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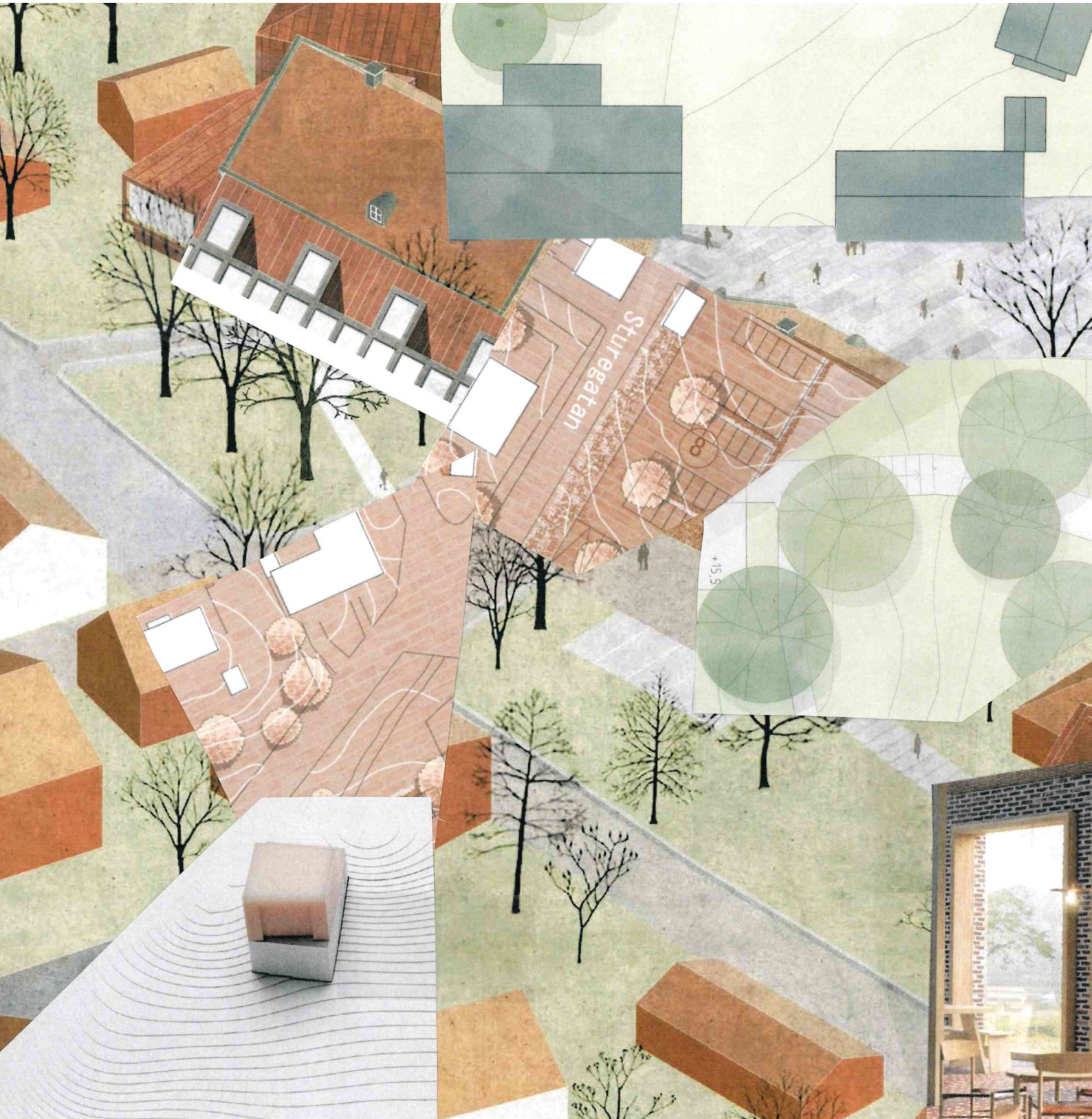

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CONTENTS

EDITORS' NOTES 5
MADELEINE GRANVIK, DANIEL KOCH, AND MAGNUS RÖNN

INVESTIGATIONS OF PLACE ATTACHMENT IN PUBLIC SPACE 9
MARIA EGGERTSEN TEDER

ORGANISING FOR OPENNESS: WHAT HAPPENS WHEN CROWDSOURCING ENCOUNTERS THE ARCHITECTURAL COMPETITION? 35
ANDREAS KAMSTRUP AND PETER HOLM JACOBSEN

MEAT AND CREATIVITY: ADAPTIVE REUSE OF SLAUGHTERHOUSES AND MEATPACKING DISTRICTS 65
PER STRÖMBERG

ADAPTING GREEN-BLUE ROOFS TO NORDIC CLIMATE 99
BRIDGET THODESEN, TORE KVANDE, HELGA THERESE TILLEY TAJET, BERIT TIME AND JARDAR LOHNE

SOCIETY'S BLUEPRINTS – A STUDY OF THE NORWEGIAN BUILDING CODE'S MODAL DESCRIPTIONS OF A BUILDING 129
JØRGEN SKATLAND, OLE MØYSTAD AND JARDAR LOHNE

REVIEWS

DISS. REVIEW
ZHENG LIANG (PHD STUDENT, AALTO UNIVERSITY):
RETHINKING DESIGN COMPETITION TO PROMOTE URBAN DEVELOPMENT – A COMPARATIVE ANALYSIS 155
REVIEWER: MAGNUS RÖNN

DISS. REVIEW
TURID BORGESTRAND ØIEN:
SKIMMELSVAMPEVÆKST I BOLIGER – PRAKSISSER OG POLITIKKER
MOULD GROWTH IN HOUSING – PRACTICES AND POLICIES 161
REVIEWER: STEN GROMARK

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SOCIETY'S BLUEPRINTS – A STUDY OF THE NORWEGIAN BUILDING CODE'S MODAL DESCRIPTIONS OF A BUILDING

JØRGEN SKATLAND, OLE MØYSTAD AND JARDAR LOHNE

Abstract

Building codes are descriptive texts that reflect societal consensus and convey societal agency on the built environment. These texts represent an available, empirical source on a societal component of the built environment, containing expressions of enforced social necessities embedded into buildings and spaces.

By carrying out content analysis based on two sets of parameters, we performed a re-reading of the *Norwegian Planning and Building Act* and the corresponding *Technical Regulations*. One parameter set specified topics, i.e. internal categories in the regulations. The other set assigned modal force to normative descriptions, from recommendations and advice to explicit, quantified regulations.

Visualised as a diagrammatic plot distribution, the analysis combined quantitative (number of plots per topic) and qualitative (modality of statement) perspectives. Our ambition was to investigate and express differences between topics present in the legal texts and their translation into functional demands.

The approach provided an analytical toolset that allowed us to discuss the juxtaposition of technical, aesthetic and social values. Based on their expression in building regulations, it can logically be claimed that these values directly affect the whole life cycle of buildings and other elements in the built environment.

