Open Banking and Electronic Health Records

Andrew Stranieri*
Centre for IT and Mathematical Sciences
Federation University
Ballarat, Vic, Austalia
a.stranieri@federation.edu.au

Angelique McInnes
College of Business & Law
CQUniversity,
Brisbane, Australia
a.mcinnes@cqu.edu.au

Mustafa Hashmi
La Trobe Law School,
La Trobe University
Bundoora, Melbourne
Australia
mhashmi@ltu.edu.au

Tony Sahama
School of Health Information Science
University of Victoria
BC Canada
College of ICT
CQUniversity, Brisbane, Australia
t.sahama@cqu.edu.au

ABSTRACT

The Open Banking model is a data sharing model emerging in financial services sector that involves technological and regulatory innovations designed to facilitate access to banking records by third party providers such as payment service providers. The model is predicted to disrupt financial services and encourage a wave of new third-party providers offering innovative services that will change the relationship between customers and banks. This article juxtaposes the Open Banking model against models for electronic health records. Providers that could supply innovative third party services with health record data if an Open Banking model were adopted in the health care industry are advanced.

CCS CONCEPTS

• **Applied computing → Health informatics**.

ACM Reference Format:
Andrew Stranieri, Angelique McInnes, Mustafa Hashmi, and Tony Sahama. 2021. Open Banking and Electronic Health Records. In *ACSW 2021: Australasian Computer Science Week, February 01–04, 2021, Dunedin, New Zealand*. ACM, New York, NY, USA, 4 pages. https://doi.org/10.1145/1122445.1122456

1 INTRODUCTION

The *open banking data sharing* (OBDS) model includes technological and legal innovations emerging in the financial services sector where banks and other financial institutions commit to having real-time [12] customer data accessible to third parties through application programming interfaces (API) [4]. This is exemplified by a third-party payment service such as electronic fund transfer point of sale (eftpos[1]) in Australia that accesses a buyer's balance and credit limit through the buyer's bank API to process a payment to a vendor. According to Brodsky and Oakes [4] the transition to an Open Banking model represents a new high-water mark in data sharing that is likely to transform the relationship between customers and banks. Prior to an Open Banking model, customer's data was kept private and confidential within their bank. Except for police investigations, a bank would not disclose or share account information with anyone except the account holders. Customers trusted their bank, in large part, because banks had processes in place to ensure their data was not accessible to others. For their part, banks attempted to provide all the financial services their customers would desire. The relationship between bank and customer changes under an Open Banking model. The bank is no longer the sole custodian of a customer's data but is more of a gatekeeper/broker to a plethora of third-party institutions providing e-finance, cloud computing, smart phones, Internet technologies, social networking service, social media, AI, and big data analytics [12] to provide a vast array of services. With open banking, consumers can log into a single platform to access a range of services and payments tailored to their needs. Not only is this changing the role of IT, but also consumer behaviour through education, ecosystems and regulation [16].

In this article, we overlay the Open Banking developments against electronic health and medical record models in order to illustrate that healthcare is likely to be enhanced with third-party providers who access patient and provider data to perform a service beneficial to one or both. This is illustrated with hypothetical, quasi-futuristic third-party providers that could conceivably emerge if health records architectures and legislative frameworks were more like those in the Open Banking movement.

A historical analysis of electronic health records by Byyny [5] reveals that despite significant advances in the development of core infrastructure for electronic records including interoperability standards, nomenclature standards and increasingly interconnected providers, evidence to show that health care is enhanced by records, is quite patchy. A relatively small number of governments, not perturbed by this, have expended huge resources toward the establishment of nationwide electronic health records [17]. According to Kruse et al. [10] the cost of introducing medical records is a leading barrier to their widespread introduction. A large part of the costs derives from challenges in integrating data collected from different systems [6]. This is exacerbated by recent trends for patient-generated data from mobile devices encouraged by movements such as the quantified self [6].

An overview of Open Banking is provided in the next section. Following that, an illustration of the differences between Open

[1] https://www.eftposaustralia.com.au

ACSW 2021, February 01–04, 2021, Dunedin, New Zealand

ACM ISBN 978-1-4503-XXXX-X/18/06…$15.00
https://doi.org/10.1145/1122445.1122456

Banking architectures and digital health records is outlined. Examples of third-party providers that could conceivably emerge if an Open Health Banking approach were in place are then described before concluding remarks.

