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SEMINAR PAPER

A Critique on existing PPGIS empowerment conceptualizations

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Abstract

PPGIS – Public Participation GIS - is a method to empower individuals and communities underrepresented in decision making processes by altering existing power relations with the help of GIS. The process of participation is complex and embedded in a place-specific, social, cultural and political context. Attempts by the scientific community to conceptualize a sophisticated framework of empowerment resulted so far in a variety of different concepts and are only able to describe parts of the complex process. By examining the internal and external factors affecting empowerment, missing characteristics of empowerment such as the embeddedness of PPGIS in cultural and social structures, the inner composition of PPGIS organizations and the communication of interests among members and across other actors were identified in existing frameworks, that should be considered in future conceptualizations.

Introduction

Since the 1960s the rapid development of GIS and its capabilities contributed to a fast and widespread acceptance of the technology across public organizations and private business. The expansion was accompanied by an unquestioned acceptance, a celebration of its capabilities and a belief of having a positive social impact. In the 1990s external critique from human geographers and internal critique of the GIS community arose and questioned the existing paradigm. Two of the most important publications were 'Ground Truth' by John Pickles and 'GIS and Society' by Eric Sheppard. The critique was concerned with the inexistent reflection on the social, economic and political implications of the technology and its underlying positivistic imperialism (Harris & Weiner 1998). The use of GIS in resource management, planning or other policy-making activities was the task of a small group of technocrats embedded in the hierarchical structures of institutions. High costs of hardware, software and data, as well as the technical complexity of this technology led to an exclusion of certain demographics of citizens. This exclusiveness of spatial information was problematic. Not only just a small group had access to spatial information that is key for supporting decision-makers, but in addition GIS suggested wrongly to be value free and neutral (Corbett et al. 2016; Ghose 2018). GIS technologies are socially constructed. On the one hand GIS is embedded in existing power relations. The creation of spatial information relies on the subjective decision taken by an expert and his view of the world. Consequently, GIS captures only one official version of reality (Corbett et al. 2016; Harris & Weiner 1998). On the other hand, GIS is reinforcing the existing power relations with the representation of spatial information via a map or other mediums. GIS is a powerful technology that gives experts or respectively those in power the ability to shape, control and manage the land and its resources by disseminating their space and their spatial knowledge. Simultaneously, with the enforcement of authorities and/or

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corporations a further disempowerment of the marginalized is taking place (Elwood 2006; Ghose 2018; Schuurman 2000 & 2009).

As a result of those heavily led debates between critics and proponents a new sub discipline of GIScience called Public Participatory GIS (PPGIS) has emerged. The goal of this new research agenda is to overcome the uneven access to spatial information and technology and to foster participation and empowerment of the marginalized communities (Corbett et al. 2016). As the technology and data become more affordable and user-friendly, PPGIS projects began to spread extensively across the world. While some PPGIS organizations were (to some degree) successful in participating more effectively in policy making, others were not so (Ghose 2007). The goals set by the community can rarely be attained. PPGIS is a complex process that tries nothing less than to redefine the existing power relations. The reasons why it is difficult to say whether a fundamental shift is occurring or not are multifaced. PPGIS needs to take in consideration internal and external factors which are essential to the success or failure of empowerment and are difficult to challenge. Furthermore, the term 'empowerment' is ambiguous and is understood differently by the participants. The attempts by the scientific community to conceptualize empowerment have not led to a holistic framework, but to a variety of different concepts. The concepts only help to describe some parts of the complex process. Some concepts are defining different forms of empowerment outcome, other highlights the process of empowerment, where capacity building of members or of the whole organization is important. And yet others are considering empowerment as embedded in the social and political context (Elwood 2002; Corbett et al. 2016; Kyem 2002). To reach the goal of a holistic framework, the scientific community not only has to integrate the different concepts existing already, but examine as well whether the identified factors influencing the process of empowerment can be satisfyingly explained by the existing concepts. A holistic concept therefore should be able to explain who is empowered, how is empowered and what empowerment is constituted of.

