Transforming construction

the multi-scale challenges of changing and innovating in construction

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EDITORIAL

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Introduction

What does "transforming" construction mean? – Where is it, who is doing the transforming, and how (and when) do we know it is happening? In Construction Management and Economics and elsewhere, there is a longstanding discussion amongst scholars on the topic of innovation in construction – but what of transformation in construction? Is it different, and if so – how?

We set out with this Special Issue to answer these questions and advance the theoretical understanding of the transformation of the built environment, and how this requires the construction industry to transform accordingly. We believe that a "transforming construction" research agenda entails a multi-scalar perspective and therefore called for papers on industry-level transforming, firm-level transforming, and project- and programme-level transforming. We also recognise the process focus in contemporary social science through our framing of "transforming" construction as never-ending, and by seeking out accounts of how this is unfolding in practice.

This resulting Special Issue will hopefully act as a provocation for new perspectives on transforming construction: it attempts to revisit, re-evaluate, and re-invent how we conceptualise both construction and construction research. The eight papers build on a strong legacy of research on innovation in construction management, while providing new insights on what is being transformed and how; locating, albeit tentatively, where the future debates are; and identifying spaces where rich data may be found. Readers will find a stimulating range of conceptual thinking and empirical evidence being brought to bear on change, innovation, and transformation, with extensive discussion of implications for future research on construction policy, projects, and people, broadening our field of view and drawing out strong new ideas to guide practice.

The structure of this Editorial is as follows. First, we provide a synthetic recap of key themes within the transforming construction topic, as outlined in the Call for Papers. Secondly, we summarise the content of the eight accepted papers, positioning each paper under one of three headings, which reflect the multi-scale perspective of the Special Issue and as presented previously in the Call for Papers. We then go on to a discussion section, in which we set out what we see as five major themes emerging from the papers, characterising what transforming construction looks like from the perspective of these authors. There is a conclusion section to identify what the editorial team feels are the most pertinent reflections and questions, in a bid to offer some direction to future research in the area, followed by a short commentary on some limitations of the Special Issue.

Changing, innovating, and transforming construction – the scope of the special issue

Today's unprecedented rate of global urbanisation and population growth, climate change, pandemics, and conflicts, are putting renewed attention on built environments and their development (United Nations 2019). The COVID-19 pandemic is highlighted by Lingard *et al.* (2021), who invite us to reflect on how it has provided an opportunity for organisations to change "business as usual" and engage in innovation and transformation, but with relatively little time for detailed planning and workforce preparation. Likewise, Thomson *et al.* (2021) have called for research which bridges construction management and urban planning, in a bid to address the grand societal challenges facing urban environments, acknowledging the potential of multi-level perspectives in so doing. Certainly, the necessary rapid development and transformation of the built environment require that the construction industry delivers more value, efficiently, safely, and at a higher standard, within the constraints of limited economic, social, and natural resources.

Y*et al.*l this comes at a time when the industry struggles to deliver projects on time and budget (Denicol *et al.* 2020), recruit and retain talent, and embrace digital transformation (McKinsey Global Institute 2017, Whyte 2019). Concurrently, we are seeing external investments in the construction industry, and new technologies are emerging rapidly that can deliver novel value propositions for construction clients. Yet anticipated outcomes, such as the industrialisation and digitalisation of the construction industry, threaten to erode the competitive position and viability of incumbents (Gans 2016, Pullen *et al.* 2019), and long-running narratives of a conservative and fragmented construction industry indicate a reputation for being slow to adopt and integrate new technologies at scale (Winch 1998, Slaughter 2000, Gann 2001).

Stimulated by these challenges, newcomers, and – in places – government intervention, construction is nevertheless undergoing a period of transformation, with

organisations (both incumbents and new entrants) developing and implementing new technologies and delivery models (e.g. Eklund and Kapoor 2019, Steinhardt *et al.* 2019), and not always succeeding (Christensen 1997). This changes how construction is conducted, the industry itself, and how we define it – hence our curiosity about the idea of transforming construction and what this might mean for both scholarship and practice. Indeed, based on a simple keyword search of "transform*," we find dozens of papers within Construction Management and Economics in recent years, and while this might suggest that there is a developing body of work in the field, this is not entirely the case – we see evidence of interesting tracks, but no clear research agenda as yet.

We therefore invited researchers to contribute to the Special Issue by exploring this disruption, innovation, and change, in other words, what we considered were key facets of the transformation taking place in construction, both in practice and in theory (Chan 2020). These phenomena have attracted great academic interest over the years, reflected in numerous books on the topics (Manseau and Shields 2005, Orstavik *et al.* 2015, Havenvid *et al.* 2019). Researchers around the world are exploring changing construction contexts to address local and global challenges (Jansson *et al.* 2014, Hall 2018, Aitchison 2018, Bygballe and Swärd 2019, Pan *et al.* 2019, Kedir *et al.* 2022), yet the development and application of new theories has been limited (Schweber 2015). Having compiled this Special Issue, we have been able to consider the idea of "transforming" anew – the eight papers offer a renewed and fascinating understanding which we later reflect on, under five themes, before we finally present some concluding thoughts around a forward research agenda.

In summary, the Special Issue is a unique moment to revisit the theoretical foundations of construction research, and to develop and apply theories and methodologies that help describe these changes at multiple levels, and to guide practice. The Guest Editorial team hope you find as much value and enjoyment in these papers as we have done, and we look forward to seeing the transforming construction track developing in future issues of Construction Management and Economics.