2 OPEN BANKING ECOSYSTEM

The UK was the first country to implement open banking or moving personal consumer data ownership from the banks to the consumer in January 2018 thereby further enhancing the interconnected digital economy [9, 11]. Open Banking systems were developed by industry using commercial principles as opposed to legal rules based principles and regulated by frameworks advanced in Europe by the Payment Services Directive (PSD[2]), in the United Kingdom by Mulesoft[3] and in Australia by the Australian Banking Association [2]. The Australian Consumer and Competition Commission (ACCC[4]), supported by other relevant bodies endorsed Open Banking giving consumers greater choice and control over their own data that banks have already collected about them via secure online systems. Non-major banks plan to join Open Banking in 2021 [2]. Open Banking is underpinned by Consumer Data Rights (CDR) principles that assign individuals the right on an opt-in basis to securely share specified banking information held about them by businesses (data holder) with other financial service providers (an accredited data recipient) for better deals or apps for new services using automated data technology [7, 15]. Although data transfer occurs between service providers, the Australian Government oversees the main framework.

The main purpose of CDR is to encourage greater competition between services providers, better prices, innovative products and services, the ability for consumers to compare and switch between product and services. Thus, these consumers receive more personalised services, low-cost and convenient access to [12] financial products and services [3]. Supported by the Consumer Data Right Act 2019 legislation, eventually CDR will be rolled out across other sectors of the economy, including energy and telecommunications.

Consumers currently have several ways of initiating payments including cards in-store, in-app, using a wallet, cash, direct debits, online banking with pay anyone, including real-time Osko[5] and BPAY.[6] Current payments governance protocols and fraud controls provide considerable protection for consumer funds. Open payments are already live across Europe under PSD2 and through the UK's open banking regime. To keep pace with these developments globally, Australia is also due to pursue this capability as part of its CDR framework [1].

Consumer Data Rights underpinning the Open Banking model promotes competition through 'switching' and 'end to end' comparison. For example, under a fully developed CDR, an energy consumer would be able to compare their existing energy plans, choose a better deal and immediately transfer direct debit instructions all within a single streamlined user journey.

Although there are many benefits to CDR, such as digital innovation, data portability and information sharing there are also risks associated with CDR and the use of this data, such as privacy and security [15]. The Australian Banking Association [2] proposed ecosystem wide protections, overseen by a CDR governing body, to prevent offerings that would exploit vulnerable customers. This is envisaged as a stand-alone semi-government body which is:

- A single point of accountability.
- An entity that has human resources and funding capability to deliver such a significant economy wide IT infrastructure project.
- An entity that can manage the complexity of such a build to ensure greatest possible commercial viability of that infrastructure. Including the undertaking of an extensive education program for Australian consumers.
- Responsible for the end to end security of the ecosystem.

Standards, technologies and regulatory frameworks can be seen to be moving rapidly to support the development of an ecosystem that encourages the entry of new service providers promising to offer new products for consumers while keeping security, privacy, technology compatibility, counterparty risk, algorithmic failure and other issues at bay [12]. In the next section, we outline how the landscape for electronic health records differs from Open Banking. We advance, as research in progress, the case for an Open Banking style electronic health and medical records ecosystem.

3 OPEN BANKING AND ELECTRONIC HEALTH RECORDS

Figure 1 illustrates a schematic view adapted from Mastercard [14] that depicts a high level view of interactions between buyers, vendors, their banks and third-party providers. The figure illustrates a transaction between buyer and customer where payment from the customer's bank to the vendor's bank is performed by a third-party provider such as Eftpos in Australia. The third-party provider

