

Design as communicative activity: implications for sustainability assessment software

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Buildings & Cities

Design as communicative activity: implications for sustainability assessment software

RESEARCH

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ABSTRACT

Interviews with architectural practitioners are commonly used to analyse design activities and adapt building sustainability assessment software for early design. However, previous interview studies only identify design activities, and not how they gain importance in the specific context, which is crucial for adapting software capabilities to practical needs. This study draws on practice theory using the 'interview to the double' approach, exploring how practitioners justify design activities related to the sustainability assessment of a design proposal. Architectural practitioners ($n = 9$) in European countries were interviewed under the assumption that the interviewer was a body double needing instructions to perform the participant's tasks the next workday. A total of 28 design activities were identified, of which 17 were previously undocumented, including (1) informative activities, *e.g.* interpreting regulations; (2) generative activities, *e.g.* preparing presentation material; (3) analytical activities, *e.g.* environmental assessment; and (4) communicative activities, *e.g.* internal and external design reviews. Architectural practitioners describe their design activities through both the specific steps involved and their communicative purpose. Software developers could use this method to document building sustainability assessment activities in early design stages.

PRACTICE RELEVANCE

This method identifies and helps to create representations of design practice. These can be used to define sequences of design activities. This would align sustainability assessment tools with practice needs, improving the likelihood of practice integration. The method and findings may also be relevant to software development in other design contexts involving multiple transdisciplinary actors and stakeholders.

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1. INTRODUCTION

Quantitative building sustainability assessment (BSA) software is needed in the early architectural design stages[1] to understand the social and environmental impacts of design alternatives (Hensen & Lamberts 2011; Meex *et al.* 2018). Performance improvements implemented in early design create better conditions for detailed optimisation during the later design stages (Østergård *et al.* 2016). The early assessment can resolve several, often conflicting, performance criteria such as energy and daylight performance, and life-cycle environmental impacts (Säwén *et al.* 2024). However, surveys with practitioners reveal that the integration of such assessment in everyday practice remains limited (Jusselme *et al.* 2020; Mahmoud *et al.* 2020). A proposed explanation is that software development has emphasised technological capabilities and ease of use rather than how tools fit into the complex relationships between the transdisciplinary actors in the design practice (Säwén *et al.* 2024). The relational complexity is especially high in architectural design because of the need to adapt the design output to a specific context in each project. This relational complexity motivates a methodological and theoretical shift toward studying BSA integration in architectural design through a 'practice lens' that captures how the use of technology is structured by recurring human action and interaction (Orlikowski 2000).

One way of applying the practice lens is through interviews soliciting practitioners' accounts of their activities (Nicolini 2009). The present study explores the use of ethnographic interviews for design practice analysis, with the aim of guiding BSA software development to adapt tools not only for the individual architectural practitioner (Bleil de Souza 2009) but also for improved communication among all the actors engaged in the design process (Schweber & Green 2026).

Historically, design practice has been represented through design process models that focus on how designers think and solve problems (Lawson 2006). Especially, models that describe the specific activities of designers have been proposed to support BSA tool development because they allow tools to be adapted to those activities (Purup & Petersen 2020). However, available activity-based models focus on design as a problem-solving activity carried out by the individual designer. Further, previous interview studies mainly focus on describing design activities, not how they fit into a wider relational context.

The present study instead approaches design activities through a theoretical lens following recent streams in design research, where attention has shifted toward the relational, discursive composition of practice (Kimbell 2012), and thus enhances descriptions of design activities with how they are justified by practitioners (Nicolini 2009). The following sections review the shift from problem-solving to discursive views of design, framing the implications for applying a practice lens to understand design activities in order to inform the adaptation of BSA software for use in early design.

1.1 MODELS OF THE DESIGN PROCESS

Efforts to model design processes have occupied researchers during the last half-century or more (Lawson 2006). This body of work distinguishes between scientific, problem-oriented thinking, and designerly, solution-oriented thinking (Lawson 1979; Cross 1982). Dorst & Dijkhuis (1995) further contrast two paradigms in design methodology: design as rational problem-solving (Simon 1969) and design as reflection-in-action (Schön 1983). According to Bleil de Souza (2012), this reflects a need to adapt BSA software from the problem-oriented, scientific engineering context in which it often originates to the solution-oriented, designerly architectural context where it can have the greatest impact. While this insight is valuable, it is not sufficient to align the development of BSA software with practice, which also requires an understanding of the tasks and goals of intended users (Wallach & Scholz 2012), *i.e.* the specific activities in which users apply software (Bedny & Karwowski 2003), and the circumstances in which these activities are carried out (Gould & Lewis 1985). Accordingly, BSA software developers have directed their attention towards the activities in the design process (Purup & Petersen 2020).

Detailed descriptions of design activities to conceptualise the design process are not a recent development (Pugh 1986; Lawson 2006). The activity descriptions can organise the design of complex systems in product design (Kusiak & Wang 1993; Sim & Duffy 2003), and support faster project deliveries in architectural project management (Kumar & Mocko 2009; Wang *et al.* 2016). Whereas these studies consider design work as an industrial process, Goldschmidt & Rodgers (2013), building upon Cross (1982), use sequences of design activities to explore how designers think as a design concept evolves. They empirically show the ad-hoc, situated nature of design activities, revealing how designers navigate back and forth between activities and not necessarily according to a linear progression from problem statement to solution.

Lawson (2006) cautions against trying to achieve a fine-grained understanding of the design process through mapping specific design activities. Drawing upon experimental studies, he instead describes the design process as an interplay between analysis, synthesis and evaluation, *i.e.* activities that together enable a negotiation between design problems and solutions. While this conceptual view illustrates the complexity of the design process, avoiding the misconception that analysis, synthesis and evaluation activities occur as 'identifiable, separate events', it does not describe the specific tasks and goals of users interacting with software.

To make activity-based design process models actionable for BSA software development, Purup & Petersen (2020) propose adapting building energy simulation software by focusing on the specific design activities of architectural practitioners, and model the design process as a sequence of generalisable design activities. Through interviews investigating how software for indoor climate and energy performance simulation can conform to early design, they identify 31 design activities, organised into four categories: research, analysis, modelling and meeting. They conclude that software can meet practice needs by supporting specific design activities (Williams 2009), and that a coordinated framework of software could potentially support any given sequence of design activities. They further highlight three ways of integrating building performance simulation (BPS) software in architectural design practice, ranging from the architect receiving BPS results from external consultants, to an integrated approach where architects and technical experts collaborate, to the architect performing BPS with access to a hotline for technical consultancy.

