



Future of Billing

A SIX White Paper



Lucerne University of
Applied Sciences and Arts

**HOCHSCHULE
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Foreword

As a key player in the Swiss financial industry, SIX strives to understand, identify, and shape developments affecting payments ecosystems and key elements of the industry together with different communities. One particular element is billing, a topic that is very much ingrained and established in Switzerland's payments industry and highly relevant for buyers and sellers of goods and services, as well as financial institutions. Therefore billing is an essential element for a functioning economy in Switzerland. In light of progressing digitization, billing is about to transform from an approach bound to paper to a digital experience.

The goal of this white paper is to provide a guide for invoice issuers, invoice recipients, and the interested wider community in Switzerland, one that introduces the different billing approaches: It seeks to examine the current state of the Swiss billing industry, thereby

focusing on a selection of billing approaches offered today. These are assessed based on a number of different indicators. The white paper also provides strategic insights into potential future developments in the area of billing for both invoice recipients and invoice issuers, based on current tendencies and trends.

The study is based on a number of considerations and discussions of the billing industry today – and in the future. It should thus not be understood as a complete and conclusive overview of billing, but rather as a guide and food for thought for companies that issue and receive bills as well as software and billing services providers, banks, fintechs, and other payments experts.

The present study was conducted in a joint effort between SIX and the Lucerne University of Applied Sciences and Arts.

Marco Menotti

Head Banking Services
SIX

Daniel Dahinden

Head Innovation & Digital
SIX

Daniel Berger

Head Billing & Payments Ecosystem
SIX

Thomas Ankenbrand

Head Competence Center Investments
Lucerne University of Applied Sciences and Arts

1 Introduction

Billing forms a central part of the Swiss payment industry, which is characterized by a diverse landscape. The banks, with their clearing system from SIC as well as internal clearing systems, process the majority of the Swiss payment transactions. Though cash is still relevant, it is slowly but steadily decreasing in importance. Furthermore, debit and credit cards constitute via further element of the Swiss payment landscape via their own clearing schemes. Mobile payment solutions are on the rise in Switzerland. TWINT, for example, demonstrates the increasing acceptance of mobile payments and illustrates the digital maturity of Swiss consumers.

In Switzerland, 1.16 billion outgoing payments with an associated volume of CHF 7.42 trillion were reported in 2019 (SNB, 2019a).¹ This volume corresponds to more than ten times Switzerland's gross domestic product (Federal Statistical Office, 2020a). The majority of the number and volume of transactions in 2019 were domestic transactions (97.1% and 79.1% respectively), while only a small percentage of the number and volume of transactions were cross-border transactions (2.9% and 20.9% respectively) (SNB, 2019a). The number and volume of payment transactions in Switzerland demonstrates the relevance of the payments industry.

This study sets the focus on one specific part of the payments industry: billing. In Switzerland, billing holds a certain importance in society and is ingrained in the Swiss mentality. In a 2019 survey conducted among Swiss consumers, 99 percent stated that they were familiar with invoices, both those paid at a counter and those paid via online transfer channels (Gehring, Graf, & Trütsch, 2019). The usage of invoices² paid through online transfers is high, with 93 percent of the survey respondents reporting using this payment instrument, while the usage of invoices paid at the counter was mentioned by 34 percent of the respondents in the 2019 survey (Gehring, Graf, & Trütsch, 2019). While 22 percent of the Swiss respondents in a European survey chose bills as their preferred payment method, the European average for this payment option lies at just seven percent (Intrum, 2019a). These survey results indicate the high level of importance associated with invoices in Switzerland on the one hand, and a development away from counter transactions on the other. In addition to the high acceptance by customers, modern billing methods offer further advantages like efficient end-to-end processes with reliable, stable cash flows for the invoice issuer. In the present study, we define a bill and billing payments as follows:

- ➔ *A **bill** is a document issued by the seller of goods or services, stating the amount owed by the buyer of the goods or services. Often, this document also includes a payment deadline, but can also include further details about the goods or services to fulfil certain formal criteria, which are imposed by the law.³*
- ➔ ***Billing transactions** can be defined as transactions whereupon the buyer of goods or services pays his or her debt usually with a delay after the order or receipt of the goods or services.*

¹ See the Swiss National Bank data portal: [https://data.snb.ch/en/topics/finma#!/cube/zavekuza?fromDate=2019-Q1&toDate=2019-Q4&dimSel=D0\(IZ1,GZ1\),D1\(TT0,BMF0\)](https://data.snb.ch/en/topics/finma#!/cube/zavekuza?fromDate=2019-Q1&toDate=2019-Q4&dimSel=D0(IZ1,GZ1),D1(TT0,BMF0)).

² Throughout this study, the terms "bill" and "invoice" are used interchangeably.

³ For the Swiss case, see SME Portal for small and medium-sized enterprises (SME Portal for small and medium-sized enterprises, 2020).

Bills constitute an important part of total payments by consumers. In a survey among European consumers, 65 percent of the Swiss respondents attributed a higher priority to bills than to other daily payments (Intrum, 2019a). Data sourced from the Swiss National Bank database provides an overview of cashless payment transactions in Switzerland (SNB, 2019b; SNB, 2019c).⁴

Note that these figures include cashless billing transactions, as well as other forms of cashless payment transactions. The left-hand chart in Figure 1 shows the absolute (in millions) and relative number of cashless payment transactions in Switzerland. The right-hand chart illustrates a detailed breakdown of the payment transfers by the means of payment initiation.

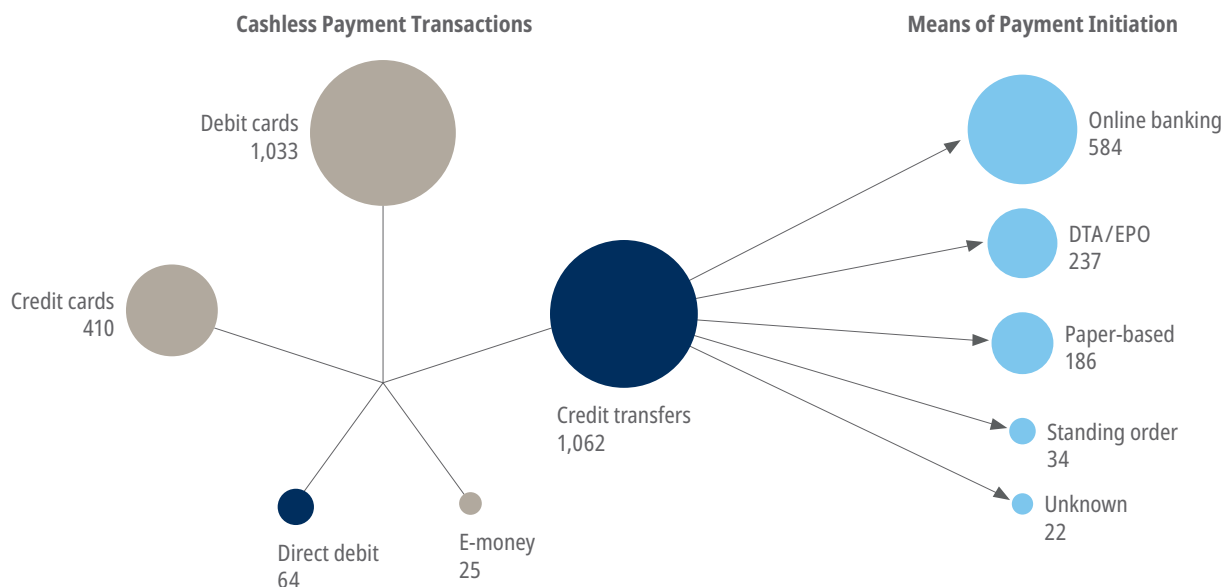


Figure 1: Breakdown of cashless payment transactions in Switzerland, absolute figures in millions. The figure is based on an illustration from BAK Basel (2016) with updated data sourced from SNB (SNB, 2019b; SNB, 2019c).⁵

In the billing process context, a payment initiation either follows the receipt of a bill from an invoice issuer or is initiated automatically via a direct debit approach. A bill can either be received in a paper-based form, such as by postal mail, or an electronic form, such as by e-mail or through a digital billing service (e.g., eBill). The payment order can then either be initiated through a paper-based medium, such as paying the bill for example at the post office counter, or electronically such as through mobile-banking (m-banking) or e-banking. A further

option is to settle the bill automatically through a direct debit option. Therefore, the form of payment request and payment initiation need not necessarily be of the same type. For example, one could receive a paper-based bill by postal mail (e.g., QR-bill) but settle the bill electronically through e-banking (electronic).

Figure 2 shows the historical development of the number of transactions categorized by direct debit, paper-based, and electronic payment initiations. On the one

⁴ For further information, see the Swiss National Bank (SNB) data portal: [https://data.snb.ch/en/topics/finma#!/cube/zavkuzart?fromDate=2019-Q1&toDate=2019-Q4&dimSel=D0\(IZCHFZ,GZCHFZ\),D1\(TT0,TT1,TT2,TT3,TT4,TT5,TT6\)](https://data.snb.ch/en/topics/finma#!/cube/zavkuzart?fromDate=2019-Q1&toDate=2019-Q4&dimSel=D0(IZCHFZ,GZCHFZ),D1(TT0,TT1,TT2,TT3,TT4,TT5,TT6)) and [https://data.snb.ch/en/topics/finma#!/cube/zavezaluba?fromDate=2019-01&toDate=2019-12&dimSel=D0\(ZT\),D1\(K,D,EG\),D2\(IZ,AZ\),D3\(II\),D4\(TT\)](https://data.snb.ch/en/topics/finma#!/cube/zavezaluba?fromDate=2019-01&toDate=2019-12&dimSel=D0(ZT),D1(K,D,EG),D2(IZ,AZ),D3(II),D4(TT)).

⁵ The number of payment transfers included in the SNB data set only covers payments made in Swiss Francs. Note that cash withdrawal transactions were not considered. Based on the SNB data, certain electronic payment initiations cannot be clearly assigned to one of the three methods of e-banking, DTA/EPO or standing order, thus the category “unknown” was added. Further explanation of abbreviations can be found in Table 1. Since the numbers are rounded, the sum of all the payment transfers in the right-hand chart does not correspond to the total payment transfers in the left-hand chart.

hand, the absolute number of paper-based payment initiation orders has constantly decreased over recent years (2012-2019: from 291 to 186 million, -36%), a development which is thought to be primarily attributed to a change in consumer behavior. Electronic as well as the direct debit payment orders, on the other hand, have increased (2012-2019: electronic: from 637 to 877 million, +38%; direct debit: from 55 to 64 million, +16%). By far the most payments (more than 77% in 2019) were initiated electronically. The strong growth in the number of electronically initiated payments in recent years can mainly be attributed to the growth in e-banking payment initiations.

Transactions by Type of Payment Order

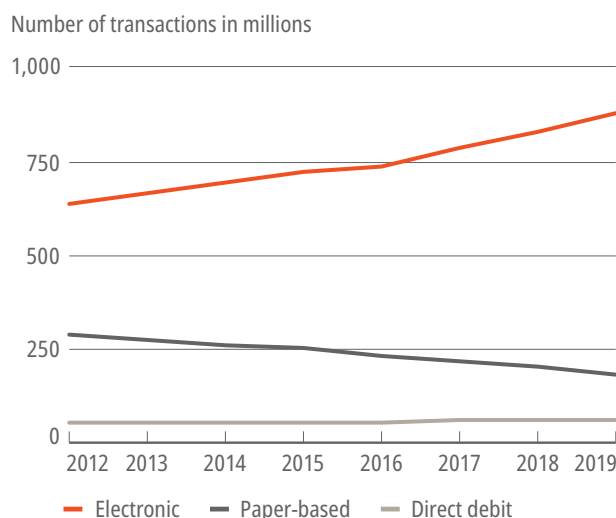


Figure 2: Number of transactions by type of payment initiation order in Switzerland, 2012-2019. Data source: SNB (2012-2019)⁶.

In the case of the billing industry, the use of electronic approaches is growing. For example, the number of eBill transactions grew by almost 16 percent between 2018 and 2019 (to 25 million eBill transactions in 2019). Different developments have driven or are expected to drive the increase of electronic bills and of electronic payment initiation orders. On the one hand, existing

approaches such as eBill have been further developed. On the other hand, m- and e-banking as a channel of payment initiation has grown in popularity, become more established, and offers payment slip reader capabilities. As a result, the number of m- and e-banking transactions in 2019 witnessed significantly⁷ higher growth (+8.2%) compared to previous years (2012-2018: average annual growth rate of 5.3%).

While it can be expected that through the general trend of digitalization the number of bills issued and payment transfers initiated electronically will continue to rise, the diverse range of billing approaches is strongly anchored in the Swiss mentality. As different billing approaches appeal to different customer segments and use cases, most of the currently used billing approaches can be expected to retain a certain level of importance in the near future.

The present study seeks to offer an overview of billing today, as well as how billing could expect to look in the future, while setting a focus on business-to-consumer (B2C) transactions. The study is divided into two parts. First, Chapter 2 starts with an outline of billing today, followed by an introduction to a selection of four different billing approaches offered today. These include the direct debit, eBill, QR-bill⁸, and e-mail invoice approaches, which are each described in more detail with the help of the corresponding customer journeys. In Chapter 3, a utility analysis is then applied to the four approaches in order to rank the approaches from both the invoice issuer and invoice recipient perspective. The utility analysis is based on a PEST approach with the four following underlying dimensions: political/environmental, economic, social, and technological. Each dimension is assessed with the help of two or three indicators. In the second part, Chapter 4 focuses on the future of billing in Switzerland, establishing theses about four predicted future developments and trends.

⁶ The SNB data set only includes payments in Swiss Francs. For further information, see the Swiss National Bank (SNB) data portal: [https://data.snb.ch/en/topics/finma#/cube/zavkuzart?fromDate=2012-Q1&toDate=2019-Q4&dimSel=D0\(IZCHFZ,GZCHFZ\),D1\(TT0,TT1,TT2,TT3,TT4,TT5,TT6\)](https://data.snb.ch/en/topics/finma#/cube/zavkuzart?fromDate=2012-Q1&toDate=2019-Q4&dimSel=D0(IZCHFZ,GZCHFZ),D1(TT0,TT1,TT2,TT3,TT4,TT5,TT6)).

⁷ Based on two-sided t-test with 5% level of significance.

⁸ The QR-bill was launched in June 2020 and gradually replaces the payment slip (ESR).

2 Billing Today

2.1 Introduction to Different Billing Approaches

This study seeks to examine billing transactions, which can be considered a subgroup of the total payment transactions. A defining element of a billing transaction compared to other payment transactions is that it usually involves a delay between the order or receipt of the goods or services, and the actual payment. This delay offers the buyer the advantages of a certain level of convenience, affordability, and security. Also, a bill payment usually follows the issuance of an invoice document by the seller of the goods or services. The process leading up to the issuance of a bill by the seller depends on the invoice issuer and can have varying levels of length, complexity, and automation depending on the companies' business model, resources, priorities, and infrastructure. The buyer of the goods or services enters the billing process upon receipt of the issued bill and must then choose the preferred bill payment approach among a variety of different options. Some of these customer journeys, namely those of the direct debit, eBill, QR-bill, and e-mail invoice approach, are described in detail in chapters 2.2, 2.3, 2.4, and 2.5 respectively. Although the payment slip (ESR) accounts for a large volume of billing transactions in Switzerland today, this billing approach is not examined in detail in the present study. This is explained by the launch of the QR-bill in June 2020, which is planned to gradually replace the traditional payment slip (ESR), with which the QR-bill shares similar purposes of use and customer journeys. Moreover, the focus of the study is set on the future of billing.