Keywords:
building regulations, buildings, diagrammatic representation, regulation modalities, text analysis, social purposes

Introduction

The relationship between a society and the environment it builds for itself is characterised by dynamic reciprocity. A society imposes its internal needs and agreements upon the environment through building. The built environment grounds these strategic acts of the collective; a shared built reality emerges, which in turn produces stabilising effects on society.

Societal interests in the built environment manifest themselves in several forms, some of which are barely noticeable and others more tangible. The particulars of these belong in fact to the very epicentre of political value discussion, about how people can act strategically together to shape a physical shared reality. However, discussions are not final solutions. In the practical world of the AEC (Architecture, Engineering and Construction) industry, the shape and content of interests must be settled pragmatically on a daily basis at every building site.

In this study, we examined how a society embeds its collective concerns in the built environment. Building codes represent the most direct societal interventions in building projects. They are the main, most formal representations of shared interests that determine buildings. The subject of our analysis was the Norwegian building code, in particular the Building Act (2008) and the Technical Regulations (Byggteknisk forskrift, 2010). While Norway is not generally included in comparative studies within the EU framework, we chose to study the Norwegian building code for its relevance in an international context and for its explicitly social purpose statement. Our analysis was context-specific, but some of the findings from the analysis are generalisable to the international context. Rather than focusing on particular elements of the code (technical, procedural etc.), we opted to use a systematic, overall approach to organisation of the code and its functioning.

The Norwegian building code is divided into a wide array of different themes. These vary from the purely technical (fire, security etc.) to concerns of a non-technical nature (universal accessibility, preservation, aesthetic concerns etc.). However, the overall ambition of the code cannot be captured within such themes; its purpose is explicitly articulated to be of a social nature and therefore it needs to be assessed in societal terms.

Building codes in general contain societal intentions. For these intentions to become physical interventions, they need to be formulated into descriptions that modalise the physical form of buildings. In language, modalisation is typically expressed through modal verbs, such as “can”, “should”, “must”, “ought” etc. This is also the case in building codes. Our general aim in this study was to understand the societal function of the Norwegian building code through modal mapping of its content.

To investigate these general concerns, we established the following research questions:

- How does the Norwegian building code describe a building?
- How do societal purposes in the building code come to expression as distinctively social concerns?

The following section provides a theoretical contextualisation of the analysis and a brief outline of the structure of the present Norwegian building code. A section on methods then describes the analytical operations applied in our reading of the Norwegian building code. To visualise our findings, the regulation topics are presented in a plot diagram that encompasses different modes of meaning, presenting a modal hierarchy within the regulation texts. Finally, we discuss the findings in light of our research questions, draw some conclusions, make some recommendations and identify areas for future studies.

Theoretical framework

Few contemporary built environments are pre-imagined, planned wholes (Alexander, 1987). Recent research suggests that environments such as cities are complex systems that mainly grow in a bottom-up manner (Batty, 2008). In fact, simultaneous and continuous change characterise the built environment (Møystad and Pisters, 2013).

Building projects are inherently social activities (Fallan, 2008). The organisation and execution of a project reflect collaborative efforts in a community. Building projects utilise shared resources such as infrastructure to enable acts of adaptation that participating individuals alone would be incapable of. This makes building projects, whether informally or formally constituted, strategic acts in the sense of Certeau's (1980) theory of action. By establishing collective control over an environment, these projects make available a shared advantage. Such actions matter beyond the particulars of their occasions; building projects actually ground social reality in physical reality by their concrete results.

By being locally grounded and socially constituted, the interface between social and physical processes produces a certain output, that of the building. Spatiality characterises this local output and buildings embody certain spatial intervals that characteristically create a tension between (new) potential and limitations in use. These differentiations permit an articulation of the interface between thought and physics, a building, that is desirable in the first place.

The effects of buildings are shared and a building matters beyond the interest of individuals. Buildings play important roles in the inherently social field of human activity (Gieryn, 2002). The social significance of buildings exceeds their instrumental aspects; they partake in matters aesthetic, politic and epistemological (Kara, 2011).

The long-term interest of the collective makes a society interfere directly in building projects. However, any building project harbours potential conflict of interest. The broadness of a building's social significance, combined with its sheer longevity, adds to the severity of potential conflicts. Settling conflicts before they have more large-scale consequences is in the practical interest of any society that wants to retain continuity over time. To ensure collective interest in the future consequences of a building, however, a society must lay down guidelines before conflicts arise; it must anticipate the (consequences of) the built future.

To impose actual effects on the built future, society's interests must take the form of normative descriptions that resist mistranslation when confronting the many concerns and interests that surface within a project framework. As a consequence, society's interests are often formulated as explicit normative descriptions of the form and content of buildings.

The most imperative descriptions of buildings appear in building codes. Many communal documents describe buildings either explicitly or by implication, but none has comparable effects to building codes. In building codes, society directly acts upon the building. Building codes – as representations of society's view on the building– effectively decide whether a building has societal recognition, i.e. they define how buildings become legal.

In principle, building codes embed information in the built environment for societal reasons. They do so on the most efficient scale and in a linguistic form that is intended to have an actual effect, by modalising buildings through normative descriptions. In addition, the codes are well documented, and their availability, impact and explicitness make them a unique resource in analyses of the interaction between a society and its built environment/buildings.

The building regulations of different societies have been shown to vary in nature (Heijden, 2009). Comparative studies of building codes have been carried out within the EU (Meijer, Visscher and Sheridan, 2002). The Norwegian regulations are not included in these studies, but they are directly comparable, and correspondingly valuable, as a research case.

The structure of the Norwegian building code

The Norwegian building code explicitly states a social purpose. The opening paragraph of the *Norwegian Planning and Building Act* (§ 1-1, 2008) begins thus:

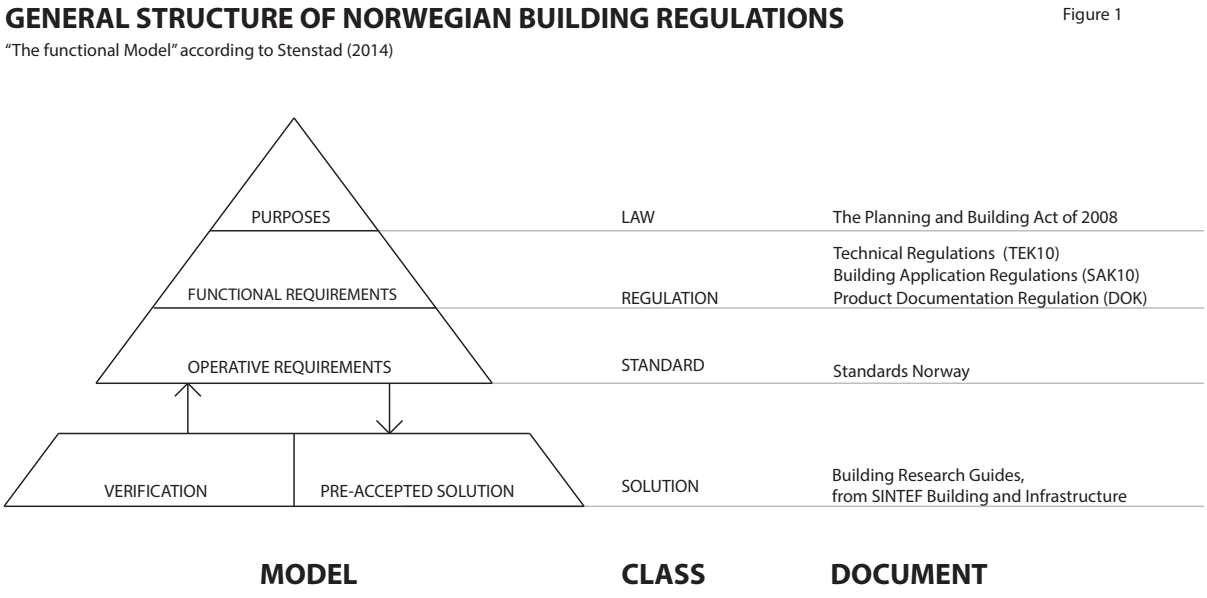
> *The Act shall promote sustainable development in the best interests of individuals, society and future generations.*

