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van de Kaa, Geerten; Viardot, Eric; McCarthy, Ian P.

DOI
10.1007/s12525-022-00611-6

Publication date
2022

Document Version
Final published version

Published in
Electronic Markets

Electronic Markets
https://doi.org/10.1007/s12525-022-00611-6

PREFACE

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Geerten van de Kaa[1] · **Eric Viardot**[2,3] · **Ian P. McCarthy**[4,5]

Received: 21 October 2022 / Accepted: 22 October 2022

Keywords Standardization · Standards · Dominant designs · Platforms · Platform ecosystems

JEL classification L15 · O32

Background

Platforms and their ecosystems have been around for many years. A traditional platform would be a forum or a shopping mall that provides space and infrastructure to collate stores to offer products and services to consumers. This platform provides a concentration of different shopping opportunities that attract a concentration of consumers, and this reduces transaction costs. The same logic applies to digital platforms such as Apple's App Store and Google Play where consumers go to one place to search for and download apps from an extensive library, onto the Apple iOS and Google Android platform ecosystems. Thus, the distinction between a platform (e.g., Apple App Store and Google Play) and a platform ecosystem (e.g., Apple iOS and Google Android), is that a platform is a host for third parties to transact with consumers more easily, whereas a platform ecosystem, controls, links and curates the collective value from different third parties and their offerings.

Platform ecosystems have become an increasingly popular and important research topic in the last five years (Kapoor et al., 2021). Research on platform ecosystems has converged towards a shared understanding of what they are and why they thrive (Hein et al., 2020), with studies highlighting aspects such as 'joint value creation, (Cennamo & Santalo, 2019), 'super-modular complementarity' (Jacobides et al., 2018) or 'alignment structure of the multilateral set of partners' (Adner, 2017, 40). And with advances in technology such as cloud computing, internet of things, big data, and artificial intelligence, the value and impact of platform ecosystems is expected to rise (Cappa et al., 2021).

As more industry sectors are adopting such technologies, this is driving a trend towards increased interconnectivity within and between sectors. As a result, the boundaries between sectors are becoming increasingly blurred. The technological developments will result in platform ecosystems that consist of connected but previously unrelated stakeholders from different backgrounds (e.g., in terms of type (public/private), industry background) (Kenney & Zysman, 2016) and complex systems that consist of components originating from different sectors that are moving towards each other (Van de Kaa et al., 2014).

Another interesting illustration is the "metaverse" that is emerging from the convergence of three major digital technologies: gaming, augmented reality/virtual reality (AR/VR), and Web3 (Bobier et al., 2022). While there are still various definitions of the concept, the metaverse encapsulates what will probably be the next generation of the Internet. The metaverse has different features, including an environment that can be realistic or not; a sense of immersion through VR interfaces, including physical stimulations; real-time interactivity between thousands of concurrent users; and finally, a secure and private environment that allows users to create digital artifacts and to share them with other users (Dwivedi et al., 2022). The metaverse also includes infrastructure, hardware, and platforms (Hazan et al., 2022).

This article is part of the Topical collection on Standardization for platforms ecosystems

✉ Geerten van de Kaa
g.vandekaa@tudelft.nl

[1] Faculty of Technology, Policy and Management, Delft University of Technology, Jaffalaan 5, 2628BX Delft, The Netherlands

[2] Skema Business School, Lille, France

[3] Université Côte d'Azur, Nice, France

[4] Beedie School of Business, Simon Fraser University, Burnaby, Canada

[5] Luiss University, Rome, Italy

Published online: 28 November 2022

More specifically, there are two types of metaverse platforms. One involves creative/3D development platforms, mostly open platforms, allowing developers and educated users to design and develop new games or animations. A second is dedicated to the immersive access, discovery, and use of content, experiences, and applications typically offered by browsers, search / visual search, or app stores (Eguíluz et al., 2018).

So far, the most visible metaverse platforms are in the digital gaming industry, a sector that is today bigger than movies and music, with more than three billion users globally and a total value of $215 billion in 2021 (PwC, 2022). The most famous digital platforms are Decentraland, Fortnite, Minecraft, Roblox, and The Sandbox. But there are also more than 90 web3-based platforms (SourceForge 2022) where users can access or develop Web3 decentralized applications for blockchain technology (e.g., Ethereus and Hyperledger), cryptocurrency (e.g., Coinbase and Binance), or digital property such as non-fungible tokens (e.g., Opensea and Ramble). Finally, there are more than 70 AR/VR collaboration platforms (Schultz, 2022) where users can collaborate in *virtual reality* from remote locations (e.g., AltspaceVR and RecRoom) (Liu & Steed, 2021).

