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Photo, front cover: Magnus Rönn

Photo is describing a Lumen Prototype from an exhibition 2024 at Louisiana in Denmark called *The Living Structures*. The exhibition is the first in a new series 'Architecture Connecting', spotlighting the evolution of architecture in an era of climate crisis and the social, cultural and political challenges this reality poses.



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## **DIGITAL TOOLS FOR EARLY PARTICIPATION IN URBAN PLANNING PROCESSES: SITUATING KNOWLEDGE THROUGH A PRAGMATIST APPROACH**

**MARCO ADELFIGIO, ÁLVARO BERNABEU-BAUTISTA,  
JAAN-HENRIK KAIN, AND JENNY STENBERG**

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### **Abstract**

This article investigates the application of digital participatory tools to engage residents in the early stages of urban planning processes in Hjällbo, a stigmatised neighbourhood in Gothenburg, Sweden, currently undergoing a process that fosters densification and gentrification. Adopting a pragmatist approach, the study aims to assess how a set of digital tools can facilitate residents' suggestions for places needing improvement and proposals for functions and qualities to be added to these places. The tools tested include a web-based participatory GIS (MapX), an e-platform for participatory processes (Decidim), and social media data (Google Places, Foursquare, Twitter, OpenStreetMap, and Instagram). The analytical framework examines the interaction between context, process, content, and local stakeholders. The results show that MapX effectively collected residents' opinions and identified key places and routes of interest, while social media data provided insights into the relevance of certain areas and activities. Decidim, however, experienced challenges with respect to user engagement and hybridisation between offline and online activities. The study concludes that digital tools should be combined with analogue outreach activities and local mobilization for effective participatory planning. The findings contribute to the development of situational and actionable knowledge, aligning with the pragmatist approach.

Keywords:  
digital tools, citizen intelligence,  
early participation, urban  
planning, participatory planning

## 1. Introduction and Problem Setting

To achieve an effective impact on urban planning from public participation, the early involvement of citizens is advocated in both policy and research (Pissourios, 2014). In mainstream processes, participation occurs in a formalistic and top-down manner (Miessen, 2010), but citizens need to be involved from the early stages rather than merely in the form of late consultations. While a huge variety of tools for participatory planning exists (Wates, 2014), the complexity of situations in which such tools are used requires a combining of methods (Pansiri, 2006) and tools into toolboxes and toolkits. Notwithstanding, such combinations are often-times confined to policy and institutional documents aiming to exhibit collections of best practices (Moore, 2013) and require more effort on the research side.

In this context, this article explores how digital participatory tools can engage residents in the early stages of planning processes, taking Hjällbo, a stigmatised neighbourhood in Gothenburg, Sweden, as a specific case study. This neighbourhood is the subject of an ongoing planning process that undermines the current status quo by boosting densification and gentrification. By testing and evaluating various digital tools aimed at grasping the perceptions and wishes of local inhabitants, our work reflects critically on the strengths, limitations, and challenges of using these tools to collect residents' suggestions for places in need of improvement and proposals regarding what functions and qualities should be added to these places. Accordingly, such citizens' perceptions and wishes constitute a form of collected intelligence, regarded as the "sum of all our individual smarts" (Atlee & Zubizarreta, 2003, p. 11), which focusses on the gathering of knowledge and opinions from the local community, rather than on an actual collaborative deliberation of such knowledge and opinions, which would aim at developing collective intelligence (Atlee & Zubizarreta, 2003).

Exploring how digital participatory tools can enable residents to articulate concerns, suggest improvements, and coproduce knowledge about their urban environment also aligns with the pragmatist approach, particularly the concept of participatory democracy coined by Dewey (1916). Our study assumes that public engagement in participatory urban planning processes should not be merely a one-time consultation, but rather an ongoing and adaptive process, in which digital tools serve as instruments for collective inquiry. Methodologically, pragmatism advocates for research approaches that are problem-driven and context-sensitive. Dewey (1938) also suggests that knowledge is generated through an iterative process of problem identification, experimentation, and reflection. In Hjällbo, digital tools are thus being tested not only for their technical capabilities but also for their ability to foster meaningful citizen participation. In this sense, a pragmatist approach can be used to adapt research to the local context and simultaneously allow for researchers' input in the choice of analytical focus (Morgan, 2007).

### 1.1. Early Citizen Participation in Planning Processes

In formal planning processes, citizens are usually involved merely in the form of consultation at a late stage, even though research has shown the need for wide involvement, which must occur “early, often and ongoing” (Wondolleck & Yaffee, 2000, p. 103). Such inclusion of citizens in urban planning is promoted since the complexity of cities cannot be managed through linear, top-down planning (Pissourios, 2014). In fact, “early participation injects community knowledge and expertise into the planning process when it is most needed, before policies are set in stone” (Brody et al., 2003, p. 250). Ronmark (2005, p. 6) adds that, besides considering early engagement in the process, participation should involve “shared decision-making authority”. The positive effect of early participation has been shown in empirical cases, such as in Leipzig, Germany, during the implementation of the Leipzig 2030 strategy, where local inhabitants “had their voices heard during the early stages of the project” and then “were more inclined to accept it and promote its continuation” (Garcia-Zamor, 2012, p. 82). Accordingly, the Norwegian government has established a so-called “earliness principle” to address the lack of opportunity for local organisations to be engaged in early planning stages, and argues that “experience shows that early efforts are important to ensure that the planning processes are as well coordinated and effective as possible”, especially in the case of controversial or big projects (Norwegian Government, 2016, p. 11).

In Sweden, participation in planning usually occurs “too late in the process” (Vestbro, 2012), although there are Swedish examples addressing this issue. One is a project in Gothenburg named “Learning Lab Hammarkullen”, whose aim was to “develop knowledge concerning how tenants can become involved early in renovation processes” (Stenberg, 2018, p. 6). Another is the government of the Skåne region declaring that “citizen dialogue must happen early in the decision-making process, when there is time to actually consider the views that are expressed” (Dehlin, 2017, p. 12). Overall, it can be said that while knowledge in the field exists, there has been only limited success with implementation.

There is also concern about an increasingly neoliberal approach to urban development in Sweden (Olsson, 2018), which can transform participation processes into formalities that can be “perceived as ‘fake democracy’ by citizens” (Soneryd & Lindh, 2019, p. 232). Consequently, “fundamental values of inclusion and participation, that have been the fundamentals for the Scandinavian model, may be threatened” (Soneryd & Lindh, 2019, p. 232). Moreover, according to Vestbro (2012), public participation in Swedish planning is hindered by developers’ lack of openness towards procedural changes as well as citizens’ difficulties in understanding planning proposals. Among other things, Vestbro suggests using a “reverse planning process, in which citizens are invited to identify desirable changes to their own neighbourhood” (Vestbro, 2012, p. 5).

### 1.2. Collecting Intelligence Through Digital Participatory Tools

Due to differing contexts, a wide range of tools are used for participatory planning purposes in both policy and research (Wates, 2014). This variety shows that there is no one single tool that fits all purposes and situations and that, very often, a combination of tools is needed (Sendall et al., 2018). Nevertheless, when tools are organised in the form of toolkits or toolboxes, they tend to get caught in the trap of standardisation and overgeneralisation (Adelfio et al., 2022). In fact, participatory toolboxes and toolkits are more often found in the grey literature than in the academic literature, which is used by institutions for the purpose of showcasing “best-practice standards for engagement” (Queensland Government, 2017) and homogenizing tools and procedures for participation in a commonly shared format (Council of Europe, 2020). This article seeks to counteract such a formalistic and standardised idea of participation and participatory tools (Miessen, 2010). It does so by following a pragmatist approach, in the sense that both the collected knowledge derived from the application of participatory tools and the relevance of such tools are contextual and not a priori universal or standardisable (Kaushik & Walsh, 2019).

