Open Data as Social Capital in a Digital Society

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1. Introduction

The classical definition of social capital becomes blurred and transforms as common tangible and intangible social infrastructures shift more and more towards the digital realm. The on-going and increasing manifestation of virtual communities unites people with similar aims, ambitions, and habits across present social and geographical boundaries. Out of these co-existing social networks, knowledge is gathered, condensed, and shared. The involved social interaction drives the community and keeps it alive at the same time. Open data position themselves as fuel for this emerging momentum. This paper therefore discusses the concept of open data as social capital in a digital society. We demonstrate the associated benefits by means of two European projects working with open data obtained by the community for the community.

The remainder of this paper is structured as follows: Section 2 is dedicated to the concepts of Social Capital and Open Data, while in Section 3, the role of Open Data as Social Capital in the context of the previously-discussed background is demonstrated with two particular examples. The paper closes in Section 4 with the conclusions.

2. Social Capital – Back Then and Now

The discussion about the term ‘social capital’ is broad and also strongly depends on the background of the observer. This becomes even more obvious when roaming through the body of literature (e.g., Newton, 1997; Nahapiet & Ghoshal, 1998; Lin, 1999; Putnam, 2001; Dasgupta & Serageldin, 2001; Adler & Kwon, 2002; Aldrich, 2012; Portes, 2014). For the sake of this chapter, the authors decided to approach the concept of social capital from a more general viewpoint and develop a transition from a classical viewpoint towards a viewpoint suitable for the digitalized society we face today.

2.1. Defining Social Capital

As mentioned before, the authors approach the concept of social capital from a more generalized perspective. For a starting point, the authors refer to the work of Portes (2000) and the three described views of social capital:

The first view describes social capital as “[…] primarily the accumulation of obligations from others according to the norm of reciprocity” (Portes, 2000, p.7). The idea behind this approach is that donors grant privileged access to resources with the motivation behind their acts, to receive appropriate compensation – a return of the favour – for their offerings. The interesting

part in this setting is that the donors are not expecting the same kind of resources in return nor is the time or 'repayment schedule' set in any way. Portes describes the **second view** of social capital along the lines of Marx ([1894] 1967) regarding the affiliation of workers to each other as they find themselves within a similar situation that ties them together and triggers actions that are not related to conventions that were taught during childhood. Thus, the resulting expressed characteristics (sharing of resources and associated conditions/expectations) are therefore limited to a particular community rather than being universal. **The third view** adopts Durkheim's 'theory of social integration' ([1893] 1984), together with the strong influences of group rituals. The relationship is not so much built on the individual knowledge and connection between donor and recipient, rather than on the guarantees of offering and repayment due to the social structure and obligation by the norms of the group of the group.

As these 'environmental settings' can be applied virtually since humanity began, the question arises, how today's digitalized society has been impacted by the current technology penetration, in particular, the increase/decrease/supplement of social capital depending on the Internet as discussed by Wellman et al. (2010). To describe their findings regarding the impact of the Internet upon social capital, they refer to three dimensions of social capital as an extension of the work by Putnam (1996, 2000): networking capital, participatory capital, and community commitment.

Regarding the **networking capital aspect**, use of the Internet is triggering supplemental behaviours rather than decreasing existing extents of networking. People still tend to communicate more with individuals closer to them than with those further away from their home location. However, if long-distance communication occurs it is handled mostly over the Internet. The predominant communication and networking focuses on friends and family. The **participatory capital aspect** is also positively influenced and therefore increased, when using use the Internet as a means of communication. In return, this leads to intensified online organizational participation and higher interest in political issues regarding current societal discussions. However, it is a matter for debate whether more Internet communication triggers a higher level of political engagement and involvement. Last but not least, the online social **community commitment** is decreasing. Wellman et al. (2010) relate this trend to potential bad experiences that people have had with online communities.

Overall, it can be stated that the Internet increases social capital. From the previously-described results, it is evident that communication and distance are strongly linked. Yet, the term distance has to be used with caution, as we have not only to consider the pure geographic distance between two entities, but also their distance in terms of networks (ties, relationships). Latour (1996) discusses this important aspect through his elaboration of the Actor-Network Theory (ANT). The verdict is visualized in Fig. 1. While, from a geographic point of view, b) is closer to (a) than all other points, the perspective changes when considering the network bond between (a) and (e).

