developers decide about ‘the best way’ an artifact should be built and used, there is a risk they trap individuals in a situation where there is just one way of correctly using the artifact, not leaving space for improvisations nor adaptations (Redström, 2006).

A major response to designs failing to gain approval and acceptance has been to consider it to be a matter of insufficient knowledge about people, their capacities, needs and desires and that design therefore needs to be based on the improvement of such knowledge (p. 123).

Participatory design is a strategy sometimes applied by developers to reduce the gap between designers and users. The appropriation cycle proposed by Carroll (2004) is a demonstration of how the information about how users appropriate a specific technology can be used in future design cycles design. However, the interpretations and forms of appropriation that take place in the participatory design cycle continue to be just a set of possible interpretations. They may work for the users involved in the design, but will not support undescribed demands from other groups, neither unforeseen situations that would lead even participating users to rethink the artifact when they change roles from developers’ support to actual artifact users (Redström, 2006).

The definition of a ‘user’ is, usually, dependent on the object being used. There is no user if there is not an object being used. But this object-centric perspective, where the person is defined in relation to the object, results in us thinking about the user as a passive agent, little capable of transforming the object, its purposes or the way it can be used. The ‘over determination’ of the IT artifact drives the system to a rigid form of use by dictating the way it should be applied to perform the task (Redström, 2006).

If we think of use, however, from a user-centered perspective, the user is assigned an important active role in development, as Redström (2006) explains.

It is user design [the user-centered design] in the sense that it is design where the processes through which people turn into users are in focus and where the explicit aim is to work with the results of this process, i.e., how use and user should turn out. We, as designers, turn people into users by means of our designs, by presenting a thing to be used. By making the desired interpretation of the objects obvious and impossible to resist, we aim to design not only the object itself but also the perception, and even the experience, of it (p. 129).

Mackay (2000) coined the term *co-adaptation* to identify the transformation of users and artifacts while in use. Individuals adapt the available technology to their own purposes, as well as they adapt themselves to the new presented technology. They do it by using and reinterpreting the artifact. That author uses psychological lenses to analyze the phenomenon at individual and group levels. This differentiates her work from sociological approaches to the organizational level of analysis. Her objective is to analyze the co-adaptation process between users and technology as a response to cognitive overload, when dealing with the artifact. She finds that the changes implemented by the developers that required users to modify their behavior are adapted by users to make the new system work as the old one. What happens is a case of retrofitting, trying to avoid switching costs. Only changes that were desired and approved by the users are well accepted. Of course, adaptation is made possible depending on the level of flexibility allowed by the artifact's technology and also the level of knowledge the user has to perform this adaptation, as Mackay (1991) also calls our attention to.

Akrich (1992) uses the term 'inscription', as it has already been mentioned, to define the process used by the designers to deposit in the artifact their intentions about how it should be used. If the designers' intentions are implemented in a closed and determined way, there is no space for ambiguity, neither for unfaithful appropriation. In fact, there are only two possibilities, either 'using' or 'not using' the artifact in the way envisaged by the designers. A different situation happens when designers implement the artifact allowing users to define new forms of appropriation, based on their different interpretations on how the artifact should be applied. The 'inscription' (or 'spirit') may intend and/or result in a dictatorial unchangeable rule or represent just a possibility, among many others that can be constructed by the users.

As the possibilities for alternative interpretations are systematically reduced as a result of the designer's attempt to optimize the design with respect to fit, the room for finding our own solutions, possibly coming up with interpretations that are more interesting than the original intent, is reduced to a minimum. The situation gets worse when not only one, but a plethora of objects try to make us do things in often incompatible ways - a situation requiring us to be creative to make everything work together. We will be surrounded by objects that try to fit us very closely and, as a result, most of the space for improvisation and interpretation will be occupied (Redström, 2006, p. 135).

There are some studies that analyze the advantages of flexible IT infrastructure on organizations (Hanseth, Monteiro, & Hatling, 1996; Byrd & Turner, 2001), but there is a lack of studies addressing the effects of artifact flexibility on how individuals use and adapt IT artifacts.

In one of the few studies that go in that direction, specifically focused on IT infrastructure, Byrd and Turner (2001) found a positive relationship between IT flexibility and competitive advantage, which led them to defend the idea of an 'open design' in order to let users and organizations act in a freer and adapting way. Ness (2005) also found a positive effect of 'IT flexibility' on 'IT effectiveness'. However, the author also detected that, in those situations, there is an increase in 'complexity' that may cancel any positive effect obtained from the provided flexibility.

3 Method

Even in the appropriation studies as the ones discussed above (Chin, Gopal, & Salisbury, 1997; Carroll, 2004; Desanctis & Poole, 1994; Salovaara, Helfenstein, & Oulasvirta, 2011), there is no deep analysis about how technology affects and changes either the task or the individual.

