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The cathedral's ivory tower and the open education bazaar – catalyzing innovation in the higher education sector

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ABSTRACT

Will open education replace traditional higher education, or augment it? Digital innovation in the higher education sector is fuelling speculation about the transformation of higher education and the future role of universities. Much of the speculation makes questionable implicit assumptions about current and future business models in the higher education sector. This conceptual paper applies an innovation management perspective to critically examine the use and misuse of the business model concept in the context of digital innovation in the higher education sector. Using Raymond's metaphor of the cathedral and the bazaar which contrasted traditional commercial software development (the cathedral) with open source software development (the bazaar). We analogue this relationship with the relationship between 'cathedral-type' business models in traditional higher education (e.g. universities) and 'bazaar-type' business models in open education (e.g. open educational resource publishers). Using the historical perspective we now have on the software industry's evolution we critique the ubiquitous replacement narrative of destruction and disruption of the sector, and propose an alternative narrative of interdependence and mutual innovative catalysis. We predict that higher education ecosystems will be based on synergistic relationships between organisations that represent many gradations on the continuum between 'cathedral-type' and 'bazaar-type' organisations.

KEYWORDS

Digital innovation; business models; open education; disruptive innovation; open innovation

Introduction

The global higher education sector in general, and higher education institutions (HEIs) in particular, are facing a transformation process triggered by digital innovation (Orr, Weller, & Farrow, 2018). The goal of this paper is to present to decision-makers, policy-makers and researchers in the higher education sector tools to better understand the impact of digital innovation on higher education business models. In order to do that we briefly review digital innovation using the framework proposed by Nambisan, Lyytinen, Majchrzak, and Song (2017). In light of Nambisan et al.'s emphasis on metaphor and narrative as a vehicle for shared sense-making in digital innovation, we present several

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popular narratives which we characterise as *replacement* – narratives that suggest that digital innovation will lead to the replacement of traditional HEIs with novel organisations using open educational resources (OER). This *replacement* narrative is contrasted with an alternative narrative of *interdependence* and mutual innovative catalysis, which suggests that traditional HEIs will not be replaced by organisations fuelled by digital innovation. Instead, we suggest that both traditional HEIs and these novel organisations will form a mutually dependent ecosystem where digital innovation is a major engine of change. We justify our preference for the *interdependence* narrative over the *replacement* narrative by using the ‘cathedral and bazaar’ metaphor (Raymond, 1999). This metaphor, which originated more than two decades ago in the software industry at the stage that open source software was emerging, allows us to use the history of open source in the software sector as a case study that teaches us about the possible impact of open educational resources on the future history of the higher education sector. The main contribution of this discussion is to present researchers and decision-makers interested in innovation in the higher education sector with a metaphor and a point of view that will help change the narrative. Such a change is conducive to moving beyond outdated concepts of innovation, and to promoting the higher education sector to innovate in a purposeful manner that will allow it to remain relevant and meet its key societal challenges in the coming decades.

In ‘What are Universities For?’ Collini (2012) describes a paradox in the tension between the growing importance of universities on the one hand and the lack of confidence in the university as an institution on the other hand. Universities have never before seen such a massive growth in numbers of institutions, of students and even of funding, yet they suffer from a lack of confidence and loss of identity. HEIs are expected to cope with the growing global demand for higher education (Economist Intelligence Unit, 2015) and to find answers to scalability of their modes of teaching through innovative digital educational technologies. ‘Open education’ (Blessinger & Bliss, 2016) is an umbrella term for innovations that could provide answers to the scalability challenges facing HEIs, for example by making digital learning resources openly available for use, reuse and adaptation (Bates, 2015), by enabling the use of open intellectual property licences, and by enabling open curricula, open learning, open assessment and open platforms (Yuan & Powell, 2013).

Higher education innovation: a replacement narrative

A common narrative of open education, which was intensified after the great breakout of the massive open online courses (MOOCs) phenomenon, is that the current business model of universities will disappear (Weller, 2015). This *replacement* narrative is supported by concepts such as Schumpeter’s *creative destruction* and Christensen’s *disruptive innovation* (Bergek, Berggren, Magnusson, & Hobday, 2013).

The use of digital resources for teaching and learning in general, and specifically MOOCs, is often referred to as *disruptive innovations*. The concept of disruptive innovation has been developed and popularised by Clayton Christensen (Christensen, Horn, & Johnson, 2011). The core of the idea is that a product or service takes over a market by disrupting the business model of this market’s incumbents. Disruptive innovations often begin as low-quality and low-cost alternatives, and eventually take over a market so

swiftly that even powerful incumbents are unable to adjust their business model sufficiently. Eventually, the incumbents end up disappearing from the market. Digital technologies and online education have often been presented as a disruptive innovation that could disrupt universities as we know them today (Christensen, Horn, Caldera, & Soares, 2011; Noam, 1996).

