

# Engineering a personal data market: Hub of all things (HAT)

## ABSTRACT

In order to harness the positive externalities (benefits) of personal data in digital economy, we must deal with the negative externalities (primarily the privacy issues). Scholars have suggested personal data market would be a proposed solution for privacy issues. Thus, there are urgent needs to create primary personal data markets enable us to overcome the privacy issues and to leverage the value of personal data. The big challenge is how to create a primary personal data market that does not exist currently. Most existing research on market creation have taken the post hoc approach by describing and reflecting on existing markets as something out there. By using HAT as a case, the paper empirically investigated how a new market could be designed and created. Contributions and managerial implications for the personal data market were discussed.

## INTRODUCTION

We are in the era of Internet of Things (IoT) with big data <sup>1</sup>as one of its distinct features. Personal data<sup>2</sup> is one source of big data (George et al, 2010). Despite the positive externalities (discussed extensively in the literature<sup>3</sup>), personal data could also potentially cause negative externalities for firms and individuals<sup>4</sup>. The negative externalities of personal data are primarily associated with privacy issues. Indeed, privacy issue has been the main concern for an3d its analytics for leveraging benefits of personal data. In order to harness the benefits and overcome the negative externalities, we propose that there is a need to create primary markets for personal data. The new development in technology, consumer behaviour and legislation makes it highly possible to create a primary market for personal data.

First, we propose that a primary personal data market would enhance privacy protection. Privacy protection is becoming increasingly important in the era of IoT.

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<sup>1</sup> Big data: volume, velocity and variety

<sup>2</sup> Personal data/information is defined as ‘any information/data relating to an identified or identifiable natural person’ Bonneau and Preibusch (2010).

<sup>3</sup> The positive externalities for firms include (1) improving decision making (Brown et al, 2011; Brynjolfsson et al, 2011) (2) delivering holistic product experience for consumers in manufacturing sector (Fleischmann et al, 1997; Guedria et al, 2009; Jun et al, 2007; El Kadiri, et al, 2016) (3) achieving real time targeting by recognizing customers’ near-purchase-decision (Brown et al, 2011). For individuals, disclosing personal data would enable them to get (1) immediate monetary compensation (e.g. discounts) and information-based price discrimination; (2) intangible benefits (personalization and customization of information content); (3) better informed by receiving targeted ads (Acquisti, 2010).

<sup>4</sup> For firms, these cost could include (1) being punished by the market by being perceived as invasive of consumers’ privacy through mere collection of data but not adequately protecting consumer data (Ponemon, 2009) (2) cost incurred by protecting data and over-investment in data security and protecting forced by legislate initiatives (Acquisti, 2010). For individuals, disclosing personal data could bring about cost and negative externalities such as privacy harms (subjective and objective) (Calo, 2011); and privacy costs (such as psychological discomfort; the embarrassment or social stigma and the effect of fear...; (2) a state of uncertainty associated with privacy costs; (3) higher prices paid due to (adverse) price discrimination (5) being manipulated towards services that consumers do not need because of segmentation and profiling by firms (Acquisti, 2010).