By focusing on 'activity' as the unit of analysis, the view is shifted from the human–machine system to the activity itself as a system (Bedny & Karwowski 2003), which includes the *subject* carrying out the activity (the user), the *object* of the activity (the task) and the *tool* (the BSA interface), as well as the *community* (the discursive context) and the *rules* (normative system) that cause the activity to be perceived as justified and necessary (Engeström 2001). Thus, to fully adopt the activity as unit of analysis, the scope of understanding design practice needs to be expanded from viewing how design problems are perceived and solved by the individual designer through 'designerly thinking' involving concurrent analysis, synthesis and evaluation (Lawson 2006) to viewing the communicative, discursive context through which design problems and their solutions—and hence, the design activities that explore them—become important (Kimbell 2012).

Activity-based models can make representations of design practice actionable during BSA software development. However, available models (Goldschmidt & Rodgers 2013; Purup & Petersen 2020) foreground the individual designer's activities to analyse the design problem, synthesise design solutions and evaluate those solutions (Lawson 2006). This overlooks how design activities, which are interdisciplinary and interactive (Dossick *et al.* 2019), are always situated in and motivated by a material and discursive context. The situated nature of design activities is identified by the recent practice turn of architectural design research (Kimbell 2012) which warrants further attention when developing BSA software.

Figure 1 summarises these theoretical developments: where model A (Lawson 2006) represents an architect's view of how they navigate from a problem to a solution, model B (Purup & Petersen 2020) shows how engineers developing BPS tools perceive the design process as specific design activities. In both cases, the focus is on the cognitive processes of the individual designer, which means little attention has been granted to the discursive context in which design activities take place.

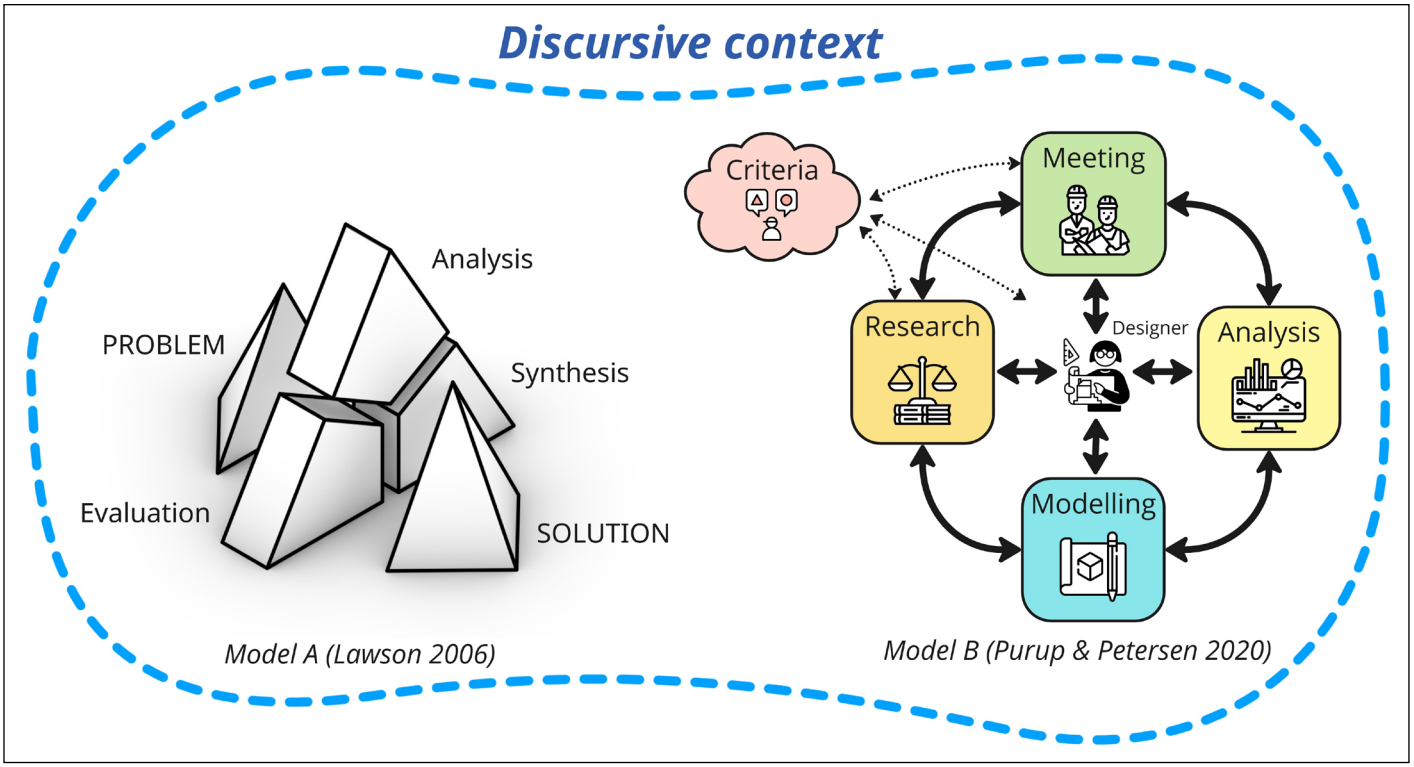


Figure 1: Activity-based models of the design process.

Note: Model A (*source:* Lawson 2006) shows a designer's perception of how they navigate from problem to solution, whereas model B (*source:* Purup & Petersen 2020) is actionable in a software development context by focusing on specific design activities. However, neither model shows the discursive context where design activities are conducted.