Another characteristic of some forms of digital innovation in the higher education sector that supports the replacement narrative is *zero marginal costs* (Rifkin, 2014). This concept describes a condition when costs for products and services reach a ceiling effect, in that producing one more unit, or adding one additional user to a service, has such a low impact on the costs of the service that the added cost is negligible. This phenomenon is common in digital environments, where the costs of communication, storage and processing drop at exponential rates (Benkler, 2006). Rifkin (2014) predicts a future in which *zero marginal costs digital educational products* dominate the educational landscape and in which organisations that produce these products replace educational institutions as we know them today.

Last but not least, the concept of *unbundling* is repeatedly mentioned in discussions about a future of higher education in which HEIs as we know them today are replaced by radically different institutions. The unbundling of HEIs into separate entities (and/or personnel) who perform the three roles currently assigned to core academic faculty, namely research, teaching and service, is not a new concept (Macfarlane, 2011). The rise of MOOCs reinvigorated the prediction (Craig, 2015) that the business model of universities will become unbundled and result in MOOC-based providers of academic teaching, and other organisations that provide services such as testing and accreditation, academic research, etc. Woolf University is one recent example of this push, applying blockchain, the distributed ledger technology, to reconfigure and reconnect an unbundled educational institution (Fredin, 2018).

These three concepts (disruptive innovation, zero marginal costs and unbundling) have a common theme. This theme – the replacement narrative – predicts the demise of the university business model as we know it today and its replacement by open and flexible business models made possible through digital innovation. The appearance of MOOCs caught the imagination of many decision-makers and policy-makers in the higher education sector, and the consequent hype strengthened the sense that we are about to witness a transformation in the sector. We question these claims about the future of higher education business models and use the history of the impact of open software on the software industry to propose an alternative narrative. This critique is important since the ubiquitous replacement narrative interferes with the way actors in the higher education sector make sense of innovation in higher education (Nambisan et al., 2017). For example, if academic faculty, decision-makers in HEIs, or higher education policy-makers adopt the replacement narrative predicting a demise of the university business model as we know it today, this can lead to confrontational attitudes within these groups and to defensive reactions that will hurt the whole sector and stifle innovation.

Instead, we present an alternative narrative that acknowledges the distributed nature of innovation agency and the fluid boundaries of the innovation space. This narrative is based on the cathedral and bazaar metaphor that was presented two decades ago. The original intention of the cathedral and bazaar metaphor was to suggest the demise of the incumbent business model in the software sector, and in this sense, it is reminiscent

of the current situation in the higher education sector. It is now widely understood how open practices can promote innovation for both the incumbents and the (former) newcomers in the software sector, and we wish to apply these insights to the higher education sector.

Business models in the higher education sector

In this section we present the concept of business models and demonstrate the use of business models in the context of the two prototypes: the cathedral and the bazaar.

Business models

A business model is a tool used by researchers and by practitioners to describe and analyse the logic of organisations (Osterwalder & Pigneur, 2010). Although it was developed in the context of for-profit organisations, business modelling is useful not only for businesses but also for any type of organisation, including non-profits in the higher education sector (De Langen, 2013; Kalman, 2014). In this paper we use Kalman’s (2014) simple business model, as it was applied to HEIs. This simple business model describes who uses the educational product/s of the HEI and why they use it (the customer value proposition – CVP), what processes and resources make this value proposition possible, and the financial consequences of this activity for the HEI. Table 1 summarises the components of the business model and briefly describes them in the two left-hand columns, and in the two right-hand columns it demonstrates the use of the model at two prototypes of HEIs, the cathedral and the bazaar. The metaphor of the cathedral and the bazaar will be presented in detail in the next section.

The most important component of HEI business models is the ‘customer value proposition’ (CVP). It answers the question ‘What are the characteristics of the students?’ and ‘What is the value that the institution provides to them?’ The obvious value is the knowledge the institution provides to the students, but there are many other values (benefits) that students receive from their HEIs, such as access to a social network of like-

Table 1. Components of the business model (Adapted from Kalman, 2014).