The conclusion of the purpose paragraph is even more explicit on the subject of social intentions:

> *There shall be emphasis on long-term solutions, and environmental and social impacts shall be described. The principle of design for universal accessibility shall be taken into account in planning and in requirements relating to individual building projects. The same applies to due regard for the environment in which children and youth grow up and the aesthetic design of project surroundings.*

This explicit social purpose in the Norwegian building code provides an opportunity to study a spectrum of meanings, values and intentions shared by Norwegian society. As they are formulated into normative descriptions, these shared concerns are embedded in the environment in the physical form of buildings. The ontological change between intentions and physical forms necessarily implies that the building code includes an act of translation. The definiteness of the physical forms prescribed by the regulations depends directly on how these are expressed as modalisations of the building in the building code text. Since the modalities of the building code are key in the connection between textual and physical form, they are the main object of our attention in this investigation.

Figure 1
Model illustrating the functional hierarchy of the Norwegian building regulations. Source: Based freely on Stenstad (2014).



The *Planning and Building Act of 2008* is the highest point in a hierarchal structure of normative descriptions of building and planning, as illustrated in Figure 1. The act provides goals, followed by functional demands described in the *Technical Regulations* (Byggteknisk forskrift, 2010) and *Standards Norway* (2014), of which 24 issues cover standards of building, provide operative definitions to functional demands. According to the Act and the Regulations, AEC professionals are responsible for documenting the solutions they choose to include in buildings. This can either be done by building according to pre-accepted solutions described in Building Research Guides from SINTEF Building and Infrastructure (SINTEF, 2014), or they may choose their own as long as these are verifiably in accordance with the standards.

An extensive network of legal and official documents supplements and extends this peak struture of building codes. Most notably, these include the whole system of physical planning, articulated in the planning part of the present Act, and the entire body of politically regulated area plans. The main bulk of this body consists of plans on the municipal level, which are subordinate to regional and national plans. Consequently, these texts form a research topic of their own and fall outside the scope of this paper.

During the 1990s, re-incorporation of aesthetic concerns into building regulations instigated, on a government initiative, a nation-wide series of aesthetics guidelines inspired by the Norberg-Schulz theory of place. These documents were intended to provide decision makers with a handy toolset, supporting planning assessments and building applications in municipalities. By implicitly amounting to an officially recognised environmental aesthetic, these texts wield considerable political authority. The content of each local guideline varies, but most are developed in accordance with the national document (Vibe, 1997)

The *Planning and Building Act* refers to an extended body of associated legal documents that mediate other important legal areas in direct interaction with the environment, most importantly the *Cultural Heritage Act* (1978) and the law covering environmental management (*Nature Diversity Act of 2009*). Following from this comprehensive system of official regulation and control, multitudes of professional documents, such as contracts, output descriptions (Moe, et al., 2010) and even sales prospects and garbage handling documents and other written materials condition the form and content of buildings. In the present study we address the top of the hierarchy of texts (see Figure 1) which, by implication, opens the way for inquiries into this extended body of documents at a later stage.

Method

This study comprised an explorative case study (Yin, 2009) of the normative description of buildings provided by the contemporary Norwegian building code; internally structured content analysis (Krippendorff, 2013; Blumberg, Cooper and Schindler, 2014); and a visual diagrammatic presentation (Tufte, 1997; 2006).

As a method emphasising how a text makes its descriptions explicit, content analysis enables an evaluation of how building regulations reflect the interaction between built environment and a society. The goal of content analysis, according to Krippendorf (2013), is to "infer features of a non-manifest context from features of a manifest text". Based on this insight, analytical interpretations of the type presented in this paper are inherently characterised by subjective judgements and general constraints of a hermeneutical nature. However, this did not undermine the present analysis in any fundamental way, since it was based on practical, manifest textual representations.

The Norwegian building code constituted the input to this study. Regulatory statements with descriptive reference to buildings were the units of analysis. The object of these descriptive references was taken to be the output of a normal building project as defined in professional standards (Moe, et al., 2010). The latter was a delimiting choice made to focus on built regularities, rather than exceptions.

The source texts for our content analysis consisted of contemporary regulation documents covering the top level of building code, notably: *The Planning and Building Act of 2008* and the *Technical Regulation of 2010*. Yearly revisions to the regulations after 2011 were not included in the analysis. The sources were limited to the documents cited, with their revisions, as openly available at lovdata.no (the Norwegian database of legal material) in October 2015.

The Norwegian building code handily categorises its description of buildings into topics. Applying these topics as analytical parameters allowed us to map contents potentially embedded by regulatory interference. This meant that our reading of the building code was selective; all statements not relating to building descriptions, such application procedures and larger-scale physical planning and building control, were effectively outside the scope of this study.

The topics correspond to sub-headlines in four chapters (Ch. 27, 28, 29 and 31) of the Planning and Building Act making direct reference to buildings. Figure 2 lists these chapters and their sub-headlines (the topic parameters for this study).

Topics of the Norwegian Building Code Headlines from the 4 chapters in Act of 2008 providing the topic paramter of analysis	
Chapter 31 **Requirments of existing structures**	**Chapter 27** **Connection to infrastructure**
Improvement program	Water supply
Demolition/change of use	Sewers
Safety and repair	Connection to private infrastructure
Projects in existing structures	Acess
Preservation of cultural value	District Heating
Chapter 29 **Requirements for the project**	**Chapter 28** **Requirments for building lot and undeveloped land**
Design	Building land
Visual Qualities	The underdeveveloped part of the lot. Common area.
Universal accessibility and reliability,	Preservation of the environment
Locations, heights and distance	Measures of adjoining land
Technical requirements	Making fencing safe
Technical installations and systems,	Making pools, wells and ponds safe,
Construction products	Tidiness and iuse of underdeveloped land
Waste management	Safety measurements for construction work
Lifts and escalators	

Figure 2
Topics in the *Norwegian Building Code,* organised according to Chapters 27, 28, 29 and 31 of the *Norwegian Planning and Building Act of 2008.*

The imperative aspect of the regulations comes is reflected in modal verbs such as "must", "can", "shall". Different aspects of the regulations are assigned different modal degrees according to their perceived importance to a building's performance. By comparing the differences between regulatory statements in terms of their modal operators, we were able to make an internal comparison between topics and statements in the building code.