In this paper, I will focus on the essential question if the current conceptualizations of PPGIS are considering the internal and external constraints within their framework. In the first part of the paper, I will begin with a general description of PPGIS, followed by putting forth the constraints identified in the research. Further, I will present the existing concepts of empowerment and finally examine the explanatory power of the concepts with regard to the constraints.

PPGIS

PPGIS – Public Participation GIS – is an initiative resulting from the debates around the implications of GIS in society and whether GIS is empowering or disempowering certain groups. With the insight of prevailing absence of underprivileged individuals and groups in political processes and the ignorance of their experiential knowledge in policy making, GIS practitioners envisioned to democratize GIS technology and developed a flexible GIS system

which corresponds to the needs of the users, so that it can assist communities that would be otherwise excluded from public policy debate (Kyem 2001).

Public Participation GIS is an interactive human process and a tool based upon a bottom up GIS technology. The principle goal is to overcome the digital divide, to incorporate multiple perspectives and to empower marginalized individuals, groups, communities or organizations by seeking for an equitable access to spatial data and GIS technologies, to integrate local and experiential knowledge and to diversify forms of representing spatial knowledge (Ghose 2018). It is important for the citizens to access official data to build their own spatial and situational awareness. The traditional GIS, based on a top-down, rational expert approach is not per se problematic. This form of GIS has a strength in capturing the physical world, but weaknesses to represent complex social processes. It's difficult to integrate, analyse and represent other forms of knowledge like perceptions, experiences and emotions of the citizens or contradicting information. Furthermore, local and indigenous knowledge, for example the condition of a neighbourhood or the ancestral land of indigenous people, is non-existing in traditional GIS, although it has a high value. By excluding this information from the decision-making process of policies, people and communities may not be represented and taken in consideration when decisions are made (Elwood 2002 & 2006; Harris & Weiner 1998). Therefore, a rewiring of GIS became indispensable. An alternative GIS capable of incorporating different forms of knowledge like pictures, photos, videos, sketches and implementing qualitative analyses allows non-traditional users to better represent their conceptualization of space, to create own perspectives and alternative agendas (Ghose 2018). PPGIS increases the use of spatial knowledge by less privileged groups, promotes situational awareness and leads to a more informed community to make recognition for their concerns and interests, to contest official discourse, to gain participation in political decision making processes and to reshape policies (Elwood 2002; Ghose 2018; Kyem 2001).

The dissemination and quality of spatial information is critical for the success of a PPGIS project and can legitimize their position of contesting and claiming. PPGIS is capable not only of providing multiple perspectives, but also to bring them together via internal consensus making. It acts as a portal with a united voice towards the powerful actors and even provides them with their professional data. By sharing their data with the public, stakeholders are gaining a better understanding of the complex local conditions (Schuurman 2009).

Public participation GIS is always carried out as a community-engaged project 'with a unique application in a specific socio-political context [and usually] under the guidance of experts from outside the community' (Kyem 2001, 6). PPGIS is not only defined by the marginalized group, but is instead surrounded by a network of actors such as activists, universities, nongovernmental organizations, corporations and governmental agencies that are involved in the process of participation. Some are contributing to the PPGIS organization. In particular, university-community partnerships are important. PPGIS institutions are often poor in resources and lack

of skills in GIS technology. Universities provide a rich source of methods and software skills to support these actors. But this role of universities is not unproblematic, as we will see in the following chapter. Community GIS organizations occupy a low power position within a network, as they try to gain influence through their PPGIS projects, in order to address and contest social and environmental injustices. To attain those issues and to shift existing power relations they build up networks of powerful allies (Ghose 2018). PPGIS must be seen as a process of a participation with GIS as a technology providing spatial decision support, 'but PPGIS in itself cannot solve the problems of structural inequities and injustices, which must be addressed through political, social, and economic reforms' (Ghose 2018, 432).

