Digitalizing B2B Business Processes—The Learnings from E-Invoicing

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Abstract Digitalizing an existing business process often proves to be more complicated than expected. This article provides insights into obstacles and success factors when digitalizing a business process, using the example of the transition from a paper-based process of handling invoices to electronic invoicing. Since e-invoicing has gained significant momentum in recent years from a business perspective as well as from governments all over the world, it provides an interesting area in which to investigate digitalization. Drawing from input collected in more than 10 years of research on the topic of e-invoicing, the authors illustrate why digitalization is still not easily achieved, despite the obvious advantages, and elaborate on the key prerequisites for success. The results emphasize the importance of understanding the needs of one's business partners and working closely with them when developing solutions. Furthermore, systematic project management and change management are important. However, as much as there is no "one size fits all" solution, there is also none that will last forever. Rather, as the business environment changes and technology matures, there will be a need to re-assess processes and solutions from time to time. Most importantly, the human factor of change cannot be underestimated. Besides standard change management practices, companies should seize the opportunity to develop their employees through the digitalization effort by engaging them in projects and decision-making processes. Acquiring project management skills, expert knowledge and experience in innovating business processes will serve as an invaluable asset in the long term.

Keywords Digitalization · Business process · E-Invoicing · B2B · Success factors

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1 Introduction

Digitalization offers huge potential to streamline business-to-business (B2B) processes in terms of the manual amount of work, material, cost and time. However, many initiatives to digitalize established business processes suffer considerable delays or fail altogether, eventually not delivering the results promised in the business case. Hereinafter, we will illustrate the digitalization of a business process by looking into the example of the transition from a paper-based process of handling invoices to electronic invoicing and derive useful learnings that can serve as guidelines in general. Therefore, we examine obstacles and success factors to uncover the underlying challenges of process digitalization before providing tips on how to prevent and address issues.

In addition to classical literature research, this article relies on insights gained in more than 10 years of intensive research into the topic of e-invoicing in the Swiss Digital Invoice-Forum (swissDIGIN). Since 2004, swissDIGIN has facilitated e-invoicing in Switzerland by connecting companies, service providers, governmental authorities and researchers in a community. As the legal frameworks are different across the world, the article focuses on e-invoicing in Europe and Switzerland as an illustrative example.

Figure 1 shows a framework of change through digitalization, which will be used to visualize and structure the content of this article.

Companies are influenced by the general business environment, classified by the factors of the PESTEL analysis (political, economic, social, technological,

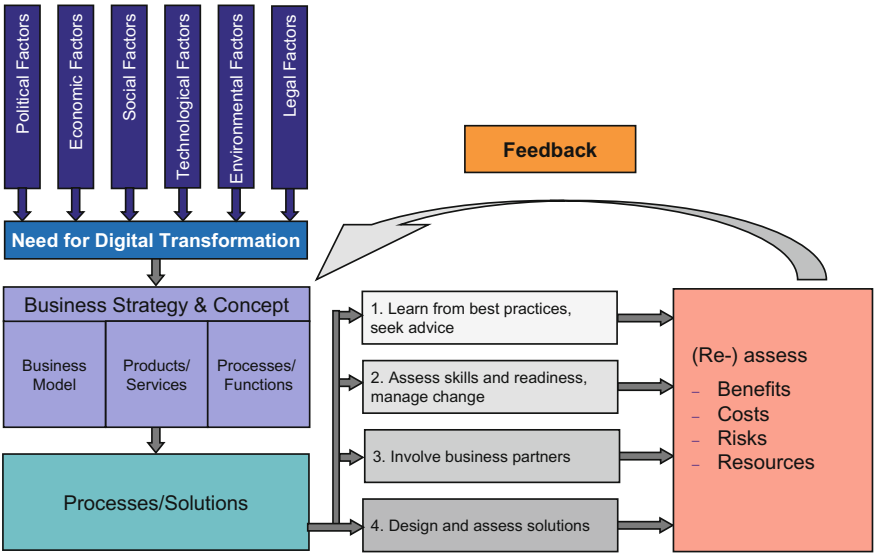

Fig. 1 Framework of change through digitalization (based on Wölfle 2000)

environmental and legal), which eventually trigger business transformation. The impact on strategy can range from disruptive changes such as new business models to moderate changes such as the optimization of processes. As a result, any change will call for new digital processes and solutions leading to a number of activities that, after assessment, will lead to implementation and continuous reassessment activities, affecting the business strategy and concept.