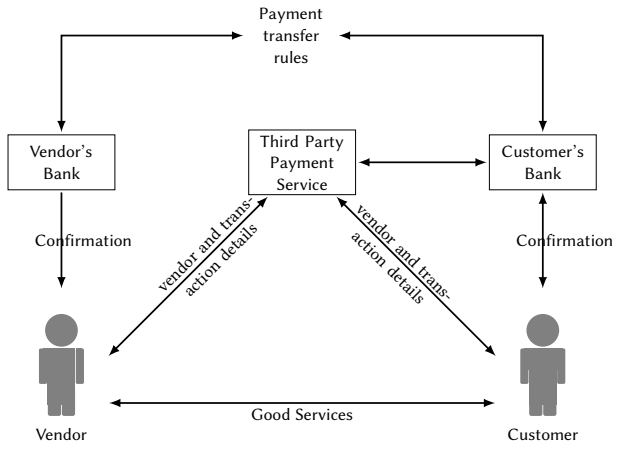

Figure 1: Open Banking Schema (adapted from Mastercard [14])

[2]https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366_en
[3]https://www.mulesoft.com/
[4]https://www.accc.gov.au/
[5]https://osko.com.au/home
[6]https://bpay.com.au/

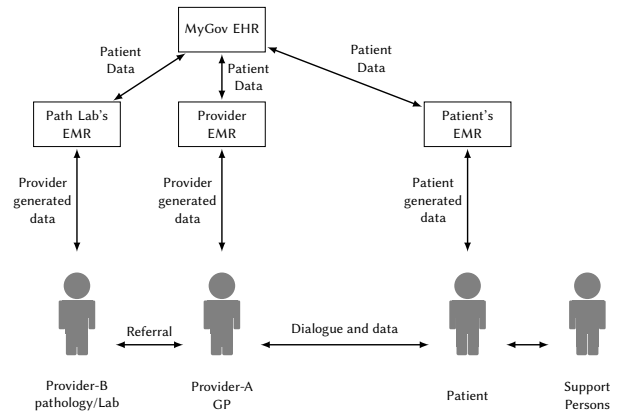

Figure 2: Electronic Health Records Schema based on Mastercard [14] schema design

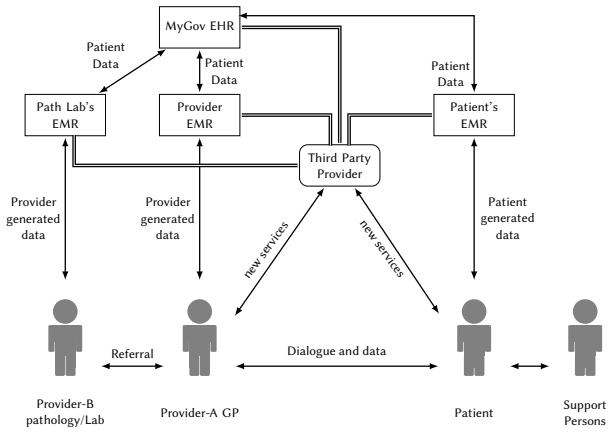

Figure 3: Open Electronic Health Records Schema based on Mastercard [14] design

automatically accesses the customer's bank to retrieve account balances and credit limits to ensure there are sufficient funds to cover the customer purchase. The provider retrieves transaction details from the vendor and directs the customer's bank to authorise and perform the transfer to the vendor's bank. The customer's bank relays the transaction details to the vendor's bank, which they accept. When the transaction has been accepted by the vendor's bank, the customer's bank approves the transaction. To finalise this process, the customer's bank produces a receipt. Both banks create a transaction record for their respective customers. However, there may be situations when the customer's bank declines the transaction. For instance, when the customer was over their credit limit, has insufficient funds, or for a security reason. For example, if the customer's bank, via their monitoring systems, suspect irregular or suspicious activity during a transaction, then the customer's bank contacts the customer to verify the transaction. Alternatively, if the customer suspects unauthorized transaction activity, then they must report it to their bank within a specified time frame. The existence of the third-party payment service saves the vendor's bank from establishing payment arrangements with every vendor and saves vendors from having to enter into payment arrangements with many thousands of banks.