1.2 THE COMMUNICATIVE NATURE OF DESIGN PRACTICE

Design research has recently shifted focus from the cognitive processes of individual designers (Cross 1982) to understanding design as a materially and discursively situated activity (Kimbell 2012), thereby highlighting the communicative nature of knowledge production in design (Lawson 2006). For instance, Luck (2007) observes how artefacts such as drawings and assessment outputs prompt conversations through which knowledge about the emerging design is shared, allowing the design to be modified. Similarly, Ewenstein & Whyte (2009) show how shared understandings of a building design develop through dialogue between architects, engineers and visual representations. More recently, Schweber & Green (2026) show the importance of digital inscriptions such as spreadsheets and PowerPoint presentations in making all actors in a design process aware of environmental impacts like carbon emissions. As Simpson *et al.* (2020) show through interviews and observations, designers such as architects are important 'middle actors' who enable communication about technical topics between trades, often using digital methods.

The view of design-as-practice draws upon the 'practice turn' of sociology (Nicolini 2009). The practice lens reveals how the use of technologies, such as BSA software, emerges through people's situated practices (Orlikowski 2000). It foregrounds the role of multiple actors, beyond the individual designer, in constituting design activity (Kimbell 2012), highlighting the communicative, discursive nature of design practice. This view is particularly meaningful in BSA software development because it highlights not only design activities themselves but also the conditions making those design activities possible, as shaped by relations between human and non-human actors within design practice (Yaneva 2005).

Furthermore, the practice lens offers both a theoretical and a methodological toolbox (Nicolini 2009). While the design process models reviewed above rely on methodologies including experiments (Lawson 1979) and interviews (Goldschmidt & Rodgers 2013; Purup & Petersen 2020), the practice lens encourages a shift toward ethnographic approaches (Kimbell 2012). Although ethnographic approaches are fundamental to understand user behaviours and needs in user-oriented software development (Wallach & Scholz 2012), and have been used to map design activities in the broad field of architectural design research (Yaneva 2005; Luck 2007; Ewenstein & Whyte 2009), their application to guide BSA software development through design practice

analysis remains limited. This gap motivates the present investigation into how activities related to BSA in architectural design appear through an ethnographic lens.

The ethnographic approach explored in this study is the 'interview to the double' method introduced by Nicolini (2009). This mimics instruction-giving discursive practices: the participants are asked to describe their next workday in such detail that the interviewer—imagined as their body double—could perform their tasks independently. Nicolini argues that this projective interview method reveals the normative dimension of practice by capturing how practitioners justify and are held accountable for their actions through:

> connections between the local discursive environment and the wider institutional and societal order of discourses.
>
> (p. 209)

The technique further allows the participant to 'become aware of what they already know' (p. 197) by imagining the interviewer as a trainee who must be guided through routines, customs and practices that are otherwise learnt primarily 'on the job' (p. 197). Applied to architectural design practice, the method can therefore yield a view of design activities extending beyond individual perception, revealing how those activities are integrated in the communicative and organisational context of practice.

1.3 AIM AND CONTRIBUTIONS

As outlined in Section 1.1, activity-based models of the design process are useful to adapt BSA software for early design because they capture the tasks and goals of architectural practitioners. However, as discussed in Section 1.2, such models must also account for the communicative nature of design practice, which can be investigated using ethnographic methods.

The aim of the present study is to explore a design practice analysis methodology combining ethnographic interviews with an activity-based model of architectural design processes, intended to guide the development of BSA software. Its main contribution is an advancement of activity-based models of the design process which highlights the communicative purpose of design activities. The study argues that the communicative purpose of design activities requires consideration when aligning BSA software with architectural practice. A secondary contribution is the detection of design activities previously not documented in the context of BSA software development.

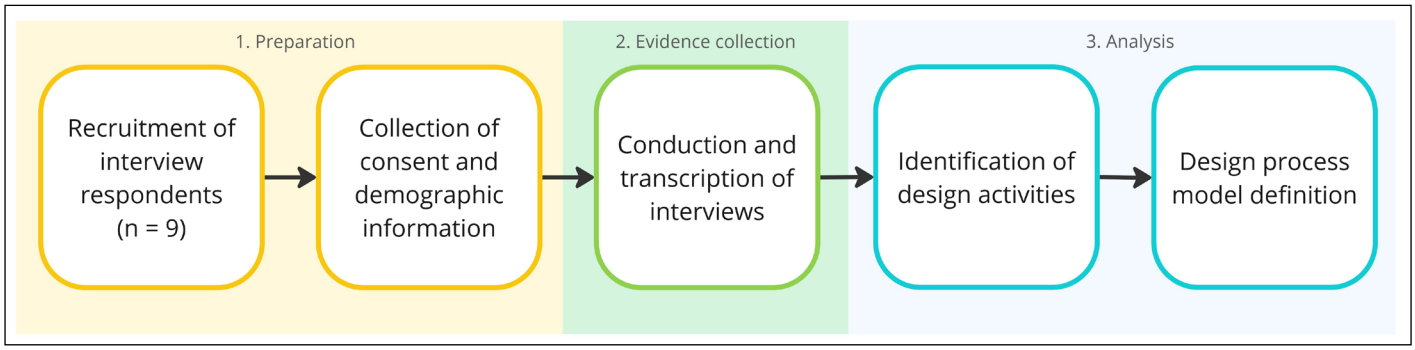


Figure 2: Overview of the interview study methodology.

2. METHODOLOGY

The present study combines the 'interview to the double' technique introduced by Nicolini (2009) with thematic analysis of the responses. Nine architectural practitioners from different organisations were interviewed separately. Their accounts were analysed to identify all mentioned design activities and categorise them according to the model of the design process shown in Figure 1 (Purup & Petersen 2020). The analysis advanced previous activity-based design process models. An overview of the methods employed, further detailed in the following section, is provided in Figure 2.

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2.1 SAMPLING AND PREPARATION

The participants, each practising in different organisations, were recruited within the professional and educational networks of the research team, corresponding to a convenience sampling strategy (Robinson 2014). This means there was previous acquaintance between the researchers and each participant (Garton & Copland 2010). While the participants were selected based on being active in consultancies in architecture, engineering and construction practice in Europe, no initial screening was made to ensure they were actively working in early design, or employing BSA in their daily work—the credibility of the participants was later confirmed through analysis of the responses.

Participants completed a demographic survey, self-reporting work experience and organisational information, as summarised in Table 1.

2.2 EVIDENCE COLLECTION

The interviews were carried out between February 2022 and May 2023, in English, Swedish or Norwegian. Here, all quotations are translated into English. The interviews lasted between 23 and 61 minutes. The interview to the double method was implemented in near accordance with the original formulation of Nicolini (2009). The participant was asked to imagine that their place would be taken by a body double, represented by the interviewer, during their next workday. They were then asked to instruct the interviewer on how to perform their tasks and behave in the workplace throughout that day.

	MALE	FEMALE	MALE	MALE	FEMALE	MALE	MALE	MALE	FEMALE
INTERVIEW ID:	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**
Age group (years)	25–35	25–35	25–35	35–50	25–35	25–35	35–50	25–35	25–35
Occupation	Ar	SE	En	Ar, SE	Ar	Ar	Ar	Ar, En	Ar
Origin (country)	SE	SE	FR	SE	SE	CZ	SE	SE	SE
Work experience (years)	5	5	5	15	2	3	12	5	5
Degree	MSc	MSc	MSc	MSc	BSc	MSc	BSc	MSc	MSc
Office's employees	31–60	6–30	6–30	1–5	6–30	61–200	1–5	6–30	31–60
Organisation's employees	31–100	101–500	101–500	1–5	6–30	101–500	1–5	6–30	31–100
Office location (country)	SE	SE	FR	SE	NO	NO	SE	SE	SE
Active countries	SE	SE	FR	SE	Nordics	Nordics	SE	SE	SE
Organisation's services	A, S	E, S, O	S	A, S	A	A	A	A	A

Table 1: Participants' demographic and organisational information (n = 9).

Note: A = architectural design; Ar = architect; E = engineering; En = engineer; O = other; S = sustainability consulting; SE = sustainability expert.

Each interview began with an initial prompt, as exemplified in the following interview with R3:

> I want you to pretend that I am your body double, and I am supposed to take over your next, [...] full work day. [...] I want you to describe, where you work, what you do there, and your tasks, in some detail. The people you interact with, in so much detail, so that I could potentially take over and nobody would notice that you're gone. So it's a bit of roleplaying, [inaudible]. And if there's anything you would like to keep confidential, don't worry about it, just tell me as much as you feel comfortable with, and ask me any questions [...] and I might fill in with questions if there's anything I don't understand or would like you to expand upon. So we'll start there!

The participants were not, as prescribed by Nicolini (2009), explicitly asked to respond in the second person. Most participants proceeded to respond in the first person. No contextualisation for the interview or structure for the participants was provided beyond asking them to describe their

workday from arriving at work to departing. The participants were open to the interview method and freely started discussing their workdays with little prompting. Most responses emphasised the tasks to perform and their necessary inputs and outputs:

> On Monday I will [...] calculate a Green Area Factor. I'll create drawings where I draw all the areas and note their properties, and then I will enter their areas in a spreadsheet provided by [the municipality], and that will help calculating if it works fine, if the Green Area Factor is OK.
>
> (R9)

Unless prompted, little detail was provided on how to perform the tasks. Thus, follow-up questions were asked requesting further details about how to conduct activities, what were the inputs and outputs of the activity, and why the activity was conducted. The participants were guided to focus on describing one specific activity when several potential activities were listed. There was, however, no interview guide defining such follow-up questions; they were asked based on the free flow of the conversation. Once the narrative reached the end of the workday, the participants were asked if they wanted to add or clarify anything. Once concluded, the recorded interviews were transcribed verbatim manually to prepare for further analysis.

2.3 ANALYSIS APPROACH

NVivo 2020 software was used to manually code and analyse the evidence. A deductive, theory-driven coding strategy was employed by matching the participants' statements to the framework of design activities shown in Figure 1. This was done by identifying whether each statement or sequence of statements could represent specific design activities. For instance:

> [...] I worked on an apartment block [in] Oslo, at a crossing with some existing buildings. We had a week, and we mostly checked some volumes, develop some proposals, did some plans, and some solar studies [...].
>
> (R5)

This was coded as '3D modelling', '2D organisation' and 'solar analysis'.

Statements mentioning activities not described by Purup & Petersen (2020) were inductively coded to increment the framework of design activities. For example:

> We had to follow the municipal regulatory plan for how densely we could build [...] and then we developed a design concept [where] you take a public gondola from the bus or train to your cabin
>
> (R5)

was coded as activities 'interpreting regulations', 'accessibility analysis' and 'developing narrative'.

The detected design activities were categorised and organised into a revised activity-based design process model. As in Purup & Petersen (2020), the activities were divided into four categories:

- Informative activities: developing information supporting the design process, such as interpreting survey inputs, identifying material availability or developing textual material supporting design.
- Generative activities: interacting with drawings and models in terms of modifying or preparing them for presentational use.
- Analytical activities: using model representations for quantitative or qualitative analyses.
- Communicative activities: communicating with stakeholders either in educational settings or to present material supporting decision-making within a design project.

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3. RESULTS

Through an analysis of the interview responses, 28 design activities were detected and organised into four overarching categories (Figure 3). In relation to the previous activity-based model of the design process (Purup & Petersen 2020), 17 design activities were previously undocumented, and the categorisation of design activities was revised. Largely, the newly detected design activities highlight the communicative nature of the design process. This section presents each category in detail, highlighting newly detected design activities.

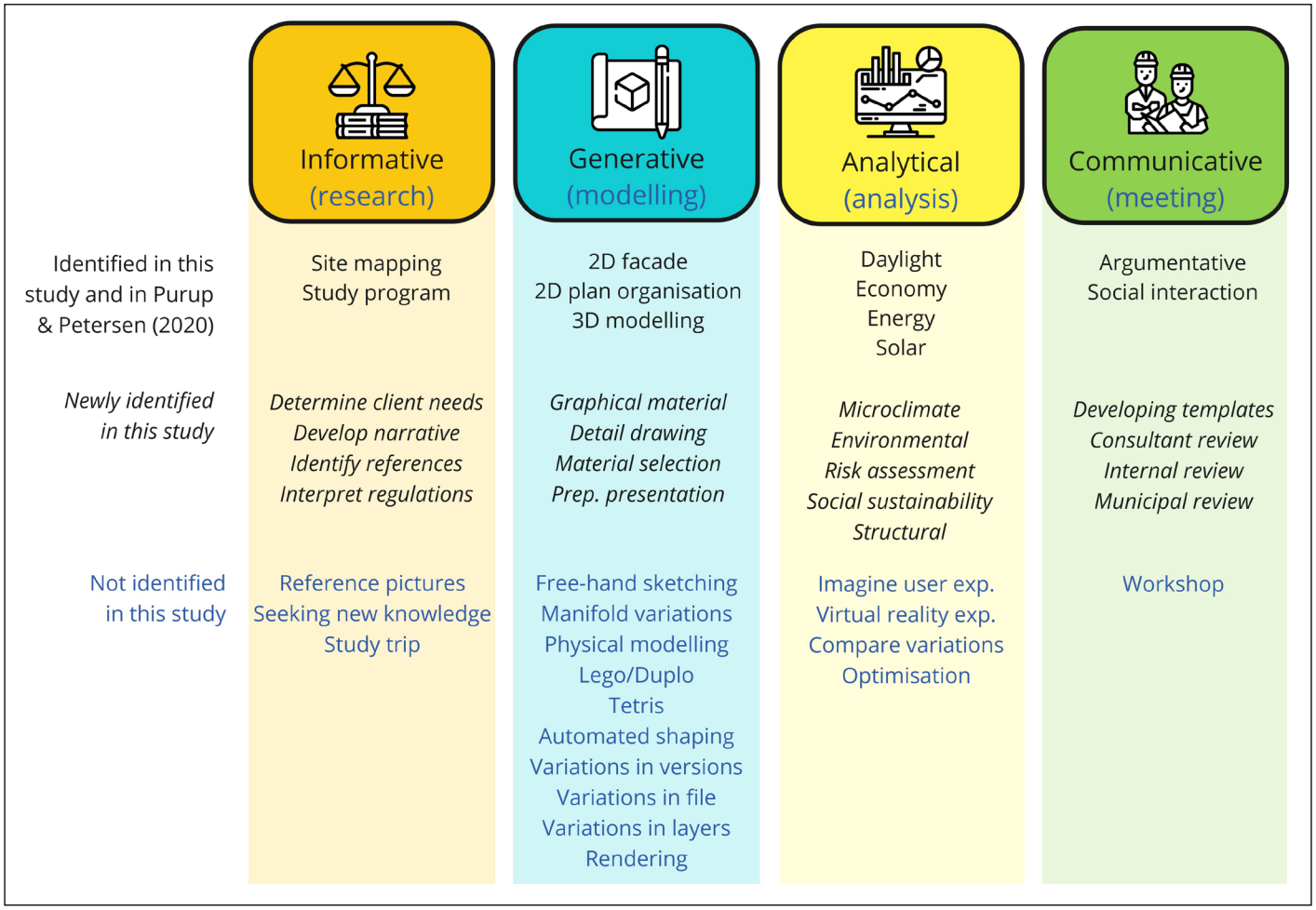


Figure 3: Detected design activities and revised categories.

Note: Design activities shown in normal font are found in both previous work and the present study; those shown in italics were newly detected; and those shown in blue were detected only in previous work.

3.1 INFORMATIVE ACTIVITIES

Informative activities were conducted to gather information about the boundary conditions of the design situation. This included the potential of the site, the motivation of the actors in the design process and relevant regulations. The category definition was changed from 'research' because it can be questioned whether architectural practitioners apply a scientific research process during the early design stages, as the end goal is a physical artefact and not the generation of knowledge (Friedman 2008).

Most participants (n = 7) mentioned *interpreting regulations* and managing their consequences. In some cases, municipal regulations such as zoning plans need to be considered:

> well, we had a municipal plan, and there [...] we were forced to follow the regulatory plan for how densely we could build on different parts of the plot, which we had to adhere to. (R5)

In other cases, environmental certifications guide decisions. Another informative activity is *determining client and user needs* (n = 5). This includes analysing the members of a competition jury to accommodate their evaluation criteria, managing the sustainability ambitions of the client and interpreting survey data to understand the needs of future users:

> as you can tell, very much is based in the local community. It is one thing to deal with environmental calculations and such, but [...] who runs the projects [greatly] drives the sustainability levels.
>
> (R4)

Beyond collecting reference pictures, participants mentioned the *collection of reference projects* to justify design proposals (n = 3). Typically, these projects come from the portfolio of the practice, either to sell the services of the office or to make sure that the design is consistent:

> [to prepare drawings] I'll have to look at [...] earlier project drawings from the same client, because they know how they want it.
>
> (R9)

A final informative activity is the *development of a narrative* (n = 3). One participant noted that sustainability aspects are often treated narratively in competitions instead of being evaluated quantitatively:

> we're trying to, like, finalise into one option. So we make arguments, why we should do this [...] size and location. And the pre-study is [...] directed to the politicians so that's why, yeah.
>
> (R1)

The informative activities serve to produce knowledge in the form of textual and graphical information or data that can guide decisions during other activities. All identified activities can be understood in terms of a communication function, whether they integrate information from regulations or client requirements as decision support, ensure that drawing materials are consistent with previous projects for the same client, or develop arguments for one design proposal over another to convince political decision-makers.

3.2 GENERATIVE ACTIVITIES

Generative activities are ways of creating, manipulating, and representing the geometric and semantic data that constitute each design variation (Wang *et al.* 2024). This differs from the definition of 'modelling' activities by Purup & Petersen (2020) in also including the ideation and generation of concepts and design alternatives beyond their crystallisation as epistemic objects (drawings, models or other representations) (Ewenstein & Whyte 2009). Several participants (n = 5) highlighted *preparing graphical material* as important. First, to make design proposals digestible:

> I mostly work in competitions, and [I've received a] very simple sketch which I will either transpose into a facade drawing to be decorated in Illustrator or Photoshop, and I will [...] work with visual, graphical material.
>
> (R5)

Second, to present analysis results graphically. Beyond manipulating geometrical data, an important task is the prescription and *selection of materials* (n = 5). This can be on a purely aesthetic basis:

> today I helped develop some colour samples for a project [...] they had an idea about what colour they wanted and I retrieved the exact NCS code.
>
> (R9)

In other cases material selections are made to improve circularity and reduce climate impact. One participant mentioned changing material selections on a company level rather than project basis.