Based on the framework introduced in Fig. 1, the transition to electronic invoicing is, notably, not about disruptive change. Instead, it can be seen as a classic example for the digitalization of a business process that is managed in any given company or organization striving for more efficiency.

In the next section, we examine the maturation of e-invoicing over time, obstacles and key success factors. Thereafter, we provide an overview of recent developments before drawing a conclusion and pointing out the lessons learned.

2 The Need for Digital Transformation in Invoicing

In recent years, e-invoicing has gained significant momentum from a business perspective as well as from governments all over the world. Hence, not a single year in the last decade passed without being declared the year of the e-invoicing breakthrough (Ulrich 2002; Rombel 2007; Hawser 2009; Airey 2014). To understand today's obstacles as well as success factors that will be examined in the following sections, it is necessary to have a look at how e-invoicing developed. Following the political agenda and the economic potential to promote e-invoicing, the necessary framework conditions were established aiming at an efficient and transparent handling of invoices that contributes to a competitive economy (Tanner and Wölfle 2011).

We focus on the political, economic, technological and legal factors mentioned in the model introduced in Fig. 1. From a political perspective, e-invoicing has gained considerable attention for its economic benefits. Industry experts point out that by utilizing e-invoicing, the potential savings in the EU's public sector are estimated to be at least 40 billion Euro of which today, less than 10% is exploited (Koch 2017a). Together with the savings for the general economy, these figures amount to being relevant to the national economy. The European Union (EU) has set the goal to make e-invoicing the primary method of invoicing by 2020 (European Commission 2013). Therefore, the EU launched initiatives to drive the adoption of e-invoicing such as the Pan-European Public Procurement OnLine (PEPPOL) initiative seeking to enable interoperability between dissimilar systems through providing technical specifications being implemented into existing e-procurement applications (Pan-European Public Procurement OnLine 2017). Moreover, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), a body of the United Nations Economic Commission for Europe (UNECE), drives the harmonization of trade processes internationally.

From an economic perspective, implementing e-invoicing is attractive as it reduces "waste" (i.e. non-value-adding manual labor), offering significant potential for optimization for companies of any size (Kioses et al. 2007). Furthermore, e-invoicing processes are highly scalable, supporting growing businesses while, at the same time, reducing the need for manual work. Research findings suggest that companies, depending on the amount of paper invoices handled, could save up to 80% of their current costs related to the process (Koch 2017a). Contemporary cloud-based solutions are easy to implement, even for small and medium-size businesses (SMEs) with little need for investment or particular expert knowledge (Hayward 2013; Koch 2017b). Thus, if followed through in a straightforward fashion, payback periods of e-invoicing projects can be as short as 6 months (Mayer 2011; Koch 2017a). Further, findings show that e-invoicing significantly reduces the carbon footprint of an organization (Tenhunen and Penttinen 2010). Altogether, in globalized markets with fierce competition, e-invoicing can contribute to efficiency gains.

From the technological point of view, e-invoicing itself is not a recent invention, since companies trading in transaction-intensive industries such as retail and automotive started to send and receive invoices electronically through electronic data interchange (EDI) in the 1980s (Self 2008; Tanner and Wölfle 2011). However, the first EDI systems were rather complex and expensive to implement and maintain. Additionally, due to a lack of standardization, suppliers faced the situation of having to comply with their customers' preferences and deliver invoices in various different data formats, which was especially unappealing for SMEs with a low number of transactions (Self 2008). Therefore, the adoption rate remained at low levels and it was very difficult to convince smaller suppliers to participate in the solution. In the 2000s, B2B networks for e-invoicing began to simplify cooperation. Service providers established new ways of connecting suppliers and buyers by managing the conversion between differing standards of data exchange and other related services for either end of the process. However, while solutions today are available at nearly every level of sophistication, covering a variety of needs, the adoption rate is low and only increases slowly (Rombel 2007; Hernández-Ortega 2012; Koch 2017b).