Business model component	Description	Example taken from cathedral type HEIs	Example taken from bazaar type HEIs
Customer value proposition	The characteristics and needs of the organisation’s customers, and the way these needs are met.	The students get structured, pre-defined curricula, and study in clearly defined degree awarding programmes.	The learners have extensive freedom in choosing their learning materials, based on their preferences goals, and needs.
Infrastructure	The resources and processes of the organisation.	Physical <i>resources</i> such as lecture halls, laboratories, and student dormitories. <i>Processes</i> such as advising and financial support.	Digital <i>resources</i> , that allow studying anytime and anywhere. Digital <i>processes</i> such as automated grading and peer feedback.
Financial	The financial principles according to which the organisation operates.	Income is derived mainly from tuition and government support.	Income is derived mainly from learner payments for specific services such as certification, delivery of physical books, and other freemium services.

minded peers, social capital, involvement in diverse cultural and social activities, and the certificate and academic degree that confirm a student's successful completion of all academic requirements. The second component of the business model is the HEI's infrastructure, which includes the resources of the institution, and its processes. Each traditional HEI has dozens of resource categories including real estate (e.g. labs, classrooms, dormitories, and sports facilities), IT resources, human resources, financial resources, and more. Each HEI also has a large number of processes including teaching, research, and administrative processes (Orr et al., 2018). The third component is financial, and it describes the financial principles according to which the institution operates: the cost structure (i.e. how costs are allocated to various processes and units at the institution), the nature of these costs (fixed or variable), the sources of income from students and from other stakeholders such as government and philanthropists, etc.

No two HEIs are identical in their CVP, infrastructure, or financial profile, and thus each HEI has a different business model. Nevertheless, many institutions can be grouped under a particular kind of business model that characterises the institutions as a group. For example, the business models of top-tier research universities around the world are more similar to each other than to the business models of teaching-focused institutions in their countries, such as (US based) community colleges, or to the business models of distance teaching universities. Business models of non-HEI's in the higher education sector are, again, very different. These organisations include academic book publishers, providers of online learning materials such as MOOCs, providers of software for administrative purposes (e.g. enrolment, financial aid) and for academic processes (e.g. plagiarism detection, learning management systems), providers of financial services to students, tutoring services, and more.

Significantly changing a business model is difficult and risky. Attempting such a change could lead to a disruption of the business model (Johnson, Christensen, & Kagermann, 2008) and eventual failure of the organisation. In an organisation that has a good business model, all of the components interlock and complement each other. This interdependency provides robustness and stability, but could also become a hindrance to change (Christensen & Raynor, 2003).

Cathedrals and bazaars

Raymond (1999) famously coined the metaphor of the cathedral and the bazaar to compare commercial and open source software development. At the time Raymond published his ideas, commercial software development was based on centralised design and meticulous execution, while open source software development was based on a noisy emergent process rife with redundancy and imperfection. The main purpose of Raymond's work was to describe how open source software development was different from commercial software development, and to explain the ways in which the apparently inferior process of open software development can lead to better results than the highly structured and closely managed processes of commercial software development. The cathedral metaphor was used to describe the centrally managed software-development process in which a clearly defined development team provides the end-user with a closed software product that can be used right out of the box. The bazaar metaphor was used to describe the more loosely coordinated software development

process, carried out by a distributed group that collaborates on an ad-hoc basis, releasing incrementally modified versions of the software, while keeping the product free and the source code open to the community. The end product is constantly evolving, and often requires more technological sophistication from the end user than parallel commercial products.

The cathedral and bazaar metaphor is useful for discussions of business models in the software industry and in other sectors (e.g. Baraniuk, 2008; Bezroukov, 1999a; Fitzgerald, 2006), although the applicability and generalisability of Raymond's claims are controversial due to their oversimplification, utopian nature and inefficiency (Bezroukov, 1999a, 1999b). Furthermore, Raymond's sense that the bazaar will replace the cathedral was proven to be wrong. In fact, the contemporary software sector comprises of a host of companies that combine 'cathedral' and 'bazaar' characteristics. A good example of the complex relationship between the cathedral and the bazaar in the software industry is the 2018 \$34 billion acquisition of Red Hat, a company heavily reliant on open source software, by IBM, one of the archetypal 'cathedrals' in the software sector (Lohr, 2018). The main two motivations for this acquisition were investing in open source, and positioning IBM as a cloud computing powerhouse (Vaughan-Nichols, 2018). Thus, without adopting or endorsing Raymond's claims, we adopt his metaphor, and use it and the recent history of the software industry since 1999 in order to gain insights into the higher education sector.