Papers in the special issue

In this section, we present a synopsis of each of the accepted papers and reflect on how they attend to the three levels of transforming: the industry level, firm level, and the project and programme level, noting that there was scope for authors to take a local, regional, or international view, and for research that compared transformation in different geographies. The commentary includes our own thoughts on the papers, and our interpretations of what matters in shaping the transforming construction agenda – not all our reflections may resonate with other readers, who may naturally find that other themes and findings emerge.

Industry-level transforming

At this level, we were interested in descriptions of the transformational role of construction's institutional context (e.g. Steinhardt *et al.* 2019). This might be related to theorising the re-skilling of the industry, or perhaps the role of knowledge transfer in the transformation process, but the scope was left deliberately broad to encourage new insights and approaches. Three papers offered fascinating new thinking at this top-level – with a range of important implications for policymaking, industrial strategy, as well as firms and scholars.

It is appealing to be able to open with a high-level paper on the policy gap in transforming construction. Andreas *et al.* provide a valuable contribution by focussing on how construction policy shapes and is shaped, drawing on 20 interviews with a range of informants. They consider the "misfiring" of policy for the UK construction industry, citing government's privileging of the announcement of policy over implementation in causing many failed policy interventions. They address the talking point that transformation requires institutional change, which we return to in the Discussion section. While focused on the UK, nevertheless, the paper refutes four central ideas or beliefs about government: the capacity to legislate, that legislation changes behaviour, that consensus can be organised, and that government is the/a major client. This is useful because it initiates some strong threads that emerge through the Special Issue around actors (Cidik and Boyd), narratives (Ninan *et al.*), influence (Brunet and Cohendet), change (Jones *et al.*) and implementation (Lundberg *et al.*), not least in the public sector (Salmi *et al.*, and Rosander). Andreas *et al.* also offer us a new template for political economy analysis in construction, describing it as a "more deliberately pragmatic philosophy" to policy studies, and invite researchers to test it in comparative studies between sectors, sub-sectors, or countries.

We also expressed an interest in hearing about reconceptualization of the industry and its participants, to facilitate an understanding of the overarching dynamics of transformation (Dubois and Gadde 2002, Koskela 2003, Green and Schweber 2008, Meacham and Van Straalen 2018). Ninan *et al.* draw on a secondary dataset of 133 cases "stories" of innovation from the UK to articulate five narratives and five new theoretical propositions showing relationships between industry and firm level narratives and innovation. Enduring themes such as productivity, health and safety, sustainability, profit maximisation and image creation are framed in a new way. The authors complement work by Andreas *et al.* by exposing "grand narratives" used in and by industry and policymakers, whilst explaining how individuals focus on

innovation and how collective action is sustained to develop firm-level narratives. The paper captures the breadth and types of innovation we might expect to see in construction and uses the narrative lens to go beyond conventional innovation classifications, and in so doing connects well with recent studies of classification work (e.g. Sage *et al.* 2021). It revisits some important moments in research in innovation studies in construction, such as Graham Ive's tenet that one needs the "*means, motive and opportunity*" to be able to innovate, but it is the more nuanced mentions of characteristics like negotiated cooperation, and the sporadic emergence of innovation which are perhaps more thought-provoking. This paper closes with a call to explore how practitioners dynamically shape narratives – which is also being mentioned in other papers, such as Salmi *et al.* and Lundberg *et al.*

Acknowledging that value, per se, could have featured in discussions within and across any of the levels, we were keen to hear, for instance, how non-financial value and the risks of stranded assets might be integrated into decision-making to help guide transformation (Bygballe *et al.* 2013). Cidik and Boyd offer a provocative account of the politics of value in construction, centred on the implications of digital transformation. They boldly question the transformation agenda, asking why so many studies still report problems with digitalisation in practice, and arguing that digital exchangeability is valued more highly than the outcomes that such digitalisation seeks to deliver. We welcome the degree of challenge in this conceptual paper – captured neatly in its statement that "digitalization is not a neutral change". It is an intriguing paper on the value of digitalization, questioning the business motivations of technology firms and the "digital first" (grand) narrative, offering us a neat link to Ninan *et al.* Cidik and Boyd remind us, therefore, of the value-laden decisions that underpin transformation and in so doing ask us some tough questions. Not everyone will agree with their conclusions, and the conditions around policymaking on digitalization in the UK may compromise the paper's relevance for other geographies. Nevertheless, the paper is a remarkable talking point, not least in its call for further studies of value creation logics in practice.

Firm-level transforming

At this level, we were keen to hear new insights on how firms may need to change to address the industry transformation. For instance, how we might conceptualise and predict how the ongoing transformation will shape firms' business models and affect employees (Lessing and Brege 2018, Hall *et al.* 2020), and even attempts to reframe the notion of the "firm" itself. Three papers attend to research questions at the firm-level or organisational-level.

We expressed an interest in how the concepts of platforms and ecosystems might be further leveraged to develop insight as to how the construction industry can create and capture value at an institutional level (drawing on Gawer and Cusumano 2014, Jansson *et al.* 2014, Thomas *et al.* 2014, Pulkka *et al.* 2016). Considering the relative immaturity of this body of work in the field, it is understandable that the paper we have included is a pragmatic study of how the development of a product platform is stimulating transformation at the firm level. Jones *et al.* offer an example of firm-level transformation, which led to changes in innovation capabilities. This qualitative paper draws on a UK case study, in which a major consultancy firm's experience in developing its own product platform is described. There is a strong technical focus about how firms change, and the paper responds well to the question of "*where does transformation come from?*", which it shares with other papers such as Salmi *et al.* We appreciate the authors' choice to study an incumbent rather than a new entrant (building on Eklund and Kapoor 2019), documenting how the established firm is doing what a new firm might be expected to do and in doing so responding to our interests in publishing insights to aid firms to re-configure themselves (Davies *et al.* 2006), in this case by bundling design and delivery services. The research offers a practical narrative about the iterative development and augmentation of capabilities, including the tactical employment of specialist staff, which enabled the firm to capture value from capabilities rather than lose to a competitor.