The present *Planning and Building Act* (2008) provides a scale of modal degrees. These modalities demarcate an interval spanning from vague possibility to mandatory, legal necessity. In the Norwegian case, this corresponds roughly to four levels: From making *Recommendations*, it increases to *Cohesive recommendations*, before becoming binary (yes, no) as *Absolute regulations*. The most specific tier, *Quantified regulations,* describes legal necessity by prescribing intervals (within, below or above) of certain pre-established values with which buildings must comply. Figure 3 shows examples of these modalities from the *Planning and Building Act* (2008) and the *Technical Regulations* (2010).

Modalities in Norwegian Building Codes

a description of the 4 step modality scale, and examples from the Act of 2008 and the Tech. of 2010

Modality	Recommendation	Cohesive recommendation	(Absolute) Regulation	Quanitified regulation
Modality DESCRIPTION	*1. Recommendation* Makes a recognizable requirement, which can be interpreted in several ways, either because it contains many sub-themes, or because there are several (obvious) valid interpretations of the claim.	*2.Cohesive Recommendation* Provides a coherent requirement, but does not make a recognizable/concise "must"-claim. In neither of the two examples, requirement become binary (a yes-no question), it remains open to interpretation within the context of the expression of the text.	*3. (Absolute) Regulation* Provides a clear requirement that the object cannot legally be built without – this is a binary claim (expressing absolute necessity in the built object).	*4. Quantified regulation* Provides clear requirement defined in quantified maximum, minimum or intervals that the object cannot legally be built without. This is modally stronger than a regulation, as it provides an interval that gives a detailed quantification of built necessity.
Example PLANNING AND BUILDING ACT 2008	"Pursuant to Chapter 20, each and every project shall be designed and carried out so that it is given a good architectural design in accordance with its function pursuant to the rules specified in or pursuant to this Act. (plot 29 – Plan and Building Act)	"Technical installations shall be designed and carried out so as to yield the performance required and tolerate the internal and external loads that normally occur" (plot 41- Plan and Building Act)	"No building may be constructed or put to use for the purpose of housing humans or animals without proper access to hygienically safe and sufficient potable water, including water for fire-fighting." (plot 1 – Plan and Building Act)	"Unless otherwise decided in a plan pursuant to Chapters 11 or 12, the distance of the structure from the boundary of adjoining property shall be equal to at least half the height of the structure and not less than four meters" (plot 35 – Plan and Building Act)
Example TECHNICAL REGULATIONS 2010	"The locations, access ways, dimensions and design of receiving docks shall be tailored to a structure`s function" (plot 131 – TEK10)	"Escape routes shall in a clear and easily understandable way, lead to a safe location. They shall be of adequate width and constructed as a separate fire cell designed for speedy and efficient escape" (plot 82 – TEK10)	"Rooms designed for constant occupation shall have a window that provides adequate access to daylight, unless the activity indicates otherwise." (plot 171 TEK10)	"Openings in railings shall be a maximum of 0.10 m up to a height of 0,75 m. The horizontal distance between a building component and railings affixed to its outer surface shall be a maximum 0,05 m" (plot 140 – TEK10)
Example EXPLANATION	These statements represent recommendations because both "good architectural design in accordance with its functions" and "tailored to a structure`s function" are open to a wide array of positive interpretations.	These examples contain cohesive recommendation because they explicitly state a "shall" supplied with a cause, like "as to yield performance required" and "lead to a safe location".	These statements are interpreted as absolute regulations because they both claim an absolute: Buildings imply access to water. Rooms for constant occupancy imply a window.	Both these statements put a numerical interval as an absolute requirement, thus they contain a more detailed account of necessity than the examples of absolute regulations.

Figure 3
Modalities in the contemporary Norwegian building code, according to the present analysis.

In analysing the data, a reference number was assigned to each unit of analysis. This ensured replicability of the study, as any individual number can be traced back to a statement in the regulation texts. By repeating the procedure, the reliability of the study could be further improved in the future, either to provide a measure of Bayesian confidence or quantifiable deviations.

The choice to study normal building projects excluded headlines from Chapter 30 of the *Planning and Building Act* as topics for the analytical construct (Figure 4). Consequently, the findings diagram (Figure 5) does not show headlines from this chapter. Chapter 30 deals with special projects, notably: *Agricultural buildings*, *Hazardous structures/activities*, *Signs and advertising devices*, *Temporary structures* and *Leisure buildings*. Such special projects do not logically correspond to the output of normal building projects. Still, some of the descriptive statements in this chapter of the law apply to normal projects. Accordingly, the legal statements numbered 53 and 54 in Chapter 30 are plotted into suitable topics in the findings diagram.

Sections 28–8 and 29–10 in Chapter 28 are thematically identical but apply to different circumstances. To avoid ambiguous double topics when designing the diagram, this topic was placed in Q4 in Figure 4, due to the fact that it concerns the building lot and the project's effect on the environment. The data content in these two overlapping sections still results in two different requirements, so they were plotted accordingly. The data concerning the building lot were placed in the relevant sector. In contrast, the data from Chapter 29 were plotted in *Design*, since it explicitly makes a design reference.

The analytical construct resulted in a procedure that can be summarised in the following four steps: First, we reviewed the text material to identify units of descriptive statements with direct reference to buildings. Second, we assigned a unique number to each in order to reference these units to statements in the text. Third, we allocated topics and modal force, re-coding each unit relatively to one another. Fourth, by plotting these recoded units, we obtained a new reading of the building code in the findings diagram.

The diagram, organised as a circle with subdivision into sectors (Figure 4), reflects the coding parameters. Chapters from the *Planning and Building Act* divide the diagram into four quadrants. Sectors within the corresponding quadrant designate topics. Alongside sectors, the radial axis denotes the modal dimension of the analysis. Weaker regulatory statements are placed near the centre of the circle, which we call the "recommendation" zone. Positions closer to the circumference correspond to increasing degree of modal force. Regulations positioned in the "recommendation" zone are typically characterised by wording like