The cathedral is an apt metaphor for the university and for traditional higher education institutions, where most learning takes place in carefully predefined and relatively rigorous tracks (courses, degrees), where most teaching is carried out by paid staff, and where there is a well-developed infrastructure that provides the resources and processes required to support all aspects of a fully developed organisation. In contrast with the cathedral, the bazaar is a metaphor for the open higher education sector, where most teaching is technology-based, where learning is often self-driven by motivated learners, where most exchanges are not based on monetary compensation, and where the infrastructure (resources and processes) is usually fragmentary and distributed. The bazaar approach allows for a greater degree of personal autonomy as a result of more horizontal structures of power and influence due to its decentralised nature (Farrow, 2017). The bazaar has long been evolving in the shadow of its cathedral's proverbial ivory tower, and has recently emerged into the sunlight, at which point its ability to leverage the exponentially declining costs of digital computation, communication and storage, enabled it to offer educational services and products for free or at a significantly reduced cost. The cathedral and the bazaar can thus be used as metaphors for the business models of traditional higher education organisations, and of open higher education initiatives, respectively.

Cathedral-type and bazaar-type business models in the higher education sector

How can the cathedral and bazaar metaphors and the concept of business model assist us in the analysis of business models in higher education? We begin by describing Cathedral-type (C-type) business models in the higher education sector. Some well-known archetypal C-type business models in higher education are the research university, major textbook publishers (e.g. Pearson), academic publishers (e.g. Elsevier) and

major educational technology providers (e.g. Blackboard Inc.). What are the characteristics of these C-type business models?

The customer value proposition (CVP) of C-type organisations in higher education is to provide the customer with a highly structured path to achieve their goals. In return for the fees paid per customer, the customers (students, faculty members, HEIs) receive services and resources that are outside their area of expertise (or, in the case of organisational customers, which are not a part of their core-competencies), and in return can focus on achieving their overall goals. For example, students pay annual university tuition and receive a clearly defined path to achieving their undergraduate degree, including not only their courses but also a process for selecting the courses, access to advising and other support services, a clearly defined academic calendar, and a host of other services and resources that allow them to focus on achieving their goals as students¹. The customers of the textbook publisher are teaching faculty who assign the textbooks to their courses. They receive from the publishing house not only a comprehensive text that provides their students with the knowledge required in the course, but also additional products and services such as online resources for the faculty members (e.g. slides, a teaching guide) and students (e.g. supplementary audio-visual resources, practice questions and quizzes), as well as ongoing updates about future editions of the textbook (Hammond, Danko, & Braswell, 2015). The customers of educational technology companies such as Blackboard are HEIs who purchase a host of software products closely adapted to their particular needs: learning management systems, tools for providing education at a distance, tools for sending mass notifications to students and staff, academic library software tools, etc.

The infrastructure component of the business models of C-type organisations is also easy to characterise. C-type organisations have access to extensive and diverse resources, they rely on a large number of interdependent processes to operate, and most of their resources are provided in exchange for money. Research universities have access to extensive resources (e.g. financial, human, political, scientific and cultural), rely on hundreds of different processes that take place in the context of a large number of departments and units, and are funded through student-paid tuition, various streams of government funding and subsidies, diverse philanthropic sources, and more. Similarly, major textbook publishers and educational software providers are based on an extensive infrastructure, funded by the revenues created through the sale of their products and services (Greco & Wharton, 2008).

Interestingly, the financial component of C-type organisations in the higher education sector is not unique. These organisations can be for-profit or non-profit, and the way they allocate resources to their different activities is unique only in as much as the infrastructure of these organisations is unique (as discussed in the previous paragraph).

Having described the typical business models of C-type organisations, we now describe bazaar-type (B-type) business models in the higher education sector. Some well-known archetypical B-type organisations in higher education are digital course providers (e.g. OERu, Coursera, OpenLearn), open textbook publishers (e.g. FlatWorld and BCcampus) and open educational technology providers (e.g. Moodle). What are the characteristics of these B-type organisations?

The CVP of B-type organisations in higher education is based on providing customers with flexible products that they can adapt and adjust to their needs. The products are

usually free, and are usually digital, though they often include ‘freemium’ options that offer end users the opportunity to purchase additional features or services for a fee (Anderson, 2009). For example, learners can register for a course they want that is offered by course providers such as Coursera, OERu or OpenLearn, without prerequisites or other limitations. These courses are usually flexible, enabling learners to study at their own pace and move between the course components at a sequence that fits their personal preferences. Many courses are offered for free, and learners can often pay for extra services such as personal attention of faculty, certification of course completion credentials, textbooks, unlimited access, etc. Open textbook publishers such as FlatWorld, BCcampus or Openstax usually offer a free or inexpensive online book that is provided ‘as is’ and can usually be viewed, printed, shared, remixed and reused. Some of these publishers also offer faculty additional resources such as test banks and manuals. The customers of educational technology organisations such as Moodle receive, free of charge, access to a software product that is supported by an open source community. This includes access to the source code so that users can modify and adjust the code to their own needs. Further support requires paying either the organisation or other, independent, suppliers. This CVP of B-type organisations is reminiscent of the CVP of organisations characterised as disruptive innovators (Christensen & Raynor, 2003) which target customers for whom the CVP of the cathedral HEIs overshoots their needs and/or is overpriced.