Participation as a process can take several forms. It can for instance, as Arnstein's (1969) concept of participation ladder, be a range from tokenism at the bottom to collaboration in the middle and to citizen control at the top. In the case of PPGIS, tokenism would be about providing the public with information and create attention to an issue. This can take the form of opposition or confrontation. The collaboration level is met when PPGIS organization maintain good relationship with authorities and support and consult these actors in their decision making. The highest level of participation would be a partnership between PPGIS and authorities where PPGIS has the ability to co-decide on policies (Ghose 2018; Kyem 2001).

 PPGIS projects are implemented in developing countries just as in industrial nations, in indigenous communities and local underprivileged groups. Consequently, they cover a wide range of topics. There are studies about land reforms in South Africa as a consequence of the apartheid heritage, a collaborative forest management between foresters and the local community in Ghana, or protection of biodiversity in the amazon forest of Brazil. Other projects deal with land rights, demarcation and protection of ancestral land of indigenous people in North America or the revitalization of neighbourhoods in Michigan. Further, discussed topics include gathering and guarding traditional knowledge, conflict resolution over resource allocation or urban planning (Kyem 2001 & 2002; Sieber 2003).

Current PPGIS research focuses on how and why GIS might alter social and political structures. On the one hand, effectiveness and constraints of empowerment are analysed. Researchers are no longer focusing only on the resources available, but integrating as well internal and external factors that are having an impact on the process of empowerment. On the other hand, scholars are trying to define a theoretical framework of empowerment that suites PPGIS. The scientific studies of Kyem (2001), Ghose (2007), Sieber (2003) and Elwood (2002) are central to this research focus.

Kyem examines in his paper internal and external factors that influence the empowerment process of a PPGIS organization. He uses prior studies done in southern Ghana about resource management in the forestry industry to illustrate not only the internal structural influence of a PPGIS on its outcome. But, in addition he analyses the impact of PPGIS in a cultural, societal

and political context with a focus on the compatibility of western technology in a non-western environment. Furthermore, his study provides an overview of different existing definitions of empowerment in scientific literature which he summarizes in different concepts.

The work of Sieber considers the aspects that are needed to frame a transnational PPGIS. To reach such a framing, she defined a new empowerment framework based on a scaling-up approach of organizational capacities and by analysing existing obstacles of empowerment in local PPGIS.

Elwood develops a conceptual framework to assess empowerment. She manages to integrate different existing conceptualizations by adding multidimensionality to empowerment. The dimensions incorporate different degrees of empowerment, going from tokenism to real participation in political processes, but also include capabilities and skills of PPGIS's members and add different temporal and spatial scales to her framework. She illustrates her concept based on a case study conducted in Minneapolis, where she examines the empowerment of PPGIS organization within the scope of a neighbourhood's revitalization project.

Ghose intends in her paper to explain the unevenness in the outcome of PPGIS by implementing the concepts of politics of scale and networks of association to the world of PPGIS. Her framework describes the process of altering power relations as a space where different actors are building networks of associations with other actors at multiple scales and are using those connections for securing their own interests or contesting the power of others.

Constraints in empowerment
The central goal of PPGIS is to empower citizens, while necessarily disrupting existing power relations. PPGIS research is about examining the impact of GIS, whether GIS is an empowering or marginalizing force of community groups. The assessment of whether a shift of power is occurring in practice or not is difficult (Elwood 2002). It is more than just the mere willingness or unwillingness of authorities to share power. Empowerment is a complex process and is greatly influenced by the local, social and political context. The process of participation takes different forms and each has a different influence on the empowerment. The success or failure of PPGIS depends on a multiplicity of factors. Internal factors as financial, social and natural resources of communities or the access to knowledge or the structure and organization of PPGIS initiatives are equally important as the external embeddedness in culture, legislation and society (Ghose 2018). Another obstacle is that the process of empowerment emerges slowly over a long period of time and is therefore rarely evaluated in case studies (Kyem 2001).