Also at this level, there was scope to explore how can we better describe the demand side and its influence on industry transformation, in a fragmented market (Boyd and Chinyio 2002), and there are two papers which respond with studies of demand side actors in Scandinavia.

Salmi *et al.* focus on the role of municipalities as a gatekeeper or facilitator of transformation – and actor in a wider network – through the lens of a shift to sustainable construction, more specifically to wood construction. Their well-constructed and insightful paper attends to our provocation to consider how firms can identify, implement, and scale solutions to address productivity, resource, and carbon challenges (Greenwood *et al.* 2019). The qualitative study utilises a survey of building professionals and civil servants across 293 out of 294 of Finland's municipalities, supplemented by 14 interviews. It places a strong emphasis on socio-technical systems as well as collaboration across functions, to describe municipalities' actions and practices – and thereby exposes to us how transformation can be "seen" within the organisation. The research relates well to Andreas *et al.*, as it explores the role of a major client and regulator, acting within a state-driven system under a sustainability stimulus, albeit describing the influence of state/policy voice as mainly "one-directional". Furthermore, like Ninan *et al.*,

the authors note the innovating role of companies in the construction supply chain when they say that "companies need to develop and provide competitive wood products to the market". The most resonant outcomes from Salmi *et al.*, however, arise from its strong engagement with a multi-level perspective: for instance, it recognises municipalities as working at the intersection of different actors, managing interaction and boundary spanning across different organisations, and providing an understanding of local conditions.

Moving to Sweden, Rosander also brings a public sector view, in their qualitative study of seven major infrastructure projects in Sweden, with the client (Swedish Transport Administration) framed as a change agent. Using a longitudinal cross-project case study, including 29 interviews, Rosander offers new insights on what it takes to transform an industry, responding to our call for studies of what new procurement models might apply to support transformation, and what might this mean for the contractual landscape, warranties, and the future of supply chains. The paper considers organisational routines in pre-procurement to explore contracting practices such as early contractor involvement, finding that relational contracting is an intra-organisational and an inter-organisational process, and that organisational routines are a bridge between external predictability and internal dynamics. It is pleasing that Rosander strongly addressed our call for contributions that consider what implications firm-level transformations have for organisational routines (Bygballe and Swärd 2019, Addyman *et al.* 2020, Cacciatori and Prencipe 2021). Hence, this could be an important gateway paper to bring more scholars to the routines lens to look at transformation, exploring what role routines play in the interactions between projects, institutional processes, and departments in the organisation. Rosander neatly and robustly answers the question "*what is being transformed?*" by showing us that "routines are being transformed," demonstrating that routines are an effective way of explaining how things are changing. Beyond the obvious link with Salmi *et al.*, there is also a clear connection with Andreas *et al.*, in this paper's implicit message that policy alone cannot be relied upon to enact change.

Project and programme level transforming

At this level, the Special Issue intersects with the project studies field very nicely, where many scholars have considered the role of innovation, its management, and governance. We sought papers which further developed theories to explain project level innovation (Slaughter 2000, Gann 2001), or those which offered a reconceptualization of team structures (Levitt 2012, Hall and Scott 2019). Two papers speak directly to these points and offer some fascinating new departure points.

Brunet and Cohendet directly answered our call for studies which were engaging with the contingent and emergent nature of the multi-party construction project, in their case – the megaproject. Digitalisation is portrayed as the specific, timely and motive force spurring the authors to focus on megaproject governance in this highly enjoyable and informative paper. It joins a strong body of work (e.g. from Denicol *et al.* 2020) in which megaprojects are seen by industry and policymakers as drivers of innovation and change, so a detailed consideration of their effective governance is important and welcome. In their elegant conceptual paper, they consider heterarchies in megaproject ecologies, in a bid to address what they see as a lack of theoretical conceptualisation around project governance to suit megaprojects and improve the management of innovation therein. The paper articulates three strong propositions spanning common pool resources, carefully assigned roles, and learning – all of which are robustly developed and ready for others to test empirically. Their finding that innovation is not limited to ideas created by top management and that micro creativity is important may sound like a truism, but it speaks directly to our interests in stimulating multi-scale thinking and reinforces the authors' own call to continue studying temporary organizing in this field, not least to challenge the pervasive "top down" logic we see in so many papers on innovation – a point we return to in our reflections, later.

We also sought contributions investigating how our understanding of technological adoption can be structured to better steer project delivery models and support the integration of more complex systems (Whyte 2019). Like several other papers, Lundberg *et al.* select digitalisation as a stimulus for transformation, but unlike others, and in stark contrast to Brunet and Cohendet, this study takes us all the way to the micro-level. It thereby neatly closes the Special Issue, completing the journey across the levels, and concludes our exploration of transforming construction. The authors use a qualitative case study of a construction site in Sweden to explore the role of the socio-cognitive environment in shaping digital adoption. They deploy technological frames to describe the behaviour of individual human actors and find that the combination of loosely coupled digital technology systems and a variable degree of digital maturity amongst users leads, for example, to people creating their own routines and workarounds on a day-to-day basis. In concluding, Lundberg *et al.* call for firms to not stop transforming socio-technical arrangements when a digital technology is implemented, indicating that there is an interactive and iterative relationship at play in this transforming space. This practical and straightforward paper offers a valuable insight into how innovation is translated in practice and its use of technological frames is particularly helpful in showcasing this popular lens from the organisational studies literature.