### 1.3. Vagueness of the Empirical Situation and Need for Operationalisation

Following Koed Madsen (2024, pp. 96–97), since “digital traces are produced under constantly changing conditions [and] the world can be inscribed in various ways by various actors, depending on what they find important” it becomes unfeasible to apply “clear and durable methodological standards”. This implies that in each project, researchers need to evaluate what the digital data are used for and what kind of knowledge they are expected to generate. Inspired by previous work by Dewey, Koed Madsen (2024) describes this as a form of vagueness in the empirical situation that “creates a need to (re)establish the analytical components of the situation one is interested in studying” (Koed Madsen, 2024, p. 97). In other words, this means that to operationalise the research, making sense of what the actual problem is, choosing which data to select, and deciding what the data are for, need to be established collaboratively by the group of researchers. Vagueness is perceived as something positive. In fact, a “good enquiry involves an attempt to deliberately provoke such situations. If we fail to do so, our analytical schemes will ultimately be unfit for the constantly changing empirical world” (Koed Madsen, 2024, p. 97). The digital tools can support the need for operationalisation and be used in a form of operational tests, where “the only possible test is whether it fits the problem at hand” (Koed Madsen, 2024, p. 97). All this justifies the need to adopt a pragmatist research approach, as explained in the text that follows here.

## 2. Research Approach and Questions

Pragmatism as a research approach for inquiry is useful in supporting societal engagement and the creation of actionable knowledge, as outlined by Stark (2014). In particular, “through pragmatism as a mode of inquiry, those involved in the research process are looking to fit new pieces into their current understanding about a given phenomenon. These pieces fall into place through a process of acting and observing in the research site, and then evaluating and making sense of the results towards a given goal” (Stark, 2014, p. 89).

Accordingly, this article does not aim to provide readers with a fixed recipe for a replicable set of tools or a toolbox. It is rather about showing how the process has worked in a specific location and the advantages and disadvantages stemming from the use of specific tools in that specific location. In this sense, it can be ascribed to a pragmatist approach that prioritises applicability to the local context over replicability. Specifically, the following research questions are posed:

- **[RQ1]** How could a set of digital participatory tools work to make it possible for residents to easily suggest places for improvement and propose what functions and qualities need to be added to these places?
- **[RQ2]** What lessons can be learnt by both residents and researchers from the application of these tools in Hjällbo?

Specifically, this article adopts various epistemological principles of the pragmatist approach: 1) actionable knowledge, 2) relevance to the local context, and 3) mixed methods.

a) *Actionable knowledge*. In this article, pragmatism incorporates elements of action research due to the our work’s aim to empower the local community, which was previously described as pragmatic action research (Greenwood, 2007). This is in line with the position of Kelly & Cordeiro (2020, p. 1), stating that pragmatism emphasises “production of actionable knowledge ..., ensuring that research is contextually relevant”. For instance, the proposals for urban functions and qualities addressed by **[RQ1]** can potentially influence planning consultation and development processes in the specific context of application.

b) *Relevance to the local context and the “what works”*. Within the pragmatist paradigm, researchers “make the choices about what is important and what is appropriate” (Morgan, 2007, p. 69) in terms of methods and tools. They apply “the pragmatist credo of ‘what works’” (Kaushik & Walsh, 2019) to a specific study in a specific context, without excluding a possibility that another method or tool would fit better in other studies or context. This approach acknowledges how “knowledge practices are ‘instrumentized’ ... in an intimate exchange with the tools applied” and how “methods and objects are ... invested with interest” (Asdal, 2018, pp. 750–751) when they are adopted in the

research. By studying the “what works” aspect of pragmatism based on the results of the application of the various participatory tools used in this article, it is possible to address **[RQ2]**.

- c) *Mixed methods*. Pragmatism is usually associated with mixed methods (Creswell & Clark, 2011), to the point that it is actually “hailed as the best paradigm for justifying the use of mixed-methods research” (Pansiri, 2006, p. 223). The use of mixed methods increases the credibility of results and is here embedded within the choice and use of diverse digital participatory tools, whose results can be analysed both quantitatively and qualitatively (for instance, examining statistics or numbers, but also textual information like comments or critical reflection on the material).

This work is part of a larger research project involving collaboration between academia, local residents, and other stakeholders such as the Swedish Union of Tenants and the consulting company Digidem Lab. Particularly, the Swedish Union of Tenants was an active part of the research by facilitating contact and interaction with local residents as well as collecting and analysing data, while the Swedish consulting company Digidem Lab provided technical support for the work with the Decidim platform.

## 2.1. Operational Pragmatism as Methodology

From a methodological perspective, the work is inspired by the above-mentioned work of Koed Madsen (2024) on the use of operational pragmatism when employing digital methods. Based on it, a series of methodological steps can be established:

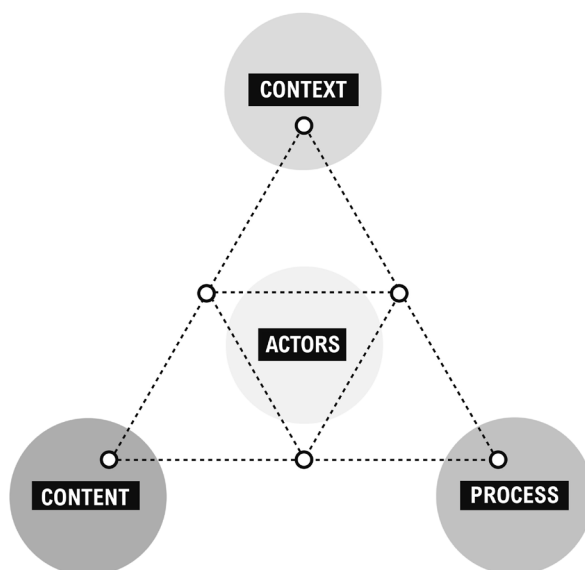
1. Problem setting and vagueness of the empirical situation (sections 1 and 2): Define the main problem and questions, and identify the “vague empirical situation where the analytical components and their internal relations are unclear” (Koed Madsen, 2024, p. 96). The vagueness of the empirical situation here depends on the fact that the article relies on intelligence collected by digital tools. As previously noted, data from digital tools are always changing and, when analysed, reflect the time and context in which they were collected. Moreover, the analysis requires the qualitative interpretation of the research team, which leads to the following point of operationalisation.
2. Operationalisation including a) the definition of a relevant analytical framework (section 3.1); and b) the application of the framework (sections 3.2 and 3.3) to data gathered from a set of digital tools as detailed in section 3.4.
3. Collaborative sensemaking: The research team collaboratively interprets the results and learnings from the application of the analytical framework and digital tools as operational tests (section 4).
4. Discussion and conclusion: These are the results of a collaborative reflection and evaluation by the researchers based on the overall process (section 5).

### 3. Operationalisation

#### 3.1. The Analytical Framework

In accordance with a pragmatist approach, the analytical framework is identified by researchers as being “best suited to answering the research question” (Glogowska, 2010) and adapted to the local circumstances of application. In the context of this research, it needs to reflect the specific context in which the digital tools are tested, the processes involved in the actual application of the tools, the content generated by them, and the actors involved. To do so, the analysis of the application and use of digital participatory tools in the specific context of Hjällbo applies an adapted version of Walt & Gilson’s (1994) policy triangle, particularly its re-interpretation by Farhadi et al. (2022). This triangular framework represents the interaction between context, process, content, and local stakeholders both graphically and analytically (fig. 1).

The rationale behind this study is the need for increased citizen engagement in the early phases of urban development processes and the notion that participatory digital tools may play a role in enabling the collected intelligence of the local community to obtain increased importance in how the neighbourhood is to be developed. The purpose of the article is not a quantitative assessment or measurement of the tools. Nevertheless, analysing their use offers insights regarding many of the characteristics defined by Belausteguigoitia et al. (2021) for evaluating participatory tools with respect to the inclusion of a diversity of participants, a broad range of engagement and communication mechanisms, the objective of building capacity and awareness in the participants, and the aspiration to impact or contribute to planning.



**Figure 1**  
The policy triangle as interaction between context, process, content, and actors.

SOURCE: THE AUTHORS BASED ON THE WORK OF FARHADI ET AL. (2022)

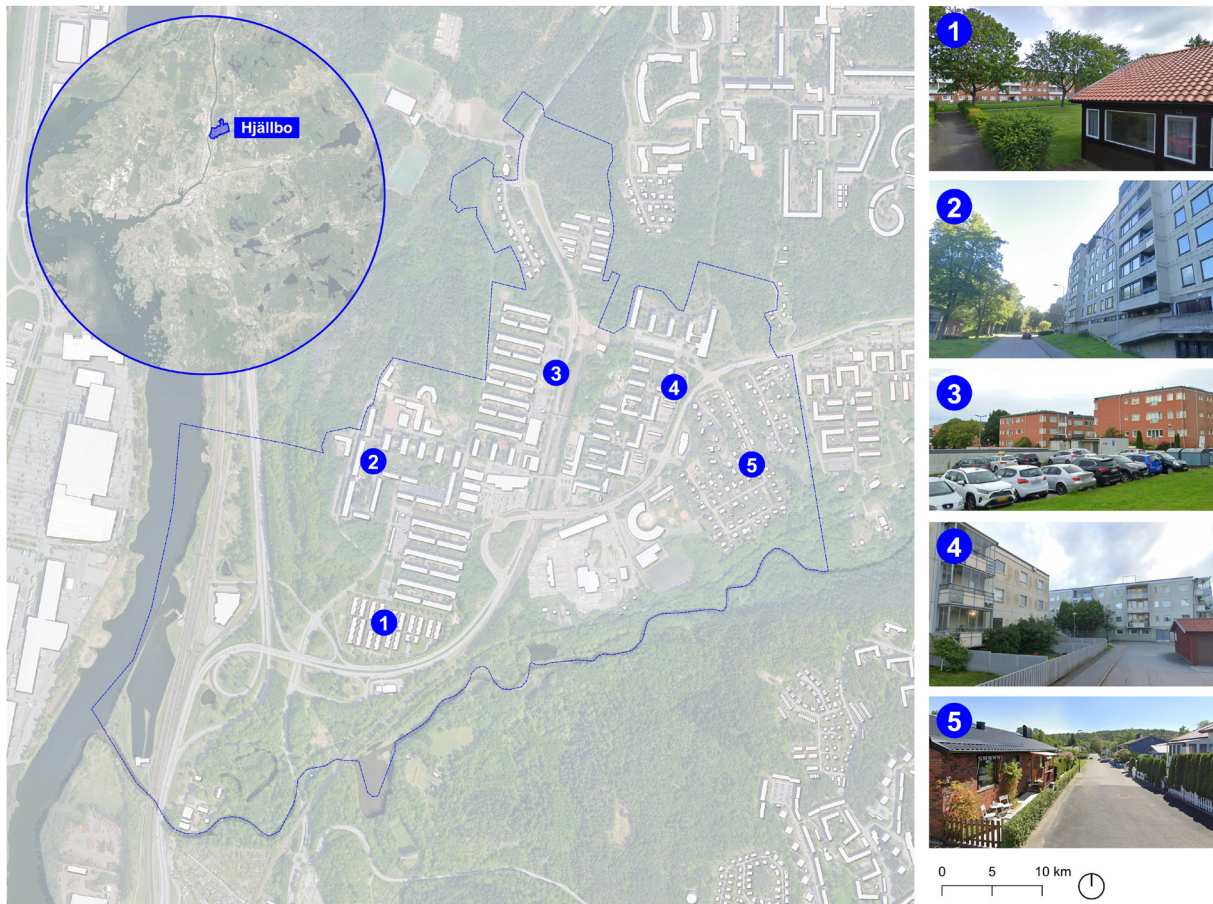
### 3.2. Application of the Analytical Framework to Three Digital Tools

The adapted policy triangle has been applied to each of the tools. Taking the fact that the context of application is the same for all tools as a point of departure (Section 3.2.1), the following sections first describe each tool and its content (Section 3.3), followed by the process of its application (Section 3.4), including the stakeholders involved. A graphic summary figure with the triangle applied to the three tools is visualised in figures 3, 4, and 5.

#### 3.2.1. *The Context: Hjällbo in Gothenburg as a Testbed*

This study focusses on Hjällbo, a neighbourhood (also known as a primary area) of Gothenburg with a population of 7,353 inhabitants according to a recent census (Statistikdatabas Göteborgs Stad, 2022). As Jivén (2004, p. 108) points out, Hjällbo was built between 1965 and 1974 and represents “a typical peripheral apartment building area built during the days of the Million Programme”. This national programme was conceived as “an initiative driven by the Swedish government to provide affordable, accessible homes as well as to improve the housing standards in Sweden” (Brandao et al., 2021, p. 119). Even though the development included a large number of villas and detached houses, in the eyes of the public, the programme mainly “took the form of large, rapidly developed areas in peripheral locations” (Hall & Viden, 2005, p. 303) and has “become almost synonymous in people’s general consciousness with uniform, large-scale housing estates with buildings of grey pre-cast concrete slabs” (Hall & Viden, 2005, p. 304). From the residents’ perspective, however, this is not a true picture of Hjällbo. They instead appreciate the physical structure, especially the three- to five-storey slab houses surrounding green yards, highlighting the rich community life and emphasising how people like to spend time together in public and semi-private places outdoors during the warm part of the year (Hyresgästföreningen, 2022).

The municipal authorities’ current image of Hjällbo is, however, not very positive and focusses on problems that the residents have not highlighted, such as spatial separation or difficulties with orientation, and highlights such things as “sparse buildings and large impediment surfaces mean that the boundaries between the built-up and nature or the streets become diffuse” (Stadsbyggnadskontoret Göteborg, 2021, p. 9). In the mass media, the neighbourhood is often described as inhabited by people who have migrated to Sweden and/or have a lower-than-average education and salary, and as a place where a larger-than-average percentage do not pass the core subjects in primary school (Kerren, 2022). Additionally, the area is on the national police’s list of particularly vulnerable neighbourhoods due to its rate of criminality (Polisen, 2015). A large proportion of the homes in Hjällbo are rental properties owned by a public housing company, but there is also a small proportion of privately owned villas and terraced houses. Municipal politicians have



designated the area for densification, with an addition of 1,100 homes to an area that currently has 2,500 homes (Blixt et al., 2019) (table 1), and during the period when the research project was carried out, planning documents were prepared for this (Stadsbyggnadskontoret Göteborg, 2021), including the planning authority’s formal formats for public consultation.

**Table 1**  
The municipality’s plan for the development of new dwellings and percentage of single-family dwellings.

	Hjällbo today	Added in the municipality’s plan
Dwellings	2,500	Approx. 1,000
Dwellings of which single-family (%)	9%	30–35%

**Figure 2**  
Map of Hjällbo and street view images of different areas of the neighbourhood.

SOURCE: THE AUTHORS BASED ON GOOGLE STREET-VIEW

### 3.3. The Content: Citizens' Perspectives Through Digital Tools

Based on the pragmatist approach, the selection of tools is motivated by the local context and its actors. Specifically, the use of three digital tools was studied with respect to how they could bring citizens' perspectives into the formal planning process: 1) a web-based participatory GIS (Geographic Information System) (i.e. MapX); 2) an e-platform for participatory process (i.e. Decidim); and 3) social media (i.e. Google Places, Foursquare, Twitter [now X], OpenStreetMap, and Instagram).

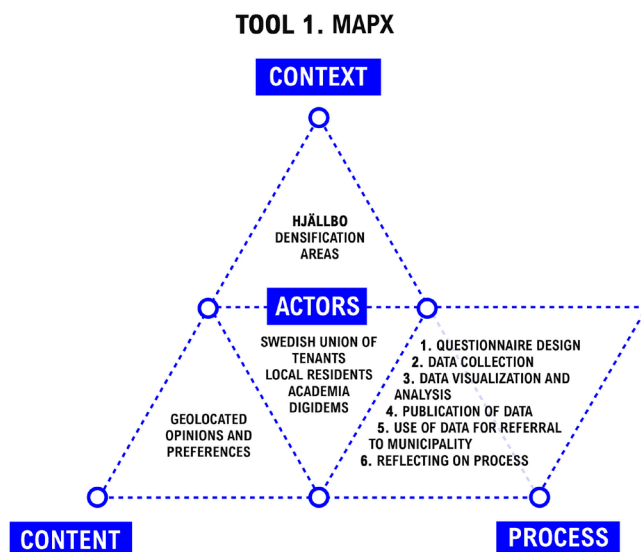


Figure 3  
Application of the policy triangle to the MapX tool.

SOURCE: THE AUTHORS BASED ON THE WORK OF FARHADI ET AL. (2022).

On the one hand, the web-based participatory GIS tool follows in the tradition of public participation geographic information systems or PPGIS (Brown & Kytä, 2014) and is based on the use of MapX, a software for community engagement that collects and analyse data using a map-based questionnaire (mapx.se). The power of the tool lies in the collection and visualisation of abundant inputs, collected by engaged residents, concerning city development or planning and in building a strong credibility in relation to dialogical processes. All the input can be brought together in one place, the map, forming a strong basis for the social knowledge of an area. This type of tool has been used in previous urban participatory planning-related research for over a decade (Zhang et al., 2010; Repetti & Prélaz-Droux, 2003). MapX provides an interactive interface that opens the discussion of the cartography of the neighbourhood, in which respondents can express their ideas in a spatial way.

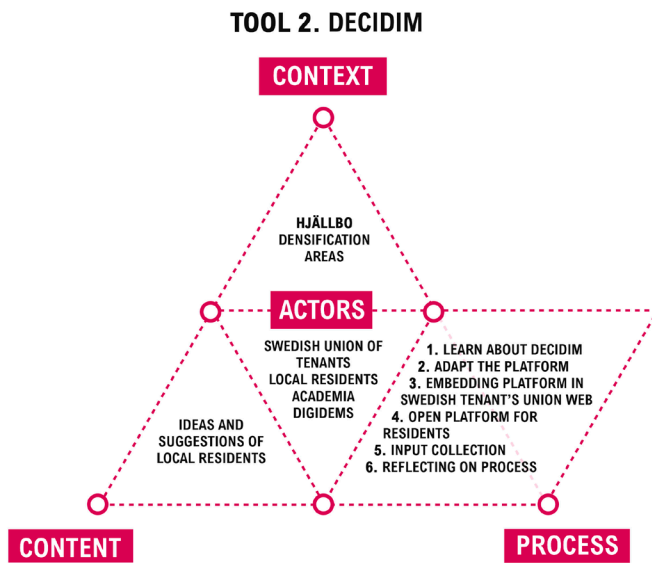


Figure 4  
Application of the policy triangle to the Decidim tool.

SOURCE: THE AUTHORS BASED ON THE WORK OF FARHADI ET AL. (2022)

On the other hand, the e-platform for participatory process tool is based on a digital platform, Decidim, originally developed for the City of Barcelona (Peña-López, 2019) to facilitate the empowerment and participation of citizens in planning processes. The platform is designed so that municipalities, public institutions, and organisations can bring together different modes of participation, for instance, polls, discussions, meetings, proposal collection, proposal development, surveys, and co-created action plans in the same tool and process. In fact, Decidim is not just a digital tool; while it creates a network where users can participate digitally, it should be seen as a hybridisation between what happens face-to-face and what happens digitally (Barandiaran et al., 2018). The Decidim platform was used in Hjällbo on the initiative of the Swedish Union of Tenants to support their work on reviewing the municipality's densification plans and to give residents the opportunity to respond to them. By using Decidim, the intention of the Swedish Union of Tenants was to strengthen the organisation and management of such participatory processes by digitising parts of the activities and to give the local community increased influence and an arena for local organisation. All in all, Decidim facilitates democratic participation through a web-based platform where people can share their experiences, ideas, or opinions about the area.

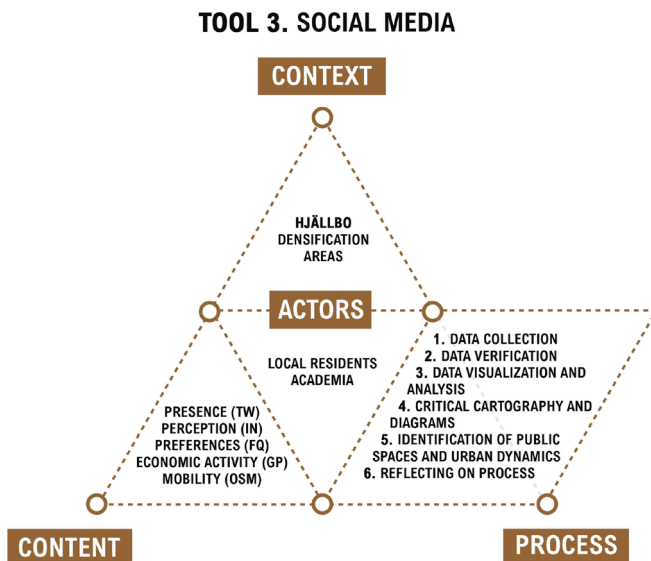


Figure 5  
Application of the policy triangle to  
Social Media tools.

SOURCE: THE AUTHORS, BASED ON THE WORK OF  
FARHADI ET AL. (2022)

Finally, based on Volunteered Geographic Information (VGI) (Goodchild, 2007), “social media and web 2.0 tools offer opportunities to devise novel participation strategies that can engage previously difficult to reach, as well as new, segments of society in urban planning” (Fredericks & Foth, 2013). The impact of online social networks as new technological tools for modern society and the changes that they have brought to the way we communicate, share, learn, and consume information, have influenced our social behaviour, not only in the private context but also in the public sphere of the city. People are often interested in sharing where they go, what they do, whom they meet, and what they are thinking, leaving behind digital footprints that can be quite useful in understanding how the city is used and perceived (Blanford et al., 2015). The interpretation of geolocated social media data offers a wide range of opportunities for the study of diverse urban phenomena, such as people’s preferences, opinions, mobility, and social behaviour in urban spaces. This is possible due to the vast and varied amount of information they provide, which, among other things, includes the exact location, the exact time data were shared, and the categories in which data is structured (Bernabeu-Bautista et al., 2021). Having timely clues about the reality of the city that these data provide can contribute to informing future decision-making in planning processes, with the aim of considering people’s preferences and activity traces as key sources of information. Overall, social media provide more spontaneous information, as it comes directly from the users’ experiences in urban spaces. Specifically, data from five different social networks and web services were collected: 1) Google Places (location and diversity of economic activities), 2) Foursquare (preferred activities and urban spaces with the number of visitors and visits), 3) Twitter (now X) (spatiotemporal patterns of people’s presence in urban spaces), 4) OpenStreetMap’s GPS tracks (pedestrian mobility patterns across the neighbourhood), and 5) Instagram (urban images, activities and elements in public space).

### 3.4. The Process Involved in the Application of the Digital Tools

Each of the tools selected required the design of specific methods for data collection, data gathering, and input collection. This section covers the implementation of these processes for all three tools. In order to provide a general overview of the temporal implementation of each tool, table 2 includes the timespan for the social media data and MapX data collection, as well as the activity registered on the Decidim platform.

**Table 2**  
Timespan of data collection for MapX, Decidim and social media.

SOURCE: THE AUTHORS.

		Start of data collection	End of data collection
<b>MapX</b>		November 2021	December 2021
<b>Decidim</b>		1 September 2021	30 June 2022
<b>Social media</b>	Google Places	18 October 2021	
	Foursquare	6 November 2021	
	Twitter	1 January 2020	4 May 2021
	Instagram	30 April 2023	
	OpenStreetMap	8 February 2022	

The web-based participatory tool MapX was used by the Swedish Union of Tenants for two months in 2021. First, a specific survey was designed with questions related to citizen's perceptions and future prospects in connection with the area. The content of the questionnaire was developed jointly by the researchers and the individuals involved in the project at the Swedish Union of Tenants. To achieve successful data collection, young people living in Hjällbo were consulted to act as interviewers with support from the Swedish Union of Tenants staff. They were given knowledge about the city's development process and underwent training at the Swedish Union of Tenants regarding how and why the dialogue was being conducted, and also regarding the MapX tool itself and its use. The actual collection of data was performed by knocking on doors or by stopping people on the local public square. More than 540 residents were invited to view the map-based survey on a tablet. The interviewers helped the respondents navigate the tool and fill in the responses, but without influencing their answers. After the data were collected, they were analysed, highlighting those places indicated by several residents as areas of interest for improvement or development as well as those indicated as being important for maintaining existing qualities. Data were packaged, analysed, and visualised to be made useful for the Swedish Union of Tenants' comment letter to the municipality concerning the city's densification plan.

Regarding Decidim, the non-profit company Digidem Lab was consulted to introduce and implement the platform and provide technical and procedural support. The platform was adapted to explain the actual and ongoing planning process of the municipality and was also used to embed the results from the MapX questionnaire so as to share the consolidated survey results with the residents. The platform was also embedded in the Swedish Tenant's Union webpage to ensure easier and quicker access for respondents and then opened publicly to residents. The aspiration was also to accommodate an online debate among them by means of a suggestion function, in which inhabitants would have the possibility to propose their own ideas or comments. After the process, the inputs of citizens were collected and analysed.

Regarding social media, data for the delimitation of the Hjällbo neighbourhood were first obtained through various methods, depending on the source – data from Foursquare, Twitter, and Google Places were retrieved through their API – Application Programming Interface using a web-based application designed for that purpose (Martí et al., 2019). Instagram photographs taken of a specific place linked with a location pin were accessed directly through the website and downloaded in bulk using web-scraping methods. OpenStreetMap data were obtained via manual methods of downloading them through their web platform. It is worth mentioning that social media research implies some ethical standards. Although user-generated content is publicly available, there is an implicit agreement between users and social media platforms concerning data ownership. As acquiring consent from every user is unfeasible (Lunnay et al., 2015), data were aggregated to maintain user anonymity and safeguard personal privacy (Sloan et al., 2015). Thus, 1) Google Places and OpenStreetMap do not contain information on who generated the data, while 2) in the case of Foursquare and Twitter, the selected data only contain quantitative, categorical, and temporal variables, but not the user's profile, and 3) in Instagram, priority is given to those photographs that show the urban environment, while those in which people can be easily recognised are discarded. Consequently, the interpretation of user data in this study did not compromise anonymity or violate data privacy. Second, verification and filtering processes were required to prepare the data for the analysis, including the validation of the geolocated properties, the identification and elimination of duplicated registers, the filtering out of nonhuman activity, et cetera. Following these initial steps, data were reclassified based on the research objective and the specific urban dynamic being evaluated (for instance, economic activity specialisation, patterns of use, et cetera). Third, validated and reclassified data were visualised using specific software, such as GIS tools, enabling several geospatial analyses (data density, clustering, dynamic visualisations) to be conducted. The different social media data visualisations were overlaid and compared, as they have proven to be complementary when combined and used as superimposed layers

of information, offering a thorough understanding of the urban reality. Lastly, an interpretation of data and diagnoses regarding urban public spaces and urban dynamics were obtained. Specifically, A) Google Places, Foursquare, and Twitter (now X) were implemented to identify some of the characteristics that make Hjällbo urban spaces liveable and resilient, and also to promote activities in the neighbourhood according to citizens' preferences or needs; B) Twitter was also used to inform the design of better public transport infrastructure and timetables by analysing movement patterns and the influx of people during the week and the day based on the timestamp of tweets; C) crowdsourced GPS tracks from OpenStreetMap were implemented to identify which characteristics make streets successful urban axes for pedestrian mobility and to promote better street designs on the most affluent axes; and D) Instagram was implemented to identify which urban elements are necessary and best contribute to people's presence in the space and to promote new activities or elements of the public space based on what is missing or could be improved.

After each individual process for all three tools, there was a final and shared step that involved reflecting on the overall process, how the information was collected and reviewed, and whether the main objectives and expectations for each tool were fulfilled. The next section covers the results of the implementation of the tools, as well as lessons and learnings obtained after the process.

## 4. Collaborative Sensemaking: Results, Lessons, and Learnings

### 4.1. MapX

In the case of MapX, survey questions included current perceptions and experiences of the area so as to identify liked and disliked spots, but also involved perspectives on the future of the area, such as the types of housing and facilities desired by the inhabitants. A concrete example of the utility of the tool pertains to locations for housing densification. In this case, it was possible to compare and contrast the opinions of the inhabitants with the municipality's plans for densifying the area. Both a qualitative interpretation and visualisation of data (fig. 6 top) and a quantitative visualisation of survey results were performed (fig. 6 bottom).

The results show that only quantitative analysis may not suffice to correctly represent the opinions of the inhabitants. For instance, qualitative analysis of free-text responses was needed to interpret the responses regarding houses with courtyards (*hus med gårdar*) and elongated multifamily high-rise housing (*skivhus*) from the MapX survey. Based on respondents' answers, most residents would prefer to have rental

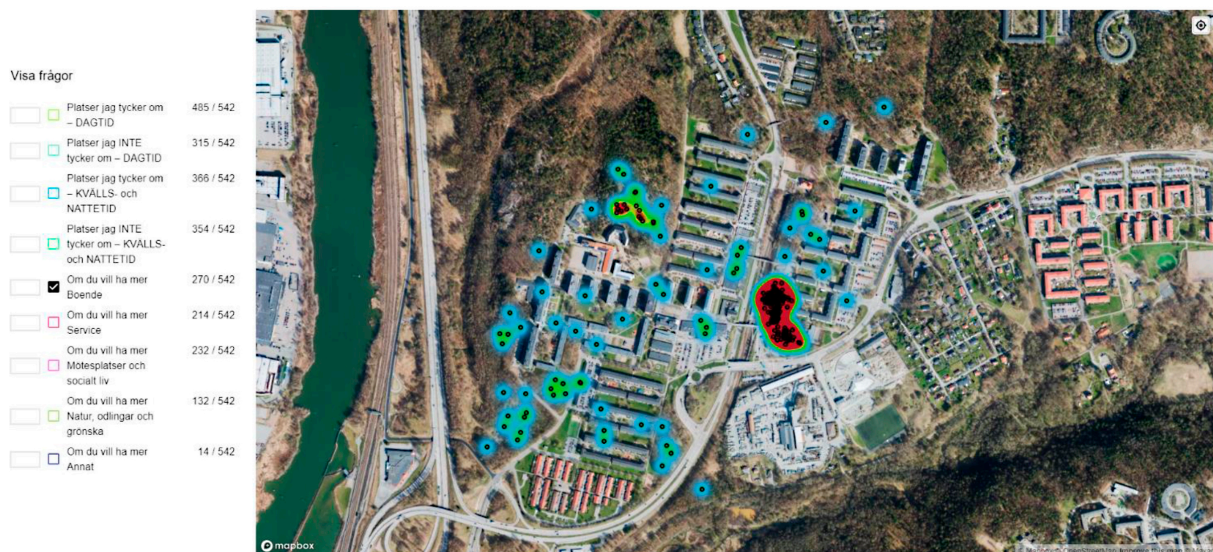


Image 3. What type of tenure do you prefer?

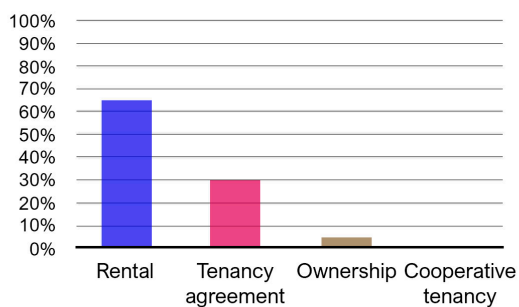
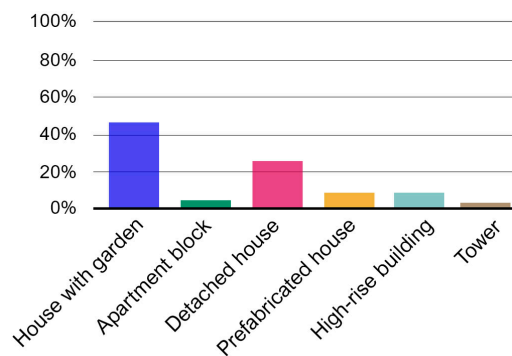


Image 4. What type of house do you prefer?



housing (hyresrätt) in terms of tenure and apartment houses with courtyards (hus med gårdar) as a housing type. It is worth noting that most rental housing in Sweden is located in apartment blocks. Specifically, there is a need for a deeper understanding of what “houses with courtyards” really means. In fact, Hjällbo consists largely of three- to four-storey multifamily houses with semi-open courtyards, and further discussions with residents indicated that this is a preferred building type. Out of 542 responses in the MapX survey, only twenty-one (4 per cent) asked for detached houses. It thus appears that the municipality’s planning programme proposal, which includes 30 to 35 per cent single-family houses, has little support among the residents. The relatively weak interest in detached houses and high-rise buildings also contrasts with the building types and building heights found in the municipality’s proposal.

The application of the tool in combination with the method for collecting data (that is, by engaging local youth to knock on doors) demonstrated that MapX can provide local institutions and ORGANISATIONS with large numbers of respondents and amounts of data, in other words, with the

Figure 6  
MapX interface after the process showing places where the inhabitants envision having more housing (top). Example of the quantitative analysis of survey results (bottom).