A general issue described by most scholars is that PPGIS communities are lacking in financial resources. Even though hardware and software became more affordable over time, it remains a limiting factor for many, mostly not-western, community initiatives. Insufficient funding is not only limiting access to computing but also remains a problem for adequate training of community members (in GIS), the maintenance of computer systems and the operating mode

of projects. In numerous cases, resource poverty is accompanied by a lack of infrastructure that aggravate the condition. Without electricity or adequate internet connection, the basics of PPGIS like downloading data, analysing data or distributing information, is difficult or nearly impossible (Sieber 2003).

Another limiting factor is data availability. Data must be accessible, unprocessed to discover relationships, current, in a suitable file format and affordable to be used in an PPGIS context. Public information takes up an essential role for making PPGIS possible, but access to governmental data is not given everywhere. In some countries legal frameworks exist that assure information as a right and make it accessible for the citizens, while in others those opportunities don't exist. Furthermore, the form of participation towards governmental agencies, either in a collaborative or confrontational manner, influences the access to data, whereas the second form can be an obstacle (Sieber 2003).

These basic constraints within PPGIS groups are often compensated by an expanded social infrastructure of support including GIS vendors, professionals, non-profit organization, governmental agencies and universities that provide PPGIS organizations with hard- & software, GIS expertise, data and funding. Non-profit organizations are fundamental to PPGIS by sharing datasets with others when the government is not providing data. The most valued partner is the university by offering expertise in GIS and project management over a longer period of time. Researchers and students help in acquiring, manipulating and distributing data that is often nonintuitive for PPGIS members. Furthermore, it's often assumed that without the external support PPGIS can't reach the full potential of GIS (Sieber 2003). The strong reliance on external forces isn't without constraints. The lack of funding creates a dependence between the financier and the PPGIS institution. Financial support can be tied to requirements and weaken the organization and its goals. Potential compromises are made to meet the expectations of the sponsors (Kyem 2001). The dependence on external expertise is in so far problematic, as those external actors are not familiar with the local traditions, norms and rituals. It might be the case that the local community has difficulties to communicate their needs to the experts. Also the concept of empowerment can be understood differently. This impact can even go so far, that when both support in funding and expertise is not continued, the sustainability of PPGIS is at risk. Kyem (2001) showed some examples in southern Ghana, where community-based organizations collapsed after the supportive institutions had left.

PPGIS is based on a western worldview, that mediates a picture of widespread public participation and democracy where all members should be empowered. While this concept might also not be shared by some groups in Western democracies, in many non-western countries and indigenous communities we can find majorities or strong forces who oppose this model of society. The promotion of PPGIS is likely to fail, if the local and cultural context is not taken in consideration (Sieber 2003). Local beliefs, rituals and customs can't be neglected. PPGIS cannot just simply be imposed on communities by PPGIS experts, but is an internal

decision of the local population to commit themselves to it and seek for common goals as a community. PPGIS application can simply fail due to the local conditions of how power is organised. In a non-western context, local leaders of communities might be opposed to PPGIS projects. They may be unwilling to share their power or fear that PPGIS projects might undermine their power. Furthermore, local leaders may not feel any commitment to the needs of local groups, especially when those are poor in political influence (Kyem 2002). Further, the implementation of a widespread participation within a traditionally non-democratic institutional arrangement, if only put forward by the naive illusion of PPGIS experts, may be impossible to achieve and may provoke confusion or/and conflict potential instead. For example in societies, where women have religious or cultural restrictions to express their views and concerns, PPGIS initiatives that try to alter gender roles and motivate women to participate might fail, as in the case of Kyem's study in Ghana with the quest to empower all members of a society: Either the female participants hesitated to join the project or were unwilling to speak in public and left almost exclusively men the opportunity to participate in the PPGIS initiative. Another example is a study from the post-soviet Poland, where remarkably even in the post-soviet era members of PPGIS organizations couldn't contradict local government policies (Sieber 2003). Besides gender roles or old socialisation patterns, it happens also quite often that old institutional arrangement are reproduced within PPGIS. Therefore, it's not surprising that men with wealth and good education are more likely to be in decisive position hold more power than the poor and disadvantaged (Kyem 2001).