Government has stepped into this space through legislations. The EU legislation primarily takes the regulatory approach and deems privacy as human rights and privacy protection as ends regardless of economic consequences (xxx). However, current EU policies on privacy implicitly acknowledge that personal data is a commodity, tradable and subject to the laws of supply and demand (Godel et al, 2012, p.54). It is suggested that there are signs that the idea of a market for personal information is regaining support (Godel et al, 2012, p.46; Novotny and Spiekermann, 2013, p.104). Regulation in other countries (such as US) takes the self-regulatory approach; deems privacy as an externality problem and privacy protection could be achieved by market self-correction and through the interactions of industry self-regulation, consumers, and technological solutions. The regulators role lies in steering the market through a combination of incentives, disclosure policies, and even liability (Acquisti, 2010, p.33). Individuals could be assigned property rights in information by contract with other parties about how they might use the information (Sharpiro and Varian, 1997) (proptertisation of personal data). However, proptertisation of personal data could be very problematic<sup>5</sup>. Indeed, complete proptertisation of personal data would lead to market failure. *These market failures would result in problems for Privacy protection* (Schwartz, 2003). A model of hybrid inalienability was proposed as a solution to overcome these problematic issues of complete proptertization of personal data. This model allows individuals to share, as well as to place limitations on, the future use of their personal information” (Schwartz, 2003, p.2094). Therefore, in order to protect privacy effectively and also increase economic efficiency, Acquisti (2010) proposed ‘co-regulative approach... combine market forces, technologies and regulations’ (p.35). Second, technology advancement has provided tools and devices allowing individuals to collect, store, transfer and use data with increasingly reduced cost. With the increased transparency and user control over personal data (e.g. Tucker, 2010; Brandmarte et al, 2010), consumers are willing to trade their personal data for money and non-monetary rewards. Consumers concern for privacy is not absolute and would make the trade-off between privacy concerns and economic benefits (Hann et al, 2002) (Godel et al, 2012, p.53). Thus, there would be large amount of data to be supplied and traded. In addition, policies and technologies aiming to strength consent mechanisms would enhance the development of personal data markets (Godel et al, 2012, p.54).

We propose that technology would make it possible to create a primary personal data market. In order to harness the benefits of personal data, personal data must be internalised into the economy in such a way that is privacy-preserving; Individuals

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<sup>5</sup> This would result in (1) people trading way too much personal data and producing less privacy (Cohen, xxx); (2) firms underinvesting in technology and services to enable consumers to express their privacy preferences if they could acquire personal data at low costs; (3) firms making it difficult for consumers to understand information about data collection and use and this would result in information asymmetries between users and firms (Langer, 2003; Schwartz, 2003, p.2080). The boundary rationality caused by the lack of information would place much limitation on free choice and consumers generally inertia toward default terms (Markoff, 2003). Proptertization of personal data would therefore mainly benefit those who have greater power in the existing privacy market- the parties who collect, process, and transfer personal data (Fortt, xxx) (Schwartz, 2003).

must become the key stakeholders for collecting, contextualising and supplying their data; create value for both individuals and firms; and for data to be exchanged in such a way that a market for personal data and metadata could exist. For example, HAT has developed the technology which would (1) enable individuals to integrate data across the vertical repositories – between, for example, our diary, messaging, location, finances or consumption – with applicable service timetables or catalogues (2) enable individuals to allow firms to access to some of their consumption contexts which is likely to result in better offers; (3) enable individuals to contain, flatten, bundle and, with suitable permissions, exchange their data with other individuals, organisations or “things” within a trust framework. Moreover, HAT would also enable the commercial organisations involved into exchange information – to receive and process personal data from individuals and potentially to share their own proprietary information with individuals. As a result, firms and other organisations are able to offer us personalised product or service offerings if given the right permissions to really understand our needs, and the context of our consumption.

Despite the technological advancement, the current prevalent practices in market place are that firms collect data through their technology, own and exploit the data for their own benefits. As a result, various forms of exchanges for personal data have developed such as<sup>6</sup> (1) ‘informediaries’ (2) ‘free products or services provided to consumers in exchange for their data’ (3) ‘market for privacy’. These forms of personal data exchange also result in secondary market for personal data. These forms of personal data exchange also result in secondary market for personal data. How to create a primary personal data market is the challenge in the digital era. Research on market creation has primarily taken the post hoc approach by describing and reflecting on existing markets as something out there. By taking a design approach, using HAT as a case, this paper would address the challenge by empirically investigating how a new primary market could be designed and created for personal data.

## **BACKGROUND LITERATURE ON MARKET CREATION**

### **Creating a market for personal data**

Creating a market could be challenging. Based on the literature, we propose that we need to address these three issues (1) what constitutes a market; (2) whether market is given, emergent or created; (3) how to create a market.

