Urban Planning (ISSN: 2183–7635)
2023, Volume 8, Issue 2, Pages 57–69
https://doi.org/10.17645/up.v8i2.6411

Article

Planning the Smart City With Young People: Teenagers' Perceptions, Values and Visions of Smartness

Simeon Shtebunaev *, Silvia Gullino, and Peter J. Larkham

School of Engineering and the Built Environment, Birmingham City University, UK

* Corresponding author (simeon.shtebunaev@mail.bcu.ac.uk)

Submitted: 31 October 2022 | Accepted: 12 February 2023 | Published: 27 April 2023

Abstract
Young people are often seen as "future citizens" and therefore relegated to a back seat in the planning process, awaiting their coming of age. Recent digital transformations in planning have brought new consultation processes but also created a digital divide and conflicting agendas. This article engages with youth, specifically teenagers, a heterogenous community stuck between childhood and adulthood, assumed to possess the necessary digital skills, but usually overlooked in participatory planning processes. This article will examine the case study cities of Manchester, Birmingham, Valencia, and Sofia, where 121 teenagers between 15 and 19 years of age have been interviewed in relation to their awareness and perceptions of digital technologies and smart cities. It focuses on critically examining young people's perceptions and values towards the smart city. Using the smart city wheel as an engagement and discussion tool, the article presents teenagers' critique of smart city models and future city visions. The article categorises common threads and values that this demographic has espoused and presents cautionary tales relating to awareness and skills development in this age group. Throughout the interviews and surveys, young people in all four case studies have reported strong affiliations to specific modes of inhabiting the city and values that they would like to see reflected in any future visions. The article identifies key considerations for planners and smart city practitioners when engaging young people in the creation of future city visions.

Keywords
city visions; participation; smart cities; teenagers; urban planning; young people

Issue
This article is part of the issue "Smart Engagement With Citizens: Integrating "the Smart" Into Inclusive Public Participation and Community Planning" edited by Jin-Kyu Jung (University of Washington) and Jung Eun Kang (Pusan National University).

1. Introduction

The smart city is the next iteration in a long series of utopias concerning the city to the present day (Angelidou, 2015). At the core of any utopian world is the desire for reconciliation between humans and the natural world. What the debate and practice about smart cities tend to promote is the sustainability and citizen-friendly credentials of digital optimisation in the city (Girardi & Temporelli, 2017); yet the validity of such claims remains largely contested. Yigitcanlar et al. (2018) are critical not of the concept itself but the framework in which smart cities operate, as in their view the failure of both sustainable and smart urbanism is bounded by their performance within an anthropocentric practice. Hollands (2008) stressed that progressive smart cities need to be founded on the needs of the people inhabiting them instead of uncritically promoting the role of IT as a panacea, which has led to a range of critiques of the smart city. Smart cities as a largely technocratic idea have permeated the visioning process not only in local municipalities but on national and international levels. The adoption of "smart city" aspirations in the European context was largely driven by the European Commission's agenda and the European Marketplace for Smart Cities (Neirotti et al., 2014). Translated into the national context, specific frameworks were created to fund the digitalisation of cities and their integration into the new "knowledge

economy." Smart city concepts have made their way into the renewed Horizon Europe, heading one of the five missions on 100 climate-neutral and smart cities by 2030 (European Commission, 2022a). A rather more critical approach has been adopted by the UN-Habitat which has developed a flagship programme on people-centred smart cities (UN-Habitat, 2022), which, while attempting to critique the concept, establishes it firmly as a future city vision on the international stage.

Meadows (1994) writes about visions as the most important part of the policy process, yet she suggests that we are deprived of meaningful discussions not only in the policy process but also in society at large. Meadows stresses that sharing visions with others is essential: Only a shared vision can be a responsible one. Smart city strategies as visions of the future are rarely discussed in the public realm. The failed Sidewalks project in Toronto Quays (Bozikovic, 2022) is an example of the contradictions which a smart city vision can encounter when put to the test. The project faced scrutiny by the public and community actors, which eventually led to its withdrawal. Smart city visions bear similarities to science fiction novels—grounded in realism and technocratic approaches but subservient to current political and economic narratives, casting aside the alternatives possible under a more open and community-led approach. Smart city visions based on current politico-economic realities often glance over the non-rational human and fail to accommodate alternative imaginations of the future. Future city visions should address the issues of climate change and citizen participation to be truly transformational, considering not only the human-centric factors but also the flora and fauna which inhabit the city, a sentiment echoed by the youth climate strike movement (Gorman, 2021). Yigitcanlar et al. (2018) advocate a post-anthropocentric smart city which prioritises a long-lost way of thinking about our habitats—as parts of the natural world.

Communities, and in particular, historically marginalised members of society are often sidelined in the visioning process. Adopting the viewpoint of youth, as one such demographic, can help us to test the validity of smart city planning and start questioning top-down future visions. In the urban debate, youth have been a diverse, complex, and elusive demographic often taken to mean children and adolescents. The hypothesised benefits of involving youth in the planning process (Frank, 2006) have rarely materialised as meaningful inclusion has been low on the priorities list. However, changes brought about by digital technologies have made consulting youths much more practicable. Digital transformations have also brought the so-called digital divide (Stratigea et al., 2015) and young people have become one of the prime targets of educational programmes by state actors to upskill them in preparation to become smart citizens. Innovative ways of consulting are becoming commonplace, such as utilising place-based education (Heffez & Bornstein, 2016), virtual and augmented reality tools (Argo et al., 2016) as well as large online multiplayer games (Potts et al., 2017).

Within the human-centric smart city approach we can find overlooked actors who possess the power of imagination needed to shift the debate. We need to more closely examine how youth's perceptions and participation in urban life relate to a post-anthropocentric world, where the gaps of knowledge are, and how can youth be seen to drive action which respects the intergenerational contract of sustainable development. Young people are aware that their futures are uncertain—we can see them organising in emergent movements across the world—but what values do young people hold when considering the smart city? Can we imagine the future of our cities together with youth and what would it look like?

2. The Human-Centred Smart City

In the Global North, authors critical of the smart city straddle a wide range of disciplines such as urban sociology, architecture, urbanism, and media studies (Greenfield, 2013; Hollands, 2015; Marvin et al., 2015; McFarlane & Söderström, 2017). The smart city is seen as a construct of the corporate in the public realm, striving towards which in the long term could exclude citizens from participating meaningfully in urban life. Academics adopting this viewpoint seek to unpick critical aspects of future cities which the predominant smart city rhetoric tends to obfuscate or omit, such as sustainability (Cugurullo, 2018), gendered cities (Datta, 2015), power dynamics (Klauser et al., 2014), branding strategies (Söderström et al., 2014), and citizen participation in the process (Stratigea et al., 2015). This contrasts with the more technological approach which attempts to view the city from the perspective of urban analytics (Caragliu & Del Bo, 2019) and the "embedded" approach which aims to conceptualise the inner workings of cities in their digital transition and is situated in disciplines such as public administration, urban studies, and the built environment (Cardullo & Kitchin, 2018).