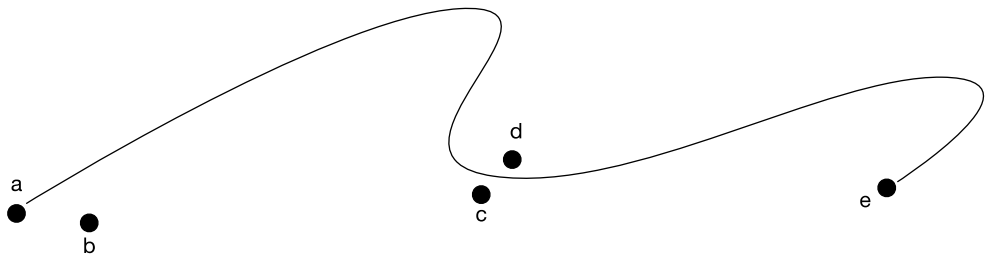

Figure 1: The relative aspect of distance, adapted from Latour (1996)

An example can be given by referring to a person living in a big city within an apartment block.

While he or she may live next door to his or her neighbours, they never talk to each other, while he or she has Skype calls with his or her best friend in another city at least twice a week – therefore being "closer" to each other.

This observation is important, as it proves that the basic conditions for social capital are still valid and apply to the digital realm as well. The most important concept that has changed is the concept of distance, with the strong influence of networking an aspect in our digital society.

2.2 Open Data as a New Form of Social Capital

Bearing the afore-mentioned concept of social capital and the influence of the Internet on it in mind, we can now proceed with the introduction of open data as a new form of social capital. In order to present the authors' views to the reader in the most precise way, we must provide a systematic treatment of the concept and therefore also distinguish between: (a) the resources themselves, (b) the sources of social capital (those agreeing to arising demands), and (c) the possessors of social capital (those making claims) (Portes, 2000, p.6).

Open data and their discussion and application, compared to other movements such as open source software, originated in recent years. Within this chapter, the authors refer to a broad, yet compelling definition of open data by Murray-Rust (2008). Open data provides interaction with all kinds of data under this term without limitations or restrictions of any kind. In addition, re-distribution of the original or modified data is possible. If there are any licensing conditions, these may only be applied to ensure that these rights of freedom cannot be suppressed regarding future beneficiaries or contributors. This enables a strong curiosity-driven environment that can produce various new data sets or even products (mashups).

The reasons for people contributing data and/or re-publishing their created derivatives are manifold and can be compared with similar motivations behind open source software projects (Lerner & Tirole, 2002). Some people may act solely by altruism, while others see an opportunity to promote themselves, increase their value in the job market or in specific working areas (e.g., academia), or just want to solve existing data issues for their own purposes (cp. Bogers & West, 2012).

The desire for open data as a resource is as manifold as the reasons for its contribution. Companies see the high business value of open data, e.g., in stock exchange forecasts (Bollen et al., 2011) to invest in the right markets, while researchers use open data, e.g., for demographic (Hofer et al., 2015) or crime analyses (Kounadi et al., 2015). But also laypeople use open data to increase their understanding of topics and learn new things (Atenas et al., 2015).

3. Examples for Open Data as Social Capital

While the authors presented in the previous section the overall idea of open data as social capital, in this section, two particular examples are given. The first example focuses on a policy simulation system, while the second example introduces a community-driven legal information platform.

3.1. The MOSIPS Project

The EC-funded research project "Modeling and Simulation of the Impact of Public Policies on SMEs" (MOSIPS) aims at providing a simulation tool for public policies and their socio-economic impacts. The MOSIPS project's primary goal is to develop a user-friendly policy simulation system allowing forecasting and visualization of the socio-economic potential

impact of public policies. The simulation system allows for policy makers to conduct experiments with different socio-economic scenarios and to share the results with citizens and potentially impacted stakeholders, before the actual implementation of the policy. Hence, the project benefits from an interdisciplinary combination of suitable (spatial) data, spatio-temporal simulation models, artificial intelligence, and interactive web-based tools.