#### *What constitutes a market*

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<sup>6</sup> (1) ‘infomediaries’ (trade consumer data among firms and consumers are not generally active agents in these transactions); (2) ‘free products or services provided to consumers in exchange for their data (such as search engines and online social networks); consumers are directly involved but the exchange of information is invisible; (3) ‘market for privacy’: consumers buy technology or services to protect their personal information.

Market has been defined in various ways when the researchers are focusing on different facets of a market. In marketing, a market is referred to as “*all persons or business units who buy or may be induced to buy a product or service*” (Kotler, 1967, p.6). Therefore, a market primarily consists of *buyers* (person or business unit) and *a product or service, and the need for the product or service*. From economic perspective, a market is described as a setting for economic exchange. There would be a group or groups of people, some of whom desire to obtain certain things and some of whom are in a position to supply what the others want (Marshall: 1919: 182)’ (Loasby, 1999, p.107). This setting entails ‘*concrete exchange structures between producers and consumers*’ (Weber et al, 2008) and also ‘*a specific institutional arrangement consisting of rules and conventions that make possible a large number of voluntary transfers of property rights on a regular basis*’ (MeÂnard, 1995, p.170)’. From this perspective, a market constitutes (1) people and business units (buyers and suppliers); need; products or services (2) concrete exchange structures (physical infrastructure, Loasby, 2000); (3) rules and regulations at institutional level; (symbolic infrastructure, Loasby, 2000) (4) exchange/transfer of ownership of things.

Whereas, in *sociology*, a market is deemed as a social arena in which all the actors (firms, customers, workers, government) interact and exchange (Fligstein and Dauter, 2007, p.107) and market exchanges are embedded in social structure (Granovetter, 1985). Thus, to create a new market, it is important to develop these social structures (institutions and institutional arrangement in terms of cognition, regulation, and practice, Humphreys 2010a, 2010b; Scaraboto and Fischer, 2013) and to make offerings to become institutionalised solutions (Vargo and Lusch, 2013).

| References   | Definition of a market   | Constituents of market   |
|--|--|--|
| Kotler, 1967, p.6  | <i>all persons or business units who buy or may be induced to buy a product or service”</i>  | <i>Buyers</i> (person or business unit) and <i>a product or service, need for the product or service.</i>  |
| Marshall: 1919<br>Loasby, 1999<br>Weber et al, 2008<br>MeÂnard, 1995 | a market is described as a setting for economic exchange. There would be a group or groups of people, some of whom desire to obtain certain things and some of whom are in a position to supply what the others want (Marshall: 1919: 182)’ (Loasby, 1999, p.107). This setting entails ‘ <i>concrete exchange</i> | (1) People and business units (buyers and suppliers); need; products or services.<br>(2) concrete exchange structures (physical infrastructure, Loasby, 2000);<br>(3) rules and regulations at institutional level;<br>(symbolic infrastructure, Loasby, 2000) |

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|  | <i>structures between producers and consumers’ (Weber et al, 2008) and also ‘a specific institutional arrangement consisting of rules and conventions that make possible a large number of voluntary transfers of property rights on a regular basis’ (MeÂnard, 1995, p.170)’.</i>  | (4) exchange/transfer of ownership of things.<br>(5) scale   |
| Fligstein and Dauter, 2007<br>Granovetter, 1985<br>Vargo and Lusch, 2013 | A social arena in which all the actors (firms, customers, workers, government) interact and exchange (Fligstein and Dauter, 2007, p.107) and market exchanges are embedded in social structure (Granovetter, 1985).<br>Develop these social structures (institutions and institutional arrangement in terms of cognition, regulation, and practice, Humphreys 2010a, 2010b; Scaraboto and Fischer, 2013) and to make offerings to become institutionalised solutions (Vargo and Lusch, 2013). | (1) All actors<br>(2) Exchange and interactions<br>(3) Social structure<br>(4) Institutionalised solutions |

From marketing perspective, goods are needed and exchanged between buyer and seller but how to make the exchanges take place was not clearly illustrated. From economic perspective, the emphases are on settings (physical and symbolic), exchanges and rules and regulations, needs and exchanges at large scale, however, how these rules could be established and how the scales could be achieved were not their focus. Thus, market conceptions from economic perspective expanded the definition from marketing perspective and make it one facet. From sociological perspective, the focus is centred on both exchanges and interactions; how the norms /institutions and regulations could be developed/institutionalised; participants in the

market extended to all relevant actors. Sociological perspective further addressed some issues which is not the core focus of the conception from economic perspective. Thus, we suggest that in order to understand what constitutes a market in marketing, we need to leverage on the conceptions of market from economic and sociological perspectives.

*Therefore, it can be suggested that the prerequisites of creating a market and the constituents of market include (1) new offerings (a product or service), (2) need for a product or service (3) concrete settings for exchange (4) mechanisms for firms and consumers and other actors to interact, exchange and connect at both local and societal/structural level.*

#### Market as “given”, market as “created” and market as “emergent”

For several decades, a market is primarily deemed as something out there (being) (Alderson and Cox, 1948) and a natural given. If there is a product then there will be a market (Loasby, 2000; Darroch and Miles, 2011, p.723). However, it is an increasingly accepted that markets ‘become’ through human effort (Anderson and Cox, 1948; Casson, 1982; Loasby, 2000). An increasingly accepted notion is market creation. The notion of markets as social structures has revived the research and progressed the understanding of origins, operations and dynamics of markets in both sociology and marketing. Therefore, it is suggested that ‘the process of market creation is a largely a process of institutionalising certain shared understanding and practices of exchange (Fligstein, 1996; White, 2002; Humphreys, 2010 a). One term used to describe this process is legitimation encompassing cognitive legitimation (spread of knowledge of a new venture, Aldrich and Fiol Markene, 1994) and socio-political legitimation (... acceptance of a venture by public, government etc as appropriate given existing norms and laws... Aldrich and Fiol Markene, 1994). The legitimation process would result in the legitimacy of these new products, ideas, practices and institutions. Thus, in marketing, *the legitimation and legitimacy process of products and exchange practices* have been paid much attention in understanding new market creation. For example, Humphreys (2010) investigated how new industries are created and sustained in a complex social and political context. By examining the legitimation process of the casino gambling industry, the authors demonstrated that *normative and regulatory structures are important in facilitating the legitimacy process of the new industry*. With the notion of market as an ‘organizational field of institutions and actors’ (Dolbec and Fischer, 2015, see the definition in Table 1), in order to bring into the existence of a new market, actors must engage in iterative processes that enrol other actors in their market creation project to establish *the legitimacy of new offerings* (Dolbec and Fischer, 2015, p.??). Dolbec and Fischer (2015) investigate how consumers could initiate the effort to create a new market by introducing new forms of institutional work and consumers could support and promote new logics through their practices and thus precipitate the formation of new categories of actors. Vargo et al (2013) also discussed market

innovation and stressed that new markets do not automatically occur when actors or group of actors introduce new ideas or products until when new practices (i.e. solutions) become institutionalised. Zietsma and McKnight (2009) describe this institutionalisation process as a non-linear process in which all actors engage in institutional work and co-create institutions through multiple iteration of institutional development until common templates emerge that reflect shared conceptions of problems and solutions (p.7).