Related to graphics preparation is the graphical design and *preparation of presentation material* (n = 2). This is done both to support the design and to present analysis outputs:

> [...] I've created a lot of presentations [for competitions], it is just InDesign presentations with image material, some lines of text, and then creating graphical material. In principle, that is all I did [...].
>
> (R5)

Finally, some participants (n = 2) noted that not only large-scale drawings such as facades or plans are required; *detail drawings* are sometimes required in the early design stages to prove the feasibility of the design or to explain the design concept:

> [...] we drew some details on the walls, because we have to decide wall [...] er [...] width [...] in order to like [...] see how many buildings that we could fit, and that we actually can build it [...].
>
> (R1)

The emphasis during generative activities is on producing graphical outputs that can be used in communicative activities, both supporting the design proposal in external and internal reviews and also to evaluate the design proposal qualitatively. Further, some activities usually considered to belong to the later design stages, such as material selection and detail drawings, show that the early design stages should not be considered static and include design activities as needed in the specific design project (Lawson 2006).

3.3 ANALYTICAL ACTIVITIES

Analytical activities were conducted to evaluate the performance of design variations qualitatively or quantitatively by investigating models from generative activities contextualised by supporting information from informative activities. Participants (n = 4) brought up *environmental analyses* of the life-cycle environmental impact of the proposed building. This can happen at a strategic level or in response to regulations:

> You can talk about [...] changing geometry, but it makes a rather little difference, [...] so we would rather [...] experiment with [the selected components], how to build them, than how many they are.
>
> (R4)

Another quantitative analysis mode is *microclimate analysis* (n = 2) to achieve a comfortable or healthy local environment:

> [...] in the first meeting we discuss about how we could integrate the wind into the building design, [...] and I point out where we have issues, and then they come back to me with ideas of solutions, and then I test it [...].
>
> (R3)

Some (n = 2) mentioned *risk assessment*, in both the short term (the risk that a project does not fulfil the requirements) and the long term (life-cycle) perspective:

> But we're also doing a climate risk assessment to help them, because it's an area where in a future climate we will probably be like, higher sea levels, rising sea levels, and problem with like [...] water.
>
> (R2)

Finally, *social sustainability analysis* (n = 2) and *structural analysis* (n = 1) were mentioned:

> [...] in this project we should have started over, because we missed the parking garage in the basement, which affects the structure the whole way up, so they had to overdimension steel. And this affects both money and environment.
>
> (R6)

Additional previously identified quantitative analytical activities included area compliance, daylight, economy, energy and solar analysis (Purup & Petersen 2020).

The analytical activities show that decision-makers increasingly consider life-cycle perspectives, such as embodied environmental impacts and climate risk, when making building investments. The analytical activities are described in terms of how the results can be communicated to other stakeholders to directly influence design changes and drive the design based on performance.

3.4 COMMUNICATIVE ACTIVITIES

During communicative activities, supporting information, developed models and analysis results are communicated within the architectural practice or to external stakeholders such as clients or policymakers, which Purup & Petersen (2020) describe as argumentative consolidation. They also mention informal meeting activities, such as workshops or social events, to improve team coherence. This study proposes a more fine-grained understanding of these activities, as each communicative context serves different purposes, and a wider scope would capture additional communication modes among design practitioners and other stakeholders (Bygballe *et al.* 2016). The participants mentioned senior architects 'looking over the[ir] shoulder' to review the developing design, exemplifying informal communication modes in developing the design. Notably, design review processes often involve document deliveries to consultants or regulatory bodies, not meetings in which decision-making is argumentative.

Internal reviews (*n* = 6) can range from organised meetings to very informal:

> [...] it was rather someone looking over your shoulder [saying]: 'change this and this and that'. Maybe not so good, in my view, structure for how to work together, but rather [...] very much: 'now you have to fix this' [...].
>
> (R5)

Several participants (*n* = 5) mentioned *municipal review*:

> so the municipality wants to keep track of whether we keep track of our Green Area Factor, already at this stage, and then all the way until it is built. So that we take responsibility.
>
> (R9)

Municipalities are considered important stakeholders in terms of both approving design proposals and in driving sustainability work to a higher level.

Another communication involved *client review* (*n* = 3) of the design proposal as well as *consultant reviews* (*n* = 3):

> Yes, we will probably be there this meeting, but [...] usually it is the architect that presents the project, and we present the environmental parts, [we are there] for support and questions [...].
>
> (R3)

Finally, *coordination of template files* (*n* = 2) ensured consistent data management within each project:

> we will discuss the [template file for] mapping of reused material, [how] to adapt it to the building component standard. [...] it won't be hard to implement, but [...] who will do it? Because nobody is paying for this, it is an internal project [...].
>
> (R6)

This shows that architectural practitioners need to consider and interact with a wide range of stakeholders during design. Outputs from other design activities allow designers to communicate effectively and receive feedback to advance the design. The communicative activities range from informal discussions among architects in the breakroom, to formal meetings involving clients and consultants, to the submission of design documents including drawings, reports and presentations.

4. DISCUSSION

A method for design practice analysis that was explored combines ethnographic interviews with an activity-based approach to modelling architectural design practice. A total of 17 previously undocumented design activities highlight the communicative, discursive nature of design practice. This finding has implications for guiding BSA software development using activity-based models of architectural design processes. Most importantly, it indicates that not only is a detailed understanding of individual designer tasks and activities important, but also that of the *communicative purpose* of those activities and, by extension, of the possible inputs and outputs

