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PLANNING SUPPORT SYSTEMS: FROM UNIVERSAL SOLUTIONS TO LOCAL PLANNING METHOD. THE CASE OF PLANNING PRACTITIONERS IN ANDALUSIA.

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HIGHLIGHTS

- There is a strong relationship between planning challenges, technologies and the planning context.
- Each planning challenge has different technological needs.
- PSS should be focused on a context-based methodology to understand the situated challenges of planners.
- PSS implementation must be done through its context-based demands, not as a generalized package of universally transferable software.

ABSTRACT

Processes of urban transformation and technological advances are leading to drastic changes in urban environments and to novel local challenges for urban planners. Scientific research is exploring the potential of various technologies to support planning and Planning Support Systems (PSS) have been proposed as strategies to improve current planning practices. PSS are not without their critics, both from academia and practice, who dispute their usefulness and usability, and they have so far been scarcely implemented in practice, with limited success. Using a case study approach, we report on the findings of in-depth interviews with practitioners in Andalusia, Spain, focusing on the main planning challenges that respondents identify in their work and how technology can help address them. We identified three main challenges: developing an adaptable general plan, improving current public participation processes and encouraging interdisciplinary dialogue. Each planning challenge is understood to have different technological needs (if any at all), that indicates a strong relationship between reported planning challenges, the use of technologies and the planning context. This shows the need to reevaluate mainstream approaches to PSS, shifting from the development of generalized, transferable PSS to context-based approaches that focus on *methodologies* for collecting situated knowledge on local planning challenges, which could lead to specially-tailored PSS.

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1. INTRODUCTION

The role of planning support systems (PSS) and the technological tools that they entail to support and make planning practice more efficient has been at the core of many theoretical and applied debates since the 1980s (Harris, 1989; Batty, 1995; Klosterman, 1997; *inter alias*). While many have encouraged integrating complex technological advances in the process of planning cities through PSS and thus fostering collaborations and dialogue between academia and practice, many others have criticized the usefulness and usability of such support systems (te Brömmelstroet, 2013; Pelzer, 2015), debating the quality and the nature of the aforementioned dialogue.

We contend that there is an additional challenge to designing PSS that goes one step before discussions on technological usefulness and usability and that we feel has not been addressed sufficiently and successfully, namely the process of integrating the *diverse* local needs and demands of *diverse* practitioners into a situated, context-based PSS (Geertman, Toppen, & Stillwell, 2013). To this end, in this paper, informed by both theoretical and applied knowledge, we study the role of technological tools in general and PSS, in particular, in addressing planning challenges that professionals face in their daily practices. Using a case study approach, we report on the findings of in-depth interviews with professionals in Andalusia, Southern Spain.

Section 2 details key theoretical aspects related to the debate around PSS as well as main aspects of the Spanish planning culture with a focus on Andalusia. Section 3, "Methods", outlines the data collection and analysis methodology and section 4 details the three main planning challenges and the role of technology in addressing them, as well as respondents' overall relationship with technology. Section 5 summarizes the analysis and sets it in the context of current debates on PSS, and section 6 outlines the implications of this study as well as avenues for future research that could encourage a shift in the approach to PSS.

2. BACKGROUND

2.1 Planning Support Systems

In this paper, we build upon the definition of Portugali (2011), to define a planning support system as the combination of Geographic Information Systems (GIS), Urban Simulation Models (USMs), and visualization tools to support planners to face specific planning tasks. PSS integrate technological tools focused to assist planning practitioners in their tasks to communicate their plans (Healey, 1992; Innes, 1998; *inter alios*) as well as to support the collaborative process within the planning exercise (Geertman, 2002). Although PSS are widely discussed and have been proposed by researchers as possible strategies to support planning, they are still not widely implemented in practice compared to other visualization technologies e.g. GIS or design tools e.g. AutoCad (CAD) (Vonk, Geertman, & Schot, 2005; te Brömmelstroet, 2012). According to some critics, this is partially due because PSS fail to strike the delicate balance between usefulness and usability: "Planners see PSS as overly detailed and precise, mathematically complex, rigid, slow, unintelligible and not transparent enough to be compatible with the unpredictable and dynamic nature of strategy-making processes" (te Brömmelstroet, 2016. p. 2).