Lack of participation from the public in the creation of the "smart city" has been a crucial issue since the emergence of the field (Vanolo, 2016). Sassen (2011) is concerned that the randomness of a city, the elements of serendipity that create urban life are under threat by the highly technical visions of algorithmic controls. Greenfield (2013) addresses the threats to diversity in the smart city, driven by algorithms which prioritise financial profit, optimisation of public services, and energy consumption and which suppress inefficiencies. A key concern is the ability of people to perform citizenship in an urban arena where the power balance is shifted and the urban experience is highly controlled. The right to the smart city (Willis, 2019) has emerged as a contested debate, occupying the realm of digital technologies; however, it follows in a long tradition of urban innovation displacing and disenfranchising

citizens. The four powers which shape our cities as seen by Zukin (2010) in her analysis of development dynamics in processes of gentrification remain largely in charge in the smart city too: the economic power of capital, the state, the media, and consumer taste. Mattern (2017) discusses a similar interplay of forces shaping the city in the 21st century, in a digital age where cities have become both a marketplace for technologies and a product. Local governments have largely started to address such critiques. There is an observable shift towards citizen participation in smart city governance and strategies, progressing from contestation and acceptance to collaboration (Przeybilovicz et al., 2022).

The role of youth in participating in and developing city visions is currently largely absorbed by overarching theories of citizen and community engagement. This is a reflection of the underdeveloped theoretical field in urban planning literature concerning the inclusion of children and young people. More than two decades ago, Simpson (1997) called for a fundamental rethinking in the way we design and plan cities to include children and youth; however, little progress has been made. Youth-focused planning case studies such as Growing Up Boulder (Derr & Kovács, 2017) exemplify the practical and contextual aspect of working with young people and the need for further theorisation. Botchwey et al. (2019) examine youth-focused planning case studies in order to situate young people in one of the more established theoretical models—the ladder of citizen participation (Arnstein, 1969). There is a distinct gap in the literature in establishing the role of young people (Peacock et al., 2020), in particular teenagers, within smart cities. Barriers to their inclusion have been identified. Masucci et al. (2019) expose a conundrum as young people who are usually open to digital advances do not recognise emergent technologies working for the benefit of their communities. Cohen et al. (2016) recognise the role that young people can play in bottom-up approaches to the smart city. Costa et al. (2020) stress the positive role that ICT can play in involving teenagers in placemaking processes but warn about the potential challenges of ownership, privacy, and surveillance. Gamification approaches to e-participation in planning such as the use of Minecraft (Rexhepi et al., 2018) also provide new avenues for empowerment and engagement, promising a power shift towards youth. While these studies evaluate specific aspects of the concept of digitalisation and smart cities in relation to young people, they do not examine the validity or alignment with the demographic's values. If smart cities are becoming a dominant paradigm in municipal vision-making, it is important to understand what youth, traditionally under-represented in decision-making, think of the concept.

3. Methodology

This study is part of a wider project examining the perceptions and awareness of young people in regard to urban planning, future city visions and smart cities within the European context. To understand the phenomenon of youth inclusion and their positionality within the planning of future smart cities, a mixed methods approach was selected allowing for diverse data points to be interpreted in a narrative format. This approach suited the open exploration of an under-researched phenomenon. Druckman (2005) discusses that focused case studies are often performed in an inductive-emic tradition that allows for inventiveness at all stages of the research. This flexibility has suited the research questions as there are few existing studies describing and evaluating smart city developments from the youth lens. The method allowed for the role of the context to be emphasized in the studies; however, by its definition, it provides for limited generalisation and theorisation, instead building up the knowledge base concerning youth inclusion.

Focused case studies compare a small number of similar cases matched on all but a few variables. The project was concerned with the development of smart cities in Europe and picked three national contexts where research could be conducted in the respective native language—England, Spain, and Bulgaria. The three countries straddled the East–West divide within Europe. Three cities of each national context were selected due to their comparability in population size with Birmingham, the host city of the research and the primary case study. The process of selection was undertaken after examining all large urban settlements with over 100,000 population in each of the countries and selecting the ones covered by local authorities which possess a smart city strategy or vision, which included youth-focused goals. The four case studies were Birmingham and Manchester in England, Sofia in Bulgaria, and Valencia in Spain. The cities also carried similarities in that they are all within the European context of developed democracies, had largely aligned legislation (divergences have since occurred due to Brexit), and were all classified as beta cities by The Globalization and World Cities Research Network (2018) rankings. However, there are significant differences which have been contextualised in the analysis, such as the different political systems, relative affluence, planning systems, youth policies, level of engagement with "smart city" rhetoric, and cultural and demographic differences. The Birmingham and Manchester examples provide the best baseline for comparison, with the Valencia and Sofia examples providing a wider European contextualisation of the emergent themes. A wider screening of top-down visions was undertaken to understand the policy aspects in the three countries examined and their overlap with youth goals. A summary of the four case studies is presented in Table 1, demonstrating the narrow prism through which young people are considered within respective smart city strategies, predominantly as a future workforce to be developed and placated.

Once the broader lens through which young people are acknowledged in their city's smart vision had

Table 1. A summary of youth goals occurring in the case studies' smart city visions: Digital Birmingham Strategy (2019), Manchester Smart City Programme (Manchester City Council, 2019), Valencia Smart City (2019), and Sofia Strategy for Smart Specialization (Sofia Municipality, 2019).

Theme	Youth Goals	City
Economy	Focus on career development Young people seen as future workforce	Manchester and Sofia
Economy	Focus on youth as talent development, support growth, and retention	Sofia
Education	Focus on introduction of STE(A)M fields into teaching and schools	Valencia and Sofia
Education	Focus on upskilling and training through further education	Sofia
Citizenship	Focus on overcoming the digital divide and social exclusion	Birmingham
Innovation	Focus on youth entrepreneurship and digital incubators	Sofia
Culture	Focus on creative industries as potential youth employment	Manchester and Sofia
Health	Focus on sports provision for youth	Valencia
Spatial	Focus on physical infrastructure for youth	Valencia

Notes: All information was retrieved in March 2019; the analysis of the cities' smart visions was undertaken in Spring 2019; STE(A)M stands for science, technology, engineering, art (including architecture), and mathematics.

been identified, a bottom-up primary data collection was undertaken. The specific demographic which was approached was teenagers aged between 15 and 19. Teens in this group are in a transitional stage of their development into adulthood, acquiring citizenship rights and undergoing significant physiological and social transformations. This group has largely been categorised as "hard to reach" in planning practice. A transient and diverse community, in the European context the percentage of young people is on the decline resulting in societal pressures and economic disbalance. The case studies approach aimed to uncover broad themes within this demographic when smart city planning is concerned. Morse (2000) suggests that for shallower case studies adopting an inductive approach a larger sample size might be required; an indicative n = 30 was the goal of recruitment in each city. Figures 1 and 2 present a profile of the participants.

