Envisioning Urban Futures as Conversations to Inform Design and Research

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Abstract

Recognising that cities provide the context for, and are often the direct beneficiary of, much civil engineering design and construction, it is essential that the future aspirations of city stakeholders are understood, and accommodated where possible. Without this, engineering is likely to prove inefficient at best and potentially ineffective. Developing visions for future cities is essential for all urban design, engineering, and planning projects. However, there is a tendency for future visions to be produced in the later stages of research and design processes. Moreover, future visions usually focus on communicating a selection of alternative and coherent scenarios, rather than the complexity of their formation and context.
This paper proposes that processes of envisioning urban futures can be designed as conversations among different actors. The resulting visions articulate the multiplicity of perspectives that emerge from such conversations, rather than presenting possible solutions. Drawing from research conducted as part of the Liveable Cities programme, alongside contributions from the Foresight Future of Cities project and Urban Living research, the paper will reflect on how participatory design and information visualisation methods can be adopted to engage participants in developing visions for future cities that articulate complexity and criticalities.

Keywords chosen from ICE Publishing list
Design methods & aids; Social impact; Town & city planning

Introduction

Developing visions of urban futures is an essential part of all urban design, engineering, and planning projects. All design activities, in fact, take place in what design historian Victor Margolin (2007) defines as “a dialectical space between the world that is and the world that could be”, with the ultimate aim of shaping this potential world through material and immaterial interventions. Engineers are trained to create predictions and projections, which seek to convey what the world might look like if the new intervention is in place, and, crucially, all behaviours stay the same. Yet, this latter point is important since in many situations behaviours change in direct response to the new intervention, for example a new road built to ease congestion may lead to an increase in traffic, but it is also useful to remind ourselves that people and indeed their behaviours also change over time. The role of visions as communication devices for future city interventions belies this inherent characteristic i.e. that they assume a constancy and predictability of behaviour. On the contrary, long-term visions that depict potential (but not necessarily probable) futures can bring about novel and radical ideas for how cities might develop. By escaping the trajectory set by trend analyses, such visions can challenge rational predictions.

Exploring and understanding possible scenarios for the far future of UK cities was at the core of the Foresight Future of Cities project (Gov.uk, 2013). More specifically, the report *A Visual History of the Future* (Dunn, Cureton & Pollastri, 2014) examined over a century of visions for urban futures, and identified patterns that have emerged and those visions for future cities that have endured. The report also demonstrated both the power and agency of different visions and also their relationship to the social, economic and cultural concerns of the era in which they were produced and to which they are inextricably bound.

Creating visions for urban futures has often been dismissed or viewed as an inconsequential activity. With the increasing complexity of urban environments it is, however, clear that there need to be better ways for understanding cities and the plurality of ideas and the various, sometimes competing, perspectives we have on them. It is here that the value of longer-term visions can be argued for. As Neuman and Hull (2009) state, "if we cannot imagine, then we cannot manage". The practices of conceptualisation, envisioning and performing urban futures is vital to our ability to deal with increasing urban complexity. So, whilst images that depict

visions for urban futures are crucial as they enable a future-orientated society to have a conversation across different communities and with the public, they may be less relevant in supporting the complex interrelationships of different actors that have to collaborate or contest across ideas that lead to the formation of such a vision. In *What is the Future?* John Urry explained that the various methods for envisaging futures, visions and the role of imagination can have powerful consequences and are a major way of bringing the state and civil society back into the collective dialogue about futures. Indeed, he concludes thus, "a planned future may not be possible, but a coordinated one may be the best show in town" (2016: 191). This is the important and typically overlooked value of visualising for positive change, by enabling engineers, planners, stakeholders and the public to develop suitable ideas to help guide the forces and complex situations of urban development and restructuring whilst keeping alternative options as open as possible. Ache (2017: 1) provides further emphasis, "vision-making processes become very important in such a context, in the best case creating open political horizons interested in becoming and the 'midwifing of futures'." Therefore, it is vital to shift the attention from the production of visions to an ongoing process of visualising, since this explicitly acknowledges that such processes deal with wicked problems and complex networks of heterogeneous actors, and are therefore far from straightforward. Furthermore, it is not only visions of futures, but also futures themselves that will not be homogeneously distributed. Multiple futures will coexist and –just like the present– will be experienced differently by communities and individuals (List, 2005; Sardar 2010; Savransky and Rosengarten 2017). Including multiple perspectives in processes of future visioning is therefore crucial not only to devise a wide range of possibilities, but also to explore the way in which different actors may cohabit the envisioned cities.

This paper proposes an approach to the design of processes of envisioning urban futures as conversations between multiple actors, and to the visualisations of the future scenarios emerging from such conversations as artefacts articulating multiple perspectives.

2. Rethinking an approach: from ‘visualisations’ to ‘visualising’

Efforts to map the plurality and subjectivity of the city experience have proliferated in the fields of Art, Design, and Humanities since the 1950s. Such practices were largely inspired by several

contemporary cross-disciplinary studies and texts reflecting on the relationship between urban environment and the social practices, actions and emotions of its dwellers (e.g. Simmel, 1903; Chombart de Lauwe, 1957; Lynch, 1960; Jacobs, 1961).

