Please quote as: Schlagwein, D.; Conboy, K.; Feller, J.; Leimeister, J. M. & Morgan, L. (2017):‘‘Openness’’ with and without Information Technology: a framework and a brief history. In: Journal of Information Technology (JIT), Ausgabe/Nummer: 4, Vol.32, Erscheinungsjahr/Year: 2018. pp. 297-305.

Journal of Information Technology (2017) 32, 297–305

www.palgrave.com/journals

Editorial

"Openness" with and without Information Technology: a framework and a brief history

Daniel Schlagwein[1], Kieran Conboy[2], Joseph Feller[3], Jan Marco Leimeister[4,5], Lorraine Morgan[2]

[1]UNSW Sydney, Sydney, Australia;
[2]NUI Galway, Galway, Ireland;
[3]University College Cork, Cork, Ireland;
[4]University of St Gallen, St. Gallen, Switzerland;
[5]Kassel University, Kassel, Germany

Correspondence:
D Schlagwein, UNSW Sydney, Sydney, Australia.
E-mail: schlagwein@unsw.edu.au

Abstract

Over the past two decades, openness (e.g. 'open' innovation, 'open' education and 'open' strategy) has been of increasing interest for researchers and of increasing relevance to practitioners. Openness is often deeply embedded in information technology (IT) and can be both a driver for and a result of innovative IT. To clarify the concept of "openness", we provide an overview of the scope of cross-disciplinary research on openness. Based on this overview, we develop a framework of openness, which proposes a higher-order concept of "openness" characterised by transparency, access, participation and democracy. The framework further distinguishes open resources, open processes and the effects of opening on particular domains. To provide the historical context and to appreciate the role of IT in openness, we discuss two historical examples of openness: the introduction of an open science model in academia (openness without IT) and the emergence of open source software development (openness with IT). We conclude by highlighting some concerns with and limitations of "openness".
Journal of Information Technology (2017) **32**, 297–305. doi:10.1057/s41265-017-0049-3

Keywords: openness; information technology; transparency; access; participation; democracy; open resources; open processes; open science; open source software development; concept development; framework

Introduction

This special issue is on openness and information technology (IT). In the call for papers, we defined "openness" broadly in terms of "accessibility of knowledge, technology and other resources; the transparency of action; the permeability of organisational structures; and the inclusiveness of participation". We further discuss our definition of openness in this editorial. In line with the mission of the *Journal of Information Technology*, we were particularly interested in the symbiotic relationship between openness and IT: it is our hope that this special issue contributes to an increased understanding of this relationship.

Understanding the relationship between openness and IT is important. Openness can be a driver for, or a consequence of, new IT. Open phenomena and IT are often inseparable. That is, openness is often so deeply embedded in IT that it cannot be meaningfully analysed and discussed separately from the IT platforms on which and through which open phenomena take place. Open phenomena such as open source development and crowdsourcing (sourcing ideas or work from Internet crowds) are not merely "supported by" IT; they are "shaped by" IT (Majchrzak and Malhotra, 2013). In other words, IT is not some sort of passive background to open phenomena but is central to those phenomena. Although this relationship between openness and IT is widely acknowledged in other disciplines (e.g. Peters and Britez, 2008), it is of specific concern to scholars of information systems (IS).

Consequently, over the past decade, increasing interest in openness has become evident among IS scholars. Evidence of this interest can be seen in conference tracks (e.g. the track on "Openness and IT" at the European Conference on Information Systems [ECIS], 2013–17, which underpinned this special issue); conferences (e.g. the International Federation for Information Processing [IFIP] Working Group 2.13 Open Source Software conference series); journal special issues (e.g. Crowston and Wade, 2010; Whelan *et al.*, 2014); and the formation of the Association for Information Systems (AIS) Special Interest Group on Open Research and Practice (SIGOPEN).

In this editorial, we first provide an overview of the topics and hence the scope of the research on openness. This is followed by the discussion of a framework for openness. After that, we consider the role of IT in openness through historical examples of openness with, and without, IT. We conclude with an overview of the papers included in this special issue.

Topics of research on openness

During the five years in which we have chaired the track on "Openness and IT" and now the editing of this special issue, the editorial team members have handled over 180 manuscripts. Reflecting on the range of topics of these manuscripts and in the wider literature on openness, we find that scholars consider openness to incorporate and apply to a broad range of phenomena. The boundaries are not clear-cut and, in some cases, one can contest whether the phenomenon in question really qualifies as "open".

Forms of co-creation in online communities involving resources, processes and outcomes that are all "open" provide some undisputed cases of openness. Cases include open source software development such as that of Linux (Benkler, 2002) or Apache (Lakhani and von Hippel, 2003). Other cases include open content co-creation such as that of Wikipedia (Germonprez *et al.*, 2011). Multiple concepts have been suggested as capturing the essence of open co-creation. Yochai Benkler focused on the communal and non-proprietary production model of open co-creation and called it "common-based peer production" (Benkler, 2006). Others have focused on the novel approaches to the division of labour and integration of efforts used in open co-creation and studied them as "new forms of organising" (Puranam *et al.*, 2014).

Openness has value for traditional organisations and businesses. For example, open innovation has been posited as the systematic sourcing of external knowledge for improved organisational research and development (R&D) and, hence, innovativeness (Chesbrough, 2003; West *et al.*, 2014). Furthermore, organisations can "open source" their software development and work with open source communities on software that is of commercial interest to them (Ågerfalk and Fitzgerald, 2008). Open participation processes such as crowdsourcing are being used by organisations to create or improve products and services (Orlikowski and Scott, 2015). For instance, organisations such as Dell (Di Gangi *et al.*, 2010), LEGO (Schlagwein and Bjørn-Andersen, 2014), SAP (Leimeister *et al.*, 2009) and Starbucks (Gallaugher and Ransbotham, 2010) have used crowdsourcing to capture customer feedback or to advance their products and services. In addition, crowdfunding has become a way for entrepreneurs to fund new business ventures (Kuppuswamy and Bayus, 2013). Sharing economy models, for example, peer-to-peer exchanges which are often facilitated by commercial intermediaries such as Uber and AirBnB, is also associated with the wider openness phenomenon (Nickerson *et al.*, 2016; Sundararajan, 2016).

In addition to the above examples of "external openness", open principles have been used within the confines of traditional organisations. For example, the adoption of open source principles within corporate environments, sometimes called "inner source software" (Stol and Fitzgerald, 2015), has become popular among many organisations (e.g. Philips Healthcare, Ericsson). The benefits of opening up agile development processes with agile teams collaborating in intra-organisational open innovation networks have also been highlighted (Conboy and Morgan, 2011). Furthermore, the idea suggestion boxes in the cafeterias of old have been replaced with internal crowdsourcing platforms, the topic of an emerging research stream (Zuchowski *et al.*, 2016). "Open strategy" is a form of internal crowdsourcing in which strategy is developed in a transparent and inclusive manner (Hautz *et al.*, in press; Tavakoli *et al.*, in press). Enterprise social software supports a range of other "open" approaches within organisations (Leonardi *et al.*, 2013; Schlagwein and Hu, 2017).

Openness is also central to the creation of "platform"-based innovation and the corresponding business ecosystems (Benlian *et al.*, 2015; Eisenmann *et al.*, 2009). Open resources and technologies (e.g. open application programming interfaces [APIs] and open standards) are often central to inter-organisational forms of value creation and the formation of ecosystems of interdependent organisations (Morgan *et al.*, 2013; Tiwana, 2014). Examples of such ecosystems are the "app ecosystems" around the open APIs of Google, Facebook and Apple.

Openness has been researched with a focus on particular domains and areas of society. "Open government" is about governments making information transparent and processes participatory and collaborative (Feller *et al.*, 2011; Obama, 2009). As a consequence, open data are often considered the key foundation for open government (Janssen *et al.*, 2012). Openness has historically been central to academia and "open science" (see below for further details). Information technology (IT) now enables new open approaches for conducting research such as citizen science (Levy and Germonprez, 2017; Wiggins and Crowston, 2011). In terms of the publication of research findings, a long-standing argument has been made in support of open access (Suber, 2013) which, with IT, is much easier to achieve. In relation to education, various approaches and frameworks for open education have been proposed (Peters and Britez, 2008), including IT-enabled open approaches such as massive open online courses (MOOCs).

The above overview presents the scope of the research on openness. It also provides an intuitive sense of what, typically, is meant by "openness". However, we find it useful to articulate a more nuanced conceptual understanding of openness.

A framework for openness

Many overlapping definitions and uses of the attribute "open" and the noun "openness" have been proposed. The literature on openness has produced multiple understandings and conceptual ambiguity as to what is meant by openness (Dahlander and Gann, 2010). In some cases, disputes (including between authors and reviewers) have arisen about whether something is indeed "open".

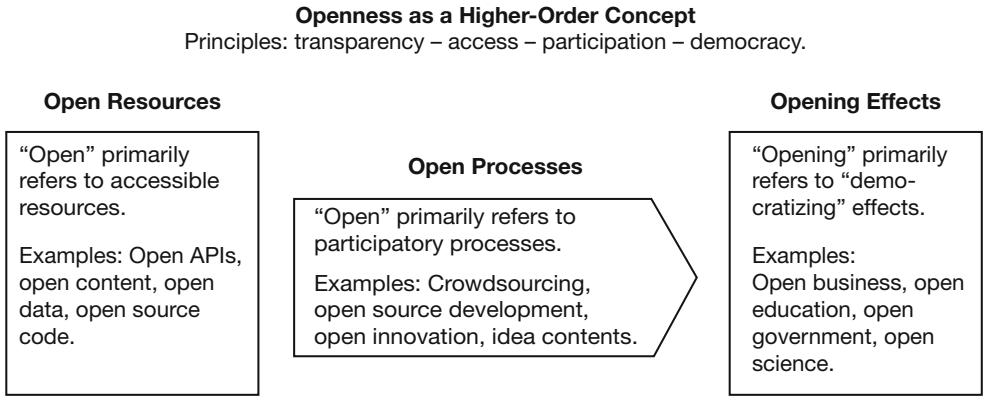

Figure 1 A framework for "openness".

It is not our intention to impose a "correct" definition of openness. Instead, we aim to provide a framework that scholars will find useful in articulating and locating their understanding of openness, while appreciating the interpretations of others.

What do people mean by "openness"? Across the openness literature, "open" and "openness" are used to describe different aspects and relate to different referents. Open terminology can refer to a higher-order concept (e.g. the "philosophy of openness"); the nature of resources (e.g. "open data"); the nature of processes (e.g. "open innovation"); or the effects on specific domains (e.g. "open education"). We illustrate these different uses and meanings of open terminology in Figure 1.

As indicated on the top of Figure 1, many uses and definitions (including those we specified in the call for papers) refer to aspects or principles of "openness" as a multidimensional, higher-order concept. This higher-order concept is sometimes referred to as a "philosophy" (Peters and Britez, 2008), a "dogma" (Mayer, 2016) or a "paradigm" (Chesbrough, 2003). The principles typically used to characterise this higher-order concept are: access to information and other resources; participation in an inclusive and often collaborative manner; transparency of resources and actions; and democracy or "democratization" such as the breaking up of exclusionary structures. The opposite of openness is closedness which is characterised by secrecy, exclusivity and "proprietary ownership". This conceptualisation of "openness" is, of course, a Weberian "ideal type" (Weber, 1904), an archetypical and stylised conceptualisation of a particular idea.

As indicated in the left column of Figure 1, open terminology, in many of its uses, refers more concretely to the nature of a resource, usually an information resource. What makes a resource open is that it can be widely accessed and used. For example, what makes source code "open" is its public accessibility (Gacek and Arief, 2004; Goldman and Gabriel, 2005), while what makes APIs "open" is that they can be accessed and used by anyone (Benlian *et al.*, 2015; Boudreau, 2012). In short, openness here primarily means accessibility, with transparency implied as people cannot access what is hidden from them.

As indicated in the centre column of Figure 1, open terminology, in other cases, refers to the nature of a process. What makes a process "open" is that the ability for people to take part in the process is widely shared. For example, what makes crowdsourcing an "open" process is its definitional "open call for participation" (Howe, 2008). Open innovation is an "open" version of the R&D process (Chesbrough, 2003) while open source development is an "open" version of the software development process (Feller and Fitzgerald, 2002). Participation could be collaborative or competitive, but regardless, it is open to many participants. In short, openness here primarily means participation and inclusiveness, while wide participation in a process implies high levels of transparency.

Finally, as indicated in the right column of Figure 1, open terminology may refer to intended effects in a particular domain or area. Framings such as "open government" (Obama, 2009), "open business" (Chesbrough, 2007) or "open science" (Nielsen, 2011) neither refer to the overarching concept, nor to a particular resource nor to a particular process. Instead, these framings focus on the (intended) "opening" effects on the domain or area. What is typically intended is the "democratizing" of the domain, thus reducing exclusivity and proprietary ownership. For example, open education refers to a commitment to a long-standing ideal of removing barriers to education. Openness here implies particular social and political values oriented towards democracy, equality and liberalism (see Peters and Britez, 2008, particularly chapters 1 and 2). This meaning of openness is in line with Popper's notion of an "open society" (Popper, 1945).

While many open phenomena are "open" in respect to all of these components (resources, processes and effects), this is not always the case. For example, open resources may or may not provide "architectures of participation" (Baldwin and Clark, 2006; O'Reilly, 2004) for open processes. Open source code can, in many licensing regimes, be reused for proprietary software development (open *resource*, closed *process*). On the other hand, while crowdsourcing is not typically based on a resource that can be openly accessed and used by anyone, it is nonetheless a process of open participation (closed *resource*, open *process*). Furthermore, the long-standing dispute between the free/libre software movement and the open source movement (see below for more details) can be understood in terms of the framework. The dispute essentially revolves around whether the commercial reuse of open source code should be possible. The free/libre software movement's primary concerns certainly include domain *effects*: This movement is based on a set of values that upholds the view that free software supports computer use and ultimately individual freedom and social progress. In

contrast, the open source movement is concerned, in a narrower sense, primarily with the open source development *process*. This movement does not hold a political view on the effects nor does it consider proprietary and commercial software as undesirable per se.

We hope that the above distinctions between the higher-order concept and resources, processes and domain effects as the referents of open terminology provide a useful frame for authors, reviewers and readers through which to more precisely understand the kind of "openness" to which they refer. Of course, these distinctions are analytical only: resources are used in processes that produce effects. The distinctions do not map neatly to all uses of the "open" term, not least because many uses are vague, language is not only diverse but it changes, and practices keep changing as new open models emerge. With these caveats aside, we hope that the discussion in this section provides a structure to improve our conceptualisation of openness and our mutual understanding of what research on openness is about.

So far in our discussion, IT has been absent. How do IT and openness relate? To discuss this question, we revisit two striking historical examples of openness: the introduction of an open science model in academia (openness without IT) and the emergence of open source software development (openness with IT).

Openness without IT

Many of the above IT-based open phenomena correspond to historical, non-IT-based open models and approaches. The transition from a closed model of science to an open model of science can be considered as one the most impactful uses of openness. As academics and scientists, we are accustomed to open science; for example, papers are published, peer review is performed and methods and findings are transparently described. Science and academia, however, for the longest period of their existence – from Greek antiquity and Plato's original Akademia founded in 385 BC through to the seventeenth century – were not organised in an open model.

In medieval times, research data and methods were typically not revealed, findings were described vaguely, and many lectures were held in the dark to prevent audiences from taking notes. Scientists such as Galileo described their findings in unreadable anagrams and cyphers so they could later claim priority in discovery should someone else replicate their findings, without revealing the actual findings (Nielsen, 2011). Famous disputes emerged as a result (e.g. between Kepler and Galileo about planetary observations, and between Newton and Leibniz in regard to who invented calculus). In the field of alchemy, for example, it was common to claim results (including the proverbial "transmuting lead into gold"), but descriptions of the corresponding methods and experiments were fiercely protected. In alchemy, knowledge was seen as divine and hence to be closely guarded (David, 2008). It is no surprise that the discipline of alchemy made little or no progress.

The general idea behind closed science was that scientists and experts would be "losing" knowledge and power through sharing it. The reasons for this closed approach were manifold. They included the intention of scientists to find a way to commercially use what they had discovered (Nielsen, 2011), the necessity to impress their sponsors (patrons such as the Medici family) through exclusive knowledge (David, 2004) and, of course, the lack of a culture and structure for openness (e.g. the concept of peer review, journals and societies did not exist as an alternative model for science until the late seventeenth century, and did not become its dominant model until the eighteenth century). We can see this "closedness" as a competing, closed, paradigm in relation to the conduct of science.

