

EVERYTHING IN ITS RIGHT PLACE: HOW CIVIL ENGINEERING APPROACHES PEOPLE-FOCUSED DESIGN

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With the rise of urban living, centring people at the heart of building regenerative cities is imperative. Increasingly, civil engineers are interacting with people-focused principles, evidenced in major infrastructure projects. However, there remains limited understanding of how the civil engineering profession is interacting with people-focused ideology and whether the role of 'serving society' by the profession is effectively executed through these principles. This is important as without sufficient understanding of how civil engineering practices currently interact with people-focused principles, there remains a risk of the sector failing to achieve a more holistic approach and sustaining future communities. Through semi-structured interviews with professionals involved in UK-based 'placemaking' schemes (an example of people-focused approaches), two questions are explored: 1) how are civil engineers using formal guidance to deliver people-focused urban development projects? and, 2) in what ways do different professional identities affect how formal guidance is used? Findings present new insights into the role of the civil engineer in people-focused projects, and recommendations for future use of placemaking approaches within the civil engineering field provided.

Keywords: built environment, civil engineering, placemaking, policy, sustainability

INTRODUCTION

With the rise in urban living, efforts to integrate sustainability into civil engineering practices have increased dramatically. Requesting civil engineering to change, Jowitt (2004) stressed the critical responsibility the profession had to sustain society, ensuring 'intergenerational equity'. He requested an expansion to the traditional balancing act of environmental resource and economic well-being to further incorporate the consideration of people in design, shifting the profession towards adopting a people-focused design approach. Now, through the formation of the United Nations Sustainable Development Goals (UN SDGs), civil engineering is recognised as a key player in achieving a more sustainable world for people, place and planet (Addagada *et al.*, 2022). Specifically, in relation to its role within the built environment, goals 3 (good health and wellbeing), 9 (industry, innovation and infrastructure) and 11 (sustainable cities and communities) are critical to achieve sustainable urban places.

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However, progress is too slow (United Nations, 2024) with Reed (2007) and more recently, Plaves *et al.* (2024), calling for built environment professionals to adopt regenerative design practices (RD) seeking to not only sustain, but provide a betterment for the future. It could be through the recognition of sustainability and a growing encouragement of regeneration that a more unique, and people-focused approach to designing urban development projects is realised. The need for swift action is evident, yet arguably, those expected to deliver are challenged by a significant workload set within a working system where deviation from the norm is not mobilised with haste or ease (Lipsky, 1980). So, in a civil engineering context, it is important to understand how civil engineers are responding to these further demands to better the future and changing their focus on people.

People-focused Design: Education Developments

One approach to people-focused design is recognising the wider societal context and subsequent impact of design decisions as an important part of civil engineering. Josa and Aguado (2021:1) suggest that incorporating social science and humanities (SSH) studies within CE education shifts traditional technical problems against the backdrop of societal problems and context, helping to ensure civil engineers can ‘design and plan solutions that are more socially sustainable’. Both the American Society of Civil Engineers’ (ASCE) Body of Knowledge and the United Kingdom’s Standard for Professional Competence and Commitment (UK-SPEC), have undergone revisions to their expectations of knowledge, skills and attitudes of professional civil engineers. As of 2019, social science and humanities knowledge is a foundational requirement for American professional civil engineers (ASCE 2019, p. XIV). The Engineering Council Accreditation of Higher Education Programmes (AHEP) 4th edition now states their learning outcomes “have a sharper focus on inclusive design and innovation, and the coverage of areas such as sustainability and ethics. The coverage of equality, diversity and inclusion is also strengthened to reflect the importance of these matters to society as a whole and within the engineering profession.” (Engineering Council 2020, p. 2). However, significant barriers still exist to integrate SSH studies such as lack of guidelines (Josa and Aguado 2021) and reluctance to change (Arciszewski 2006).

Understanding the wider societal context is key to increasing focus on people within design. Yet, Soibelman *et al.* (2011) and Van den Beemt *et al.* (2020) recognise that attention must be given to the people within wider design teams too. They warn that the current curricula, set against the mass globalisation of civil engineering, limits the ability of civil engineers to work within interdisciplinary environments as their skills, knowledge and communication ability to work with other professionals is lacking. Consequently, incorporating SSH studies within civil engineering education and recognising merits of interdisciplinary learning provides evidence as to how the profession is seeking a more people-focused approach to its practices and learnings. Importantly, the expansion of curricula demonstrates how civil engineering is beginning to recognise that both collaborating with and integrating people is critical to adopting a more people-focused approach and achieving sustainable and regenerative design. This approach is being developed in other professions, like architecture (see Kevdzija and Marquardt, 2022), but its implementation by civil engineers is still understudied. Education is vital, but whether it translates to practices is equally important; guidance documents might shape this.