Early and well-known examples of subjective city visualisations include the maps and visual essays based on personal impressions from city walks that have been developed within the Situationist movement (e.g. Ralph Rumney's *Psychogeographic Map of Venice* or Guy Debord's *The Naked City*, both 1957). These city maps were seen at the time as radical explicit attempts to disrupt conventional representation processes (Pinder 1996), with the ambition of rethinking urban planning and design disciplines (Debord 1981). This approach later inspired and influenced a wide range of psychogeographic practices. Most of these practices focus on visualising the collective and individual multi-sensorial experiences of cities, experimenting with collaborative processes, graphic means, and technologies (e.g La Pietra, 1977; Kate McLean's SmellMaps, 2017; Christian Nold's Biomapping, 2004). Processes of mapping the subjective experience of urban environments have also been utilised by activist groups, with the aim of unveiling and communicating through the map urban features of oppressions (Mogel and Bagat 2008; Iconoclasistas, 2013).

While differing in their aims and objectives, what all of these examples share is a shift in focus from city visualisations as artefacts to processes of visualising. Such processes largely determine the characteristics of the visualisations, and are therefore usually presented explicitly within or alongside the artefact itself (see for example Iconoclasista's *Manual of Collective Mapping (2013)*).

Processes of representation play a particularly important role in visualisations that are created collectively, rather than individually. Here, design can play a significant role in enabling such processes through the design of spaces, generative tools, and methodologies to facilitate creative conversations between multiple actors presenting diverging perspectives (Di Salvo, 2010; Sanders, 2000). Furthermore, visual design and information visualisation techniques can be adopted to represent such conversations visually, through graphic means that can capture and articulate their inherent pluralism.

However, while much has been written on ways of visualising the multiplicity of urban experiences, and visual methods for exploring and tackling complex issues of urban planning

have been developed (see for examples gameforcities.com or Chora.org), how to develop pluralistic visions of longer term, speculative futures is a much less explored topic. To be exact, while some examples can be found in contemporary and historical design practice (Pollastri et al., 2017), there are no established methodologies or tools that are directly transferable or applicable.

The following section presents an experiment in designing processes and artefacts for the pluralistic visualisation of possible urban futures.

3. Envisioning urban futures of liveable cities: a design experiment

The research presented in this paper was conducted as part of a larger interdisciplinary programme called Liveable Cities. Between 2012 and 2017 academics from a very wide range of disciplines from four UK universities (University of Birmingham, Lancaster University, University College London, and University of Southampton) combined to investigate methods of designing low carbon, resource secure, wellbeing-focussed UK cities. The objective of the programme was to devise tools and guidelines for policy makers and practitioners that would enable them to transform the engineering of cities. These tools and guidelines were to be informed by an in-depth analysis of indicators (or performance parameters) on how cities operate and perform in terms of their people, environment and governance, taking into account wellbeing and resource security (see Leach et al., 2017).

From the very early stages and throughout the duration of the programme, it became clear that the disciplinary and cultural diversity of Liveable Cities' researchers, investigators, and doctoral students was reflected in the pluralism of methods, epistemologies, and research directions that each team undertook. Within this complexity of identities and approaches, any attempt to reach consensus over a shared vision of what a *liveable* city would be appeared problematic. For this reason, rather than resolving this pluralism by a negotiated synthesis, dedicated Future Visioning research activities were planned specifically to articulate these controversies.

One such activity consisted of a series of Future Visioning workshops, in which experts and practitioners in various sectors were invited to discuss possible futures for UK cities through the co-creation of scenarios. The purpose of this workshop series was to further Liveable Cities' research on possible futures, by integrating it with sector-specific visions that could question

assumptions on what a desirable urban future might be. The objective of this research activity was to capture common issues and key differences between visions developed in the 9 Future Visions Workshops, each one involving between 8 and 24 participants from one of the following sectors:

- retail
- transport and mobility
- environmental and natural sciences
- heritage, culture, and archaeology,
- education,
- information technologies (IT)
- utilities
- ageing
- architecture and urbanism

The workshops took place between February 2014 and March 2015, although a series of pilot events to test and refine the methodology took place between November 2013 and January 2014 (the design process of the workshop tools and methods is described in detail in Pollastri, 2017).

Each workshop was to answer to a central question: “What would the future of your sector be in the city of 2065?” This was then further specified through three sub-questions to be investigated in each workshop:

- What are the trends in your sector? (How has your sector changed/how is it changing? How does this evolution change the city?)
- What are the radical changes that could happen in the future in your sector?
- What infrastructure is needed to support these changes? What will the city look like?

In order to explore the three areas covered by these questions (historical changes, future expectations, urban form and infrastructures) the workshop was divided into three parts and four activities:

- Introduction and warm up. The participants were asked to introduce themselves and think about what has significantly changed in their sector in the last 50 years.