2.2 *The Case Study: Andalusia*

The debates concerning the role of technology in supporting planning and particularly that of PSS are focussed in North European countries e.g. Netherlands, United Kingdom, where both the development of PSS as well as its aforementioned usefulness and usability are discussed. Comparatively, Spain is lagging behind in making use of some of the components of the PSS on a large scale due to economic conditions, limited access to PSS developments, and language barriers. However, the current economic, social and political crises in Spain are encouraging debates on new ways of thinking about urban planning practice, but while there is interest in reforming the planning process (Ferrer & Solá-Morales, 2005), the relationship with technology, and the implementation of technological tools remains problematic.

The planning culture in Andalusia, the most populated and the second largest in area in the country, is currently dealing with urban challenges like irregular settlements, abandoned developments in urban peripheral areas, rural-urban migration, and environmental degradation in protected areas. In this context, Andalusian planning practitioners have slowly implemented a limited number of technological tools to support their process, namely AutoCad and GIS, that was implemented at the same time as AutoCad but only recently is being used as a daily tool by practitioners (3 years ago); to our knowledge, no PSS have been developed, tested or used in Andalusian practice.

2.3 *The Spanish General Plan.*

The General Plan (GP) is a planning instrument required by law in every municipality in Spain; the content of the GP and the approval process are detailed in regional legislation, namely in Law 7/2002 (Ley 7/2002: “Ley de Ordenación Urbana de Andalucía”). GP has two parts: a more general structural part and a detailed part and it is approved as part of a process that has several mandatory phases, including a public participation process, an environmental assessment phase verifying the potential impact of three alternative plans, and the development and integration of the so-called “sectorial reports”, related e.g. to flooding risks, mobility and acoustic issues. The GP is a key document for Spanish planning practitioners as it is a highly complex, holistic plan, integrating aspects of land-use, mobility, infrastructure, economy, basic services, etc., that, once approved, becomes a legal document outlining the future development strategies of the city for the next years or even decades.

3. METHOD

Considering that our research is focussed on understanding the needs and challenges of specific cases of practitioners as input for a tailored, useful PSS, we conducted eight in-depth semi-structured interviews with planning professionals from a planning company in Andalusia, “Territorio y Ciudad SLP”, based in Jerez de la Frontera, and that is responsible for more than 15 GP approved in the region. We have detailed the profile of each respondent in Table 1, outlining the features that could influence their understanding and relationship with ever-changing planning needs as well as new technological developments. The interviews were structured on two main sections: three questions addressing and discussing *planning challenges* from various perspectives and three questions referring to *planning tools*, both current and potential. All the questions were focused on projects that respondents have worked on and that have resulted in the development of a GP.

Given the relationship of Spanish planners with technology and the absence, to our knowledge, of PSS in the everyday practices of planning professionals in Andalusia, “planning support system” was not used and discussed as a concept *per se* in interviews. We made the conscious decision to rely on the

concept of “technology” as a linguistic shortcut to both software professionals use or are familiar with, e.g. GIS or CAD, as well as other existing or potential technologies that we consider to be part of PSS e.g. USMs or unspecified tools to process Big Data, discussing how familiar the respondents are with such technologies and whether they would consider using them.

We have transcribed the interviews and analysed the resulting written corpora using the grounded theory method, with the help of specialized software (Atlas.ti), allowing for categories of challenges and needs of respondents to emerge from their answers.

We have thus identified three categories of challenges that respondents seemed to agree on as defining the planning process that they are embedded in: (1) developing an adaptable GP, (2) improving current planning participation processes, and (3) encouraging interdisciplinary dialogue. The three categories will be discussed in detail in the next section, as well as how respondents perceived the role of technology in addressing them.

Table 1: Respondents profile

Id	Background	Age Range	Years of Experience	Role in the office
R1	Architect & Urban Planner	50-55	+25	Technical Manager
R2	Lawyer	50-55	+25	Legal Director
R3	Urban Planner	60-65	+30	Executive Director
R4	Architect & Urban Planner	55-60	+30	Technical Manager
R5	Architect & Urban Planner	45-50	+20	Team Leader
R6	Architect & Urban Planner	45.50	+20	Team Leader
R7	Architect & Urban Planner & Sociologist	40-45	+15	Team Leader
R8	Historian & Anthropologist	30-35	+2	Junior Planner

Source: Interviews (2016)

4. PLANNING CHALLENGES AND THE ROLE OF TECHNOLOGICAL TOOLS

When respondents were asked to reflect on their current planning challenges, three themes emerged:

1. The planning process is too time consuming and there is too long of a period of time between the initial development of the document and the final approval phases, sometimes over six years, leading to the implementation of sometimes already obsolete GP documents, that no longer fit the realities of the city. The challenge they face is to develop an adaptable GP that can be updated throughout the process, according to the current urban needs;
2. The public participation process, a mandatory component of the planning process, was perceived by respondents to be of insufficient quality and not reflecting the citizens' demand, the challenge being to *improve the current public participation processes*;
3. The dialogue between various experts involved in the development of a holistic, complex GP is problematic and the process of knowledge exchange limited, the challenge being to *encourage interdisciplinary dialogue*.

4.1 Developing an Adaptable General Plan

The majority of respondents agreed on the temporal dimension of the process of approving the GP as a planning challenge. The administrative procedure of approving the document itself is time-consuming

(at least 6 years) and two of the respondents state that a third of the whole process is being spent waiting for approvals rather than developing the GP due to the way in which the legal process of approval is designed i.e. managing the information, analysis, diagnosis, public participation and proposal. As one respondent summarized it: “This is a very long process where various consecutive phases continued accumulating, and everyone perceived these phases as good and useful. But when you add all these phases up, in the end, the process becomes exhausting. One loses, on the way, the essence, leading to rigidity and disappointment.” (R2, originally in Spanish. Authors translation)

This triggers an underrepresentation of the efforts of planners in the overall temporal distribution of the process of developing and obtaining the approval for the GP, sometimes leading to obsolete proposals by the time that the GP is ready to be implemented. To address this challenge, respondents referred to the need to develop more adaptable GP documents that are also more responsive to unexpected situations that can occur in cities.

Some respondents suggested that one way to address this challenge would be to reduce the overall duration of the process of approving the GP; two of them proposed to separate the structural and the detailed parts of the GP, allowing to remove the bottleneck in the approval process that is usually generated by the detailed part and thus accelerating the approval of the structural part.

While technology was not a tool that was seen to be able to address this particular challenge, one respondent did reflect on the possibility of technological tools to support the development of a long-term plan like the GP: “the main challenge is to distinguish between what is essential and what is secondary. And maybe these new tools might allow us to understand the city from a more long-term perspective where precisely this long-term perspective allows you to see what is essential and what is secondary.” (R2, originally in Spanish. Authors translation).

4.2 *Improving Current Public Participation Processes*

Five respondents referred to the need to improve the current public participation processes as a planning challenge in Andalusia. They outlined three main issues that frame this challenge:

1. The current participation process is consultative rather than a bottom-up process of co-creation of knowledge, which leads to participants being frustrated as their opinions are seldom integrated in the final GP;
2. The debate is dominated by actors from the private sector, e.g. developers or other private stakeholders who push their private interests, minimizing the input of individual citizens participating in the debate;
3. Current participation processes suffer from a lack of trust from and awareness among citizens in relation to their role in the process of developing the GP, which leads to a limited number of citizens getting involved and, therefore, to the limited representativeness of the result of the participation process;

As R3 stated: “Planning must discuss with citizens, with various stakeholders, with other institutions and, from my point of view, this is not done in an authentic manner, it is done because it is mandatory by law, regulations and laws demand that such a process takes place and that it has to be made visible” (originally in Spanish. Authors translation).

Respondents offered three possible solutions to address this challenge which include various technologies, ranging from social media to innovative visualization software:

1. Encourage multiple iterations of the participation process since the beginning of the development of the GP, empowering citizens to participate in various debates on their cities;
2. Develop various tools and techniques, including information and communication technologies e.g. social media platforms, that can improve outreach and awareness building strategies among members of civil society, encouraging them to participate in the decision-making process of

transforming their cities;

3. Introducing novel technologies (e.g. for visualization) to support but not dominate the planning process.

4.3 Encouraging Interdisciplinary Dialogue

The majority of respondents refer to the lack of interdisciplinary dialogue between planners and other experts in the process of developing the GP as a critical issue, encouraging interdisciplinary dialogue being a challenge that needs addressing. One respondent stated that the idea of a holistic GP document integrating various dimensions in the document (e.g. mobility, acoustics, etc.) becomes, in practice, more of a summary of a number of documents compiled by experts in each field, that are not integrated and reconciled in the final document: "They are used almost as external elements, including external to the plan itself. [...] They must be incorporated because the legislation in Andalusia states [so], not because one actually thinks they are should be part of the actual exploration of the proposed plan." (R1, originally in Spanish. Authors translation).

The quality of the interdisciplinary dialogue depends on whether the experts involved in the decision-making process, that were consulted for the GP, are part of the private or public sector. On the one hand, *public institutions* were perceived to refuse to engage in dialogue, providing planners with reports that included tools and knowledge unknown to the latter, without much explanation or room for discussion, thus not allowing planners to take full advantage of the capabilities of the experts' tools. On the other hand, *private companies* were perceived as being more willing to engage in an iterative process to better understand the needs and goals of the GP and to find ways to use the specialized tools they had at their disposal to support the development of the GP.

The lack of interdisciplinary dialogue leads to potentially problematic GPs where the various insights should, in theory, be integrated for the best possible outcome; not knowing or understanding the tools and outputs of various experts make planners uneasy about parts of their proposed GP. One respondent expressed their concern about this: "more than just integrating more software, because there are many types of software covering these topics, the part I'm worried is knowing how to interpret the results" (R4, originally in Spanish. Authors translation). Two respondents proposed two possible ways of addressing this challenge: 1) sharing, as part of a dialogue, the necessary knowledge to interpret or at least understand the data generated by various technologies, which could lead to the enrichment of the dialogue through the shared use of technologies and 2) the discussion of the results of proposals as part of an iterative process, rather than using technology as a barrier set between planners and experts.

4.4 Overall relationship with technology

Respondents could be separated in two groups, based on their profile (as detailed in Table 1), which influenced, visibly, their experience with technology and the role that they understand technology plays in planning. The first group included younger respondents, aged 30-50 years old, with their professional experience averaging between 15 and 20 years; they made use of technology extensively in their daily work, to support their drawing tasks as well as their process of collecting and analysing the urban data. The second group included slightly older respondents, aged 50-65, with more than 30 years of professional experience. Respondents in this group were usually in charge of managerial and supervisory tasks and hence their engagement with technology and technological tools was minimal. While the first group explained in detail the perceived advantages and limitations of technologies, the second group focused on the overall added value of implementing various technologies in the process of developing the GP: "professionals don't have the time, their training is insufficient or the technology

is very expensive. We only move when we are forced to do something by circumstances. We find ourselves among more advanced teams in Andalusia. Technology is more accessible and the persons in the team are curious and they train by themselves” (R3, originally in Spanish. Authors translation). All the respondents agreed with the need to integrate existing and potential technologies as a planning challenge in itself, with multiple benefits to the process of developing the GP. This could include potentially making the final document more rigorous, allowing the process to be more efficient by helping to process more data in a shorter time, and shifting the intuitive approach to certain planning decisions and diagnostics by supporting them with actual data. Using technologies is of course not without its limitations, including the ways in which they are being used (e.g. exclusively for visualization instead of also supporting the decision-making process), the quality and availability of the data needed, and the issues related to the technologies themselves, e.g. their usual universal and generalized nature that does not allow for adaptable, context-based implementations, as it is the case for certain simulations used by experts in their sectoral studies, which usually focus on specific areas of expertise.