Besides the widespread of democracy, PPGIS culture conveys a technological solution approach to solve problems in society. But GIS-technology itself can be a constraint to empowerment. GIS technology is based on data, but what if rituals and customs can't be stored in an appropriate way and what if the data isn't able to represent the needs and concerns of a community. GIS technology is effective in analysing objective spatial data, but 'technology remains ineffective in the analyses of subjective data, embedded in values, beliefs, and traditions, that abound in communication and exchanges of views within local communities' and in representing alternative forms of knowledge (Kyem 2001, 13; Sieber 2003). In Kyem's case study in southern Ghana (2001), he asserted that beliefs and rituals, like trees or streams embodying spirits that protect members of the community from evil, are difficult to analyse in terms of how those rituals are shaping social institutions. GIS has limited capacities to incorporate intangibles to be analysed in a numerical manner. Furthermore, by bringing technology to indigenous communities, PPGIS might erase culture that should have been protected. 'PPGIS desires to preserve the uniqueness of place', but when applied to non-western cultures, an assimilation process is triggered that can transform traditional folkways and their knowledge production systems (Sieber 2003, 55).

The inner structure of PPGIS is important to its success. PPGIS should be built upon a stable foundation including common goals within the community as well as solidarity, reciprocity and

trust among the members. A network of strong social ties is important to reduce selfishness of the members. But empowerment is a subjective experience. Most members have different reasons for joining a PPGIS organisation. Their perception of problems and how they should be resolved within a PPGIS community can heavily differ. To find common gaols where all interests are considered is difficult. If internal differences can't be overcome in the first place, an pre-existing instability might evolve over time in disparities that can't be neglected anymore. Self-interest of individuals or subgroups will dominate the PPGIS and will sooner or later bring the PPGIS initiative to a collapse (Kyem 2001 & 2002). Kyem (2001) illustrated such an example in his case study, where dominant members seeked favours from forestry officials and dictated their views to other members. The struggle over influence, the seized opportunities and the personal conflicts harmed the PPGIS organization and led to quitting of some members. But also the disappointment over personal expectations not being met or the lack of direct reward turned into frustration and finally to leaving the organization.

Another important requirement of an organization is to be willing to take up the responsibility and the new roles that are coming when authorities are relinquishing power. But inner obstacles as when members are lacking in skills, training and experience to deal with the newly gained power or an absence of desire for change can prevent organizations from being empowered. This viewpoint is often ignored but shows that failure of empowerment is not always due to unwillingness of authorities to share power, but also the unwillingness or incompetence of PPGIS to embrace power (Kyem 2001 & 2002).

Another constraint is the manner in which empowerment is seeked. PPGIS is situated in a dilemma. For increasing the chances of being empowered, PPGIS seeks for more professionalization, to adopt the practices of authorities and apply a more scientific rational approach. By doing so, PPGIS is giving up on some of its fundamental values and creating some internal barriers that lead to disempowerment of non-technocratic members within the PPGIS organization. In the process of professionalization local knowledge and qualitative data is undermined. Most data used is of quantitative form and needs experience and expertise to be analysed (Elwood 2002; Sieber 2003). A case study of Elwood (2002) in Minneapolis, where a neighbourhood is revitalized, describes such a case. She identified that the language and the form of information used by the PPGIS group changed over time. A former language of visual description of housing condition relying on residents' observation has been transformed to a language of planning expertise and city policy using numerical property-condition codes. By adopting the language of the experts, the PPGIS initiative could better promote their case and had been granted legitimization and influence in decision-making processes. This transformation created internal barriers of expertise and knowledge where members with a technical background were able to contribute to the project and could make greater claims to authorities, while other members without GIS expertise were left behind. Internal democracy has failed and lead to an inner inclusion and exclusion of members. This case study shows that

empowerment and disempowerment can take place simultaneously within a PPGIS organization. As a PPGIS initiative, it is a balancing act to strive for more professionalism, greater involvement and influence in policies at the same time as integrating members of a diverse range of social groups and to represent their needs and priorities.