Our model and research design adopts a position that is close to DeSanctis and Poole's (1994) and Chin, Gopal and Salisbury's (1997) propositions, however trying to use more objective measures for the constructs derived from the theory. Even though our methods are different from those specified and applied by Orlikowski (2008) and Bijker (1997), we also tried to keep as close as possible to their concepts and

definitions. Our intention is to propose an extension to their efforts, which will allow their concepts to be tested by means of a more objective methodology, following the positivistic tradition, which is usually disregarded or given little consideration by interpretative/constructivist researchers, whose good theory ends up not calling the deserved attention of main stream researchers, particularly in the IS field, who are conservative in their methods, most of the times. We believe that by doing that we can help bridging the different streams of research regarding the use and appropriation of IT within organizations and help better explain that important phenomenon to businesses and to our society.

Aligned to the socio-technical perspective, we do not intend to put either the user or the technology at the center of our efforts to understand information system. We take the information system here as socially constructed, resulting from the interaction of users and artifacts, under the pressures of structures and structuring forces.

A case study was conducted in a Brazilian university (the organization) that is using an *academic portal* (the IT artifact) to help lecturers (the users) with their teaching activities. Systems such as this are many times called *Course Management Systems* (CMS) or *Learning Management Systems* (LMS). The research was conducted in the business school of this university.

This specific case was chosen because the academic portal has been in use in this organization for many years as a mandatory system and the relationship between users and the artifact went through several stages, being perceived differently by different users and also with variations over time.

Academic portals are mainly implemented as mandatory systems due to their standardizing and controlling features, but we also find universities that offer them in a voluntary basis. In both cases use is very flexible and ranges from the application of a basic set of communication features (such as e-mail, group lists and file transfer capabilities) to more advanced sets of distance learning possibilities (such as virtual classes, video casts, on-line tests, wikis etc.). Different interpretations of these customizable features allow for the existence of several distinctive patterns of use and adaptation behaviors among system users that were identified and analyzed.

Primary and secondary sources were used in this research. Documents (secondary data) included manuals and commercial advertising available in the developer's website. Interviews and observation were sources of primary data. The main data collection happened from June 2013 to September 2013, but the interviews and document analysis also provided longitudinal data about use and the relationship between users and the IT artifact.

The participants were 14 lecturers, who were interviewed independently. They were 12 males and 2 females, with 13.2 years of average experience in university teaching. The average time at this institution was 8.4 years (ranging from 4 to 25 years). The interviews lasted 27 minutes in average (the shortest having lasted 14 minutes and the longest 58 minutes).

The interviews were recorded, and full transcriptions were prepared. The transcription of the interviews, the manuals about how to use the portal, and the promotional materials used by the developer were coded using NVivo 10 software for qualitative analysis.

The collected data were then analyzed using open and axial coding techniques (Strauss & Corbin, 1998), relying on NVivo's capabilities of creating nodes and advanced searches. Creswell (2007) discusses the different visions of researchers who apply concurrent coding schemas. The 'prefigured' categories are more often used in health sciences while 'emergent' categories and 'open coding' are becoming more common in social sciences. Creswell (2007) "encourage[s] the researchers to be open to additional codes emerging during the analysis" (p. 152). We followed that advice and used 'prefigured' coding as well as 'emergent' ones.

4 Analysis and Results

The Brazilian educational institution where the study was conducted started its education business in 1972, offering preparation courses for students who intended to go through the tough selection processes of good universities in the country. After achieving business success with these preparation courses, which involved the development of books and standardized materials to be used by their students in their effort to increase their chances of being selected, the organization applied its model to all educational levels, from elementary school until university. In 2013, the group had more than one million students from kindergarten to university being taught according to their methodology, either in their own institutions or in franchise schools.

Nowadays, the methodology involves course books, class materials, educational software, and educational Internet portals.

In 2007, the university decided to use an academic portal to support its undergraduate and graduate courses. Lecturers should publish their syllabi, and content for all classes. Everything should be available at the portal one week prior to the beginning of each academic semester. For each class, they should publish the list of objectives, the references and any other content that could be used during class (slides, texts, and exercises) or as additional material for students' reference, afterwards.

Using the portal is considered as part of a lecturer's job at this specific university, the same way it happens with other duties, such as being punctual to classes and evaluating students using the university's grade system. The organizational workflow forces lecturers to, at least, use the portal features to inform grades and attendance records. This can be considered the minimum level of use since there is no way to inform grades and attendance without using the academic portal. These features are well accepted and used by all lecturers without much complaint. Even the most critic interviewee confirms that this is an evolution to the old types of controls in paper forms. However, lecturers complained a lot about system stability and the difficulty in registering attendance during classes. When the system is not available, due to network problems, they must use other strategies to register attendance.