Discussion

In our interpretation, there are five themes emerging from the papers in this Special Issue, although we fully expect readers to observe other strands and key points of departure over time.

Transforming as a multi-level phenomenon

With a multi-level perspective overtly framed as part of the Call for Papers, several authors have chosen to present research which attends to this idea, but the way in which they have done so has resulted in some fascinating new lines of thought. The papers not only draw our attention to several distinct levels, but several also mention how important it is to consider multiple levels within individual studies, as well as highlighting the merits of studying boundary conditions (e.g. as an inter-organizational phenomenon). Building on the position of Bygballe *et al.* (2013) that "construction is interorganizational," Salmi *et al.*, among others, set out to show us how various actors are affecting change, and/or being affected by change at various levels. Indeed, they draw out the relevance of interaction and boundary spanning across different organizations, and then Lundberg *et al.* go on to reflect on the problems at multiple levels and within and across firm boundaries, articulating these as "technology frame" misalignments. In effect, Brunet and Cohendet are seeking ways to address such misalignments in their paper on megaproject governance, and they note the importance of the "common pool resources" needed in and between each (social) layer, to mitigate problems of knowledge sedimentation within layers, for example. They build on the "commons" of Ostrom (2015), and latterly Hall and Bonanomi (2021), very effectively, and indicate fascinating opportunities to consider how collaboration across functions and units internally can impel/impede innovation which leads naturally to a consideration of organisational structures. Jones *et al.* also note the role of boundary or knowledge objects in overcoming fragmentation, which in their case study was made manifest in the form of a "digital warehouse". Certainly, the organisational structure of public clients is found by Rosander to limit their prospects of changing their own, as well as others, practices, and in their paper, we see a robust case for organisational routines acting as an interorganizational "bridge".

Transforming as an institutional change

If we think about transforming as the cumulative result of traceable shifts in the regulations, norms, and cognitions of the broader industry (Henisz *et al.* 2012), then the lens of institutional theory offers another helpful framing of our authors' contributions, since several papers consider one or several of these shifts. From the regulatory perspective, Andreas *et al.* lead us to reflect on how transformation plays out in relation to construction policy, but with an eye on both the power and politics at work in the institutions which define and characterise the industry and its work. They use the political economy as a good example, where its boundary position between the state and various parts of society is inhabited by multiple actors. From the normative and cognitive perspective, Ninan *et al.* recognise that industry-level "grand" narratives (which may or may not echo policy intentions) may or may not reinforce the norms and regulations of the industry. Their exploration of such interactions helps us to understand the interaction between policies and national programmes and the resulting impact on transformation. For example, the use of carbon emissions and energy savings represents the dominant narrative around sustainable construction, as also reported in Salmi *et al.*, in which the state is seen as the governing actor with a "one-directional influence". Furthermore, the institutional setting itself can also benefit from new theorizations, as found in the work of Brunet and Cohendet to conceptualize the project ecology of megaprojects as a heterarchical form or organizing. A number of papers also provoke questions in our minds around who has the *power* to innovate and/or transform? Cidik and Boyd certainly do with their provocative account of the role of "big tech," but Andreas *et al.* invite us to look at the situation conversely. They propose that government's *lack of power* over the industry, its transformation, and outcomes, mean that other actors, such as individual firms and practitioners, have more agency than they might assume. The closing message of Andreas *et al.* is that "*policy for the sector should be understood as integral with the wider societal phenomenon of industrial policy and as a product of the political economy context*," and suggests that transformation requires a much stronger change in institutions than current thinking might suggest. This is an exciting prospect for future research in the field, and one that aligns with the future research agenda proposed by Brunet and Cohendet and others.

Transforming as a negotiated space

Among the papers, there is also an interesting commentary developing around the theme of interactions between actors (e.g. after Bygballe and Ingemansson 2014), with numerous accounts of dyads as relevant to innovation and industry transformation. Although it is not always apparent whether this is because actors just happen to be at specific boundaries or intersections, or whether they are there deliberately – as active intermediaries or even orchestrators. In a way, Ninan *et al.* initiate the theme when they refer to Graham Winch and others who have found that "*innovations have to be negotiated*". Cidik and Boyd also reflect on the collaborative sense-making and negotiations that take place in

construction – namely the "social mutual adjustments" that characterise construction practice. However, it is Brunet and Cohendet who offer a more precise reflection through their account of digitalisation in megaproject ecologies when they characterise interactions between different communities of knowing in a "*space of collaborative practices*" – positioning this a clearly relational space (after Grabher and Ibert 2011). Exploring this idea further, Andreas *et al.* refer to the many different "tribes" in the sector, and Salmi *et al.* go on to articulate the different actors and knowledge flows as interactions in a socio-technical system, which they understand within a layered understanding of institutional work (after Gluch and Svensson 2018). Jones *et al.* further offer a concrete explanation of how transformation may be helped or hindered in this negotiated space. In the context of introducing product platforms, they explain that vertical fragmentation reduces clarity on roles and responsibilities and causes multiple knowledge hand offs ("throwing the design over the fence"), and that longitudinal fragmentation means problem solving know-how remains with individuals and is prevented from flowing by failures in horizontal communications. Again, with reference to Grabher's work, Rosander points us to a useful future research direction, with their reference to the potential opportunity to investigate learning architectures in the infrastructure sector, echoed by a call from Brunet and Cohendet to continue studying temporary organizing, which we would agree continues to be helpful in this field.