The institutional approach has embraced the social constructionist notion of market. Social constructionists hold the belief that shared agreement between social actors shape and govern their interactions and perceptions (Berger and Luckmann, 1966; Gergen, 1985; Hirschman and Holbrook, 1992; Sarbin and Scheibe, 1983; Schutz and Luckmann, 1973; Deighton and Grayson, 1995). The shared understandings, as the fabric of social reality (Schutz and Luckmann, 1973, p.22-24) (Deighton and Grayson, 1995, p.661), provide the “*prescriptive and proscriptive rules for social conduct and meaning ascription*” (p.661). These shared agreements could be reached at three levels<sup>7</sup> of agreement. *Any new market is the outcome of the continuous negotiation from private agreement, local consensus and institutionalised consensus/agreement between three forces (1) what the marketers wants; (2) what the customers want; and (3) what the institutionalised reality will allow (Deighton and Grayson, 1995, p.662).*

From actor-network perspective, market is deemed as changing entities, not much has to be done to trigger change. Creation of a new market is a matter of directing and preventing change in order to stabilise a particular market situation, allowing to be repeated over time and across space (Araujo, Finch and Kjellberg, 2010a) (Kjellberg, et al, 2015, p. 8). *Thus, market creation involves two interrelated dimensions: First dimension involves configuration this bounded network in particular ways so as to channel interactions between entities.* The scripting of buyer and seller roles is an example (cf. Storbacka and Nenonen, 2011) (Kjellberg, et al, 2015, p.9). *The second dimension involves establishing and maintaining a bounded network of buyers, sellers, goods etc (market structure, devices and agents),* which cannot be allowed to expand or contract in an uncontrolled fashion, since this would stabilise the market (Kjellberg, et al, 2015, p.9). The means for stabilise markets include (1) institutionalising norms and rules; (2) building devices and technical infrastructures (3) generating and disseminating images, models and representations; (4) enacting practices, routines and habits (Kjellberg, et al, 2015, p.9-10).

*Even though institutional approach and the actor-network perspective have different philosophical assumptions, ANT perspective provided a way to capture (1) how the*

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<sup>7</sup> (1) private agreement (reached between two people; This type of agreement ‘remains tenuous, easily changed...’ (Berger and Luckmann, 1966, p.58-59) (2) local consensus: with more people joining, the agreement becomes “this is how things are done here” and with the local consensus become widespread, it is said to have become institutionalised (Berger and Luckmann, 1966, p.54; Deighton and Grayson, 1995, p.662); (3) institutionalised consensus/agreement.

*institutions could be established and to capture the dynamic nature of institutions and understand how the rules and norms could change.*

### *How to create a market*

From economics perspective, in order to create a new market, many obstacles have to be removed such as “*no contact between buyer and seller, no knowledge of reciprocal wants, no agreement over price, the need to exchange custody of goods, no confidence that goods correspond to specification, and no confidence about restitution in case of default*” (Casson, 1982, p.164) (cf. Loasby, 2000). The efforts have been depicted as ‘*inform potential buyers and sellers, to bring them together in the actual negotiation off a transaction, and to make it possible for them to carry out all transactions negotiated*’ (Anderson and Cox, 1948, p.142) and creating a *system of conventions and rules* (Casson, 1982), i.e. institutions (Loasby, 2000, p.298). These efforts aim to reduce transaction costs between the benefits to the buyer and the direct cost of production to the producer. As a result, markets are the products of investment in continuing transaction capability, accessible to many and constitute a form of public good (Loasby, 1999, p.119), which need to be created and maintained (Loasby, 2000). In order to develop these conventions and rules for exchanges, producers and customers must have a shared understanding in terms of *what is being exchanged and why*. In order to achieve this, organisations draw on the institutions of the society and develop new institutions (rules and conventions) to co-ordinate their activities and align them with the activities of suppliers and customers through integration with their deliberate decisions and consequences of day-to-day interactions. With a significant number of people /customers find the new institutions helpful and more firms would look for the similar ways of facilitating their transactions. This widening of the scope of market transactions may benefit the original market-maker; indeed the innovator may encourage others to join in the creation of a new market, hoping not only to share the costs but also enjoying increasing returns from this enlargement of the market (Loasby, 2000, p.303).

