Privacy by Design in Value-Exchange Systems

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“The cashless and checkless society is obviously technologically feasible now and will soon be economically feasible. (Political feasibility is another question.) Personally, the thought of a system that will record and store information on what I purchased for how much at what time and place everytime I purchase so much as a newspaper or candy bar frightens me. And that brings me to the privacy question.” — Paul Armer, the RAND Corporation, 1967 [1]

This article addresses some of the most contentious issues related to privacy in electronic payment systems, particularly the current zeitgeist of proposed solutions for central bank digital currency, in support of arguments made by Goodell, Al-Nakib, and Tasca [2].

1 Core Principles

We begin with some terms. We use the term privacy to characterise a situation in which a person is not forced to reveal his or her attributes or transactions in a manner that allows those attributes or transactions to be linkable to each other or to the person. This contrasts with data protection, which concerns the unauthorised use of data containing such linkages once they have already been revealed. In the context of a system, therefore, privacy is an architectural characteristic of the design of a system wherein its users are not forced to reveal linkages among their transactions or attributes in the course of using the system. We refer to this architectural characteristic of systems as privacy by design.

We use the term exceptional access mechanism to refer to an element of system design wherein a privileged authority (or other actor, perhaps a hacker or insider) can access data linking the attributes or transactions of an individual. Systems containing exceptional access mechanisms are never private by design, not because of the specific mechanisms for accessing the linkages but because the systems force their users to reveal the data in the first instance. Furthermore, exceptional access mechanisms are widely understood to introduce security vulnerabilities and increase the scope for abuse [3, 4, 5]. We specifically note that privacy cannot be “provided” or “guaranteed” by any particular authority or third-party.

We use the term value-exchange system we refer to a system that people can use to exchange value, including but not limited to payment methods and networks in which people exchange goods and services for money.

We believe that ordinary people conducting ordinary, legitimate activities, for everyday purposes should use value-exchange systems that are private by design to conduct those activities. This is necessary to ensure that individuals can conduct their ordinary, private business without fear that their behaviour will be profiled. Specifically, we mean to imply that transactions conducted using a value-exchange system that is private by design should not intrinsically be linkable to information about both counterparties.
2 Money Laundering

We begin by asserting that AML/KYC regulations around the world, including but not limited to rules intended to achieve conformity with the FATF recommendations [6], should not be construed as a broad admonition against private exchange of value. First, such regulations apply to a particular set of businesses and institutions that handle money on behalf of others. They do not directly apply to all users of money. Second, such regulations were established at a point in history when, unlike today, ordinary people had the option to use cash, a broadly anonymous mechanism for exchanging value, as an instrument in wide range of ordinary transactions, and when the manifest ability for powerful state and non-state actors to collect, aggregate, and analyse data to build profiles of individuals throughout entire populations was far smaller. It is not because of AML/KYC regulations that “surveillance capitalism” [7] has become a leviathan, but the fact that the world has changed means that we need to rethink the contours and limits to what such regulations should achieve.

By stating our requirement for privacy by design, we do not mean to imply that value-exchange systems must allow peer-to-peer transactions without the involvement of regulated intermediaries. Instead, we mean to imply that individuals must be allowed to transact without the need to trust any third party to ensure that they will not be profiled. To satisfy this requirement, it would be sufficient for regulators to have visibility into every transaction, provided that there is no expectation that they will have access to information that could identify both counterparties. We argue that a transaction to or from an anonymous user should be allowable under ordinary circumstances, provided that regulators can identify one of the counterparties to every payment (generally, the recipient), and with the expectation that regulated institutions would share whatever data are needed to satisfy AML/KYC regulations. We note that regulated intermediaries might have never received the counterparty information in such cases.

Following the argument from Goodell, Al-Nakib, and Tasca [2], businesses do not generally need to know who their customers are, and their banks certainly do not need to know who the customers of their customers are. Cases wherein businesses need to know their customers can be handled outside the context of the payment mechanism, and cases wherein businesses are concerned about assurance of payments can be handled by escrow services. Additionally, payments for extraordinary or large-value goods and services can be handled on an exceptional basis without privacy by design, and such requirements can be made legally binding for that subset of payments without providing exceptional access to all payments.

3 Tax Evasion

In most countries that conform to IFRS or GAAP accounting standards, government authorities are assumed to have a legitimate interest in knowing and auditing the income of all individuals, partnerships, and corporations. We interpret this to mean that for transactions of value that can be interpreted to constitute a payment, authorities have a legitimate interest to associate each transaction with its recipient. Note that this does not mean that authorities have a legitimate interest to know both the sender and the recipient.

Therefore, we suggest that regulated intermediaries would generally require the recipient of payments to be financial institutions, for the benefit of particular account-holders of that institution. Recipients of payments without a bank account could opt to receive cash or digital tokens via a regulated intermediary that might be required to conduct an identification procedure for AML/KYC purposes and flag the relevant tax authorities for reconciliation, with appropriate exceptions made for reimbursements and gifts.

In this sense, all remittances using a digital payment system could be monitored, avoiding the peer-to-peer transactions that are viewed by authorities as undesirable from the perspective of taxation and the social contract without creating infrastructure that could be used to conduct mass surveillance by linking recipients of payments to their counterparties.

We also suggest that payers could obtain attribute-backed receipts from their counterparties that could be used as evidence of eligibility for tax deductions or credits. Claimants would be encouraged
but not required to file such claims, and incentives would be aligned such that, all else being equal, they
would be inclined to do so. Using zero-knowledge proofs, such receipts could even be reconciled without
linking specific receipts to specific claims.