Transforming as a (sited and) situated practice

Within the Special Issue, it is Lundberg *et al.* who most explicitly bring in the micro level, in their account of site-based digitalization behaviours. They explain that individuals establish their own routines and workarounds and discuss the role of the socio-cognitive environment in forming expectations within and between groups of individuals. Yet we also notice the presence of the micro level in a few other papers. For example, building on Willems *et al.* (2020) and others, Rosander talks about the importance of individual agency in shaping routine enactment, acknowledging that local flexibility can be structurally enabled by understanding projects' complexity, uncertainty, and degrees of freedom. Brunet and Cohendet provide an insightful synopsis of how the individual determines practices in their paper, referencing Obstfeld (2017) and Arena *et al.* (2017), to call for more research into the "distinctive roles of brokers, connectors, and energizers," albeit in a megaproject setting. The idea of "situated practices" is, however, provided by Cidik and Boyd in their discussion of the negotiations from which new value creation logics emerge. This is a fruitful train of thought: Salmi *et al.* note that "local context influences practices," and Ninan *et al.* point to the role of day-to-day problem solving as a fertile ground for innovation, through their narrative lens. Drawing on Pellicer *et al.* (2014), Ninan *et al.* discuss the ad hoc emergence of innovation, reminding us that many construction innovations emanate from "grassroots" situations and experiences (after Winch 1998 and Loosemore 2015). The idea that micro creativity can stimulate innovation therefore seems uncontroversial, but the role of the micro-level in leading to transformative action at industry level seems under-explored. For instance, how is transformation at a grand scale being reflected in practice? How do we see transformation in day-to-day situations or micro processes? Lundberg *et al.* tackle this to some extent, but there is scope for both greater theorization and further empirical studies. For instance, Sandberg *et al.* (2021) offer a helpful departure point around "coupling work" on the part of construction site managers, reminding us of the value of studying micro-level work-life realities. There are many questions remaining, however, and these could be explored either retrospectively or longitudinally over time, which brings us onto the final theme.

Transforming as an unending act

Reviewing the papers in this Special Issue also suggests an emerging theme around temporality as a lens through which to view and research changing, innovating, and transforming, in construction. For example, Ninan *et al.* invite researchers to think about how practitioners dynamically shape narratives and Cidik and Boyd discuss what, how and by whom value is created, negotiated, and captured – both of which indicate the relevance of a dynamic view. Certainly, the ideas expressed in the previous theme suggest the sporadic and ad hoc emergence of innovation, across actors, sites, and firms – by any individual, and at any moment. And while the papers traverse the many levels of this phenomenon, one is left with the feeling that the dynamic, temporal nature of transformation is not captured as fully as we might hope. That said, Salmi *et al.*, do mention the enduring narrative of construction being "slow to change," and Andreas *et al.* remind us that "*construction is suffering from a long-term illness in its resistance to change*" (after Murray and Langford 2003) – although we offer a further reflection on such narratives in the next section, to use the framing of Ninan *et al.* Jones *et al.* note that the specific challenge of overcoming the effects of institutionalised processes, such as procurement, in retarding transformation is worthy of further study. We would invite researchers to consider how such ideas, as well as theoretical or conceptual framings, such as the routines lens deployed so effectively by Rosander, can be further utilised to unpack the dynamics of transformation (as an unending act), perhaps via longitudinal studies which are a rare and valuable find in this field. This theme resonates strongly with our overall framing of the "transforming" of construction

as an ongoing, never-ending act, with its underpinning emphasis on process and broader, professional context together spurring us to continue to explore how this is unfolding in practice.

Conclusion and forward research agenda

Returning to our initiation questions: *What does transforming construction mean? – Where is it, who is doing the transforming, and how and when do we know it is happening*? The papers in this Special Issue answer these questions in part, but there is significant scope for further research, as we articulate in this closing section, along with some commentary on limitations.

Re-reading the Special Issue, it feels like we are moving towards a stronger theoretical engagement with the concept of transforming construction, yet our understanding is imperfect. Transformation certainly comes across as loosely coupled with innovation in its consideration of change in the broadest sense, and we get the impression that "transforming" is inherently more sophisticated in practice than, say, a firm's response to one or more topical ongoing changes or challenges. Indeed, the papers speak to a swathe of policy implications, organizational processes, and delivery models (after Whyte 2019) that a "grand" transformation invokes and involves.

For instance, the articulation of propositions for heterarchical governance of megaprojects by Brunet and Cohendet is a profound contribution, and their neat conclusion that "*the permanent interactions between different communities of knowing in a megaproject contribute to bridging micro day-to-day creativity with the global project vision"* captures well the extent and complexity of transformation in a very practical and appealing way. Cidik and Boyd also offer a helpful framing when they reflect that "… *any change in management or organizational methods … needs to be considered in terms of the implications on how the two value creation logics are balanced in practice*". Their mobilisation of the distinction, expressed in Bygballe and Jahre (2009), between the project value creation logic and the production value creation logic seems particularly apt, given the focus on technology (and digitalization) within this issue. For instance, we see these logics being played out in the account of the development of a product platform, as reported by Jones *et al.*, in which the firm's production capabilities are being configured differently in a bid to enhance competitiveness in delivering projects. Taking it one step further, the Jones *et al.* case might thus be framed as the most concrete example of "how" such a transformation is taking place, where the two value creation logics are being re-balanced through a change in the configuration of the inter-organizational "technical core" of construction (after Bygballe *et al.* 2013) – going some way towards achieving the "*sufficiently aligned frames, contexts and technology within and across firm-boundaries*" that Lundberg *et al.* conclude is vital to the success of digitalization, for instance. We also note that the application of the routines lens by Rosander illustrates well how this approach may be used to examine "what" transformation looks like, and describe "how" it is happening in practice.