Another factor that plays a strong role in whether empowerment is taking place or not is time. Most of the projects are not getting the time that is needed to change local political structures or social institutions. 'Community empowerment is a long-term undertaking, though the urgent need for change in communities often makes it difficult for advocates to fully contemplate the length of time it would take to bring about a lasting community empowerment.' (Kyem 2001, 13). Also, as mentioned above, the support of external actors is often just guaranteed for a limited period of time and can risk the sustainability of PPGIS when it comes to an end.

Concept of empowerment

The complexity of PPGIS and empowerment as well as the variety of factors that influences the outcome of PPGIS projects makes it difficult to actually develop a single framework for assessing how power relations are altered and negotiated. The multiple, sometimes even contradicting frameworks of empowerment existing within social science are not really helpful either and are leading to a significant gap when applied in PPGIS (Elwood 2002). Corbett et al. (2016) describe empowerment as 'a fuzzy concept; imprecise, contested, confusing, widely used, and essentially meaningless unless explicitly defined' (Corbett et al. 2016, 339). The current concepts of empowerment in PPGIS literature, accepted by most scholars, defines empowerment as a process and an outcome. A more robust and precise evaluation of empowerment is seeked by many to strengthen the understanding of it and to be a better guidance in PPGIS practice (Corbett et al. 2016). In the following section I will present the most relevant frameworks.

Elwood (2002) identified three mayor definitions of empowerment existing among social scholars. The first group argues that empowerment is based upon a distributive change. Empowerment is mainly seen as an acquisition of resources and an increase of opportunities for political participation. The material gain embodies an increased access to goods and services or financial support. For example, a distributive change leads to an 'increased access to grant and loan funds for improvement of rental and owner-occupied properties in the neighbourhood' that is part of a PPGIS neighbourhood revitalizations project. (Elwood 2002, 910). The increased participation in political processes must be seen as simple inclusion. For example, a community is offered a seat on a decision-making board where they can share their views and ideas with the stakeholders.

The second group understands empowerment as a procedural change, that refers to a change in the decision-making procedures. Therefore, empowerment can be observed in a political and social shift, which benefits the marginalized groups by giving them the opportunity not only to be heard, but also to contribute actively in a decision making process by bringing in priorities and proposals of the community. The adoption of proposed opinions occurs, because the knowledge and the needs

of citizens are based on legitimacy. Sometimes PPGIS participants even reach a level of legitimacy where their interests are considered on equal footing with other stakeholders (Elwood 2002).

The last group defines empowerment by capacity building capabilities. Capacity building is understood as the 'expansion in the ability of citizens or communities to take action on their own behalf' and to alter 'structures of oppression that have led to disempowerment' (Elwood 2002, 909). Researchers in this group focus on many different forms of capacity building. Some scholars focus on the abilities that include the technological, communication and organisational skills to produce community-based knowledge, to communicate and organize interests. Other scholars focus on skills necessary to gain a better understanding of political affairs and the complex interrelationship that underlies decision making. A last group of scholars concentrates on the capacity of individuals and communities to increase politicized consciousness and self-confidence. All three groups of abilities are necessary to assert control over their conditions, to put in place effective actions and to alter existing structures (Elwood 2002).

Elwood's concept of empowerment is based upon those three identified groups. For integrating those different groups of empowerment, who have been formerly seen as separate, singular definitions, Elwood embodies them 'as potential dimension of empowerment' that can occur simultaneously and at multiple scales (Elwood 2002, 910). She differentiates between political, spatial and temporal scales. The political and spatial scales range from individuals, communities to whole nations and are inseparable connected with each other, as interactions of actors occur in space at different spatial levels. For example, a PPGIS project can make loans accessible to local neighbourhoods, at the same time PPGIS participants are sitting at the table of the decision makers and are consulting those and by doing so they gain access to new information and have the consciousness that they can foster their interest. Furthermore, a PPGIS community might be connected to other PPGIS projects or NGOs on a national level and are sharing their knowledge. The time scale refers to the sustainability of empowerment. Long-term implications are more likely to foster a shift in political procedures, but it depends also on the dimension of empowerment. Distributive empowerments are due to their relative weak position the least sustainable type of empowerment. Their gain in power can be easily undone. Procedural empowerment is more sustainable. The legitimacy of PPGIS is build up over a long period and is difficult to revoke. The most sustainable form of empowerment is when capacity building takes place. New skills and capabilities are maintained and can even be transferred to other individuals (Elwood 2002).