- Imaginary futures. Two activities engaged participants working in pairs or groups of three and discussing and mapping fears and aspirations about possible futures.
    - Negative scenarios. In this activity participants were asked to discuss the worst possible things that might happen in the future, and write their thoughts on sticky notes. At the end of this activity all of the sticky notes were collected in the “box of doom” and taken out of the room, to encourage participants to focus on constructive ideas.
    - Imagining futures in the city. For this activity the team prepared a deck of “thinking cards”, each one presenting a future-focussed finding from Liveable Cities research (e.g. “artificial intelligence”, “smart environments”, “health and chronic diseases”, etc.) in a synthetic way. The cards were designed both to ground the conversations within the body of research already developed by Liveable Cities, and to help participants to think beyond their assumptions or expectations about the future. The cards were used during the workshop as a generative tool (Sanders, 2000) to facilitate and structure creative conversations about possible urban future: what will they look like, and how will people live in them? (A printable version of the cards can be downloaded at *http://liveablecities.org.uk/updates/future-city-visions-workshop-materials).*
- Designing the future city. Finally, participants were asked to design a future city (50 years from now) from their professional perspective, bearing in mind the issues and ideas that emerged from discussions in previous activities. Depending on the number of participants, in each workshop the models of 1-3 cities were created and discussed by the whole group. These models were at the same time fictional plans and conceptual representations, used to describe the general vision of the city for the particular group, as well as its infrastructures, patterns of production and consumption, and the way in which people would live in it (Figure 1).

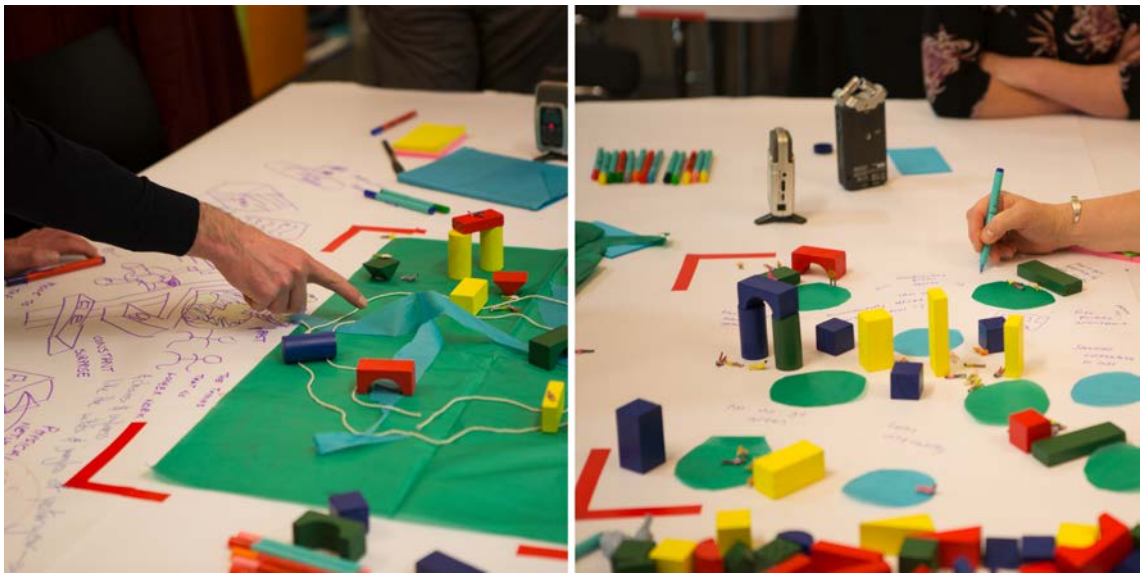

Figure 1. Participants designing their imaginary future cities during two Future Visioning Workshops

As the series of workshops progressed, it became clear to the team that both connections and contradictions in what people from different sectors would say and build could be identified. However, the series of reports that was produced as a first outcome of the project proved unsuitable to capture the richness of this information. In order to do this, a cartographic approach was chosen to visualise the individual visions as well as the overall emerging scenario simultaneously. The conversations and the models from each workshop were coded and analysed using a conventional approach to quantitative content analysis (Hsieh and Shannon, 2005). The transcriptions and photographs that constituted the main documentation outputs from the workshops were carefully studied by the research team, who searched for themes and patterns that emerged from the text (see Figure 2).

