EDITORIAL

From the Pantheon to the Anthropocene: Introducing Resilience in Architectural History

Elizabeth Mays Merrill* and Stylianos Giamarelos†

Originally developed in the ecological circles of the 1970s that pursued critical alternatives to the modernist worldview, the concept of 'resilience' has pervaded 21st-century thought, from psychology to political theory, and from planning to architecture. But in most of its current guises, it has been used in positivist and future-oriented frames of thinking that limit it to an aspired benchmark for managing crises and withstanding catastrophic events. This Special Collection of *Architectural Histories* is an attempt to recuperate the overlooked potential of 'resilience' by asking whether and how its introduction in architectural history can transform current disciplinary practices. In their articles, the contributing authors revisit buildings that have been reused and transformed to withstand change over the centuries. Adopting the long-term perspective of 'resilience', they examine these physical objects as carriers of multiple layers of interventions, leading them to re-evaluate the intentions of architects and users and to reconsider the place of these buildings in architectural history. In most cases, 'resilience' offers a novel historiographical perspective that unveils long-standing conceptual schemata, from periodizations to methodological tropes, which still condition the historians' interpretation of the past. In the final instance, 'resilience' illuminates the deep-seated modernist dichotomy between 'innovation' and 'tradition' in architectural history. In keeping with its origins in the late 20th-century, the concept offers a significant alternative to 21st-century architectural historians' established views on modernity that are still embedded in their thought and practice.

Introduction

From antiquity to the present, the myth of Theseus's ship has been continually revisited as a thought experiment that explores the resilience of an object's identity over time:

> The ship on which Theseus sailed with the youths and returned in safety, the thirty-oared galley, was preserved by the Athenians down to the time of Demetrius Phalereus. They took away the old timbers from time to time, and put new and sound ones in their places, so that the vessel became a standing illustration for the philosophers in the mooted question of growth, some declaring that it remained the same, others that it was not the same vessel. (Plutarch 1914: 49)

Throughout intellectual history, philosophers have mainly focused on these questions: As the Athenians gradually replaced the rotten planks with new ones, was there a point at which the reconstructed ship in the harbor

was no longer the 'original' resilient object but rather a brand-new artifact? And if they did not discard but instead saved and stored the original planks, then where exactly did the old galley lie? In the rotten planks in the storage rooms, or in the reconstructed vessel in the Athenian harbor? For historians of the object, these last questions are especially significant, as the possible answers suggest two different trajectories for continued research. They also foreground two main perspectives on resilience, especially in relation to objects that gradually transform over time. The first suggests that resilience is conditioned by the physical properties of objects. The second perspective turns resilience into a question of historiography. This not only involves a reinterpretation of the physical object, alongside the intentions of its designers and makers, but also concerns the historians' own conceptual schemata. Introducing resilience in architectural history, the articles gathered in this Special Collection of *Architectural Histories* explore both perspectives. But as the contributing authors move between the physical and the historiographical perspective, a recurring tension arises, between resilience and modernity and the deep-seated dichotomy of 'innovation' versus 'tradition'. It is this tension that foregrounds the significance of resilience as an alternative to the residues of modernist thinking in architectural design, history and theory. In what follows, this editorial sets out to explore in greater detail the implications of these perspectives for architectural history.

* Max Planck Institute for the History of Science, Berlin, DE

† The Bartlett School of Architecture, University College London, UK

Corresponding authors: Elizabeth Mays Merrill (elizabethmerrill11@gmail.com); Stylianos Giamarelos (s.giamarelos.12@ucl.ac.uk)

Defining Resilience: From Ecology to Architecture

The concept of resilience as we understand it in the 21st century is historically rooted in the ecological critiques of modernist thinking of the previous century. It was originally developed by Crawford Stanley Holling (1973), who argued that an ecosystem has multiple points of equilibrium, as opposed to existing in an inflexible, singular state. Since then, 'resilience' has evolved to assume relevance in diverse fields of study. Expanding beyond its original use by geographers and ecologists, today it not only pervades fiction and popular literature (see Zolli & Healy 2012), but also serves as the impetus behind large-scale government initiatives, health programs and funding campaigns (McGreavy 2015: 106). Within this broader context, 'resilience' is commonly defined as the capacity of a system, enterprise or person to absorb or withstand change, maintaining its core purpose, integrity or character in the face of dynamic circumstances. In other terms, it denotes a system's ability to self-organize, learn and adapt (Gunderson & Holling 2002).