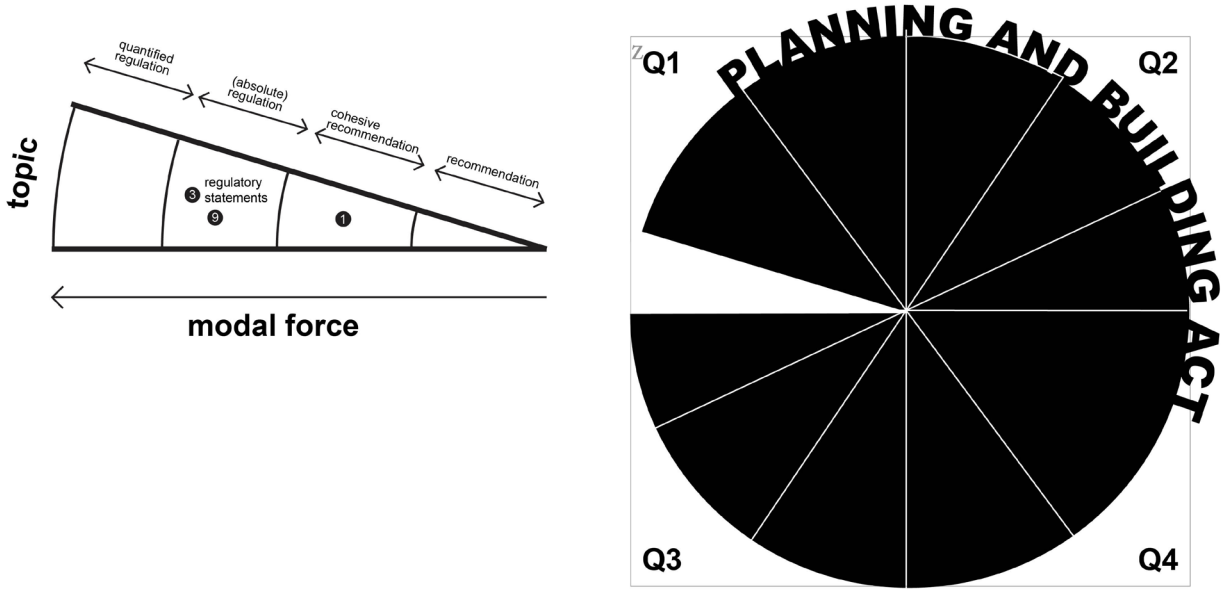


Figure 4
Analytical construct. Quadrants Q1–Q4 refer to chapters in the *Norwegian Building Act of 2008* (Q1 represents Chapter 31, Q2 Chapter 27, Q3 Chapter 29 and Q4 Chapter 28). Chapter 30 is omitted, as it deals with exceptions to the rule.

"shall be", without articulating the explicit reason for this. Regulations positioned in the "cohesive" zone typically provide a reference to why this is so (e.g. based on a standard). Regulations positioned in the "absolute" zone are typically characterised by words such as "must". Regulations positioned in the 'quantitative' zone are characterised by words such as "must", with a corresponding quantified value, interval etc. Supplementary subdivision of the axis according to Figure 4 eases reading, but the modal dimension could be viewed as a continuum spanning from possible to necessary. In the example in Figure 4, the diagram illustrates a topic (e.g. preservation of cultural value), where two legal statements are classified as absolute regulations, while one is a cohesive regulation. No quantified regulations or recommended regulations are included in this example.

As pointed out by Krippendorff (2013), analyses of the sort carried out in this study of necessity highlight parts of the general picture that are of particular interest. Rather than providing any pre-determined, clear-cut selection method for identification of the chosen objects, such analyses proceed in a pragmatic manner to explore the subjects that stand out to the reader. There is thus an intuitive component to the present analysis that is based on the factual representations of the codes.

Findings

Displaying the content of the building code in a findings diagram (Figure 5) revealed how a society intervenes upon its built environment. In addition to an actual map of descriptive topics from the *Planning and Building Act of 2008*, the topics are illustrated by descriptive volume (quantity) and relative modality (quality). Comparison of individual

topics, related and unrelated, brought together by the law, revealed which of these are expressed most forcefully in the regulation texts. Revealing these descriptive forces provided a perspective on the topics given the most priority in the Norwegian building code. In addition, accentuating the legal modalities helped reveal how different aspects of buildings are affected differently by the building code`s normative agency.

Strict legal modalities prescribe a well-defined physical modalisation in the built environment. The topics in themselves merely designate societal wants and interest. Topic volume only indicates degrees of societal interest, which may or may not correspond to their relevance in settling controversy on the construction site. These distinctions single out modality as the most informative aspect of this re-distributed image of the Norwegian building code. Differences in legal modalities indicate where and how the Norwegian building code makes a difference to what can and will be built.

The findings diagram shows the different topics contained within the Norwegian building code. Among these topics, there are several different modes of signification at play. Some topics address the technological aspects of a building, others deal with a building's social significance in use, others still its aesthetic value. All these aspects matter to the societal purpose of regulation. What we specifically aimed to highlight in the findings diagram was whether and how these different modes of built meaning are described and modalised differently in the legal texts. As the building code is intended to have a pragmatic effect on buildings, we were interested in how this pragmatic effect – as expressed in legal modalisations – might influence different aspects of buildings.

The next step of the analysis consisted of assessing different elements in the findings diagram (Figure 5). Two concerns guided the choice of the elements studied, namely degree of modality and volume. The basic conviction governing the analysis was that the stronger the modality, the stronger the influence on the built environment. Equally, the more volume (that is, number of regulatory elements) identified within a subject area, the stronger the influence on the built environment.

In internal comparisons weighting modalities greater than volume, the following topics stood out: *Technical Requirements*, *Universal Accessibility and Reliability*, *Lifts and escalators*, *Design*, *Locations, heights and distances*, *Technical systems and installations*, *Access* and *Waste management* (Figure 6).

These topics can tentatively be categorised into the following taxonomy of shared meanings: technology, aesthetics, systemic aspects and community concerns.

