

## Chapter 3

# Complex Network Perspective on Collaboration in ICT Standardization

**Timo Ali-Vehmas**  
Aalto University, Finland

### ABSTRACT

*Standardization is a crucial enabler of global business of information and communications technologies. Convergence of the underlying networking paradigms of licensed mobile communication and license-exempted internet has made progress, but full integration is still far from being complete. For standardization professionals, the unpredictable convergence makes decision making and participation in standardization complicated. This chapter examines collaboration in five closely related standardization organizations working in this field during the years from 2003 to 2008. The results show similarities and differences in collaboration structures and behaviours reflecting the specific scope and context of each standardization organization. Furthermore, this chapter extends the use of social network analysis as a tool to the field of empirical standardization research. The results pave the way towards better collaboration in standardization communities of converging mobile internet and beyond by providing better visibility and new insights to standardization leaders, policy makers, and users.*

### INTRODUCTION

Standardization (Swann, 2010) and Information and Communications Technologies (ICT) standardization specifically (Shin, Kim, & Hwang, 2015) have been studied extensively. Standards and standardization are major drivers of choice and change. Standards are known to enable value systems where complementary products utilize open interfaces (Katz & Shapiro, 1985). Emerging network effects reflect the strength and type of ties defined by standardized interfaces. Network effects motivate companies to voluntarily contribute their proprietary technologies to open standardization (Economides, 1996) while too strong network effects create undesired technology lock-in as is the case in the QWERTY keyboard (David, 1985). High expectations related to the network effects can make incompatible competition more lucra-

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tive for leading dominant companies. Therefore, open interoperability through standardization must be favoured by public policy makers (Farrell & Klemperer, 2007).

Linkages between standardization and business models have increased. Scope of standardization has expanded to new areas when focused collaborative consortia have emerged to address weaknesses of the traditional formal standardization (Hawkins & Ballon, 2007), (Blind & Gauch, 2008). Number and volume of different standardization activities has spawned as needs for interoperability, compatibility, scale of economies and for faster innovation diffusion have increased in the globalized markets (Choi, Kim, & Lee, 2010), (Rogers, 1995).

Extensive use of ICT technologies spreads further in our society when the 5G, Internet of Things, Virtual Reality and consumers' data driven applications are emerging. Multiple parallel ICT standardization processes needs more clarity and better structures. Traditional classification of standardization leans to the formal or informal legal status defined by regulation (*de jure*) or by market actors (*de facto*). The *de jure* standards may be promulgated directly by governmental agencies (mandated) or be based on a collaborative work in standards writing organizations (committee) having a formal delegated ("licensed") position. Long time ago governmental organizations alone took care of standards for telecommunications. Today, authorized organizations such as the European Telecommunications Standards Institute (ETSI, 2016) create most of the formal standards for telecommunications. *De facto* standards may have a dedicated sponsor or owner having interest and full control over the standard (proprietary platform leader controlling publicly available interface specifications) or an "unsponsored" standard is an outcome of a voluntary open collaboration of interested actors. This last model is the most rapidly growing area of standardization, the Bluetooth (Bluetooth, 2016) community being one example. The key difference between the two *de facto* standardization approaches is the level of openness and control of the standard and the standardization process. (David & Greenstein, 1990), (Funk & Methe, 2001), (Gandal, Salant, & Waverman, 2003). As a summary, Table 1 shows a simplified categorization below:

Standardization is sometimes considered as a competition between different technologies, different business models and between different SSOs. Success of a standardization process depends on a large number of different factors including characteristics of the supporting companies, standardized technology itself and actions of all the stakeholders (Kaa van de & Vries, 2015) as well as on network effects and life cycle dynamics of the standard (Blind, 2011). New needs for research arise related to question on how standardization entities develop over time. When originally small and agile market driven standardization organization gains recognition and develops its processes the initial clear scope may become ambiguous (Pohlmann, 2014). Growing number of market driven standardization consortia parallel to the progressing convergence of the ICT with all other sectors of life have created a need to look at the competition and collaboration of the standardization groups as a larger network of standards and standardization (Jakobs, 2003), (Jakobs, 2008), (Baron, Meniere, & Pohlmann, 2014). Collaboration networks in standardization do not emerge randomly but a number of factors characterises successful

*Table 1. Simplified categorization of the system archetypes (Ecosystem Dynamics) of different compatibility seeking approached (Adapted from (Ali-Vehmas & Casey, 2012))*

	<b>Mandated/Non-Collaborative</b>	<b>Collaborative</b>
Public <i>de jure</i>	1: Mandated (by government)	2: Delegated to authorized actors
Private <i>de facto</i>	4: Proprietary dominant design	3. Voluntary collaboration

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