Metaverse technologies are starting to converge as firms are testing new activities with the metaverse from socializing to virtual learning, fitness, commerce, and others. For instance, some gaming platforms are now addressing multiple uses, such as virtual concerts in Fortnite, Roblox, and Minecraft, while Meta's VR platform has been hosting virtual NBA games. On Decentraland, e-consumers can now shop on a Samsung digital copy of its NYCity store while Gucci sells virtual sneakers on Roblox virtual skate park. In another area, Meta Quest 3 is working on inward-facing cameras that will enable the user's facial expressions to be projected onto avatars, making eye contact and facial identification easier. Soon, people will probably be able to use all three metaverse technologies simultaneously such as accessing a gaming platform using VR to purchase a non-fungible token with a Web3 currency.

The role of standardization

It is obvious that the interplay of these technologies requires standards at many levels, from the data and the functional interfaces to the protocols. A standard is an established norm, rule, or approach that can describe the characteristics of a technology, it's mode of operation, and its performance. Standardization is the process of developing, adopting, and controlling such standards based on the consensus of firms, users, interest groups, and governments (Xie et al., 2016). The process of standardization has been studied by academics for many years. Standardization mostly occurs in international standard development organizations such as the International Organization for Standardization (ISO), regional standard development organizations such as the International Telecommunication Union (ITU) or national standardization organizations such as the Deutsches Institut für Normung (DIN) and scholars have, e.g., described these organizations in detail. However, sometimes, firms compete directly with other firms for a standard and engage in a market-based standardization process. The result could be a dominant standard or a dominant design. One crucial aspect that determines the success of platform ecosystems is the role of standardization in producing dominant designs. To reach dominant designs, generally accepted common standards should be developed and used by firms and society so that, e.g., the technological components of the systems can be connected, and quality and safety requirements can be guaranteed (Viardot, 2017).

Dominant designs are technologies that have achieved widespread dominance due to natural selection (Abernathy and Utterback, 1978; Utterback & Abernathy, 1975). However, scholars argue that the process that leads to dominant designs can be influenced by trying to increase the technology's installed base (Gallagher & Park, 2002; Schilling, 1998). Under the influence of network effects, the technology that achieves an upper hand will become the dominant design. This results in standards battles, such as the case with video recording technology in the late 1970s between Victor Corporation of Japan (JVC) and Sony and their competing VHS and Betamax video technologies (Cusumano et al., 1992). VHS is a typical example of a technology with features of a dominant design, platform and standard.

Despite the importance of standardization and the increasing popularity and significance of platform ecosystems and despite their evident links, both scholarly communities have not often studied the phenomena in combination. With this context and opportunity to offer new insights on the role of standardization in platform ecosystems, this special issue aims to advance knowledge in this field. In particular, the special issue focuses on how standards are an important element of platforms and their ecosystems. We aimed to bring together scholars studying standardization and platforms in a digital context. This included research on the impact of standardization, standardization strategies, standardization through consortia and/or strategic alliances, committee-based standardization, market-based standardization, standard selection, standards, and dominant designs, and standards battles and platform wars. Papers on other standardization topics about platform ecosystems were also considered. Following the journal's standard submission and peer review process, we are delighted to share the five accepted papers for this special issue.

Goals, content and analysis

One of this special issue's goals was to understand the role of standardization in relation to platform ecosystems to help entrepreneurs and other practitioners attain digital transformation. In this section, we elaborate on this, introduce the papers in the special issue, and provide an agenda for future research.

Standards and dominant designs can be defined for platforms and ecosystems. A platform dominant design is a platform that has achieved widespread acceptance and use by a majority of the market. An ecosystem dominant design is one where a platform secures the allegiance of users by standardizing how consumers and third parties join, participate and transact on the platform.

With the increasing convergence of industries, it is challenging for companies from different industries to cooperate on standards in committees, and companies do not seek out competition either as they are afraid of cannibalizing their own market. This can result in a stalemate when it comes to the standardization of various systems as companies from different industries do not want to coordinate their developments through standardization and as a result, a system will not emerge. As more users and technologies get interconnected, the uncertainty concerning the choice to select a standard will increase for every party. At some point, it might not be possible to explain the outcome in terms of which standard will be selected.