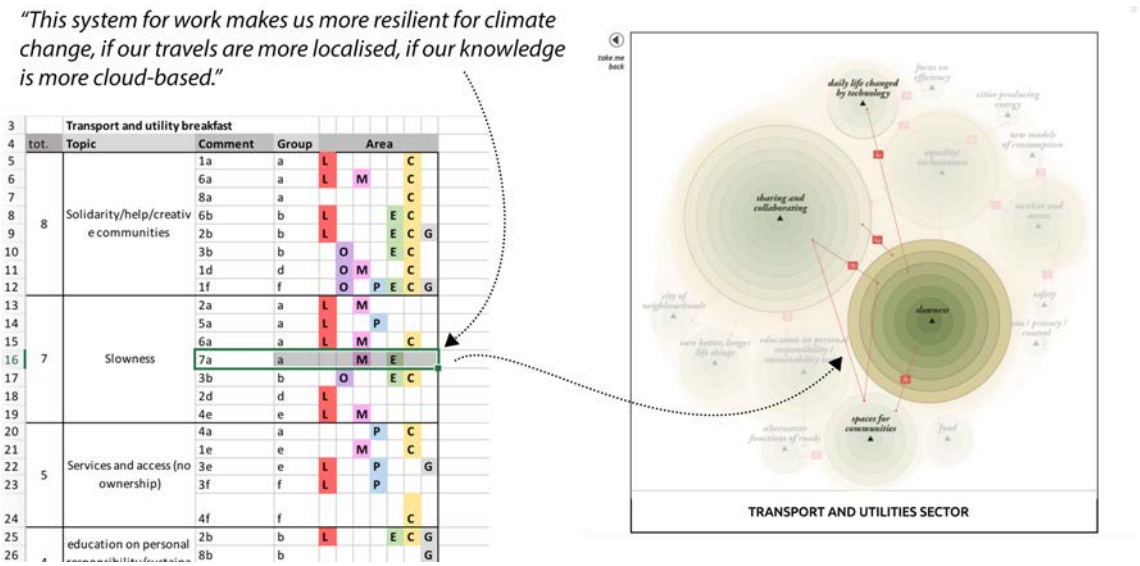

Figure 2 This image shows an example of how conversations between participants in the workshops have been coded and visualised in the Atlas. This example refers to the 'Transport and Utilities' sector, and in particular to a comment that has been tagged as being about both "slowness" and (not pictured) "daily life changed by technology". The table also have some additional coding, that refers to the areas of the comment, which in this case are mobilities, and the environment. On the left, the image shows how this comment has been represented in the interactive Atlas within the topic of "slowness", and how the comments within this category are linked to the topics of "daily life changed by technology", but also (in other examples) "sharing and collaborating" and "spaces for communities".

The analysed data was then collected into an atlas. In this context, an atlas is intended as a cartographic communicative device that represents specific universes of objects as considered systematically in their structures, parts, measures, shapes, and relations (Harley and Woodward, 1987; Baule, 2006).

The Atlas of Imaginary Future Cities was designed as a communicative artefact to:

- Explore differences and similarities across issues discussed by different groups.
- Move through layers of granularity of the information: from a general overview, to a very detailed one, in which it is possible to read the exact words of the participants.

Figure 3 illustrates the structure and mode of interaction of the Atlas.

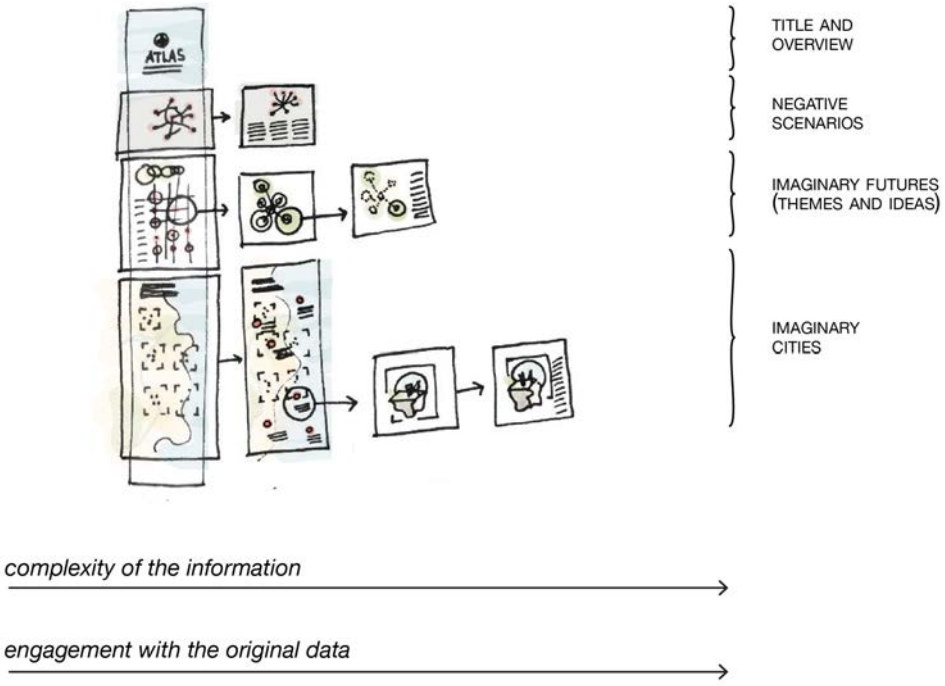

Figure 3 A sketch of the structure of the Atlas. From the single home page, the user can explore the maps and access visualisation of individual workshops. Different users may therefore wish to simply have an overview of what emerged from the research, or delve into the complexity of the information, examining in details the dataset that have been used to compile the Atlas.

The Atlas is published online as a continuous page that presents the overarching visions as emerged from the three future-focussed activities conducted in the workshop (negative scenarios; imagining futures in the city; designing the future city). By exploring the interactive maps in the Atlas' home page, users can examine the networks and constellations representing the issues discussed across the workshops, how different themes (e.g. 'energy', 'mobilities', etc.) are interpreted by the sectors, but also what the most striking differences across visions and discussions are (Figure 4). From here, users can access the individual visualisations of each activity, and explore emerging topics and individual ideas within each workshop (Figure 5).

