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Understanding the Evolution of Standards: Alignment and Reconfiguration in Standards Development and Implementation Arenas


ABSTRACT: The paper focuses on the various frameworks that have been advanced for socio-economic analysis of compatibility standards in information systems, and their adequacy in addressing a set of key issues and challenges. The paper draws upon the concepts developed within the social shaping of technology perspective to approach the standardization process in a dynamic fashion. A dynamic approach to the analysis of standards development is proposed which examines together the settings of standard development and use. The analysis addresses the entire life cycle of a standard, which is conceived in terms of a series of versions of a particular standard, and the displacement of one standard by another. These issues are explored empirically through the case study of healthcare messaging standards in the English and Scottish healthcare sectors.

1. Introduction: laying out the context

The crucial role that standards play for Information and Communication Technologies (ICT) development, especially in relation with technological innovation processes, has been largely documented in the socio-economic literature on standard development. Standardisation has been found to have a major impact on technology innovations (Jakobs, 1998), to represent an endogenous factor that shapes technology development (Egyedi, 1996), and to affect the rate and direction of innovation (David and Steinmueller, 1994). A growing body of literature has thus emerged investigating the factors shaping the standards development process and its outcomes.

This paper addresses some analytical challenges and shortcomings evident in this literature. For methodological, practical and theoretical reasons, many socio-economic studies of standard development have involved case-studies of particular instances and fora for the agreement for a particular standard, and focusing on the interplay between the various interests involved in relation to a particular standard.

The result has been a markedly static conception of the standardisation process. The interaction between the various stages in a standard life cycle and its influence on the evolution of standards over time has been largely ignored in existing research. Examples include the analysis by Graham et al (1995) of the global development of the EDIFACT standard, and the discussion by Egyedi and Loeffen (2002) regarding the transition from SGML to XML and

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Schmidt and Werle (1998) analysis of telecommunications standard development. While providing useful insights into the socially shaped nature of the standard development process, for example by illustrating the conflict and alignment of interests between the actors (Graham et al, 1995), and the mixed socio-technical nature of the process (Egyedi & Loeffen, 2002), such studies do not address the dynamic analysis of standards as they evolve over time.

We argue that such a static focus has restricted the ability of existing socio-economic analytical frameworks to conceptualise and fully investigate the ongoing relation between the various stages in the standard life cycle and interaction between standards and their evolution over time.

1.2. The objectives of the paper

The reasons for these shortcomings in existing studies of standardisation are various, and include practical considerations (for example resource constraints mean that direct investigation of standard setting contexts is limited in time and social/geographical space) as well as the prevalence of actor-centred accounts within much contemporary technology studies (which, with their concern to explore the influence of actors on standard development have tended to focus on the immediate locales of standard setting) (Williams, 1997). We suggest that the framework of analysis has to be enlarged in order to account for a dynamic evaluation of standard development. The aim of this paper is to articulate a more complex conceptual framework that can address the dynamics of standards as they evolve over time. Two major objectives are addressed in this paper:

(1) First, the paper examines the standards development and implementation stages together, even if they operate in very different kinds of socio-technical settings.

(2) Second, the analysis of standardisation process is approached from an evolutionary perspective, where the life-cycle of standards is conceived in terms of series of versions of a particular standard, and the displacement of one standard by another.

The next section will lay out the theoretical argumentation which justifies a dynamic approach to understand standards development and use. Such a move clearly presents a number of challenges for research, which needs to take on board longitudinal study and to address the interaction between a number of social locales. The theoretical discussion will be exemplified in the following section with a short discussion of the evolution of healthcare messaging standards in the British health service. A discussion of the findings of the study concludes this paper.

2. Theoretical approach and framework

2.1. Background

In the broad sense, a standard can be defined as "a set of specifications to which all elements of product, processes, formats, or procedures under its jurisdiction must conform" (Tassey, 2000, pg. 588). David and Steinmueller (1994) differentiate between four categories of standards, reference standards, minimum quality standards, technical interface design standards, and compatibility standards. This paper focuses on the latter category, i.e. standards that "assure the user that a component or sub-system can successfully be incorporated, and be 'inter-operable' with other constituents of a large system of closely specified inputs and outputs." (David and Steinmueller, 1994, pg. 218). Compatibility standards are addressed in relation with network
ICTs, in which case they are crucial in that they enable data exchange between components within a particular system or between different inter-organisational information systems.

The development and implementation of compatibility standards not only technically defines a method of interoperation between the different components in a network, but most importantly it represents a proposal for the future of complex socio-technical systems, that is the shape of a inter-organisational network. According to Graham et al (1995), the standardisation process also represents an attempt to align interests, business practices and expectations of an array of people with an interest to develop and use the system that is to be standardised. Therefore, standardisation is not only about providing workable solution, but most importantly, it refers to articulating and aligning expectations and interests (Williams, 1997).

A number of different analytical frameworks have been used in the existing standardisation literature to address the development and, less often, the implementation and use of standards. An overview of these frameworks is presented in the table below, together with some examples of the studies in which they have been, implicitly or explicitly, used: