A framework for ICT standards creation: The case of ITU-T standard H.350

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Abstract

This paper addresses a fundamental question: Is there a standard way of creating standards? Based on our first-hand experience of creating a technical ICT standard called H.350, we pondered over the process and reflected on what really happened. H.350 is a Directory Services for Multimedia standard ratified by the International Telecommunications Union in September 2003. Resulting from an Internet2 Video Middleware working group the new H.350 standard provides a uniform way to store and locate information related to video and voice over IP (VoIP) in directories that are linked seamlessly to enterprise directories. There were many socio-economic-technical factors that led to the creation of H.350 and we were able to organize the process into a framework, which we present here. We have combined the "public policy good" model and the "stakeholder analysis model" in standards creation into a comprehensive framework that can help the research community to better understand what goes on in standards creation. We conducted in-depth interviews with the core H.350 team to learn more about the entire process and their experience. The findings from these interviews further validate our framework. We apply the case of H.350 to our framework and help understand the forces that affect development of ICT standards.
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1. Introduction

The environment that surrounds the birth of information communication technology (ICT) standards is one that is, for lack of a better word, magical. After all, these standards enable core innovation, invention and creativeness that in some way represent our productive capabilities in today's modern information age [1,2]. It is these fundamental forces, these standards, which drive our organizations, our businesses and schools, and ultimately our lives. Standards ensure product compatibility and interoperability, which in turn ensures productivity of the workforce.

This paper proposes a framework for understanding the different forces that must work together in the development of such a standard.

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However, this framework is not a scientific formula for creating ICT standards. Any given technology standard starts with a vision for something that could be, or should be. However, no single person's vision leads to the establishment of an ICT standard. Instead, it is a coalition of organizations and groups of individuals working together towards a common goal that make ICT standards happen [3–5].

This paper uses the development of the H.350 multimedia standard [6], which was established in coordination with Internet2, the University of North Carolina at Chapel Hill, University of Alabama at Birmingham and Claremont Graduate University in 2003 (including one of the co-authors of this paper). At first glance, it appears no different than many other standards—it is a lengthy, often extremely technical document, freely available on the Internet [7].

However, it will no doubt become evident that, in many ways, the H.350 standard is unique in its own right. In particular, we believe that this may be the first standard ever to be developed that integrates work from two standards bodies, namely the International Telecommunications Union (ITU) and the Internet Engineering Task Force (IETF). H.350 is a ''Directory Services for Multimedia'' standard ratified by the ITU in September 2003 [6]. Resulting from an Internet2 Video Middleware working group [8], the new H.350 provides a uniform way to store and locate information related to video and voice over IP (VoIP) in directories that are linked seamlessly to enterprise directories (ED).

This study consists of two parts. First, we present two previously established models used for different purposes and integrate them to form a framework that helps understand creation of ICT standards. This framework is used to answer several important questions: What is an ICT standard? Is it information or knowledge? What is the process of creating an ICT standard? Who are the major stakeholders and what roles do each play? Are there political forces behind standards making? What is the utility of such standards?

In the second part of our study, we report and analyze data from in-depth interviews with the core H.350 team to learn about the entire process and their experiences. The findings help us to further expand our framework and to validate our model. This model is a first step towards better understanding of how to create ICT standards.

In Section 2, we present a core public policy model and a stakeholder analysis model that can be used as a foundation for understanding the stakeholders in ICT standards development. Section 3 reviews the existing literature to identify current research on the process by which standards are created. Section 4 describes the work done with the H.350 standard, including what it took to formally establish it. The process from problem formulation to conceptualization through to creating an international standard is described. In Section 5, we apply this model to the H.350 standard. Finally in Section 6, we present a new model based on the integration of the public policy model with a derivation of research done by Robinson [9] in stakeholder analysis for standards. Using our in-depth interviews with the core developer team, we demonstrate how the proposed framework can be used for better understanding the forces that affect development of standards. This is important because we believe that current academic literature has shed very little light to date on the actual process and experiences of creating an ICT standard. The paper concludes with a discussion of lessons learned and the usefulness of the proposed framework.

2. Public policy analysis as a framework for understanding ICT standards

Some ICT standards offer a freely available resource to the general public. In public policy analysis, we would classify this resource as a nonrivalrous and nonexcludable ''pure public good''. The work of Weimer and Vining [10] defines a good that is nonrivalrous as one in which ''more than one person can derive consumption benefits from a given level of supply''. A good that is nonexcludable is one in which ''it is impractical for one person to maintain exclusive control over its use'' [10].

However, just as there can be a nonrivalrous and nonexcludable pure public good, we can also examine cases where a good is both rivalrous and excludable. This case is called a ''private good'', one which people can be prevented from obtaining and is found in limited supply. In fact, in public policy analysis there can be several combinations of rivalry and excludability (see Fig. 1). There are two reasons that public policy analysis is relevant to ICT standards. First, one is dealing with a good that is in many ways a vital economic force—these standards are responsible for the core design of