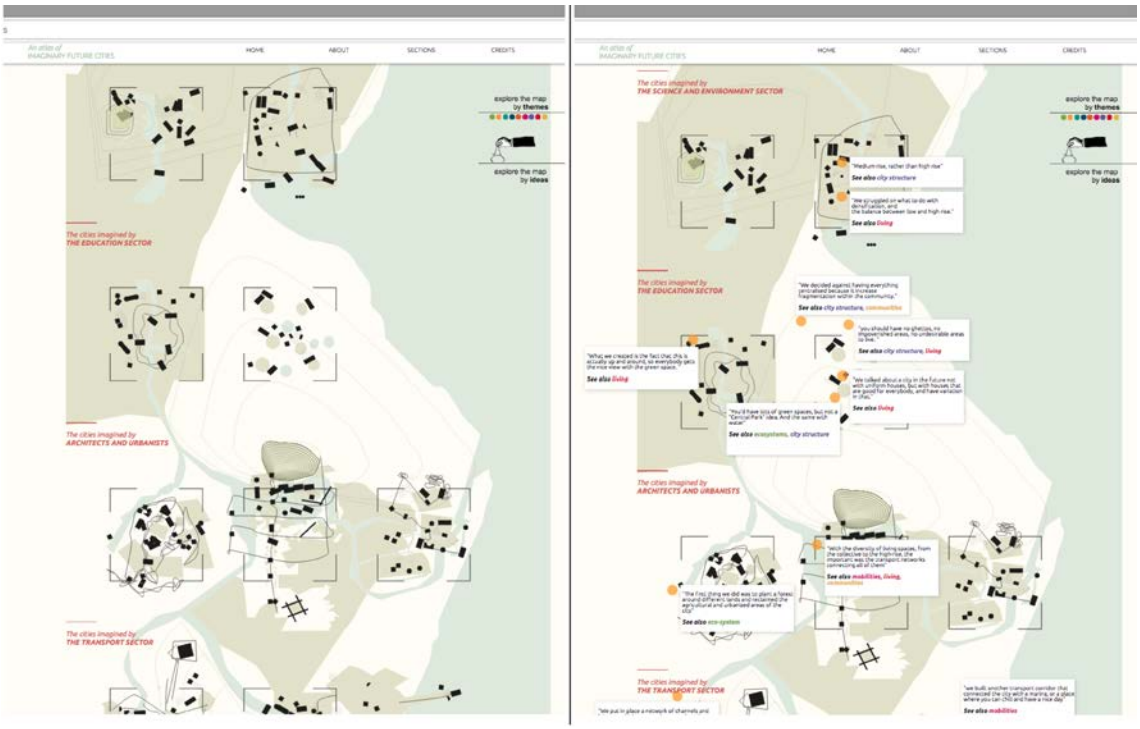

Figure 4. A section of the Atlas representing all of the imaginary cities envisioned by the different sectors in a single map, that can be navigated exploring how themes (such as energies, mobilities, governance, etc.) are articulated.

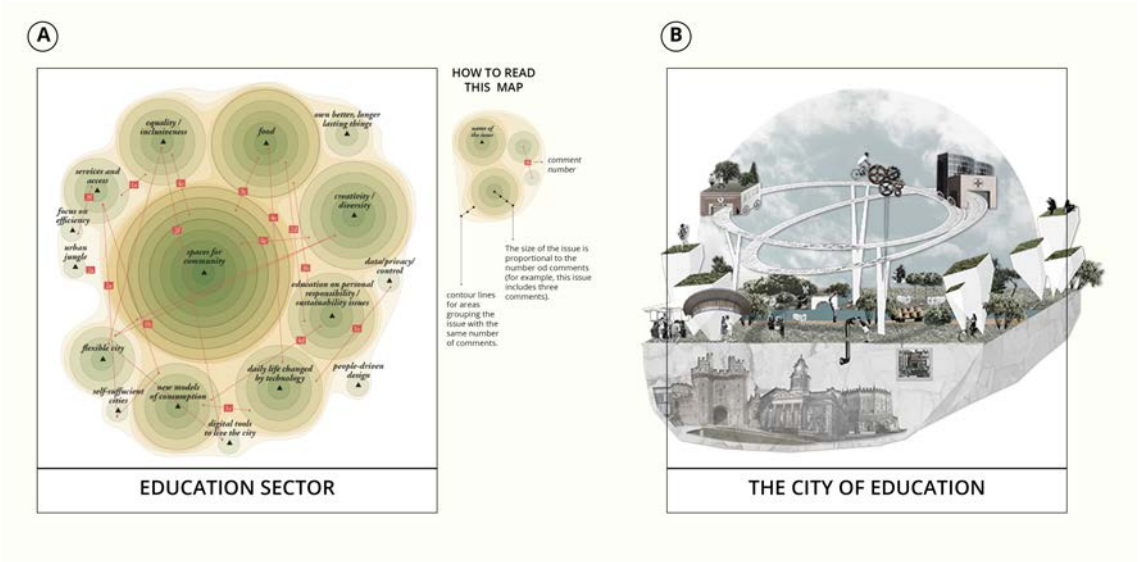

Figure 5. A visualisation of the issues explored by the Education Sector during the second part of the workshop (A), and (B) a graphic translation of the model that the group built to describe their vision of the future city

In this paper, the authors will not present the content of the visions that emerged from the Future Visioning Workshops, and that are visualised in the Atlas, a summary description of which is provided in a recently published article (Pollastri et al., 2017). What this paper will discuss in the next section is the role that visioning processes and artefacts designed as conversations can play in engineering and urban design research and practice.