SOURCE: THE AUTHORS BASED ON INTERVIEWEES’ RESPONSES

aforementioned collected intelligence. The local authorities need such a capacity as an integral part of a planning process, since – at least in Sweden – there is typically always a lack of data sourced from residents. The tool can be used in several ways, but working with places and routes on a map appears to be a very powerful way to initiate place-based discussions of their local environment with residents. Furthermore, the conversations between the respondents and interviewers established trust and a bond in support of continued commitment and cooperation concerning neighbourhood densification as well as other housing matters, especially as the interviewers were local youths.

Utilising MapX yielded several significant advantages in this participatory planning process. Firstly, its user-friendly interface made it accessible to a diverse range of individuals, including those with limited digital literacy, hence fostering inclusivity in data collection. Secondly, its map-based interface facilitated dynamic and detailed discussions between respondents and interviewers, facilitating nuanced insights into community perspectives. Furthermore, the visualisation tools offered by MapX, such as the heatmaps and concretised survey findings, reveal patterns and concentrations of opinions regarding specific locations. Additionally, the incorporation of free-text responses encouraged deeper quantitative and qualitative analyses, thereby enriching the understanding of community dynamics. Lastly, MapX enhanced stakeholder engagement by providing a platform for various parties to participate in ongoing efforts to shape neighbourhood development, thus fostering collaborative urban planning initiatives.

At the same time, various challenges nevertheless emerged. First, it took some time for the local youth to get used to MapX, even though the tool has not proven to be particularly difficult to manage. Second, a significant challenge was the large amount of data collected from the residents and how to manage and process this data to make it meaningful for the residents, but also for the municipal planners and in formats compatible with geo-based platforms used by the city's planning department. Third, proper and transparent interpretation of the quantitative data collected emerged as a key issue in ensuring that they are both reliable and relevant to urban development. As mentioned above, it was not obvious what the residents meant when indicating that "houses with courtyards" was their preferred building type. Since mainstream debates in Gothenburg regarding inner-city neighbourhoods tend to revolve around exemplars such as Barcelona's Eixample, civil servants with little familiarity with Hjällbo could easily interpret this as a call for such closed-block housing developments, while the residents themselves actually meant something completely different. This example of the need for data to be interpreted further leads to a reflection on the usefulness and meaningfulness of tools such as MapX in participatory processes. MapX makes it possible for many people to present their knowledge

and opinions about a neighbourhood. The tool is able to handle many answers without losing clarity (which is linked to the concept of collected intelligence) and its visualisation functions are useful. Nonetheless, the tool does not facilitate any interaction or deliberation between those who have provided their input, which would be needed to secure a high-quality bottom-up coproduction of knowledge, resembling collective intelligence.

#### 4.2. Decidim

In the case of Decidim, the platform was intended to support public consultation about the future planning programme in Hjällbo by sharing information about the current processes in order to provide transparency and opportunities for residents to influence decisions. All the information about the process was submitted in the same digital space so that local groups could be aware and interact simultaneously by making suggestions and commenting on other people's suggestions as a way of creating a complementary digital process intended to strengthen local work. Decidim aims to give local residents more influence and a space for local organising by reflecting on what has been done, what is being done, and what can be done in the future based on citizens' opinions and needs.

Even though the Swedish Union of Tenants embedded access to the platform in their webpage so as to encourage people to participate in the process (fig. 7 top), there was very little interaction on the website (fig. 7 bottom). Considering the analytics from the Swedish Union of Tenants' Decidim website, only thirteen unique visitors were counted, of which six were from Sweden and only two from Gothenburg. In fact, the analytics suggested that, at this point, just one visitor might actually have been from Hjällbo. Against this backdrop, the Swedish Union of Tenants concluded that one of the possible detriments was the need to register before being able to interact on the platform, and the ORGANISATION knows from past experience that people have an aversion to doing so.

This tool proved to be more complicated to set in motion than expected. Setting up and using the platform did not go smoothly, with much preparatory work needed simply to make it possible to upload information to the platform. The need for support from the external consultants (Digidem Lab) was relatively extensive. What was supposed to be an open-source and free platform ended up requiring significant financial resources, including paying the consultants for technical support. Moreover, information disappeared during updates, which also created extra work.

In terms of target group and users, the dissemination of knowledge did not work well. The Decidim website at the Swedish Union of Tenants mostly attracted interest from municipal representatives and colleagues

The screenshot shows the website of Hyresgästföreningen (The Swedish Union of Tenants). At the top, there is a navigation bar with the logo, a search bar, and links for Svenska, Registrera, and Logga in. Below this is a main menu with options: Hem, Dialoger, Media och event, HGF rapporter, and Hjälp. The main content area features a large banner with the text "Din åsikt är viktig!" (Your opinion is important!) and a button that says "MEDVERKA I VÅR DIALOG". Below the banner, there is a welcome message in Swedish: "Välkomna till Hyresgästföreningens dialogplattform Vår stad." followed by a paragraph explaining the platform's purpose: "Här vill vi erbjuda en mötesarena för hyresgäster, beslutsfattare, civilsamhälle och andra intressenter kring stad, stadsdel och samhällsutvecklingsfrågor. Hur ska vi tillsammans skapa ekologiskt, ekonomiskt och socialt hållbara städer? Var får det gröna plats i urbanisering och förtätningsprojekt? Och hur bygger vi en stad och samhälle för alla sorters människor och minskar segregationens konsekvenser i samhället och stadsrummet? Var finns de öppna mötesplatserna i framtidens stads och bostadsområden? Den hållbara staden är dig som vill engagera dig här och nu för framtidens hållbara stad." Below this, there is a sidebar with navigation icons for Kontrollpanel, Dialoger, Grupper, Samråd, Global moderering, Sidor, Deltagare, Nyhetsbrev, Inställningar, Term customizer, Analytics, and Decidim Awareness. The main content area is titled "Analytics" and shows a "Besöksgraf" (Visitation graph) with a line chart comparing "Besök" (Visits) and "Unika besökare" (Unique visitors) from April 2022 to September 2022. To the right of the graph is a "Besöksräknare i realtid" (Real-time visitor counter) showing a count of 1, with a note: "1 besök och 3 händelser (sidvisningar, nedladdningar och outlinks) dom senaste 3 minuter." Below the graph is a "Besöksöversikt" (Visitation overview) section with several key metrics: "13 besök, 13 unika besökare -60,6%", "6s genomsnittlig besökslängd -98,2%", "85% besök som studsat (lämnade efter en sidvisning) +136,1%", "1,5 aktiviteter (sidvisningar, nedladdningar, utlänkar och interna sökningar) per besök -71,7%", "4 max antal aktiviteter i ett besök -86,7%", "18 sidvisningar, 17 unika sidvisningar -89,5%", and "0 totalt antal sökningar på din webbplats, 0 unika nyckelord". On the far right, there is a "Kanaltyp" (Channel type) table and a "Sociala Nätverk" (Social Networks) section.

they, for example, form part of the everyday life of residents. Although some urban spaces in Hjällbo include urban or economic activities, the population may still not recognise them as places of preference or attractive spaces. Such pinpointed places, ones that are not recognised or positively valued in public participation processes but support some sort of social activity, can then become areas of opportunity for reactivating urban environments.

**Figure 7**  
The Decidim platform embedded in the Swedish Union of Tenants' website, claiming, "Your opinion is important!" (top). Analytics from the Swedish Union of Tenants' Decidim website (bottom).

SOURCE: THE AUTHORS BASED ON INTERVIEWEES' RESPONSES

within the Swedish Union of Tenants rather than obtaining the expected broad use by the residents of Hjällbo. Compared to the participatory processes in Barcelona, the origin of Decidim, there was not much hybridisation between offline and online activities in Hjällbo. For the platform to function in a way that residents come to use it, it would have been necessary for extensive community work to have taken place in parallel, both to inform and teach how Decidim can be used and to empower people to form their own counter-proposals to those of the municipality. Instead, there was a counterproductive mismatch between the extensive participatory processes taking place (such as those initiated by the local youth and Swedish Union of Tenants staff jointly knocking on doors) and the introduction and use of Decidim. This was very unfortunate since the great innovation and potential of Decidim lies in the linking of two worlds previously regarded as separate: virtual and physical participatory processes.