Semi-structured interviews formed the main part of the primary research within the case study of Sofia, but

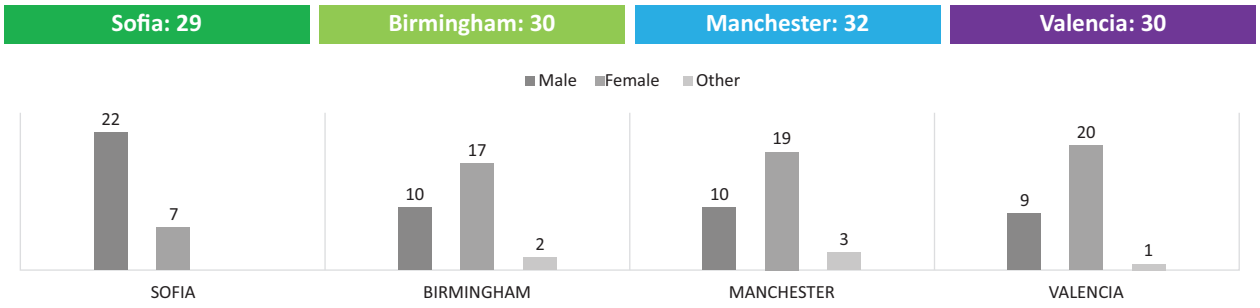

Figure 1. Breakdown of participants by sample size and gender.

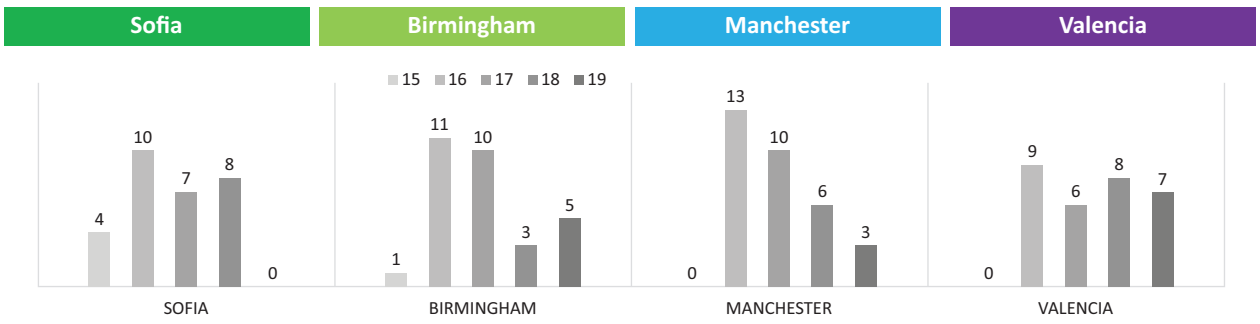

Figure 2. Breakdown of participants by age.

the approach was later adapted to an online survey and social media research in the case studies of Birmingham, Manchester, and Valencia due to pandemic restrictions. In Sofia, participants were recruited through secondary schools' administration and after-school English language classes. Interviews took place in person during the winter of 2019 and 2020, within school settings, for up to 30 minutes. As the Covid-19 pandemic occurred in the middle of the data collection, participants in the remaining three cities were recruited online throughout winter 2020 and spring 2021, primarily via Instagram and Twitter. Participants were approached through direct messaging and presented with a link to a detailed online survey. Contrasts were observed: In the post-pandemic conditions, 15-year-olds were harder to recruit due to the need for parental permission; additionally online recruitment attracted more females.

Semi-structured interviews and online surveys were able to uncover how young people perceive the planning system, the concept of smart cities, and how they value it. The design of the interviews and survey questionnaire focused on three main areas: urban planning, technology and the smart city, and citizen participation. The questionnaire consisted of approximately 30 questions across all seven sections. Figure 3 provides an overview of the sequential survey design and thematic focus. Both interviews and online surveys followed the same structure.

There were limitations to the research. The primary data collection took place from 2019 to 2021, with the implication that the research had to cope with pandemic conditions and their potential influences on perceptions and values. Examining the target demographic of 15- to 19-year-olds also meant that one could not expect young people at that age in mainland Europe to be bilingual nor feel confident in answering questions in English. Linguistic and cultural differences were key to understanding the perceptions towards urban planning and smart cities. The research was conducted in the respective native language and then coded and analysed in English.

Ethical considerations when working with young people are significant and require re-centring in the digital domain. The recruitment and interview processes reaffirmed the experience of encountering "slippages"—moments of ambiguous nature but with no clear ethical implications, as described by Cutting and Peacock (2021). The pre-pandemic data collection in Sofia generally followed the traditional approach to recruitment and interviews with youth, following institutional ethical approval, recruiting participants through negotiations with gatekeepers (such as schoolteachers and after-school clubs) first and being present on site when interviewing the young people in either individual or group settings. Due to the pandemic limitations, however, the remaining samples were collected employing a digital methodology. Participants were recruited via social media and incentives were provided in the form of charity donations. Even though a revised institutional ethical approval was obtained, some key ethical fuzzy boundaries emerged. Gatekeepers shifted from persons of influence and authority to platform owners and friends' networks. The boundary between a researcher and participant was also blurred as two-way feedback was much easier to establish over social media platforms such as Instagram. Equally, recruitment was much more time intensive as social media approaches require audience building, branding and advertising, the development of incentives, and the generation of a public conversation. Building trust in the digital domain was challenging, both on the side of participants who often ignored invitations to take part and on the side of the researcher with respect to the identity of participants. Self-verification of age was one such issue, as a suspicious spike in responses from over 16-year-olds was observed, avoiding the required parental consent procedures for 15-year-olds. It is important to note that the digital approach to data collection revealed issues which would present themselves in digital youth participation processes within urban planning practice.

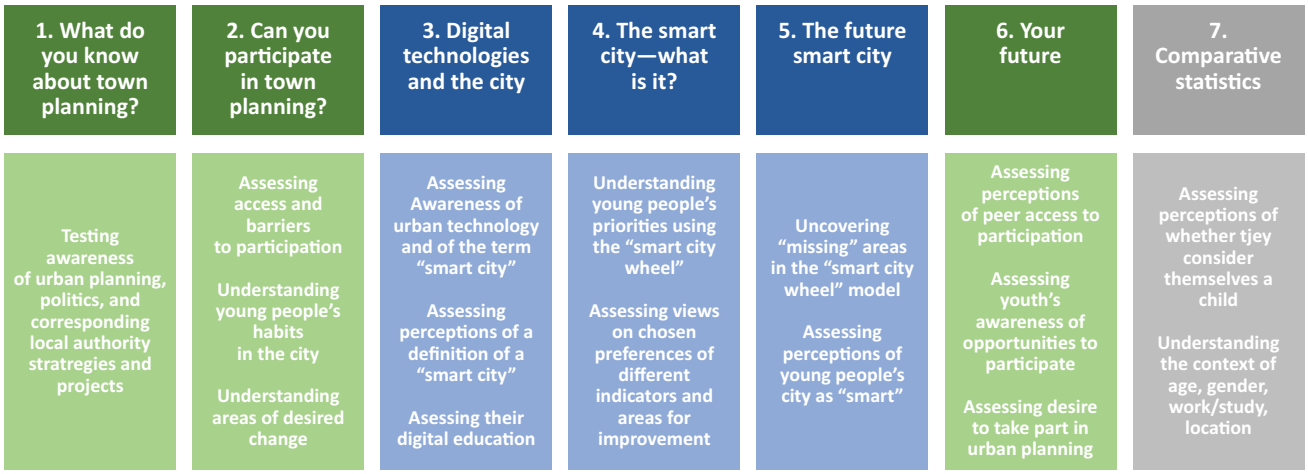

Figure 3. Example interview and survey structure. Note: This article focuses on the results and discussions covered in themes 3–5 of this figure, in blue.

4. The Smart City Wheel as a Method of Engagement

To approach the smart city debate with young people, a framework had to be adopted which was relatively accessible to explain and dissect. One of the more influential smart city models has been the smart city wheel (Cohen, 2018), widely quoted by city authorities and smart city consultants, and widely referenced in research on cities across the world: Dubai (Virtudes et al., 2017), Guadalajara (Mexico; Ceballos & Larios, 2016), and the EU CITYKeys project (Bosch et al., 2017).

The wheel is a graphical representation of key areas of progress and indicators. The wheel is based on the methodology developed by Giffinger et al. (2007) at the European Smart Cities research group at the Centre of Regional Science of Vienna University of Technology. The project European Smart Cities 4.0 (https://smart-cities.eu) led by Giffinger benchmarked the progress of European cities towards smartness and achieved wide publicity, including influencing the European Commission's early image and idea of the smart city. The methodology was later adopted by the smart city wheel, developed by Cohen (2018). The wheel covers six areas and 18 indicators claiming to present a holistic strategy towards becoming a smart city.

The wheel was presented to the participants in both a complete and a broken-down form to elicit responses (Figure 4). The wheel presented a useful framework focusing young people's understanding on the possibilities and domains of the city in which technological advances are considered. It visualised the description of the smart city concept and allowed for the evaluation of aspects of their respective cities which might have been overlooked when smart technologies are considered. Young people were asked to first identify their top priorities from the outer circle of indicators and then to select one area of focus from the inner six where they would like to see technological advances in their city. Finally, teenagers were asked to consider what elements might be missing from the model. Once reflections were collected, the research applied analysis approaches developed from grounded theory. The data was analysed using inductive thematic analysis where codes emerged from the text. The analysis then compared the emergent themes across all four case studies. This article presents the overarching results and conclusions.

5. Young People's Ability to Engage in the Smart City

New technologies broadly under the guise of the term "plantech" (planning and technology) have revolutionised the ways in which public participation takes place (Alizadeh, 2017). The availability of urban data online provides new tools and avenues for consulting citizens. However, digital participation can often be passive, therefore the design of the tools needs to be considered in detail (Bizjak, 2012). Emerging plantech and smart city tools demonstrate that higher engagement levels with young people can be achieved, as reported by private companies such as Commonplace (2019). Digitalisation is promoting the enfranchisement of a wider population in the planning process, in particular young people. Digital methods should, therefore, consider youth's different needs, skills, and values. There is a risk that we transplant the same biases existing in physical consultation methods to online ones. Digitalisation allows for youth

Figure 4. Smart city wheel as presented to youth. Note: On the left is the complete wheel and on the right is the broken-up version. Source: Authors' work based on Cohen (2018).

to engage in the planning conversation but can as easily constrain the diversity of ideas and opinions. It is also crucial to understand the validity of the general assumption that generations who have grown up with the internet would by default be more willing and able to engage with new technologies. The points above have a direct impact on the confidence of young people to take part in the future smart city.

When asked, most young people knew little about urban planning and conflated politicians with professionals. This was observed across all cultural aspects. It is an important context for any future engagement in the digital realm which fails to first educate youth about urban planning. The permeation of digital technologies in the urban realm also proved hard to assess for teenagers. Overwhelmingly, the interviewees had difficulties naming urban tech examples beyond technologies that were close to their everyday life (Table 2). The predominant three examples in every city were broadly consistent with the comment of a 17-year-old female from South Birmingham: "Phones, computers, smartwatches."

There were detailed attempts at unpeeling the urban environment, and a 17-year-old male in Sofia exemplified the thought process observed in most responses: "The stop signs, uh, I don't know if it's with the traffic lights, where it's pressed to turn green, if it's for something like that. I guess some cameras, the traffic police, something like that." This indicates a lack of critical engagement with technology in the urban realm, apart from awareness of some transport-based urban technologies, which scored higher in the mainland European context.

Indeed, when asked if they possess the necessary digital skills to be better equipped in the future, responses were unequivocally negative as seen in Figure 5. Young people do not yet believe that they have the expertise to be "smart citizens." There was a significant confusion between their self-reported knowledge, desire to take part in planning, and understanding of available opportunities. A 17-year-old male in Sofia responded: "I'm not qualified for that, and I think there are people who would do it much better than me." Another 16-year-old male in Sofia responded: "Maybe again, we're not mature enough for that [participating in urban planning]." As Himmel et al. (2014) suggest, urban challenges connected with planning and future city visions need to be incorporated into school-level education in order to provide a deeper understanding of systems thinking and causal links.