People-focused Design: Guidance Developments

Echoing the education reforms, Reed (2007) argues that adopting a more collaborative, ‘place’ specific approach to built-environment design will achieve a people-focused approach by not only sustaining communities but actively working to regenerate them for the future. The concept of ‘placemaking’ is common in architecture, urban planning and now increasingly, civil engineering. Placemaking is a key approach to delivering people-focused design. Yet, Ellery *et al.* (2021) warn that the concept is poorly defined, as evidenced by Lew (2017), and lacks an agreed definition within the planning, designing and building literature, hampering its effective use to benefit communities. Despite this, there has been a shift in policy and guidance towards the use of ‘place’ principles as a tool to ensure effective collaboration, community-led and locally relevant design is executed by the built environment community and thus, arguably achieve a more people-focused approach. Examples are detailed below.

National Planning Framework 4 and the Place Principle

The latest edition to Scotland’s National Planning Framework 4 (NPF4) signifies a shift in focus on community involvement in the future design of places. It requests all development of Scotland’s places are in line with the Place Principle. The Principle “promotes a shared understanding of place, and the need to take a more collaborative approach to a place’s services and assets to achieve better outcomes for people and communities” (Scottish Government, 2019). The Principle focuses the design of future development for people and works towards achieving the UN SDGs.

Designing Streets and Designing Places

These are supporting documents to NPF4. Designing Places focuses on spatial design of urban spaces, whilst Designing Streets focuses on the design of urban streets. Designing Streets, increasingly used by civil engineers in city designs, introduces a new street user hierarchy, in which non-motorised road users are prioritised over private vehicles in urban streets, thus, centring people at the heart of urban street design. Whilst not mandatory, the guidance is advised as best practice and reframes streets as having a ‘place’ function, rather than solely to facilitate movement. Again, through ‘place’, a more people-focused approach is potentially realised.

Motivation for Research

Evidently, efforts have been made by the civil engineering profession to focus people within its practices. Set within a wider societal context, the incorporation of SSH studies and sustainability in CE education pushes the profession to understand the people impacted by design decisions. Turning attention to people within urban development practices is evident, for example, in the newest revision of NPF4. However, despite civil engineering being a key player in regenerating cities, there remains limited understanding of how their profession is delivering people-focused design through new policy, guidance and educational reforms, specifically through the tool of placemaking. This is important as without sufficient understanding of how civil engineering practices currently interact with these principles, there remains a risk of the sector failing to achieve a more holistic people-focused approach and sustaining future communities. Thus, the research questions are:

- How are civil engineers using formal guidance to deliver urban development projects that seek to focus people within their designs?
- How do professional identities affect the ways in which formal guidance is used within these projects?

RESEARCH APPROACH AND DESIGN

Data Collection

The data were collected as part of an initial study conducted in 2021, exploring the ways in which mental wellbeing is incorporated into the design of urban development projects. Since this study, I have gained three and a half years' professional experience working as a design engineer on active travel and placemaking projects. For the purposes of this study, the data have been re-analysed to address the new research questions, with my own experience and new knowledge guiding data analysis. A comprehensive data collection method for this study was presented as part of the CIBW099 Conference 2023 (Gilmour and Smith 2023), with a summary below.

The exploratory nature of the study called for qualitative methods, using subjective ontology and interpretivist epistemology. Therefore, semi-structured interviews were used as the data collection method to adopt a 'probe and explain' technique (Robinson 2023). Using the semi-structured form allows the interviews to be rigid enough to ensure discussion remains in scope, yet introduces a fluidity to the conversation, further allowing participants to discuss ideas on their own accord. This can be favourable when exploring subjective accounts such as design decisions, practices and thoughts within work as participants can bring to light information that the interviewer does not already know to mention. Thus, the researcher can probe for further details, allowing the respondent to explain their ideas more fully, creating a two-way data sharing process and enriching the data results. The interviews were conducted between January and March 2021 via the online platform Microsoft Teams. Their duration lasted approximately 30 minutes. Prior to interviews, all respondents received an interview guide which outlined areas of conversation to be discussed. The interviewees, shown in Table 1, were selected by purposive sampling; interviewees ranged from planning to more engineering orientated roles. Issues concerning bias were considered as part of this research design, with purposive sampling chosen as the preferred method. Further discussion regarding bias is found in Gilmour and Smith (2023).

Table 1: Participants Selected

Participant Number	Professional Role	Planning or Engineering Background
1	Manager	Planning
2	Consultant	Planning
3	Manager	Engineering
4	Design Engineer	Engineering
5	Design Engineer	Engineering
6	Co-ordinator	Engineering
7	Manager	Planning

Data Analysis

The interviews were transcribed from the audio recordings as permitted by participants and analysed using thematic analysis. As laid out by Braun and Clarke (2006), themes can either be of semantic or latent nature. This entails a choice of the level at which the themes are identified within the data and thus, changes the nature of the research design. Semantic themes are identified by the researcher and presented as literal occurring themes. Conversely, the identification of latent themes calls for a

more interpretive approach allowing for a synthesis of not only their presence but reasons for their residency within the data set. Semantic level themes were chosen for the analysis. This aligns with the critical realist standpoint adopted in the research design as the analyst can interpret the findings whilst presenting them in a realist manner.

Analysis followed the six-step thematic method laid out by Braun and Clarke (2006). The initial two steps start the analysis through firstly familiarising and generating initial codes. The following three steps require searching, reviewing and defining identified themes within the data, from the initial code set generated in step 2. The final sixth step is the resultant report of findings and summarised themes. Whilst not intended to be a strict set of rules for thematic analysis, following the six steps ensured that the analysis was thorough and structured, yielding more robust conclusions.

RESULTS AND DISCUSSION

Theme 1: Disconnect

Referencing the volume of Local Place Plans, one participant asked, “how do we do it? [...] there are 56 neighbourhoods, so it would be 56 plans. How do we support them in producing these plans?” Here, almost despairingly, the participant voices the challenges met with tailoring guidance to a high volume of small-scale areas. These places exist under one local authority (LA), yet their individuality is to be reflected in their localised plans. The exasperated questioning signifies the concern over the scale of the task faced by one LA alone. Local Place Plans seek to achieve a people-focused approach through being community-led, yet here, the management and synthesis of such a large quantity of community voices seems a daunting task.

It is not only the volume of places voiced as a concern: the intricacies of local authorities are also highlighted as a challenge. One remarked “Scotland-wide different local authorities have a different set of strategic priorities”. Another voiced, “standards differ within one local authority,” revealing “different knowledge of what makes a good place”. Thus, leading to what one called a “patchwork quilt of quality”. Hence, challenges exist enforcing guidance on a local scale: how are professionals able to deliver locally tailored projects, if standards differ and clear internal disconnection exists within LAs?

Participants also discussed the ways in which guidance documents related to one another, revealing another challenge in their implementation. One said, “if it's written properly, the national policy should be channelled through the local plan to understand.” Here, the use of the word ‘if’ suggests a degree of uncertainty in the connectivity of policy documents, despite this being their aim. Echoed by another, this uncertainty is shown through the hopeful (and idealistic) alignment of guidance, “I would hope, in every case that it would be a response to the national planning framework [...] these policies would ideally be aligned in some way or Local Place Plan would be aligned to their transport plan.” Clearly, there exists an aspiration to use guidance that speak to one another, yet the premise of this is communicated as an ‘ideal’ arrangement, and not one that is a current reality. Thus, a key barrier to people-focused design is highlighted: with a high volume of different guidance not reflecting one another, fragmented understanding and subsequent use is evident.

Theory vs Practice

Strikingly, the level to which placemaking theory was understood and then executed to achieve a people-focused approach was criticised by several participants. One

remarked that “the knowledge base isn't really there around what the theory is and [...] what makes a good place”. On the surface, this can show the fragmentation of theoretical knowledge of placemaking within the field, and thus, despite guidance being used by civil engineers, a deeper understanding of why and how this is to be used is missing. Yet, it is important to consider this further. How are civil engineers expected to implement appropriate theory into practice, if the guidance itself is viewed as disconnected? As noted above, there exists key disconnections in relating national policy on the local scale, as well as navigating different approaches within the multitude of local authorities themselves.

Definitions also seemed hazy. During interviews, placemaking as a concept was discussed at length. However, its definition was kept brief, and at times, not explained at all. When it was explained, numerous elements of an urban development project (process and product) were listed by participants. For example, one explained, “Throughout this interview, [...] when I'm talking about travel, I am also talking about placemaking as a part of that”, clearly indicating a synonymous definition of placemaking with travel. Echoing this synonymity, another continuously used the phrase “active travel and placemaking”, interchangeably. One expanded further saying, “creating a more amenable space where people feel more comfortable and making it less hostile, making it safer”, clearly connecting the concepts of placemaking and people-focused design. The common use of the placemaking term, yet the lack of detailed definition echoes concerns raised by Ellery *et al.* (2021) regarding the lack of consistent definitions of placemaking. They argue that without a consistent theoretical understanding of what placemaking is, its effective use within practice is stalled. If a concept is vaguely understood, it risks existing as a common term, not common practice.

When discussing the idea of theory in practice, notable comments were made by participants with regards to an engineer's role. One planner remarked “And I think when the engineering factor start[s] to come into it [...] a lot of this sort of idealism of planning a place gets lost”. One participant, with an engineering background, saw their input of green infrastructure as being “partly a nod to that”, with ‘that’ referring to placemaking theory. By recognising this as only a ‘nod’ to it, suggests an almost side-lined approach to engineering interventions and an engineer's role in placemaking approaches, as part of people-focused projects. However, this is arguably to be expected, as predominant literature around a people-focused approach and the built environment resides outside civil engineering such as urban design, planning and architecture for example, Kevdžija and Marquardt (2022). Courage (2021) emphasizes the integral role community has in achieving successful placemaking, with the synergy of architects, urban designers, planners, developers, to name but a few - but no mention of civil engineers. This is interesting as it not only emphasizes the fragmentation in guidance, but it allows the second research question to be explored: how do professional identities affect the ways in which formal guidance is implemented within urban development projects?

Theme 2: Identities

The theme of identities was established through the re-occurrence of discussions surrounding roles, responsibilities and the structure of projects. The theme allowed a deeper exploration of the different characters, processes and values held by personnel within the built environment sector. Thus, a deeper understanding is developed of

how this guidance is being used to focus on people, and how different identities within the built environment sector affect its usage.

Conflicting Identities

One participant, from a planning background, argued that with a “very sort of strict engineering sense of safety and wellbeing [...] an engineer will argue that they're protecting your wellbeing”. Continuing, they expanded on the strict engineering interventions being a product of engineering thoughts such as “we have to have rails up to protect us [...] a junction is so wide that it [has] to have signals” and “cars are moving so quickly that there has to be controlled crossings everywhere because people need to be controlled”. Another planning background participant remarked, “an engineer would argue, they make the place safer and better and so, better for your wellbeing. But I think a planner or an architect, [or] urban designer might have a different view.” Probed to elaborate on this different view, the participant explained, “...if you put a continuous footway in there, it would give that psychological cue that people have the right of way.” One engineer expressed a notable reluctance to changing the traditional way of thinking saying, “whether it be engineers or whether it be [the] general public, [...] some people can be a bit reluctant to the idea of [...] changing the thought process.” Whilst not explicitly comparing the planning view against their own, the engineer’s comments still indicate a possible rigidity within the mindset of engineer’s when it comes to adopting people-focused approaches.

Here, comments indicate that despite both professional identities seeking to focus the design on people and their safety, the interventions of the planning vs engineering side conflict. The planner sees the engineer as working in a top-down approach, with the belief that once behaviour is controlled and enforced by tangible engineering design, safety is achieved. Yet, the planning thought process follows a more bottom-up approach, allowing people (rather than vehicles) to dictate street design, aligning more people-focused thought processes evident within placemaking principles in *Designing Streets*. Notably, efforts to ease tensions between engineering vs planning views have been at the heart of new urban development design policy in Scotland for years (Llewellyn 2008). Yet, these discussions suggest that engineers are still perceived as adopting more traditional views of physical segregation to enhance safety, and thus, their professional identities could obstruct the application of more people-focused interventions, as seen in placemaking guidance, that seek to change the built environment in a people-responsive way, rather than vehicle serving.

Strong individuals

The interviews also highlighted the significance of individual identities and their influence on executing meaningful, unique designs. One emphasized that they retained “very strong individual characters” such as “someone charismatic and who really believes in the strategy to help deliver it”. Another revealed a “personal connection with project management,” helped convince the importance of incorporating more social or softer elements in design. Here, it seems that despite guidance encouraging a shift in design thinking towards tailoring to community needs, the influence of strong individuals dominates project outcomes. It is important to recognise that these comments may reveal reflections of a few individuals on a few projects, and therefore, may not wholly represent the field. However, my own experience within the field confirms that in certain projects, this can be the case. Efforts are being made to adopt more people-focused design approaches, yet their delivery in line with formal guidance may not solely be governed by the guidance itself. The guidance exists within a complex work setting, where project teams and

their working circumstances such as time pressures, influence, connections etc. may also affect people-focused outcomes (Lipsky, 1980).

Community identity and the civil engineer

A concluding, and important finding in this study was the interaction of the identities of both the civil engineer and the community and its influence on guidance use. Participants considered the act of “designing for all” as an act of “juggling” and overcoming the “challenge of striking a balance” with vulnerable groups within the community that “usually have conflicting needs”. The language used by participants frames the community as a challenge to overcome, rather than an integral component to be embraced for successful design, encouraged by formal guidance. The progression of the National Planning Framework within Scotland, and its subsequent supporting documents, has been towards a more local, collaborative approach to community planning and design, yet little conversation concerned itself with the inclusion of the community within design processes or outcomes, other than to reference the challenge of its incorporation. Notably, this echoes the concerns raised by Lucena (2013) regarding civil engineers assuming the ‘expert’ role in projects, whilst the community remains the ‘non-expert’, thus revealing the challenging reality of collaborating with the community to develop long-term, benefitting designs for people.

Despite civil engineers' increasing interactions with people-focused guidance, the traditional dominance of technical expertise in their education may limit understanding of community collaboration theory and thus, their ability to execute more holistic, people-focused design. However, it is important to reflect on not just the individual engineer, but the system in which they operate. Whilst it could be argued that a traditional mindset limits the implementation of more collaborative approaches, the evident disconnected, rigid and resource deficient system in which civil engineers work importantly signifies the complexity of adapting a more collaborative approach (Lipsky, 1980).

CONCLUSIONS AND RECOMMENDATIONS

This study looked to explore the ways in which civil engineers are adopting a people-focused design approach in urban development projects, specifically using various formal 'placemaking' guidance. Generally, the way in which national guidance was required to be localised was viewed as a significant challenge, both by the volume of places, and the apparent differences within the teams delivering the projects within local authorities. Strikingly, inadequate understanding of placemaking theory and its subsequent integration into practice was expressed by many. This was considered understandable as placemaking (as a tool to enable a more people-focused approach) is still hazily defined in the literature. However, for it to have such dominance within key guidance and policy raises concerns for its effective implementation. Greater clarity is needed on a universal definition of placemaking - through this, a clearer way of integrating people within design will be realised.

This lack of understanding also became evident in the contrast shown between professional identities within urban development projects. Despite current guidance calling for a people-focused approach, engineers were perceived as exhibiting strict, top-down, ‘expert’ roles whilst the planning side of the sector assumed bottom-up, collaborative design practices. Engineering input was viewed by some engineers as an ‘add-on’ to placemaking, instead of forming an integral role. This traditional view was also seen in commentary surrounding the engineer and the community. Framed

as a challenge to overcome, collaboration with the community seemed outside the engineer's remit. Focusing on people in design requires a deeper understanding of society, community and people's needs. Yet findings point clearly to disconnections between an engineer's understanding, professional identity and role within placemaking projects to achieve a more people-focused design output.

It is recommended that for people-focused design practices to become common place in civil engineering, critical emphasis must be placed on the civil engineer's ability to collaborate with the community. Current guidance assumes that the built environment community are well-versed in collaborative practices and thus, community-led, design-led approaches can be adopted smoothly. Findings suggest that members of the planning side of the BE sector exhibit more experience in relation to collaborative initiatives, with civil engineers perceived by their wider community as remaining stuck in traditional views. However, findings also point to the complexity of people-focused ideology such that systemic changes in both the working environment and educational reforms are still required to allow civil engineers to achieve more collaborative practices, in line with guidance.

It is recommended that further research looks to observe and analyse the ways in which guidance is used specifically by civil engineers to develop a rich understanding of current theoretical understanding, perspectives and role of the civil engineer in people-focused urban development projects, to ensure regenerative, people-focused designs are realised. Thus, a deeper understanding can be gained of the various, complex barriers that exist to people-focused design implementation.

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