Platform ecosystems based on digital technologies can avoid such situations because the processes and offerings they use to attract and connect users (third parties and consumers) are highly suited to standardization practices. Figure 1 illustrates this by showing how four different standardization approaches can result in different potentials for platform dominant design and ecosystem dominant design. The two axes indicate the extent to which a platform (i.e., the X-axis) and an ecosystem of users of the platform (i.e., the Y-axis) have evolved to have dominant functionality, appearance, and modes of use. With the Laissez-faire approach, there is no standardization and associated dominant design, making it much like a traditional value chain where users search for or post calls for transactions. This approach includes the search engine Google and exchanges on social media sites. With the Architectural approach, there is a dominant platform design that hosts and supports users who build and offer transactions in customized ways. For example, Shopify is a dominant platform for helping merchants to develop and customize online stores in different industries and regions of the world. The Complement approach involves platforms with different business models and modes of use and appearance, but within an industry, they require

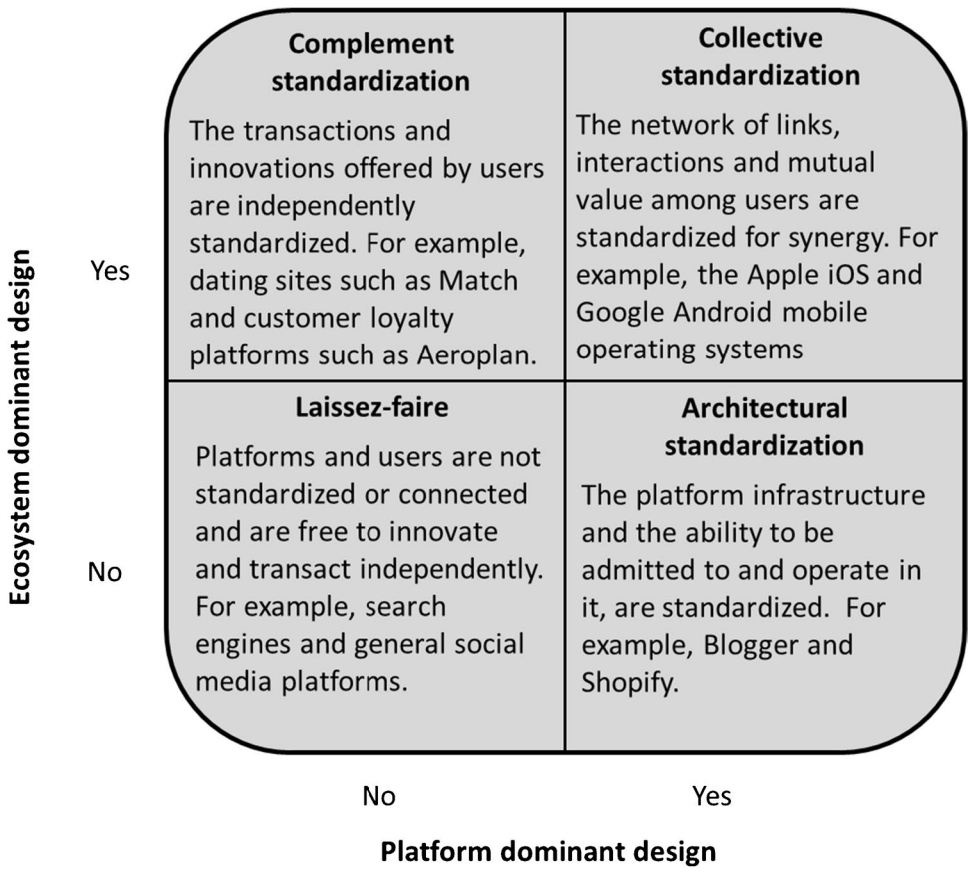

Fig. 1 Standardization approaches for platform ecosystems

highly standardized input and behavior from users. This approach includes loyalty card programs like Aeroplan and dating sites like Match. The Collective approach is when the platform and users' ecosystem are mutually dominant designs through standardization. The approach includes the Apple iOS and Google Android mobile operating systems. This approach helps ensure compatibility, interoperability, and quality of user transactions.