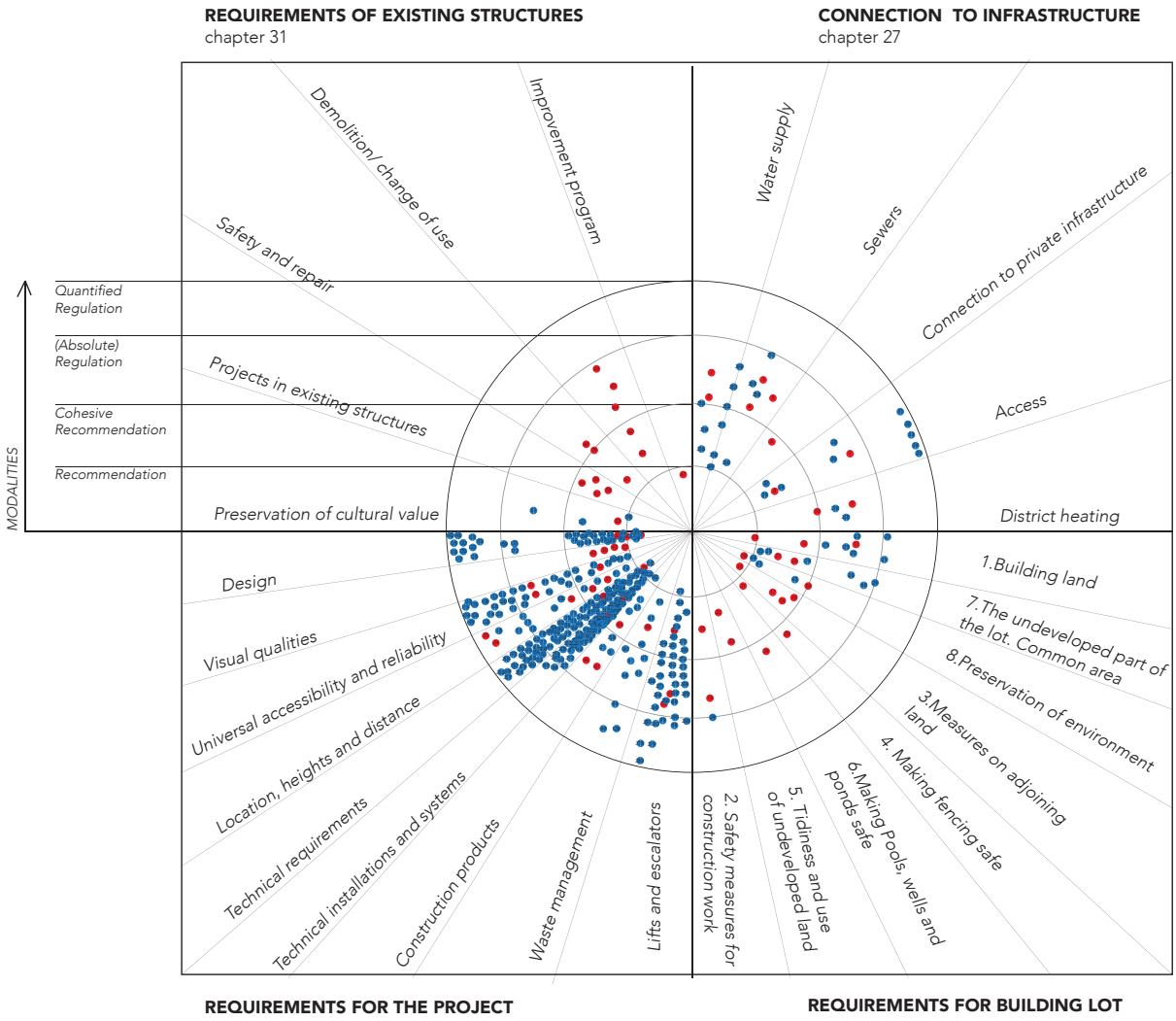


Figure 5
Findings diagram illustrating the Norwegian building code's description of a building. Red dots denote paragraphs from the *Planning and Building Act* (2008) and blue dots denote paragraphs from the *Technical Regulations* (2010).

The technological aspect appears to be by far the most prominent in the building code's description of buildings. This mode of significance is expressed in the following prominent categories: *Technical Requirements, Technical systems and installations, Lifts and escalators* and, to a lesser extent, *Construction products*.

Accomplishments such as static stability, resilience and reliability, avoiding malfunction and hurting users and being economical with respect to energy and building costs characterise the technological meanings of building in a society, according to the building code.

A concern about aesthetic meaning in the Norwegian building code comes to expression mainly in the *Design* topic, but also in two additional topics, namely: *Visual qualities* and *Tidiness and use of underdeveloped land*, although neither of these topics appeared prominent in this analysis. Concerns about the user's experience of the building and the

Figure 6
The eight most prominent topics in the Norwegian building code's modalisation of buildings. From most to least prominent, these are: 1. Technical requirements; 2. Universal accessibility and reliability; 3. Lifts and escalators; 4. Design; 5. Location, heights and distance; 6. Technical installations and systems; 7. Access; 8. Waste management. Red dots denote paragraphs from the *Planning and Building Act* (2008) and blue dots denote paragraphs from the *Technical Regulations* (2010).

visual impact on the environment typically characterise the aesthetic meanings. However, most of the statements concerning aesthetics correspond with the recommendations.

A peculiarity in the description of design seems to contradict this general pattern. Some quantitative requirements pre-determine minimum door and window sizes and thus affect buildings as architectural compositions, and therefore aesthetically. However, closer inspection reveals that these statements are not motivated by aesthetic concerns, but actually stem from technical considerations (luminance requirements, view requirements, fire safety, escape and so forth). Consequently, these design requirements scarcely represent societal interest in enforcing certain aesthetic values. Instead, they exemplify that specifying certain technical outputs can potentially have unintended consequences for buildings as artistic expressions. Basically, these technical desires impose unwarranted discontinuities on non-technological feedback loops in society.

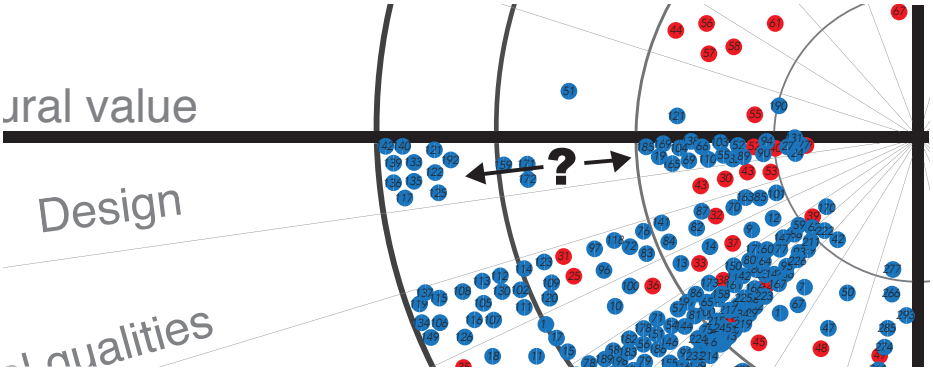


Figure 7
Expanded view of part of the findings diagram showing a spread between quantified design descriptions and cohesive design descriptions in the case of the "Design" topic. None of the other prominent topics displays a similar spread. Red dots denote paragraphs from the *Planning and Building Act* (2008) and blue dots denote paragraphs from the *Technical Regulations* (2010).

The systemic aspect of buildings reflects the specific meaning of these objects as part of a physical network, or even a complex social system (Fischer-Kowalski and Weisz, 1999; Hoffmeyer, 2008; Moffatt and Kohler, 2008) Inputs and outputs characterise this genus of feedback; systemic meaning is characterised by how a building participates as a node or a hub of physical processes. Notably, *Access, Location, heights and distances* and *Waste management* correspond to topics of connective significance. Other less pronounced topics dealing with systemic aspects are: *Sewers*, *Water supply*, *Connection to private infrastructure*, and *District heating*.

The findings indicate that the systemic aspect of a building is broadly represented in the building code, but it comes across as less pronounced than the emphasis placed on a building as an isolated technological entity in Q3 (see Figure 4). The building's capability for interacting in a greater system emerges from its technological constitution. However, its interactive aspect can scarcely be reduced to instrumental concerns about technology.

Treating systemic meaning like a technological concern only, or over-emphasising the building as an isolated artefact, may prove less sustainable than viewing it as a node in a partly technological network. Understanding the greater impact of a building in its environments, both natural and artificial, depends more on facilitating the right feedback loops – the ecologies and economies in which it participates – than isolating it from them. Our findings clearly reveal the opposite tendency in the present Norwegian building code.

Finally, reflecting both the implicit and explicit societal agenda, community meanings come to expression in the topic *Universal accessibility and reliability*, and to a less prominent degree in *Preservation of cultural value*, *Improvement programmes* and the topics concerning outdoor safety. Built expressions of community, harbouring egalitarian values, care and concern for each other, as well as explicit acknowledgments of interdependence and trust, characterise the social meanings of the building.