This workflow and control feature (to inform the university about grades and attendance), together with the mandatory fields that have to be filled in for each lecture, form what can be considered the 'minimum use' to guarantee no problems in the lecturer's assessment by upper management.

Considering the number of available features, the other extreme of use, full use of all features, would be hard to achieve. Users are in the range that goes from making minimum use (to survive management's assessment) to a regular use of the main features related to the teaching and learning processes (inclusion of syllabus, lecture planning, assignment publishing, assignment submission, questions database, bulletin board and forum). The majority of the lecturers use the artifact to an intermediate level, applying more or less features to their activities, depending on their technical competence and level of agreement with the system's purpose and quality. Based on how they use the features, patterns could be identified and classified, related to their appropriation moves.

There are users who apply the artifact features as expected. DeSanctis and Poole (1994) identified this behavior as 'direct use' in their classification of appropriation moves. Lecturers who behave this way use the tools as they were planned and implemented by the developers. They can use some of the features available to them (partial use) or they can try to use all features (full use). As the organization invested time and money to implement the artifact, extensive use of these features is desired by the organization. The obtained results, when they involve full use, help justifying the original decision made about the artifact's implementation. DeSanctis and Poole (1994) include the behavior of 'direct use' as an appropriation move that results in a faithful appropriation. We can attribute 'direct use' to designers who successfully understood users' needs and implemented them in the artifact. But we can also consider it as part of the users' attitude to conform to the desired organization's intentions. In the university's mandatory setting, a few users confirmed that they use the tool as proposed by the university and consider that as being part of their job. One of them, who was already at the institution when the implementation began, years ago, remarks:

Since the organization adopted the portal, and has recommended its use, I try to use it. I chose to concentrate all my teaching resources in the portal. My communication with students is made through the portal. The content of my lectures is available in the portal. Any assignment is made available in the portal. I am clearly trying to increase the use of the portal and make it a success (P12).

It should be highlighted the fact that, although we are talking about a compulsory artifact, users do not feel completely obliged. As stated by P12, above, he 'chose' to concentrate his teaching resources in the portal. Not that he thought he 'needed' to do that. This perception of a compulsory system that the user can use according to his/her own interpretation was present in most of the interviews.

A lecturer who came from another institution where there was a portal in a volitional environment, took the new task as something expected to be carried on by a lecturer. He says: "when I came to this organization, where the use is mandatory, I did not feel pushed towards using the portal. This was part of a natural process of adapting to my new work environment" (P1).

We prepared some diagrams to graphically represent the types of adaptations we found in our field work. These diagrams compare the artifact adopted by the university, including all the available features presented to the users, and the technology being effectively used by the lecturers in their daily activities. The diagrams were inspired by Griffith (1999), but we are going into more detail in our attempt to show how appropriation moves change the way technology is used.

4.1 Appropriating the artifact 'as is'

The first diagram, shown in Figure 3, represents the situation in which a user is using all the available features in his/her activities the way they were planned by the designers. This full use of such complex artifact would represent a complete faithful appropriation of the adopted artifact because the user is not challenging any of the features that were included by the developers.

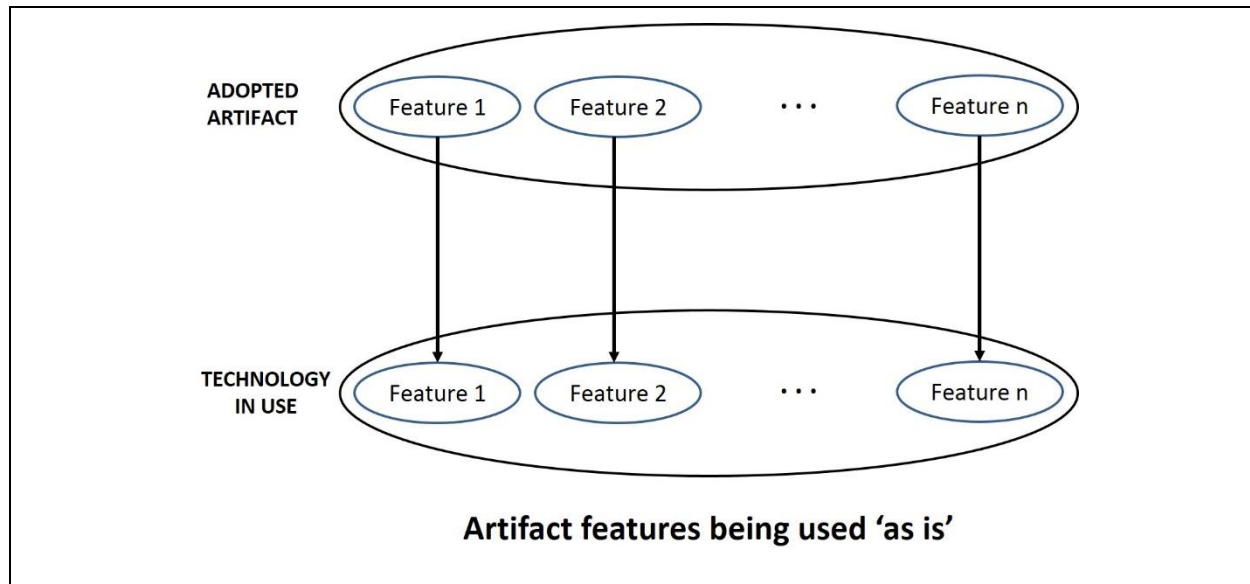


Figure 3. Use of artifact 'as is'

There are lecturers that apply the features available in the adopted artifact and use it in their activities and teaching processes without much questioning. Full use of all the features, however, was not identified among the interviewees. This is understandable, considering the large number of features that are available, the new functionalities that are implemented in each new version of the artifact, and the lack of time and interest of users to master all those features.

4.2 Becoming the codeveloper of one's own system in use

Besides the use of features as they were conceived and implemented by the developers and the organization that adopted the artifact, we noticed some movements of adaptation, replacement, and complementation of features. Pinch and Bijker (1984) called these movements solutions, attached to each problem identified by a relevant social group. "Around each problem, several variants of solution can be identified" (p. 35).

While Pinch and Bijker (1984) spotted possible directions for technology development and innovation, when users apply different solutions to those identified problems, in the currently examined case, some users identified their own directions for IT artifact use. Individuals and groups evaluate the adopted artifact and apply strategies to transform it into something more adjusted to their needs or interests.

While some individuals and groups opt for a simple 'to use or not to use' dilemma, there are others that appropriate the IT artifact in a more complex way, interpreting the artifact and its features in different manners and deciding to change it through an appropriation move.

It was possible to find clear examples of structures being blended with, or related to, other structures in the appropriation moves performed by many users, as foreseen in AST models (Desanctis & Poole, 1994). Some of the lecturers participating in the research talked about the artifact and expressed the structures

they formed while dealing with it. They explain how they *replace* – “I do not use the university’s e-mail, I prefer to use my own” (P5) –, *combine* – “the communication tool is weak, but I connect it with Facebook” (P1) –, *enlarge* – “today I go to classroom carrying nothing or just a flash drive as a backup” (P10) –, and *contrast* – “I compare the portal to the physical bulletin board that we have in every classroom” (P3) – the artifact’s features.

Analyzing the explanations about the use of the artifact’s features we classified the transformations applied to the artifact by the users of the university portal in four main categories: (1) refutation of an available feature, (2) adaptation of an available feature, (3) replacement of an available feature, and (4) complementation with unavailable features.

4.2.1 Refutation: denial of specific system features

Refutation occurs when a user selects some features to be used in his/her activities and refutes the use of other available features. This refutation occurs due to incompatibility between the user’s interpretations of the artifact and the developer’s intentions in offering this feature in the adopted artifact. In our field research we found a participant who refused to use the profile page by means of which lecturers could present themselves to students. He stressed his opinion about this feature: “there is a profile page, but I never visited or changed it. I did not publish my *resumé* or my picture there. Students must know me from the classroom. The portal should not be a replacement for my face-to-face relationship with students” (P10). Another example is the use (or not use) of wiki and blog features available from the academic portal. Nobody among the interviewees perceives usefulness in those features. The diagram in Figure 4 shows the situation (appropriation move) where the user refutes using an available feature because his interest and needs are not in line with the designers’. We consider this level of use as a “partial as is” use. The user does not try to change any feature, but s/he declines using some of them.