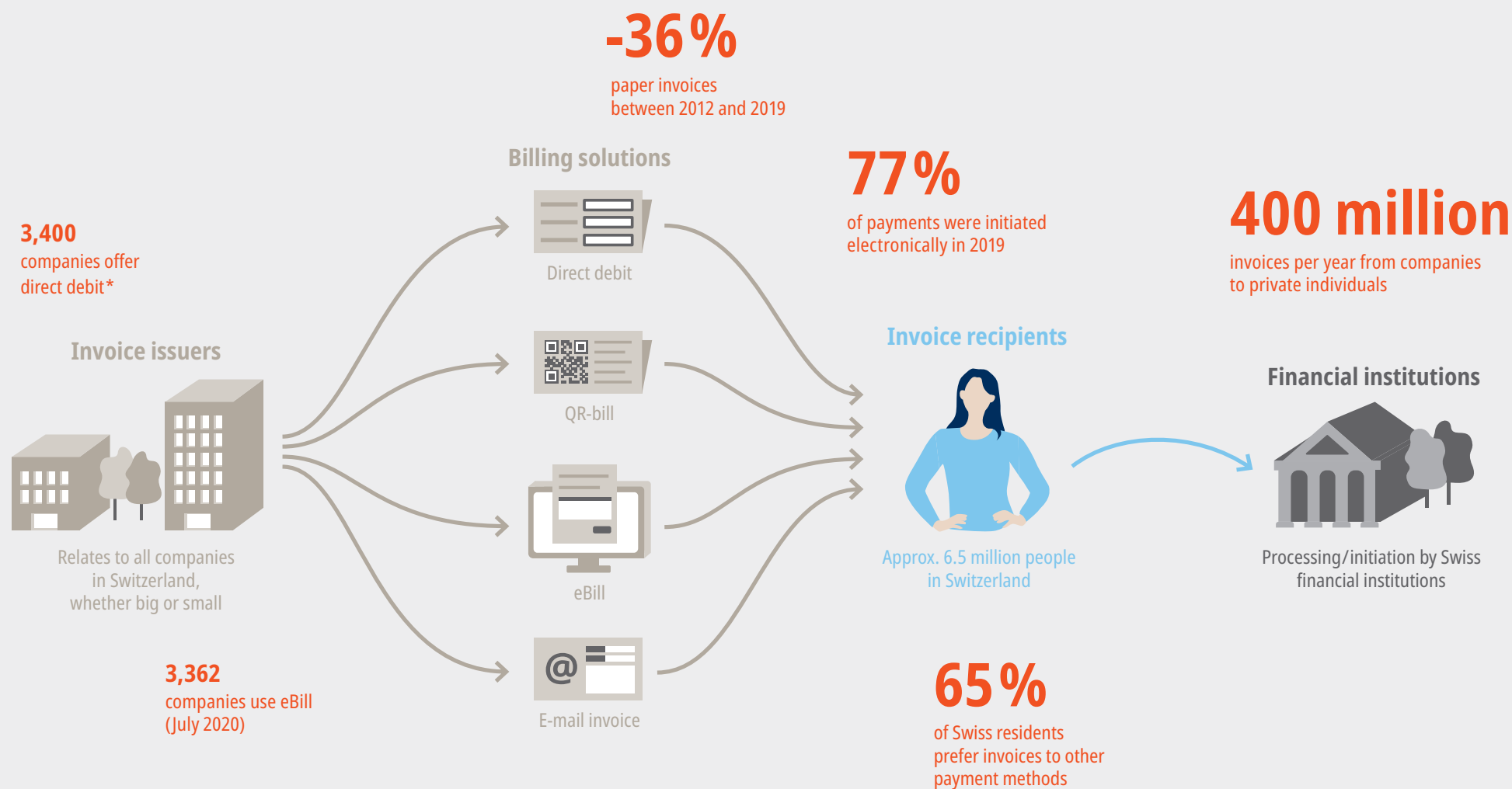
Different information structures can be used to transfer relevant billing information, such as the reference number and bank account details, to the invoice recipient. Currently, these include the payment slip (ESR), eBill, and e-mail invoice. By June 2020, a new payment slip including a quick response (QR) code, containing all the relevant billing information, was introduced. While the payment slip (ESR) and QR-bill can be transmitted in either a paper-based or electronic form (e.g., PDF document), the transmission of the eBill invoice and e-mail invoice are purely digital. A further method is the direct debit billing approach, though in this case the billing information often does not reach the bill payer until the transaction has already been completed.

The oldest and most established among the mentioned approaches is the payment slip (ESR), which contains all the relevant information necessary to execute a payment. In the paper-based form, the payment slip is either integrated into a bill document and can be removed along a perforated edge, or is enclosed as a separate document. In its electronic form, the payment slip (ESR) is usually part of a PDF document. In line with the harmonization of processes with the ISO 20022 standard, however, the currently used form of payment slip is in the process of being replaced with a payment slip including an integrated Swiss QR code.

Following a transition phase, the end of which has not yet been defined⁹, the QR-bill is to completely replace the traditional payment slip (ESR). The integrated QR code contains all the relevant information such as the bank account information and reference number, and can include further structured information (Swico, 2020), but requires a mobile device or a scanner to be accessed. In addition, however, the billing information is printed on the payment slip part of the QR-bill and can thus be used in the same way as the original payment slip (ESR). The bill with the integrated QR code can be sent either electronically (e.g., by e-mail) or in a paper-based form by postal mail. Besides the payment slip (ESR), direct debit is another established, though not widespread approach in Switzerland. After an initial, usually paper-based, onboarding process by the invoice recipient, the invoice issuer can from then on automatically initiate a payment, whereby the corresponding financial institutions will debit the invoice recipient's account and credit the invoice issuer's account. The eBill constitutes a further option. With this approach, the bill is delivered completely electronically to the eBill platform, which can be accessed via the m- or e-banking account of the invoice recipient, and merely needs to be released. In the present study, an e-mail invoice is considered an unstructured digital invoice containing an IBAN number, but not including a payment slip (ESR) or QR reference. The same kind of bill could, of course, also be sent by postal mail, i.e., a paper-based bill containing an IBAN number. All of the mentioned bill approaches are classified along two

9 As of the end of April 2020.

Billing in Switzerland



*Companies with >10 direct debit transactions per month
Sources: SIX analyses, European Consumer Payment Report 2019 (intrum)

Figure 3: Billing in Switzerland.

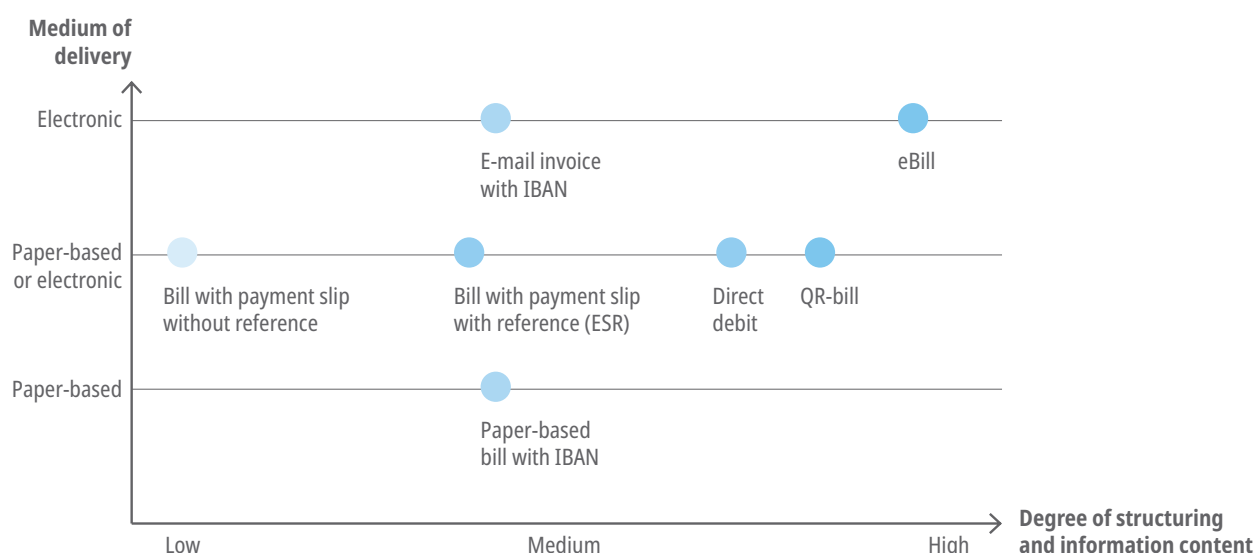


Figure 4: A selection of billing approaches classified by medium of delivery, and degree of structuring and information.

dimensions in Figure 4. The bill approaches are classified as either being delivered in an electronic format, paper-based format or both. Additionally, the degree of structuring and information content is considered on a gradual scale, with the degree of structuring being the more decisive feature in classifying the billing approaches as low, medium, or high. The payment slip without a reference can be delivered either electronically or in a paper-based form and has the lowest degree of structuring and information content among the approaches mentioned in Figure 4. If the payment slip includes a reference, however, it has an increased degree of structuring and information content. An e-mail invoice with an IBAN number and a paper-based bill with an IBAN number can be assumed to have similar degrees of structuring and information content, though the former is delivered electronically, while the latter is delivered in a paper-based form. From the remaining approaches illustrated in Figure 4, the direct debit and QR-bill approaches include both paper-based and electronic mediums of delivery, though the latter has a higher degree of information content. The eBill

approach has the highest degree of structuring and information content among the approaches illustrated in Figure 4, and is delivered electronically.

Figure 5 shows the growth rates between 2018 and 2019 of the number of ESR reference-based¹⁰, direct debit and eBill transactions, respectively, that are cleared over the SIX platforms. No figures were available on the e-mail invoice¹¹. The highest growth rate, at 15.7 percent, is witnessed by the number of eBill transactions. In contrast, the number of direct debit transactions shows a below-average growth rate (3.5 percent). Since ESR reference-based transactions account for the highest share of the total number billing transactions, it is not surprising that its growth rate of 7.9 percent is close to the average growth rate of 7.8 percent. The number of payments with an ESR reference (342 million) in 2019 was much higher than the number of eBill transactions (25 million)¹².

The growth rate of the number of eBill transactions compared to the number of payments with an ESR reference was almost twice as high in 2019.

¹⁰ The sample of ESR reference-based payments does not include eBill transactions.

¹¹ Many different definitions of the e-mail invoice exist in literature and practice. No figures were found on e-mail invoices considered as unstructured digital invoices containing an IBAN number, but not including a payment slip (ESR) or QR reference.

¹² The 342 million ESR reference-based transactions, 25 million eBill transactions, and 54 million direct debit transactions include only those transactions cleared over the SIX platforms. Since not all the Swiss transactions are included, the growth rates should be understood as indications for the Swiss market.

Growth Rates of Number of Transactions Between 2018 and 2019

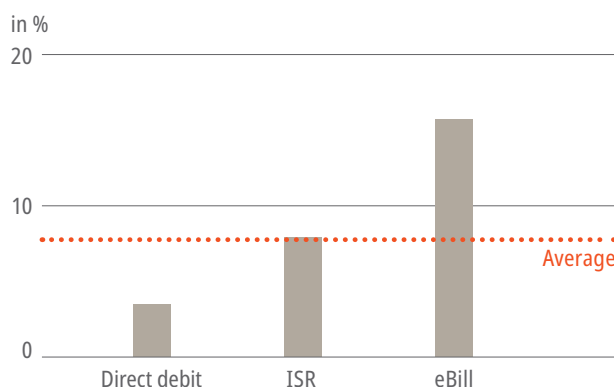


Figure 5: Growth rates of the number of billing transactions by approach in Switzerland in 2019 in percent compared to the previous year. Data source: SIX (2020a).¹³

Average Amount per Transaction in 2019

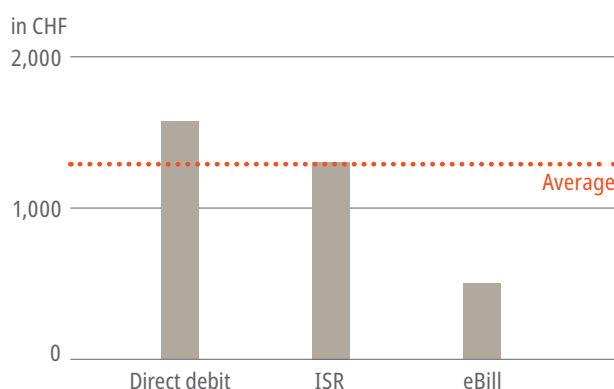


Figure 6: Average amount per billing transaction by approach in Switzerland in 2019 in CHF. Data source: SIX (2020a).¹⁴

Figure 6 shows the average volume per transaction in 2019 of ESR reference-based, direct debit, and eBill transactions.¹⁵ Overall, in 2019 the average volume per transaction was CHF 1,290. The lowest average volume per transaction is attributed to eBill, at CHF 501. In contrast, the highest average amount at CHF 1,572 is assigned to direct debit. Since payments with an ESR reference account for the highest share of the total volume of billing transactions, it is not surprising that its average billing transaction amount of CHF 1,304 is close to the average.

One explanation for the difference in the average amount per transaction is that eBill is a more consumer-focused product. In addition, the use of different billing approaches by invoice issuers appears to differ among industries. As shown in Figure 7, while there is a wide range of industries making use of the direct debit and eBill approach, the extent of use differs by industry and billing approach¹⁶. There is a large representation of insurance and health insurance companies as invoice issuers across both the direct debit and eBill approach, with 32 percent and 34 percent respectively. Around one-third of the eBill issuers included in the sample, but only four percent of the direct debit invoice issuers, are active in the utilities industry as of March 2020.

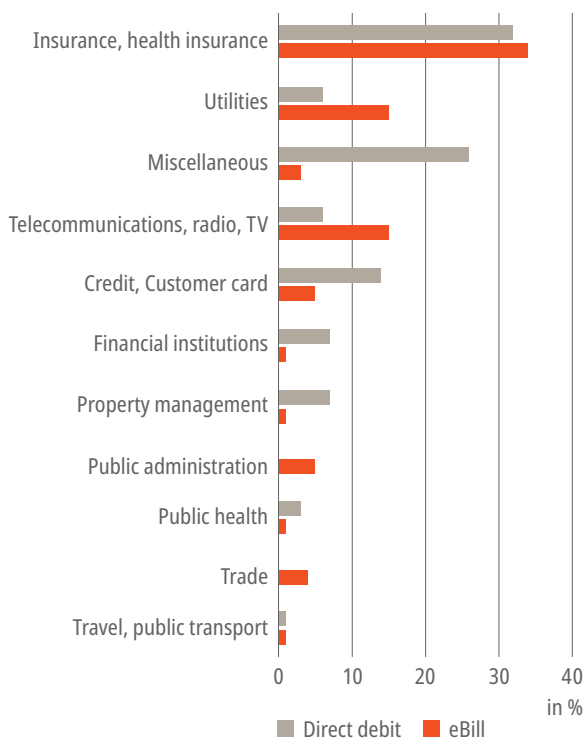
A further 15 percent of the eBill invoice issuers are telecommunications, radio, and TV companies, which represents six percent of the direct debit invoice issuers in the sample. Credit and customer card companies as invoice issuers have a larger representation among the direct debit invoice issuers at 14 percent, while companies active in this industry account for only five percent of the eBill invoice issuers in the sample. In both the cases of the companies active as financial institutions or in the property management industry, there is a larger representation among the direct debit invoice issuers at seven percent respectively, compared to just one percent respectively among the sample of eBill invoice issuers.

¹³ The sample of ESR reference-based payments does not include eBill transactions

¹⁴ The average transactions are calculated based on figures that include only the transactions cleared over the SIX platforms. Since not all the Swiss transactions are included, the average amounts per transaction should be understood as indications for the Swiss market.

¹⁵ The sample of ESR reference-based payments does not include eBill transactions

¹⁶ The sample of direct debit and eBill invoice issuers covers the 100 largest direct debit and eBill invoice issuers in Switzerland, representing 83.9 percent of the direct debit transaction volume and 95.6 percent of the eBill transaction volume, cleared over the SIX platforms, respectively.

Direct Debit and eBill Issuers Categorized by Industry**Figure 7:** Direct debit and eBill invoice issuers by industry as of March 2020. Data source: SIX (2020a).

2.2 Direct Debit (LSV)

Direct debit is a billing approach that allows for the automatic bill settlement based on a debit authorization given to the invoice issuer by the invoice recipient. After this, the invoice recipient's account can be debited while the invoice issuer's account is credited by the financial institution without the invoice recipient giving his or her confirmation for each bill payment, though the invoice recipient has a certain amount of time to contest the transfer afterward. The main function of this billing approach is the automatic settlement of recurring bills.

Figure 8 shows the customer journey of the direct debit billing approach. Before the direct debit approach can be used, it has to be set up by the invoice recipient. In order to do so, the invoice issuer must provide the corresponding registration form (1). This form then usually has to be filled out by hand and signed by the invoice recipient (2). The invoice recipient must then send the completed form to his or her bank, as well as to the invoice issuer (3). The invoice issuer passes the completed form on to the invoice recipient's bank. The invoice recipient's bank verifies and registers the information contained in the completed registration form and provides the invoice issuer with the authorization to debit of the invoice recipient's account (4). The invoice issuer processes this information (5). With the registration completed (6), the invoice issuer receives the debit authorization to automatically debit the invoice recipient's account, and can initiate the payment order (7). This is done by the invoice issuer initiating the payment initiation at his bank, who passes this request on to the invoice recipient's bank. The invoice recipient's bank then verifies the authorization to debit the invoice recipient's account and, if verified, fulfils the request by debiting the invoice recipient's account and crediting the invoice issuer's account (8). The invoice recipient receives a statement including the details of the transaction and has the opportunity to check the debited amount (9). Should the debited amount not be correct, the invoice recipient can contest the transaction within the time period of objection (10/11).