4. Discussion

4.1 The value of this type of work in engineering programmes and urban design projects.

The process of visualising described above presents neither extremes of plausibility nor extremes of aspirations. However, what it does achieve is of profound value to the design process. There is always a need for all relevant perspectives to be brought to bear on a design, and in doing so each perspective must be heard and considered equally. This balance of perspectives is vital, and is brought about here by involving them in the conversations. Once this has been done, then it is possible to test the ideas using extreme futures (Rogers et al., 2012; Rogers 2018).

Urban design processes inevitably involve tensions and trade-offs (Lombardi et al. 2011), and the conversations advocated herein provide a means of resolving the tensions and trade-offs at the very earliest stage of the design process. This reflects the imperative of introducing such ideas, alongside the ideas of sustainability, resilience and liveability, before design decisions are made. It also reflects the imperative of avoiding ‘lock out’ that can be caused once design decisions have been made (Rogers et al., 2008), as well as the constraints that codes, standards and regulations bring to designs, and even well-intentioned design aids such as sustainability assessment frameworks (Leach et al., 2014).

The underlying principle of conversations is that they form a narrative, and this reflects the recommendation of the Future Urban Living Policy Commission (see Table 1) that citizens should collaborate with those who govern their city and with all other city stakeholders to create a city narrative that not only describes the city’s history and its current context, but also sets out their visions for the future (Rogers et al., 2014). The visions thus arrived at will combine the imperatives that should underpin urban designs – sustainability, resilience, liveability, smartness, adaptability – and the ambitions and aspirations of all those in the city. This can be conceptualised as then setting the brief for urban design professionals. Any design brief can be

questioned and challenged, of course, yet in so doing the designs should become progressively more robust, and such iteration might be considered with those who hold the conversations described above. Circularity in the design processes at an early stage can only be of value if it can be achieved.

4.2 The role that visualisation processes played in Liveable Cities.

This paper presented one way in which collaborative visualisation processes were adopted in the Liveable Cities programme. On the whole, such processes played two key roles in the Liveable Cities project: (1) articulating the team's research areas, interests, and objectives; (2) providing an opportunity for critical reflection. Regarding the first point, when the entire team was assembled after the first year of the programme, researchers and stakeholders met and visually mapped their areas of interest and objectives within the broader project (Figure 6). This exercise helped to better articulate to each other what everybody's research interests were, over and above a verbal presentation, alongside the methods that were used and the case studies that would be undertaken. The process of visualising the whole project also helped the team to see where connections and potential synergies could happen. For example, the wellbeing and the ecosystem services groups saw that they could work together to develop a robust methodology for auditing the physical environment that involved collecting valuable data for both teams simultaneously.