To model the effects of public policies, the project makes heavy use of the concept of agent-based modelling. Agent-based modelling (ABM) is a concept that simulates the actions of autonomous agents and reveals their behaviour regarding the interactions between them (Batty et al., 2012). The aim of ABMs is not to reach an equilibrium state, but to find out how a system reacts to changed situations (Macal, 2010). According to Mandl (2003), ABMs incorporate an environment with a spatial dimension, as well as a number of objects present in the environment. The objects may be passive and can be recognized, created, destroyed, and changed by the agents. ABMs consist of a community of active and moving agents. They can be physical or virtual, interacting with and within a natural or an artificial environment. In general, agents communicate and interact with other agents, as they may have "goals" to reach. In addition, agents are mostly able to reproduce and show individual behaviour (see Fig. 2). In the research project MOSIPS, a number of models and rules are established that describe the behaviour of the agents acting in the environment. The agents are individuals (i.e., humans, families, enterprises, or establishments). The agents interact with each other based on a defined set of rules and models (Lampoltshammer, Heistracher, & Mittlböck, 2013). As a result of an agent's behaviour, the environment can be changed – similar to the concept of a footprint.

In order to start a simulation process, the system needs to be "filled" with data. This is necessary to equip the agents with their relevant properties, e.g., (spatial) demographic data for individuals and families, as well as (spatial) economic data for enterprises and establishments. In MOSIPS, open data is applied wherever possible. Hence, a number of demographic datasets and economic datasets, as well as Land Cover and Land Use datasets are used throughout the project. As some demographic datasets have a relatively coarse resolution for ABM purposes, spatial disaggregation methodologies for population data were analysed (Scholz, Andorfer, & Mittlboeck, 2013). Disaggregation is a promising approach to calculate fine-grained data out of data sets with coarse resolution (e.g., GEOSTAT 1A project of the European Forum for Geostatistics (EFGS) is a 1 km population grid). Due to the fact that open data sets need to be coarse in order to disguise personal information, disaggregation is a necessary pre-processing step before these open data sets can be used for simulation purposes.