Similar difficulties were encountered when asked how digital technologies can help better engage young people in urban planning. A sizeable minority in all four contexts struggled to name any suggestions, particularly in the Bulgarian case. However, clear themes emerged which were considered priorities: increased accessibility and use of municipalities' websites, better digital advertising to inform about future developments, better use of social media by stakeholders, involvement of youth in digital simulations and games in order to communicate changes in cities, and facilitation of online workshops, events, and surveys. Young people were cautious of digitalisation as far as it allowed meaningful engagement and for their voices to be heard. Lack of access to information and awareness of what is happening in the city was also widely reported, and digital technologies were seen as a potential solution if equitable engagement platforms were established. As one 18-year-old male from North Manchester reports: "This survey is the only information I have come across regarding this topic."

Table 2. Urban technologies: Youth's top five choices across the four case studies in order of number of responses.

Birmingham	Manchester	Sofia	Valencia
Smart Phones (17)	Smartphones (21)	Digital screens (17)	Smartphones (16)
Laptop (13)	Laptop (14)	Smartphones (6)	Transport tech (6)
Personal computer (10)	Tablet (11)	Metro barriers (6)	Tablets (6)
Social media (7)	Personal computers (7)	Traffic lights (5)	Personal computers (5)
Wearable tech (6)	Digital billboards (5)	e-Scooters (5)	"I don't know any" (5)

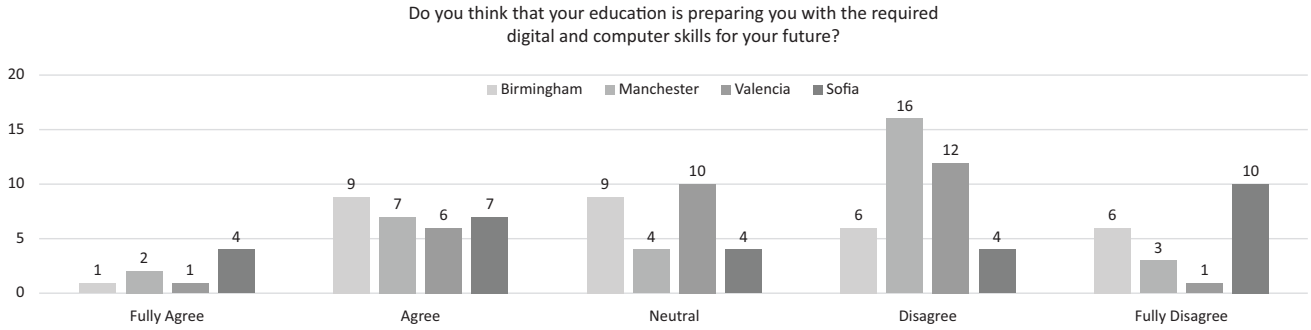

Figure 5. Self-assessment of digital and computer skills education.

6. Teenagers' Priorities in the Smart City

In his book *Smart City Citizenship*, Calzada (2020) proposes a fifth helix in the multi-stakeholder framework of innovation in the smart city—the social helix including activists, entrepreneurs, and assemblers. As a demographic often lacking a firm basis in the other four domains—public, private, academia, and civic society—some young people have gravitated to the social domain, adopting the mantle of activists as seen in the climate movement (Gorman, 2021). However, youth are not a homogenous group. It is key therefore to understand what are the visions that diverse teenagers have for the future and whether they differ from those that municipalities prioritise.

Young people were presented with a definition of the smart city adopted by the European Commission (2022b). More than 70% of youth interviewed in each case study indicated that they would very much like to live in such a city, indicating an openness to the concept as a vision of the future. However, critical evaluations emerged, especially centred around the need for smart city visions to acknowledge human interactions, tackle inequality, and address sustainability in a holistic way. When asked to reflect on the survey and consider if their city was a smart one, the Bulgarian youth were most negatively predisposed, followed by the Spanish. In England, young people were more likely to indicate that they are not sure whether their city was a smart one. This could reflect attitudes across the population in terms of their future roles and opportunities in their cities or reflect the politico-economic distinction between the three countries or the adoption of technology in day-to-day life.

A preferential analysis of the smart city wheel was undertaken where young people were asked to rank the aspects of the model that they value most. Figure 6 presents the comparison in priorities. There were clear overarching preferences in all four contexts, where young people generally prioritised smart people and smart living first, followed by smart environment as the top three overarching themes to which they would like resources to be allocated. Contextual factors then drove the prevalence of economy, governance, and transport; however, in all cities, they were superseded by human-centred themes. In Sofia, economy and governance were strongly represented themes, demonstrating the awareness of young people of ongoing national debates as a country with turbulent politics and a smaller economy.

When granular preferences of the indicators (the outer circle of the smart city wheel) were analysed, the four cities become more diverse in their priorities (Table 3). In Birmingham, themes of safety, culture, creativity, happiness, well-being, and education dominated. In Manchester, while similar to Birmingham in the dominant themes, a much stronger emphasis emerged in areas of green energy and clean transport. In Sofia, health was much more pronounced than in the other three cities. Drivers such as education, safety, creativity, and culture were still well represented, but similarly to Manchester, green energy and clean transport were also strongly preferred. Valencia emerged as the most people-centred city among young people. Issues of education and inclusivity dominated the debate. Economic issues were also strongly represented, as well as issues of sustainability and green planning.

There were clear cross-cutting trends, mainly in priorities such as education and safety that appeared in the top five preferences across all four cities. Issues of liveability and people-centric smart cities were top of the agenda in all of the case studies. In Birmingham, desires

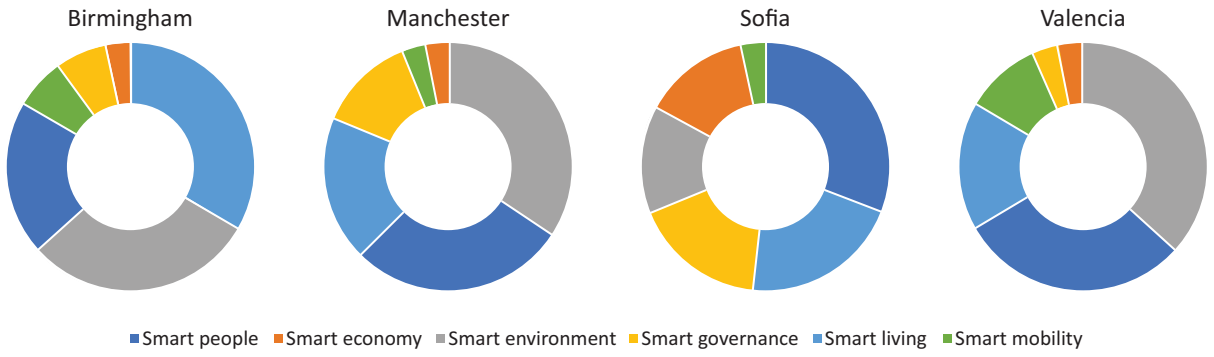

Figure 6. Areas of the smart city where technological improvements should be a priority according to young people.

Table 3. Smart city indicators: Youth's top five priorities across the four case studies.

Birmingham	Manchester	Sofia	Valencia
Safe city	Education	Healthy city	Education
Education	Safe city	Safe city	Inclusive city
Inclusive city	Green energy	Education	Safe city
Creative city	Inclusive city	Green energy	Green energy
Green planning	Clean transport	Creative city	Entrepreneurial city

for a safe and green city were one of the main justifications for how young people selected their preferences. A 16-year-old female from North Birmingham stated: "Future urban development needs to be green and innovative to fight the growing threat of climate change and global warming, and in doing this it will help public health, the economy, and transport." In Manchester, awareness and concern for inclusivity, tolerance, and multiculturalism emerged as strong themes in the justification of responses. A 16-year-old female from West Manchester elaborated: "I picked the three from the outer circle because we are facing significant divisions in the population. As much as technological advancement is good, we cannot forget and leave behind core human principles and needs." In Valencia, preoccupation with climate change was the main reason quoted for the selection of priorities. There was also a strong indication of a more proactive approach, as young people indicated that those were priorities they were working on or wanted to change in their city. A 17-year-old non-binary person from North Valencia explained: "I feel that not enough measures are being taken to combat climate change." In Sofia, young people were acutely aware of the economic reality of the proposed smart city visions and how it might affect them. A 17-year-old male from South Sofia responded: "Everyone's economic capabilities are different, so the definition of a smart city changes depending on the people." There was also awareness of the political campaigns—part of the Sofia mayoral election—that were in progress during late 2019 when some of the data was collected. In the Eastern-European context, teenagers' long-term visions for their city were related significantly to their plans to stay in the city they grew up in. A majority of the participants reported societal or parental pressures to emigrate to study and live abroad dictating their choices, uncertain whether they could take part in the planning of the future city. Such trend did not emerge strongly in the three Western-European cities, even if individuals indicated that they will be moving out of their home city for higher education purposes.

Once priorities of the existing model were uncovered, participants were asked to point to aspects from their life which are not represented in the smart city wheel. A broken-up model was presented as a visual prompt (Figure 2). Most of the participants struggled to name an area that was missing in their city. In Sofia, students put on the spot within the school settings where the interviews were taking place struggled to name areas which were missing; this was not observed in the other three case studies, with online surveys appearing to present a better opportunity for reflection. Ultimately, across all contexts, a rich sample of topics emerged. Cultural change and personal and political will to implement innovative projects were identified as key to the success of smart cities. A post-anthropocentric understanding also emerged, with some young people naming animal welfare and non-human species' wellbeing as key considerations missing from the model. Some young people struggled with the lack of concrete definitions of the "smart city" scope and themes and suggested that those were open to misuse. An interesting contrast was observed. Whereas a post-capitalist sentiment emerged in most answers with issues of togetherness, community, political activism, affordability, and care for vulnerable populations all named as key to any future visions, an alternative narrative of consumerism was presented in some answers with ideas such as smart shopping presented. Cultural activities, art, and creativity were also clearly identified as essential to the future city and desire for even stronger integration across all themes of the smart city model was exposed. Equality, equity, diversity, and inclusivity were all issues which were felt to be missing from the smart city model, reflecting the fear of young people that institutional biases will be replicated in the digital domain. Sport and active populations were other issues which were felt to be not strongly represented in the model. Table 4 shows the key themes identified in each city.

The answers of young people broadly point to a desire for the collective imagining of alternative visions of the future which are not constrained to the techno-politico-economic origin of the smart city wheel. As observed in the Youth 4 Climate Strike actions (Gorman, 2021), young people are acutely aware of the challenges humanity faces and are willing to contest our collective acceptance of visions and strategies based on a faulty system which ultimately has caused our precarious situation.

7. Conclusions

A better translation of young people's needs must be incorporated into future city visions. Reaching teenagers in smart city planning needs to be a proactive process and involve them in the priority phase in a holistic manner—both in person and digitally. As demonstrated, digital participation raised new issues in terms of ethics and accessibility. The transition towards human-centred smart cities needs to be accompanied by a transformational process in policy-making and vision setting. Including diverse voices in this process is the key to reflecting wider values within society. In the case of teenagers, we need to acknowledge that there are barriers to education, participation, information, and critical skills that need to be overcome in order to achieve meaningful inclusion. Young people can help broaden the horizons of what the future city can be and allow alternative conversations to take place within the policy realm.

Teenagers are intrigued and attracted by the prospect of living in a smart city; however, they are able to critically examine the concept against a socio-economic and political landscape. Future city visions, whether a smart city strategy or a local plan, need to be examined in relation to their long-term sustainability if they are to capture the imagination of young people. There is a general lack of knowledge of the terminology

Table 4. Youth identified aspects missing in the smart city model.

Area	Birmingham	Manchester	Sofia	Valencia
Community	Smart socialisation Vulnerable people Youth empowerment Homelessness Smart community	Sense of community Vulnerable people Smart communities Youth spaces Social action	Citizens' motivation Ethics and morals Religion	Intercultural city Ageing population Right to the city Social exclusion Political inclusion
Culture	Enriched arts	Art and creativity		Language and culture
Education	Access to education Smart knowledge		Life-long education	
Affordability	Affordable housing Affordability	Affordability Lower living costs		
Economy	Independent businesses Unemployment	Independent business Labour relations		Modern infrastructure
Consumerism	Smart consumerism Smart shopping			Smart consumerism
Health	Sport and fitness	Mental health		Clean city
Services	Smart public facilities			Security
Sustainability			Animal welfare Non-human focus	Circular economy Ecological Focus
Governance			Implementation plan Concrete definitions Cross-theme integration	Progress monitoring Implementation
Regional			Regional disparities	Smart regions
Politics		Tackling racism	Political will	

Note: Each theme represents one individual's opinion.

and processes of policymaking and planning; however, there is a good overall level of awareness of key problems in their cities. There are overarching trends in the prioritisation of smart city indicators. Young people want to see most resources in areas connected with urban living, people-centric, and environmentally smart cities. Young people hold values which are community and society-driven, identifying areas within the smart city model that are concerned with the wider environment, a sense of justice and fairness, and post-anthropocentric views. The omission of such issues in current models reflects the underlying ideology of "smart city" projects, which needs to be challenged. Political will and leadership are key to securing the trust of young people. Planners can rely on this demographic to present competing visions of the future and challenge policymakers.