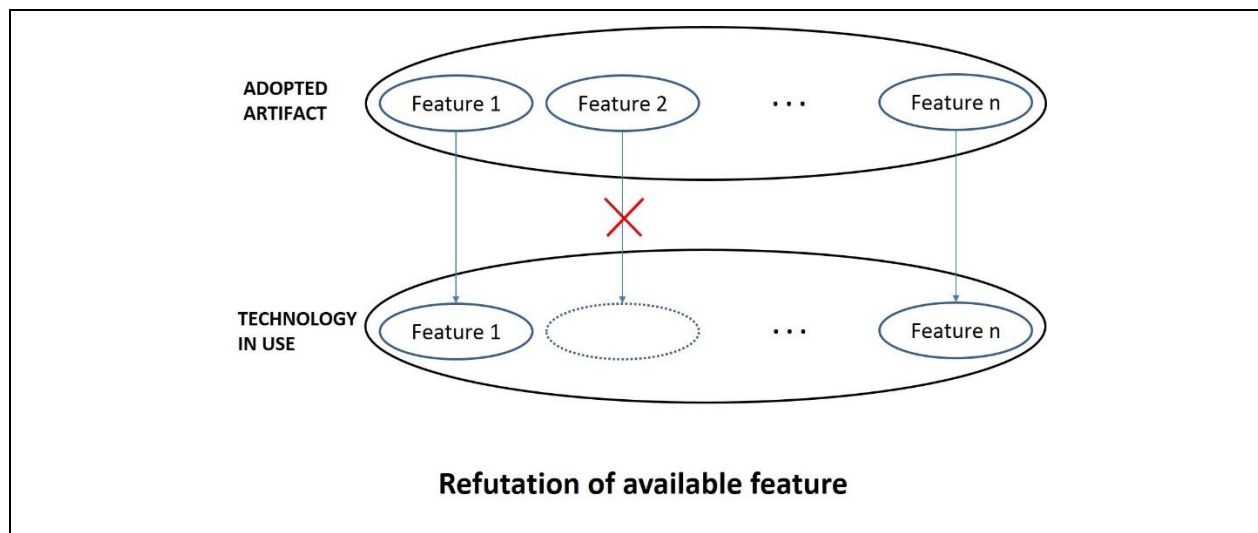


Figure 4. Refutation of an artifact’s available feature

4.2.2 Adaptation: transformation of an available feature

The adaptation of an available feature occurs when a feature that is present in the artifact is used in a different way than what it was planned for. Lecturers evaluate, interpret, and repurpose the available features. The program of action inscribed by the developer in the artifact is rejected or bended by the user. An example is to use the forum tool to organize a question database to be used by students to prepare themselves for the exams, as reported by one of the lecturers: “I prepare a first question about a text my students are reading and post it in our online forum. Then, the first student in the students’ roll must answer it and place another question for the second student. This goes on until everyone has had a go. I am sure

that was not what the forum was conceived for, but it is a very good tool to obtain the students' engagement in creating questions that will help them reflect about the content discussed in class"¹.

The diagram in Figure 5 shows the situation (appropriation move) where the user uses an available feature in a different way than that planned by designers.

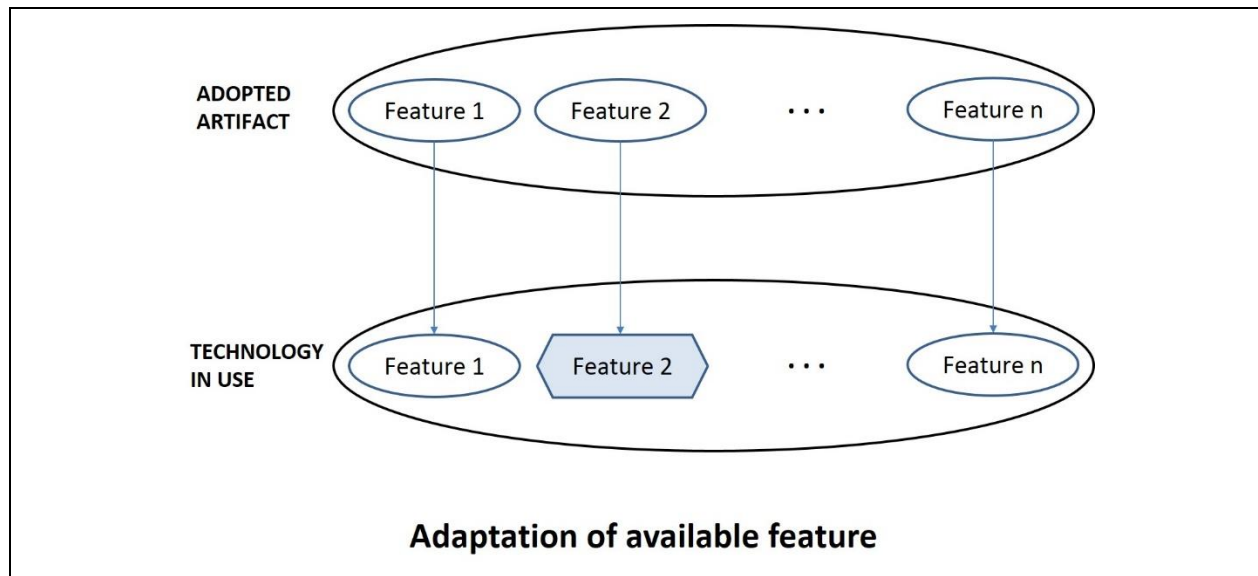


Figure 5. Adaptation of an artifact's available feature

4.2.3 Replacement: substitution of an available feature

The replacement of an available feature happens when the feature is present in the artifact, but the user prefers to use another structure to perform the task. S/he behaves this way because there are perceived advantages in doing so. The task is completed, and the results are satisfactorily obtained, but it is performed by replacing a feature from the artifact by another one the user finds available somewhere else. Again, the artifact is used in a different way than conceived.