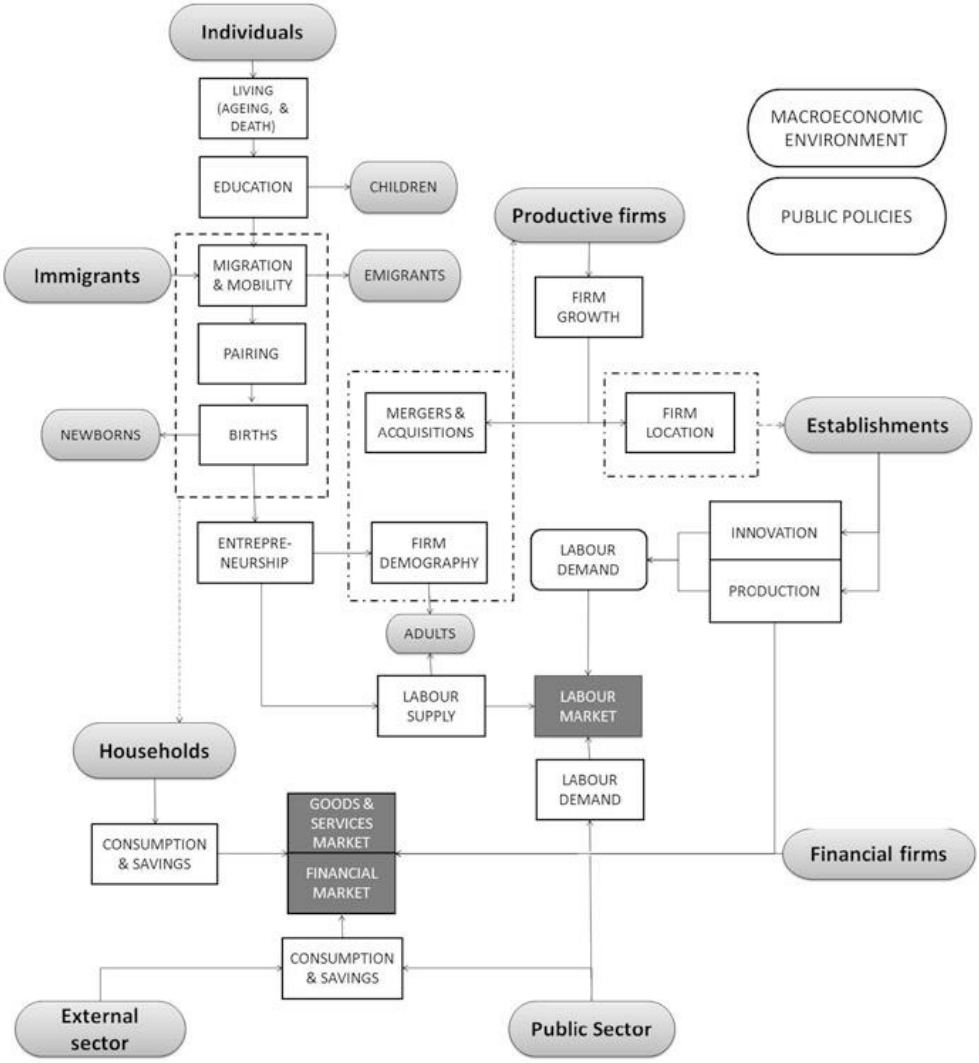

Figure 2: The objects and agents modelled in the MOSIPS project. Individuals (i.e. humans) and their aggregations (i.e. families & households) are working in companies and consume goods. In addition, individuals are able to make their independent decisions concerning education, working, living, and consuming. Funding is necessary to implement the public policy as such (from Pablo-Marti et al., 2014).

To provide a high level of flexibility, the MOSIPS policy simulator allows for the possibility of creating user-defined scenarios. Users are able to fine-tune a scenario by adjusting several simulation parameters, where each chosen parameter is stored in a database and explicitly published along with the simulation result. As the MOSIPS system massively makes use of open data, it returns valuable simulation results to society. Due to the fact that the simulation results are published openly by exploiting various communication channels, the digital society can make use of the simulation results as such (see Fig. 3). Additionally, society is able to gain insights into political discussions about public policies in a more transparent way. Notably, the open data exposure of the simulation results, combined with a spatial-temporal geoportal – that publishes the results in an easy to digest manner for the public (Scholz & Mittlböck, 2012) – and Social Media Apps disseminating the main results, provide the possibility of getting rich feedback from society. This feedback is an additional benefit, one the MOSIPS project can only get if the results are published in an open accessible manner.

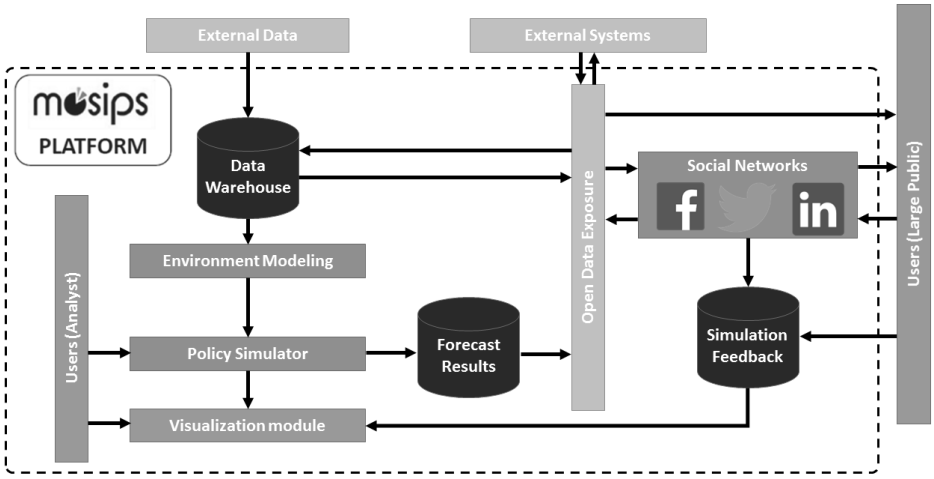

Figure 3: Architecture of the MOSIPS simulation platform. Adapted from Anova IT Consulting (2013).