Most topics covering the built environment's special community significance display little modal force. Compared with the explicitness of the purpose paragraph in the *Planning and Building Act of 2008*, the actual descriptions reveal a more implied interest in all but one of the topics identified. This exception, *Universal accessibility*, introduced already in the purpose of the Act, emerged more like a building technology in our findings than the modesty shown in other community concerns. This curious explicitness is discussed in the next section.

Discussion

The research questions governing this study concerned the general representation (and modalisation) of the building in the Norwegian building code, and how the stated societal purposes in the building code come to expression as distinctively social concerns.

How does the Norwegian building code describe a building?

The findings of our analysis illustrated that the Norwegian building code describes the generic building by prescribing a frame, i.e. it imposes a legal framework. As a frame, the code cannot generate creative synthesis by itself or index all possible solutions; its actual effect on the built environment is that of imposing restrictions. From our findings, it can be seen that these restrictions mainly, and significantly, describe building technology. However, mapping the direct impacts of societal interest in the findings also revealed a broader perspective, namely that the societal interest in the building stretches beyond the technological realm.

It is not surprising that the Norwegian building code contains a comprehensive description of the building as a piece of technology. As artefacts (the result of human arts of production), buildings are technologically constituted and made up of technological parts. However, this does not correspond well with their comprehensive philosophical identities (Baker, 2004). In use, buildings are more than tools for survival. As a part of a constructed *umwelt*, buildings are an integral part of the human experience and a source of common reference in societal life. Buildings condition us, both in our private and public lives.

The normative language of building regulations appears to be well suited to describing technological aspects of building. However, it appears less well suited to describing some other aspects of meaning, such as aesthetics. Nevertheless, regulations clearly have an impact on the possibility space of building aesthetics.

A possible explanation for the prominence of technological descriptions compared with other aspects of built meaning may be found in the language used in regulations. Legal language and the description of technology are modally compatible. This is because the language of natural

science underpins technological meanings, and these are largely akin to legal expressions. More precisely, natural science expresses itself largely in the form of laws meant to explain phenomena and, more importantly, make predictions. This corresponds with the effect of legal language in the case of building regulations; it predicates the future.

The difference between the casual necessities of natural science and technology and those of social necessity is the difference between brute factuality and symbolic representation (Peirce and Buchler, 1955; Eco, 1976; Møystad, 1998). The corresponding, law-like expressions of these two modal categories appear essentially compatible, however. They both express necessary consequences given the validity of their initial conditions; they assume that a certain legal description sustains society and its consequence for the built environment becomes social necessity by deduction.

Legal descriptions do not distort the meaning of technological augmentation of the built environment, at least not in principle, but merely adjust technology`s vast potentiality to fit with the needs of the collective horizon, that is society as a collaborating unity. This is how the future strategically allows itself to be controlled (Certeau, 1980). However, some modes of signification are more dependent on context and interpretation than the brute factuality that characterises causality or law-likeness. As a consequence of this difference, some socially significant aspects of the built environment do not maintain their meaning as well as technology when translated into legal formulations.

The juxtaposition of meanings identified in our findings provides a comparative perspective on the difference between topics characterised bylaw-like and non-law-like modes of signification in the Norwegian building code. The peculiar quantified descriptions in “Design” provide an informative example of how indexisation, i.e. the collapse of interpretation into a law-like relation, produces discontinuities in aesthetic meanings shared in society.

In the findings, we observed that door and window sizes have become quantified by technical demands in the Norwegian building code. This modality effectively contravenes one important design parameter, given that the dominant style, i.e. the artistic, visual order of a built environment, depends on a different range of window and door sizes than prescribed in the present building code. Introducing such societal imperatives on technical grounds represents an undermining of the aesthetic continuity of the built environment. Effectively, such imperatives constitute disruptions, both locally and temporally (historically), in the aesthetic continuity of a built environment; technical regulations de facto close off an aesthetic option that could prove critical for sustaining e.g. a preceding classicism.

Disregard for non-law-like continuities, such as the aesthetic, indicates a lack of sensibility regarding the comprehensive spectrum of consequences implied in the technical regulations. The impact of building regulations on the meanings of the built environment is not restricted to the technological realm. However, the linguistic form of the regulations is pragmatically limited to predictive, law-like descriptions.

If building codes are logically restricted to constrain possibilities in the built environment, it follows that the societal benefits aimed for by regulation must be limited to the shared benefits of restriction, such as restrictions on building technology. It is not obvious, however, how a society would benefit from restricting building technology, i.e. limiting the pool of possible technical solutions. These considerations evoke an epistemological dimension of building codes, emerging from their *impact* on the built environment, as opposed to evaluating them solely on their *purposes*. The epistemological basis of our shared interference in built environment, i.e. a satisfactory understanding the nature of the expressions, limits and consequences of building regulations, appears to be lacking. To better understand the social (systemic) intelligence of imposing a frame upon the possibilities nested in the built environment, both on technical solutions and aesthetics, a deeper analysis of the reciprocity between building regulations and their physical effects seems crucial.

This overall discussion of the Norwegian building code`s description of buildings suggests that it is not sufficient, epistemologically speaking, to judge regulations solely on their intentions. Rather, a more comprehensive reflection upon the consequences of regulation, through the effect of buildings, on the social system over time appears necessary to avoid unintended, potentially negative effects of regulation.

How do societal purposes in the building code come to expression as distinctively social concerns?

Universal accessibility and reliability clearly stands out as the most prominent, most explicitly social topic in the Norwegian building code, according to our findings. At the same time, a remarkable peculiarity characterises the description compared with other topics of a social nature.

The juxtaposition of topics presented in the findings diagram revealed that the modalities of *Universal accessibility and reliability* resemble that of a building technology, rather than a topic corresponding to non-technical meanings. In turn, this implies that the topic determines the built environment much like a technical specification, i.e. with little or no room for interpretation. The striking difference between the social motivation of this topic and that of technological meanings suggests that this descriptive similarity might be a case of mistranslation, courtesy of the law-like language of the building code.

Universal accessibility and reliability also stood out among the topics in the Norwegian building code by being one of the newest additions to the regulations, with the shortest regulatory history of all the societal interests displayed in our findings. The purpose and content of this topic stretch only back to the Act of 2008, which increases the plausibility of mistranslation. Universal accessibility has not yet had the chance to go through the process of adaptations one can expect to have formed more mature topics. As a regulatory topic, universal accessibility is thus un-tested and the long-term effects of its implementation remain largely unknown.

Based on the above, it appears that the introduction of *Universal accessibility and reliability* has entered the technical language of the text as a legal translation of a perceived social purpose. As a result, two consequences seem plausible: i) The topic will develop over time to resemble other non-technological issues, because of unwarranted effects of its preliminary mistranslation; or ii) because building regulations in effect constitute a live, societal-scale experiment, their imperatives could have unwarranted effects on other societal processes than the intended object.