Owing to its increasing cultural pervasiveness in the 21st century, 'resilience' has promoted different ways of thinking in diverse fields of study, ranging from psychology and political theory to international relations and architecture (Grove 2018). The concept has also fostered interdisciplinary studies, as it invites scholars to look beyond the conventional confines of their disciplines and to consider the multiple factors that render systems, structures, people and enterprises as resilient. In architecture and studies of the built environment, 'resilience' has now become part of the common parlance, most frequently applied to the large scales of urbanism, planning and geography (Bosher 2008; Hamnett & Forbes 2011; Rogers 2012). Over the past two decades, it has been employed to address wide-ranging challenges in architectural practice, from sustainability, at the most immediate level, to urban crisis management in the wake of catastrophic events, and, at a global scale, the Anthropocene.

Architects frequently understand 'resilience' in relation to specific design challenges that involve 'sustainable' adaptation to foreseeable changes in the environment. Yet resilience and sustainability are not synonymous. Sustainable architecture and its recent history suggests minimizing a building's environmental impact by means of efficient systems and the moderate use of materials, energy, and space (see Tabb & Deviren 2014; Nucera 2016). Highly touted 'sustainable design' and 'sustainable development' are often guided by the technocratic and market-led debates usually associated with the UN's 1987 Brundtland Report on global sustainable development (see Rawes 2013). 'Sustainable' architecture is mainly preoccupied with the present and the future. By contrast, resilience is more clearly focused on long-term developments that reach back to include time-honored regional or vernacular building practices. As architects learn from them, they also update and apply them to the precarious present. But resilience is not only about continuity or reuse (as in Knapp 2003). The active process of change, and the capacity to adapt, is at the core of a resilient system.

In reducing vulnerability, resilient architecture does not necessarily prevent adaptation and innovation. Rather, the concept incorporates flexibility, the dynamic interplay of persistence and transformability (Walker & Salt 2006). In 'bouncing back', resilient architecture maintains a key element of its identity – and stability within a specified state – while also adapting, innovating and reorganizing according to new conditions (Walker et al. 2004).

In recent years, the resilience concept has become de rigueur in international discussions of best practices of governance and planning following catastrophic events, from natural disasters to terrorist attacks — such as September 11 (in 2001) and Hurricane Katrina (in 2005) in the United States, or the Tohoku earthquake (in 2011) in Japan (Awotona 2017; Coaffee 2009; Masterson 2014; Pelling 2003; Van der Heijden 2014). The ideal of the 'resilient city' has been normalized with the establishment of programs such as the United Nations' Making Cities Resilient, the Rockefeller Foundation's 100 Resilient Cities and the *City Resilience Index*, the World Bank's Resilient Cities, and the Urban Land Institute's Urban Resilience. These programs seek to fortify cities against chronic urban stresses (shortages in energy, food and water, endemic violence, overcrowding and poverty), and to prepare them for single-event disasters and threats triggered by environmental changes. In the discourses built up around these subjects, 'resilience' is usually conceived as a paradigm of systemic thinking. It connotes an understanding of the world as fragile and vulnerable, buffeted by crisis and in need of fortification (Abramson 2016: 155). Again, the capacity of urban, environmental and social systems to withstand intense disturbances, reconfiguring themselves to endure and persevere while they also adapt to change, lies at the core of these debates (**Figure 1**). But more crucially, 'resilience' also serves as a rallying cry for those who want to affect change in the status quo and to improve the built environment in its multiple dimensions (Chandler 2014; Washburn 2013). Hence, in the case of human ecosystems, conversations around urban and social resilience also address major issues of environmental justice (Allen, Griffin & Johnson 2017; Coaffee 2016; Lansford et al. 2010). This is how broader challenges at a planetary scale — from climate change and the need to move beyond fossil fuel-based modes of production, to questions of equity in community-driven design — enter the agenda of debates around 'resilience' (Brown 2018; Hopkins 2008; Newman 2017).

Recent scholarship suggests that the concept of resilience is also instructive from the vantage of the Anthropocene, the latest human-made layer in the geological substratum of the planet (see Trogal et al. 2018). Among others, Neyran Turan (2019) argues that architecture acts as a measure for the planetary impact of human activity, as it is now inscribed and embedded in geology and geography. From its deceptively limited 'site-specific' scale, architecture therefore contributes to discussions of broader urban, geographic and geological spans in ways that are relatively unexpected and unfamiliar (cf. Turpin 2013). Conversely, understanding architecture's embeddedness in these broader scales challenges the discipline's

Figure 1: Aerial view of Inglewood, California. Photo by Leslie Evans, 2018.

protagonists to move beyond localized discussions of green technologies and sustainability. In this context, 'resilience' emerges as a pertinent concept that enables the transgression of limitations and blind spots of 20th-century modernist thinking and practice (Walker & Salt 2012).

Resilience in Architectural History

The flourishing discourses in architecture and the built environment render 'resilience' an apt heuristic for contemporary developments. But, as previously noted, most of these discourses are positivist and future-oriented in their scope. Starting from the present, they focus on building renewal, flexibility and adaptation in the future. Architectural historians, in turn, have yet to systemically address resilience as a paradigm that could exert a pertinent influence on their discipline. Assuming this project, this Special Collection asks whether and how architectural history might appear differently through the lens of resilience. The articles critically reassess the technocratic employment of the concept, as applied to the global history of architecture, from ancient Rome to contemporary Japan. As examined by the Collections' authors featured here — experts in the fields of architectural history, urbanism and archaeology — 'resilience' provides a new lens with which to examine the physical objects of the built environment and the histories that envelop them. In the final instance, 'resilience' challenges both existing notions of modernity and its relationship to history.

As applied to buildings as physical objects, structures that withstand the adversities of time and nature, the concept of 'resilience' appears closely tied to the long history of architecture. A 13th-century cathedral, for instance, has a history that spans the centuries, narrating its incremental evolution over time. This understanding of a structure's physical resilience leads us to question how we assess the history and chronology of a building — what is the 'original' design? It likewise prompts reflection on the figures integral to a building's making. What is the role of the architects in the history of a building that extends over centuries? How have architects contributed to reinforcing architectural, urban or community resilience over time? And have they done so in ways that have been possibly undervalued or overlooked in the past? In these cases, 'resilience' becomes a question of active and transformative design.

For the historian, however, resilience also denotes deliberate creative forces — systems of design and construction, ideologies and theories, which ground practices integral to the discipline. In these cases, 'resilient architecture' implicitly affirms that no building is unique. Architecture adheres to common underlining structures by which its forms, uses and ideologies are rendered elastic and durable. As an active force, how then is 'resilient architecture' assessed by architectural historians over a prolonged period? And to what extent is the concept applicable and adaptable across broad temporal and geographical spectra? Examining long-term patterns in the history of the built environment, scholars are not only able to delineate the continued use of certain physical forms, materials and design methods. More critically, they are also able to pinpoint the specific cultural developments and social ideologies that remain embedded in the material production of built forms. Still, the interpretation of a given structure, and its broader historical importance, is continually open to change (**Figure 2**).

The concept of 'resilience', as applied to the practice of writing history, introduces a different set of questions pertaining to established periodizations and historical narratives. Architectural historians increasingly consider why and how conceptual schemata like the 'dark Middle Ages' have become resilient (see Le Goff, 2015). What does the resilience of these concepts imply for historiographical practices? Are colonizing and other power structures

Figure 2: Former auto service station, repurposed as a community center, Natchez, Mississippi. In its physical form, the structure might be considered an example of American colonial architecture or resilient Palladianism. The building has also proven to be functionally resilient. Photo by Elizabeth Merrill, 2018.

historically embedded in the modes of production and perpetuation of this historical knowledge? Do such long-standing ideas need to be decolonized and challenged, or should they be further developed to incorporate other possible forms of historical knowledge production? Selective genealogies proposed by architectural historians might deconstruct and critique their subjects, or alternatively, reconstruct and vindicate them. And since such conclusions are not mutually exclusive, history can be limited neither to the vantage of a single assessor, nor according to its own past trajectory. Through changing cultural attitudes and interpretations, the course of history unfolds as a responsive continuum, within which architecture and the built environment play major roles (cf. Giedion 1967: 5–6). As elucidated by the articles of this Special Collection, the concept of 'resilience' in architectural history provides a lens through which to look back, to examine constructs that previously were largely ignored, such as the Roman thermal baths or the constructions of Bernhard Klemm in the German Democratic Republic. At the same time, it offers a framework with which to reconsider oft-studied figures, concepts and structures – Pier Luigi Nervi, Louis Kahn and museum architecture, among others.

On a methodological level, the introduction of 'resilience' in architectural history also reveals a dichotomy at the core of the discipline: between 'innovation' and 'tradition'. This is another symptom of the tension that persists between the study of primary, physical objects and the modernist historiographies that come to envelop them. Architects and architectural historians often celebrate novelty and invention, exalting the unprecedented 'modernity' of exemplary projects across the globe (see, for example, Ching, Jarzombek, Prakash 2007). Yet within the long history of architecture, there are just as many narratives that speak to the continuity of design methods

and practices, building programs, plastic forms and functional typologies (Van Schaik 1994). Such continuities invite further reflection on the utility of the terms commonly used by architectural historians and their embedded ways of thinking in relation to modernity. In focusing on the diverse approaches and expressions of 'resilience' in specific cultures over time, the articles of this Special Collection promote more nuanced and contextually sensitive interpretations of architectural history. In each case, the concept of 'resilience' is developed beyond its prevailing positivist and future-oriented connotations and discourses (as in Shah 2012). 'Resilience' itself is shown to be a ductile and elastic concept, the critical application of which extends far beyond the deep-seated and generic juxtaposition between 'tradition' and 'change'.

Resilient Places
Architects have long evoked the 'spirit of the place' in the conception of buildings, also alluding, implicitly or explicitly, to the idea of resilient architecture (see Norberg-Schulz 1980; Tuan 1977; Casey 1997). These places — physical spaces denoted by distinct formal, environmental or experiential qualities — are in turn understood as eternal and resilient. Within the scope of this Special Collection, the idea of resilient place is but one means by which to draw parallels between subjects of diverse temporal and geographic focus.

The Roman concept of *genius loci* — the spirit of place (**Figure 3**) — conveys the idea that place retains its essential qualities, regardless of changes in time, culture or form (Acocella 1992: 28). Ariel Genadt's article 'Three Lessons from Japan on Architectural Resilience' draws upon this notion, examining how, in three historically distinct contexts, Japanese architects have devised building systems that balance natural and environmental factors

Figure 3: Depiction of the Genius Loci, Casa dei Vettii, Pompeii, 1st century AD. Image shows the Genius Loci, as the guardian spirit of the residence, standing between two household gods. Photo by Patricio Lorente.

with inventive technologies to accommodate disruption. Discussing the reconstruction campaigns that followed the 2011 Japanese earthquake, Genadt shows how selected architectural proposals for the reconstruction of Tohoku were not mere responses to a state of emergency, but resonate with a history of resilient architecture that contextualizes them in the long term. His analysis highlights the balance that had to be met between government-driven 'engineering resilience', characterized by the implementation of durable, fail-safe solutions, and the local inhabitants' desire to maintain a link to their past, which may be regarded as a form of 'ecological resilience'. Highlighting the initiatives spearheaded by the ArchiAid and Home-for-All design groups in the reconstruction of Tohoku (2011–2016), Genadt relates how, in drawing upon the 'genetic information' of the region, architects realized resilient architecture that not only was physically strong, but also remained faithful to the long-standing spirit of the place.

The architect Julian Beinart likewise relates place, as architecture's innate foundation, to a living ecosystem, but more explicitly draws attention to the connection between places and constructed monuments:

> Architecture comes about only in the context of existing places: buildings are restored, reconfigured, or replaced within already formed urban plans. Even isolated virgin sites possess a territorial heritage. Monuments, memorials and museums are deliberate attempts to maintain memory, battles against the terror of forgetting. The artefacts of our cities give us biological equilibrium and cultural continuity by virtue of their stability. (Beinart 1998: 202)

Indeed, it is in the construction of memorials and monuments that the resilience of place is most often materially captured. Carola Hein examines this topic in her contribution 'Scales and Perspectives of Resilience: The Atomic Bombing of Hiroshima and Tange's Peace Memorial', focusing on Kenzo Tange's Hiroshima Peace Memorial, a project specific to a single place and to the local and global resilience narratives integral to its making. Her study reminds historians that although resilient architectures may well be place-bound, the resilience narratives that encircle them are boundless in comparison. Strictly regional interpretations cannot exhaust resilience narratives whose intended reach is potentially global. Through this case, resilience therefore invites a broader historiographical scope that can zoom in and out of the specificities of place at will. Distinguishing the different local and international actors involved in Japanese post-war reconstruction — from architects to filmmakers, historians, politicians and planners — Hein's article explores the construction of diverse resilience narratives, each born from a different perspective and addressing a specific audience. The article exemplifies how, in discussing resilience, architectural history also reframes socio-political questions of representation and outlines the contested spaces of narrative and identity. Appropriately, Hein foregrounds the need to develop 'critical resilience narratives', further contributing to this nascent historiographical discussion.

Resilient Methods and Models: From Antiquity to Modernity

The concept of resilience is latent in architectural history, although it has traditionally been overlooked. Vitruvius's *De Architectura*, the founding text of Western architectural theory, is a good starting point. The well-known tripartite

Vitruvian rubric for good building — 'Firmitas, Utilitas et Venustas' — notably begins with 'strength' or 'durability'. The Latin term *firmitas* connotes the idea that architecture should be not only well built, but also designed for posterity. Vitruvius further underscores this in the preface to Book I, where he directly addresses the Roman emperor Augustus: 'For I perceived that you had already built extensively, were building now and would be doing so in the future: public as well as private constructions, all scaled to the amplitude of your own achievements so that these would be handed down to future generations' (Vitruvius 1999: 21). Vitruvius's advice was prescient, as many Imperial Roman structures remain standing today. The Pantheon (**Figure 4**), which has withstood wars, destruction, rebuilding, natural calamities and various 'restoration' campaigns, is just one prominent example (see Marder and Wilson Jones 2015).

While positioning Vitruvius as an early champion of resilient architecture might seem anachronistic today, the ideas he espoused undoubtedly find resonance in present-day discourses. Within the articles of the Special Collection, ancient precedent — methods and models — recurrently provides a foundation for the realization of resilient architecture. Within the context of Jo'anne van Ooijen's article, a series of architectural palimpsests can be read in the built fabric of ancient Rome, where monuments that have undergone ruination, spoliation and reconstruction bear evidence to multiple layers of intervention. Re-examining structures like the Cathedral of Syracuse in their multiple historical contexts, Van Ooijen's study uses resilience as a tool to draw parallels between the architectures of different epochs and regions. In her study, the extant structure is a historical vessel, a witness and carrier of multiple layers of intervention, itself shedding light on the variegated significance of its distinct historical uses.

Like the 'resilience' concept, the idea of the palimpsest carries biological connotations, the notion that buildings are living and evolving. While buildings do not exist in the same way that a living being does, they are moved by conscious human activity. The idea of the architectural palimpsest is therefore related to architectural reuse. For historians Alexander Nagel and Christopher Woods, 'All production of artifacts; all art making, meaning making, and manipulation of codes; all histories of building and painting are histories of reuse. In fact, the true rarity is the opposite of reuse, namely, pure creation ex nihilo' (Nagel and Wood 2010: 178). The Vitruvian dicta implicitly mandate such an idea of reuse — the construction of architecture whose form and meaning are continually perpetuated by individuals long after its construction — and a structure like the Pantheon exemplifies it. Constructed as a pagan temple, the Pantheon withstood the fall of the Roman Empire and the ruination of Rome that ensued. In the 7th century it was converted into a Christian church, and in the course of the early modern period, it was increasingly identified as a mausoleum. Today it is a monument to Roman history — in its full scope — and a popular tourist attraction. As underscored by Edward Hollis (2010), in examining the 'metamorphosis' of structures like the Pantheon over time, Van Ooijen's study of architectural palimpsests also draws attention to 'the secret life' of resilient architectures revealed through their multifarious uses and inhabitations over time.

Allyson McDavid's article, 'A Blueprint for Sustainability', on the other hand, examines the practice of the Vitruvian

Figure 4: Anonymous, elevation of the Pantheon in Rome, reconstructed to its original form, engraving (Lafreri 1549).

dicta within the ancient period. As explored by McDavid, resilient building was a time-honored practice in ancient Rome, whereby cities and empires solidified their legacy through the construction of monumental, lasting structures. But where the late Imperial period is traditionally viewed as an era of decline, McDavid's discussion of the re-adaptation of the monumental baths to serve contemporary needs highlights their resilience and active transition to the next phase of their history. In other words, writing the history of these resilient physical structures also sheds new light on a whole period of architectural history of the late empire.

In this instance, the Roman adaptation and reuse of existing structures for contemporary needs is strikingly modern. While the processes employed are specific to a given culture and location — Imperial Rome, Italy — they are not exclusively dependent on these conditions. Over 1500 years later, following another period of exceptional political and economic growth, Italians again found themselves with a surplus of abandoned architectural monuments (Skansi 2014). Many of these technically advanced, reinforced concrete constructions were designed by Pier Luigi Nervi. The approach to repurposing these structures in the second half of the 20th century is similar to that employed in late Imperial Rome, whereby bath complexes were not only physically reconfigured for a different bathing public, but were also adapted in their functions to suit the social and economic demands of a Late Antique society. Constructed in 1961 and 1963 respectively, Nervi's Burgo Mill Paper Factory in Mantua and George Washington Bridge Bus Station in New York have likewise been adapted to continue to serve their original purpose (**Figure 5**). Expanded and updated, the

facilities accommodate 21st-century population numbers, technology and product demands (see Cresciani & Forth 2014).

In conceiving structures like those in Mantua and New York, Nervi was himself moved by ancient precedent. As discussed by Micaela Antonucci and Sofia Nannini in 'A Concrete Resilience', Nervi rooted his approach to design in the study of ancient architecture. As his lecture slides and notes show, these projects from the distant past provided him with technical and theoretical models for his 20th-century concrete designs. In studying them, Antonucci and Nannini thus exemplify how a 'resilient historiography' breaks apart from, and substantially furthers, the established but effectively sterile modernist divisions between 'innovation' and long-standing 'tradition'. The constructions of Nervi are not only physically strong and resilient by modern standards. Following their Roman counterparts, they also display durability in the mentalities they express and elasticity in the functions they fill.

Roman classical architecture features again in the study of Marvin Trachtenberg, which interprets anew Louis Kahn's design for the New Yale Art Gallery (1951–53). Trachtenberg reads the project's huge, closed brick façade as a modernist interpretation of imperial architecture, harnessing, in spirit, the resilience of its formal characteristics and its symbolic associations. More provocatively, Trachtenberg argues that the ponderous Gallery façade was designed to appear physically defensive and resilient. As a visual 'Fire Wall' running along the edge of the Yale campus, Kahn's Gallery both guarded and separated the elite culture of the university from the city that surrounded it. In this case, the conceptual associations implicated in the idea of 'resilience' lead to a novel historiographical

Figure 5: George Washington Bridge Bus Station, New York, designed by Pier Luigi Nervi (1961). Photo by Addison Godel.

interpretation of a project that has been discussed mainly for its formal features.

The discussions of Kahn's and Nervi's projects thus foreground the dual face of resilience: Within the long history of Western architecture, the same buildings and forms return with renewed ferocity in different times, but the ideas and discourses that are constructed around them are rarely the same. In a recent study, Panayotis Tournikiotis (2016) also focuses on the multiple quotations of the Parthenon in modern times, a celebration that sharply contrasts with the relative invisibility of the project in the previous centuries. The long course of this history enables Tournikiotis to advance an argument about 'the building of ideas' in modern Western European historiography. In modernity, the writing of history serves as a discourse that legitimizes the progressive projection to the future. In this sense, the acknowledgement of idealized historic origins is simultaneously a rooting and an uprooting. It serves only as a stepping stone for the great modern leap forward. In modern history, the focal question is never about the past; it is of the present, and always directed to the future. In his influential study *The Historiography of Modern Architecture*, Tournikiotis (1999) similarly shows how successive historical discourses framed the architecture of the recent past to serve agendas for the desired future of modern architecture. Like its reinterpreted past, the aspired future of modern architecture was not singular, but different at specific moments and historical contexts.

Resilient Modernities

In his 2016 study, *Obsolescence*, Daniel Abramson problematizes the deep-seated urge, especially in modern architecture, to perpetually create newer, grander and more efficient structures. He attributes this compulsion to architectural obsolescence, the idea that buildings are inherently not resilient — in either physical form or practical function — and that over time they become less functional and must eventually be replaced. But the idea of architectural obsolescence is just one among many other modern concepts that can give way to the making of resilient structures and spaces. The 20th century also witnessed the development of the concepts of architectural sustainability, renovation, adaptive reuse, conservation and preservation. Within this Special Collection, discussions on resilient architecture in the modern period challenge these accepted concepts and shed new light on their parallel development in 20th-century architectural practice.

Andreas W. Putz's article, 'Housing Paul and Paula: Building Repair and Urban Renewal in the German Democratic Republic' examines 'resilience' in the context of mid-20th century East Germany. Neither synonymous with nor directly antithetical to contemporary trends of sustainability, renovation and conservation, in this case 'resilience' provides an alternative heuristic for understanding conflicting architectural movements, and their intersection, in the making of the modern built environment. Contrasting the post-war, East German concept of 'Rekonstruktion' with social reconstruction,

Putz underscores how similar discourses around modern socialist architecture were not as clear cut as architectural historians have often assumed. The term 'Rekonstrukion', exemplified in the work of Bernhard Klemm, involved the re-use of existing building stock, and employed industrial maintenance, prefabrication and standardization in the modern refurbishment of historic East German urban environments. The approach of Peter Doehler was much the opposite. Favoring periodic demolition and the construction of entirely new buildings, Doehler's approach may be likened to a system of planned obsolescence, whereby the socialist economy was buoyed by continual building endeavors. In highlighting such initiatives, Putz urges architectural historians to reconsider established Western historiographies of modern and postmodern architecture. At the same time, the resilience of East German architecture, and the methods and industries involved in its rehabilitation, invite the adaptation of existing historical narratives from which these exemplars are currently excluded.

Studies like Putz's raise the possibility of resilient concepts in architectural historiography, that is, long-standing schemata through which we tend to understand architecture and its history. This is especially the case in studies of modernity that can be recast as histories of resilient frameworks of architectural thought. Mario Carpo's *The Alphabet and the Algorithm* (2011), is such a case in point, as it examines the resilient concept of architectural authorship. From the Renaissance to the current digital age, Carpo argues, the modern notion of the single, architectural-author is an enduring characteristic of architectural design (**Figure 6**). It was evoked by Leon Battista Alberti in the 15th century, long before mass production and standardization was possible in architecture, and persists well into the 21st century, when the complex and digitally enabled processes of design and building seem to preclude individual authorship.

Maarten Liefooghe's article, 'Buildings for Bodies of Work: Single-Artist Museums after the Death and Return of the Author', develops a tangent of this longer history of architectural authorship. In so doing, he also showcases how difficult it often proves to break from deeply embedded conceptual schemata, especially in their interplay with established architectural practices. Focusing on Roland Barthes's influential conceptualizations of the death, and subsequent return, of the author in the late 1960s and early 1970s, Liefooghe examines the resilience of artistic authorship, as expressed through the architectures of three single-artist museums of the last two centuries — the Thorvaldsen Museum (Copenhagen, Denmark), the Roger Raveel Museum (Machelen-aan-de-Leie, Belgium), and the Van Gogh Museum (Amsterdam, The Netherlands). Beyond shedding light on the physical manifestation of the artists, as read through the museums' built forms, