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Data for outcome payments or information for care? A sociotechnical analysis of the management information system in the implementation of a social impact bond

David Jamieson, Rob Wilson, Mike Martin, Toby Lowe, Jonathan Kimmitt, Jane Gibbon and Max French

Abstract

Social Impact Bonds (SIBs) are a policy intervention designed to explicitly link the activity of social interventions to outcome payments. Despite a burgeoning literature on SIBs there is a lack of evidence in relation to the information system characteristics and accounting mechanisms of SIBs. Applying a multi-dimensional sociotechnical lens to a case study of a SIB allows us to reveal the current problematic convergence of public management and information systems. The authors found that an information system within a SIB is introduced and adapted to increasingly prioritize the production of data for payment over documenting care accounts to support improved provision. The findings of this paper also suggest that claims of SIBs as an innovation are limited as they are subject to the familiar problems of New Public Management practice, in the way they shape the design and use of the data in governance, management and service delivery practices.

Impact

Social Impact Bonds (SIBs) have been positioned as an innovative vehicle to improve health and social outcomes through the use of externally provided funding. Although the debate about the viability and robustness of SIBs continues, no focus has been given to the informational requirements that are mandated in order to ensure that outcomes are being achieved—and therefore enable payment. The authors challenge that the data that is being collected by SIBs is in essence for the purposes of financial accounting rather than demonstrating improvements in the quality of care.

Keywords

Data sharing; information management; information sharing; management information systems; Social Impact Bonds; social care; social determinants of health; sociotechnical system

Introduction

A Social Impact Bond (SIB) brings together a network of actors—including social investors, commissioners and delivery organizations—to facilitate, enact and account for specific social interventions which will make a calculable financial saving to the state. Many UK SIB projects use

special purpose vehicles (SPVs) as third-party organizations to manage the contracts between the investors, commissioners and service providers engaged in the definition, funding and delivery of the service intervention. A feature of the SIBs approach is that stakeholders engaged in all levels of their operation must create explicit links between measurable outcomes and financial payments (Warner, 2013; Fraser, Tan, Lagarde, & Mays, 2018; Lowe, Kimmitt, Wilson, Martin, & Gibbon, 2018; Sinclair, McHugh, & Roy, 2019; Carter, 2019). This is implemented in accounting mechanisms which in turn implies some form of information system to support the operation of a SIB-funded activity. Despite the universality of this requirement, and recent calls for the widening of perspectives on SIBs (Tan, Fraser, McHugh, & Warner, 2019), there is little evidence regarding the informational aspects of how SIBs are operationalized in practice. This paper explores these information systems aspects within their wider sociotechnical contexts making use of a three-dimensional view (3D) approach (McLoughlin & Wilson, 2013).

The SIB-funded intervention examined in this paper was associated with a social determinants of health (SDH) programme with the aim of improving the wellbeing of cohorts of adults with health risks in an economically deprived area of a city in the north of England. The main purpose of the intervention was to provide link workers to offer coaching and support (social prescriptions) to clients (with specific chronic conditions) based on referral from local primary care organizations (Dayson, Fraser, & Lowe, 2019). The social investment provided working capital, combined with grants from other UK government sources, on the premise that, as the outcomes of the intervention were delivered, the public service beneficiaries would repay the investor at an agreed rate of return. These payments would be released on the submission of sets of accounts which provided evidence that the service delivered had achieved the planned outcomes defined by a basket of measures. These measures included the reduction of unplanned admissions to hospital for the identified cohort of service users.

Before turning in detail to the information systems theories and the empirical context of the SIB-funded SDH programme, we examine the ways in which information and data are currently generated in public service contexts. The application of detailed and rigorous accounting to relational services involving care and wellbeing must currently be positioned within the wider framework, by which health and social care is delivered in the UK: New Public Management (NPM). The NPM approach has been the underlying paradigm of an ongoing shift in public service provision from grant-based funding, largely founded on trust, to what Ferlie, Ashburner, Pettigrew, and Fitzgerald (1996) have described as 'management, markets and measurement'. In order to make this work significant, changes in the use and intensification of data have been required to support the processes of disaggregation, competition and incentivization which have drawn upon the practice's digital commerce as their principle basis (Dunleavy, Margetts, Bastow, & Tinkler, 2006).

Dunleavy et al. (2006) recognized that a combination of the growth of the internet, together with the pervasive uptake of IT, information management and diagnostics in organizational back-office systems, meant it was only a matter of time before the resulting data-driven management approaches permeated to front-office practices as well. After 2000, the rapid informatization of public services in the UK, through a range of government initiatives and investments, led Dunleavy to propose that the informational problems NPM had created could be addressed by adopting digital-era governance—DEG (Dunleavy et al., 2006; McLoughlin & Wilson, 2013; Dunleavy & Margetts, 2010). The DEG concept is comprised of three elements: reintegration of service elements, needs-based holism, and digitization. It was claimed that DEG made NPM effective in the delivery of public policy by foregrounding the technological affordances of data storage and communications. As a result of this, Dunleavy et al. (2006) claimed it made sense to characterize current public service changes in terms of these new information-handling potentialities. In parallel, attempts in the USA to build a 'virtual state', highlighted the fact that the outcomes of the adoption of digital technologies in public services are conditioned by the way in which public managers 'enact' these policies within and through them (Fountain, 2001). However, the technological focus of both these perspectives fails to recognize the interdependence between technical and organizational change, particularly in the context of public service organizations. The complexities of motivations and of presenting problems in these contexts mean that they tend to behave as sociotechnical systems where the ambiguities, affordances and constraints of the parts interact in complex indeterminate ways to influence the whole (McLoughlin & Wilson, 2013).

This paper makes sense of this convergence of public management and information technology by making use of a case study of a SIB focused on SDH. Our focus on the information systems aspects of the problem leads to the conclusion that the implementation of policy initiatives such as SIBs can be better understood from the perspective of a sociotechnical process through which context-specific outcomes are shaped (McLoughlin, Clark, & Wearne, 1995; McLoughlin, 1999; McLoughlin & Badham, 2005; McLoughlin & Wilson, 2013). To this end, the paper adopts a sociotechnical framing, in the form of McLoughlin and Wilson's (2013) three dimensions of digital government, to better understand the interdependence between the technological and human/organizational factors within the system which supports a SIB. The framework allows us to explore key issues that would otherwise be obscured by deterministic perspectives of the organization or technology. The three perspectives relate to how the development, implementation and ongoing use of a management information system (MIS) impacts the operation and functionality of a SIB.

Digital government: where technology, public management and organizations collide?

In seeking to explain past and current technology and organizational factors applicable to this SIB case, the emergence of digital government—and its associated literature base—has given new emphasis to the situated interdependences of change in public organizations. However, McLoughlin and Wilson (2013) observe that research on public service organizations has tended to ignore the social aspects in the analysis of information and communications technology. Each stage in the framework we adopted included propositions regarding the dynamics of change and the nature of the relationships between it and ICTs that were involved. This approach supports the explicit exploration and explanation of ‘social dynamics’ based on three views of the system which are characterized by the number of dimensions they make use of (McLoughlin & Wilson, 2013).

The one-dimensional view (1D) of technology and the organization assumes a causal relationship between the changes in technology and changes in the organization and its behaviour. In this view, technology and organization are seen as two distinctly separate entities. Within the first dimension, there is a widely held belief that technology has a mediating— but not determining—effect on the organization. Those operating in the technical 1D perspective do not see technology as being open to social influence. The ‘technical view’ of the 1D perspective sees technology as having an independent external impact on organizations. New technologies are regarded as coming from ‘outside’ the organization or sector and affect the nature of management, work and organization within it (McLoughlin & Badham, 2005). This technologically deterministic perspective is often implicit in a number of theories that have been used to examine the adoption and diffusion of technology in the organization (Grandon & Pearson, 2004; MacKenzie & Wajcman, 1999).

The second form (or ‘social view’) sees the causation being ‘reversed’ and technology is seen as ‘socially shaped’ by the economic, cultural, policy, and the institutional context thereby influences its development and deployment within organizations. As a result, technology exists in a direct response for the organization to exist, participate or compete alongside others. Therefore, the organization sees the introduction of technology as one of the ‘costs of entry’ to participate within the overall system, or as a direct response to remaining current with competitors and similar-minded organizations. In direct comparison with the 1D perspective, the two-dimensional (2D) view emphasizes the role of system designers and the interactions between people or organizations over time. From the 2D perspective, there is a specific need to understand the ‘duality’ between technology as an entity and how it responds to the managerial, organizational and environmental frameworks during its conception, development, deployment, implementation, and operation. Furthermore, this view suggests that information technologies are not so much adopted or implemented but are enacted through the decisions of managers and professionals about how and where technologies should—and conversely, should not or cannot—be deployed and used (Fountain, 2002). As such, it is argued that organizational, political and institutional logics are

reinforced through technology and the organizational status quo rather than acting on them (Fountain, 2001).

However, both 1D and 2D views fail to account for key aspects of the relationship between technology and the organization, in particular for changes that take place in and through its use. The cause of this gap in understanding is, as Heeks (2005) suggests, a result of the temporal, spatial and organizational separation between the system designers, developers and technologists who are external to the organization, and the system stakeholders. These ‘technology creators’ are not privy to the contexts required to ensure successful representations of the organization which results in a ‘design-use mismatch’ and ‘contextual collision’. This requires an additional specific focus on what has been termed the ‘biographical’ aspects of the system (Williams & Pollock, 2008). This is crucial within the processes of a networked sociotechnical system where the complex interactions between the range of organizational and technological actors are ongoing.

The 3D perspective seeks to incorporate the observations from the first and second dimension in order to add the insight that the distinction between ‘technology’ and ‘organization’ is itself a dynamic, emergent, malleable, and contingent sociotechnical factor (Badham, 2005). Orlikowski (2009) suggests that understandings of technology are neither fixed nor universal and instead emerge from situated and reciprocal processes of interpreting and interacting with particular artefacts over time. As such, the temporal and perspective limitations observed within 1D and 2D view are mitigated using the 3D perspective. This in turn enables improved interpretations of technology and the organization. All three dimensions with the underlying assumptions are summarized in Table 1.

Table 1. Dimensions of digital government.

Dimensional view	Underlying assumptions
Technical 1D view: technological determinism or techno-centric	Causal relationship between changes in technology and changes in the organization with technology are seen to having external impact on organization
	Technology has mediating but not determining effect on organizational outcomes

Dimensional view	Underlying assumptions
Social 1D view: socially-shaped (Bellamy and Taylor, 1998)	Technology is itself a product of social, economic and political forces and dynamics; technology is an output that is delivered via the shaping process
	The world of the 'user' is inscribed in the system by the 'designer'
2D view: enactment perspective (Fountain, 2001); DEG (Dunleavy et al., 2006)	Moves beyond the simple cause and effect models implicit in the impact of technology and social-shaping approaches. Emphasis is on mutual shaping of the technical and the organizational through the dynamic interactions between people and technology and decisions 'enacted' over time
	Outcomes are the result of a process that is mutually dependant, integrative and co-evolving
3D sociotechnical view (McLoughlin & Wilson, 2013)	The distinction between 'technology' and 'organization' is itself emergent, malleable and contingent socio-technical entity
	Interactions occur through everyday use of the technology which involves a repeatedly experienced, personally ordered and edited version of the technological artefact being experienced differently by the same individuals depending on the time and circumstance

3D encompasses the full lifecycle of design and procurement through to implementation, adaptation, customization and mature alignment (McLoughlin & Wilson, 2013). We used 3D to reveal, through the sociotechnical lens, an integrated and multi-dimensional view which better reflects the real-world realities of the delivery, management and governance of health and social care.

Methods

This analysis in this paper draws on a single case study research design incorporating a combination of a longitudinal ethnographic approach allied to interviews with key stakeholders, commencing with the initial technology specification in 2013 through to the mature and stable system of the present day. This was achieved primarily through ongoing interviews (five) and observation notes of meetings (seven), supported by documentation provided by the actors and events involved with the specification, development, implementation and operationalization of the SIB MIS and its wider systems environment drawing on a series of interviews with the participants (including the stakeholders—SIB participants, commissioners and service providers—22 interviews conducted in 2015– 2016).

The use of an in-depth single case study design, according to Eisenhardt and Graebner (2007), is useful in circumstances that relate to new phenomena being studied. In this case, the information systems were being created to support the mechanisms required for a policy innovation of SIB

funding of an emerging care innovation of link workers providing ‘social prescribing’ and advice. Following other studies adopting a sociotechnical perspective (see Geels, 2002; Geels & Kemp, 2007), we used a multi-perspective approach in the form of the multi-dimensional account of the system—via the organizational system and corresponding MIS. These concepts were used as the basis of a thematic analysis (Miles & Huberman, 2002) to draw out the key developments over the biographical course of the SIB-funded system and connection to the wider system throughout its lifecycle. Our thematic overview is augmented with abstract projections or figures (see Figures 1–4) drawn to represent the complex web of interactions between the organizational and informational aspects of the complex sociotechnical system (see Jenkins & Wilson, 2007; McLoughlin & Wilson, 2013).

Context of the case study and the MIS phases of development

The aim of the SIB funding was to resource an SDH programme based on the innovation of ‘social prescribing’. Social prescribing is an increasingly popular intervention aimed at addressing the societal challenges posed by social determinants of health and wellbeing (see Dayson, 2017). In our case, the intervention was primarily to support the creation of link worker roles to build relationships with clients referred by NHS GP practices. In this relationship, the work of the link worker is to broker (or ‘prescribe’) a range of relevant activities (such as community walking clubs) and/or referrals to existing local services (social prescriptions). The SDH began its journey toward a SIB programme through a coalition instigated by a local voluntary sector support agency, in 2011 (outlined in Figure 1).

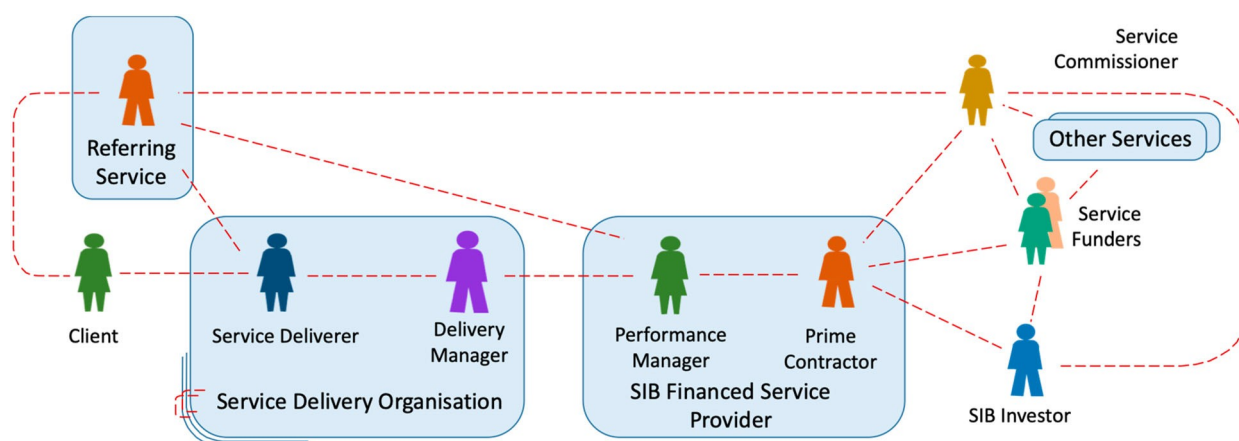


Figure 1. Organizational inter-relationships with the SIB-funded SDH programme.

The service commissioner for the SIB programme was the local clinical commissioning group (CCG). The investment organization was a national body with significant activity in the social investment arena. The programme also received ongoing grant funding from central government and charitable organizations to enable readiness, deployment and operational management. The roles of the stakeholders/organizations involved in the programme were as described in Appendix 1.

We now describe the development and implementation of the MIS, with particular emphasis on the

relationship between the organizational actors and the data and information issues through three phases of development.

One of the early steps in the first phase of the development of the MIS was the design of the SDH SIB. The requirements for the management of data and information were driven by the emerging needs in the negotiations led by the team of social entrepreneurs proposing the SDH SIB. This had implications for the organizational framework surrounding it including establishing the SPV and the selection of tools for managing of delivery of care. A key decision here was the selection of the 'outcome star' as the core tool for supporting the discussions between the link workers and the clients. The outcome star is a validated tool that supports and measures development and change in a supporting relationship by recording progress across a series of dimensions using visual representations (based on the points of a star). The outcome star is intended to be used as part of an overarching co-productive approach to conversations between the parties involved which takes into account the multiple dimensions, perspectives and needs of an individual. These can then be used to determine the 'distance-travelled' from when the intervention commences through to its completion (see MacKeith, 2011).

The initial focus of the proto-SPV was on the design of the intervention and, as the negotiations progressed, the implied need for data and information. This was an intrinsic part of the process of setting up the instruments for a SIB. The realization that this required a bespoke MIS emerged from conversations led by the SDH SPV organization discussing options with the various stakeholders who had a role in allocation of resources (the service commissioner, the social investor and grant funders). The proposed data flows between the stakeholders, including those within the SIB MIS and from the wider system (for example QoF and HES data), are shown in Figure 2.

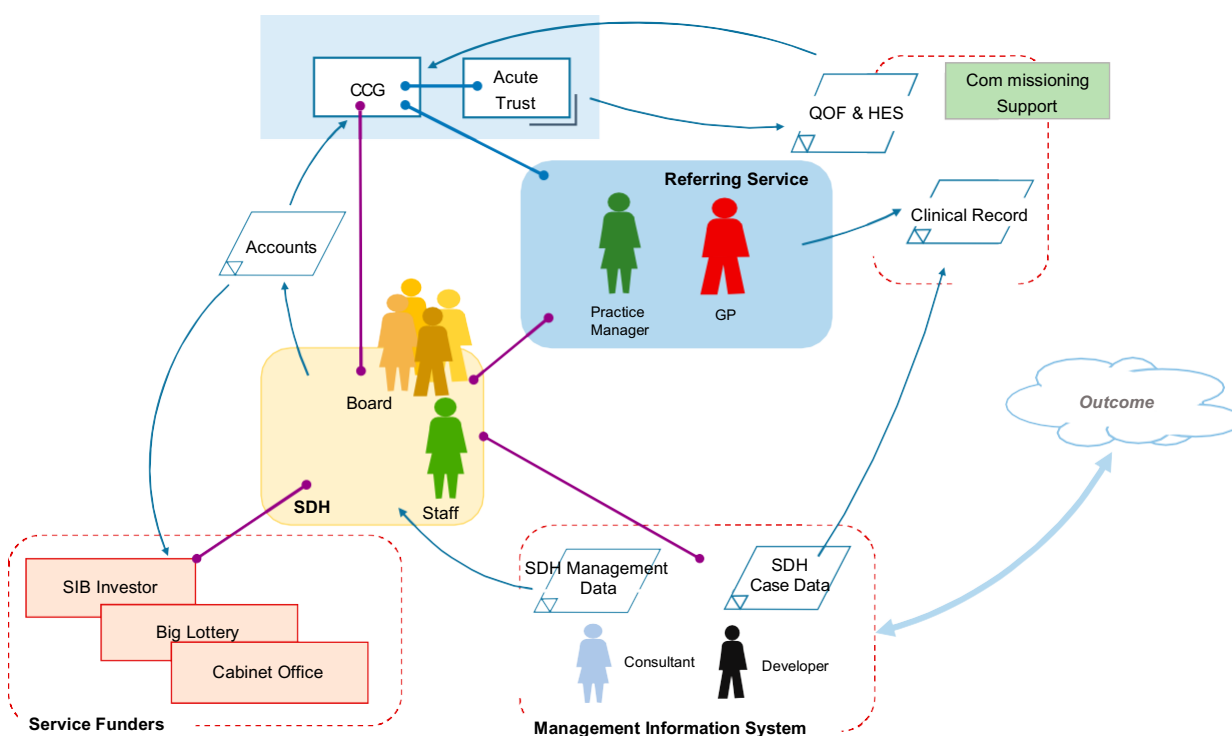


Figure 2. Resource actors engaged in formulating the service and its management.

Key to these discussions were negotiations around the potential target clients of the SDH intervention whose health outcomes could be improved through interactions with a link worker. Initial conversations with the general practices in the targeted local area had identified a range of cohorts with chronic diseases that might benefit—for example people with musculoskeletal problems. Further discussions between stakeholders identified tensions between the underlying mission of the SPV, which was to focus work on longer term population prevention activity, and the requirement of the SIB funding to demonstrate outcomes in terms of short reductions in the use of services (such as hospital admissions). For example the discussions with the CSU which culminated in the ruling out of direct engagement with clients with musculoskeletal problems as the tariff in the existing NHS payments system at that time, for that class of disease, was considered too low to deliver the potential for resource savings needed to meet the proposed terms of the SIB.

There were challenges involved in recording individual client information with the need to record with whom, when and for what reason, service providers and link workers were engaging with a client. The internal actors were uncertain as to the best method to design and implement such a system so, early in this phase, an information systems consultant was appointed to assist with assessing these requirements. The objective was to provide a solution that would allow the SDH to not only capture their patient engagements, but also allow them to exchange data from and to NHS partners, including GPs and service commissioners.

At the culmination of the first phase, decisions regarding how data was to be produced were made. This included the building of an MIS containing datasets proposed by the CSU and the information system consultant. Care-related information would be input by the service providers and link workers. The SDH SPV would provide exports of the accounting data to the service commissioners and case information to CSU.

Table 2. Initial data and information sources and tools in the SDH programme

Performance indicator	Data source	Data purpose	Data source(s)	Data user(s)
A patient wellbeing indicator	Wellbeing outcome star completed electronically using the SDH's MIS	Records the wellbeing progress of a patient using accredited intervention tool	SDH SPV and service provider	CSU, service commissioner
A reduction in the number of unplanned hospital admissions	Hospital episode statistics (HES from secondary	Submitted to secondary uses service (SUS) in relation to patient	Secondary healthcare (i.e. hospitals) information systems	CSU, service commissioner

Performance indicator	Data source	Data purpose	Data source(s)	Data user(s)
	healthcare providers	hospital admissions, accident and emergency attendances, and outpatient appointments		
A reduction in the number of GP visits	Quality outcome framework (QoF) data from GPs	Subset of data used from GP-specific reward and incentivization scheme used to measure the quality of care delivered to patients	Referring services	CSU, service commissioner

The original set of data sources and information tools which were to be combined by the SDH in order to provide the accounts are described in [Table 2](#).

The developments then entered the second phase of post-implementation, set-up and initial organizational/MIS changes (April 2015–September 2016), going live at the beginning of the SDH programme. The assumptions made in the run up to the deployments led to a series of issues for the initial stakeholders involved in the discussion but also for the wider network of stakeholders who now became directly involved as the SDH programme began. [Figure 3](#) summarizes the set of stakeholders involved in the SIB at the point of implementation. In particular, the pivotal role of the service providers and link workers in the production of data and their stake in how it is recorded and reported for payment is clear.

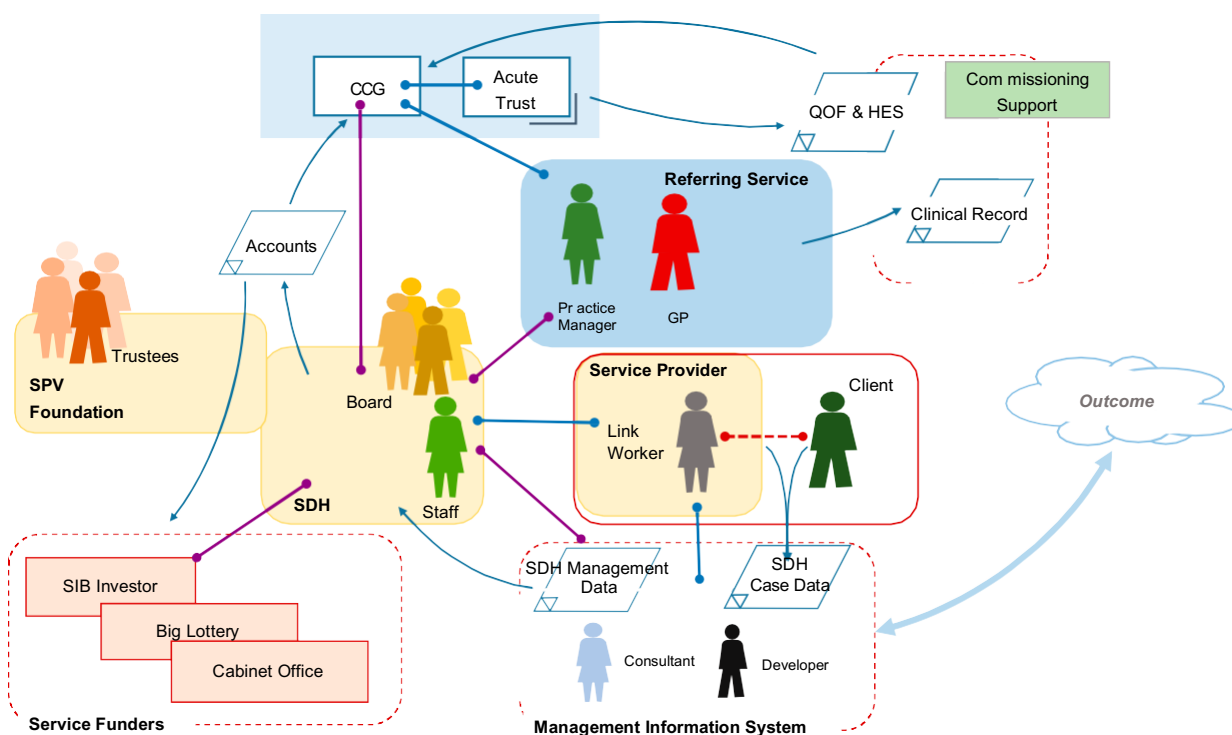


Figure 3. Initial operational SIB relationships and data flows.

One of the key initial targets linked to outcomes payment for the SPV and the service providers contracted to run the intervention was the recruitment of clients via referrals from general practices in the CCG area. Early projections of a potential shortfall in recruitment meant increased emphasis was put on the recruitment of clients, in order to meet projected, contractual targets, and to ensure that service providers received payments for the completion of outcome stars. The initial MIS was unable to respond to these needs. The service providers highlighted that the dataset did not contain enough information for link workers to capture client contact—especially where explanations as to why specific, contractual key performance indicators (KPIs) linked to the completion of an individual outcome star were missed. Service providers were also unsure as to the number of outcome stars that had been adequately completed and therefore what payments were due. In response to this gap the service providers began to keep local records in order to have an account from their own perspective from which to show their version of the work that had been undertaken.

In response to these sorts of problems, changes to the MIS were requested, and implemented. New 'features' included the ability to provide notifications when an outcome star was due to be completed, a claims feature, which tracked and progressed payment claims, and the ability to have differentiated outcome star payments when specific criteria were met. One example of such criteria was the recruitment of 'hard-to-reach' clients from Black, Asian and minority ethnic communities and 'maintaining engagement' with those clients that had been deemed 'completed' by the service provider but where contact was still going on between the client and link worker.

Following the second phase of development, the MIS entered a third phase of continuity and change (from September 2016 onwards), where ongoing developments occurred in response to a series of unplanned requirements with the current situation being the emergence of the SIB SDH as a 'mature' system. An important driver in the process was the SDH SPV initially seeking to manage the risks to outcome payments for client engagement. One of the means by which this was addressed was by increasing the likelihood of success in meeting the KPIs of the programme, which largely rested on the service providers and the link workers. Another source of change was the questions that began to arise regarding the unintended consequences of the SDH programme. For example reports from SDH service providers and the wider community that clients were being signposted to social services and other service providers (statutory and voluntary community service organizations and community groups). These provider organizations found themselves filling social prescriptions made by link workers without being resourced from the SDH SIB programme—ironically running counter to the underlying premise of the outcome payments for reductions in use of services (these were care and community services outside of the NHS). This was further complicated by apparently competing SDH programmes with similar aims and methods being funded in the locality, who were drawing from the same client groups as part of their activities, thereby further muddying the water in terms of the recruitment to the SDH and attribution of the outcomes. Later in this phase there were changes to the referral processes into the SDH programme through both self-referral and a link via specialist secondary care services working with clients with a combination of the appropriate conditions and postcodes.

This resulted in further interest and inputs from other external organizations, including local government social services, into the programme. The response, from the SPV, was to adjust the MIS in an attempt to assign attribution to the intervention by the SDH. The extension of engagement into the wider local statutory care network led to new data capture needs, including the tracking of client interactions with other services. In addition, the SDH was evaluated by third-party organizations partially using data exports from the MIS (including a local university which sought to expand the dataset as a means to explore the establishment of cohort-based research).

While changes were made to the MIS, the outcome star based functions of the system remained stable, implying that the underlying basis of the SDH intervention being conducted by the link workers remained broadly similar. However, the volume of data items being collected by the link workers expanded significantly, including functions specifically aimed at recording the reality of the unforeseen frequency of interactions with clients. Enhanced data collection tools included

characteristics such as height and weight (in order to calculate BMI) and contacts with other services, such as mental health. The increased number of data fields within the MIS was in response, partially, to changes to the NHS tariff over the period, but also the needs of external parties, in particular the social investors where pressures intensified to improve the breadth and volume of the data to improve quality of decision-making surrounding outcomes for payment.

Throughout all three phases, ongoing and fragmentary demands made on and by the SPV and the SDH programme had implications as to how the activity of the link worker was organized, with consequent effects on the ways in which client outcomes were being recorded. The emphasis on the expansion of data capture requirements within the MIS can be interpreted primarily as mechanism for recording encounters, rather than supporting link worker interventions aimed at enhancing wellbeing (for instance the provision of a local directory for social prescriptions).

From the perspective of the system, the maturity of the MIS and the wider system becomes the basis on which to produce the data for an accounting ledger, where transactions provide evidence and activity for performance-related payment rather than recording used primarily for care. Figure 4 reveals the complex network of actors involved with the mature SIB system and the production and use of data which go far beyond the original understanding of the stakeholders engaged in the original specification of the MIS. Given the coupling between the systems required to produce the data for the SIB accounting, even minor changes in the surrounding health systems, as we have seen throughout the phases of the MIS lifecycle, potentially have significant implications for the SDH MIS.

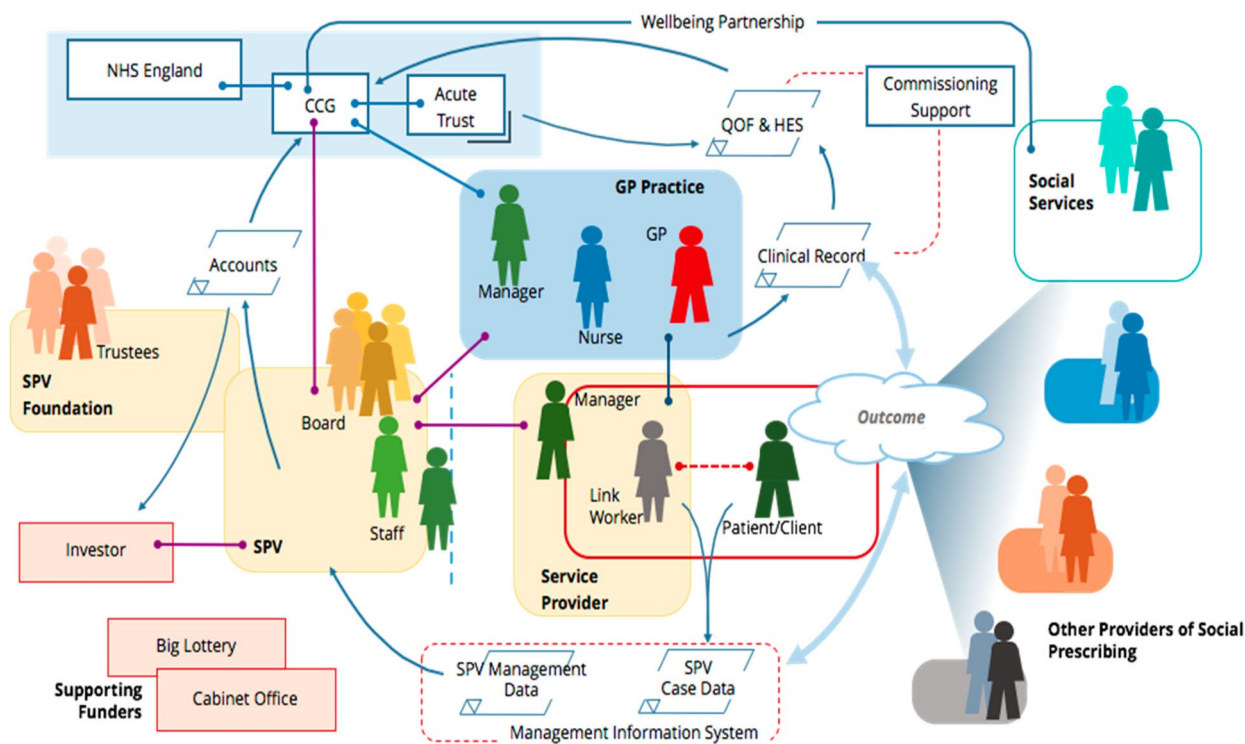


Figure 4. Mature operational SIB relationships and data flows.

The evolution of Figures 1–4 highlights the increasing involvement of actors and organizations. This

only becomes apparent once the MIS is operationalized and the purpose of the information produced is realized.

Discussion

Turning back to the dimensions to provide the sociotechnical lens through which to analyse the MIS of the SDH, [Tables 3–5](#) highlight the key events from the development of the SIB including observations made. Within the context of the SIB, the MIS—and therefore the starting functionality and outputs—was inscribed by the system designers from the technical and social perspectives primarily in phase one of the case. This is because the understanding of the SIB was ‘completed at distance’ from the work of link workers and their recording practices and done so in the context of imposed constraints of the central tool for recording (the outcome star) and existing data sources needed to provide evidence for the payments (the NHS payment tariffs). Furthermore, this perspective shows how the primary concern of the stakeholders (separately from the technical and the social perspectives within the view) in the design and intended use of the MIS (and its associated outputs of data for payment) shaped the first part of the activity where the initial design took place. How these played out from the technical and social 1D perspective is summarized in [Table 3](#).

Table 3. 1D view of digital government applied to the SDH case.

Dimensional view	Key events from the SDH case
Technical 1D view: technological determinism or techno-centric	Assumption that outcome star would provide necessary information to support delivery and production of data to ensure payment
	SDH needed to provide data for accounting purposes and ensure similar-based datasets and data objects used by service commissioners were in place. Accounting data ensured validity of funding, leading to financial payments
	Technology implemented to reflect interpretation of requirement outcomes to validate underlying process, and the origins and provenance of the data provided. Fluidity in how (more) data would later come to be produced
Social 1D view: socially-shaped (Bellamy and Taylor, 1998)	Social, economic and political aspects of bespoke MIS defined in response to several pre-conceptions and interpretations by external information system consultant. Assumption that NHS datasets were needed, and to frame a client’s episode of care without prior consideration
	Underlying assumptions implemented by system developer led to certain restrictions to SDH and the service providers being unable to respond to requirement to produce more data relating to outcomes. Role of information system consultant, in the design stages, impacted production of data at a later stage when more and different data was needed to respond to low recruitment

The realities of how the MIS would and could be used in practice for service delivery and care were

not able to be explored in any meaningful sense, leading to many of the issues which emerged in the second phase. This supports the notion that the system designers and SDH programme stakeholders—invested and aware of the intention of the MIS but not the extensions that might be required in the delivery of the care to the clients—were operating almost exclusively within the first dimension.

Turning to the insights provided by the 2D view, we focused on the imperative at the beginning of phase two for the SDH SPV and service providers and the management of the recruitment to the SDH programme. This was allied to the tensions between ongoing management and development of the MIS over the data recording for payments. The specification during the first phase of the SDH programme had failed to account for the agility and functionality needed to record and progress the care of a client—from the initial starting point of recording transactions between the client and those involved in the SDH programme intervention. As a result, the SDH programme ended up being increasingly integrated into the performance logics of the wider healthcare system and the MIS being one of the sources of data needed to provide the accounts for the payment of outcomes. [Table 4](#) provides key observations and events from the SDH, underpinned by the theoretical framing within which the observations from the 2D perspective are summarised.

Table 4. 2D view of digital government applied to the SDH case.

Dimensional view	Key events from the SDH case
2D view: enactment perspective (Fountain, 2001); DEG (Dunleavy et al., 2006)	Additional data points along with prompts for notification regarding payment-related activity implemented. Care delivery predicated by requirement to introduce incentivization to produce and provide more data to ensure payment. Further evidenced with introduction of explicit incentivization
	Use of activity-based data supported identification of lack of referrals. MIS re-developed to include incentive-specific features and refactored to respond. No stable state for SDH: managerial requirements emerged and requested, to ensure proof and timely payment. Changes have been made to MIS to provide this data

Finally, we looked at the case through the 3D lens to build on the insights from the 1D and 2D views, with the additional insight that the difference between ‘technology’ and ‘organization’ are in themselves an emergent, malleable and contingent sociotechnical entity (McLoughlin & Wilson, [2013](#)). Applying a 3D view requires the adoption of a new discourse that is a critique of current methodologies and their perceived benefits. This view, which includes the considerations and importance of 1D and 2D views, should and can be used as a means to reflect and predict the outcomes of care-based information systems—see [Table 5](#).

Table 5. Towards the 3D view of digital government applied to the SDH case.

Dimensional view	Key events from the SDH case
3D sociotechnical view (McLoughlin & Wilson, 2013)	MIS remains constantly under development due in part to reconfiguration of NHS data requirements and need for further performance-related data which increased interrogations of KPIs. Organizational changes are represented within the MIS and data it produces. Little evidence to support real improvements to healthcare delivery. Evidence of performance of an indoctrinated way of working, whereby data is produced to support payments
	Increasingly wide array of interested parties and ways they have come to be involved reflected in ongoing reconfigurations of MIS. Constant re-development coincided with new linkages and interpretations of data and how recording this information is primarily geared to recording encounters to scaffold payments. New customizations seen to reduce risks to payment with greater emphasis on those which allow for communication of actions required to manage the risks associated with these payments

By applying the ‘integrated multi-dimensional view’ to the SIB system, we conclude that, in our case, information being recorded by link workers for care is at best agonistic with the overall requirement to collect data for the purposes of payment. By using and applying the 3D view, we improve our understanding of the challenges of management information systems overall—including the case being analysed here—and the ways in which the modes of interaction between the organization and information system create a ‘locked-in’ perspective of data and information.