The infrastructure component of the business models of B-type organisations is quite diverse. Some B-type organisations, especially for-profit ones such as commercial MOOC providers, are similar to C-type organisations in this sector: they have access to extensive and diverse resources and rely on a large number of interdependent processes to operate, most of which are based on the exchange of money. Other B-type organisations, such as Moodle and BCcampus, have limited access to resources, their processes are fewer and simpler, and many of their core activities, such as coding and content development, are based on volunteer work and contributions. Interestingly, some of the core processes of many B-type organisations in higher education rely on C-type institutions, and especially on university faculty who perform tasks such as MOOC development and authoring open textbooks. These tasks are often performed without significant direct financial compensation.

As explained before, the financial component is not a significant differentiator between C- and B-type organisations in the higher education sector, and mostly reflects the different infrastructures of the organisations.

In contrast with Raymond’s 1999 conceptualisation of the bazaar and the cathedral as two separate models, we conceptualise C- and B-type organisations as two extremes on a continuum of business models. A similar conceptualisation of business models in higher education was used by Orr et al. (2018) who classified HEI business models by placing them on a continuum between prospector organisations that are more entrepreneurial and defender organisations which are more focused on protection and stability (Miles & Snow, 1978). Similarly, at the one extreme we find C-like organisations that are well established institutions such as traditional universities and commercial textbook publishers. At the other extreme we find organisations characterised by loosely structured product, the absence or minimization of payments, and the stretching of the small amount of resources through the reduction of processes and through unpaid and volunteer work. In fact, some B-like activities can hardly be classified as organisations,

and they are so skeletal that it might seem artificial to analyse their business model. For example, an author who writes an open textbook and puts it online has a very rudimentary business model, yet it is a business model nonetheless. Most HEI organisations fall somewhere along this continuum.

In conclusion of this overview, we propose an analytic framework that assists in the analysis of the business model of organisations in the higher education sector, by determining the location of the HEI's business model on the C-like to B-like continuum. In the following example we will demonstrate how this CAB (Comparative Analysis of Business models) framework can be used to compare the business models of three organisations: a traditional university, a MOOC provider such as Coursera, and a provider of open educational resources such as OERu. OERu is a virtual collaboration of HEIs from around the world which allows OER learners to create flexible learning pathways, including pathways that lead to formal academic credit from recognised education institutions. We chose OERu as a candidate for analysis based on a report by Orr et al. (2018) that identified OERu as an organisation with a high level of online, open, flexible and technology-enhanced education (OOFAT) use. This high score on the OOFAT scale suggested that it would also be a good representative of B-type HEIs.

CAB is based on evaluating a series of elements that characterise the components of the business model of the organisation or organisations that are being analysed. Each of the components of the business model being analysed (e.g. the CVP) comprises elements that are evaluated on a quantitative scale, and the results are presented on a radar diagram that helps visualise the relationships between the business models. In this particular example, the centre of the radar diagram represents elements that characterise C-type organisations, and the outer periphery of the diagram elements that characterise B-type organisations. In the case of the three academic teaching organisations we mentioned (university, Coursera, OERu), the analysis will focus on the CVP and infrastructure components of the organisations, since, as we explained above, the financial component of the business model of organisations in the higher education sector does not differentiate between C-type and B-type organisations beyond what is already covered by the other two components. For brevity, the illustrative example uses only five elements (three for the CVP component and two for the infrastructure component) to compare the business models of C-type and B-type higher education teaching institutions:

- Elements that differentiate between the CVP of the HEIs:
 - How structured is the course of study?
 - How flexible are the studies in regards to time and place of study?
 - How high is the value of a credential awarded to students who complete the course of study?
- Elements that differentiate between the infrastructure of the HEIs:
 - What is the extent of resources that enable the organisation to support its teaching services?
 - How high is the number and complexity of processes that support teaching and learning in the organisation?

A radar diagram that illustrates a hypothetical outcome of the analysis would look like that depicted in [Figure 1](#). Lower numbers denote more structure, lower flexibility, higher

value of the awarded certificate, more extensive resources, and a higher number of processes and more complex processes.

The CAB diagram in [Figure 1](#) places the university, the archetypal C-type organisation, at the centre of the diagram, places OERu close to the periphery of the diagram, the area that characterises B-type organisations, and places Coursera about midway between the two areas, with processes and resources that are more similar to universities than to OERu, with a level of structure that is midway between universities and OERu, and with flexibility and certificate value that are more distant from universities.