Youth engagement in urban planning and smart city visioning is largely an under-researched area worth exploring further. Comparison with the post-pandemic condition in the city will be necessary to understand whether the pandemic has not only changed young people's priorities but also their confidence in their ability to make contributions to their city. The political landscape has also changed in each of the case studies, which might influence young people's attitudes. Further qualitative research in the four cities is needed to fully understand the reasoning behind some of the cultural and contextual trends. The online methodology can be easily adapted by local governments considering the development of future visions and a wider sample of teenagers engaged. In the smart city domain, understanding what models and processes of developing the smart city can incorporate the priorities and the areas identified by young people can prove transformational in envisioning a post-anthropocentric vision for the future city.

Acknowledgments

Simeon Shtebunaev is a recipient of Birmingham City University's STEAM doctoral scholarship. This research is part of the funded doctoral project Youth City Futures on the topic of youth inclusion in urban planning and smart cities.

Conflict of Interests

The authors declare no conflict of interests.

References

Alizadeh, T. (2017). Urban digital strategies: Planning in the face of information technology? *Journal of Urban Technology*, *24*(2), 35–49. https://doi.org/10.1080/10630732.2017.1285125

Angelidou, M. (2015). Smart cities: A conjuncture of four forces. *Cities*, *47*, 95–106. https://doi.org/10.1016/j.cities.2015.05.004

Argo, T. A., Prabonno, S., & Singgi, P. (2016). Youth Participation in urban environmental planning through augmented reality learning: The case of Bandung City, Indonesia. *Procedia—Social and Behavioral Sciences*, *227*, 808–814. https://doi.org/10.1016/j.sbspro.2016.06.149

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, *35*(4), 216–224.

Bizjak, I. (2012). Improving public participation in spatial planning with web 2.0 tools. *Urbani Izziv*, *23*(1), 112–124. https://doi.org/10.5379/urbani-izziv-en-2012-23-01-004

Bosch, P., Jongeneel, S., Rovers, V., Neumann, H.-M., & Huovila, A. (2017). *CITYkeys indicators for smart city projects and smart cities*. European Commission. https://www.dataplan.info/img_upload/7bdb1584e3b8a53d337518d988763f8d/citykeys.pdf

Botchwey, N. D., Johnson, N., O'Connell, L. K., & Kim, A. J. (2019). Including youth in the ladder of citizen participation. *Journal of the American Planning Association*, *85*(3), 255–270. https://doi.org/10.1080/01944363.2019.1616319

Bozikovic, A. (2022, March 22). The end of sidewalk labs. *Architectural Record*. https://www.architecturalrecord.com/articles/15573-the-end-of-sidewalk-labs

Calzada, I. (2020). *Smart city citizenship*. Elsevier.

Caragliu, A., & Del Bo, C. F. (2019). Smart innovative cities: The impact of smart city policies on urban innovation. *Technological Forecasting and Social Change*, *142*, 373–383. https://doi.org/10.1016/j.techfore.2018.07.022

Cardullo, P., & Kitchin, R. (2018). Being a "citizen" in the smart city: Up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal*, *84*, 1–13. https://doi.org/10.1007/s10708-018-9845-8

Ceballos, G. R., & Larios, V. M. (2016). A model to promote citizen driven government in a smart city: Use case at GDL smart city. In G. Betis & D. Petri (Eds.), *2016 IEEE International Smart Cities Conference (ISC2): Improving the citizens quality of life* (pp. 1–6). IEEE. https://doi.org/10.1109/ISC2.2016.7580873

Cohen, B. (2018). *Blockchain cities and the smart city wheel*. Medium. https://boydcohen.medium.com/blockchain-cities-and-the-smart-cities-wheel-9f65c2f32c36

Cohen, J., Backhouse, J., & Ally, O. (2016). Youth expectations of smart city living: An importance-performance analysis of young residents' perspectives of city government. *Commonwealth Youth and Development*, *14*(1), 118–128.

Commonplace. (2019). *Where are the young people? They're waiting and waiting*. https://www.commonplace.is/youngpeoplereport

Costa, C. S., Batista, J. S., Almeida, I., & Menezes, M. (2020). Exploring teenagers' spatial practices and needs in light of new communication technologies. *Cities*, *98*, Article 102574. https://doi.org/10.1016/j.cities.2019.102574

Cugurullo, F. (2018). Exposing smart cities and eco-cities: Frankenstein urbanism and the sustainability challenges of the experimental city. *Environment and Planning A: Economy and Space*, *50*(1), 73–92. https://doi.org/10.1177/0308518X17738535

Cutting, K., & Peacock, S. (2021). Making sense of "slippages": Re-evaluating ethics for digital research with children and young people. *Children's Geographies*. Advance online publication. https://doi.org/10.1080/14733285.2021.1906404

Datta, A. (2015). A 100 smart cities, a 100 utopias. *Dialogues in Human Geography*, *5*(1), 49–53. https://doi.org/10.1177/2043820614565750

Derr, V., & Kovács, I. G. (2017). How participatory processes impact children and contribute to planning: A case study of neighborhood design from Boulder, Colorado, USA. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, *10*(1), 29–48. https://doi.org/10.1080/17549175.2015.1111925

Digital Birmingham. (2019). *Birmingham's smart city roadmap*. http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Birmingham_Smart_City_Roadmap_revised-Nov-2014.pdf

Druckman, D. (2005). *Comparative case study approaches*. SAGE. https://dx.doi.org/10.4135/9781412983969

European Commission. (2022a). *EU mission: Climate-neutral and smart cities*. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en

European Commission. (2022b). *Smart cities*. https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en

Frank, K. I. (2006). The potential of youth participation in planning. *Journal of Planning Literature*, *20*(4), 351–371. https://doi.org/10.1177/0885412205286016

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Milanović, N., & Meijers, E. (2007). *Smart cities—Ranking of European medium-sized cities*. Centre of Regional Science.

Girardi, P., & Temporelli, A. (2017). Smartainability: A methodology for assessing the sustainability of the

smart city. *Energy Procedia*, *111*, 810–816. https://doi.org/10.1016/j.egypro.2017.03.243

Gorman, J. (2021). *Disobedient youth: Lessons from the youth climate strike movement*. EU–Council of Europe Youth Partnership. https://pjp-eu.coe.int/documents/42128013/47261800/Gorman-J.-%282021%29-Disobedient-Youth-Lessons-from-the-Climate-Strikes.pdf/b1ec729d-ee2f-1e5d-9de3-a22b68e61bb8

Greenfield, A. (2013). *Against the smart city*. Do Projects.