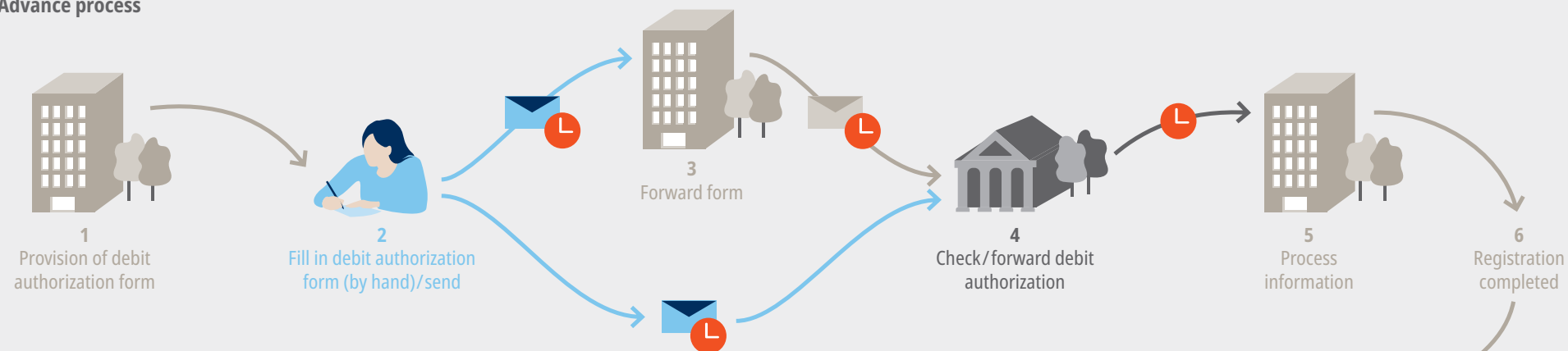
In 2019, around 4.5 million direct debit transactions (LSV+/BDD) were executed per month, totaling 54 million transactions per year (SIX, 2020a). A total of around 3,400 invoice issuers initiated these transactions. The number of transactions (LSV+/BDD) in 2019 increased by 3.5 percent compared to the year 2018. The associated transaction volume witnessed only a very slight year-on-year increase in 2019, to a total of CHF 85 billion. As illustrated in Figure 6, the average amount per transaction is highest in the case of direct debit compared to other billing approaches and can be explained by the participating industries.

Direct debit

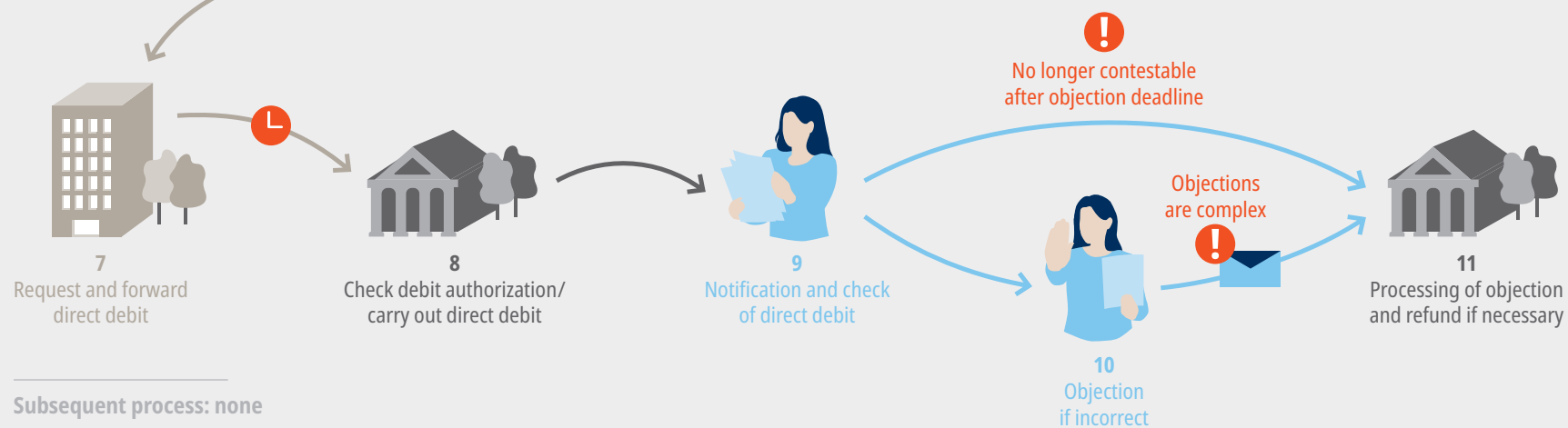
How are the three participants – the **invoice issuer**, the **financial institution**, and the **invoice recipient** – involved in the payment process?

Where are **critical points** ! or **delays** L?

Advance process



Payment process



Subsequent process: none

Figure 8: Direct debit customer journey.

2.3 eBill

eBill is a billing solution that is offered through a platform that can be accessed directly through the invoice recipient's m- or e-banking account. This means that the invoice recipient is notified of incoming bills through his or her m- or e-banking, and can subsequently pay the bill by releasing the payment on the eBill platform. The main function of this billing approach is the fully digital settlement of recurring bills through the eBill platform. For this, the invoice recipient is required to have an m- or e-banking account. Figure 10 shows the customer journey of the eBill billing approach. As with the direct debit billing approach, before being able to use eBill, the invoice recipient must complete a registration process. First, the invoice recipient must register for eBill through his or her m- or e-banking account (1), as well as enter his or her home address and e-mail address. Once the invoice recipient has been successfully registered on the eBill platform, the invoice recipient can then register his or her eBill request with different invoice issuers. A recently released new functionality enables invoice recipients to register for all invoice issuers in general, rather than for each invoice issuer individually (2)¹⁷. The registration only needs to be done once to enable the future receipt of bills. The invoice recipient then receives a notification through a pre-defined channel for every new bill that is issued (3). If the invoice recipient has opted for a standing approval, the invoice recipient's account will be debited automatically (4a), similar to the direct debit mechanism. Should the standing approval not be in place, the invoice recipient must log on to his or her m- or e-banking account or eBill platform upon receipt of the notification of a newly issued bill in order to view the pending bill and release the payment (4b). The invoice recipient's bank then carries out the transaction (5), and the bill is stored on the eBill platform for 180 days (6).

The bars in Figure 9 show the historical development of the number of eBill users from January 2015 to June 2020. The figure clearly shows an increase in the number of eBill users over recent years. The line shows the number of eBill users as a percentage of the permanent resident population¹⁸ in Switzerland, which serves as a

proxy for the potential number of eBill users. The development of the line and the bars is about the same, since the permanent resident population in Switzerland has changed relatively little compared to the number of eBill users. Growth in the number of eBill users can be observed from the beginning of 2015. Between then and June 2019, the number of eBill users increased from around 0.6 million to around nearly 1.8 (+203%) and thus tripled in just over four years. During this period, the proportion of users in relation to potential eBill users rose from eight to 25 percent. Figure 9 shows an increase in the growth rate in January 2019. The reason for this higher growth rate could be associated with the further development of the eBill platform (i.e., the changeover from "E-Rechnung" to eBill in December 2018), as well as the effects of the new innovative functionalities and corresponding marketing campaigns.

Historical Development of Number of eBill Users

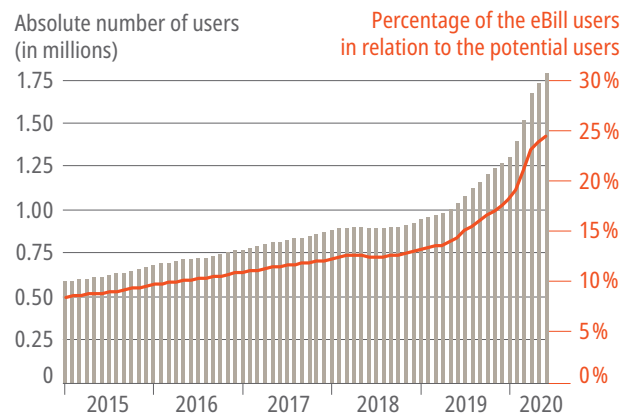


Figure 9: Historical development of number of eBill users. Data source: SIX (2020a) and FSO (Federal Statistical Office, 2020b).¹⁹

A similar trend as described for the number of eBill users is also apparent for the number of eBill transactions. Figure 11 shows the number of eBill transactions per month from January 2015 to June 2020. The number increased from around 1.0 million eBill transactions in January 2015 to over 3.6 million in June 2020 (+260%). The total transaction volume in 2019 is estimated at

¹⁷ The new functionality was released on March 5, 2020. Its implementation depends on the corresponding financial institution.

¹⁸ Swiss permanent resident population that are 16 years old or older.

¹⁹ 19 Potential eBill users covers Swiss permanent resident population that are 16 years old or older.

eBill

How are the three participants – the **invoice issuer**, the **financial institution**, and the **invoice recipient** – involved in the payment process?
Where are **critical points** ⚠ or **delays** ⌚?

Advance process



1
Registration for eBill
with address/e-mail

Payment process



2
Issue
eBill invoice



3
Receive
push notification

4a
In the case of standing
approval, eBill invoices
are triggered automatically



4b
Approval of eBill invoice
in mobile/online banking



5
Initiation of
payment

6
eBill invoice
saved

Subsequent process

Figure 10: eBill customer journey.

around CHF 12.6 billion. As illustrated in Figure 6, the average eBill transaction amount, at CHF 501, is the lowest among the considered billing approaches. The number of eBill transactions per user remained constant between 2015 and 2019 at a level of around 1.8 eBill transactions per user per month. The dashed line in Figure 11 provides an approximation of the historical development from a linear regression analysis. Since the growth of the number of eBill users is expected to further increase in the future, this can also be expected to have an impact on the future development of the number of eBill transactions.

Historical Development of Number of eBill Transactions

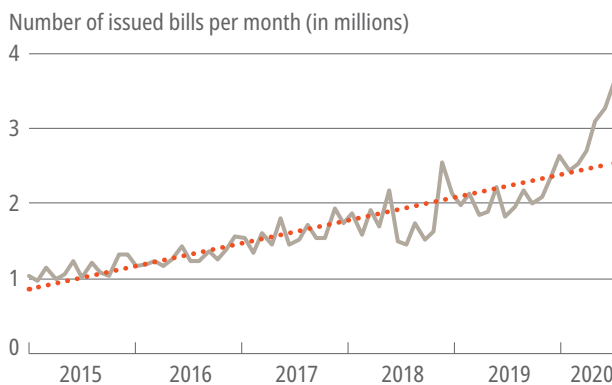


Figure 11: Historical development of number of eBill transactions from January 2015 to June 2020. Data source: SIX (2020a).

2.4 QR-Bill

The QR-bill approach continues the tradition of payment slips in a more advanced way. It includes an integrated quick response code (QR code). The QR-bill can be both received and paid in either a paper-based or electronic form. The main function of this billing approach is the flexibility of being able to opt for either an analog or digital bill payment for one-time payments. The customer journey of the QR-bill approach is illustrated in Figure 12. The journey starts with the issued bill being sent to the invoice recipient by postal mail or e-mail (1), who can then collect all the incoming bills to be paid (2). Once the invoice recipient decides to pay the QR-bills, he or she

has four options. With the *first option*, the invoice recipient scans the QR code on the QR-bill (3a), thereby opening the billing information in the invoice recipient's m- or e-banking account where the payment can be released. As a *second option*, the invoice recipient can transfer the billing information into his or her m- or e-banking (3b) and then release the payment. The *third option* consists of the invoice recipient sending the QR-bill by postal order to his or her bank or post office, requesting its payment (3c). The back-office team at the bank or post office processes the payment. With the *fourth option*, the invoice recipient pays the QR-bill at the post office or bank counter (3d), followed by the processing of the payment by the back-office team. All four options are then followed by the execution of the payment by the invoice recipient's bank (4). The invoice recipient can then store the QR-bills for a certain amount of time (5) before discarding them (6).

The predecessor of the QR-bill, the payment slip (ESR), is considered the oldest billing approach in the modern sense of the payment industry. The approach was introduced in 1906 as the first nationwide payment system in Switzerland (NZZ, 2015). The long history of this approach explains why it is currently still very popular and rooted in Swiss payment habits, despite the conditions of advanced digitalization. Since at the time of writing, the QR-bill is still in an early stage in Switzerland, there is no available data such as the number of QR-bill transactions, volume per QR-bill transaction, etc., on the approach. Therefore, with the payment slip (ESR) and QR-bill being very similar in terms of their structure and design, the figures available for the payments with an ESR reference cleared over the SIX platforms are used as a proxy for the development of the QR-bill. Figure 13 shows the number of ESR reference-based transactions per month from January 2015 to June 2020. The number increased from around 16.2 million transactions in January 2015 to about 29.2 million in June 2020 (+80%). The total associated transaction volume is estimated at around CHF 445 billion in 2019. As shown in Figure 6, the average amount per ESR reference-based transaction is CHF 1,304. The dashed line in Figure 13 shows an approximation of the historical development of the number of payments with an ESR reference with a linear regression line. The slope indicates that, during the period considered, on average each month around 262,000 additional ESR refer-

QR-Bill

How are the three participants – the **invoice issuer**, the **financial institution**, and the **invoice recipient** – involved in the payment process?

Where are **critical points** ⚠ or **delays** ⌚?

Advance process: none

Payment process

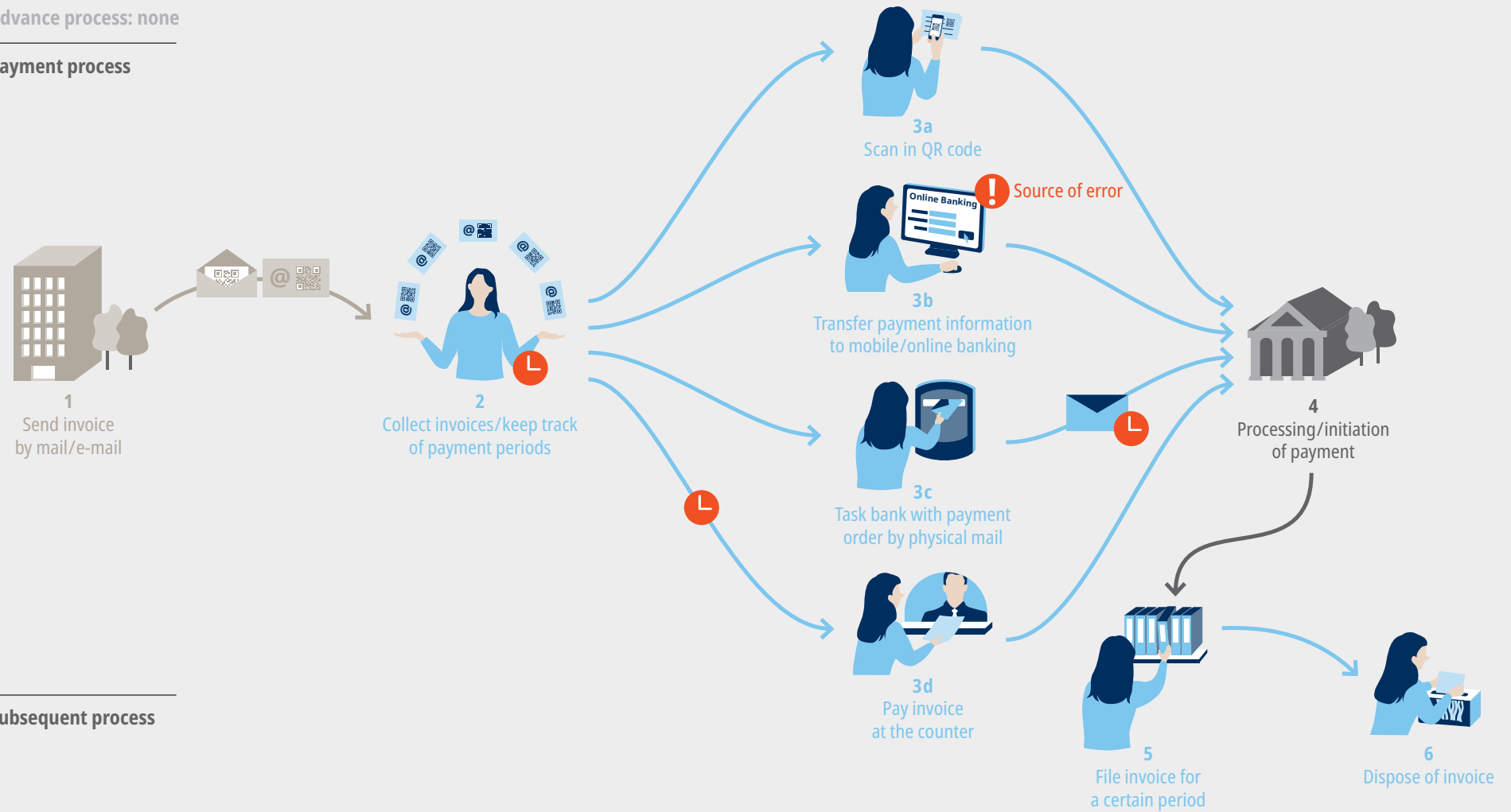


Figure 12: QR-bill customer journey.

ence-based transactions were made compared to the previous month. This is a higher absolute growth rate compared to the number of eBill transactions. However, it is important to understand that this is a linear approximation over a specific period of time. The relative year-on-year growth rate of the number of eBill transactions in 2019 is much higher compared to payments with an ESR reference.