Acknowledging the first consequence comes easily, as it brings an immediate reward in the form of improved regulation consequences. Acknowledging the second consequence involves admitting human fallibility when confronted with a certain magnitude of complexity. Society has been reluctant to accept fallibility since the days of Socrates. In the specific case of building regulations, however, accepting our cognitive limitations appears critical if we are to avoid the dire consequences of its reversal when applied on such a large scale as a society.

Unchecked, the potential mistranslation of universal accessibility represents a non-trivial societal transgression, because it undermines the social fabric itself. The communal feature of the topic matters in ways that differ from how to get water safely and cost-effectively into a building. Community presupposes a degree of imagination, empathy and mutual cohesion not implied, or necessary, in the implementation of law-like meanings such as technology. The translation of a social purpose into an automated response potentially undermines our need to care about each other. Uncorrected, this suggests that the social ambitions of the Norwegian building code contain the seeds of their own destruction; they quite literally undermine the mutual cohesion that is likely to have motivated implementation of the topic in the purpose of the *Planning and Building Act* in the first place.

The reduction of genuine care to an automated response not only affects the buildings it describes, but also the very process of caring, by separating the act of caring from the effects of caring. In making every-

thing universally accessible, regardless of whether we care about each other or not, we cease performing this act out of empathy. This worrisome prospect poses ethical questions of a magnitude far beyond the scope of this single, empirical study.

The short-time consequences of enforcing universal accessibility through imperatives might be gratifying, judged solely as the fulfilment of a well-intending predicate. Seeing that the built environment finally becomes universally accessible represents an achievement that fulfils a social purpose. Complications surface, however, when reviewing the long-term sustainability of the underlying law-upholding capacities nested in social feedback loops.

Unwittingly undermining aesthetic possibilities makes the shared environment less varied, less beautiful, less civilized, less sophisticated, less rich and, according to Dewey (1934), less stimulating as a learning environment. Undermining trust, care, solidarity and collaboration leaves us with shared catastrophes. The antithesis of social meanings becomes manifest in their destruction by pure brute factuality: War and terror are very easy to accomplish through lack of trust and care, but correspondingly difficult to resolve without these social virtues present.

As with all laws and regulations and other expressions of power, there is an acute possibility of abuse by short-term, insular interests. The problem of undermining care manifests itself not because of Realpolitik, but rather from the singularity of Norwegian regulatory ambitions. As the explicit purpose of the *Planning and Building Act of 2008* extends beyond that of stipulating the correct building technology and mediating the process of building, it contains a prediction of future. Thereby, the present building code gambles on the truth value of the basic assumptions hidden within its predicates.

When translated into legal language, the social ambitions stated in the *Planning and Building Act* move the impact of building codes beyond the scope of technology and into issues touching the very fabric of human civilisation itself. Because of its purposes, the Norwegian building code comes to have deep ethical, political and epistemological implications, through the effects on the physical buildings it produces; it reflects and influences societal processes. To go beyond this and assess the concrete implications of our findings, we will need to investigate the role of regulations in social history in greater detail.

Conclusions

The conclusions out from this study are that the building code seems well equipped to describe building technology, which is doubtless an important aspect of building regulations. However, contradictions arise

when a regulation on social purpose describes its social purposes in legal language. Throughout this analysis, we observed a juxtaposition of greatly different topics and meanings towards actual implementation in the built environment. This juxtaposition of technological concerns, social purposes and aesthetic values raises important questions concerning the nature of the interaction between society and the built environment. More specifically, our analysis provides a perspective on the meanings a society can/cannot embed into its built environment through imperatives, without jeopardising its fragile continuities.

Our specific findings and the analytical method we applied, which allowed for modal comparison of topics, are of practical and methodological value for AEC professionals, policy makers and social scientists alike. More broadly, identification of building projects and physical buildings as the interface between social and physical processes opened up an empirical channel and showed that the research material nested in shared, societal descriptions appears vast and largely untapped.

Our findings raise some questions previously obscured in the bulk of regulatory texts, most notably epistemological questions such as why would a society benefit from delimiting the use of technology in its built environment? Further studies, including historical and comparative cases, into the epistemological significance of building regulations for society as a collective/system and architecture as a knowledge field are urgently needed.

Our finding that a topic with strong social significance (*Universal accessibility and reliability*) is introduced into regulatory texts as a technological concern opens questions of ethical proportions. It can be the result of indexisation, which may be adjusted over time, or it can eventually undermine the social constitution of the regulating society. Dealing with society as a piece of technology clearly raises ethical issues, the severity of which call for further studies into the interface between politics, ethics and built environment.

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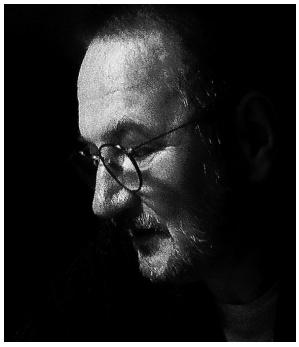
Biographical information

Jørgen Skatland – PhD. Research Fellow
Department of Architecture and Technology, Faculty of Architecture and Design, NTNU
Address: Sandgata 14,
7012 Trondheim, Norway
Phone: +47 99487878
Email: xxxxxx

Jørgen Skatland graduated with a degree in architecture in 2011. He is currently pursuing his PhD in architecture at the Faculty of Architecture and Design, NTNU. His research project *Between Intentions and Facts in Architecture Production* deals with how the pragmatics of architecture production – such as building law, bureaucracy and enterprise organisation (etc.) – contribute to the shape and content of buildings. Jørgen has been teaching studio courses in architecture at the Faculty of Architecture and Design since 2011 and is a member of the Urban Trigger research group



Biographical information

Ole Møystad – Professor
Department of Architecture and Planning,
Faculty of Architecture and Design, NTNU
Address: President Harbitz' gate 15A,
0259 Oslo, Norway,
Phone: +47 45006495
Email: xxxxx

Ole Möystad wrote his PhD on architecture and cognitive semiotics in 1994. He has pursued this topic through academic and professional work in Beirut, Oslo, Trondheim, Lisbon, Barcelona, Asmara, Xi'an and Brussels. He is professor at the Faculty of Architecture and Design, NTNU and head of The Urban Trigger Group. He has lectured and written extensively. His latest publication is *Cognition and the Built Environment* on Routledge 2017.

Biographical information

Jardar Lohne
Research scientist, dr. art.
Department of Civil and Transport Engineering, Faculty of Engineering Science and Technology, NTNU
Address: Hospitalsløkkan 31,
7012 Trondheim, Norway
Phone: +47 93444930
Email: xxxxxxx

Jardar Lohne is a research scientist at the Norwegian University of Science and Technology, Department of Civil and Environmental Engineering. He defended his doctoral thesis – *Le triomphe de la vertu – Étude sur les représentationsd'u neépistémologie morale dans le* Télémaque *de Fénelon* in 2008. Since then, he has published extensively on subjects ranging from LCA analyses via tunnelling and masonry to different themes within project management. His main current interest is applied ethics, especially concerning unethical behaviour and criminal activities in the construction industry. His latest publication (Lohne, et al., 2017) is "Ethical behaviour in the design phase of AEC projects", *Journal of Managing Projects in Business*, 10(2).