The usage and provision of open data has great potential for creating additional value for society, which can be summarized in the case of MOSIPS as follows:

- Results of socio-economic simulations based on open data can foster the understanding of real-world processes
- Replicability of the results published
- Feedback from society regarding the open model and the open simulation results as such, which might improve the underlying model
- Re-use of the simulation results – published as open data – in other applications and projects, thus providing benefits across domains and in various application contexts

MOSIPS contributes to the defined paradigm of open data as social capital in several ways. Concerning the **network capital aspect** MOSIPS is able to enhance the exchange between city planners and public policy makers in order to compare policies and their effects in reality under given boundary conditions. In addition, interested laypeople can provide feedback to the experts via social networks or direct communication channels. In addition, citizens are able to critically discuss simulation results of public policies themselves. Thus, the simulation experts, public policy makers and citizens form a network that acts together to make better and well informed decisions. In order to realize the network capital aspect the simulation results have to be published as open data – so that they can be usable by other experts, systems and laypeople. The **participatory capital aspect** is strengthened too, due to the possible cooperation of adjacent administrative units (e.g. counties). In a globalized world the decisions of each administrative unit have effects on the neighbouring units as well. Thus, data sharing by means of open data contributes to making better political and administrative decisions. In addition, citizens get an insight into how public policies are planned, discussed, assessed and also into the interdependencies of public policies. MOSIPS increases **community commitment** by providing a structured and trusted environment for simulating public policies and for collaborating between laypeople (i.e. citizens) and policy makers. Hence, we envisage MOSIPS evolving towards a lively platform where citizens and policy makers interact and discuss future political planning scenarios to develop society a step further in a sustainable way.

Last but not least, the concept of Open Data in MOSIPS enhances the transparency of political decisions leading to the implementation of public policies. Due to the fact that different scenarios can be shared with the interested public, society can participate in the political discussion based on objective facts.

3.2 The Openlaws.eu Project

A major problem with legal information today is that a small number of organizations and administrations are responsible for publishing and maintaining it. This information infrastructure is usually a closed environment, with little possibilities for external influences. The information being handled does also include the associated metadata, which plays a key role in any automated processing. Scholars from the legal domain commonly use classical publishing services, which results in little to no bi/multi-directional communication and information exchange. In addition, computer-based processing up to a complete automation of (meta) data handling is not yet possible. This stands in high contrast to other scientific communities such as computer science or life science, where developments towards the use and distribution of open data in a broad public community are complementing classical dissemination channels.

The openlaws.eu project, funded by the European Commission Directorate-General for Justice and Consumers, aims at increasing access to legal information for the public by fusing open innovation principles, open data, and open source software. It is the overall goal to provide users with innovative ways to search, find, organize, and share legal information with the community (Wass et al., 2013; Lampoltshammer & Wass, 2015). Furthermore, the openlaws platform is envisaged to bring together lay people as well as legal experts and practitioners to exchange knowledge and interact with each other to create new contents.
As the basis for this interaction, the openlaws platform aggregates various open data sources in the legal domain, such as legislation and case law and literature, as well as commentary (see Fig. 4).

On top of this institutional layer, the project introduces a new and innovative "social layer". At the present time, none of the existing legal platforms can offer this degree of interaction between users. The output of this "social layer" is aggregated and fused with the existing legal data within the openlaws database. This newly generated data repository forms the intended BOLDbase (Big Open Legal Database) to provide improved as well as new information services to the users (Wass, Sageder & Lampoltshammer, 2015).