The goal of this illustrative analysis of a hypothetical university and two world-class OER/online education providers is to demonstrate the analytic potential of quantifying the extent to which an HEI's business model is close to being a C-type or B-type business model. A full empirical analysis would require extensive work to identify and to evaluate many components in the different institutions. Such an analysis is beyond the scope of this conceptual paper.

Discussion

This discussion section demonstrates how our framework of C-type and B-type business models in the higher education sector can improve our understanding of the implications of digital innovation on this sector. Furthermore, visualising the significant differences in the business models of organisations helps expose false comparisons and analogies, i.e. the proverbial 'comparing apples and oranges.' This analysis is pertinent to this early stage of development of digital innovation in HEI (Orr et al., 2018).

A critique of the replacement of the university business model narrative

In his book *'MOOCs and a Zero Marginal Cost Education'*, Rifkin (2014) describes a future in which traditional universities are being replaced by zero marginal cost operations,

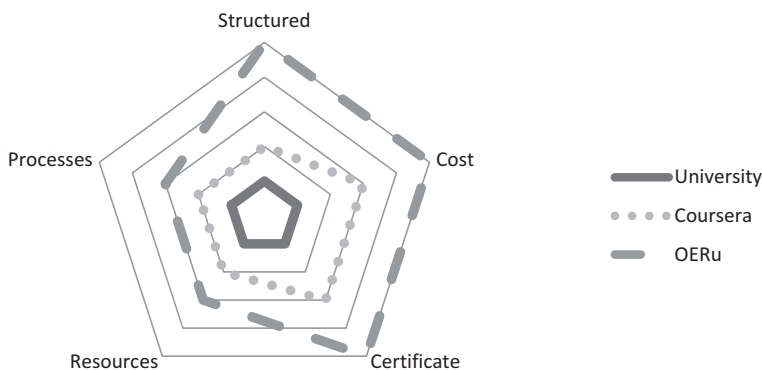


Figure 1. An illustrative example of a CAB diagram displaying a simplified comparative analysis of business models of a traditional university, of Coursera and of OERu.

such as MOOC providers. This claim extrapolates a principle that operates at an organisation that is predominantly a B-type organisation, and which has a very specific CVP and associated infrastructure and financial components, and suggests that this CVP will replace the CVP of C-type organisations. This claim ignores the fact that the components of business models are tightly interlinked, and that changing one significant component in a business model influences other significant components. The fact that the zero-marginal cost can support a B-type organisation does not lead to the conclusion that such an organisation can start providing the significantly more extensive value proposition that is currently offered by C-type organisations. To do so, it will have to add processes and resources, and this will have consequences (e.g. additional costs), that will fundamentally alter the CVP of the organisation (Kalman, 2014) and shift its characteristics much closer to the C-type organisations it is purported to replace.

Similarly, the 'disruptive innovation' theme ignores the fact that many of the resources that the B-type organisations have access to are based at – or originate from – the C-type universities. Most faculty who develop MOOC courses, or the videos, syllabi and other learning materials offered on OERu, are from universities or from other C-type organisations such as museums, major for-profit corporations, government entities, etc. In other words, in the higher education sector, the business models of B-type organisations are highly dependent on resources that originate at C-type organisations. Universities and their faculty still need to invest extensive amounts of time and money to produce courses and other learning materials, and the technology only eliminates the reproduction and dissemination costs (Caswell, Henson, Jensen, & Wiley, 2008; Read, 2011). A report by Duke University estimated that 600 working hours were required in order to build and deliver one MOOC course, including more than 420 hours of effort by the instructor (Belanger & Thornton, 2013). These facts are ignored by those who predict the demise of the university by B-type organisations. The business model of the universities will not be critically disrupted by B-type organisations as long as the B-type organisations' business model continuously relies on resources that can only be provided by a large and diverse number of university-based resources. Coursera and OERu not only fully rely on faculty from C-type organisations to develop the courses and course materials, but also benefit from the fact that their best 'customers' are university graduates, professors and teachers from other C-type institutions (Hansen & Reich, 2015; Koller, Ng, Do, & Chen, 2013).

Finally, the fact that the business model of B-type organisations is heavily dependent on resources from C-type organisations is also one of the reasons that extensive unbundling is less likely to occur in the higher education sector. Many services have been successfully outsourced by universities – the academic textbook industry and academic software industries are just two examples. Nevertheless, few current B-type organisations point to a potential significant unbundling of the three key roles of the current university: teaching, research and accreditation. On the contrary: more and more of the B-type organisations rely on the 'bundled' resources of the university, especially those that arise from the bundling of teaching and research. The category of B-type organisations that is most often discussed in this context is MOOC providers. In particular, the discussion focuses on ways to measure the success or failure of MOOC participants.

Measuring success and failure in MOOCs

One of the most extensively debated products of B-type organisations are MOOCs (Kovanović, Joksimović, Gašević, Siemens, & Hatala, 2015). A common critique of MOOCs is that they present an excessively high level of student failure, and, correspondingly, unacceptably low student retention rates. Thus, their product is inferior to that offered by traditional universities (Morris, 2013). This critique, which compares the educational attainment of participants in MOOCs and in traditional universities, makes the classic ‘comparing apples and oranges’ error, when it measures educational attainment of learners in a B-type organisation but uses criteria that are derived from the C-type business model. This comparison ignores the significant difference between the CVP of MOOC providers versus that of traditional universities. As proposed by Kalz et al. (2015), by Henderikx, Kreijns, and Kalz (2017) and by Reich (2014), criteria for success in MOOCs should be student satisfaction oriented, and reflect the extent to which the MOOC allowed participants to fulfil their intentions. Unlike students who choose C-type organisations and who seek the value proposition associated with them (e.g. a highly structured course of study that leads to a highly valued credential such as a certificate of completion which confirms that the student met all of the requirements defined by the institution), learners come to B-type organisations with goals that are more diverse. Some wish to deepen their understanding of a specific topic. Others wish to master a topic. Others still are looking for personal enrichment and intellectual enrichment, and some teachers and professors wish to improve their own teaching. Research on the outcomes of B-type organisations that uses only criteria that originate in C-type universities limits our ability to understand the outcomes and value these organisations provide. Rather, the success criteria should be as diverse as the reasons participants choose to use the services of a B-type organisation. As Nambisan et al. (2017) suggest, digital innovation requires us to innovate our research methods, for example by using process mining (van der Aalst, 2011).

The relationships between B- and C- type organisations

One of the interesting insights suggested by the CAB diagram that places the business model of a university in the middle of the graph, Coursera around the university, and OERu at the outer periphery of the diagram (Figure 1) is that the relationship between C- and B-type organisations is that of centre and periphery: The cathedral-type organisations are at the middle, and the bazaar organisations surround it. This suggestive relative placement might appear to be arbitrary in that the scales could have been reversed, placing the B-type organisation at the centre and the C-type at the periphery. Nevertheless, we believe that placing the C-type organisations at the centre and the B-type in the periphery conveys several important ideas. It underlines the fact that we do not yet know how far B-type organisations might yet move away from the centre. The ‘B zone’ of the graph is a hotbed of experimentation and digital innovation, while the ‘C zone’ at the centre remains relatively stable and is the reference point for evaluating B-type organisations.

This relative placement also reflects the fact that a business model analysis of B-type organisations reveals extensive dependence on resources that originate in C-type organisations, as well as the blurry boundaries between them (Loeckx, 2016) .

The bazaar as a catalyst of open innovation in the cathedral

Does the strong dependence of B-type organisations on C-type organisations suggest that B-type organisations feed, parasite-like, on C-type organisations? No. In fact, we claim that B-type organisations have an important role in the higher education sector's ecosystem. Raymond's cathedral and bazaar metaphor for the software industry demonstrates this claim. In the two decades that have passed since Raymond's ideas were published, there have been significant developments in the relationships between the major corporate software developers (e.g. Microsoft, IBM and Apple) and the open source software movement. Open source software is no longer perceived as a threat to the cathedral (i.e. the commercial industry players), but rather as an integral part of the software ecosystem. IBM, known for strong protection of intellectual property (IP) through trade secrets, patents, licensing and other measures, was reported to invest hundreds of millions of dollars in the development of Linux and other open source software projects (Samuelson, 2006), as is demonstrated by the \$34 billion acquisition of the open source software company Red Hat (Lohr, 2018). Microsoft too is embracing open source projects (Vaughan-Nichols, 2016), and even Apple, one of the best known examples of the 'walled garden' protective and closed approach to software, is open sourcing some of its products (Finley, 2015).