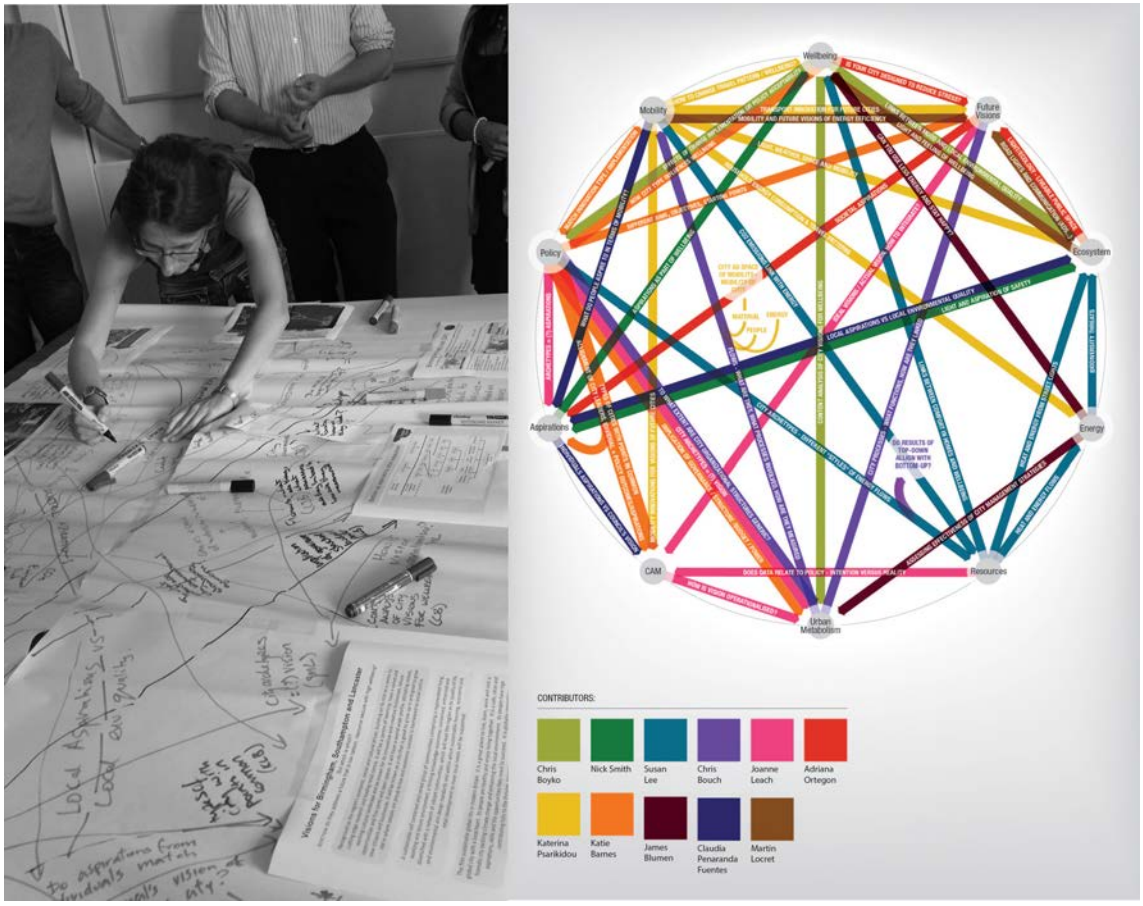

Figure 6. Liveable Cities team members mapping their research and their questions to each others (left). On the right: a visualisation of research areas and interdependencies produced after the workshop.

Concerning the second point, the research team learned a valuable lesson about the perceived finality of some visualisations within a larger process of visual conversations on urban futures. In a meeting with the team's researchers and PhD students shortly after all of the future visions workshops were completed, visualisations from the workshops were shown, and everybody was invited to provide feedback. Specifically, the group was asked to modify, question and discuss the visualisations from their research point of view. For example, if there was no mention of how energy could be provided, the researchers and PhD students were encouraged to write the question on the visualisation or draw something to symbolise the lack of energy provision. What resulted was a debate between the team, but the visualisations were left untouched. In speaking with the team, they felt that the visualisations looked too 'complete', and that adding to them in any way would mean defacing the hard work that had gone into making them. These critical

comments helped to understand that visualisations may need to look less finished at different stages of the process in order to allow the diverse array of stakeholders who are involved in urban issues to poke, prod and interject with their thoughts and ideas.

4.3 Design implications

The findings discussed so far have important implications for the design of processes, spaces, infrastructures, and artefacts for envisioning urban futures as conversations.

Firstly, if, as the literature and previous research suggest, it is crucial to involve diverse groups of actors (including citizens) in envisioning urban futures, then the process of designing such visions should start with the careful design of the infrastructures that make this involvement meaningful. This means, in practice, designing the strategies, platforms, tools, and spaces for exploring pluralistic futures (DiSalvo, 2010). In the experience presented here, this involved:

- setting up shared rules and a common language, by providing a context, tasks, and shared resources (such as the Thinking Cards) that support the involvement of all participants regardless of specific knowledge or professional background.
- promoting different ways of thinking, making, and expressing ideas to be employed at any time. In some cases, it was useful to encourage participants to work independently and at the same time on different aspects of the matter, to mitigate the power of dominant voices.
- Finding a balance between structuring and facilitating the conversation and allowing radical and imaginative ideas to emerge.

Another important phase in the design process of these type of visions is finding ways to visually articulate the outcomes of the conversations, to make them readable and usable in the research or design projects they are intended for. In practice, this means devising both methods for translating conversations into structured data, and graphic means to visualise such data. Translating conversations into structured data to be visualised, like any act of translation, is not a neutral process. In conventional content analysis, categories are assigned by researchers studying a text, and therefore very much depend on the way the content is understood and interpreted by those who conduct the study. This is a clear limitation of research and design methodologies of this kind, one that should be carefully considered to mitigate bias and

misinterpretations. In this case, the team involved in the design of the visualisations sought to do so by involving the broader research team in various stages of the analysis, to discuss insights and initial findings. Once again, the collaborative processes of visualising, rather than the visualisations themselves represent the significance of this approach.

By tracing on the Atlas the findings that emerged from the analysis, the designer made a series of choices that influence the message received by the reader. At the same time, however, this practice was necessary in this context to make visible patterns of information that would otherwise remain unseen.

Designing a graphic language to represent this information meant, therefore, to find ways of making these patterns visible while maintaining their ambiguous nature. Because of the speculative nature of visioning, conversations about urban futures are necessarily characterised by ambiguity, uncertainty, and subjectivity. The challenge, when translating such conversations into visual artefacts, is to maintain these characteristics and make them explicit, balancing the ambiguity of ideas with the clarity of their presentation. This can be done, for example, through visual modality markers (Kress and Van Leeuwen, 1996), that is, by using elements such as colours, definition, scale, and grain to modulate the levels of certainty and realism of the visions. For example, while the cartographic approach adopted in the Atlas of Future Imaginary Cities highlights patterns of information and key themes and topics, the individual urban visions produced by the various sectors remain elusive, and are represented in a way that deliberately leaves room for subjective interpretation (Pollastri et al., 2017).