Figure 2 illustrates a similar schematic for electronic health records as currently rolled out in Australia. The interaction between patient and general practitioner provider results in an exchange in signs, symptoms, diagnoses and prescriptions. The patient may record elements of the transaction in their personal health record alongside other data generated from wearable sensors. Key elements of the patient/GP interaction are recorded in the provider's electronic medical record, typically transferred automatically by the provider's patient management system. The consultation in Figure 2 generates a blood test referral to another provider, a pathology lab. The referral and test results are entered into the pathology provider's medical record. Some data is copied from both the provider's medical record to the Australian Government managed My Health Record (electronic health record) that the patient and other providers can access. The schema differs from the open banking schema in that there is no third-party provider that co-ordinates the flow of data between stakeholders. Access to a patient's personal health record is difficult for any provider unless the data has been transferred to the My Health Record. This can only be done by the patient. Figure 3 presents a schematic view of a health setting where a third-party provider is embedded in the setting. This is described in the next section with sample providers.

4 OPEN ELECTRONIC RECORDS WITH THIRD PARTIES

Figure 3 illustrates a schema where third-party providers can access the patient's personal health record, providers' medical records and the My Health Record. Third-party providers in health care that operate in a similar way to those in financial services can conceivably emerge to provide a plethora of services. Three quasi-futuristic services are presented here to illustrate benefits that could flow to stakeholders under an open banking style model for electronic health records:

(1) Telehealth consultation providers that not only provide scheduling and video consultation services but also retrieve all data relevant for the consultation from relevant repositories. This is particularly useful in shared care or multi-disciplinary consultations where consolidating records from many sources is difficult. (Telecare is an Australian start-up that offers this type of services https://telecareonline.com.au).
(2) Third-party auditing service providers that offer information accountability services [8]. This type of third-party provider can access transaction records across multiple providers and patients to discover possible breaches of privacy or security.
(3) Third-party data analytics providers that access a patient's prescription records from the My Health Record, pharmaceutical repositories and provider records so that medication combinations can be compared with entries in adverse drug reaction databases to detect a possible reaction for the patient [13].

In each of the three examples above, a third party is envisaged to provide services to patients and/or healthcare providers that currently does not exist or is not prevalent. The third parties imagined have based their business model on extracting data from one or more medical record repositories, analyzing the data and returning a result for the benefit of its customers. This is akin to the Open Banking model's ecosystem with its Consumer Data Rights underpinnings, in that the data may reside in a repository such as a bank. However, third party providers have access to the data in order to perform a service that is desired by consumers. By directing technological, cultural and regulatory change, industry and governments will create a new ecosystem that enables the sector to change in the direction desired.

An electronic health records ecosystem that entices third party providers to emerge with new models and services using health data, can be expected to require new and perhaps complex regulatory entities that perform roles such as registering and deregistering third party providers. In the financial sector in Australia, the Australian Prudential Regulatory Authority (APRA[7]) is a statutory authority that accredits insurance, superannuation, banking and other financial organisations. The Australian Securities and Investment Commission (ASIC[8]) is the Australian corporate, markets, financial services and consumer credit regulator. The Australian Competition and Consumer Commission (ACCC) ensures businesses comply with Australian fair trading and competition law. The Reserve Bank of Australia (RBA[9]) is responsible for fostering financial systems stability and promote the safety, efficiency, and regulate the payments systems. The extent to which the complex and often overlapping roles of APRA, ASIC, ACCC and other regulatory organisations would suffice to regulate the registration and actions of businesses that access and manipulate health care data as third party providers is unclear. Further, how these and other regulatory authorities should perform their role with third party health data businesses is similarly unclear and warrants further exploration.

5 CONCLUSIONS

The Open Banking model provides an exemplar of technological and legislative innovation in the financial services sector that represents a globally coordinated process for change that benefits consumers and other stakeholders. The result is an ecosystem that encourages new entrants to continuously devise new products and services that is personalised, low-cost and more convenient to access by their customers. In contrast, electronic health records models have not met expectations, are very expensive and have not led to new ecosystems that obviously benefit patients or other stakeholders. The differences between health record models and Open Banking models have been outlined in this article by drawing on third-party providers that could plausibly emerge to deliver new benefits to patients. Further research is planned to identify benefits and barriers to the introduction of Open Banking style electronic health records by analysing responses to Delphi consultations with patients, health care professionals, government representatives and other stakeholders.

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