2.5 E-Mail Invoice

An e-mail invoice is considered an unstructured digital invoice containing an IBAN number, but not including a payment slip, and is sent to the invoice recipient by e-mail. The main function of this billing approach is to transfer the billing information for payments electronically to the invoice recipient who can then choose to settle the bill over an electronic or paper-based channel. The customer journey of the e-mail invoice is illustrated in Figure 14. The process is initiated by the invoice issuer sending the e-mail invoice to the invoice recipient (1), and thus appears in the invoice recipient's e-mail inbox. Once ready to pay his or her bills (2), the invoice recipient can choose from three different options. *First*, the invoice recipient can log on to an m- or e-banking account and manually type in the billing information contained in the e-mail invoice (4a). For the *second* and *third* options, the invoice recipient can manually transfer the billing information contained in the e-mail invoice to a payment slip (3). In the case of the second option, the invoice recipient then sends the payment slip as a postal order to his or her bank or post office, requesting the payment (4b). For the third option, the invoice recipient pays the bill at the post office or bank counter (4c). Following these three options, the back-office team at the bank or post office processes the payment (5) before it is executed by the financial institution. Meanwhile, the invoice recipient can either electronically or physically store the bills for a certain amount of time (6) before eventually discarding them (7).

Historical Development of Number of Payments With an ISR Reference

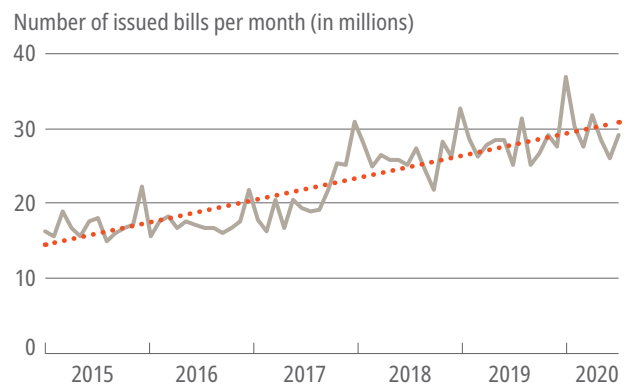


Figure 13: Historical development of number of payments with an ESR reference from January 2015 to June 2020. Data source: SIX (2020a).

3 Evaluation of Billing Approaches

Having identified four currently relevant billing approaches in Switzerland, the present study now seeks to evaluate these four approaches through a utility analysis. The aim is to capture the relative utility of each approach from both the invoice issuer and invoice recipient perspective with the help of qualitative proxy measures and with a focus on the B2C business case. Capturing the relative utility of each approach allows the ranking of the approaches from first (1) to last (4) place. The utility analysis is structured around a PEST approach with the following four underlying dimensions examining different aspects of the billing approaches: political/environmental, economic, social, and technological. In turn, each dimension covers three indicators, with the exception of the technological dimension, which only covers two indicators. This means that all four billing approaches are ranked for 11 indicators in total. An overview of the different dimensions and indicators of the utility analysis is illustrated in Figure 15.

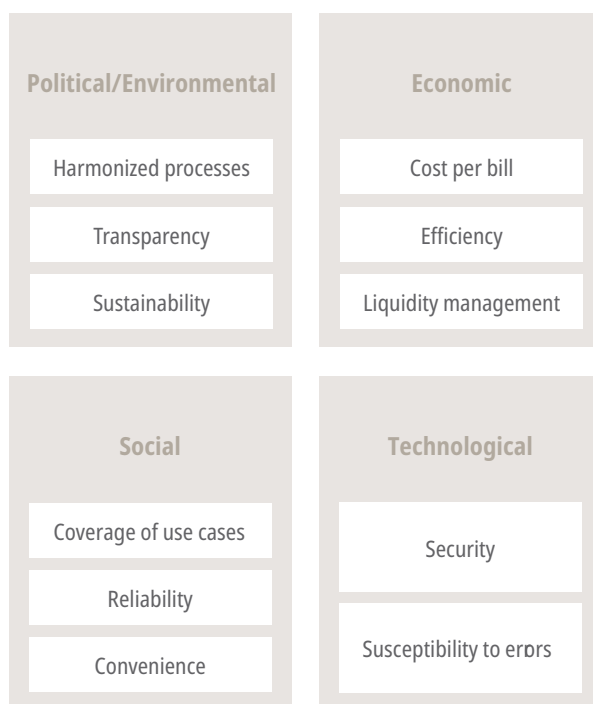


Figure 15: Overview of dimensions and indicators of utility analysis.

The **political and environmental dimension** covers indicators evolving around political aspects and environmental considerations in a broader sense. The first

indicator chosen within this dimension is the degree to which the billing approaches support harmonized processes and more specifically how they comply with the ISO 20022 standard, an international standard aimed at widespread standardization in the financial industry (ISO, 2020). The second indicator is the transparency of the billing approaches. Sustainability is the third and final indicator within the political and environmental dimension, and refers to the future potential of a billing approach related, for example, to the use of resources or infrastructure associated with a billing approach or its future acceptance. The **economic dimension** includes indicators tied to economic factors. The cost per bill for each billing approach is the first indicator in this dimension. The aspect of efficiency is the second indicator and assesses how effective and time-efficient the billing approach is. The third indicator assesses the degree to which the billing approaches are able to contribute to the improvement of liquidity management for both the invoice issuer and recipient. The **social dimension** includes the extent of the coverage of use cases as its first indicator. The aim of this indicator is to judge how many use cases, and thus how many different customer segments, the billing approaches may apply to. The reliability of the billing approaches constitutes the second indicator within the social dimension. The third social indicator is the convenience of the billing approach. This multi-faceted indicator covers considerations such as the user friendliness, degree of customer connectivity, presence of bill storage options and possibility of re-accessibility, level of switchover costs, and the presence of network effects. The **technological dimension** seeks to examine the technological aspects of the billing approaches, with the first indicator focusing on the security of the billing approaches. The susceptibility to errors is the second indicator included in this dimension, seeking to assess the robustness of the different approaches.

3.1 Political/Environmental

Indicator 1: Harmonized Processes

In a globalized world, the presence of harmonized and standardized processes in the financial industry not only allows for more efficiency today, but may also constitute a prerequisite for future cooperation. The ISO 20022 international standard covers universal financial industry message schemes, and is aimed at widespread stand-

Harmonized Processes	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	– Approach is partially harmonized	3	– Approach is partially harmonized – Could eventually be confronted with legacy issues	3
eBill	– Approach is already harmonized – In harmony with new standards	1	– Approach is already harmonized – In harmony with new standards	1
QR-bill	– Approach is already harmonized – In harmony with new standards	1	– Approach is already harmonized – In harmony with new standards	1
E-mail invoice	– Approach contains harmonized element with IBAN number – Form of e-mail invoice depends on the invoice issuer	4	– Approach contains harmonized element with IBAN number – Could eventually be confronted with legacy issues	4

ardization in the financial industry (ISO, 2020). Switzerland strives to align all payment transactions with this standard in order to benefit from more efficient processing of payment transactions (Deloitte, 2017). The launch of the QR-bill in June 2020 constitutes the last step in this process of harmonization. The new standards facilitate compliance with national and international regulations (PaymentStandards.ch, 2020a). For this step toward harmonization, a catalogue of recommendations, the “Swiss Payment Standards”, was released by the Swiss financial industry on the exchange of data between customers and banks (SIX, 2020b). These recommendations are based on the ISO 20022 definitions in the areas of payments and cash management (SIX, 2020b). One of the main changes resulting from the harmonization with the international standards is the replacement of account numbers with uniform IBAN numbers and the introduction of QR codes, which allow for standardized identification and the reduction of errors (Deloitte, 2017). By introducing QR-bills, the payment slip diversity in Switzerland can be reduced and straight-through processing rates increased (PaymentStandards.ch, 2020a). More established approaches such as the payment slip (ESR) and direct debit approach are likely to have higher hurdles in adapting to the new standards as, at the time, they were not created with the standards borne in mind. Though some billing approaches may reach certain limits in terms of standardization in the long term, this does not affect the utility for the invoice recipient in the short

term. The QR-bill and eBill, as more recently created approaches, were able to implement the standards directly into their design. These new approaches are therefore in harmony with the new standards and more future-oriented, while other approaches may eventually be confronted with legacy issues. By including an IBAN number, the e-mail invoice contains standardized billing information, but cannot be considered a harmonized and standardized approach as a whole from an invoice recipient’s point of view.

Indicator 2: Transparency

Transparency refers to the quality of being open, clear, and as comprehensible as possible. In the case of billing, this primarily concerns the information content available to both the invoice recipient and invoice issuer. From the perspective of an invoice recipient, the transparency of a billing approach can relate, for example, to the degree and detail of billing information the invoice recipient is able to access. A transparent billing approach allows the invoice recipient easy and unrestricted access to all relevant information and details. The transparency of a billing approach from an invoice issuer perspective refers, for example, to the straightforward access to information on the status of bills. Accessible information can then help improve processes such as liquidity management and the management of reminders. From an invoice recipient’s perspective, the eBill invoice contains all the information

Transparency	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Billing information is received after transaction – Little information on a specific bill can be accessed directly 	4	<ul style="list-style-type: none"> – Progress can mostly be tracked – High certainty of predicted payment 	1
eBill	<ul style="list-style-type: none"> – Billing information is received before transaction – All information on all current bills can be accessed for 180 days 	1	<ul style="list-style-type: none"> – Progress can be tracked – Possibility of predicting payment date 	1
QR-bill	<ul style="list-style-type: none"> – Billing information is received before transaction – All information on a specific bill can be accessed 	2	<ul style="list-style-type: none"> – Unreliable tracking of progress – Hard to predict receipt and payment of bill 	3
E-mail invoice	<ul style="list-style-type: none"> – Billing information is received before transaction – Little information on a specific bill can be accessed, depending on the form of the e-mail 	3	<ul style="list-style-type: none"> – Unreliable tracking of progress – Hard to predict receipt and payment of bill 	3

needed to initiate the payment, as well as a PDF version of the invoice, which can be accessed for at least 180 days following the release of the payment on the eBill platform (eBill, 2020). The invoice recipient also benefits from additional information content on the platform such as an overview of all the outstanding eBill invoices, the completed and rejected invoices (for 180 days) and is able to adapt settings such as the standing approval or instalment payments (eBill, no date). The QR-bill also offers all the information relevant for the invoice recipient (PaymentStandards.ch, 2020b), though, in contrast to the eBill platform, only for the specific bill. In the case of the direct debit option, the invoice recipient receives a confirmation containing the relevant information only after the transaction has been completed. Apart from this confirmation document, the billing information cannot be accessed directly. The amount of information included in an e-mail invoice depends on its individual form, though it contains at least an IBAN number. From the invoice issuer's perspective, the direct debit option is most attractive in terms of transparency, as it gives the highest level of predictability about the payment execution date. In the case of the eBill approach, with all steps of the process being conducted electronically, a certain

level of progress tracking is possible. The invoice issuer knows, for example, that the eBill invoice was delivered to the recipient successfully. For the remaining two approaches, information on tracking is only limited and unreliable.

Indicator 3: Sustainability

Sustainability is the third indicator considered within the political and environmental dimension. It is to be understood in a broader sense as the ability of the billing approach to be able to exist in the future considering its use of resources and infrastructure, as well as its future acceptance. One important aspect here is the presence of either paper-based or electronic documents. Electronic documents can be considered the more sustainable option as they reduce the use of natural resources such as paper and with the trend toward increased digitalization and automation, can be expected to be more sustainable in terms of future acceptance. Compared to paper-based documents, electronic documents hold the advantages of increased cost savings for the invoice issuer, more convenience for the invoice recipient, improved organization and management for both parties, as well as being more environmentally friendly (Monexa, 2014). The future accept-

Sustainability	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Some paper-based documents involved in the registration process – Average level of digitalization because in some cases additional receipt on paper 	3	<ul style="list-style-type: none"> – Some paper-based documents involved in the registration process – Little manual work involved and average level of digitalization 	3
eBill	<ul style="list-style-type: none"> – No paper-based documents involved – Highly digitalized 	1	<ul style="list-style-type: none"> – No paper-based documents involved – No manual work and highly digitalized 	1
QR-bill	<ul style="list-style-type: none"> – Issued either in paper-based form or electronically – High potential level of digitalization 	2	<ul style="list-style-type: none"> – Potentially many paper-based documents (e.g., recurring bills issued in paper-based form) – Potentially little manual work and highly digitalized 	2
E-mail invoice	<ul style="list-style-type: none"> – Can involve paper-based documents (e.g., if manually transferred by invoice recipient) – Low level of structure and standardization 	4	<ul style="list-style-type: none"> – No paper-based documents involved – Can be fully automated 	3

ance is a further important aspect of sustainability. In the long term, only those approaches can be expected to survive that are accepted by all parties in a process (Bernius, Pfaff, Werres, & König, 2013). The customer journeys described in Chapter 2 help to assess the utility of the billing approaches in terms of sustainability. The direct debit billing approach involves the completion of paper-based documents by the invoice recipient as well as a fair amount of manual work in the registration process. Following the registration process, however, there are no paper-based or manual steps involved as the transaction is fully digitalized and automated for both the invoice issuer and invoice recipient, although the statements can be sent by postal mail. In the case of the eBill approach, all the steps of the registration and payment process are conducted electronically, without the use of any paper-based documents. In addition, there is a relatively high degree of automation involved, which allows the invoice recipient to pay his or her bills with just the click of a mouse or to set up the standing approval for automatic payments. The QR-bill offers a range of different options, and could thus be judged as sustainable in terms of future acceptance as the invoice recipient can choose how to use the QR-bill.

The QR-bill can be issued in different forms, either as a paper-based or electronic document. The level of digitalization along the customer journey also depends on how the invoice recipient chooses to use the document as it can either be scanned, thereby importing the contained information directly into an m- or e-banking account, printed, or transferred manually to a payment slip. According to Moeller & Quack (2006), invoice recipient's behavior has a crucial impact on the environmental profile of an approach. In order to generate sustainable benefits, responsibility has to be accepted on both the consumer and enterprise level (Moeller & Quack, 2006). As in the case of the QR-bill, the e-mail invoice also shows different levels of sustainability depending on the way the invoice recipient chooses to use it. Though the bill is issued electronically, the option still exists to manually transfer the information to an empty payment slip, thereby involving paper-based documents that will eventually need to be discarded. In terms of automation, the level is relatively high from an invoice issuer's perspective, but low from an invoice recipient's perspective, as the information has to be transferred either to a payment slip or manually typed into the m- or e-banking.

3.2 Economic

Indicator 1: Cost Per Bill

The first economic indicator examined in the scope of the present utility analysis is the cost per bill. First, the costs imposed on the invoice issuer are discussed, followed by a discussion of the costs for the invoice recipient. Research by Grüşchow, Kemper, & Brettel, which examines a European e-commerce company, shows that compared to other payment methods such as credit card and PayPal and taking both fixed and variable transaction costs into account, invoices outperform alongside prepayments for both small and large transaction sizes (Grüşchow, Kemper, & Brettel, 2016).

In contrast, costs related to customer payment default increase the cost per bill more than in the case of other payment methods (Grüşchow, Kemper, & Brettel, 2016). Of interest here, however, is how the different billing approaches in Switzerland compare. The calculation of the cost per bill while taking the entire bill issuance and payment process into account is complex. Costs also arise from setting up a new solution and the corresponding infrastructure. On the one hand, more established approaches hold a cost advantage as they have had a longer time period over which to amortize the costs of setting up an approach.

New billing approaches, on the other hand, are likely to be more expensive in the short term. A quantitative analysis of different billing approaches in Switzerland by Gashnjani and Klinkert (2019) calculates the cost of a bill by considering the associated direct costs and indirect costs for the invoice issuer. Their calculations all refer to the Swiss market. The results of the study show the average cost of an e-mail invoice being CHF 4.10 in total (Gashnjani & Klinkert, 2019). The total average cost for paper invoices is estimated at CHF 4.53, while the average cost of an eBill is estimated at CHF 1.90 (Gashnjani & Klinkert, 2019).