Kyem (2001) found partly similar conceptualizations in existing literature as Elwood. He differentiates between empowerment as 'distributive power', as 'generative power', as 'building human capital for collective action' or as 'social change'. Empowerment as distributive power is based on greater access and control over goods, services and political participation resulting in more political influence and on having an impact on decisions. He did not focus on different graduations of empowerment as Elwood did within distributive and procedural change. Instead he describes empowerment as a distributive process of limited amounts of resources and power between groups where the distribution takes place in confrontational manner. The gain of political shares of one

group corresponds to the loss of power of another group. He referred to this concept as a zero-sum game.

The second concept of empowerment identified in the literature - generative power - corresponds with Elwood's 'capacity building'. The acquired skills of an individual or community shouldn't only be used for dismantling existing power relations, but also help to build up new relations, to consolidate and manage newly gained power. In addition, empowerment is seen as a 'positive-sum' game where every individual has power in the society and can use his power for a collaborative action. The gain in power of an individual or group is not at the expense of the powers of others but should lead to a common good of all.

The third group – empowerment as building human capital for collective action – focuses on the process of empowerment. The scholars argue that empowerment starts with an inner realization of individuals that their own well-being or goals can be achieved better as a group than through egoistic and individual action. To attain this kind of self-esteem, the building of social networks with shared norms and an environment of trust are necessary. During this process, adaptations of their own interests occur to overcome slight differences and are transformed to a common goal for being able to work as a group and pursue collective actions. Empowerment in a community is thus taking place at an individual level when a collective action leads to the fulfilment of a person's well-being, that is adopted over the time and when a group of internally empowered members are working together.

Furthermore, the last group – empowerment as social change- embodies empowerment in a larger social context and must be seen as only effective when it leads to changes in social institution that are defined as 'collective patterns of our thinking, feeling and acting' (Kyem 2001, 9). To reach this kind of empowerment, PPGIS communities have (1) to develop political awareness and participation and put pressure on existing institutions or (2) to gain control over decisions and resources of a local neighbourhood and become sort of an own institution for the local context. An important perquisition is to be independent from external expertise and to be able to manage their affairs on their own by building up local capabilities in management, communication and in GIS.

Sieber (2003) based her concept of empowerment on a scaling-up of capacities that are within an organization to reach empowerment. The potential for empowerment can only be reached when sufficient organizational capacities are built up to match the scale of the political power or the scale of the problem. She differentiates between quantitative, functional, organizational and political scaling-up. The quantitative scaling-up describes an organizational expansion in terms of increasing the membership base and acquiring financial and other substantial resources for gaining in weight and influence in participation processes. The functional scaling-up focuses on the diversification of the organization's activities in multiple areas. By broadening their fields of interest more resources can be attracted. The organizational scaling-up refers to improvements within the organization to become more sustainable. This embodies a more efficient management, an acquisition of advanced technical skills and a better communication and presentation of goals and interests to increase the visibility of the project, to stabilize funding or even sell 'professional' data to generate income (self-

financing). Political upscaling as last level aims at establishing alliances to leverage own goals. The coalition building can or should take place across different spatial scales.

Ghose (2007) based her theoretical framework on the literature of politics of scale and networks. She attempts to explain why some PPGIS projects are successful and some are not by exploring and exposing the underlying causalities of power relations in society. PPGIS projects are embedded in social and political power relations at a specific place, also referred as 'space of dependence', where different agents of different scales, hierarchy and resources are defining those power relationships. Scale is considered as one element, besides capital and political networks that can construct power relations and exercise control over space. 'Space of dependence' is non-static and is subject of constant transformation where actors of different power are contesting and renegotiating the power relations of others to improve their position. In this arena of power struggles, it's important for the actors to create a 'space of engagement' to connect with other actors and build networks of association at multiples scales for either protecting their own interests ('politics of securing') or for contesting existing power relations and gaining territorial control. The struggle for power is a balancing act of competition and cooperation between different actors. For communities or grassroots groups, it is key to construct alliances with (powerful) actors at multiples scales ('politics of scale') to get the own voice heard and to legitimize the own viewpoint, but also to assure the required material resources. For powerful actors a good relationship with community organization is critical to advance their own agendas.