We close the Special Issue by raising some questions, which we hope will inspire future authors to continue the exploration of change, innovation, and transformation in construction.

Among the papers, we have noticed that the focus and/or participation of certain actors within the construction sector is consistent with other papers in Construction Management and Economics. In studying innovation, construction management scholars retain a rather "top down" approach, focussing on the lead organizers of the supply chain – namely the designers, contractors, and clients – and their capacity to instigate change (e.g. Lindblad and Gustavsson 2021). The attention paid to these actors appears entirely reasonable and logical on the face, but it overlooks the role of suppliers and manufacturers, which is somewhat surprising given so many significant calls to include them, from Dubois and Gadde (2002), Håkansson and Ingemansson (2013), and Seaden and Manseau (2010) and others. Havenvid *et al.* (2019) describe how such actors are the ones "*holding the means of production,"* yet when they are not involved in the design and decision processes, they are prevented from being innovative and contributing to innovation. We also hear anecdotally that innovators in the construction product manufacturing sector feel "unheard" by scholars, and this may be a factor in why innovations like product platforms appear to be underresearched, at the time of writing. That said, we recognise that some of the contributions in this Special Issue acknowledge the role of these firms and their capabilities; for example, Jones *et al.*, and Ninan *et al.*, who conclude that "*supplier firm-level narratives are critical,"* but we would argue that it is incumbent on the research community to include supply side testimony much more robustly in future accounts of innovating and transforming. Indeed, we sense there is a timely and broad opportunity to go beyond the list of conventional research participants. Is it time to explore new avenues of enquiry around new business models and entrepreneurship? A focus on start-ups and product platform innovators – taking a "bottom up" approach – but considering supply-side innovators and disruptors might be undertaken in a more inclusive manner, whether as new entrants or incumbents?

Furthermore, we see a credible, yet remarkably familiar and comfortable, set of references on innovation among the papers in this Special Issue (Winch 1998, Slaughter 2000, Gann 2001, etc). This may be useful for some researchers arriving to construction management for the first time, but it might also serve as a warning about the vitality of enquiry in the field and there are more profound implications here. For example, the

consistent reiteration of narratives around innovation – which portray construction as a cash-strapped, risk-averse, slow to change sector with declining productivity – can be seen as a particularly worrying trend. As Andreas *et al.* and Ninan *et al.* indicate, narratives influence us, and they influence others – we shape them, and they shape us. Is it possible, therefore, that our own field narratives are constraining our capacity and capability to study the industry in new and interesting ways? In other words, does every academic or industry presentation on construction transformation need to begin with *that same* McKinsey graph? (McKinsey Global Institute 2017). In the same way that Hall *et al.* (2020) challenge firms to engage in mirror-breaking strategies, is it time for construction management scholarship to break its own mirror, such that it can free itself of the effects of these self-perpetuating narratives? And consequently, can we break the mirror of innovation references – to go deeper and challenge the narratives, reframe our enquiries, and ask new or different questions?

Limitations of the special issue

As a final note, it is appropriate to reflect on some limitations which affect this Special Issue.

First, the papers we include here represent a predominantly western view of construction, with a strong showing from authors based in the UK, as well as Sweden, Finland, and Canada. It would have been pleasing to have been able to convene a more geographically representative selection of papers from around the world, but it was clear at the extended abstracts stage of the process that this was going to be unlikely, as we received very few submissions from outside those countries named above. This leaves the door open for researchers to direct future submissions to Construction Management and Economics which use the papers in this issue as a robust departure point for studies of transformation in other geographies and cultures, for instance.

Secondly, we launched our call for papers in June 2020, at the height of the pandemic when many countries were in lockdown and swathes of the global research community had pivoted their scholarship to desk-based studies or online data collection methods. There is no doubt that this timing influenced the nature of the contributions we received, as empirical work was simply not possible for many months, so we could be missing emerging insights from the "grassroots" level. That said, we were pleased with the overall level of interest in the Special Issue and commend our colleagues for earnestly trying to address the challenging and broad-based questions posed in the call for papers.

We would encourage scholars to consider the many new propositions, models, and frameworks presented in this issue as an inspiration for subsequent empirical studies and we look forward to seeing such submissions to the journal in the future.

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References

Addyman, S., Pryke, S., and Davies, A., 2020. Re-creating organizational routines to transition through the project life cycle: a case study of the reconstruction of London's Bank underground station. *Project management journal*, 51, 522–537.

Aitchison, M., 2018. *Prefab housing and the future of building: product to process.* London, UK: Lund Humphries.

Andreas, B., Fernie, S., and Dainty, A., 2021. Understanding policy and change: a political economy analysis framework. *Construction management and economics*, 40 (11–12).

Arena, M., *et al.*, 2017. How to catalyze innovation in your organisation. *MIT sloan management review*, 58, 39–47.

Boyd, D., and Chinyio, E., 2002. The client at rest. *In: Understanding the construction client.* Oxford, UK: Blackwell Publishing Ltd.