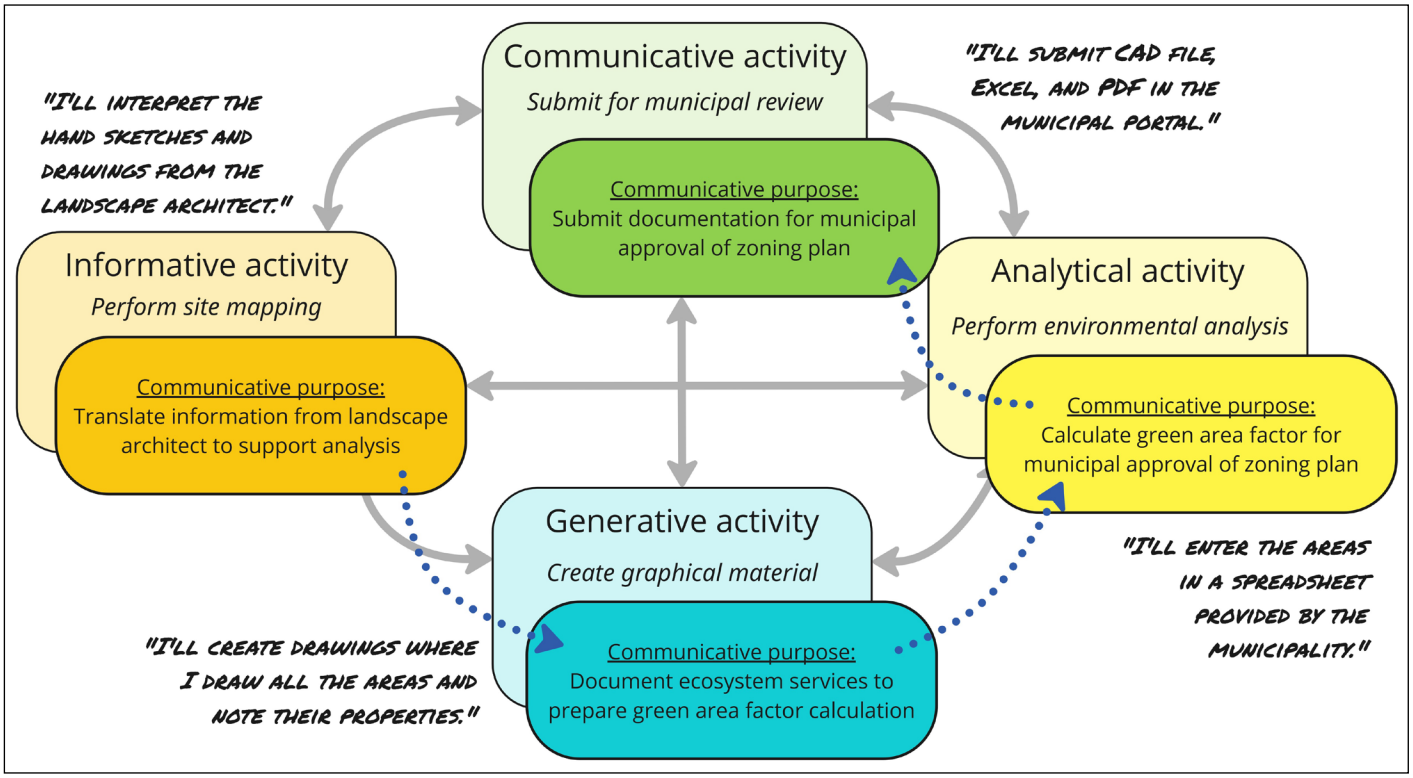


Figure 4: The revised design process created an additional interpretation to designers' narratives, highlighting what is done and the communicative purpose.

Note: Quotations are from interview R9; the model is shown in relation to model B in Figure 1.

of BSA software aligned with architectural design practice. The finding is summarised in Figure 4, which exemplifies a representation of the design process capturing specific design activities, and the communicative purpose of those activities, as retrieved from an example of calculating a green area factor in interview R9.

4.1 ADVANCING MODELS OF THE DESIGN PROCESS

While the design process can certainly be described through the designer's actions to frame a design problem, make moves toward a solution and evaluate the moves based on certain criteria (Dorst & Dijkhuis 1995), those frames, moves and criteria are always motivated by a communicative context, as seen in the example of informative activities engaging with restrictions imposed by the municipal zoning plan; in analytical activities helping a client understand future climate risks; and in communicative activities, where the evaluation of design is conducted through informal meetings with the senior architect overlooking the junior designer. Indeed, as Lawson (2006) argues, design can be described as a 'conversation' between people, software and drawings, and communicative design activities allow a shared understanding of design problems and solutions, often through narrative, conceptual understandings, as shown in the identified analytical and informative activities.

Previous efforts to model the architectural design process through specific design activities have yet to account adequately for the communicative context of these activities. For example, Goldschmidt & Rodgers (2013) focus on individual design students' activities, and while they detect activities such as 'studying the brief', 'consulting with others' and 'preparing the final presentation', the thread is not extended through questions such as where the brief came from, who the 'others' are whom the students consulted, and how students establish what kind of materials are needed for the final presentation. In this way, the experiment does not trace how the design criteria and rules are established through communicative activities, and there is no view of the community that causes the design activities to be normatively justified.

In the interview responses in this study, practitioners constantly refer to the communicative purpose of engaging in a specific design activity, and the need to seek justification and retrieve information from other actors in the design process to carry out a specific activity. This indicates that a description of the communicative purpose and context of each design activity, as

understood by the practitioner, improves the ability for an activity-based model of design practice to guide BSA software development. This aspect is briefly covered by Purup & Petersen (2020) when discussing different collaborative set-ups for the design process. However, while it is a useful insight that software needs to adapt to different configurations of expertise for analysis to be able to inform the design, it overlooks the process of negotiation among multiple actors, which causes the integration of analysis to be perceived as useful. In this way, when describing design activities, the way that activities are justified through participation in a community governed by certain rules is not presented. This makes it difficult to see how activities not expressly labelled as 'meeting activities' are made possible only through inputs from other activities, and how they become relevant only once the outputs of the activities are shared within the collaborative setting of the design practice. This anchors the work of Purup & Petersen in the paradigm of 'design thinking', centring the individual designer's way of knowing and understanding the design problem and potential solutions. In contrast, the present work expands the scope to the discursive context of design activities through a consideration of the communicative purpose of design activities.

4.2 A DISCURSIVE VIEW OF DESIGN ACTIVITIES

The interview responses show that the communicative context offers justification for a majority of the design activities mediated by digital tools. Kimbell (2012: 134) points toward understanding design-as-practice through:

> accounts of what designers do in their embodied, situated routines, [which] cannot be completed without reference to the artefacts they use, make, and work with [...].