The papers in this special issue examine examples of the forms of standardization and platform ecosystem highlighted in Fig. 1. For example, the first paper 'Developing design principles to standardize e-commerce ecosystems' was written by Tobias Wulfert, Robert Woroch, Gero Strobel, Sarah Seufert, and Frederik Möller (Wulfert et al, 2022). The paper studies e-commerce ecosystems and investigates the metarequirements and design principles that foster standardization in these ecosystems. The second paper 'A multilevel, multimode framework for standardization in digital B2B platform ecosystems in international cargo transportation—A multiple case study' was written by Ruben Tessmann and Ralf Elbert (Tessmann & Elbert, 2022). This paper investigates which factors determine the choice for a mode of standardization (e.g., standards developed by committees, in markets or by governments) that is followed within a platform ecosystem and which are the factors for standard adoption for platform ecosystems.

The third paper 'Building digital platform ecosystems through standardization: An institutional work approach' was written by Carolina Costabile, Jon Iden, and Bendik Bygstad (Costabile et al., 2022). This paper studies how standards are arrived in platform ecosystems when a central platform leader is unavailable. By conducting a longitudinal case study of a digital platform ecosystem within the Norwegian aquaculture industry the paper finds four institutional work practices that are involved in the standardization process. The fourth paper 'Compatibility promotion between platforms: The role of open technology standards and giant platforms' was written by Sven Niederhöfer and Sebastian Spaeth (Spaeth & Niederhöfer, 2022). The paper studies the factors that affect 'platform-to-platform compatibility promotion'. The focus lies on the smart home market, a typical example of a market that is the result of a convergence of various sectors as mentioned before. The fifth paper "Selective promotion for standard development in shared platforms: A rising tide may not lift all boats" by Rikard Lindgren (Lindgren, forthcoming) focuses on a specific form of standardization whereby both current and possible new procedures and practices are standardized simultaneously within the context of platform ecosystems.

We thank Rainer Alt as Editor-in-Chief of Electronic Markets for inviting us for this special issue and hope the articles in this special issue will motivate and guide future research. We feel that the identification and investigation of the various forms of standardization shown in Fig. 1 serves to deepen the knowledge and strengthen the link between standardization and platform ecosystems. Specifically, in future studies, factors that affect the selection of platform dominant designs and ecosystem dominant designs could be investigated and it could be studied to which extent such factors overlap with factors for standard or design dominance. Interestingly, irrespectively of the existence of indirect network effects, most platforms and platform ecosystems coexist resulting in no dominant design (e.g., App store and Google play; iOS and Android). An interesting area of future research could be to study the reasons for this co-existence.

References

Abernathy, W. J., & Utterback, J. M. (1978). Patterns of industrial innovation. *Technology Review, 80*(7), 40–47.

Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. *Journal of Management, 43*(1), 39–58. https://doi.org/10.1177/0149206316678451

Bobier J-F., Merey, T., Robnett, S., Grebe, M., Feng, J., Rehberg, B., Woolsey, K. & Haz, J. (2022). *The Corporate Hitchhiker's guide to the metaverse*. https://www.bcg.com/fr-fr/publications/2022/a-corporate-guide-to-enter-the-metaverse-explained. Accessed 8-10-2022.

Cappa, F., Oriani, R., Peruffo, E., & McCarthy, I. P. (2021). Big data for creating and capturing value in the digitalized environment: Unpacking the effects of volume, variety, and veracity on firm performance. *Journal of Product Innovation Management, 38*(1), 49–67. https://doi.org/10.1111/jpim.12545

Cennamo, C., & Santalo, J. (2019). Generativity tension and value creation in platform ecosystems. *Organization Science, 30*(3), 617–641. https://doi.org/10.1287/orsc.2018.1270

Costabile, C., Iden, J. & Bygstad, B. (2022). Building digital platform ecosystems through standardization: An institutional work approach. *Electronic Markets, 32*(4). https://doi.org/10.1007/s12525-022-00552-0

Cusumano, M. A., Mylonadis, Y., & Rosenbloom, R. S. (1992). Strategic maneuvering and mass-market dynamics: The triumph of VHS over beta. *Business History Review, 66*(1), 51–94. https://doi.org/10.2307/3117053

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., Janssen, M., Kim, Y.-G., Kim, J., Koos, S., Kreps, D., Kshetri, N., Kumar, V., Ooi, K. -B., Papagiannidis, S., Pappas, I. O., Polyviou, A., Park, S.-M., Pandey, N., Queiroz, M. M., Raman, R., Rauschnabel, P. A., Shirish, A., Sigala, M., Spanaki, K., Tan, G. W.-H., Tiwari, M. K., Viglia, G., & Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management, 66*. https://doi.org/10.1016/j.ijinfomgt.2022.102542

Eguíluz, A., Garaizar, P. & Guenaga, M. (2018). An evaluation of open digital gaming platforms for developing computational thinking skills. In D. Cvetković (Eds) *Simulation and gaming*. IntechOpen, 143–168.