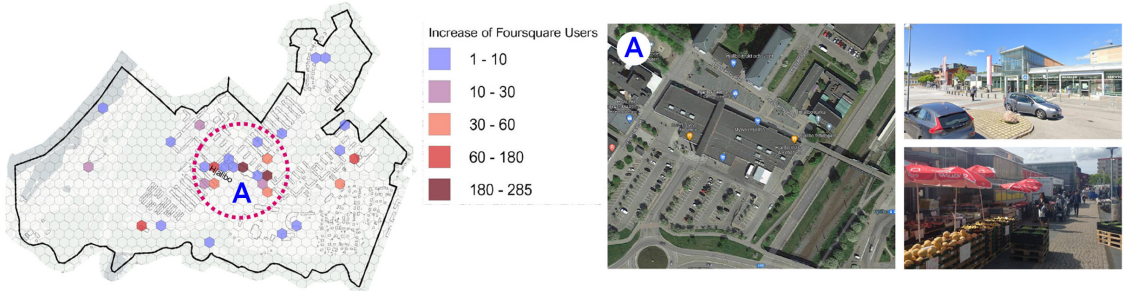
### 4.3. Social Media Data

Regarding social media data, the application results (fig. 8) helped to identify the relevance of certain areas that agglutinate a large number of people (according to the Twitter [now X] dataset), especially in the morning and the evening, which are thus characterised as being complex urban spaces (that is, dense in activity but also diverse, with a good number of different types of activity, according to Google Places). Such areas also encourage outdoor activities and are close to open public spaces like parks, squares, or playgrounds as well as pedestrian streets and light rail stations, thus encouraging pedestrian, bicycle, or public transport mobility, too. In fact, urban mobility is another relevant topic addressed by the Twitter and OpenStreetMap data. The location and timestamp of tweets helped to identify those places where residents travel to from Hjällbo or where people come from to the neighbourhood, as well as at which moments of the day or the week urban activity is higher, representing people's presence in Hjällbo's public spaces. Moreover, GPS tracks were useful in identifying the most frequented routes, which, in some cases, are not pedestrian-friendly and could thus be redesigned to enhance this type of mobility.

The representation and interpretation of data obtained from geolocated social media data provided significant insights into a wide range of topics related to both physical conditions and human activities in the neighbourhood. Among others, one potential of these data sources comprises the opportunity they offer to identify places that are sometimes unconsciously relevant to people. As opposed to the structured and directed information obtained through interviews and questionnaires in public participation processes, social media data offers unstructured information that, once validated, organised, and interpreted, can pinpoint spaces or activities that would potentially have been taken for granted. They could thereby simply be missed in more structured interviews if

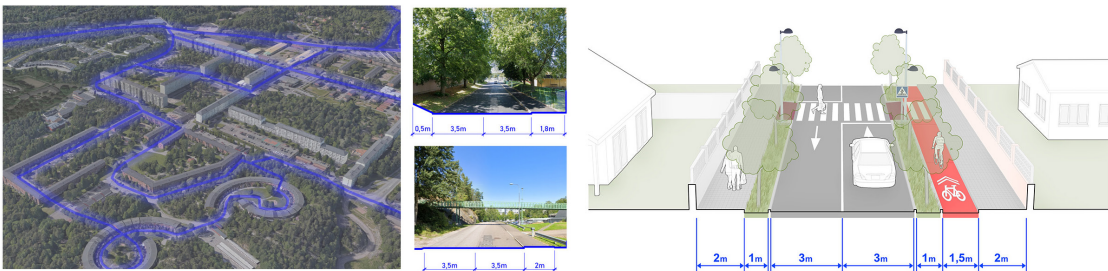
Identification of resilient urban spaces and their characteristics

FOURSQUARE & GOOGLE PLACES



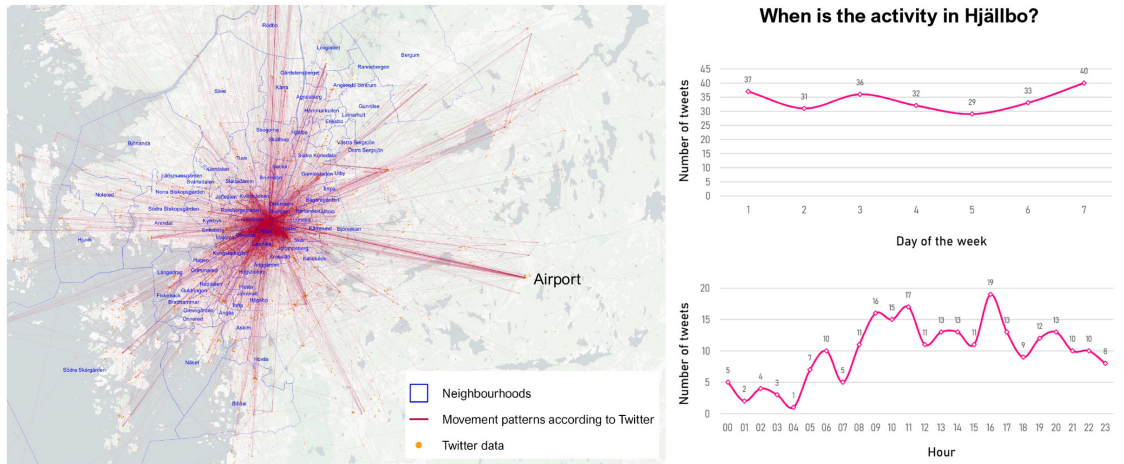
Identification of frequented urban axes and their characteristics

OPENSTREETMAP



People's presence spatiotemporal patterns

TWITTER



Identification of informal activities in urban spaces

INSTAGRAM



Figure 8  
Different approaches to social media data for addressing urban phenomena in Hjällbo. SOURCE: THE AUTHORS

Regarding the relevance of the results for informing future urban regeneration processes in the neighbourhood, the information related to the physical and social aspects of Hjällbo's most frequented urban spaces could be used to align such regeneration with people's preferences and the activities they perform. This makes it possible to better promote neighbourhood-scale places where social demands are represented.

However, various challenges still need to be addressed. Although social media data have proven to be useful as a representative sample of citizens' preferences, opinions, and urban activities, social networks are not used by the entire population and there could therefore be a lack of representation of particular profiles. Another challenge is related to the data sample size, especially in such case studies or research objectives that require a great density of data in order to draw significant conclusions. On the other hand, when databases are too large, detailed perusal and verification are no longer an option, which means that biases need to be considered prior to the interpretation of the data. Moreover, as the data retrieved from such sources are unstructured and often have not been verified by the platforms themselves, it requires a good amount of detailed scrutiny to pinpoint those data that are valid for the purpose of the research. Lastly, there is also a challenge associated with the processes for obtaining data, as social media platforms are continuously changing their access points. In this regard, technical assistance is likely to be required.

## 5. Discussion and Conclusions

The pragmatist approach adopted by this article means that the findings are context-dependent. This position can be summarised with Menand's statement that "since ideas are provisional responses to particular and unreproducible circumstances, their survival depends not on their immutability but on their adaptability" (Menand, 2001, cited by Snarey and Olson (2003, pp. 91–92). This means that the findings and lessons learnt from the application of a set of participatory digital tools can be very useful in other contexts, but also that there is a need for a considered process of translation and adaptation (Adelfio et al., 2022). It is worth mentioning that the lessons learnt are not just from the researchers' perspective but emerge from the opinions provided by residents, the feedback given by the Swedish Union of Tenants, and the work developed by the consulting company Digidem Lab. Each group's experience with the digital tools provides distinct but complementary insights, which together could help refine participatory urban planning approaches. Table 3 summarises the main reflections and recommendations that each of the tools has brought to the fore.

**Table 3**  
Summary of recommendations for the use of the set of tools based on the process experienced in Hjällbo.

LAYOUT OF THE MATRIX ADAPTED FROM FREDERICKS AND FOTH (2013)

Tool	To think it through	What can go right	What can go wrong
<b>MapX</b>	To set up a participatory survey process; a large amount of data to handle after the process; a need for compatibility with other GIS platforms	Identification of key places or routes of interest for local residents through a large amount of respondent data and spatial location analyses	Success is based on a large number of answers and the quality of the answers
<b>Decidim</b>	A need for resources for external technical support and prior training to learn how to handle the tool	Identification of issues that can lead to further research or discussions and transforming them into projects or policies	Lack of online/offline HYBRIDISATION; not a user-friendly platform, making it difficult to handle the tool and the information
<b>Social Media Data</b>	To pre-process the data according to the specific topics to be analysed	Promotion of urban strategies to improve public spaces based on less visible aspects that contribute to liveability as well as people's activities or needs	Misrepresentation of the population; small sample sizes; unstructured data that requires prior verification processes; limited data access

With respect to the research questions posed in this article, the application of the tools showed an unbalanced user-friendliness that conditioned, to a greater or lesser extent, the participation of local residents in the process. One of the major issues of digital participatory tools involves learning how these tools work and how participants can add their ideas and opinions, and such learning is also part of the process. Even after the question of tool usability has been tackled, so that participants become engaged, platforms should make them feel that their input has an impact on the final decision-making process. In this aspect, the spatial relations with the physical environment are crucial, as the tools link the opinions provided to specific areas of the neighbourhood, thus highlighting the relevance of certain spaces that could lead to the definition of more accurate strategies and policies.