Finally, as previously pointed out when discussing the role of visualisations within Liveable Cities, the modes of interaction with the visualisation should also be considered in the design of the artefact. Future visions can be left unfinished, and incorporate devices that encourage active manipulation, if their purpose is to act as tools for thinking and discussing, rather than to present ideas. Figure 7 shows an example of a future vision for Birmingham parks that a group of citizens developed and presented to local councillors and other stakeholders. Because this vision was intended as the starting point of a meeting to discuss future strategies, ideas and comments were arranged into a box, designed to be unpacked and explored.

Figure 7. The box that was used to visualise citizen's ideas for the future of Birmingham's parks, as presented to local City Councillors and other stakeholders involved in drafting a 25 years strategic agenda.

5. Conclusions

This research has shown that it is possible for visualisations of urban futures to embed the complexity and the contradictions that characterise life in the city, as long as equal attention is paid to the design of processes and artefacts of visualisations. Processes of visualisations should be designed to enable and facilitate creative conversations between different actors, and artefacts visualising such conversations must be able to articulate the different emerging visions and their interrelatedness, while maintaining their fundamentally ambiguous and subjective character.

The experience conducted as part of Liveable Cities demonstrated the role that visions developed as conversations can have in engineering and urban design processes, particularly those that are interested in investigating longer-term futures. While engaging citizens and stakeholders in visioning conversations may not lead to the development of plausible and actionable strategies, the value of these visions lies in the way in which they challenge assumptions and highlight less-quantifiable issues.

This paper aims to discuss the need for and the main characteristics of a pluralistic, process-based approach for developing multi-actor visions of possible urban futures in the context of engineering and urban design practice and research projects. While the authors hope that the description of this experience may encourage others to experiment with similar approaches, it is

not an ambition of this study to provide the reader with a directly transferable set of methods and tools. Further work is needed at this point to explore and test the potential and dynamics of processes of pluralistic visions of urban futures in various other contexts, especially those characterised by heated debates on contested future, where understanding and unpacking diversities of experiences and aspirations is paramount.

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460 **Tables**

461 Table 1. Recommendations of on citizens participation in creating urban future visions (from
462 previous studies).

Findings from the Birmingham Eastside Urban Regeneration Project (Rogers *et al.*, 2008; www.esr.bham.ac.uk)	What is 'sustainable' is determined locally: local conditions set local priorities.
	The past and the present must be incorporated to achieve more sustainable regeneration.
	Early involvement in the development process is central to advancing the sustainability agenda.
	Individual design decisions influence the ability to meet very different sustainability objectives.
	Sequencing activities correctly in the development process keeps sustainability-related options open.
The Future Urban Living Policy Commission Six Recommendations for Change (Rogers *et al.*, 2014)	Citizens should be empowered to combine with those who govern and other city stakeholders to create a City Narrative that describes their city's history, its present context and its visions for the (far) future, via a transparently democratic process that delivers consensus across all sections of the community.
	Citizens should be empowered to be instrumental in delivering this City Narrative, and be entrusted to do so.
	There is a need for a system that creates inspirational local leadership, and this would best be achieved via either mayors or leadership groups elected on the basis of an ability to deliver the City Narrative.

	Local government leaders in turn need to be empowered by the triple devices of a balanced degree of devolution of power from national government, an ability to raise finances locally and structures that enable effective cooperation with organisations beyond the city's boundaries (regional, national and global).
	Cities need financial and business models that allow them to experiment, enable them to invest for the long-term, and facilitate the capture of economic, social and environmental returns on investment.
	There should be a radical upgrade in the role of planners to promote creative, long-term, thinking on urban sustainability and resilience, and to enable more organic growth within that strategic framework. In this role planners should act as integrators of urban practitioners and other urban stakeholders.

Figure captions

Figure 1. Participants designing their imaginary future cities during two Future Visioning Workshops

Figure 2. A sketch of the structure of the Atlas. From the single home page, the user can explore the maps and access visualisation of individual workshops. Different users may therefore wish to simply have an overview of what emerged from the research, or delve into the complexity of the information, examining in details the dataset that have been used to compile the Atlas.

Figure 3. A section of the Atlas representing all of the imaginary cities envisioned by the different sectors in a single map, that can be navigated exploring how themes (such as energies, mobilities, governance, etc.) are articulated.

Figure 4. A visualisation of the issues explored by the Education Sector during the second part of the workshop (A), and (B) a graphic translation of the model that the group built to describe their vision of the future city

Figure 5. Liveable Cities team members mapping their research and their questions to each others (left). On the right: a visualisation of research areas and interdependencies produced after the workshop.

Figure 6. The box that was used to visualise citizen's ideas for the future of Birmingham's parks, as presented to local City Councillors and other stakeholders involved in drafting a 25 years strategic agenda.