Digital artifacts development and evolution, who has the control/supremacy?  
A story of UNIX developmental trajectories read from institutional theory perspective

Luca Sabini¹, Paolo Spagnoletti¹  
¹LUISS Guido Carli, Rome, Italy

DISCUSSION ABSTRACT

PURPOSE OF THE RESEARCH

In recent years the generativity of digital artifacts (DA) has gained much attention in the literature on innovation. DA are seen as capable of driving innovation in businesses and public services through their capability of being combined with other modules and also embedded as subcomponents of systems designed for other purposes. Therefore a digital product can be seen as an intermediate state in the evolutionary trajectory of a previous artifact in the attempt to materialize the strategy of the developer in satisfying the requirements of the environment (Yoo, Henfridsson, & Lyytinen, 2010).

In DA lifecycle, especially in big projects of software (SW) development, many different actors are involved (e.g., IT companies, universities, communities of voluntary developers, customers). Those actors can have different objectives and priorities toward the SW and, since a project of SW development can last many years, the actors themselves and their strategies may change during this process. We position this work on the stream of research that studies effects of large numbers of actors in the development of software programs (Boudreau, 2012).

To implement this ideas, the proposed research attempt to depict the different development trajectories that the development of UNIX operating system had since his first appearance in 1969. As matter of fact, since 1969, UNIX kernel, which is the core of the operating system, continue to be used in modern operating systems. This history read through the lens of institutional theory can highlight how some actors, such as big IT companies, influenced UNIX development according to strategies pursuing self-interests (i.e.: standardize the product to rise revenues) instead adjust SW according to technical specifications.

To simplify the explanation we can make an analogy with the example of IPad in the work of Resca, Za, & Spagnoletti (2013: 73): “a digital product characterized by a layered modular architecture can be both a platform and a product”. In the first instance UNIX is an operative system (and a product per-se). Anyway, other firms have develop other versions from this operative system to expand its capabilities. In this way, companies that manufacture UNIX kernel (the product) with this architecture invest also in this product as platforms considering different markets and the possibility to build innovative product ecosystems around it. As a platform, its layers can become source of further digital products as different players can take advantage of it contributing to its continuous innovation (Boland, Lyytinen, & Yoo, 2007). This means that this field is particularly complex with many different actors that have played a different role in UNIX development.

THEORIES USED AND CONTRIBUTION TO THE LITERATURE

Power issues in IT design, such as SW development, have been a topic quite well investigated. Some important works (Markus & Bjørn-Andersen, 1987; Markus, 1983) analyze power relations between users and information systems professionals. Others more recent works, instead focus on the IS implementation part within the organizations (Silva & Fulk, 2012). The main implications of this study, focusing on the field of SW development, can be understanding how trajectories of development follow different paths according to the power pressure exerted by all players acting in that field.

DA are characterized by specific architectures that defines them (Yoo et al., 2010) but generally they are characterized by layered modular architecture (Hanseth & Lyytinen, 2010). This means that the product is formed by different components and structured following a particular hierarchy, in a way that there are different components (not necessarily embodied in a single product) that can be puzzled in a different ways. UNIX, to some extent is an example of a DA characterized by this type of architecture.

This is a research proposal to investigate the field of digital product development through institutional theory lens. The research problem that arise is linked to the way the field of information systems contribute to innovation and development of a DA (Yoo, 2013), and it is declined under three aspects: (1) which are the players that “drive” growth and improvement of a given DA, (2) which strategy drives those actors, (3) how they behave and influence this development throughout all the DA development history, (4) how and why they decide to quit or enter in the process of DA development.

A possible contribution relates to the institutional theory mainly in helping to understand dynamics that drive the work of institutional agents in the development of DA.

RESEARCH METHOD

Drawing on the possibility to do a documentary analysis, this work propose to examine the management of tensions through the combination of distinct strategies performed by different actors in different time moments. The usefulness of this analysis is highlighted also in a previous work: “the presence of an organizational logic that involves heterogeneous players pursuing their own strategy of innovation is fundamental” (Resca et al., 2013: 74)

The course of this process can be even more interesting if investigated through a long period of time in which main technological and social phenomena happened. Internet development for example gave the possibility to some actors (communities of free developers, customers) to enter the game and gain power respect to others (big IT companies) that correspondingly were forced to change their strategies.
The methodology to be used in order to answer the research problem can be driven from the Fig. 1 that represent the timeline of UNIX system development. An extensive archival data collection will be gathered from the massive quantity of open historical data available on the many different UNIX releases and developments.

**MAIN RESULTS**

The analysis of this scenario could lead to interesting findings. From a preliminary analysis of the data it is possible to conjecture that the developmental path of a DA does not follow a “pure” technological path. In our interpretation it is important to consider how the development of this artifacts is not just following a “classical” path tightly linked with technological changes, but the presence of the several actors involved in this scenario (with particular reference to large corporations) would affect the development for this DA.

---

![UNIX Timeline](http://www.levenez.com/unix)

**Fig. 1**: A diagram showing the timeline of UNIX system development (http://www.levenez.com/unix)

**REFERENCES**