In the case of Decidim, it must be acknowledged that the literature shows several cases of its successful use (Barandiaran et al., 2024), but in the context of application of this article it has also shown the challenging side of digital participation. In fact, “this new way to participate, actively, rather than in a passive way, is more complex, more engaging, more rewarding, but also more demanding of personal resources and capabilities, ICTs [information and communication technologies] skills among them” (Peña-López, 2019, p. 87). Moreover, the success of democratic deliberation via a platform like Decidim depends on the “number of interactions and exchanges between participants” (Peña-López, 2019,

p. 92), which were very limited in the case of Hjällbo. The Swedish Union of Tenants had high expectations, especially from the use of Decidim, that have not been fulfilled. The aim of the Union was to make information about their own work available via Decidim, to provide transparency regarding both process and content, and to offer opportunities for citizens and local groups to influence the planning process. They envisioned an active forum where residents could make suggestions and comment on other people's suggestions to strengthen local mobilisation. As explained above, these objectives were largely hindered by difficulties in using the platform, but also by the limited number of users resulting from the chasm between offline and online activities.

In the case of MapX and social media, the experience in Hjällbo was more positive. The MapX study – especially as it was carried out by the Swedish Union of Tenants with personal door-knocking by people known in the area – worked particularly well in capturing residents' opinions, suggestions, and ideas.

The three tools appear to have the potential to be complementary, as they contribute to different aspects of the participatory planning process. MapX both provided an overall impression of the neighbourhood and identified advantages and problems that require further analysis and development, whereby Decidim may serve as a collaborative platform for such deliberation. MapX and social media were both useful in recognising specific venues in the neighbourhood as well as geolocated opinions and preferences that, due to their spatial component, enable these ideas to be associated with the corresponding places. The spatial component is significant in tools like MapX or social media, where the participants' collective maps and geolocated data provide insights about where these spaces are located, which activities are carried out there, and how they are perceived by local residents. Moreover, both tools offer the possibility to collect the results in GIS layers, which are easily accessible for planners. One difference between these two tools is that, while in MapX the resulting information derives from a process of interaction between interviewers and local residents in a more "guided" way, social media data are provided by users voluntarily but disconnected from any planning process and, therefore, offer unconscious and/or spontaneous details and information that are difficult to obtain otherwise. The two tools thus contribute in different ways to the formation of situational knowledge (de Jong & Ferguson-Hessler, 1996), which derives from interactions with the local community.

The combination of all three tools – voluntary but disconnected data collected from social media apps, "guided" data collected through MapX surveys, and online and offline deliberation and collective intelligence with Decidim as the knowledge hub and database – potentially enables us to elicit both the general context of the neighbourhood and the

significance of particular urban spaces or activities, while identifying opportunities for the development of local urban strategies. As a result, the situational knowledge acquired can have the potential to also become actionable knowledge in line with a pragmatist approach.

The starting point for the transdisciplinary process reported on in this article was the perceived importance of implementing digital tools in early stages of urban planning so as to successfully incorporate a wide range of local perspectives and insights into the formal planning process based on the needs, concerns, and ideas of the community. The tools studied all have the potential to bring forward valuable knowledge of local residents regarding historical context, cultural significance, and practical insights that could lead to more relevant and sustainable urban solutions based on residents' priorities. Such priorities are not always aligned with the goals of the local administration, here exemplified by MapX revealing a mismatch between the housing types preferred by residents by comparison with those proposed by the planning authority. Another example is the identified importance of certain public spaces that, because of both physical (design, economic activities, et cetera) and nonphysical aspects (local preferences, presence of people, et cetera), have become gathering places for the community, as shown by social media data. When identified, the characteristics of such spaces could help to define new and better strategies that can be implemented in other urban spaces in the neighbourhood, reflecting the diverse needs and aspirations of the people who inhabit them.

The collection of individual inputs does, however, have the limitation of being an individualistic approach, as the opinions provided by locals through MapX and social media data lack the possibility to evolve through interaction with other people, thus precluding discussion and the further development of ideas. On the one hand, this could be considered a disadvantage from a participatory perspective, as it does not lead to the coproduction of knowledge or collective deliberation or negotiation. In fact, if taken in isolation, maps display a large number of points of view that are not necessarily related to each other, and if decisions are based purely on the observation of such aggregated maps, they may not lead to outcomes that are satisfactory for the community as a whole due to a lack of a more detailed understanding of the background and rationale underlying each data point. On the other hand, each individual data input could be considered a significant source of information that is unique to each respondent, and decision-making is impacted by gathering multiple positions on topics such as housing and neighbourhood facilities. By collecting such multiple inputs, the value of intersubjectivity is brought forward, which Morgan (2007) ascribes to the pragmatist approach as a way to bridge the gap between objectivity and subjectivity in data collection and research. Either way, the experiences of the research team and stakeholders involved have shown that

digital tools cannot stand on their own, but need to be combined with analogue outreach activities and local mobilisation. Thus, any participatory toolbox would need a combination of both aspects. The end goal of public participation is not merely consultation but the coproduction of actionable knowledge that informs planning decisions. Digital tools should therefore not only collect data but also facilitate reflection, iteration, and local problem-solving. Hybrid models that integrate digital engagement with offline participation are therefore essential to achieving meaningful participation.

From the residents' viewpoint, however, exploring how a set of digital tools could make it possible for them to participate in urban processes requires continuous engagement and an ongoing feedback loop. While these tools offer potential for public participation, their effectiveness depends on accessibility, local social dynamics, and integration with traditional participatory methods. The result suggests that successful digital participation is not just about providing tools, but also about fostering a culture of engagement that empowers all residents, not just the digitally proficient or socially active, in order to build public opinion. Public opinion is often treated as a collective entity, yet it is, in reality, an aggregation of diverse and sometimes conflicting perspectives. In the context of this study, digital participation tools act as filters that make certain voices visible, but to engage a broader population, public opinion should not be seen as a fixed entity, but instead as a continuous process of inquiry and negotiation.

The ephemeral nature of social media discussions and online participation platforms also suggests that public opinion is dynamic and context-dependent. By contrast, professional planning processes often operate on long-term horizons, where decisions based on public input may take years to materialise, thus requiring an ongoing dialogue embedded in planning processes so as to ensure that momentary ideas are meaningfully integrated into long-term strategies.

In relation to the analytical framework proposed in this article, the tools provided inputs to all policy triangle components (Farhadi et al. 2022), that is, process, context, content, and actors. The benefit of using such a model stems, on the one hand, from its simplicity, a quality originally highlighted by Walt & Gilson (1994), and, on the other hand, from its adaptivity. In relation to the latter, the components of the triangle have been shown to fit a pragmatist approach within context-sensitive studies that do not necessarily restrict to policy, as holds true in the case of this article. The triangle thus becomes a way to structure the analysis according to a framework that is highly adaptive to local contexts. This also makes it possible to include detailed information within the broader categorisation of the triangle's main components. Hence, such an analytical approach can serve as a framework for further research or be

applied to other contexts in which other tools are used, according to the pragmatist principle of adapting the choice of tools – i.e. in the case of this article, we refer specifically to digital tools – to local contexts. From a future perspective and with respect to upscaling or replicating the methodological process followed in this article, it is important to take into account that the ideas, preferences, and concerns expressed by citizens through participatory processes may contribute to the content of urban planning and policies, influencing goals, strategies, and decisions.

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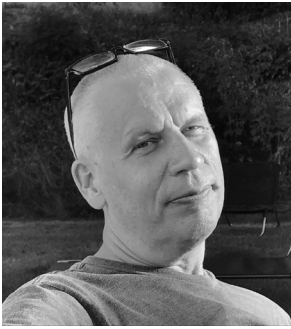
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