The lower cost per e-mail invoice compared to the paper invoice can be explained by the absence of material costs. Furthermore, seeing as the eBill and direct debit approaches are initiated electronically, no post office counter or reject fees have to be paid and (part of) the process costs can also be eliminated. Though the QR-bill is sometimes issued in a paper-based form, thus having comparable costs to the paper invoice cal-

culated by Gashnjani & Klinkert (2019), the introduction of a QR code is expected to reduce manual input and avoid data entry errors, thereby reducing costs (Deloitte, 2017). Therefore, the QR-bill sent in a paper-based form is assumed to be slightly less expensive than the paper invoice analyzed by Gashnjani & Klinkert, due to QR-bills adaption to standards, straight-through processes, and lower reject fees. If sent electronically, the direct cost of a QR-bill is expected to be even lower. We therefore assume the costs of a QR-bill and e-mail invoice are around the same.

As direct and indirect costs of a direct debit bill are not calculated by Gashnjani & Klinkert, here they are sought to be estimated using the same approach to assess the cost of a direct debit bill in relation to the other billing approaches. The direct cost calculation by Gashnjani & Klinkert includes the costs of sending, materials, fees for cash payment at the post office, and reject fees, of which only the costs of sending are relevant for the direct debit approach.

The direct costs are thus structured similarly as in the case of the eBill, which also only includes the costs of sending the invoice, i.e., the charge by the service provider. The indirect costs are calculated by Gashnjani & Klinkert using the costs of personnel for processing invoices, costs of personnel for handling inquiries, and the costs of sending reminders. The costs of personnel for processing invoices are not applicable in the case of the direct debit approach. The overall costs associated with sending reminders are expected to be lower than in the case of the eBill. This is because on average, fewer reminders can be expected to be necessary for direct debit transactions, as the invoice issuer has the authorization to initiate the transaction. We therefore conclude the direct debit approach to be the least expensive approach for invoice issuers in Switzerland, as the cost elements are estimated to be lower than in the case of the eBill invoice.

Generally, the cost of a bill and the following ranking depend on the use case with the average amount per bill, frequency of issue, etc. The direct monetary costs incurred by the invoice recipient are usually zero for the bills that are sent electronically or for direct debit. However, there are also invoice issuers that charge a specific amount based on the credit rating of a customer when a product or service is paid by bill (e.g., digitec (digitec.

Cost Per Bill	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	– No costs for invoice recipient except for potential fees for paper-based statements	3	<ul style="list-style-type: none"> – Least expensive option – No material costs – No fees for cash payment at post office and associated reject fees – Low costs associated with reminders 	1
eBill	– No costs for invoice recipient	1	<ul style="list-style-type: none"> – Cost-efficient option – No material costs – No fees for cash payment at post office and associated reject fees – Low costs associated with reminders 	2
QR-bill	– No costs for invoice recipient if bill is received electronically	3	<ul style="list-style-type: none"> – Expensive option if sent by postal mail – Some material costs (e.g., postal mail) – Potential fees for cash payment at post office and associated reject fees – High costs associated with reminders 	3
E-mail invoice	– No costs for invoice recipient	1	<ul style="list-style-type: none"> – Expensive option – No material costs – Potential fees for cash payment at post office and associated reject fees – High costs associated with reminders 	3

ch, 2020)). In addition, certain companies have started to charge invoice recipients for the cost of sending paper invoices, such as, for example, companies active in the telecommunications industry (Swisscom, 2019; Salt, 2020; Sunrise, 2020). Generally, it could be argued, however, that if there are no direct monetary costs for receiving a bill as, in the end, the costs for issuing and sending bills will be included in the product or service costs and therefore always (at least partially) paid by the customer. The non-monetary costs, such as time and usage costs for electronic equipment (e.g., computer or mobile device) incurred by the invoice recipients to receive the bill, are difficult to estimate and vary greatly from invoice recipient to invoice recipient.

Indicator 2: Efficiency

One aim of the billing process is the transfer of the correct and complete billing information from the invoice issuer to the invoice recipient, followed by the settlement of the owed amount on time, all while still fulfill-

ing the necessary requirements. The better this goal is achieved, the more time is saved, and the more efficient the corresponding billing approach is. Factors hindering efficiency are, for example, delays and reminders, double working steps, missing, incorrect, or incomplete information, or the lack of appropriate resources and infrastructure. On the one hand, the humans involved in the billing process influence the efficiency of it.

On the other hand, however, the organization of the billing process itself can also impact the level of efficiency, for example through the reasonable automation of certain process steps. In a survey among European companies in 2019, 58 percent of the Swiss companies stated that one of the main reasons for delayed payments among their customers was the deficiency of the invoice recipient's administrative efforts (Intrum, 2019b). Relieving the invoice recipient of administrative efforts and manual steps could thus support lowering the probability of delayed payments, and thus the necessity of reminders. The results of qualitative inter-

Efficiency	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Paper-based sign-up process – High level of automation after registration, though only for one single issuer – No need for devices or tools and no effort required after registration 	1	<ul style="list-style-type: none"> – Registration of clients requires effort – High level of automation after registration – Few reminders 	2
eBill	<ul style="list-style-type: none"> – Electronic registration process – High level of automation – Need for m- or e-banking account (payment-related information is built in) and corresponding device 	1	<ul style="list-style-type: none"> – Electronic registration process – High level of automation – Few reminders 	1
QR-bill	<ul style="list-style-type: none"> – No registration necessary – High potential level of automation through facilitated information input – Optional use of QR code requires scanning device and m- or e-banking account 	3	<ul style="list-style-type: none"> – No registration necessary – High potential level of automation – Many reminders 	2
E-mail invoice	<ul style="list-style-type: none"> – No registration necessary – Low level of automation – Potential need for m- or e-banking account and corresponding device 	4	<ul style="list-style-type: none"> – No registration necessary – Potentially low level of automation 	4

views²⁰ among Swiss invoice issuers revealed the lowest average reminder quota for the direct debit approach, followed by the eBill approach. The payment slip (ESR) showed a higher average reminder quota, which can be expected to be comparable for the QR-bill approach. The length and steps of the customer journeys described in Chapter 2 give an indication of the efficiency of a process.

The direct debit approach involves a time-consuming registration process. If, however, the invoice recipient uses this approach for recurring payments in the future, in the long term, both the invoice recipient and invoice issuer are able to save time. The same aspect applies to the eBill approach. Though here, the time and effort

connected to the registration process mainly concerns the invoice recipient. In contrast to the direct debit approach, the eBill requires only a single registration for the platform, followed by a shorter registration process per invoice issuer, though the user also has the option to automatically register for new invoice issuers. How smoothly the eBill process is able to unfold also depends on the easy and frictionless access to an m- or e-banking account, which requires a device such as a computer or mobile phone. The QR-bill and e-mail invoice do not require a registration process. However, due to the fact that they have to either be scanned, manually transferred, or paid at the post office or bank counter each time, in the case of recurring bills, these approaches are associated with a consistently high

20 The qualitative interviews were conducted by SIX in 2019.

degree of effort. In addition, the QR-bill provides the option of scanning a QR code to facilitate the transfer of billing information to an m- or e-banking account. To make use of this option, the invoice recipient is required to have access to a scanning device (e.g., a smartphone) and an m- or e-banking account. In the case of the e-mail invoice, no registration is necessary and the minimum requirement for the invoice recipient is access to an e-mail account. Besides the length of the customer journey, the degree of automation also affects the efficiency of an approach. While the registration process of the direct debit approach involves paper-based and manual steps, after its completion the payment process can run automatically.

The eBill approach also offers this fully automated process following the registration phase with the standing approval option. However, the invoice recipient can also opt to release each payment individually. The QR-bill is able to offer a high level of reliability by being able to scan the QR code on the bill, which automatically enters the payment information in the m- or e-banking or mobile banking. The QR code can also support further steps of accounting with additional information. The e-mail invoice has a low level of automation for the invoice recipient, with the billing information having to be transferred manually. For the invoice issuer, an important aspect of the efficiency of an approach is the effect on the delay of payments. The lowest potential for delayed payments is in billing approaches with an automated payment initiation process such as the direct debit approach, or the eBill approach with the standing approval option. In the case of the QR-bill and the e-mail invoice, the invoice issuer has no option to influence the due payment except through reminders, though those sent by e-mail are more likely to run into problems such as landing in a spam folder.

Indicator 3: Liquidity Management

Liquidity management is the third indicator considered in the economic dimension of the present utility analysis. It refers to how well the billing approaches contribute toward invoice issuers and invoice recipients being able to manage their liquidity. This is an important indicator as, compared to other payments approaches, invoice transactions require the highest level of working capital from the invoice issuer's perspective (Grüschow, Kemper, & Brettel, 2016). In the case of the

invoice issuer, optimized liquidity management ties in with the improvement of the company's working capital. For the invoice issuer, the important point in liquidity management lies in being able to plan ahead and know when payments will be transferred. Receiving a payment earlier, rather than later, contributes to a company's working capital and liquidity situation. Compared to businesses in other European countries, Swiss companies offer private individuals longer payment deadlines on average (average CH 2019: 24 days, average Europe 2019: 21 days) (Intrum, 2019b). In a survey among European invoice issuers, 71 percent of the Swiss companies reported issues with customers' delayed payments (on average after 28 days), in many cases leading to liquidity problems (Intrum, 2019b). Earlier research has found this to be the case in particular for paper-based processes (Bernius, Pfaff, Werres, & König, 2013). For the invoice recipient, the important point in liquidity management lies in the flexibility of being able to pay a bill when it is most convenient. For example, the customer could delay the payment of a bill in the case of other unexpected costs or choose to benefit from discounts in the case of early payment. In essence, therefore, in terms of liquidity management, billing approaches offer very different levels of utility for invoice issuers and invoice recipients. From an invoice issuer's point of view, the direct debit and eBill standing approval options are the most attractive in terms of liquidity management, as they offer the highest level of certainty concerning the date of payment initiation and execution. The eBill approach without the standing approval option offers a relatively high level of certainty concerning the time of payment initiation and execution, as a notification is received upon issuance of the bill, and the invoice recipient may choose to pay straight away with a few simple clicks. Also, this approach can be integrated into personal financial management systems. In the case of the QR-bill and e-mail invoice, there is a low level of certainty regarding the date of payment initiation as invoice recipients may choose to gather all their bills and pay them all together at the end of the month due to the higher effort involved in the payment initiation. In a recent survey among Swiss retail banking customers, 43 percent of the participants reported accessing their e-banking account monthly for the initiation of payments (Ankenbrand, Bieri, Dietrich, & Illi, 2020), indicating that the gathering and payment of bills could be a relatively

Liquidity Management	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	– No financial flexibility	4	– High level of certainty regarding date of payment	1
eBill	– Approach allows for financial flexibility (depends on use of standing approval option)	1	– Average level of certainty regarding date of payment (depends on use of standing approval option)	2
QR-bill	– Approach allows for financial flexibility	1	– Uncertainty regarding date of payment	3
E-mail invoice	– Approach allows for financial flexibility	1	– Uncertainty regarding date of payment	3

widespread behavior pattern among Swiss invoice recipients. Invoice issuers are thus less able to influence their liquidity or working capital management when using the QR-bill or e-mail invoice approaches. Considerations from the invoice recipient's perspective show the exact opposite. Invoice recipients can benefit from the financial flexibility that the QR-bill, e-mail invoice, and eBill without standing approval offer, as they do not have to pay immediately should other unexpected payments arise. The direct debit approach and eBill with standing approval offer the least short-term flexibility for invoice recipients.

3.3 Social

Indicator 1: Coverage of Use Cases

With different invoice issuers and invoice recipients included in the process, certain billing approaches appeal to a specific user more than others. This depends on the preferences and habits of the invoice issuer and invoice recipient, such as preferring digital approaches or being used to a certain system. It also depends on the use case of a billing situation. For example, the appropriate billing approach for recurring payments may not be the same as the suitable billing approach for one-time payments. Differences also arise in terms of the size of a bill, the industry, type of service, or the number of invoice recipients an invoice issuer has to transfer bills to. Here, some of these different aspects

help assess how broadly the four billing approaches are able to cover different use cases.

First, the recurring payments are considered. For recurring payments of the exact same amount, the invoice recipient has a certain level of certainty on the amount billed, and may thus feel less inclined to have to check the payment transaction before it is released. For this type of payment, the direct debit or eBill approach with standing approval is appropriate, as it offers the highest level of payment reliability. Recurring payments with flexible amounts may need to be checked and confirmed by the invoice recipient. Therefore, the eBill approach is very appropriate, as it allows for an easy confirmation process for invoice issuers that are already registered, while still permitting checking and confirming the payment beforehand or defining rules for automated approval. Nevertheless, the direct debit approach is also appropriate for flexible recurring payments. In addition, eBill is an appropriate solution for multiple but irregular payments from the same invoice issuer. The second aspect is one-time payments. Seeing as in the case of one-time payments the invoice recipient does not expect to receive frequently recurring bills from the same invoice issuer, the registration process for the direct debit or eBill option constitutes an unnecessary effort for both the invoice recipient and invoice issuer. Therefore, for one-time payments, billing approaches that do not include a registration process,

Coverage of Use Cases	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Appropriate for fixed and flexible billing amounts – Appropriate for recurring payments 	2	<ul style="list-style-type: none"> – Appropriate for fixed and flexible billing amounts – Appropriate for recurring payments – Used for B2C and B2B transactions 	3
eBill	<ul style="list-style-type: none"> – Appropriate for fixed and flexible billing amounts – Appropriate for recurring and multiple payments 	1	<ul style="list-style-type: none"> – Appropriate for fixed and flexible billing amounts – Appropriate for recurring or multiple payments – Used mainly for B2C transactions, onboarding of business payers at early stage – Appropriate for large number of invoice recipients 	1
QR-bill	<ul style="list-style-type: none"> – Appropriate for one-time payments 	2	<ul style="list-style-type: none"> – Appropriate for one-time payments – Used for B2C and B2B transactions – Appropriate for small or large number of invoice recipients 	2
E-mail invoice	<ul style="list-style-type: none"> – Appropriate for one-time payments 	2	<ul style="list-style-type: none"> – Appropriate for one-time payments – Used for B2C and B2B transactions 	3

such as the QR-bill and e-mail invoice, are the most appropriate as they offer a low-barrier alternative.

The third aspect concerns the number of invoice recipients an invoice issuer must transfer billing information to. Depending on the nature of the business, some companies can be expected to issue fewer bills per year on average. The larger the number of bills issued, the more worthwhile the one-time effort to automate the billing process, for example by implementing the necessary infrastructure. Therefore, it may be more feasible for companies issuing a large number of bills to implement the eBill approach, while companies with fewer bills issued per year may prefer more simple approaches, such as the e-mail invoice. As in the case of the direct debit approach, each billing relationship has to be registered individually and over a lengthy process which is not automated. This may represent too much of an effort for some companies if the billing relationship is expected to be held over just a short time period.

Indicator 2: Reliability

To which degree invoice issuers and recipients are able to rely on a billing approach is the second indicator covered by the social dimension. The reliability of an approach refers to its trustworthiness and the degree to which it can be expected to perform consistently. From the invoice issuer's perspective, aspects such as delayed payments and the timely receipt of the bill are considered. Safe and consistent access to the billing information is important in terms of reliability from the invoice recipient's perspective. Depending on the billing approach, the tools needed to use the approach such as devices, an internet connection, or an m- or e-banking login may influence the level of reliability.

The reliability of an approach does not refer to the depth or degree of information received, but merely how consistently it is issued, received, and cleared. The direct debit approach offers the invoice recipient access to the billing information through a confirmation issued

Reliability	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Access to information depends on the reliability of the issuance of a confirmation document by the respective bank and invoice issuer – No tools needed to initiate the payment 	1	<ul style="list-style-type: none"> – Lowest probability of delayed payments – Tracking of bill receipt is not necessary 	1
eBill	<ul style="list-style-type: none"> – Safe and consistent access to complete information and quick receipt of bill due to electronic issuance – Need m- or e-banking account and corresponding devices 	1	<ul style="list-style-type: none"> – Low probability of delayed payments – Receipt of bill can be tracked 	2
QR-bill	<ul style="list-style-type: none"> – Safe and consistent access to billing information though time of receipt of bill depends on delivery method (post vs e-mail) – Use of smartphone and m- or e-banking is optional 	3	<ul style="list-style-type: none"> – Probability of delayed payments – Receipt of bill cannot easily be tracked 	3
E-mail invoice	<ul style="list-style-type: none"> – Safe and consistent access to billing information is not always guaranteed, nor is the time of receipt – Need access to e-mail account 	4	<ul style="list-style-type: none"> – Probability of delayed payments – Receipt of bill cannot easily be tracked – Higher spam rate and lost rate 	4

by the bank stating the details of the transaction. The reliability of the receipt of this confirmation depends on the efforts of the respective banks or invoice issuers. No devices or other tools are needed to initiate the payment. Due to the mandate given to the invoice issuer, the delay between the intended payment date and payment execution is reduced to a minimum, and hence there is a low probability of delayed payment.