*It can be suggested that from economics perspective, creating a market entails formation and expansion of a network. This issues have been addressed from performative school of markets. Taken a practical constructionism approach<sup>8</sup> and influenced by the performative school of markets, Kjellberg and Helgesson (2006) defined market as constituted by market practices (all activities that contribute to constitute markets, p.842). Kjellberg, Azimont and Reid (2015) deem market as ongoing practical accomplishment; ongoing results of multiple practices and changing*

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<sup>8</sup> It is based on practical constructionism, a combination of ontological relativism and epistemological realism (Kjellbrg and Helgesson, 2006, p. 841). *Taken an ontological relativism, social reality could be viewed as an on-going process of creation and is constantly shaped and reshaped in interactions that are simultaneously material and social (Law and Urry, 2004) (Kjellberg and Hegesson, 2006, p.840). Social reality could be constructed and entities are enacted, depending on what they are used for and they could become different things when they are associated with other things. What is relative to the multiple associations enacting it (Kjellberg and Hegesson, 2006, p.841). Since social reality is multiple, different truths may be enacted as part of the ongoing practices that constitute it.*



of the rule rather than some definite reality or stable entities (p.8). Market practices include three broad and interlinked practices (1) exchange practice; (2) normalising practice (3) representing practice (see the definitions in Table 2). These three categories are being conceived as being linked through chains of translations involves various intermediaries, such as rules, roles, measures and measurements (p. 843). In one respect, translations are simply transformation or movements of material or meanings from one medium or space to another (Latour, 2005). Translations result from the relations among actors. Actor are co-constituted in and by these relations. All actors are outcome of associated practices and are characterised as networks-actor-networks (Latour, 1987). Callon (1986) also refers to translation more specifically as a process by whereby one actor problematizes a situation and then mobilises an actor-network to deal with it. Such intentional actors may set up obligatory points of passage for materials and/or communication within the emerging network in order to shape the assemblage in a particular way or manage it toward certain outcomes (Martin and Schouten, 2014, p.?).

In our research context, we would integrate these approaches (marketing, economic, performative and institutional) to create a new market for personal data MSP. Due to the non-existence of a personal data market, a MSP for personal data needs to be developed; a setting for interaction and exchanges for participants in the MSP would be developed and the network would expand (through translation); institutions and practices would be developed in the network. New institutions associated with the new offering could be legitimated and the new offering could also become institutionalised solution.

### **3. RESEARCH SETTING AND DESIGN**

The researchers adopt the design science research (DSR) methodology (xxx), which is a problem-solving process that generates prescriptive knowledge regarding the design of new and innovative artifacts. The artifact of this research is the market for the Hub-of-All-Things (HAT). HAT is user-centric and cloud-based personal data platform that enables end users to collect, contextualize, and trade their own personal data for benefits in a privacy- preserving way [33].

The researchers combine the DSR method with a qualitative case study approach [xxx] to examine the iterative process underlying the HAT market development [cf. 23]. In doing so, this research approach emphasizes the inherent interweaving and iteration in problem identification, goal formulation, design, and evaluation of the HAT data market. The researchers investigate the on-going process of how HAT market was designed, i.e., built and evaluated [64], by applying the six-phase design process proposed by Peffers et al. [60, 61], including (1) problem identification, (2) goal formulation, (3) design, (4) demonstration and implementation, (5) evaluation, and (6) communication.

#### **Data Collection**

For the case study and the DSR approaches, data collection took place over a two-

year period from June 2014 until October 2016, encompassing a time frame of 3.5 years of longitudinal case study data from March 2013 until October 2016 [60, 83]. The researchers included multiple archival, and secondary data sources for triangulation to increase robustness and quality [32, 28, 83]. Archival and secondary data collection included HAT-internal archival data (e.g., meeting minutes), information on the HAT website, handouts, briefing papers, and other publicly available HAT material such as press articles, blogs, forums, and social media posts. Two additional sets of secondary data included annual reports of 10 leading organizations in the cloud, big data, and Internet of Things (IoT) industries as well as 65 press articles from leading international press outlets (for a complete list of data sources, see Table 1).

#### **4. Data Analysis and Findings (To be presented at the conference)**

##### **References:**

References would be provided upon request.