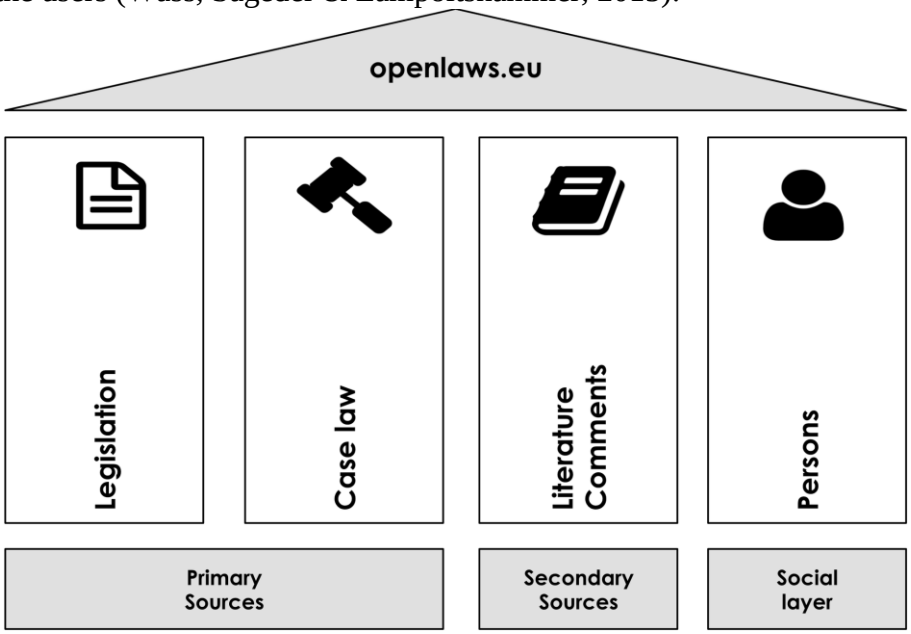

Figure 4. Information sources of openlaws.eu – Lampoltshammer et al., (forthcoming)

This BOLDbase serves not only for data storage purposes but is also responsible for reflecting the structure of the data. This structure goes beyond classical schemata from relational

databases as it also holds the "social network structure", generated by the interaction of the community with the legal data. Following the open source software vision of openlaws, the project applies a graph database (Neo4j) to provide the necessary technological basis within the backend infrastructure (Lampoltshammer, Sageder, & Heistracher, 2015). To foster the reuse of the BOLDbase and to share the generated added value, the openlaws project foresees a third-party API that would open the databases to other projects and would build their own projects and services on top of it.

Overall, the project delivers several enhancements to the existing legal domain and therefore has a positive impact on open data as social capital:

Regarding the **networking capital aspect**, the introduced social layer connects people with similar interests in open legal data. The platform also boosts exchange between experts and enables non-experts to find professionals in their field of needs. This reflects the properties of networking capital, as defined in the literature, quite well. While the Internet-based service provides a means of global communication, intense dialogues will be happening in local communities, as people make discoveries together. Yet, over time, this is envisaged to change towards a global interactive community.

The **participatory capital aspect** also increases, as national laws and decisions are strongly interconnected and interdependent on European laws and decisions. This entanglement unites legal experts and non-experts in their pursuit to foster better access and understanding of legal information leading ultimately to a Pan-European legal community, where geographical boundaries will diminish over time.

Finally, the platform protects against potential decrease in online social **community commitment,** by providing a trusted environment for searching, organizing, and sharing legal information. As described by Wellman et al. (2010), negative experiences are likely to harm future social community commitment. The openlaws platform therefore aims at providing extensive support for users in their endeavours via a parallel, metadata-based search across several (cross-border) data repositories, paired with enhanced means regarding the structure of contents towards sophisticated analyses of big open legal data. This high-level technological backend, together with a non-discriminating community exchange, creates a flourishing open legal information environment generated by the people for the people.

4. Conclusion

The concept of social capital has evolved and is even more present today through its manifestation in the digital realm. Open data represent the digital artefacts that serve as resources for fuelling social capital and the underlying community. The creation of open data, its curation, and distribution has arrived in all aspects of today's society. The two projects demonstrated the driving force that keeps the momentum behind open data alive. This momentum is also fuelled by a governmental and political backing in form of, e.g., the realization of the Public Sector Information Directive by the European Parliament & Council.

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