4 Common Fraud

There are many forms of fraud, and we specifically argue that it is better to empower ordinary citizens
to detect fraud than to create exceptional access mechanisms for authorities. We quote directly from
Goodell, Al-Nakib, and Tasca:

“Because our system allows a measure of true anonymity, it does not intrinsically require the
identities of both counterparties to be visible to authorities. Revealing mutual counterparty
information for every transaction would divert the onus of fraud detection to law enforcement
agencies, effectively increasing their burden, while well-motivated criminals would still be able
to use proxies or compromised accounts to achieve their objectives, even if every transaction
were fully transparent.” [2]

“Our system design offers a different approach. Because every transaction involves a reg-
ulated financial intermediary that would presumably be bound by AML/KYC regulations,
there is a clear path to investigating every transaction. Authorities would be positioned to
ensure that holders of accounts that take payments from private wallets adhere to certain
rules and restrictions, including but not limited to tax monitoring. The records from such
accounts, combined with the auditable ledger entries generated by the DLT system, could en-
able real-time collection of data concerning taxable income that could support reconciliation
and compliance efforts. Because all of the retail payments involving digital currency would
use the same ledger, identification of anomalous behaviour, such as a merchant supplying an
invalid destination account for remittances from private wallets, would be more straightfor-
ward than in the current system, and real-time automated compliance would be more readily
achievable. Such detection could even be done in real time not only by authorities but also
by counterparties, thus reducing the likelihood that it would occur in the first instance.” [2]

5 System Operation

With the focus on privacy, it might be reasonable to ask: Why do we need the transactions to be processed
by private actors, who have obvious incentives to capitalise on data that can be used to profile users,
rather than by government actors, who would at least be accountable to the public? Were our approach
based on data protection, then we might indeed make such a recommendation. However, privacy is
not the same as data protection, and a system based on privacy by design has a different set of design
requirements.

First, we recognise that in a truly private system, the operators do not actually have access to the
information from which profiles might be constructed in the first instance, because customers are not
forced to reveal it. Thus, although the motivation and integrity of individual actors is important, it is
more important that customers have a wide range of independent actors with which they can interact,
so that none of them are in a position to compel users to reveal ancillary metadata outside the system
requirements that could be used to build profiles.

Second, only in a federated system of private, independent actors can we achieve a measure of
assurance that the system operators are accountable to the wider public. Correct operation of the
system is essential for a system that is private by design, since the temptation to change the rules to
undermine the privacy of its users would surely be great. We use the term sousveillance to refer to
the means by which the governed can observe the actions of those in power and ultimately hold them
to account. Because proposed changes to the system must be circulated and agreed by members of a
federated system, any of whom could potentially object or even publicise news of the proposed change,
and because compliance with the rules can be observed and audited, a federated system of private, independent actors offers a measure of accountability to system operators.

Third, we recognise that a monopoly operator lacks an incentive to maintain privacy characteristics through continued improvement. Competition in general and a diversity of implementations in particular offer scope for innovation that will lead to more robust design characteristics and outcomes.

6 Data Brokerage

Privacy is a public good and susceptible to the Tragedy of the Commons. We believe that it is not enough to make it possible for users to make payments without identifying themselves. Unless a system is private by design and private by default, the anonymity set of users who need privacy the most will be undermined by the preponderance of people who are not part of that set.

The autonomy of individuals around the world is under threat every day by data harvesters, data brokers, and data consumers who build profiles for the purpose of manipulating populations cheaply and at scale. With surveillance capitalism in mind, we might imagine that regulations that mandate the implementation and use of systems that are private by design could be a means by which state actors could push back against powerful profilers in the interest of the public. The challenge of compelling powerful incumbents to change behaviour is daunting, although there is evidence that the EU has recently begun to explore ways to change the model that allows data brokers to be as successful as they are [8]. Of course, the value of payments data is not lost on global data brokers and profiling businesses, who are keen to access such data [9]. Financial transactions are particularly sensitive as a high-value source of information about the habits, predilections, and circumstances of individual persons, not only because of the high degree of assurance provided by AML/KYC procedures that are prerequisites to such transactions in practice today but also because of the fact that exchanges of value definitionally consume scarce resources that require judgement and parsimony on the part of transacting parties.

In the meantime, full-service banks are being squeezed, on one side by challenger banks that often have data-sharing relationships with data consumers such as payment networks, retail marketplaces, credit bureaus, and insurance firms [10], and on the other side by costs associated with AML/KYC compliance [11]. Although we do not suggest specific changes to AML/KYC regulations, we do believe that a system that encourages banks to collect less data rather than more about their customers’ transactions would benefit both the banks and their customers.

7 Concluding Remarks

Ultimately, the costs and benefits of dragnet surveillance are unevenly distributed across the population. Profiling, whether by state actors or non-state actors, means that people at the margins face discrimination on the basis of their status, while protections accrue to those who are already well-endowed. Furthermore, surveillance does not actually serve the purpose for which it is intended, even if we ignore its costs to society. Criminals would not need a system that is private by design to achieve their objectives because they will always have access to stolen credentials or account information that will allow them to transact using the credentials of their victims. Individuals with the means to do so will also not need a system that is private by design, as they always be able to rely upon members of their retinues to conduct transactions on their behalf. So really, the only people that would be harmed by surveillance would be those who are both law-abiding and relatively poor. Thus, surveillance as a policy is intrinsically regressive.

In conclusion, trust is something that must be earned. Trust cannot be compelled by a central operator, and that privacy must be intrinsic and not subject to trust. We must not countenance the deployment of a system that demands that its users submit their everyday activities to monitoring and profiling by powerful authorities. Not only would such a system inexorably create demand for alternative, “outside solutions” that would be accessible only to a small segment of the population, but it would also undermine the autonomy that is foundational to liberty and human flourishing.
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