5. DISCUSSION

This paper has shown that, according to our respondents, as planning experts, there is a strong relationship between planning challenges, the role of technology in addressing them and the planning context. Practitioners face unique challenges in their everyday work and their technological needs vary according to the complexity and nature of each challenge. First, for developing an adaptable GP, only one respondent mentioned technology as a way to address the challenge. Instead, most respondents referred to non-technological strategies, usually related to changes in administrative procedures, legal and institutional reform, etc. Second, in relation to improving current processes of public participation, there was a divide among respondents on whether technology could help address the challenge. Half of the respondents believed that technological tools could better support and encourage the engagement process, while the other half considered that the challenge is more related to methodological and awareness aspects and thus could not be solved using exclusively a technological approach. Third, all respondents agreed that technology could encourage interdisciplinary dialogue because of the nature of the dialogue itself and how it is appropriated by experts to become a barrier in the iterative process of communication and collaboration between experts and planners. These interviews show that the planning challenges that practitioners planners face in their everyday work in Andalusia cannot be addressed using a generalized approach to technology (and therefore to PSS), but instead they have to follow a challenge-per-challenge logic. In the wide range of demands for technology implementation in planning, we have observed the need for a shift towards a “grey-scale” approach, allowing for various challenges to have various technological needs, that depend of various context-based factors e.g. location, planning culture, scale of the planning instrument, law, government, political parties, so on. We thus consider that the usefulness of any PSS depends on this shift towards context-based approaches, taking specific, situated planning challenges as a starting point for the development of PSS that planners need in a specific moment of their planning process.

6. IMPLICATIONS AND FUTURE RESEARCH

The findings of this study indicate the need for a shift in the mainstream approach to PSS development and the overall discourse on the role of technology in planning, showing the need for a situated, context-

based approach that can help develop adaptable PSS responding to specific planning challenges that have different technological needs. This paper lays the foundations for future research with the aim of developing and testing tailored PSS in a number of case studies, similar e.g. in their planning challenges or planning approaches, and assessing the added value of using such PSS for implementing contemporary planning approaches rooted in collaboration. The type of study as the one described in this paper could be considered a *pilot* for a larger data collection process to support a targeted PSS that can cater to the specific challenges of Andalusian planners. We contend that their challenges are different, to various extents, from those of planners from different planning cultures like the Dutch or Italian ones, and they are embedded in a planning context that also has a different relationship with technology and technological tools. We can build on this knowledge to understand how a PSS could help address these context-based challenges, varying from the daily work of planners themselves to institutional constraints and demands of other stakeholders, which are crucial components of the process that need to be accounted for in a complex manner, using a tailored PSS. This line of questioning could be addressed to planners in other cities or regions in Spain or other countries to see whether there is an overlap at a national or global level of needs and challenges; to an extent, we can help establish the scale at which a PSS methodology should function. Doing so, we can ensure the development of PSS that respond to context-based demands and not as generalized, unadaptable tools that do not correspond to the specific issues of diverse groups of planners throughout the world.

Our understanding of the role of PSS in the planning process might be contentious and, in criticizing existing PSS, we do not aim to not undermine the usefulness of certain PSS that are meant to be transferable or to support planners with very specific challenges. Our intention is to emphasize the importance of understanding the specific challenges that PSS can address in each planning context and to shift the focus from the technology underpinning PSS to the *methodology* through which information on the planning challenges and contexts can be collected and that can represent the backbone of a successful PSS. Therefore, future research could be based on the development of such a general and adaptable methodology, suitable for various planning cultures, for the development of tailored PSS. Furthermore, we contend that a more critical approach is required when assessing the need for a PSS in addressing a planning challenge altogether; while PSS can contribute to more accurate or rigorous planning processes or outcomes, it is not a mandatory component of the process and hence it is highly dependent on the context and the planning challenges it is expected to tackle. What we thus suggest is to first, understand the situation (planning challenges) and afterwards understand how technology could improve the situation. Or, as Cedric Price (1996) questioned, "Technology is the answer but what was the question?"

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