Brunet, M., and Cohendet, P., 2021. Transforming construction: heterarchical megaproject ecologies and the management of innovation. *Construction management and economics*, 40 (11–12).

Bygballe, L.E., Håkansson, H., and Jahre, M., 2013. A critical discussion of models for conceptualizing the economic logic of construction. *Construction management and economics*, 31 (2), 104–118.

Bygballe, L.E., and Ingemansson, M., 2014. The logic of innovation in construction. *Industrial marketing management*, 43 (3), 512–524.

Bygballe, L.E., and Jahre, M., 2009. Balancing value creating logics in construction. *Construction Management and Economics*, 27(7), 695–704.

Bygballe, L.E., and Swärd, A., 2019. Collaborative project delivery models and the role of routines in institutionalizing partnering. *Project management journal*, 50 (2), 161–176.

Cacciatori, E., and Prencipe, A., 2021. Project-based temporary organizing and routine dynamics. In: M. Feldman, B. Pentland, L. D'adderio, K. Dittrich, C. Rerup, and D. Seidl, eds. *Cambridge handbook of routine dynamics*. Cambridge, UK: Cambridge University Press.

Chan, P.W., 2020. Revisiting basics: theoretically-grounded interesting research that addresses challenges that matter. *Construction management and economics*, 38 (1), 1–10.

Christensen, C., 1997. *The innovator's dilemma: when new technologies cause great firms to fail.* Boston, MA: Harvard Business School Press.

Cidik, M.S., and Boyd, D., 2022. Value implication of digital transformation: the impact of the commodification of information. *Construction management and economics*, 40 (11–12).

Davies, A., Brady, T., and Hobday, M., 2006. Charting a path toward integrated solutions. *MIT sloan management review*, 47 (3), 39–48.

Denicol, J., Davies, A., and Krystallis, I., 2020. What are the causes and cures of poor megaproject performance? A systematic literature review and research agenda. *Project management journal*, 51 (3), 328–45.

Dubois, A., and Gadde, L.-E., 2002. The construction industry as a loosely coupled system: implications for productivity and innovation. *Construction management and economics*, 20 (7), 621–631.

Eklund, J., and Kapoor, R., 2019. Pursuing the new while sustaining the current: incumbent strategies and firm value during the nascent period of industry change. *Organization science*, 30 (2), 383–404.

Gann, D.M., 2001. Towards an understanding of innovation processes in construction. *Building research and information*, 29 (3), 253–255.

Gans, J., 2016. *The disruption dilemma*. Cambridge, MA: MIT Press.

Gawer, A., and Cusumano, M.A., 2014. Industry platforms and ecosystem innovation. *Journal of product innovation management*, 31 (3), 417–433.

Gluch, P., and Svensson, I., 2018. On the nexus of changing public facilities management practices: purposive and co-creative actions across multiple levels. *Construction management and economics*, 36 (5), 259–275.

Grabher, G., and Ibert, O., 2011. Project ecologies: a contextual view on temporary organizations. *In*: P.W.G. Morris, J.K. Pinto, and J. Soderlund, eds. *The Oxford handbook of project management*. Oxford: Oxford University Press.

Green, S.D., and Schweber, L., 2008. Theorizing in the context of professional practice: the case for middle-range theories. *Building research and information*, 36 (6), 649–654.

Greenwood, B.N., *et al.*, 2019. The role of individual and organizational expertise in the adoption of new practices. *Organization science*, 30 (1), 191–213.

Håkansson, H., and Ingemansson, M., 2013. Industrial renewal within the construction network. *Construction management and economics*, 31 (1), 40–61.

Hall, D. M. 2018. Cracks in the Mirror: Conceptualizing the Ongoing AEC Industry Re-Organization. In: EP OC Conference Proceedings, December 2018, Brijuni, Croatia. Switzerland: ETH Zurich, pp. 458–477. Available at: https://www.researchcollection.ethz.ch:443/handle/20.500.11850/275328.

Hall, D.M., and Bonanomi, M.M., 2021. Governing collaborative project delivery as a common pool resource scenario. *Project management journal*, 52, 250–263.

Hall, D.M., and Scott, W.R., 2019. Early stages in the institutionalization of integrated project delivery. *Project management journal*, 50 (2), 128–143.

Hall, D.M., Whyte, J.K., and Lessing, J., 2020. Mirror-breaking strategies to enable digital manufacturing in Silicon Valley construction firms: a comparative case study. *Construction management and economics*, 38 (4), 322–339.

Havenvid, M., *et al.*, 2019. *The connectivity of innovation in the construction industry*. Milton Park, UK: Routledge.

Henisz, W.J., Levitt, R.E., and Scott, W.R., 2012. Toward a unified theory of project governance: economic, sociological and psychological supports for relational contracting. *Engineering project organization journal*, 2 (1–2), 37–55.

Jansson, G., Johnsson, H., and Engström, D., 2014. Platform use in systems building. *Construction management and economics*, 32 (1–2), 70–82.

Jones, K., *et al.*, 2021. Addressing specialization and fragmentation: product platform development in construction consultancy firms. *Construction Management and Economics*, 40 (11–12).

Kedir, F., *et al.*, 2022. Formative scenario analysis of the factors influencing the adoption of industrialised construction in countries with high housing demand – the cases of Ethiopia, Kenya, and South Africa. *Construction management and economics*, 40 (9), 690–710.

Koskela, L., 2003. Is structural change the primary solution to the problems of construction? *Building research & information*, 31 (2), 85–96.