From a legal perspective, early adopters were not able to replace the established paperbound process by utilizing EDI, since there was no legal framework allowing electronic documents to be deemed relevant for tax and reporting purposes. Paper held special significance as it represented material evidence (Tanner and Wölfle 2011). Starting around 2002, legislation in the EU and Switzerland began to remove the hurdles for electronic invoicing and allowed invoicing in a purely digital format for governmental tax audits. Thus, the legal basis was created to effectively handle electronic invoices and theoretically stop using paper. While this bold move should have made e-invoicing more attractive, especially to larger companies receiving thousands of invoices every month, e-invoicing was still not broadly adopted. This was due to differing standards among countries, complicating the process for companies engaged in cross-border business (Lejeune et al. 2003; Foryszewski 2006). More recently, governments reacted to the market need for standardization and less rigid legal frameworks (Koch 2017b). For example, in March 2016, the European Committee for Standardization (CEN) approved the first steps towards a unified European

e-invoicing standard (de Jong 2017). In Switzerland, in September 2016 the obligation to sign electronic invoices digitally in order to prove authenticity and integrity during tax audits was eliminated (Eidgenössische Steuerverwaltung ESTV 2016).

Summing up, establishing e-invoicing makes good business sense for companies and governments. Combined political efforts translated into national law emphasized the interest of governments to promote e-invoicing. In the near future, all public administrative bodies in the EU member states have to accept electronic invoices in at least two standards, namely UBL and UN/CEFACT XML (Koch 2017b). Furthermore, electronic invoicing is requested from suppliers under certain circumstances, which will put pressure on organizations to implement e-invoicing.

3 Today's Obstacles

Since the driving forces behind the development in B2B relationships are mainly the companies receiving invoices from a multitude of different suppliers, the perspective of the invoice-receiving parties seeking to onboard their business partners is focused on hereinafter.

In the previous sections, we saw that many of the obstacles hindering the adoption of e-invoicing in B2B settings were already addressed and removed, especially from legal and technological perspectives. Nevertheless, why is it that e-invoicing is still not rising dramatically, although it would make good business sense to adopt it? Following the activities represented in boxes one to four in Fig. 1, we will look at the obstacles impeding the adoption of e-invoicing in organizations today.

Concerning activity one, *learn from best practices and seek advice*, rather than following a trend, this activity is about setting the stage for making an informed decision. Too often, decision makers do not have relevant and reliable information for their specific industry, do not interpret information correctly, or rely on outdated sources or even mere prejudices. Moreover, due to the fragmented market, various solutions are on offer that are not transparent regarding costs and benefits. In addition, not knowing about the needs and digital maturity of business partners will lead to poor decisions. Ongoing efforts to standardize and progress technologically could also impede decision-making, as it never seems to be the right moment to start implementation.

Concerning activity two, *assess skills and readiness and manage change*, besides other change initiatives that keep organizations occupied nowadays, restructuring the invoicing process is not likely to be given priority. Since the average paper-based invoice handling in organization typically shares an abundance of interfaces with related upstream and downstream business processes, automation is not established in passing. One of the biggest challenges in the internal sphere is to assess the organizations' culture concerning change and innovation. Furthermore, it would need to be decided what activities the organization can and wants to perform internally and what should be outsourced. Therefore, a critical assessment of the technological

maturity of the organization is important, as well as connecting to relevant internal stakeholders such as IT, finance, accounting, procurement and other departments.

Concerning activity three, *involve business partners*, the company would need to work with external parties such as their business partners and service providers. However, companies (or more concretely: people working in companies) are reluctant to engage in a change project that involves the need to convince their business partners to change. Findings indicate that it is the human factor that poses the biggest challenge (Rombel 2007; Tanner and Wölfle 2011; Billing 2012; Hernández-Ortega and Jimenez-Martinez 2013; Hornburg 2017). In general, larger companies typically exhibit a high level of complexity due to organizational inertia, fragmented non-transparent processes and unclear accountability. Another challenge is that the involved parties might have differing understandings of the process, objectives and priorities of the project, as well as not being familiar with the technological aspects due to limited experience. Often, large corporates receive invoices from a variety of SME suppliers. However, when invoice-receiving companies implement e-invoicing, research shows that the rate of connected business partners is at not more than 30% after several years (Koch 2017a) because SMEs are not interested in implementing sophisticated e-invoicing infrastructure only for one client. This is even more the case as invoicing typically represents a process that either side has already organized in a satisfactory way. Nevertheless, the chances are that some suppliers are not yet on board simply because they were never approached by their customers (Hornburg 2017).

Concerning activity four, *design and assess solutions*, even if an e-invoicing process is already in place and standards are available, they are often not efficiently used to their full potential. This is due to the adoption of standards to "house rules" while at the same time proper documentation is lacking. This often happens when companies try to tweak an e-invoicing process to reflect company-specific needs (Tanner and Wölfle 2011). In addition, solutions might have been implemented as a quick fix, but are not accepted by the users and do not blend into the surrounding IT landscape. Furthermore, insufficient assessment of the stakeholders' needs can hinder business partners in joining the e-invoicing journey as they feel that either the solution is too sophisticated, complex and expensive for them to implement or too simple, thus not offering a compelling opportunity to automate.

The aforementioned points are reflected in data collected by swissDIGIN in 2016, asking a non-representative sample ($n = 196$) of the Swiss e-invoicing community about their primary concerns. The results show that across all company sizes, the top three issues reported are lack of expertise, high costs of implementation and the general inertia of the organization. Especially companies with more than 250 FTE (full-time equivalents) report lack of compatibility with existing systems as an additional obstacle. However, internal capacities and questions of IT security are less of a concern. Interestingly, it is mostly the invoice sending parties who report general inertia as a key issue, compared to the invoice receiving parties. This might be explained by the fact that it is typically the companies receiving invoices from an abundance of different suppliers that benefit the most from the implementation of

e-invoicing solutions. This being said, the strong business case might offset inertia or set a stronger incentive to make an effort to overcome inertia.

4 Key Success Factors

After having identified the obstacles for e-invoicing today, the question remains of what can be done to drive implementation and reap the expected benefits. Again, the success factors are clustered following the activities represented in boxes one to four in Fig. 1.

Concerning activity one, *learn from best practices and seek advice*, it is crucial to seek information from trusted, reliable and non-opinionated sources. Considering today's availability of solutions for every level of sophistication, from e-mailing PDF documents to fully-fledged EDI-solutions, the definition of the specific objectives will determine what is and is not a good choice. Ideally, there is an opportunity to obtain recommendations and best practices from business partners in a comparable industry and combine them with on-site visits. Events such as expert conferences are also a good source of information and networking contacts. Collaborating with a service provider who has expert knowledge in the given industry can help to navigate the possibilities.

Concerning activity two, *assess skills and readiness and manage change*, experience from the swissDIGIN community shows that project management remains an important skill for e-invoicing. Practitioners report that e-invoicing projects too often lack proper project plans, resources and the definition of SMART (specific, measurable, achievable, realistic and timely) objectives being well matched with the other parties involved. From an organizational perspective, this also includes analyzing the current invoicing process critically. Too often, projects start with a picture of the current process as it should be rather than as it is. From the day the process was set up and documented, workarounds and tweaks might have emerged that never made it into the records. In the same vein, e-invoicing has to be approached as a holistic procure-to-pay exercise, involving representatives from the procurement, finance, logistics, tax and accounts-payable teams as well as the IT experts, in order to create a seamless workflow and obtain buy-in for the initiative (Taylor 2011; Billing 2012). Developing solutions together with those who work with the process every day will provide valuable insights and an opportunity to develop project- and change-management skills internally. Furthermore, accountability for the rollout and process ownership should be defined beyond the project end. Furthermore, it is key to gain commitment for the new solution, from top management to employees and all involved stakeholders. Therefore, classic change management guidelines should not be neglected, as change is likely to be met with resistance. The success of the project should not be jeopardized by not taking the human factor of change initiatives into account.

Concerning activity three, *involve business partners,* it is vital to evaluate which solutions would not only suit the needs of one's own organization, but also those

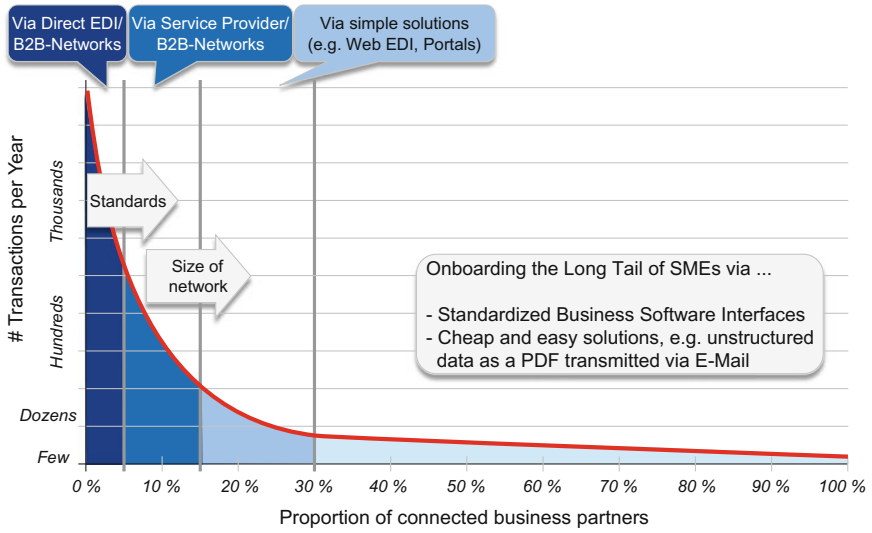

Fig. 2 Onboarding the long tail of SMEs (based on Tanner and Wölfle 2011)

of the business partners. Figure 2 shows the proportion of the connected business partners together with the number of transactions per year.

While those partners with high numbers of transactions are relatively easy to onboard onto e-invoicing through direct EDI or through EDI by using B2B networks run by service providers, the remaining long tail of SMEs has yet to be convinced (Tanner and Wölfle 2011). Political efforts therefore focus on the onboarding of the long tail of SMEs (Tanner and Wölfle 2011; Taylor 2011). For a company, it is crucial to proactively involve business partners to exploit the full potential of e-invoicing. That having been said, it is worthwhile to conduct a thorough analysis of the willingness and technological maturity of the company's business partners in order to clarify what range of solution options a company should offer. For the rollout, it is advisable to prioritize business partners with high numbers of transactions and those who are experienced in e-invoicing. A mutually shared understanding across stakeholders and compelling benefits for the suppliers are additional key success factors for this activity.

Concerning activity four, *design and assess solutions*, it is important to ensure that there is a unified internal process in place, supplied with high-quality core data and working with a broadly accepted standard. Further key elements for the successful rollout are collaboration with a service provider and being connected to a relevant B2B network that offers attractive pricing models for the suppliers and facilitates an easy onboarding process. Moreover, it is worth considering the different options available between paper-based invoicing and a fully-fledged EDI solution to obtain the long tail shown in Fig. 2 on board and find the appropriate range of solutions for the specific company. Figure 3 shows different levels of sophistication in e-invoicing

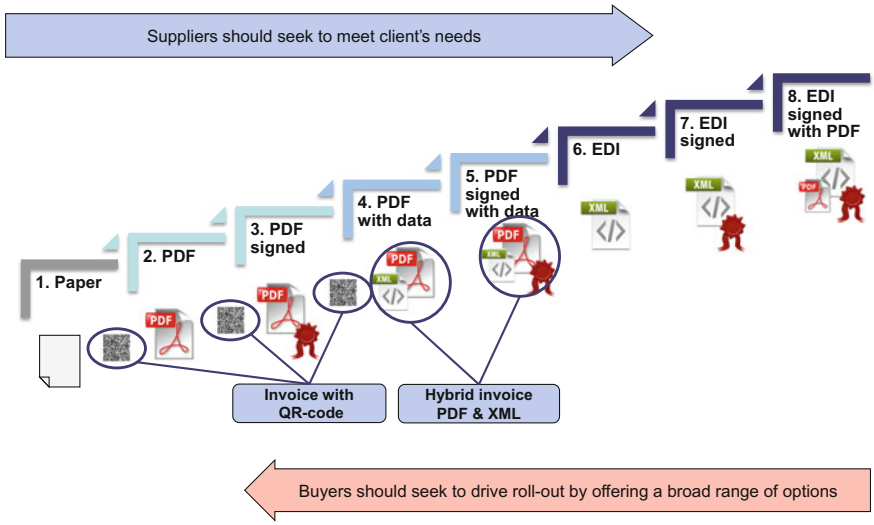

Fig. 3 Levels of sophistication in e-invoicing solutions (based on Tanner 2016)

solutions. Organizations can decide to approach the implementation of e-invoicing from either side of the model.

Starting with a paper-based process, one could decide to stop using paper through scanning, turning paper documents into PDFs. Since this is rather close to the original process and processing PDFs via e-mail is an established procedure in business settings, the effort needed to convince people to participate and further change management is small. However, the benefit is limited, as this approach does not allow for the automated processing of data. This is the basic approach mostly taken by suppliers needing to meet their client's requirements. Based on the client's needs, they will likely have to move up to a more sophisticated solution such as sending a digitally signed PDF invoice or structured data (EDI) at a certain point.

On the other hand, a company might decide to make a bold move and go for the fully-fledged EDI solution. This approach is more complex to implement and calls for proper project- and change management since it implies major changes compared to the original process. Furthermore, this approach requires trust in technology and automated controls. However, it also allows for fully automated processing of invoices while being highly scalable. This is the approach mostly taken by organizations receiving thousands of invoices from their suppliers. However, as they aim to onboard a maximum number of business partners, they tend to open up to simpler solutions eventually.

Either way, organizations pursuing e-invoicing will need to evaluate the individual requirements of their business partners in order to determine what range of solutions needs to be offered, depending on transaction volumes and technological maturity. They will eventually see the need to adapt to simpler or more sophisticated solutions in order to maximize the number of connected business partners.

5 Recent Developments

Concerning the EU's goal of establishing e-invoicing as the primary method of invoicing by 2020, it is worth considering the current developments and state of readiness of involved parties.

From a legal perspective, recent changes in legislation have opened the door for less sophisticated ways of e-invoicing (e.g. by omitting the obligation to digitally sign invoices). For instance, sending documents in a PDF format via e-mail is a legally compliant way of e-invoicing, as long as the authenticity and integrity of the document can be proven through adequate internal business controls and is duly supported by accounting documents. The swissDIGIN community regards this as an important step in driving e-invoicing in general, as it bridges the needs of companies seeking to maximize efficiency through e-invoicing and companies looking for simple and cheap solutions.

From a technological perspective, there has been a recent convergence of standards, making e-invoicing across different solutions, systems and standards easier. Furthermore, there is a trend towards business software solutions implementing e-invoicing as a basic functionality, following established standards. The incorporation into existing invoicing processes can be achieved with little effort, especially with options such as e-invoicing through PDF/A-3 documents enriched with attached structured data in UN/CEFACT XML format.

Opinions about PDF invoices were collected by swissDIGIN in 2016, surveying a non-representative sample of companies in the Swiss e-invoicing community mainly receiving invoices ($n = 71$) and mainly issuing invoices ($n = 58$). Results indicate that the majority of companies in either role support PDF invoices in general as contributing to the overall goal of widely adopting e-invoicing. However, 18% of the companies that mainly receive invoices argued that the acceptance of PDF invoices might have an adverse effect, because it hinders the adoption of fully automated EDI solutions.

Furthermore, current developments in Switzerland indicate that a new way of invoicing might soon enable even simpler solutions that would facilitate the onboarding of the long tail of suppliers. This new option is based on the standards of the Single Euro Payments Area (SEPA), which harmonizes bank transfers across 34 states in Europe, and was established using a unified data format following the ISO 20022 standard (The National Adherence Support Organisation (NASO) of Switzerland 2017; ISO-20022.CH). In 2017, the Swiss financial center presented its new QR-bill stating that "the new, future-oriented solution enables the different interest groups to meet the challenges of digitalization and regulation in an efficient way" (SIX Interbank Clearing Ltd 2017). The QR-bill will replace traditional payment slips from January 2019.

Since the QR-code will contain all necessary payment information, it can be used physically on paper or digitally, e.g. in a PDF and can be read automatically with a QR-code reading software. As shown in Fig. 4, the new QR-bill not only includes the

Fig. 4 New swiss payment slip with QR-code (PaymentStandards.CH 2017)

QR-code with a Swiss cross on the left, but also displays the payment information in text format on the right, making it readable for non-automated processing as well.

With the mandatory use of the new payment slip, invoice-processing software will inevitably have to incorporate relevant functionalities for generating invoices and reading the QR-bill. Furthermore, it will be possible to add reference information for invoice verification purposes. Therefore, Fig. 3 shows a QR-code symbol in the first three steps of the model. This is to symbolize that the QR-bill can serve as a simple measure transferring paper-based information into a machine-readable format allowing for a first level of automation. From the QR-bill, the next step of sophistication is the hybrid format combining a PDF/A document with structured data in UN/CEFACT XML format. This accommodates mainly small suppliers seeking to comply in a simple way with their business customer's requirements.

From an economic perspective, the size of B2B networks becomes the crucial factor determining the value and competitiveness for service providers. Thus, the market landscape of service providers started to consolidate as they sought to leverage synergies and market coverage to broaden their networks (Mayer 2011; Taylor 2011). Unsurprisingly, e-invoicing service providers running B2B networks supporting EDI also are not positive about the trend towards simple solutions such as PDF invoices, given that their business model today benefits from complexity, non-unified standards and a demand for digital signatures. Hence, in the swissDIGIN survey of 2016 service providers ($n = 24$) express little support for statements such as "PDF invoices without electronic signature should be accepted as evidence by the receiving party". Only 29% of the service providers state their full agreement with this statement, whereas 67% of the invoice sending companies and 46% of the companies mainly receiving invoices do.

6 Conclusion

After having looked at electronic invoicing as an example of the digitalization of a business process, what are the generalizable learnings and conclusions we can draw?

Concerning the PESTEL factors, it becomes obvious that the political, technological and legal infrastructure is ready to support digitalization and much effort has been put into facilitating the digital change. Furthermore, from an economic perspective, the business case for the digitalization of business processes is strong. This does not mean that all determining factors are indeed optimal, yet small efforts can already go a long way.

Referring to the activities of the company-internal change shown in Fig. 1, concerning activity one, *learning from best practices and seeking advice*, the mere news of good general conditions for digitalized processes will not make companies change. Therefore, the digitalization of business processes should be understood as a core task of today's division managers who need to stay abreast of the latest developments in their industry, as they are the designers of processes and systems. Since there will never be the ideal moment where there is absolute security regarding legal and technological circumstances, company culture should encourage the taking of a controlled risk and the building of adequate failure tolerance.

This is especially true when it comes to the second activity, *assess skills and readiness and manage change*. Managing change internally is known to be challenging and has been examined in countless studies and models by academics and practitioners. From the example of e-invoicing it can be derived that a culture of change and innovation has to be developed for both top-down and bottom-up initiatives. Employees should not only be involved as the experts for their processes, but they also should be further developed through designing, piloting and documenting the project. Thus, knowledge is built and retained within the company.

For the third activity, *involving business partners*, collaboration in and with B2B networks is the crucial success factor concerning standardization and meeting legal requirements. Any digitalization effort is likely to fail or never reach its projected potential if key trade partners are not on board. Companies need to collaborate with their business partners and design solutions reflecting the willingness to digitalize and the digital maturity of both parties in a joint effort. Of course, cost-benefit considerations have to be acceptable for both parties.

The fourth activity, *design and assess solutions*, takes the point made for activity three even further. Starting with a viable solution for one's own situation is good. However, this might not satisfy the needs of business partners. Therefore, companies aiming to digitalize their B2B processes should seek to adapt to their partner's needs by providing a range of solutions that suits both larger corporates and small businesses, depending on whom they do business with. Ideally, solutions would have a modular design that is scalable, allowing for extensions concerning the processes, geographical area, functions and organizational units. This would allow solutions to grow alongside the needs of the organization and its business partners. Standards should be followed and rigorously adhered to, as this will contribute to a smooth

rollout. Digital B2B networks are by far the predominant solution scenario when it comes to integrating the processes and systems with a wide range of business partners.

Summing up, it can be concluded from the example that, in order to digitalize processes successfully, organizations need to broaden their perspective. Instead of initiating an effort focusing on how to turn the exact current process into a digital version, businesses should assess and understand the PESTEL factors at play as well as the four activities from learning from best practices to designing and assessing appropriate solutions. However, we recognize that there is a range of individual cases and the results of our research and experience incorporated in this article are only generalizable to a limited extent. Furthermore, as much as there is no "one size fits all"-solution, there is also none that will last forever. Rather, as the business environment changes and technology matures, there will be a need to re-assess processes and solutions from time to time. Most importantly, the human factor of change cannot be underestimated. Besides standard change management practices, companies should seize the opportunity to further develop the people in the organization through the digitalization effort. Acquiring project management skills, expert knowledge and relevant experience in innovating business processes will serve as an invaluable asset in the long term.

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