In the case of the eBill approach, the platform contains an overview of information on all eBill invoices (eBill, no date) and can be accessed safely through an m- or e-banking account and consistently at any time. The delay between the issuance and receipt of the bill is reduced by the electronic transferal. The approach is related to a low probability of delayed payments, and the receipt of the eBill on the platform can be tracked. While the QR-bill also offers safe and consistent access to the billing information upon receipt of the QR-bill or scanning the QR code, the delay between the issuance

and receipt of the bill depends on the delivery method (postal mail or e-mail).

While the delivery by postal mail takes longer, it is considered more reliable as it less likely not to be received at all. When delivered by e-mail, on the contrary, though the delivery is quicker, the bill could land in the spam folder, get lost among all the other e-mails in a full inbox, or be sent to an e-mail account that is inactive or not maintained. All these aspects apply to the e-mail invoice too, making this approach less reliable in terms of the probability of delayed payments and the safe and consistent access to information.

Indicator 3: Convenience

The last indicator within the social dimension is convenience, which covers a number of different aspects such as the user-friendliness of a billing approach, network effects, opportunities of customer connectivity, and switchover costs. Factors such as bill storage and

Convenience	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Easiest to use, after the initialization process – No network effects – Existence of switchover costs – No integrated bill storage system – Low level of re-accessibility 	2	<ul style="list-style-type: none"> – No customer touchpoints – Existence of switchover costs 	4
eBill	<ul style="list-style-type: none"> – Easy to use – Presence of network effects – Existence of switchover costs – Integrated bill storage on platform – High level of re-accessibility 	1	<ul style="list-style-type: none"> – Combined customer touchpoint – Existence of switchover costs 	2
QR-bill	<ul style="list-style-type: none"> – Easy to use – No network effects – No switchover costs – No integrated bill storage system – Low level of re-accessibility 	3	<ul style="list-style-type: none"> – Multiple customer touchpoints – Existence of switchover costs 	2
E-mail invoice	<ul style="list-style-type: none"> – Low ease of use – No network effects – No switchover costs – No integrated bill storage system – Low level of re-accessibility 	4	<ul style="list-style-type: none"> – Multiple customer touchpoints – No switchover costs 	1

re-accessibility are also important points to consider. The user-friendliness of an approach depends to a certain extent on the preferences and habits of an invoice issuer or recipient. However, the ease of use of an approach can also depend on its design. A billing approach structured to allow quick and easy access to the billing information, as the eBill or QR-bill is, can be considered more user-friendly.

Meanwhile, the e-mail invoice contains only a limited amount of information that must be manually transformed into a payment. The eBill, QR-bill, and e-mail invoice must all be followed by the login to an m- or e-banking account in order to execute the payment electronically.

The direct debit approach is easy to use (after the rather complex onboarding process with the invoice issuer), as the invoice recipient is not required to take any action to execute the payment. Network effects refer to the utility

of an approach rising with an increasing number of users (BAK Basel, 2016). Users of the eBill approach in particular are able to benefit from this effect, as the higher the number of participating invoice issuers, the higher the utility of having an eBill account to pay bills. This is also due to the option of being able to automatically register for any new invoice issuers on the eBill platform.

The other approaches hardly show network effects. A billing approach can also constitute a medium of connecting with a client, known as customer touchpoints. The touchpoint can be created either between the bank and the customer, or the invoice issuer and the customer, and create part of the customer experience.

The direct debit approach offers a very low level of customer connectivity, both for the financial institution and the invoice issuer as, with the exception of the registration process, the invoice recipient is not required to take action in the billing process. Both the QR-bill and e-mail

invoice approaches offer multiple points of customer connectivity. To begin with, the invoice issuer is able to establish a customer touchpoint with the issued bill. This gives the invoice issuer the opportunity to present and establish its brand in the form of a document the invoice recipient must pay attention to. Moreover, the payment initiation step by the invoice recipient constitutes a further customer touchpoint, though with the financial institution. This touchpoint is established regardless of whether the invoice recipient chooses to pay electronically (touchpoint m- or e-banking) or at the post office or bank counter. The only exception is when the bill is paid by postal order to the bank, where there is no form of mutual interaction between the invoice recipient and the financial institution.

The eBill approach offers a point of contact for all three participants in the billing process at the same point, with the platform being accessed via m- or e-banking where the issued bills are viewed. Switchover costs are relevant for the newly established approaches, i.e., the eBill and QR-bill. In the case of the QR-bill from a B2C perspective, however, the switchover costs are only relevant for the invoice issuer. This is because the invoice issuer must adhere to certain form requirements, while for the invoice recipient, the process is much the same as for a payment slip with the QR code being scannable with a mobile device, which most people already own. It is important to note that the switchover costs refer to the costs today.

The direct debit approach is also subject to switchover costs, due to the high level of effort required to register for the approach. A further important factor is bill storage. In the case of the direct debit, QR-bill and e-mail invoice approaches, if the invoice recipient would like to store the bills, this must be done through his or her personal filing system, constituting an additional effort for the invoice recipient. The eBill platform, however, offers the advantage of storing bills on the platform for at least 180 days after the payment execution.

A final aspect of convenience refers to the ability to re-access bills and is linked to the above-mentioned aspect of bill storage. In the case of the QR-bill, bills can be re-accessed after payment if the invoice recipient has chosen to file them in a personal filing system. If

not already deleted, e-mail invoices can be re-accessed in the corresponding e-mail account. In the case of the direct debit approach, the bill can be viewed if the invoice recipient filed the confirmation of payment in a personal filing system.

These three approaches, however, necessitate a certain level of effort on the part of the invoice recipient in order to be able to re-access the bill. Also, the re-accessed bills do not give any indication on the status of the bill, i.e., if it has already been paid or not. The eBill approach offers the advantage of being able to re-access the bills on the eBill platform, at the moment for a maximum of 180 days after payment. As an additional advantage of the eBill approach, the status of the bills can be checked too.

3.4 Technological

Indicator 1: Security

The first indicator of the utility analysis within the technological dimension covers the aspect of security. This can include, for instance, the probability of invoice fraud the related losses, and the impact of security issues on the company image and reputation. One important aspect of security refers to the differentiation between a billing standard and a platform, with the latter being less exposed to potential fraud. The eBill and direct debit approach are considered platform systems, while the QR-bill is considered a billing standard. The e-mail invoice does not follow specific structures or rules. Due to the platform characteristic, the eBill and direct debit billing approach can both be considered to have a high level of security, from both the invoice issuer and recipient perspective. The registration process for invoice issuers is overseen by instances that check and verify the participation request.

The eBill platform is accessed via the m- or e-banking account, which is normally secured by a two-factor authentication process. The QR-bill is a billing standard and is more reliable compared to the payment slip (ESR), thanks to the integrated QR code. While the QR-bill can be delivered either by e-mail or postal mail, the e-mail invoice is delivered only by e-mail. This method of delivery creates a vector of attack for spammers. In addition, in the case of the e-mail delivery method, phishing

Security	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	<ul style="list-style-type: none"> – Onboarding process is overseen by financial institution – Transaction confirmation transferred over secure channel – Only option of use of digital payment channel 	1	<ul style="list-style-type: none"> – Platform – Very few steps of information transferal that could be exposed to security risks 	1
eBill	<ul style="list-style-type: none"> – Onboarding process includes the identity validation of the invoice issuer – Billing information is transferred as encrypted data – Only option of use of digital payment channel 	1	<ul style="list-style-type: none"> – Platform – Payer data validated by banks – Few steps of information transferal that could be exposed to security risks 	1
QR-bill	<ul style="list-style-type: none"> – No onboarding process – Billing information is transferred as structured data – Option of use of both digital and analogue payment channels 	3	<ul style="list-style-type: none"> – Billing standard – Limited exposure to phishing attacks (i.e., if received by e-mail) 	3
E-mail invoice	<ul style="list-style-type: none"> – No onboarding process – Billing information is transferred by e-mail 	4	<ul style="list-style-type: none"> – Does not follow specific structures or rules – More exposed to phishing attacks 	4

attacks could lead to further security breaches, from which a company's reputation could suffer. With targeted and untargeted phishing attempts constituting the most frequent form of cyber attack on Swiss financial institutions (SIX, 2019a), this type of security issue is not to be underestimated. Bills sent by e-mail are thus considered less secure in particular in terms of information transferal and potential security breaches.

Indicator 2: Susceptibility to Errors

The second technological indicator that helps to assess the billing approaches is their susceptibility to errors. On the one hand, there is the susceptibility to human errors to consider. Human errors will always happen, but the less dependent a system is on human input, the fewer faults it will have linked to this type of error. On the other hand, process- or system-related errors can

also occur. The direct debit approach is dependent on a number of manual steps in the onboarding process, making this part of the direct debit process susceptible to human error. The eBill approach includes no media-breach exposed steps and is thus less prone to human error. One source of human error in the QR-bill and e-mail invoice processes lies in the incorrect transferal of billing information from the bill to the m- or e-banking form or payment slip.

In the case of the QR-bill, however, this possibility can be avoided by scanning the QR code to access the billing information directly in an m- or e-banking account. A further possible human error which is more likely in the case of the QR-bill and e-mail invoice is forgetting to pay the bills, as there is no overview of outstanding bills as is the case for the eBill approach. Process-re-

Susceptibility to Errors	Invoice Recipient		Invoice Issuer	
	Assessment	Ranking	Assessment	Ranking
Direct debit	– High susceptibility to human errors in registration process as includes manual steps	2	– High susceptibility to human errors in registration process – Low probability of cross-over errors	2
eBill	– Low susceptibility to human errors as no manual steps	1	– Low susceptibility to human errors – Low probability of cross-over errors	1
QR-bill	– High susceptibility to human errors as includes manual steps: e.g., incorrect transferal of billing information unless QR code is scanned, forget to pay bill	3	– Low susceptibility to human errors if QR code is scanned – Higher probability of cross-over errors	2
E-mail invoice	– High susceptibility to human errors as includes manual steps: e.g., incorrect transferal of billing information, forget to pay bill	4	– High susceptibility to human errors – Higher probability of cross-over errors	4

lated errors can result from the design of the workflow process or by delays. For example, if there is a large delay between the payment initiation and execution, as would be possible in the case of a postal payment order, a reminder could be sent out in the meantime. In contrast, electronic approaches provide faster updates on the status of bills, leading to fewer cross-over errors.

3.5 Conclusion

The aim of the analysis conducted in chapters 3.1 to 3.4 is to assess the utility of four different billing approaches for both the invoice recipients and invoice issuers in Switzerland. The analysis is based on 11 indicators, which capture the characteristics of the direct debit, eBill, QR-bill, and e-mail invoice approaches in the political/environmental, economic, social, and technological dimensions. The approaches are assessed by ranking them from first to last. It should be noted that, as a ranking is used in the present analysis as opposed to a rating, the differences in utility between the ranks could be small. A ranking merely ranks the approaches from first to last, without an analysis of how large the differences are between the respective approaches.

This qualitative assessment depends on individual use cases from the invoice recipient and invoice issuer. Thus, the assessment can differ among different invoice recipients and issuers. The results of the analysis from the invoice recipient and invoice issuer perspective are illustrated in Figure 16 and Figure 17, respectively. One observation of the results is that the ranks for the individual indicators can vary between the invoice recipient and invoice issuer perspectives.

Overall, the eBill approach assumes the top rank in both perspectives and never ranks lower than second place in the individual indicators. The high ranking for the eBill approach across multiple indicators and both perspectives is based on the completeness of the platform. One reason for this could be that it is a relatively new system. The results speak for the future potential of the approach. As the approach is attractive in terms of the utility for both the parties involved in the billing process, it can be expected to further grow and possibly be expanded in certain areas. Many of the conclusions drawn from the analysis of the eBill approach, as well as the other three approaches, coincide with prior research (e.g., Parexa, 2018; Gashnjani & Klinkert, 2019).

In the case of the direct debit solution, the invoice recipient is found to enjoy a high level of utility from the efficiency and reliability of the approach, in particular for the use case of recurring payments. As the direct debit approach allows for the automatic payment of bills through authorization granted to the invoice issuer, no effort is involved for the invoice recipient after a registration process. In terms of utility, the invoice issuer benefits from the transparency and improved liquidity management the direct debit solutions offers due to the predictability of the payment date, low reminder quotas, and the possibility of progress tracking. Also, this approach is associated with low costs per bill for the invoice issuer.

The QR-bill ranks high in terms of harmonized processes. The approach represents the final step in the process of harmonization with the ISO 20022 standard in Switzerland and is in harmony with new standards. The QR-bill offers flexibility through the broad coverage of use cases. Financial flexibility is identified by the high rank in liquidity management, with the invoice recipient being free to choose when and how to pay his or her bills. The main benefits for the invoice issuer lie in the convenience and broad use case coverage of the QR-bill. The disadvantages of the QR-bill compared to the eBill stem from the nature of the solution, with the eBill representing a system solution, and the QR-bill a billing standard. The QR-bill represents a further development and significant improvement of the old document solutions and will be important in the future.

The e-mail invoice constitutes the most unstructured among the analyzed approaches, and its utility is in many cases dependent on its form. Invoice recipients can benefit from the low costs of this approach, as well as the financial flexibility it offers by being able to choose when and how to pay the bill. The e-mail invoice ranks high for the convenience indicator from the invoice issuer's perspective thanks to the multiple customer touchpoints, the low switchover costs, and the simplicity of the approach.

Evaluation From Invoice Recipient Perspective



Figure 16: Overview of the ranking from the perspective of the invoice recipient.

Evaluation From Invoice Issuer Perspective

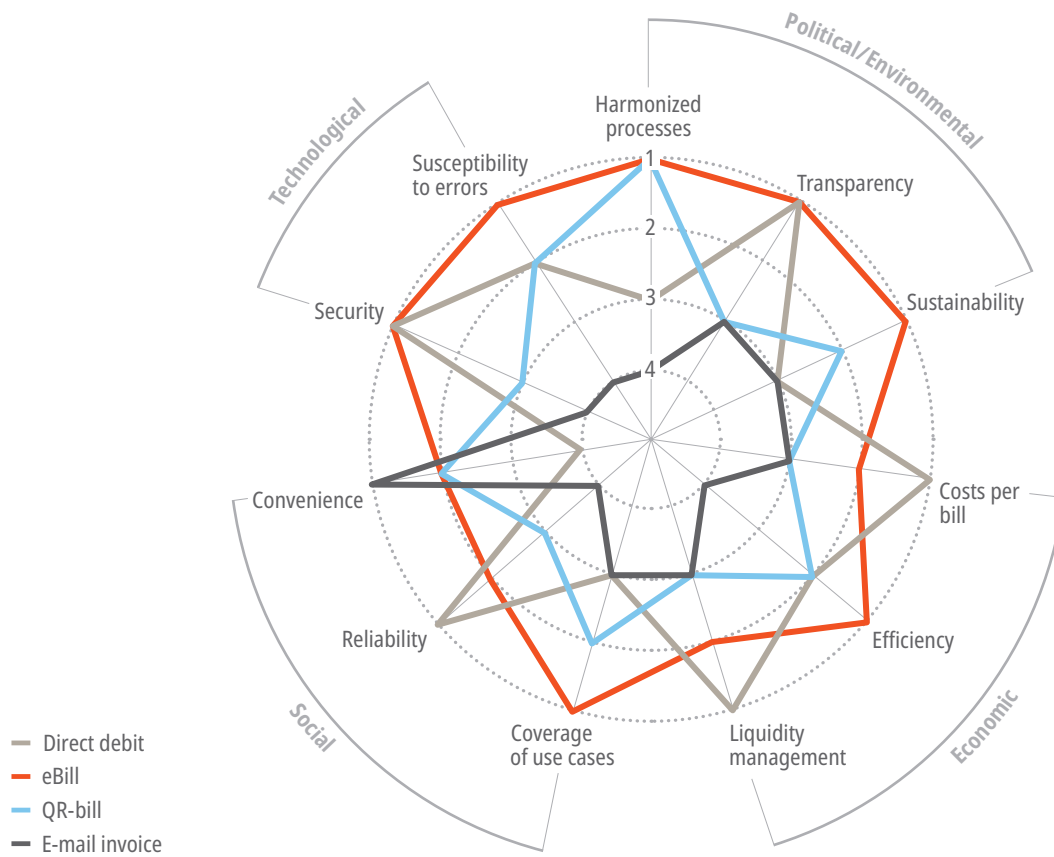


Figure 17: Overview of the ranking from the perspective of the invoice issuer.