In the enlightenment, this closed paradigm was challenged and eventually overcome. The "invisible college" was formed in London in 1646 (Crane, 1972; de Solla Price and Beaver, 1966). This group promoted an alternative approach for disciplines such as alchemy (with this discipline gradually replaced by today's discipline of chemistry). Their key idea was to generate new knowledge by building on the findings of others. Hence, they argued for "open access", that is, the publication of detailed and replicable descriptions of methods and findings. The "invisible college's" motto, *nullius in verba* or "words alone are worth nothing", eventually became the motto of its institutional successor, the Royal Society, founded in 1660. Increasingly, academia and universities embraced this open principle. Scientists started publishing their methods and findings for others to build on in an "open science" landscape. Journals started to emerge with the first being the *Philosophical Transactions of the Royal Society* in 1665. The number of journals rapidly increased with the new model coming to dominate academia. The general idea of generating new knowledge through sharing knowledge in science can be described as the first domain that fully used principles of openness.

The change towards openness is often considered as being due to the increasing complexity of science. Historical research suggests, however, that the change to the open science model was based less on a recognition of the overall usefulness of the open approach (as one might have expected with the benefit of hindsight). Instead, due to the increasing complexity of inquiry and mathematical models, patrons had less and less ability to assess if what their sponsored scholars were doing was "science" or "charlatanry". They started to demand peer review to confirm that their money was well spent and that their patronage was protected from ridicule (should they be found to be sponsoring a charlatan). This aspect, the actual socio-economic organisation of science at the time and not an epistemological concern, was the key reason for the introduction of peer review and the open science model (David, 2004, 2005, 2008). This historical account aligns with the observation of generational and paradigmatic shifts in how science is done over time (see also Berger and Luckmann, 1967; Kuhn, 1970). It points to the general lesson that open models come into place based on, and affect, various aspects of society, economy and "ways of life", and need to be understood and evaluated as such (not only by their assumed inherent qualities).

"Open science" became the default way of doing science in academia and can be seen as one of the greatest successes of openness. One of the central strengths of openness – the ability to access and freely build on the work of others – was successfully leveraged in open science. Here, open access to resources, the publications in journals that are circulated to universities, societies and libraries worldwide, was critical. The case of open science shows that openness is possible without IT (understood here as digital information

technologies). Open science, of course, required technological infrastructure (e.g. postal services which, coincidentally, had significant uptake in Europe in the seventeenth century, or the invention of the printing press by Johannes Gutenberg in the fifteenth century). Many aspects of the open science model, such as peer review, open access and data sharing, may now be further opened up using digital information technologies (Hardaway and Scamell, 2012; Suber, 2013; van der Aalst *et al.*, 2016).

Openness with IT

One of the earliest and most striking cases of "openness with IT" – and not possible without IT – is open source software development. Naturally, any form of software development is based on IT, but IT takes on a particular coordinating and generative role in open source software development. As a result, this case helps us to understand the role of IT.

When the first computer systems were distributed in the 1950s, it was common to share software source code. Hardware (e.g. IBM's mainframe computer) was considered to be the actual product with software seen as a by-product. In other cases, researchers and academics, who were already operating under an openness model, generally shared the code they wrote.

However, the period from the 1960s to the 1980s saw an increase in proprietary software with closed source code. This closedness was possible due to the technical nature of the way that programming language compilers work (translating human-readable source code into machine-executable code that cannot be easily translated back to the original source code). With the multiplication of the number of applications and their complexity, the idea of "stand-alone software" was born. The period saw the emergence of commercial software producers (e.g. Microsoft in 1975). (Ceruzzi, 2003)

The free/libre software movement emerged in the mid-1980s as a response to proprietary software (Stallman, 1985). Central to the free/libre software movement is the intention of making software free ("free as in free speech, not as in free beer"). Initiator Richard Stallman followed the idea to launch a completely free operating system. For this purpose, the GNU General Public Licence was developed and published (the first version in 1989). The central concern of the free/libre software movement, based on ideological grounds, is to replace proprietary software with free software (Feller and Fitzgerald, 2000). Proprietary software is seen as inherently immoral, preventing users from fully controlling their computers while hindering overall societal progress in favour of particular commercial interests. The free/libre software movement advocates for source code and programs to be freely available for use, distribution and modification by anyone.

The vision of a free operating system became a reality with the development of the "Linux" kernel by Linus Torvalds in 1991–92. Notably, Torvalds announced his ongoing development to an Internet mailing list, leading to increased development support by others and the eventual formation of the Linux development community. This IT-based collaboration on source code is what we would now call community-based open source development (Lee and Cole, 2003), that is, software developers creating software globally in a voluntary, distributed fashion based on publicly available free source code.

Eric Raymond presented a paper called "The Cathedral and the Bazaar" (Raymond, 1999) at several conferences in 1997. The paper reflected on the nature and benefits (e.g. "given enough eyeballs, all bugs are shallow") of jointly developing software based on publicly available source code. The impact of the paper was immediate, inter alia leading Netscape to release its proprietary source code of Netscape Communicator as open source code (the foundation of today's Mozilla Firefox). The term "open source" was adopted based on a discussion at the O'Reilly Freeware Summit (later called Open Source Summit) in 1998.

The free/libre software movement and the open source movement share the open development model (accessible code, participatory development). As previously described, they differ in regard to their expectations of how open source code is to be used. Many "open source" licences are "permissive" in that they allow for commercial use of the code, while "free software" licences such as GNU prohibit commercial reuse. The free/libre software movement is also associated with strong moral concerns and a progressive/left political orientation, while the open source movement is more neutral and more "business friendly". Open source has been embraced by commercial firms such as IBM (Samuelson, 2006). Indeed, many open source developers today are paid by firms (Capra *et al.*, 2009), and firms often exercise substantial control through various measures (e.g. Google has a substantial impact on the direction of Android).