The best explanation for this shift is open innovation. Open innovation is defined as 'a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model' (Chesbrough, Vanhaverbeke, & West, 2014, p.27). Extensive research on open innovation in general, and on open innovation in the software industry in particular, reveals that corporations which strategically embrace open software practices can significantly benefit from opening up their developments to the rest of the community, even if that community includes competitors. Furthermore, software companies can benefit from the fact that their employees contribute to external open software projects (Colombo, Piva, & Rossi-Lamastra, 2014). What might have been perceived as a paradox in the past (West & Gallagher, 2006) is now an accepted truth: the bazaar and the cathedral are not mutually exclusive; and innovation, and particularly digital innovation, can be enhanced if it combines IP protection with open practices (Chesbrough et al., 2014; West & Bogers, 2014). Furthermore, according to the theory of disruptive innovation (Christensen & Raynor, 2003), one possible strategy for organisations who wish to avoid being disrupted is through an independent unit which is dedicated to achieving the 'disruptive' goals. Similarly, one possible strategy for HEI who wish to protect themselves from being disrupted would be to use B-type organisations as their autonomous units, which can accelerate innovation. One example of this can be seen in the digital education platform FutureLearn, that is owned by The Open University in Milton Keynes, England (Marszal, 2012). FutureLearn is a controversial project, but the way it influences innovation and policy at the Open University is key to the future survival and success of both organisations (Wilby, 2018).

The analogy between the evolution of the software industry since Raymond's 1999 paper, and the projected evolution of the HEI sector, focuses us on C-type corporations in the software sector who benefitted significantly in the last two decades by opening themselves up to activities and collaborations with B-type organisations. We expect to see such collaborations and interdependencies in the higher education sector too. This concept of open innovation is already prevalent in the development of educational

software products such as the Moodle learning management system (Costello, 2014), and we project that much more is to be expected in the near future. We are not aware of research findings on this topic, but there is plenty of anecdotal evidence that faculty who are involved in the development of open educational resources such as MOOCs and open textbooks, are also catalysts of innovation within their own HEI's, integrating non traditional resources in teaching (Conole, 2012) and experimenting in approaches to using online methods to increase the effectiveness of on-campus teaching (Bates, 2013). Thus, HEIs who wish to successfully deal with the major changes that we are facing as a society in the digital age, should not perceive B-type organisations as existential threats to their future, but rather embrace them, and even nurture and develop them. These B-type organisations enable the C-type organisation to innovate, to bridge boundaries and catalyse cooperation, innovation and creativity.

Empirical validation of the suggested model

This conceptual paper is theoretical by its nature. We propose an alternative way to examine the future of higher education ecosystems. Future work could empirically examine the validity of the model and its predictions. In the first stage, the CAB model should be further developed empirically. Content analysis of documents, media coverage, case studies, and interviews will enable validating the model and mapping its different dimensions. In the second stage, a survey can be developed that will analyse and map organisations on the different dimensions of the model. This mapping could, for example, identify those organisations that are more likely to enable synergy between B- and C-type organisations. In the third stage, a longitudinal study will help identify future trends in the relationships between B- and C-type organisations and validate the prediction of the model regarding the synergistic relationships between them.

In conclusion, we propose that despite the persistent tension between B- and C-type organisations in the higher education sector, innovation in this sector will not emerge from B-type organisations disruptively eliminating C-type organisations. Rather, we predict that similar to the software industry, the higher education sector too will develop into an ecosystem populated by interdependent organisations that occupy various niches, and whose business models are characterised by various degrees of 'cathedral-ness' and 'bazaar-ness'.

Conclusion

This conceptual paper analyzes the impact of digital innovation on business models in the higher education sector. It offers an alternative to the common 'replacement' narrative of the upcoming demise of the incumbent university ('cathedral') business model by open education based ('bazaar') business models. Using an analogy from the software sector, we suggest that the future higher education ecosystems could still be dominated by C-type universities and other HEIs, but that their business models will be based on synergistic relationships with a host of other organisations. These other organisations will represent many gradations on the continuum between C- and B-type organisations. The synergy with B-type organisations will catalyse open innovation in the universities, and keep them better attuned to changing societal needs and preferences. Consequently, universities will not only offer a better CVP to their students, but also turn out university graduates who are better prepared to benefit

from the entire higher education ecosystem. These graduates will improve skills (e.g. self-regulation) required to go on to be life-long learners who effectively use open education products such as MOOCs to remain intellectually and professionally up-to-date. Our alternative to the 'demise of the university' replacement narrative acknowledges that the bazaar is an important experimental space that will guide universities to develop and innovate in ways that answer the needs of the students of today and tomorrow.

A key to promoting the healthy growth of this digital innovation-based higher education ecosystem is developing new research tools and novel measures that augment the traditional measures used to research university education. Rather than assuming that there is a single gold standard for successful HEI, the diversity of our research tools should reflect the diversity of organisations, business models and learners in the higher education ecosystem.

Note

1. For simplicity, this paper focuses on the undergraduate educational 'product' of HEIs.

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