4 Future of Billing

4.1 Overview

In the following sections we seek to identify technologies, concepts, and trends with the potential to transform billing in the future. The future of billing is embedded in the future development of the entire payment industry in Switzerland. The recent SIX white paper “Future of Money” (SIX, 2019b) examines different possible future scenarios for money, one specific aspect of which is its use as a medium of exchange. These, in turn are developments that relate to the future of the payments industry. The most likely scenario identified in the white paper is that titled “Digital Rules – But Cash Persists in a Fragmented World”. It describes a scenario in which digital payments will continue to displace cash and provide an answer to users’ demands for instantaneity and security. The trend of digitalization has also affected the billing industry, illustrated for example in the growing number of payment transactions initiated electronically in Switzerland (see Figure 2). The effect of digitalization on the billing landscape is expected to continue, and forms a prerequisite for the development and implementation of innovative solutions in the future.

How these developments could be expected to unfold is described in a series of theses, established around the following three topics:

- Billing Experience (Chapter 4.2)
- Intelligent Billing Platform (Chapter 4.3)
- Internet of Things (IoT) (Chapter 4.4)

The **billing experience** is evolving due to different factors. To begin with, increased digitalization is expected to shape future billing approaches. In addition, users’ demands for more transparency, control and automation in the billing process will see billing approaches change in an effort to align with these demands. These efforts can result in the offer of customizable settings, personalized offerings, and assistance. **Intelligent billing platforms** refer to solutions that can support users in the billing process in different ways, based on the available data. Intelligent billing platforms constitute trusted centers for invoice recipients and issuers to access their billing information and manage their billing experience and process. Combining the data gathered through the platforms with data analytics tools allows supporting the user with a range of different added value

services, from notifications to financial management systems. The **Internet of Things (IoT)** devices profit from billing platforms for the exchange and collection of data. The successful integration of billing approaches into IoT devices offers advantages for all stakeholders along the entire value chain. Different billing situations help to exemplify how the developments could affect the billing process in the future. Seeking to describe how the predicted trends may affect the future of billing on a micro-level, **the following sections** illustrate some future invoice issuers’ and recipients’ use cases.

4.2 Billing Experience

With a constantly evolving society, customer demands are ever changing. While some demand personalized customer experiences, others demand more transparency and control, exemplified in developments such as the implementation of the General Data Protection Regulation (GDPR) within the EU, and the Swiss Data Protection Act. Invoice recipients and issuers want to be in control of a personalized billing experience with transparent processes and increased flexibility. The digitalization of billing approaches can help fulfil these demands and constitutes a prerequisite for future developments and innovation. The following theses exemplify how billing can fulfil the demands for **transparency, control, and personalized services** in the future based on further **digitalization**, as well as how **instant payments** can be integrated into the billing process.

Further digitalization in the billing industry. The widespread trend of digitalization is changing the billing industry. While a few decades ago, paying for bills over an analog channel was the norm, the electronic delivery and payment of bills are increasingly gaining in popularity. The digitalization of the billing process paves the way for automated process, thereby reducing the need for manual labor and offering increased efficiency for invoice issuers and recipients. For invoice recipients especially, digitalized processes offer increased convenience and can save time and effort. The digitalization of billing processes also constitutes a prerequisite for future innovation and developments in the billing industry such as providing increased transparency and flexibility, offering a personalized customer experience, and implementing intelligent billing solutions.

More transparency: Users can access their billing information anytime and anywhere.

In the past, payments were often bound to a location, for example face-to-face transactions, or facilitated on site through a financial institution. Much has changed in the recent decades with increasing volumes in payments made over a distance, a trend that has accelerated in the age of e-commerce and globalization. In the future, a further development is expected from location-bound payments toward device-enabled transactions (Accenture, 2017). Consumers will be able to pay their bills anywhere, which increases the convenience of a billing solution for the invoice recipient. If billing is integrated into mobile banking solutions, users are not just enabled to access their bills anywhere, but at any time too. Already today, many retail banking customers make use of mobile banking, particularly on the move (Ankenbrand, Bieri, Dietrich, & Illi, 2020). A platform solution accessible through any m- or e-banking account can allow invoice recipients to log on to access the full overview of costs, manage invoices, and easily obtain further information on bills. Based on an expected increased adoption of digital receipts in the future thanks to their advantages of transparency, efficiency, and sustainability (Fuchs & Schmid, 2019), it would be convenient for these documents to also be stored on the billing platform, and accessible anytime and anywhere. With the seamless integration of billing in the sales process, the need for consistently accessible billing data for monitoring purposes is becoming increasingly important. At the same time, invoice issuers can benefit from fewer payment delays and reminders if invoice recipients gain easier access to billing information.

Users in control. With an increasing demand for personalized offerings, billing solution providers will be encouraged toward offering end users increased freedom in how they design and individually configure the use of their billing solution to suit their personal preferences and needs. The best way this can be achieved is through a platform solution, which can provide a seamless and unified customer experience across multiple channels, such as m-banking and e-banking. Incorporating the concept of the “user in control”, billing solutions will offer the opportunity for users to configure their billing platform settings such as deciding on the channel and frequency of notifications, the

option of blocking certain invoice issuers, deciding when and where to pay bills, or setting up automatic instalment payments based on certain parameters.

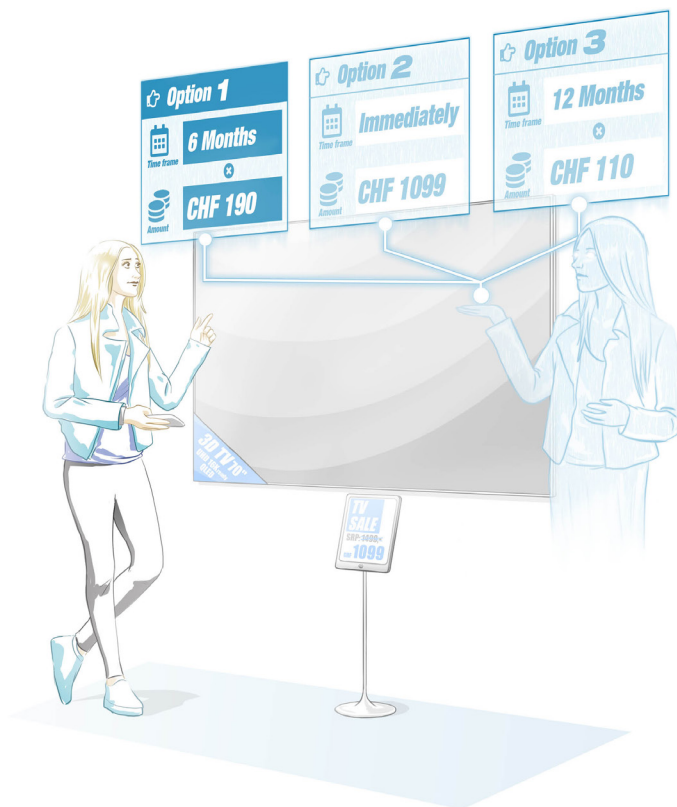
Billing as your personal assistant. According to a survey, among nonusers of electronic bills, 34 percent reported not changing to electronic bills due to their need for paper to remind them a bill is due (fiserv, 2018). But what if your billing platform could remind you instead? Future billing solutions will act as personal assistants, reminding you when payments are due, how long you can benefit from discounts or instalment options, and provide an overview of outstanding bills upon request (see example of purchase of a new television below). A further possibility is for the personal assistant to project the personal future financial situation or provide tips on how to save money (Fast Company, 2017). An automated payment process based on intelligent, self-adapting rules depending on the individual user behavior will become the norm. This can positively influence both the invoice issuer’s and recipient’s liquidity situation, and avoid inefficiencies created by delayed payments or payment rejections. The transparency and control gained can be automated and optimized by delegation to the intelligent assistant.

Instant payments in billing – the best of both worlds.

According to the definition from the European Central Bank, “[i]nstant payments are electronic retail payment solutions that process payments in real time, 24 hours a day, 365 days a year, where the funds are made available immediately for use by the recipient” (European Central Bank, 2020). Instant payments do not strictly fall under the definition of billing transactions according to this present study due to the lack of delay between the receipt or order of goods or services, and the payment thereof. But implementing instant payments into a future intelligent billing platform has its advantages. Instant payments affect the quick clearing of payments and thus offer the invoice issuer lower credit risk and an improved liquidity situation. Invoice recipients can benefit from a broader range of payment options offered at the checkout. Also, instant payments can allow for the billing for certain goods that previously couldn’t be handled, for example digital goods as software-as-a-service. Furthermore, with instant payments integrated into an intelligent billing platform, both the invoice recipient and issuer can benefit from the access to information and billing documents at the same time.

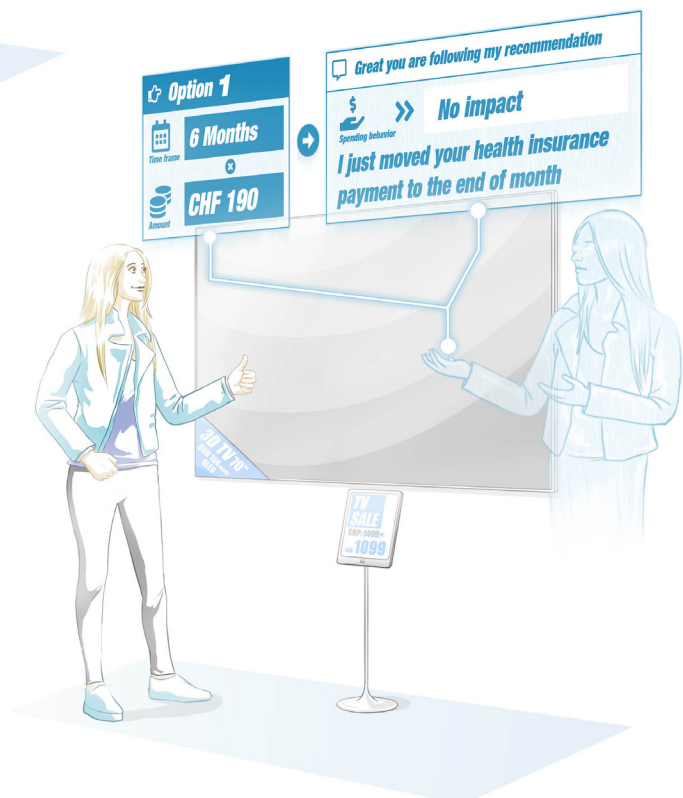
The Optimization of the Future Payment Process

Purchase of a New Television



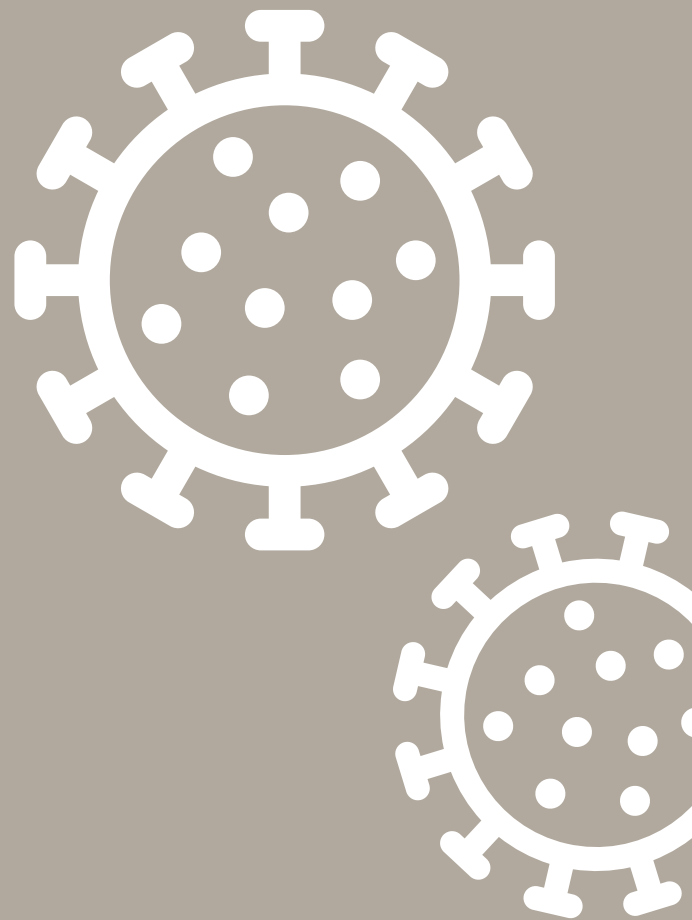
You enter a store to purchase a new television. You know which one you want, but want to check the screen quality before you purchase it. Also, you are not yet sure how to pay for it. Satisfied by the screen quality, you decide to purchase the television. By opening your banking application on your mobile phone, you can access your billing platform and request assistance from your billing assistant, who shows you your future financial obligations and all the billing options offered by the seller. Based on your current financial situation, your billing assistant recommends a payment in six instalments and some adaptations of payment dates for other existing bills.

With a simple click, you confirm this option, thereby making the purchase and agreeing on the payment in six instalments. You opt for your billing assistant to remind you for every instalment. Once confirmed, this information is sent to the seller, who delivers the television straight to your doorstep the next day. All the documents related to the purchase are saved on the billing platform, and can be accessed anytime. You benefit from the best payment options over all bills and you have your financial situation under control.



Crisis as an Accelerator for Digitalization

In early 2020, the COVID-19 virus, also known as corona virus, forced many countries, including Switzerland, into a nationwide lockdown. Measures such as the closing of schools, hotels, cafes and shops, as well as the government encouraging minimal contact between individuals were and still are being enforced. These measures have at least two effects leading to the acceleration of digitalization. Firstly, to avoid the spread of the virus, people were obliged to stay at home. Working from home is the new normal. Companies, universities and further institutions are increasingly operating digitally and virtually. Also, leisure activities are mostly reduced or taking place in the digital space. And consumers are resorting to online purchases as an alternative to the closed shops. With the increase in online purchases, the number of invoices issued from businesses involved in e-commerce can be expected to have risen across the affected time period. Nevertheless, a fall in overall consumption, and thus lower transaction volumes, have been observed as a consequence of the COVID-19 outbreak. The virus has shown that crises can have a huge impact on the pace of digitalization.



4.3 Intelligent Billing Platform

Increasingly sophisticated technologies are entering the payments market, many of which seek to optimize the payments process and customer journey. While one goal is the seamless integration of these technologies into the payment process, another goal is to use data or technology to assist the consumer and reduce payment pain. Intelligent billing transforms billing from an unattractive activity to a new touchpoint for invoice issuers and recipients.

Billing platform – a one-stop shop. The basis of a billing platform is an intelligent document storage or filing system. By offering an overview of all the outstanding and paid bills, the platform is able to show the invoice recipient or his or her digital assistant, which bills still need to be paid. According to a survey, consumers are interested in this ability to see all the bills that are still due (fiserv, 2018). In addition, creating a trusted platform for all purchase and sale-related documents, such as digital receipts and warranty certificates, allows invoice recipients and invoice issuers to access a personal, centralized, and safe document storage center (see damaged tablet example below). With the establishment of common APIs, a billing platform is open to additional, “beyond billing”, added value services. For example, it could offer intelligent factoring to provide invoice issuers with more liquidity or credits for invoice recipients. Personal financial management, advisory services, lending, and insurance-related services are further examples of what would be possible to access through the intelligent billing platform. The platform can also offer direct interfaces to tax declaration systems (see tax declaration example below) or allow loyalty and bonus programs to use the platform to store and manage their programs. Furthermore, the platform could offer updates or reminders related to purchases registered on the platform such as when your car needs its next service. This shows that a range of different possibilities exist for intelligent billing to assist in everyday life and improve the customer experience and convenience. The intelligent billing platform allows building efficient ecosystems with new revenue models for the participants.

Reaping the benefits from data and extending them with open banking. An important side effect of BigTechs entering the payments industry are the masses of user data collected due to a large number of users (BIS, 2019). This data is then analyzed so that services exploiting network effects and generating further use activity can be offered (BIS, 2019). Intelligent billing will incorporate these techniques on a platform. Data analytics, artificial intelligence, and machine learning, for example, can be used to avoid fraud and improve operations (EY, 2019). With more data available on each user of a billing platform, more sophisticated predictions and analysis can be made. This offers the user a more personalized experience and the increased efficiency of processes. Open banking, a trend that has been confirmed over the years with an increasing number of available financial APIs, has been facilitating the use and spread of data (Ankenbrand, Bieri, Dietrich, & Illi, 2020). Open banking allows external service providers to gain access to the financial market and customers (Ankenbrand, Bieri, Dietrich, & Illi, 2020), and thus seamlessly connect to different applications (SIX, 2019b). A billing platform structure ensures the invoice issuers’ and recipients’ control over their data and thus creates a trusted platform. Upon the platform users’ request, various companies and applications can use the data for the benefit of recipient and issuer (Swiss FinTech Innovations, 2020). The advantages of e-invoicing, such as structured, automated invoicing and booking, which are so far primarily reserved for B2B transactions, become available in the B2C area with the billing platform.