The way in which IT, and especially Internet technologies, are used in open source software development is remarkable. For example, Internet technologies allow for highly efficient access to source code. They make actions and changes to the source code visible and traceable. Internet technologies enable highly efficient ways for distributed people to coordinate and jointly develop code, while substantially reducing transaction costs for software development (Benkler, 2002). The extremely low transaction costs make it possible to activate the particular interests of individuals for particular implementation work (Howison and Crowston, 2014) and to source distant ideas for focal projects (that may never have surfaced in closed source development). It is this "distant search" mechanism that has been argued as being central to the effectiveness of open, participatory processes such as crowdsourcing (Afuah and Tucci, 2012; Jeppesen and Lakhani, 2010).

Furthermore, we need to recognise that IT (especially software) is highly malleable and generative. Genuinely new IT applications, systems and business models are created all the time (TCP/IP, peer-to-peer file sharing, sharing economy models, etc.). The potentially low transaction costs of IT can only be used if such new models and systems are generated based on emerging technological possibilities and creative thought. Thus, IT is generative for new forms of openness. For example, the development of online code repositories such as SourceForge (in 1999) and, later, that of distributed version control systems such as Git (in 2005 with GitHub launched in 2007) substantially helped both the development and the distribution of open source software.

Through the low transaction costs and high malleability offered by IT, openness can now be enacted in many more domains. Through IT, the general principles of openness (transparency, access, participation and democracy) are made fundamentally more efficient. Hence, IT has improved

and transformed existing open models or has created genuinely new open models that previously were simply not conceivable.

Papers in this special issue

We now turn to the papers included in this special issue. The introduction provided above to the topic of openness and IT may help us to locate these papers within a larger framework.

For the special issue, we received 49 submissions that used a wide range of qualitative, quantitative, design and conceptual approaches. From these submissions, we finally accepted four papers, following several rounds of review, feedback and revision. Each makes a significant contribution to our understanding of the relationship between openness and IT, the key interest of this special issue.

Flath, Friesike, Wirth and Thiesse in their paper "Copy, Transform, Combine: Exploring the Remix as a Form of Innovation" are interested in the art and practice of "remixing" open contents. Their analysis is based on Thingiverse, an open 3D printing platform, which allows its users to create, share, access and, hence, to remix digital 3D print designs. Using six years of quantitative data on models and users, their findings help us to better understand the role and patterns of remixes in open design communities. The paper's topic is fascinating as it shows how IT can bring openness to new domains (in this case, physical objects) and can explicitly trace the patterns of the open "building on each other" process referred to above. Thus, the analysis contributes to our understanding of open resources (e.g. the platform characteristics) as well as open processes (e.g. the remix patterns).

Gleasure, O'Reilly and Cahalane in their paper "Inclusive Technologies, Selective Traditions: A Socio-Material Case Study of Crowdfunded Book Publishing" focus on crowdfunding in traditional industries. Unbound, a United Kingdom (UK)-based publishing company uses crowdfunding technologies to help authors raise the funding necessary to publish their books. In their study of the case, the authors focus on socio-material practices, identifying the practices of fundraising, maintaining publishing standards, making creative contributions and motivating backers. The analysis identifies the multiple, entangled material, social and cultural aspects of open practices. In addition, the authors show how principles of openness (here, participation and inclusiveness) may conflict with principles of the domain (here, selectivity and exclusiveness) in which they are enacted.

Wessel, Thies and Benlian in their paper "Opening the Floodgates: The Implications of Increasing Platform Openness in Crowdfunding" focus on the role of openness in the creation and maintenance of platforms and ecosystems. In particular, they are interested in the balance between openness and control. They compare Kickstarter data before and after a policy change that relaxed the screening process for new campaigns and, hence, increased the platform's openness (in the form of access for potential campaign creators). Their analysis shows mixed effects and outcomes of this modification of openness. On the one hand, Kickstarter's immediate revenue surged due to an increase in the number of campaigns launched. On the other hand, the same increase also meant higher uncertainties for both campaign creators and backers. Creators were faced with a worsening campaign-to-backer ratio and lower campaign success rates. Backers had difficulty in finding campaigns of sufficient quality. The authors conclude that increasing platform openness may, in certain scenarios, destabilise platforms and ecosystems. The paper shows how a reconfiguration of resource openness corresponds to process changes and, ultimately, (business) effects.

Curto-Millet and Shaikh in their paper "The Emergence of Openness in Open Source Projects: The Case of openEHR" explore the unstable and dynamic meaning of "openness" over time. Their analysis is in the context of open development of the specifications of clinical concepts to be used in an electronic health records system called openEHR. Based on qualitative, longitudinal data from the openEHR case (such as mailing list discussions), they identified two intertwined processes, metamorphosis and maturation, that are enacted in the negotiation and construction of the meaning of openness. The metamorphosis process focuses on the mutational evolution of understandings of openness, while the maturation process focuses on the gradual development of a particular understanding of openness. This paper complements this editorial by showing how the meaning of "openness" is not fixed and given but changes over time and context. Open EHR focuses on the intended opening effects on the health domain (called "primordial goals" in the paper) – open resources and processes are means to achieve these ends.