In the interviews, several lecturers showed a preference for other file sharing services that provide the same kind of service as the file sharing features available at the portal. To justify this preference, they explained that the preferred services are simpler and more flexible than the features offered by the portal. Six of the fourteen interviewees mentioned that they use Dropbox as a service to share content with students instead of using the portal capabilities. They explained that the Dropbox service is simpler than the portal feature to perform the same task.

Another example is the use of other communication tools such as personal e-mail programs and instant messaging applications. Most of the participants prefer to use other e-mail services due to delivery speed and no limitation of message size.

Figure 6 represents this replacement strategy. A feature available in the adopted artifact is replaced by an equivalent feature from a different artifact adopted by the user. The task is accomplished, and the desired outcomes are produced, but the organization's adopted artifact is put, at least partially, aside by the user.

¹ Notice that in this case, as in the appropriation theory from DeSanctis and Poole (1994) and Carroll (2004), only the changes in the artifact are considered. Later on, we will also discuss adaptations in tasks and the individuals themselves.

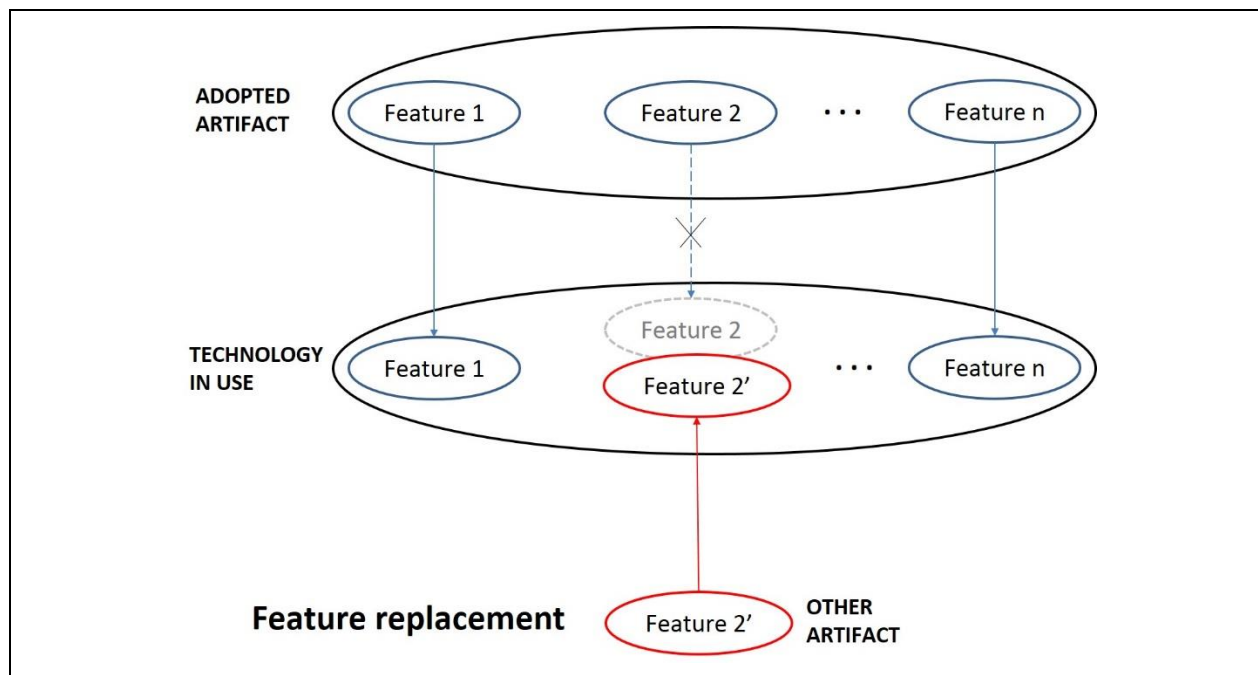


Figure 6. Artifact feature replacement by another feature from a different artifact

4.2.4 Complementation: inclusion of an unavailable feature

The inclusion of a complement in the absence of a desired feature is a different possible adaptation to the artifact. In this case, there is a feature that the user would like to have available in the artifact, but which is not there. The user must adopt a different structure to complement the artifact. Two examples of this kind of appropriation were presented by interviewees.

Some users adopted a spreadsheet with all the required fields to plan the course syllabus. The table with these fields had been prepared by one of the users, who considered it a better way to plan and organize the information prior to feeding it to the portal. Then, it was shared with other lecturers. This feature could be offered as an input option to publish the syllabus, if there was a design feedback cycle as proposed by Faraj *et al.* (2004) and Carroll (2004). It would save users a lot of time, in their own opinion.