Document Storage on the Billing Platform

Damaged Tablet



Your tablet, which you bought yourself just last year, is broken. You remember that all the documents related to the purchase of the tablet are stored on your billing platform. Using the search function on the billing platform to find the purchase, your billing assistant reminds you that you still have over a year left on the warranty, and asks you if you want a request submitted for the replacement of the tablet. You confirm, and the billing assistant sends a replacement request along with the receipt and warranty to the seller. Within a couple of days, the exchange of your damaged tablet for a new one is organized through a postal service.

Optional Services on the Billing Platform

Tax Declaration

Instead of filling out the tax declaration yourself, you decide to make use of the optional tax declaration service provided through your billing platform. All the documents relevant for the tax declaration such as your bank statements, health insurance statements, receipts, wage sheets, mortgage payments, etc. are already stored on the billing platform. You simply need to allow the tax declaration service provider access to the relevant documents. Once you have done this, the service provider can fill out your tax declaration for you and notify you once this is complete. With a simple click you can confirm the tax declaration, and the service provider sends the tax declaration to the respective address. A copy of the submitted tax form is automatically stored in your document storage center on the billing platform, and can be accessed at any time.



The Intelligent Billing Platform of the Future

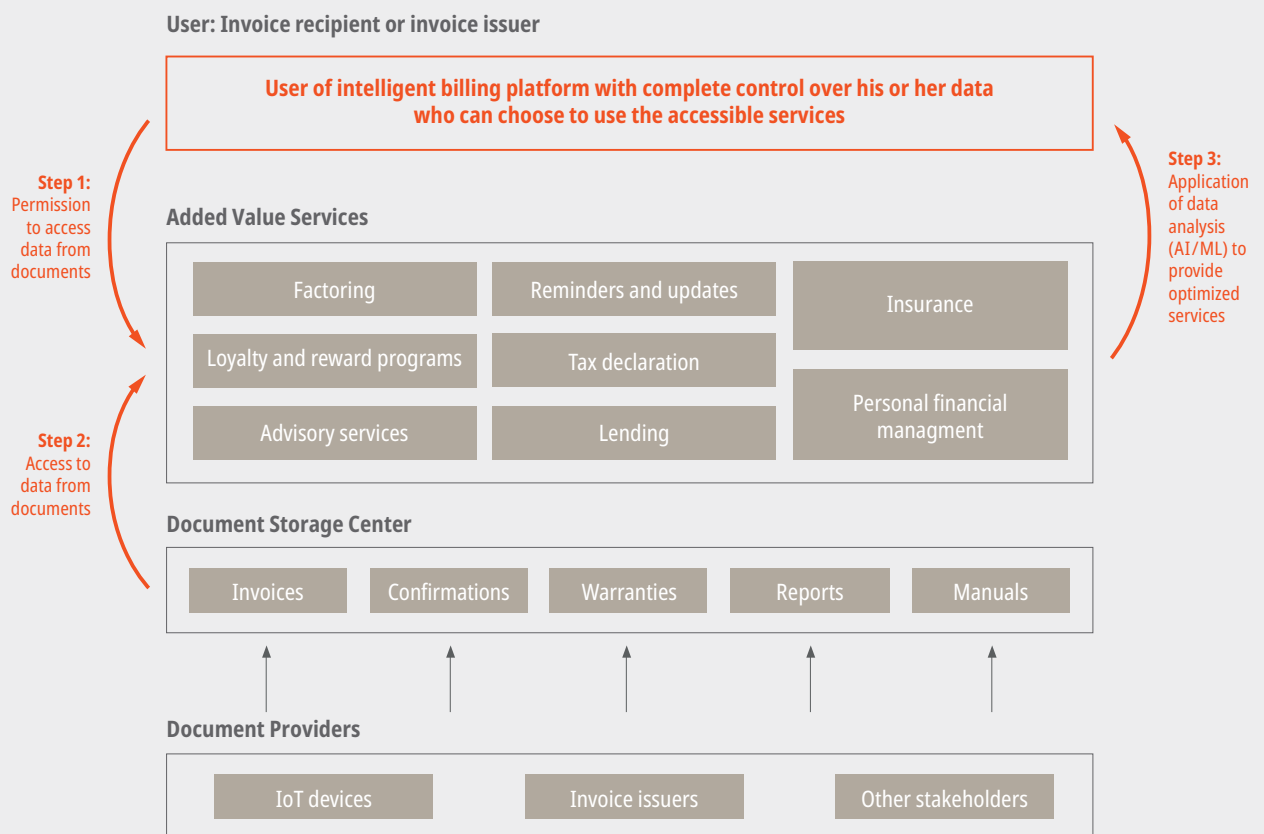


Figure 18: The intelligent billing platform of the future.

The illustration above shows what a billing platform in the future could look like. The user of the billing platform, be that an invoice recipient or invoice issuer, has complete control over all his or her data, data sharing options, configuration preferences, and access to added value services. Documents and data from transactions made by the user are provided by invoice issuers, IoT devices, and other stakeholders, and directly stored on the billing platform. These documents include invoices, confirmations, warranties, reports, manuals, and any other documents the user wishes to store on the billing

platform. If the user chooses to make use of the added value services, he or she must first grant permission for the service providers to access the relevant data from the storage center. The service provider can then access the data or documents and apply data analysis methods such as artificial intelligence or machine learning in order to provide the bill platform user with optimized support or services. The added value services can range from insurance services, to tax declaration support services, and advisory services.

4.4 Internet of Things (IoT)

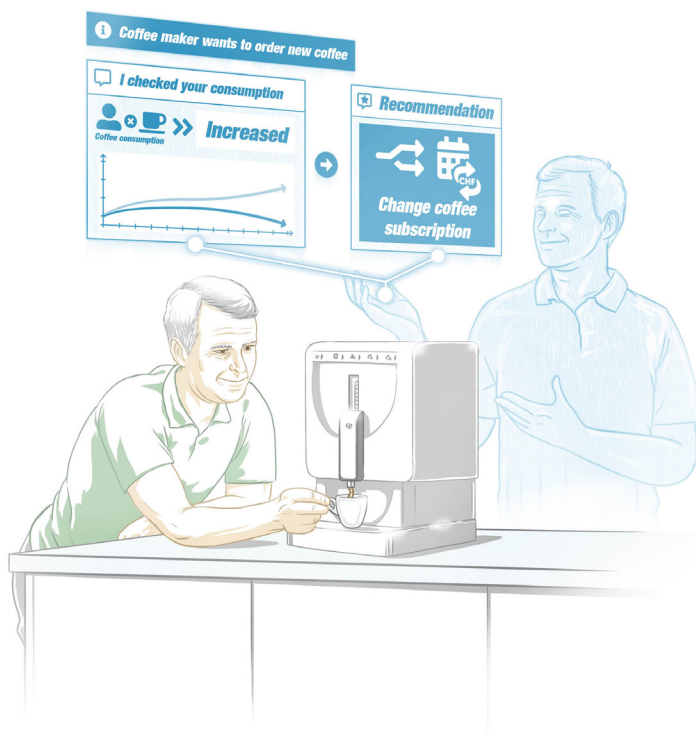
Increasingly, we are seeing smart devices and autonomous things in everyday life. Devices that connect to the internet and exchange data with each other create the Internet of Things (Norton, 2020). These devices can also be in the form of everyday objects that are equipped to gather and communicate data (Norton, 2020). Crucially, the virtual world of information technology should be integrated seamlessly into these devices (Uckelmann, Harrison, & Michahelles, 2011). There are different predictions about the future growth of the number of IoT devices. While Norton (2020) predicts 21 billion IoT devices by 2025, a forecast from the International Data Corporation (IDC, 2019) estimates 41.6 billion connected IoT devices by 2025.

Things generating bills autonomously. IoT devices can produce or consume products and services. They can send bills for the usage of their devices, such as package delivery drones. The devices can also receive bills, such as when the drone needs an instant insurance package. The process can either involve human beings, or be entirely machine-to-machine based. This aspect is particularly important in the case of autonomous things. Autonomous things are devices that use artificial intelligence to automate functions and act independently, examples being robots, drones, autonomous vehicles, and ships (Gartner, 2019). They interact naturally with their surroundings and people, and also have payment needs (Gartner, 2019). They gather and spread large amounts of data, which can then be extended and enhanced through the means of real-time analytics, business intelligence, or autonomous services (Uckelmann, Harrison, & Michahelles, 2011). Relevant information gathered by the devices could be sent to an intelligent billing platform (see Chapter 4.3), where it can be accessed by the invoice recipient or invoice issuer (see coffee machine example below). This could include, for example, information on the use or activities of the IoT device, costs, and further details. Having access to this information allows the invoice recipients and issuers to intervene in the billing process if necessary, and thus retain control over the devices. This control can also be delegated to digital billing assistant (see Chapter 4.2).

IoT devices allow the combination of more information with more intelligence. With the expected future growth in the number of IoT devices, they represent a large user group. The advantage of billing solutions enabled through these devices is that they add more information to the invoice and allow intelligent billing. To begin with, the higher information content increases the transparency of the invoice approach for the invoice recipient. Additionally, the increased amount of information, combined with a billing platform offering safe and consistent access to the invoices, provides invoice recipients and issuers with a reliable overview of the current billing situation. Thanks to their connection with intelligent billing platforms, IoT devices can enhance their “intelligence”. Examples include the storage of IoT device-related documents (e.g., warranties, reports, manuals, etc.), micropayments and machine-to-machine payments, along with a notification system for services, and updates for the device.

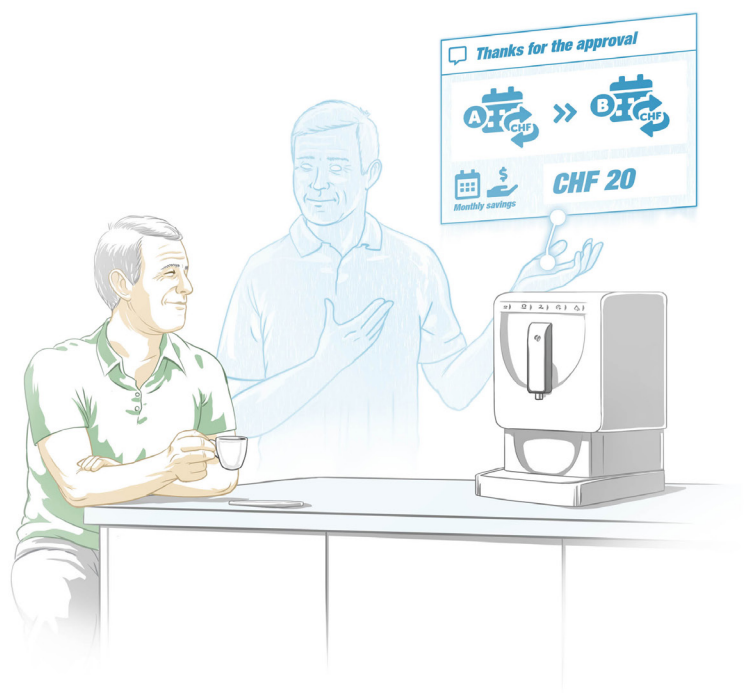
Billing Through IoT Devices

The Coffee Machine



Before starting your busy day, you like to enjoy a good cup of coffee every morning. Due to your busy schedule, you used to constantly forget to buy coffee beans, which is why you decided to purchase an IoT coffee machine. Whenever you are almost out of coffee beans, the machine orders some at your local café and has them sent to you by postal mail.

You have opted for the bill for the coffee beans to be paid automatically by your machine, but you can access and oversee the payments anytime on the billing platform. All the orders, payments, information on your coffee consumption, and documents related to the purchase and maintenance of your coffee machine are stored in the document storage center on the billing platform.



5 Conclusion

The present study examines billing methods in Switzerland and seeks to provide a guide for invoice recipients and issuers alike. This chapter summarizes the main results and conclusions from the analysis of four different billing approaches, as well as the discussion of potential future developments in the industry.

An overview of the Swiss billing industry is presented in Chapter 1 and illustrates the high relevance of billing in Switzerland. The analysis illustrates the importance of billing within the Swiss payments industry and economy, both in terms of transaction volumes and through its establishment in the Swiss payment culture. In addition, the examination of the number of billing transactions over time indicates a trend of increased digitalization of the billing industry in Switzerland, with an increasing number of payments being initiated electronically. This in turn, supports efforts for increased digital offerings in the billing industry. Chapter 2 describes four different billing approaches currently offered in Switzerland, which include direct debit, the eBill, the QR-bill, and the e-mail invoice. The assessment of the four approaches, based on a number of political/environmental, economic, social, and technological indicators in Chapter 3, seeks to identify their respective strengths and applicable use cases. The results of the analysis show approaches that are based on platforms, which are able to offer seamlessly integrated processes and customer experiences, to rank high in many of the analyzed indicators. This speaks for the potential and further development of eBill, which is such a platform system. But also billing standards, such as the new QR-bill, are expected to remain in the future due to the dissemination, coverage of different use cases, and high flexibility.

Further statements on the future of billing are described in the form of a collection of theses in Chapter 4. These evolve around an intelligent billing platform, which allows an improved billing experience, and the integration of IoT devices. The increased digitalization of billing approaches and solutions forms a prerequisite for innovation and development in the future. Based on the establishment of intelligent billing platforms, docu-

ments and data related to transactions can be stored. This enables billing platform users to easily access important documents such as invoices, warranties, manuals, and reports. In addition, users can choose to access added value services, which an intelligent billing platform is able to link to and integrate into the billing journey. This allows increased efficiency and convenience for both invoice recipients and issuers, while ensuring the security and control of the user's data. The user can delegate routine tasks to a digital assistant for further automation. IoT devices can also be seamlessly integrated and use the platform for their billing needs. IoT devices can autonomously generate or pay bills controlled by humans or their digital assistants.

Billing represents an important element of the Swiss payments industry and culture, and a range of different billing approaches are offered in Switzerland today — and with eBill and QR-bill, future-oriented solutions are in place. Trends and future developments are expected to shape and digitize further billing and related document management in Switzerland, in particular toward billing platforms offering added value services and extended capabilities leveraging innovative technologies in the interest of users. In the future, for invoice issuers and recipients this will contribute to an improved billing experience that goes beyond the payment process.

6 Definitions

Credit Cards	Credit cards include both charge cards and credit cards with instalment or partial payment options. Charge cards, also known as delayed-debit cards, offer the cardholder interest-free credit until the due date specified in the invoice, but do not offer the option of paying in instalments or making partial payments. ²¹
Debit Cards	Debit cards are linked to a bank account and allow the cardholder to debit payments and cash withdrawals directly from their bank account. In addition to debit cards issued by internationally accepted payment card organizations (e.g. Maestro, V-Pay), this also includes cards that are accepted or used at national level (e.g. PostFinance Card, M-Card). ²¹
DTA/EPO	Data carrier exchange (DTA)/electronic payment order (EPO); excluding payments submitted via e-banking. ²¹
E-Banking	Including the Electronical Bill Presentment and Payment System (EBPP; e-invoices) and data carrier exchange (DTA)/electronic payment order (EPO) payments or standing orders submitted via e-banking. ²¹
E-Money	E-money describes any electronically stored monetary value constituting a claim on the issuer that is issued against payment of funds for the purpose of carrying out payment transactions. It includes prepaid cards with a wide range of uses, but not cards whose applications are limited (such as voucher cards). In the survey, the main group obliged to report data are the providers of prepaid card products. ²¹
Standing Orders	Standing Orders excluding orders submitted via e-banking. ²¹

²¹ Definition based on (SNB, 2019d).

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Note to the Reader

Authors

The views expressed in this paper are those of the authors. For more information about this report, please contact us at: research@six-group.com.

Thomas Ankenbrand

Head Competence Center Investments
Lucerne University of Applied Sciences and Arts

Nicola Louise Illi

Research Associate
Lucerne University of Applied Sciences and Arts

Damian Lötscher

Research Associate
Lucerne University of Applied Sciences and Arts

Daniel Berger

Head Billing & Payments Ecosystem
SIX

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Core Team

Stefanie Hüsser

Product Manager
SIX

Adrian Kaufmann

Product Manager
SIX

Marie-Isabel Lang

Senior Marketing Manager
SIX

Carolyn Stege

Product Manager
SIX

Daniel Steingruber

Senior Innovation Manager
SIX

Nino Thommen

Head Marketing Banking Services
SIX

SIX
Pfingstweidstrasse 110
P. O. Box
CH-8021 Zurich
www.six-group.com