Concluding remarks

This special issue contributes to our understanding of openness and IT. Some may read this as an endorsement of openness as inherently good and effective. This is not the case. We caution that openness is not a panacea. The use of "open" approaches may not be effective (openness can and often does fail) or, worse, may have negative effects (unintended or controversial consequences). Therefore, we need to be careful not to exhibit an "ideology of openness" (Gibbs *et al.*, 2013) that presents knowledge sharing and open communication as, by default, desirable and effective. While transparency is considered to be a measure used to hold those in power accountable (such as in open government), the same "open" resources and processes may be used for "1984"-like surveillance measures in a "tyranny of light" (see also Tsoukas, 1997; Zuboff, 2015). Even from a top-down managerial perspective, transparency may lead to employees focusing on "gaming" the system rather than doing what is actually useful and valuable (Birkinshaw and Cable, 2017). Alternatively, creative workers may feel discouraged from developing left-field, deviant and potentially innovative ideas for fear of being seen as wasting time (Bernstein, 2012). We certainly encourage further research on the "dark side" – failures and problems, negative, unintended and controversial consequences, and ethical, political and power dilemmas – in the use of openness and IT.

Openness is an important and powerful concept, especially in combination with IT. Key "open" aspects – such as resources access and process participation – can be increased or enacted in entirely new ways through IT. Openness has permeated society. Someone may well read this (open access) editorial on an Android (open source) tablet while looking up entries on Wikipedia (open content) while sitting in a shared ride (sharing economy). The importance of openness cannot be overstated. It is our hope that IS researchers will

contribute to increasing our understanding of the fascinating intersection of "old" principles (as in open science) with "new" IT.

Acknowledgements

We owe much to the *Journal of Information Technology* co-editors, Chris Sauer and Leslie Willcocks, who have supported this special issue and have provided many useful thoughts and insights on this editorial. We wish to thank the associate editors and reviewers who have contributed much time and work to this special issue. We are very thankful to the publisher for their gesture and for granting our request to make part of this special issue open access. This editorial is, in part, based on an earlier working paper by the first author.

References

Afuah, A. and Tucci, C.L. (2012). Crowdsourcing as a Solution to Distant Search. *Academy of Management Review, 37*(3), 355–375.

Ågerfalk, P.J. and Fitzgerald, B. (2008). Outsourcing to an Unknown Workforce: Exploring Opensourcing as a Global Sourcing Strategy. *MIS Quarterly, 32*(2), 385–410.

Baldwin, C.Y. and Clark, K.B. (2006). The Architecture of Participation: Does Code Architecture Mitigate Free Riding in the Open Source Development Model? *Management Science, 52*(7), 1116–1127.

Benkler, Y. (2002). Coase's Penguin, or, Linux and the Nature of the Firm. *Yale Law Journal, 112*(3), 369–446.

Benkler, Y. (2006). *The Wealth of Networks*. New Haven, CT: Yale University Press.

Benlian, A., Hilkert, D. and Hess, T. (2015). How open is this platform? The meaning and measurement of platform openness from the complementors' perspective. *Journal of Information Technology, 30*(3), 209–228.

Berger, P.L. and Luckmann, T. 1967. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Penguin, UK.

Bernstein, E.S. (2012). The Transparency Paradox a Role for Privacy in Organizational Learning and Operational Control. *Administrative Science Quarterly, 57*(2), 181–216.

Birkinshaw, J. and Cable, D. 2017. The Dark Side of Transparency, *McKinsey Quarterly*.

Boudreau, K.J. (2012). Let a Thousand Flowers Bloom? An Early Look at Large Numbers of Software App Developers and Patterns of Innovation. *Organization Science, 23*(5), 1409–1427.

Capra, E., Francalanci, C., Merlo, F. and Lamastra, C.R. (2009). A survey on firms' participation in open source community projects, in *IFIP International Conference on Open Source Systems*. Springer, pp. 225–236.

Ceruzzi, P.E. (2003). *A history of modern computing*. MIT press.

Chesbrough, H.W. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA, USA: Harvard Business School Press.

Chesbrough, H.W. (2007). *Open Business Models: How to Thrive In the New Innovation Landscape*. Boston, MA, USA: Harvard Business School Press.

Conboy, K. and Morgan, L. (2011). Beyond the customer: Opening the agile systems development process. *Information and Software Technology, 53*(5), 535–542.

Crane, D. (1972). *Invisible Colleges: Diffusion of Knowledge in Scientific Communities* (1st ed.). Chicago (IL): University of Chicago Press.

Crowston, K. and Wade, M.R. (2010). Empirical Research on Free/Libre Open Source Software. *Journal of the Association for Information Systems, 11*(11), I–V.

Dahlander, L. and Gann, D.M. (2010). How Open Is Innovation? *Research Policy, 39*(6), 699–709.

David, P.A. (2004). Understanding the emergence of 'open science'institutions: functionalist economics in historical context. *Industrial and Corporate Change, 13*(4), 571–589.

David, P. (2005). From Keeping 'Nature's Secrets' to the Institutionalization of 'Open Science'. In R. A. Gosh (Ed.), *CODE: Collaborative Ownership and the Digital Economy* (pp. 85–108). Cambridge (MA): MIT Press.

David, P.A. (2008). The Historical Origins of 'Open Science': An Essay on Patronage, Reputation and Common Agency Contracting in the Scientific Revolution. *Capitalism and Society, 3*(2), 1–116.

de Solla Price, D.J. and Beaver, D. (1966). Collaboration in an Invisible College. *American Psychologist, 21*(11), 1011–1018.

Di Gangi, P.M., Wasko, M.M. and Hooker, R.E. (2010). Getting Customers' Ideas to Work for You: Learning From Dell how to Succeed with Online User Innovation Communities. *MIS Quarterly Executive, 9*(4), 213–228.

Eisenmann, T., Parker, G. and van Alstyne, M.W. (2009) Opening Platforms: How, When and Why?, in A. Gawer (ed.) *Platforms, Markets and Innovation*, pp. 131–162.

Feller, J., Finnegan, P. and Nilsson, O. (2011). Open Innovation and Public Administration: Transformational Typologies and Business Model Impacts. *European Journal of Information Systems, 20*(3), 358–374.

Feller, J. and Fitzgerald, B. (2000). A Framework Analysis of the Open Source Software Development Paradigm, in *International Conference on Information Systems*.

Feller, J. and Fitzgerald, B. (2002). *Understanding Open Source Software Development*. London, UK: Addison-Wesley.

Gacek, C. and Arief, B. (2004). The Many Meanings of Open Source. *IEEE Software, 21*(1), 34–40.

Gallaugher, J. and Ransbotham, S. (2010). Social Media and Customer Dialog Management at Starbucks. *MIS Quarterly Executive, 9*(4), 197–212.

Germonprez, M., Hovorka, D. and Gal, U. (2011). Secondary Design: A Case of Behavioral Design Science Research. *Journal of the Association for Information Systems, 12*(10), 662–683.

Gibbs, J.L., Rozaidi, N.A. and Eisenberg, J. (2013). Overcoming the "Ideology of Openness": Probing the Affordances of Social Media for Organizational Knowledge Sharing. *Journal of Computer-Mediated Communication, 19*(1), 102–120.

Goldman, R. and Gabriel, R.P. (2005). *Innovation Happens Elsewhere*. Amsterdam, The Netherlands: Morgan Kaufmann.

Hardaway, D.E. and Scamell, R.W. (2012). Open Knowledge Creation: Bringing Transparency and Inclusiveness to the Peer Review Process. *MIS Quarterly, 36*(2), 339–346.

Hautz, J., Seidl, D. and Whittington, R. (in press). Open Strategy: Dimensions, Dilemmas, Dynamics, *Long Range Planning*.

Howe, J. (2008). *Crowdsourcing*. New York, NY, USA: Crown.

Howison, J. and Crowston, K. (2014). Collaboration Through Open Superposition: A Theory of the Open Source Way. *MIS Quarterly, 38*(1), 29–50.

Janssen, M., Charalabidis, Y. and Zuiderwijk, A. (2012). Benefits, Adoption Barriers and Myths of Open Data and Open Government. *Information Systems Management, 29*(4), 258–268.

Jeppesen, L.B. and Lakhani, K.R. (2010). Marginality and Problem-Solving Effectiveness in Broadcast Search. *Organization Science, 21*(5), 1016–1033.

Kuhn, T.S. (1970). *The Structure of Scientific Revolutions* (2nd ed.). Chicago, IL: Chicago University Press.

Kuppuswamy, V. and Bayus, B.L. (2013). Crowdfunding Creative Ideas: The Dynamics of Projects Backers in Kickstarter, *DRUID Conference*.

Lakhani, K.R. and von Hippel, E. (2003). How Open Source Software Works: 'Free' User-to-User Assistance. *Research Policy, 32*(6), 923–943.

Lee, G.K. and Cole, R.E. (2003). From a Firm-Based to a Community-Based Model of Knowledge Creation: The Case of the Linux Kernel Development," *Organization Science* (14:6), pp. 633–649 + 754–755.

Leimeister, J.M., Huber, M., Bretschneider, U. and Krcmar, H. (2009). Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competition. *Journal of Management Information Systems, 26*(1), 197–224.

Leonardi, P.M., Huysman, M. and Steinfield, C. (2013). Enterprise Social Media: Definition, History and Prospects for the Study of Social Technologies in Organizations. *Journal of Computer-Mediated Communication, 19*(1), 1–19.

Levy, M. and Germonprez, M. (2017). The Potential for Citizen Science in Information Systems Research. *Communications of the Association for Information Systems, 40*(1), 2.

Majchrzak, A. and Malhotra, A. (2013). Towards an Information Systems Perspective and Research Agenda on Crowdsourcing for Innovation. *Journal of Strategic Information Systems, 22*(3), 257–268.

Mayer, K. (2016) Open Innovation and Open Science. From http://homepage.univie.ac.at/katja.mayer/php/?page_id=512

Morgan, L., Feller, J. and Finnegan, P. (2013). Exploring Value Networks: Theorising the Creation and Capture of Value with Open Source Software. *European Journal of Information Systems, 22*(5), 569–588.

Nickerson, J.V., Sundararajan, A., and Teigland, R. (2016). Call for Papers, Track on 'Crowdsourcing, Crowdfunding, Blockchain and the Sharing Economy, in *International Conference on Information Systems (ICIS)*.