Another example is the use of on-line forms to obtain information from students. Some personal information about the students is available in the university databases, but some lecturers would like to know more about their pupils, and directly from them. What is their previous professional experience and graduation perspectives (remembering that many undergraduate students in Brazil are part time students, as most are already in the labor market)? Those lecturers use on-line forms such as Google Forms, SurveyMonkey and Qualtrics to collect the desired information.

The diagram shown in Figure 7 presents the situation where the user adds a feature that is not available in the adopted artifact to his/her technology in use, adopting other artifact as a complement.

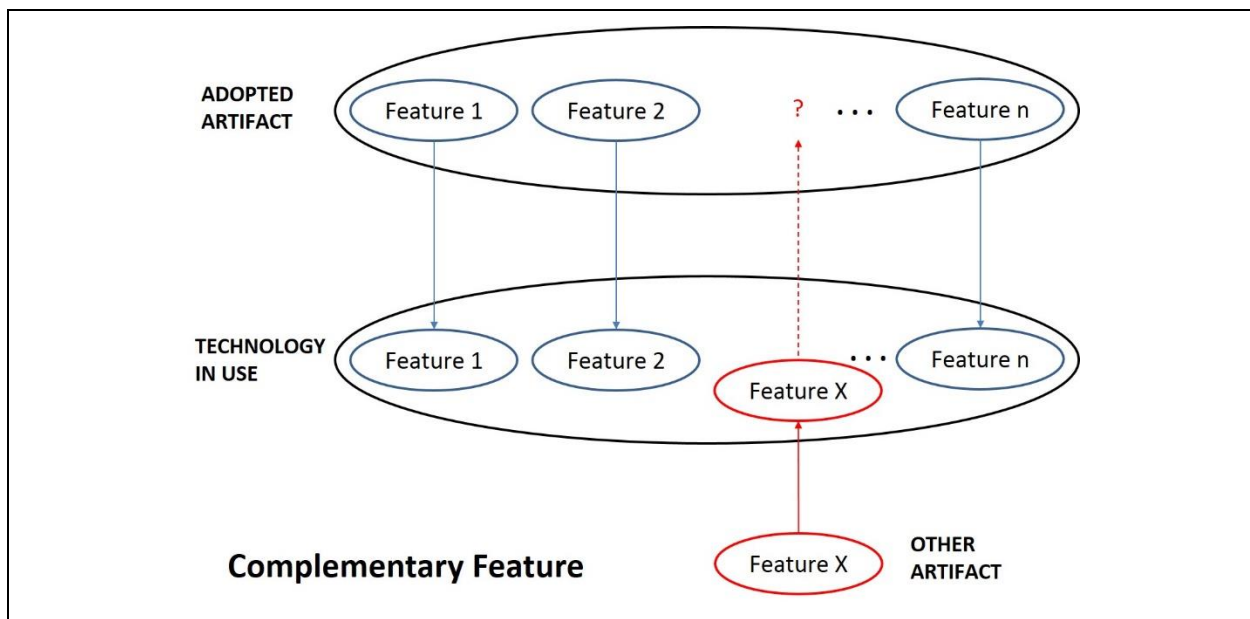


Figure 7. Adoption and use of a complementary feature

The information about desired features, not yet available in the adopted artifact, would also represent a crucial input for future development cycles. This information should complement the information on features users refuse to use, those they adapt and those they replace to provide rich input to new design efforts.

Finally, Figure 8 shows a summary of all types of adaptations we found in our researched case.

