The transformative potential of Form

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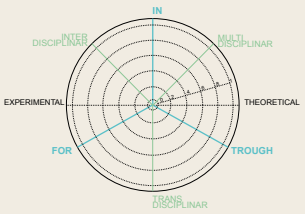

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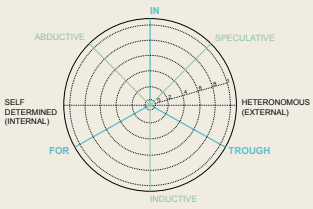

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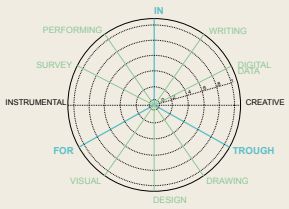

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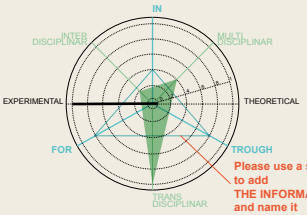

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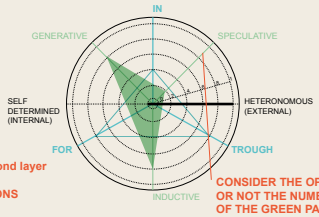

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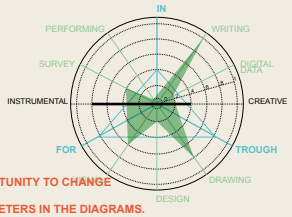

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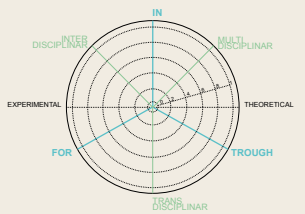

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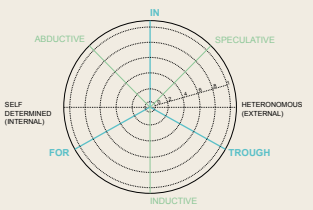

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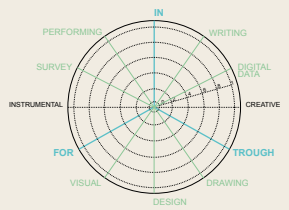

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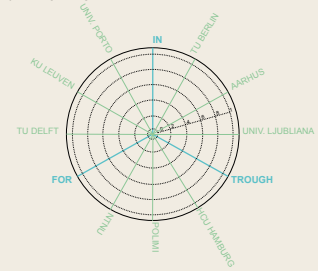

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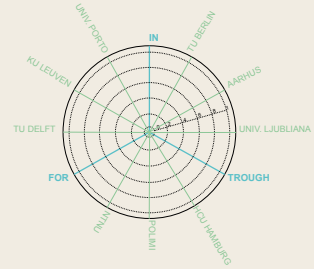

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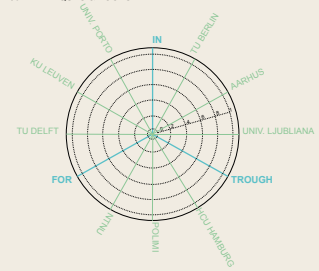

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Content

I INTRODUCTION

V. 3 DDDr TECHNIQUE

The *transformative potential* of Form

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ABSTRACT

Central to the contemporary architecture debate is the reuse of existing buildings to foster sustainable design approaches. Investigating the nebulous concept of potential emerges a relevant concern within the adaptive reuse field. However, the concept of potential is still nebulous in architecture. Among many potentials, this research focuses on the potential related to the architectural form adapted to host new uses.
The research aims to define, decode and assess the concept of transformative potential of form in existing buildings through a post-functional perspective. The methodological approach taken in this study is a mixed methodology based on the collective-case study method integrating morphological analysis, embodied energy method, following a trans-scalar and diachronic approach. This paper begins by introducing the literature review and the hypothetical definition of transformative potential. Then, the multidisciplinary approach is discussed across the methodology of collective case studies analysis. To conclude, the paper underlines the expected results. The findings should make a relevant contribution to the field of adaptive reuse by assessing a range of transformative potential for existing buildings.

Keywords: Potential, adaptive reuse, morphology, embodied energy.

In preservation theory, cultural heritage studies, and decision-making studies, choosing what to preserve from the totality is central to contemporary debate (P. Bullen and Love 2011; P. A. Bullen and Love 2010; Plevoets and Van Cleempoel 2019). However, determining what is suitable to be preserved and in which way to preserve it has been a dynamic process across history. Indeed, the idea of preserving “obsolete forms” even if not suit current needs is a quite recent concern, even in European culture. The built environment could thus be read as a palimpsest, composed of diverse layers from different epochs (Machado 1976). Thus, this shift from monument to palimpsest might potentially include all the built environment under the preservation domain. The role of adaptive reuse in conservation practice was introduced in the 1970s as a means of enlarging the traditional approach to heritage buildings and the object of conservation itself.
However, building stock is a crucial issue in the circular economy and plays a critical role in sustainability. (Merlino 2018) Stemming from the roots of the preservationist debate, the research embraces the contemporary theories both related to the adaptive reuse practice(Byard 2005; Douglas 2006; Wong 2016).
There is a growing body of literature that recognizes the importance of adaptive reuse practice, attempting to disclose the untapped potential of existing buildings.
The concept of potential emerges as a commonly used term in the adaptive reuse literature, and yet its univocal meaning is questionable. Evidence suggests that the amount of potential is among the most important factors for design within the existing buildings.
Although the term potential varies in the literature, there appears to be some agreement among the adaptive reuse field that potential refers to the ‘unexpressed transformability’.
The research aims to define, decode, and assess the concept of transformative potential in the existing buildings through a post-functional perspective. The work intends to define the nebulous concept of transformative potential following an operative view through its generative elements in the architecture realm. At first, the literature review links the notion of potential in post-structuralist philosophy (DeLanda 2002) with the prominent theories from hard sciences -starting from Galilei’s gravitational theory- in shaping the potential as a secular concept. The first essay attempts to provide a broad definition of potential, stemming from the roots embedded in other disciplines, the previous analysis and the investigation of such meaning within the architectural field allow us to propose a set of behaviours of the transformative potential in architecture.

Some shared features emerge in all the disciplines; the potential acts in a detected force field, it may be positive or negative, it is multiple and not unique, it can act as a function or a flow. It seems to require a trigger element to be activated.
Secondly, references to the potential related to architecture studies address this concept as ‘incompleteness’ (Choay 1992), ‘indeterminacy’, ‘loss’ (DeSilvey and Harrison 2020), ‘capability to change’ (Habraken 1991). The potential appears as a sum of ‘transformative’ features embedded in architectural form, as a state of equilibrium between the structure of space and the materials.
The literature about adaptive reuse practice addresses several references of potential. Douglas presents the ‘building’s adaptation potential’ as the sum of multiple characteristics; property’s location, condition, construction, morphology, and legal restraints as elements assessing the degree of freedom in adaptive reuse intervention. (Douglas 2006). Brand focuses on how to prevent

the loss of potential during the building's life span, even without defining such a potential (Brand 1995).

The literature review in architectural studies suggests the transformative potential composed by endogenous elements affected by exogenous conditions. The transformative potential may express the relationship, both qualitative and quantitative, between multiple components. As spatial elements –size, height, the geometry of the plan, configuration pattern, and tectonics of structure– and matter elements –materials and embodied energy– in a trans-scalar and diachronic perspective.

The research will analyze 16 adapted buildings across Europe as cases studies through the starting potential elements and the reuse intervention. The methodology of collective-case studies. The unit of analysis is the building as an individual object which is located and connected with its physical context. The current research does not evaluate the legal implications and norms in adaptive reuse practice, as a construct of society, which had to follow the empirical findings, not the other way around.
The cases studies selection will consist of studies within a variety of morpho-structural types, as Weberian ideal types (Weber, Shils, and Finch 1949) According to Weber, the ideal type represents a conceptual framework that is not real; it serves as a template, a scheme of reality that allows measuring, to unveil its significant elements according to the research purpose.

The classification of buildings in typologies crossed the classical treatizes spanning from Vitruvius to Durand. (Durand and Legrand 1801; Krinsky 1989) Here, the proposal is to unbuild the classical typological classification in place of a morphological one, assuming the questionable role of the new building over the present sheer amount of built stock. The ex-post sort of the built environment allows considering existing buildings as infrastructures beyond their previous functional purpose. This classification ex-post of buildings as morpho-structural types lead to believe a case generalizable to the whole category, admitting a selection between various buildings, that may not be comparable to each other. (Figure1)

The intervention actions novel selection permits to test the conditions of main approaches in the current adaptive-reuse practice (White 1999; Brooker and Stone 2004; Jäger 2010), shifting from "interventions" to constructive and deconstructive actions. Specifically, the actions are intended under the lens of Brand's shearing layers theory, in order to reconstruct the crucial phases of the evolution of buildings' form through adaptive reuse approaches.

The selected buildings faced diverse adaptive reuse approaches, from radical to minimal, that started from a diverse state of decay of the original building. The various decay stage offers an overview of obsolescence that existing structures may address, attempting a correlation between former conditions and reuse approaches.

The research method follows a multidisciplinary approach integrating the morphological analysis with the retroactive-embodied energy assessment of the existing structure.
The first method employs the critical redrawing of original buildings as a tool to highlights both dimensional features and configurational aspects; the graphical analysis of the adaptive reuse project will underline plausible links between them. (Figure 2) The second method measures the embodied energy related to primary material flow during the adaptation. The embodied energy analysis gives weight to the amount of added, removed or displaced in each reuse activity to assess the impact of these projects on the sustainable use of resources. (Jackson 2005; Benjamin 2017). Exogenous conditions are included in the morphological analysis, contextualizing each project in a specific urban context that takes part in the "deformation" of the original building.(Borie, Micheloni, and Pinon 1978) To conclude, the impact of time is highlighted across all the research, as a crucial element affecting both morphological variation and the material flow.

The need to apply an interdisciplinary approach, which merges morphological analysis, energy account embracing a diachronic perspective turns out to be suitable to analyze through multiple lenses a complex issue.
The results may underline a correlation pattern between the formal starting conditions of a building and its adapting reuse intervention.
Some sub-questions emerge. Such transformative potential increases in the balance between constructive and deconstructive approaches of adaptive reuse? Through which characteristics does an existing architectural object underlie its options of use? The concept of transformative potential may link morphotype and possible use inherent in the existing form and materials. Both conscious decay approaches and radical design projects may show an analogous transformative potential average. (Figure 3)
The present research is still ongoing, while results are not in discussion yet.
However, the current research stage allows organizing the

16 cases in four leading groups: footprints, ruins, structures and boxes. Each of these groups might be seen in terms of transformative potential, through its level of completeness and its morphological structure that per se shows a “tendency”(DeLanda 2002) of the form to be adaptated in more than one way.
Among the other, the projects actualized shows a trajectory in the adaptation, that was influenced by a multiplicity of factors. Among these factors, concerting the physical features of an existing building, the form plays a prominent role.
The theoretical objective is to add the concept of transformative potential to the current preservationist debate. The novel notion may enlarge the preservation theory following a post-functional perspective in the evaluation of existing buildings. Post functional in the context of this research means both recognizing dismissed buildings as independent from functional types and the proposal of a focus on morphology according to our increasing need for flexible spaces in contemporary society.

The task is to express the transformative potential of form as an open relationship between selected elements, such as dimensional features, embodied energy and decay, that are capable of outlining a pattern between existing buildings and adaptive reuse intervention. Such a transformative potential may give weight to multiple use options in existing buildings.

The case studies are all kinds of relevant buildings in architecture panorama, as ‘monuments’ in adaptive reuse practice. Further research should focus on ‘anonymous’ buildings, that faced a process of decay and change of use even if not under the adaptive reuse label. To conclude, this particular king of potential related to the transformation of form through an adaptive reuse project aims to be complementary to the many other potentials that concur to define variations of the built environment. The transformative potential of form is not unique nor absolute, but it is a part of a manifold net of actors taking part in any architectural transformation.

DDDr Statement

The research aims to have an impact on the sustainability of buildings, by rescuing the central role of architecture in orientating the future while addressing environmental awareness. The process follows an interdisciplinary methodology, as fundamental in dealing with complex systems such as the built environment. The research path follows the morphological analysis as the main drive. By analyzing in-depth 16 buildings, the first instrument is the drawings of the two main steps recognized as turning points of adapted buildings; the original spatial asset and the adaptive reuse one. The redraw of existing buildings allows rediscovering the buildings through the lens of the research questions and provide the graphic support for a multi-methods analysis. The relationships between elements, such as dimensional features, embodied energy related to materials and decay, emerge thanks to diagrams and critical schemes. A quantitative data analysis led by the embodied energy assessment and the quantitative dimensional factors ingrate the qualitative findings. The spatial network analysis integrates both qualitative and quantitative results. An in-depth analysis of the design project both in preexistences and in new designs on them may underline a pattern in design approaches based on the existing building form as a fundamental condition. The research aims to assess a transformative potential average to the existing buildings to support adaptive reuse approaches.

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Felix Rasehorn is a practice-based design researcher at the cluster of excellence "Matters of Activity". Elena Guidetti is PhD fellow at the Future Urban Legacy Lab (FULL) and a PhD Candidate at the Department of Architecture and Design of the Polytechnic University of Turin (Italy). She carries out research activities on the transformative
potential of existing buildings, according to morphological aspects and characteristics of embodied energy. She graduated in Architecture at the University of Ferrara with a design master thesis on adaptive reuse developed with the Faculdade de Arquitectura do Porto.

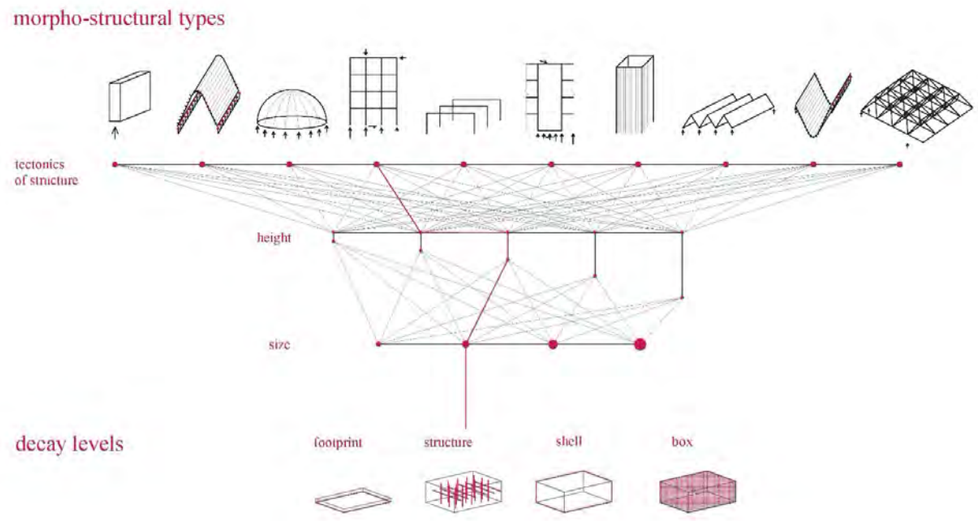

Figure 1. Morpho-structural types and decay level assessment, Elena Guidetti, 2022

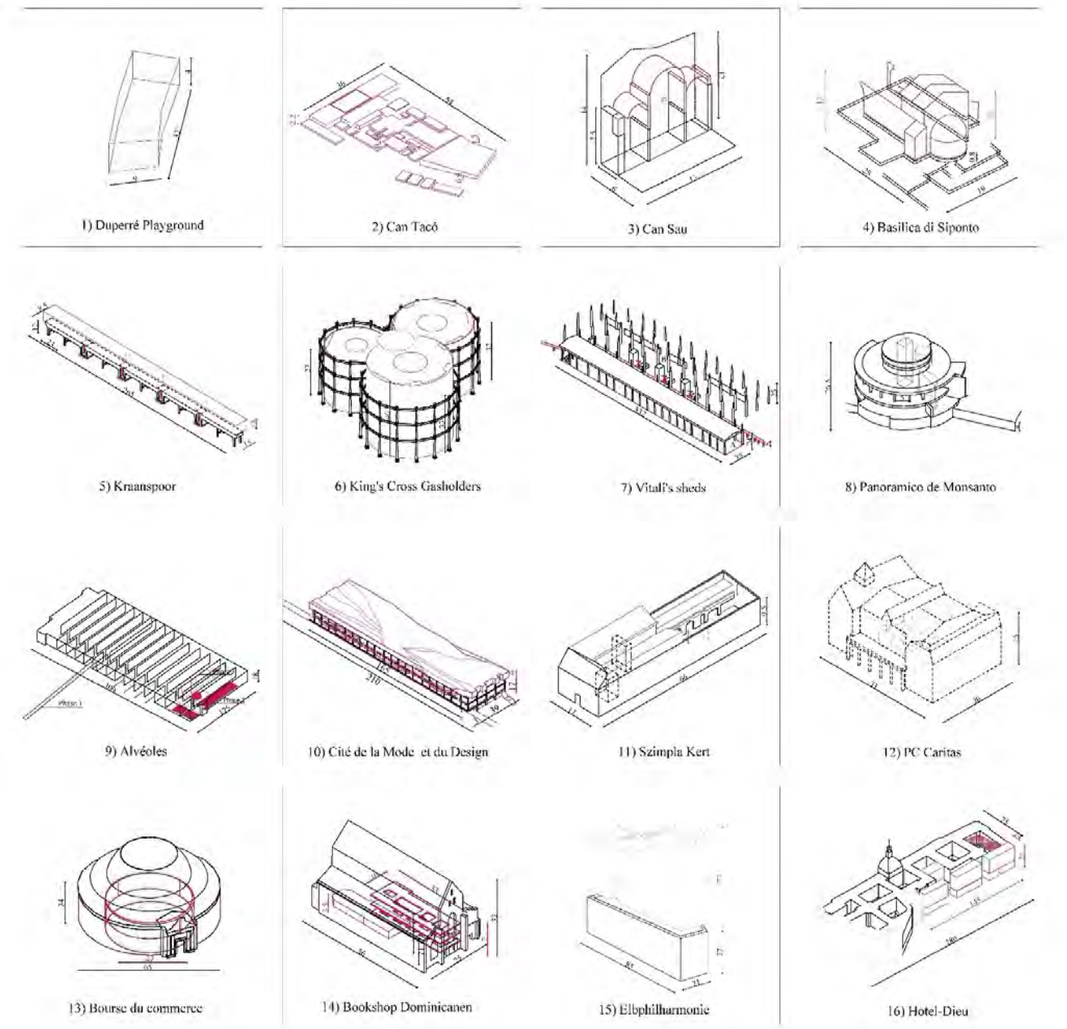

Figure 2. Morphological analysis, case studies' transformations, Elena Guidetti, 2022

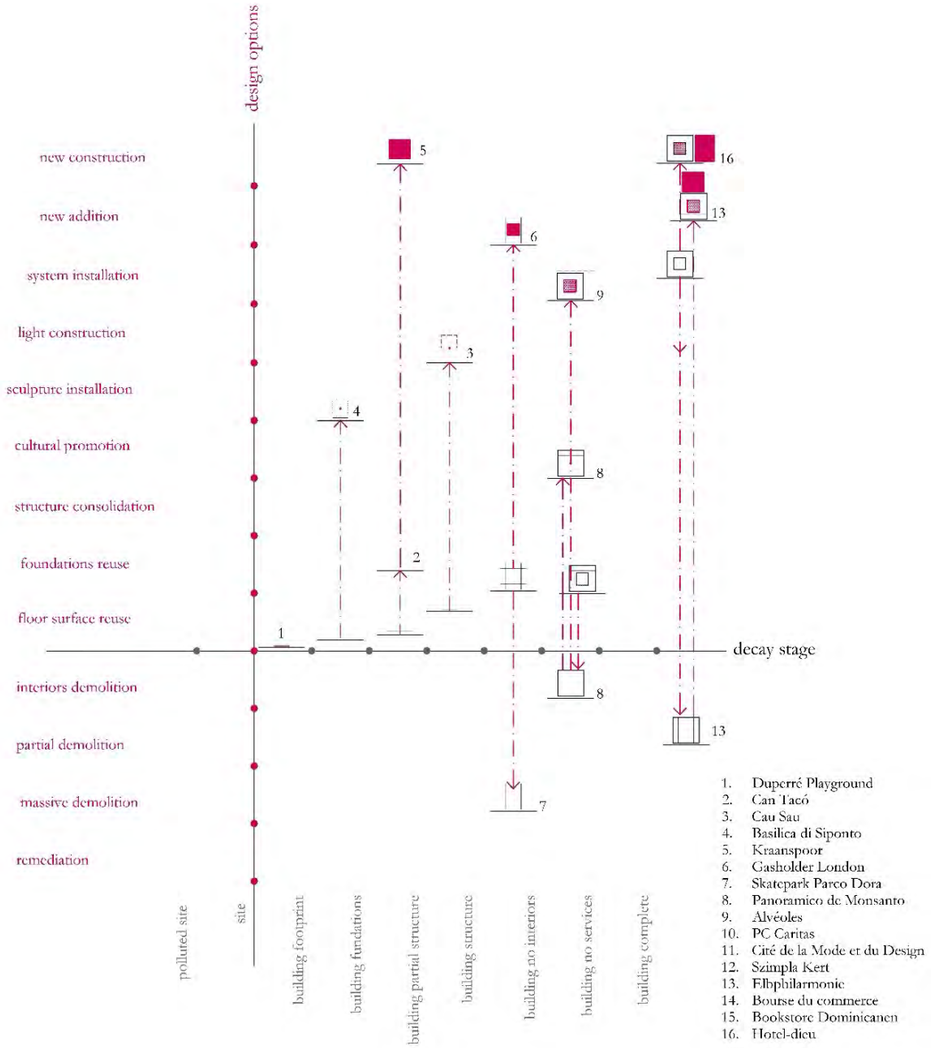

Figure 3. Constructive and deconstructive actions, Elena Guidetti, 2022

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