Nielsen, M. (2011). *Reinventing Discovery: The New Era of Networked Science*. Princeton University Press.
Obama, B. (2009). Transparency and Open Government, in*Memorandum for the Heads of Executive Departments and Agencies*.
O'Reilly, T. (2004). The Architecture of Participation. From http://archive.oreilly.com/pub/a/oreilly/tim/articles/architecture_of_participation.html
Orlikowski, W.J. and Scott, S.V. (2015). The Algorithm and the Crowd: Considering the Materiality of Service Innovation. *MIS Quarterly, 39*(1), 201–216.
Peters, M.A. and Britez, R.G. (2008). *Open education and education for openness*. Rotterdam: Sense Publishers.
Popper, K.R. (1945). *The Open Society and Its Enemies (Vol. 1 and 2)*. London: Routledge.
Puranam, P., Alexy, O. and Reitzig, M. (2014). What's 'New' About New Forms of Organizing? *Academy of Management Review, 39*(2), 162–180.
Raymond, E. (1999). The Cathedral and the Bazaar. *Knowledge, Technology, and Policy, 12*(3), 23–49.
Samuelson, P. (2006). IBM's Pragmatic Embrace of Open Source. *Communications of the ACM, 49*(10), 21–25.
Schlagwein, D. and Bjørn-Andersen, N. (2014). Organizational Learning with Crowdsourcing: The Revelatory Case of LEGO. *Journal of the Association for Information Systems, 15*(11), 754–778.
Schlagwein, D. and Hu, M. (2017). How and Why Organizations Use Social Media: Five Use Types and Their Relation to Absorptive Capacity. *Journal of Information Technology, 32*(22), 194–209.
Stallman, R. (1985). The GNU Manifesto.
Stol, K.-J. and Fitzgerald, B. (2015). Inner Source – Adopting Open Source Development Practices in Organizations: A Tutorial. *IEEE Software, 32*(4), 60–67.
Suber, P. (2013). *Open Access (Vol. 1)*. Cambridge, MA: The MIT Press.
Sundararajan, A. (2016). *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*. Boston, MA, USA: MIT Press.
Tavakoli, A., Schlagwein, D. and Schoder, D. (in press). Open Strategy: Literature Review, Re-Analysis of Cases and Conceptualisation as a Practice, *Journal of Strategic Information Systems*.
Tiwana, A. (2014). *Platform Ecosystems: Aligning Architecture, Governance and Strategy*. Waltham, MA: Morgan Kaufmann.
Tsoukas, H. (1997). The Tyranny of Light: The Temptations and the Paradoxes of the Information Society. *Futures, 29*(9), 827–843.
van der Aalst, W., Bichler, M. and Heinzl, A. (2016). Open Research in Business and Information Systems Engineering. *Business and Information Systems Engineering, 58*(6), 375–379.
Weber, M. (1904). Die 'Objektivität' Sozialwissenschaftlicher und Sozialpolitischer Erkenntnis ['Objectivity' in Social Science and Social Policy]. *Archiv für Sozialwissenschaft und Sozialpolitik, 19*(1), 22–87.
West, J., Salter, A., Vanhaverbeke, W. and Chesbrough, H. (2014). Open Innovation: The Next Decade. *Research Policy, 43*(5), 805–811.
Whelan, E., Conboy, K., Crowston, K., Morgan, L. and Rossi, M. (2014). "The Role of Information Systems in Enabling Open Innovation, *Journal of the Association for Information Systems, 15*(11), xx–xxx.
Wiggins, A. and Crowston, K. (2011). From Conservation to Crowdsourcing: A Typology of Citizen Science, *Hawaii International Conference on System Sciences (HICSS)*.
Zuboff, S. (2015). Big Other: Surveillance Capitalism and the Prospects of an Information Civilization. *Journal of Information Technology, 30*(1), 75–89.
Zuchowski, O., Posegga, O., Schlagwein, D. and Fischbach, K. (2016). Internal Crowdsourcing: Conceptual Framework, Structured Review and Research Agenda. *Journal of Information Technology, 31*(2), 166–184.

About the Authors

Daniel Schlagwein is a Senior Lecturer of Information Systems at UNSW Sydney. Daniel is an Associate Editor of the Information Systems Journal. His research is focused on crowdsourcing, IT-enabled openness and digital work. Daniel has published in journals such as the Information Systems Journal, the Journal of Information Technology, Journal of the Association for Information Systems and the Journal of Strategic Information Systems. Daniel has established the annual track on "Openness and IT" at the European Conference on Information Systems. Daniel was awarded the AIS Early Career Award in 2016. Daniel is a Founding Member and Treasurer of the AIS SIGOPEN.

Kieran Conboy is Dean of the J. E. Cairnes School of Business and Economics, National University of Ireland, Galway. He is a Senior Editor of the European Journal of Information Systems. His research has been published in Information Systems Research, European Journal on Information Systems, Information Systems Journal and other outlets. Kieran has previously edited the special issue on open innovation at the Journal of the Association for Information Systems. He has co-chaired the track on Openness and IT at the European Conference on Information Systems several times. Kieran is a Founding Member of the AIS SIGOPEN.

Joseph Feller is a Professor at the Cork University Business School, University College Cork, Ireland. He is an Associate Editor of the Information Systems Journal. His research on open phenomena has been published in Information Systems Research, the European Journal of Information Systems, the Journal of Strategic Information Systems, the Information Systems Journal, the Journal of Information Technology, and other peer-reviewed journals and conferences, as well as through books and industry channels. He was program chair of the ICSE Workshop Series on Open Source Software Engineering (2001 to 2005), program co-chair for the 2007 Conference on Open Source Software (IFIP 2.13), track co-chair for the Innovation and Open Source Software track at European Conference on Information Systems (ECIS) 2008 and the Openness and IT track at ECIS 2013, 2015 and 2016, co-chair of related workshops at ECIS 2013 and 2015, ICIS 2013 and 2015, and OSS 2016 (IFIP 2.13), and has edited seven special issues of international journals in the domain of openness and IT. Joseph is the Founding and Past President of AIS SIGOPEN.

Jan Marco Leimeister is Professor of Information Systems and holds the Chair for Information Systems at Kassel University, Germany, as well as being affiliated with the University of St. Gallen, Switzerland. He is Senior Editor of the Journal of Information Technology and Associate Editor for the European Journal on Information Systems. He is the director of several research groups on topics that include crowdsourcing, open innovation and virtual communities. He has extensively published in this area. Marco has co-chaired the European Conference on Information Systems in 2014.

Lorraine Morgan is a Lecturer in Information Systems at the J.E. Cairnes School of Business and Economics, National University of Ireland, Galway. Her research on open source software, open innovation, crowdsourcing, open business models and business value of cloud computing has been

published in journals such as the Journal of Strategic Information Systems, the European Journal of Information Systems and the Database for Advances in Information Systems, among other outlets. Lorraine served as guest editor for the special issue on open innovation at Journal of the Association for Information Systems. She has co-chaired the track on Openness and IT track the European Conference on Information Systems. Lorraine is a Founding Member of AIS SIGOPEN.