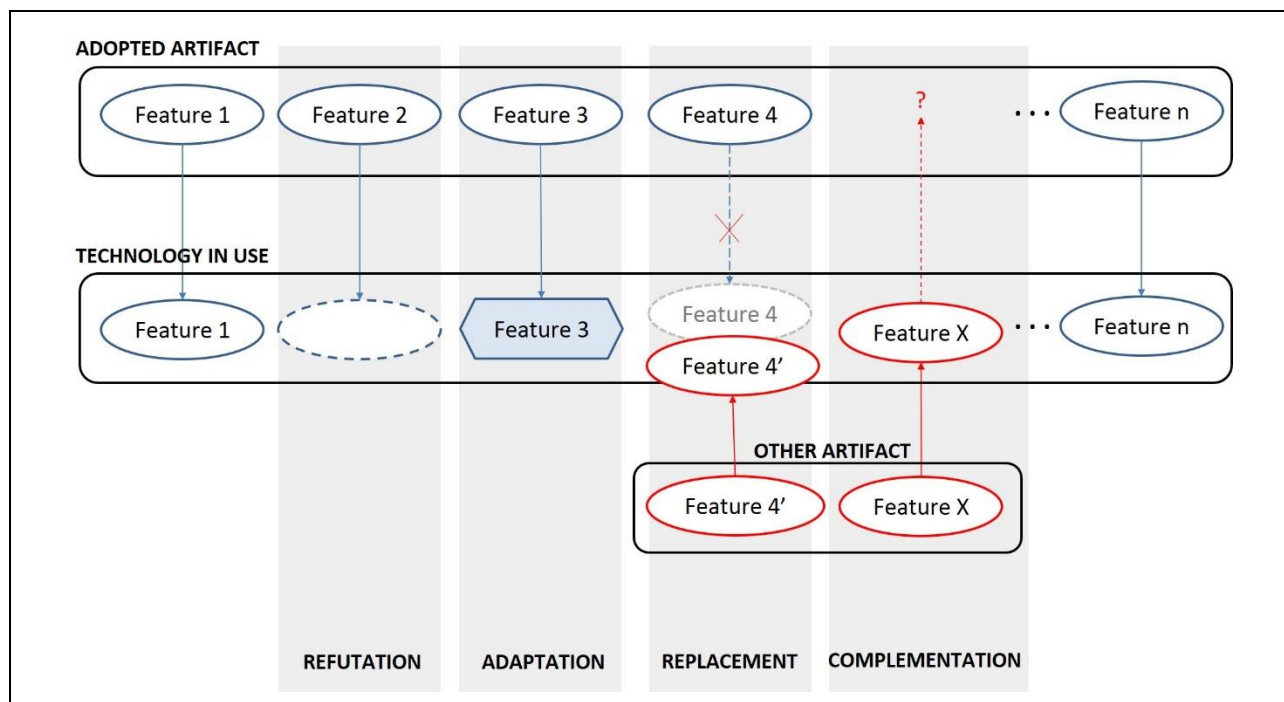


Figure 8. A typology of adaptations found in the field research

5 Conclusion

One question we intended to answer with our study was: “Do users use the IT artifact as expected by their organization?” Based on our analysis of this case we can affirm that they do not always use the IT artifact that way, even in the case of compulsory artifacts. They try to maximize their own personal results at the same time they try to minimize the effort to comply with organizational requirements. This means that users, even in a mandatory situation, use as little effort as possible to comply with monitored and controlled expectations, while they try to extract the maximum advantage of using what ‘fits them’ better in accomplishing their duties.

We were also and mainly interested in investigating “how users appropriate the IT artifact in their activities”. Our results show that this appropriation process, that applies appropriation moves, results in changes in the final solution being used (or the technology in use). We proposed some models that describe each of those situations. Far from just using the artifact as it was adopted by the organization (in an ‘as is’ manner), users refute features, adapt them so that they fit better their own interests, replace features using other artifacts available to them, and even adopt complementary artifacts to accomplish their objectives (organizational or individual). They do these adaptations not just on the technology (the artifact) but also on the tasks, processes, and behaviors to better fit their interests.

The case study also showed us that the studied artifact, even as proposed by its designers, has been changing since its initial implementation several years ago. Different interpretations about the artifact emerged in the group of users, which surely changed the way they use the artifact. Some change may also have happened in the designer’s interpretation of what the real ‘spirit’ of the IT artifact should be, over time, although depicting that was not part of the scope of this study.

A limitation of this research is that we used only one case to analyze the phenomenon, which brings a problem of generalization of any result. Another limitation relates to the interpretive perspective adopted, which could bias the analysis toward the personal interpretations of the authors. Other researchers could interpret the collected data differently.

We think however that, even if the situations we spotted here are not the common rule, they represent possibilities to be considered in the development and implementation of complex systems, for which strict control structures are either unfeasible or undesirable due to the rigidity they could bring to the setting.

We showed that there are ‘black swans’ in the lake. Future research could concern with how often those black swans exist in the corporate environment. Future research could also be focused on understanding how adaptations affect desired outcomes. Are obtained results different between faithful and unfaithful appropriators? Other interesting issue relates to the antecedents for each type of adaptation found in our field work. Are adaptations related to user’s or artifact’s characteristics?

Developers should constantly investigate ‘*what*’ users would like to have available in new versions of the artifact and one way of doing that is looking for their improvisations and planned actions, which lead to the adoption of a technology in use that was not what had been thought of by the designers. By doing that, and considering that there is at least some alignment of purposes among developers and users in their attempt to improve the efficiency and quality of the process that leads to expected goals, they would have access to invaluable information to help them with future developments.

At last, the case study provides us with good evidence that, more important than studying the original acceptance of an artifact, it is to analyze the way its use unfolds. Users, artifacts, and designers will keep interacting. Different perceptions of the artifact will keep being negotiated, as the parties struggle to reach a (possibly impossible) agreed meaning for the proposed technological solution. If and while there is no agreed problem, there cannot be an agreed solution. Organizations should be prepared to deal, and to respect this diversity and maybe even use it to burst internal creativity and innovation cycles.

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