Lessing, J., and Brege, S., 2018. Industrialized building companies' business models: multiple case study of Swedish and North American Companies. *Journal of construction engineering and management*, 144 (2), 15–19.

Levitt, R.E., 2012. The virtual design team: designing project organizations as engineers design bridges. *Journal of organization design*, 1 (2), 14.

Lindblad, H., and Gustavsson, T.K., 2021. Public clients' ability to drive industry change: the case of implementing BIM. *Construction management and economics*, 39 (1), 21–35.

Lingard, H., *et al.*, 2021. What have we learnt from the COVID-19 global pandemic: improving the construction industry's abilities to foresee, respond to and recover from future endemic catastrophes. *Construction management and economics*, 39 (2), 192–197.

Loosemore, M., 2015. Grassroots innovation in the construction industry. In: F. Orstavik, A. Dainty, and C. Abbott, eds. *Construction innovation*. New York: Wiley, 65–78.

Lundberg, O., Nylen, D., and Sandberg, J., 2021. Unpacking construction site digitalization: the role of incongruence and inconsistency in technological frames. *Construction management and economics*, 40 (11-12).

Manseau, A., and Shields, R., 2005. *Building tomorrow: innovation in construction and engineering*. Farnham, UK: Ashgate.

McKinsey Global Institute 2017. *Reinventing construction: a route to higher productivity*. McKinsey & Company. https://www.mckinsey.com/capabilities/operations/our-insights/reinventing-construction-through-a-productivity-revolution

Meacham, B.J., and Van Straalen, I.J., 2018. A socio-technical system framework for risk- informed performance-based building regulation building regulation. *Building research & information*, 46 (4), 444–462.

Murray, M., and Langford, D. A., 2003. *Construction reports 1944–1998*. Oxford: Blackwell Science.

Ninan, J., Sergeeva, N., and Winch, G., 2022. Narrative shapes innovation: a study on multiple innovations in the UK construction industry. *Construction Management and Economics*, 40 (11–12).

Obstfeld, D., 2017. *Getting new things done: networks, brokerage, and the assembly of innovative action*. Stanford, CA: Stanford University Press.

Orstavik, F., Dainty, A.R.J., and Abbott, C., eds. 2015. *Construction innovation*. Chichester, UK: Wiley Blackwell.

Ostrom, E., 2015. *Governing the commons*. Cambridge, UK: Cambridge University Press.

Pan, W., Chen, L., and Zhan, W., 2019. PESTEL analysis of construction productivity enhancement strategies: a case study of three economies. *Journal of management in engineering*, 35 (1), 05018013.

Pellicer, E., *et al.*, 2014. Model for systematic innovation in construction companies. *Journal of construction engineering and management*, 140 (4), B4014001.

Pulkka, L., *et al.*, 2016. Applicability and benefits of the ecosystem concept in the construction industry. *Construction management and economics*, 34 (2), 129–144.

Pullen, T., Hall, D., and Lessing, J., 2019. *White paper: a preliminary overview of emerging trends for industrialized construction in the United States version 1. Zurich*. https://www.research-collection.ethz.ch/handle/20.500.11850/331901

Rosander, L., 2022. Same, same but different: dynamics of a pre-procurement routine and its influence on relational contracting models. *Construction management and economics*, 40 (11–12).

Sage, D., *et al.*, 2021. Towards a new theory of construction innovation: a socio-material analysis of classification work. *Construction management and economics*, 39 (8), 637–651.

Salmi, A., Jussila, J., and Hamalainen, M., 2022. The role of municipalities in transformation towards more sustainable construction: the case of wood construction in Finland. *Construction management and economics*, 40 (11–12).

Sandberg, R., Löwstedt, M., and Räisänen, C., 2021. Working in a loosely coupled system: exploring practices and implications of coupling work on construction sites. *Construction management and economics*, 39 (3), 212–226.

Schweber, L., 2015. Putting theory to work: the use of theory in construction research. *Construction management and economics*, 33 (10), 840–860.

Seaden, G., and Manseau, A., 2010. Public policy and construction innovation. *Building research and information*, 29 (3), 182–196.

Slaughter, E.S., 2000. Implementation of construction innovations. *Building research & information*, 28 (1), 2–17.
Steinhardt, D., *et al.*, 2019. The structure of emergent prefabricated housing industries: a comparative case study of Australia and Sweden. *Construction management and economics*, 38 (6), 483–501.
Thomas, L.D.W., Autio, E., and Gann, D.M., 2014. Architectural leverage: putting platforms in context. *Academy of management perspectives*, 28 (2), 198–219.
Thomson, C.S., Karrbom Gustavsson, T., and Karvonen, A., 2021. Grand challenges facing our cities: where construction management research meets the urban field. *Construction management and economics*, 39 (10), 874–878.
United Nations (2019) *World population prospects 2019. (ST/ESA/SE, World Population Prospects 2019: Highlights, (ST/ESA/SE)*. New York: United Nations Department of Economic and Social Affairs, Population Division. Available from: http://www.ncbi.nlm.nih.gov/pubmed/12283219
Whyte, J., 2019. How digital information transforms project delivery models. *Project management journal*, 50 (2), 177–194.
Willems, T., *et al.*, 2020. Practices of isolation: the shaping of project autonomy in innovation projects. *International journal of project management*, 38, 215–228.
Winch, G.M., 1998. Zephyrs of creative destruction: understanding the management of innovation in construction. *Building research & information*, 26 (5), 268–279.

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