Heffez, A., & Bornstein, L. (2016). Youth fusion's urban environment project: Increasing youth participation in urban planning through place-based environmental education. *Children, Youth and Environments*, *26*(2), 110–127. https://doi.org/10.7721/chilyoutenvi.26.2.0110

Himmel, S., Zaunbrecher, B. S., Wilkowska, W., & Ziefle, M. (2014). The youth of today designing the smart city of tomorrow. In M. Kurosu (Ed.), *Human-computer interaction: Applications and services* (pp. 389–400). Springer.

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City*, *12*(3), 303–320. https://doi.org/10.1080/13604810802479126

Hollands, R. G. (2015). Critical interventions into the corporate smart city. *Cambridge Journal of Regions, Economy and Society*, *8*(1), 61–77. https://doi.org/10.1093/cjres/rsu011

Klauser, F., Paasche, T., & Söderström, O. (2014). Michel Foucault and the smart city: Power dynamics inherent in contemporary governing through code. *Environment and Planning D: Society and Space*, *32*(5), 869–885. https://doi.org/10.1068/d13041p

Manchester City Council. (2019). *Manchester smart city programme*.

Marvin, S., Luque-Ayala, A., & McFarlane, C. (2015). *Smart urbanism: Utopian vision or false dawn?* Routledge.

Masucci, M., Pearsall, H., & Wiig, A. (2019). The smart city conundrum for social justice: Youth perspectives on digital technologies and urban transformations. *Annals of the American Association of Geographers*, *110*(2), 476–484. https://doi.org/10.1080/24694452.2019.1617101

Mattern, S. (2017). A city is not a computer. *Places Journal*, *2017*. https://doi.org/10.22269/170207

McFarlane, C., & Söderström, O. (2017). On alternative smart cities: From a technology-intensive to a knowledge-intensive smart urbanism. *City*, *21*(3/4), 312–328. https://doi.org/10.1080/13604813.2017.1327166

Meadows, D. (1994, October 24–28). *Envisioning a sustainable world* [Paper presentation]. Third Biennial Meeting of the International Society for Ecological Economics, San Jose, Costa Rica.

Morse, J. M. (2000). Determining sample size. *Qualitative Health Research*, *10*(1), 3–5. https://doi.org/10.1177/104973200129118183

Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: Some stylised facts. *Cities*, *38*, 25–36. https://doi.org/10.1016/j.cities.2013.12.010

Peacock, S., Pauussaar, A., & Crivellaro, C. (2020). Sensing our streets: Involving children in making people-centred smart cities. In C. Courage, T. Borrup, M. R. Jackson, K. Legge, A. McKeown, L. Platt, & J. Schupbach (Eds.), *The Routledge handbook of placemaking* (pp. 130–140). Routledge.

Potts, R., Jacka, L., & Yee, L. H. (2017). Can we "catch 'em all"? An exploration of the nexus between augmented reality games, urban planning and urban design. *Journal of Urban Design*, *22*(6), 866–880. https://doi.org/10.1080/13574809.2017.1369873

Przeybilovicz, E., Cunha, M. A., Geertman, S., Leleux, C., Michels, A., Tomor, Z., Webster, C. W. R., & Meijer, A. (2022). Citizen participation in the smart city: Findings from an international comparative study. *Local Government Studies*, *48*(1), 23–47. https://doi.org/10.1080/03003930.2020.1851204

Rexhepi, A., Filiposka, S., & Trajkovik, V. (2018). Youth e-participation as a pillar of sustainable societies. *Journal of Cleaner Production*, *174*, 114–122. https://doi.org/10.1016/j.jclepro.2017.10.327

Sassen, S. (2011). *The future of smart cities* [Speech transcript]. Open Transcripts. http://opentranscripts.org/transcript/future-of-smart-cities

Simpson, B. (1997). Towards the participation of children and young people in urban planning and design. *Urban Studies*, *32*(5/6), 907–925.

Söderström, O., Paasche, T., & Klauser, F. (2014). Smart cities as corporate storytelling. *City*, *18*(3), 307–320. https://doi.org/10.1080/13604813.2014.906716

Sofia Municipality. (2019). *Sofia strategy for smart specialization*. https://www.sofia.bg/documents/20182/448750/ISIS_Sofia.pdf/f51fcd5a-2973-4679-89fe-62b3dccb6662

Stratigea, A., Papadopoulou, C.-A., & Panagiotopoulou, M. (2015). Tools and technologies for planning the development of smart cities. *Journal of Urban Technology*, *22*(2), 43–62. https://doi.org/10.1080/10630732.2015.1018725

The Globalization and World Cities Research Network. (2018). *The world according to GaWC 2018*. https://www.lboro.ac.uk/microsites/geography/gawc/world2018t.html

UN-Habitat. (2022). *People-centered smart cities*. https://unhabitat.org/programme/people-centered-smart-cities

Valencia Smart City. (2019). *Valencia smart city office*. https://smartcity.valencia.es/smart-city-office

Vanolo, A. (2016). Is there anybody out there? The place and role of citizens in tomorrow's smart cities. *Futures*, *82*, 26–36. https://doi.org/10.1016/j.futures.2016.05.010

Virtudes, A., Abbara, A., & Sá, J. (2017). Dubai: A pio-

neer smart city in the Arabian territory. *IOP Conference Series: Materials Science and Engineering*, *245*, Article 052071. https://doi.org/10.1088/1757-899X/245/5/052071

Willis, K. S. (2019). Whose right to the smart city? In P. Cardullo, C. Di Feliciantonio, & R. Kitchin (Eds.), *The right to the smart city* (pp. 27–41). Emerald Publishing.

Yigitcanlar, T., Foth, M., & Kamruzzaman, M. (2018). Towards post-anthropocentric cities: Reconceptualizing smart cities to evade urban ecocide. *Journal of Urban Technology*, *26*, 147–152. https://doi.org/10.1080/10630732.2018.1524249

Zukin, S. (2010). *Naked city: The death and life of authentic urban places*. Oxford University Press.

About the Authors

Simeon Shtebunaev is a doctoral candidate at Birmingham City University and the Royal Town Planning Institute Young Planner of the Year 2022. Their research focuses on community inclusion in urban planning and architecture, specifically focusing on young people.

Silvia Gullino is an associate professor in city making in the Department for Built Environment at Birmingham City University. She is a chartered member of the Royal Town Planning Institute with an architecture and urban planning background. As an internationally recognised planning scholar, her research on placemaking aims to create diverse and inclusive communities.

Peter J. Larkham is a professor of planning at Birmingham City University. His research focuses on urban form and change, including decision-making processes.