This view includes elements in previous descriptions of 'designerly thinking', including the aforementioned activity-based models of the design process, but to fully represent practice, attention is required to how:

> knowing, doing, and saying constitute and are constituted in relation to other elements of a practice.
>
> (p. 135)

These 'other elements of a practice' are of interest in the turn toward the communicative context of design activities explored in this article. The interview participants describe drawing materials and quantitative analysis outputs in terms of preparing them for presentation to clients, viewing them as the way that the design can settle and move forward through the establishment of a shared understanding. This dynamic is also observed by Luck (2007), who during interactions between architects and building end-users finds that design artefacts (drawings and models):

> are incomplete as embodiments of the collective knowledge of the project. It was only through the use of these artefacts and the conversation about these artefacts that the users' understanding of the design became explicit.
>
> (p. 38)

Another important facet of the communicative context is building regulations, which the participants describe interpreting and reformulating to inform clients, similarly to how building professionals interviewed by Simpson *et al.* (2020) describe enabling low-carbon design by making building regulations understandable and actionable to project decision-makers. As Schweber & Green (2026) show, it is only when topics such as carbon limits are made legible to all actors in the design process through digital inscriptions that negotiations leading to an acceptable design situation can take place.

Possibly due to the limited sample of the interview study, the descriptions of design activities provided largely focus on the digitally mediated development of material representations of the emerging design, and not on the activities in which these materials are used in the shared knowledge development process that occurs when visual representations are presented and discussed in collaborative settings (Ewenstein & Whyte 2009). This warrants further ethnographic work with a special focus on these communicative activities, and especially tracing how objects

move through these activities and work to construct a shared understanding of the emerging design. The development of user-centric software design methodologies could inspire future work integrating ethnographic approaches in BSA software development, including ways of integrating potential users in co-creation processes through design games based on ethnographic material (Johansson & Messeter 2005).

4.3 METHODOLOGICAL CONSIDERATIONS AND LIMITATIONS

The findings indicate that the 'interview to the double' approach has merit in detecting novel design activities in relation to previous work (Goldschmidt & Rodgers 2013; Purup & Petersen 2020), and highlighting the embedding of design activities in a communicative context by bringing out the 'moral and normative dimension of practice' (Nicolini 2009: 195). In relation to representing design activities, this study shows how this aspect can be used to understand the discursive context of activities by observing how activities are justified as 'what ought to be done' through references to other stakeholders in the design process. What the method cannot do, however, is describe the moves involved in each design activity in sufficient detail to develop specific software requirements. As Nicolini (2009) highlights, ethnographic interviews need to be supplemented with additional ethnographic approaches in order to achieve ecological validity.

Key divergences in this study from the original methodology introduced by Nicolini (2009) need to be considered in future work aiming to solidify the method.

First, where the practice-based approach prescribes 'zooming in' to the local, situated practice (Nicolini 2013), the sample of participants in this study represents different organisations that could be considered participants of a 'practice network'. This indicates that future work should focus attention on local, situated practice, and sample multiple practitioners working in close contact to investigate how local practice is constituted relationally (Nicolini 2013).

Second, the relative familiarity between the participants and interviewers partly overcomes the challenge of constructing a 'safe setting and an existing relationship of trust' (Nicolini 2009: 199) needed to apply a projective interview method, but also questions if the responses are informed by participants' preexisting knowledge about the research project, a filtering of what activities are important to describe, and a risk of an assumption of a 'shared vocabulary' between interviewer and participant causing follow-up questions to clarify concepts to be avoided (Garton & Copland 2010). In response, future work should combine ethnographic interviews with other ethnographic approaches in order to improve ecological validity and build relationships of trust that increase the usefulness of the projective interviews.

Third, the sample is quantitatively and geographically limited in size to nine representatives of European design practice, meaning there can be no claim to have captured a saturated set of design activities in this study, which should be considered exploratory in applying a novel method and shifting the analytical focus toward the communicative context of design activities. To resolve this and truly apply the practice lens, future work should 'zoom out' by following actors such as design documentation (Nicolini 2013) in order to capture how design is stabilised discursively (Ewenstein & Whyte 2009).

Finally, the majority of participants reported an experience in practice of fewer than 10 years, meaning the perspective on the discursive composition of local practice is limited to that of a junior architectural practitioner. This could be resolved through an improved sampling strategy, including participants from multiple levels of the hierarchy of practice, including junior and senior practitioners as well as supporting staff (Säwén *et al.* 2025).

5. CONCLUSIONS

A method for design practice analysis was developed and used to identify activities in the early stages of the design process and to describe them in terms of their communicative purpose. This study advances existing models of the design process by analysing the use of building sustainability

assessment (BSA) tools in design activities in terms of not only how they support problem-solving for the individual practitioner but also how they enable communication between the practitioner and other actors in the design process.

A total of 28 specific activities conducted by practitioners were identified and categorised, several of which were previously undocumented, among them: interpreting regulations and producing narratives; producing and organising graphical material; social sustainability and risk assessment; and internal and municipal reviews.

Practitioners describe design activities in terms of both the specific actions involved and their justification within the discursive context of practice. This indicates that the 'interview to the double' method can solicit accounts of how technologies allow communication between architectural practitioners and other actors in the design process. This approach can be used to inform the adaptation of BSA tools at the early design stages by allowing practitioners and software developers to create a shared understanding of the discursive context in which tools and other technologies mediate design activities. In a wider context, the methodology has the potential to support assessing how other digital technologies, such as computer-aided design (CAD), building information modelling (BIM) and large language models (LLMs), shape design work by shaping the communication among transdisciplinary actors in the design process.

NOTE

1 The terms 'early architectural design stages' and 'early design' refer to the conceptual and programming stages of the architectural design process. Within The Royal Institute British Architects (RIBA) Plan of Work, these stages are referred to as 'preparation and briefing', and 'concept design' (RIBA 2020). In a Swedish context, these stages are referred to as the 'pre-study' and 'programming' stages (Hansson *et al.* 2015).

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COMPETING INTERESTS

The authors have no competing interests to declare.

DATA ACCESSIBILITY

The participants in this study did not provide written consent for their data to be shared publicly, so, due to the sensitive nature of the research, supporting data are not available.

ETHICAL APPROVAL

The study was conducted in a setting (Sweden) where ethical approval for survey studies is not required. Each participant provided their informed consent and were advised of the confidentiality of their identity and their organisations, and their right to peruse, complement and/or withdraw their responses after transcription and before publication of any part of the collected evidence.

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