Gallagher, S. R., & Park, S. H. (2002). Innovation and competition in standard-based industries: a historical analysis of the U.S. home video game market. *IEEE Transactions on Engineering Management, 49*(1), 67–82. https://doi.org/10.1109/17.985749

Hazan, E., Yee, L., Elmasry, T., Srivastava, S., Zemmel, R. W., & Kelly, G. (2022). *Value creation in the metaverse*. https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/value-creation-in-the-metaverse. Accessed 8-10-2022.

Hein, A., Schreieck, M., Riasanow, T., Soto Setzke, D., Wiesche, M., Böhm, M., & Krcmar, H. (2020). Digital platform ecosystems. *Electronic Markets, 30*(1), 87–98. https://doi.org/10.1007/s12525-019-00377-4

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal, 39*(8), 2255–2276. https://doi.org/10.1002/smj.2904

Kapoor, K., Bigdeli, A. Z., Dwivedi, Y. K., Schroeder, A., Beltagui, A., & Baines, T. (2021). A socio-technical view of platform ecosystems: Systematic review and research agenda. *Journal of Business Research, 128*, 94–108. https://doi.org/10.1016/j.jbusres.2021.01.060

Kenney, M. & Zysman, J. (2016). The rise of the platform economy. *Issues in science and technology*, *32*(3), 61.

Lindgren, R. (forthcoming) Selective promotion for standard development in shared platforms: A rising tide may not lift all boats. *Electronic Markets*.

Liu, Q. & Steed, A. (2021). Social virtual reality platform comparison and evaluation using a guided group walkthrough method. *Frontiers in Virtual Reality, 2*. https://doi.org/10.3389/frvir.2021.668181

PwC. (2022). *Global entertainment & media outlook 2022–2026*. https://www.pwc.com › press-releases. Accessed 8-10-2022.

Schilling, M. A. (1998). Technological lockout: An integrative model of the economic and strategic factors driving technology success and failure. *Academy of Management Review, 23*(2), 267–284. https://doi.org/10.5465/amr.1998.533226

Schultz, R. (2022). *Welcome to the metaverse: A comprehensive list of social VR/AR platforms and virtual worlds*. https://ryanschultz.com/list-of-social-vr-virtual-worlds/. Accessed 8-10-2022.

Spaeth, S., & Niederhöfer, S. (2022). Compatibility promotion between platforms: The role of open technology standards and giant platforms. *Electronic Markets, 32*(4). https://doi.org/10.1007/s12525-022-00590-8

Tessmann, R., & Elbert, R. (2022) A multilevel, multi-mode framework for standardization in digital B2B platform eco-systems in international cargo transportation—A multiple case study. *Electronic Markets, 32*(4). https://doi.org/10.1007/s12525-022-00551-1

Utterback, J. M., & Abernathy, W. J. (1975). A dynamic model of process and product innovation. *Omega, 3*(6), 639–656. https://doi.org/10.1016/0305-0483(75)90068-7

Van de Kaa, G., De Vries, H. J., & Rezaei, J. (2014). Platform selection for complex systems: Building automation systems. *Journal of Systems Science and Systems Engineering, 23*(4), 415–438. https://doi.org/10.1007/s11518-014-5258-5

Viardot, E. (2017). Trust and standardization in the adoption of innovation. *IEEE Communication Magazine, 1*(1), 31–35. https://doi.org/10.1109/MCOMSTD.2017.1600154ST

Wulfert, T., Woroch, R., Strobel, G., Seufert, S., & Möller, F. (2022) Developing design principles to standardize e-commerce ecosystems. *Electronic Markets, 32*(4). https://doi.org/10.1007/s12525-022-00558-8

Xie, Z., Hall, J., McCarthy, I., Skitmore, M., & Shen, L. (2016). Standardization efforts: The relationship between knowledge dimensions, search processes and innovation outcomes. *Technovation, 48–49*, 69–78. https://doi.org/10.1016/j.technovation.2015.12.002