Critique on PPGIS empowerment concepts

The previous conceptualizations of empowerment have the ability to describe empowerment as an outcome in different degrees and to define important characteristics of the process. Important elements of empowerment such as the scaling-up of resources, capabilities and the building of networks as well as the different spatial, political and temporal scales are already integrated constituents in the concepts. Additionally, the perspective of the individual, who must overcome his selfishness, seek for collective goals and be conscious of his role is included likewise. These frameworks can explain the impacts of factors such as financial resources of the PPGIS organization, training of the members or connectivity with other actors. For example, after building up networks, those can be supportive in terms of expertise, financial resource, helping to promote legislation for open data or are used for gaining weight in the arena of power struggle. Furthermore, the negative impact of networks of support, the reciprocal manipulation and a potential dependency are slightly touched on within the concept of 'empowerment as social change'. In contrast to the other approaches, independence is sought in order to be capable of changing social institutions. This field of tension where we need on the one side strong social relationships with others to pursue own interests and being able to gain in political weight and on the other side to keep independence to change the bigger picture must be deepened in future research. In general, PPGIS frameworks are missing out the bigger picture apart of the underlying relationship how power is constructed. New conceptualizations must focus more on the implications of cultural and social disparities. With the implementation of

PPGIS in western and non-western cultures, old social and cultural arrangements are reproduced within the PPGIS organization, prevent a widespread participation and erode inner values of PPGIS. Also, the impact of PPGIS as a technology and the potential destructive power of non-western culture must be self-critically analysed. The composition of PPGIS members and their social, educational and financial backgrounds should not be neglected in the conceptualization either. The warranty of inner inclusion of all members, despite disparities among them, is key for an integral empowerment. Furthermore, the communication between members within a PPGIS institution and among different actors in the political arena needs further examination. How are individuals communicating their interests within the group? How is the community communicating their interest to other actors? How do groups deliberately define their common goals? A better understanding of the mediation of different interests and the abstract concept of PPGIS/empowerment help to attain a more holistic view. Another characteristic of the PPGIS process overlooked so far is the desired professionalisation of PPGIS accompanied with an undermining of the foundation of PPGIS. A more rational 'expert-driven' approach in terms of language and technology subverts the participation of the non-technical marginalized and degrade alternative forms of knowledge representations. Bringing all new insights together in one integrated framework is a mammoth task, but is eagerly awaited by the PPGIS community.

Conclusion

PPGIS is a method to empower individuals and communities underrepresented in decision making process by altering existing power relations. The process of participation is complex and embedded in a place-specific social, cultural and political context. The attempts by the scientific community to understand all facets of empowerment and to conceptualize the phenomena turn out to be difficult and have not yet succeeded completely. The foregoing critique illustrated that the existing frameworks are able to describe elementary components of the empowerment process such as the importance of resources, skills, network of association, different temporal and spatial scales and individual self-awareness. But the concepts are missing out on the embeddedness of PPGIS in cultural and social structures, on the inner composition of the PPGIS organization and on the communication of interests among members and across other actors. Furthermore, future conceptualization should be able to deal with inner contradiction. Empowerment is about an inner balancing act of seeking for external support versus pursuing independence and is about professionalization versus conserving PPGIS values. Also, the simultaneously empowering and disempowering of members within a PPGIS organization and its impact should be part of a new concept. The development of a more sophisticated framework is seeked by the scientific community to get a more holistic view, to strengthen the understanding of empowerment and to better guide PPGIS in practice. Therefore, existing frameworks most be brought together and should integrate the newly gained insights.

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