Conclusions

This paper has foregrounded an important aspect of SIBs which has not been explored before—the interrelationship between the social/organizational and technical(s). This has highlighted that the rapacious nature of the SIB—and its constant need for data— constrained the SDH’s ability to deliver the mission of wellbeing as the information for care becomes progressively denatured. Adopting the 3D perspective, we demonstrated the need for a new approach to the sociotechnical challenges of complex contexts which would allow such systems to move on from the current failure modes enshrined in NPM processes.

The MIS, and the wider system we considered, was ‘frozen’ within a 2D frame—unable to move to a reflective account of itself provided within the 3D view. This ‘freeze’ was based on the assumption that information for care and data for payment can be one and the same, that they can be re-purposed to achieve the upstream requirements of each and that this can be achieved with the current approach to designing and implementation of an MIS in digital government contexts. Looking at the SIB case through a 1D perspective foregrounds the focus of the SDH programme on the specification through the initial phase of system design, where the MIS was a vehicle to fulfil the requirements in relation to data collection specification linked to payment (driven by the mechanism of SIB funding). However, as shown in the second phase of its implementation, these requirements did not necessarily provide a usable MIS beyond production of the data, and more development

was required. From this phase, the actors in the system demanded new changes to the MIS with significant implications for the future shaping of data and the information system, and their use. However, such insight required additional dimensional views to be applied.

Applying a 2D approach revealed the MIS used to produce data was a constantly evolving, bespoke construction that existed within a constantly evolving and re-configuring environment. However, its primary mission was to provide data rather than care, producing informational assets on behalf of the SPV which were then traded—as evidence—for payment. The service providers were being paid for the data that was being produced and processed rather than improvements to client outcomes. This finding contributes to SIB literature by suggesting that the informational elements of outcomes-based payment systems supplant their original developmental purpose (for example Lowe & Wilson, 2017). The information system of SIBs takes on an essential instrumental function which can undermine their claims to innovation and, instead, restricts them to operating within traditional NPM accounting. We argue the MIS was designed, built, operates, and is constrained within, the environment where the uses and applications of data and information have been framed by decades of systems designed in the context of an NPM approach (McLoughlin & Wilson, 2013). The implementation of a MIS has been driven by principles of measurement and the shortcomings of this are revealed where the logics of two versions of this approach—one the policy innovation of a SIB-funded SDH programme and the second the wider performance management system of the NHS—collided.

The seemingly never-ending requirements for unplanned changes to the MIS, from internal and external drivers, in the end led to a mature and stable boundary being set in the short term (notwithstanding wider system changes inevitable in the health and social system in England). The constraints here are imposed both by the information environment and data ecology we have described and the specific requirements of a SIB-funded intervention and associated accounting mechanisms. The 3D helped us to identify the existence—unseen through other dimensional views—of a clear distinction between the SIB as a process and the data that is being generated and used in, and by, that process. However, from the 3D perspective, the MIS as conceived here was impossible to adjust beyond the initial requirement of producing outputs for payment to deliver on the wider intent of the SDH programme of transformations in the wellbeing of the clients. This 'frozen' state of unplanned maturity is reflective of the characteristics of the SIB implementation process; the irony here is, despite SIBs being heralded as an innovation in funding and therefore able to increase investment in risky interventions, the SDH programme become merely redolent of the systems in which SIBs operate. The consequences of this are the data being offered as evidence of the success or failure of the intervention is, at best, a mere shadow of the effectiveness (or not) of the SDH programme.

This shift is critical and extends beyond the usual rhetoric of wellbeing. Such ambitions fall foul of the ability for the parties to access information. In this case, parties are isolated and excluded and are unable to access the data required to evaluate themselves against appropriate benchmarks and client-specific wellbeing improvements with judgements of success being predetermined in the

contracts for payment. The parallel challenge here to the apparent disjointedness, contingent and fragmentation of the MIS outlined in this paper is to shape the information systems into ones that join things up around wellbeing of clients (and link workers). The answer potentially lies in taking an infrastructural approach to the complexities of health- and social care, both in terms of the organizational and technical aspects and the inter-relations between them. Here, stakeholders would be better served through the support provided to sociotechnical environments in which resources are shared between organizations. This would enable the exchanges and distributions of the information needed to support the 'constellations' doing the work of caring, managing and governing of the system (Ellingsen & Monteiro, 2003; Wilson et al., 2017). Without adopting a radically different approach to the sociotechnical system at this infrastructural level, the improvements in the wellbeing of the clients that services are designed for will remain largely invisible and co-produced in the conversations between them, their carers, and the link workers in spite of—rather than by—the current structural approaches to improving the system.

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No potential conflict of interest was reported by the authors.

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Appendix

- Social/SIB investor: a national investment organization providing working capital to potential social impact investments (including SIB) funded interventions.
- Service funders: grant funding sourced from the government and national charitable funder (as additional funding to unlock the funding from the social investor).
- Service commissioner: a northern England CCG.
- Service delivery organization (SDH): a northern England charitable foundation responsible for the provision of the SDH programme.
- Service providers: several not-for-profit health and social care providers sub-contracted by the SPV. Service providers employ link worker staff to co-ordinate the patient/client/service user to social prescribing interventions.
- Client/service user: recipients of the interventions co-ordinated by the providers contracted by the SPV.
- Commissioning support unit (CSU): one of the supporting 'other services'—a northern England organization providing external services to the commissioner such as business intelligence, clinical procurement, information technology, and information processing and governance.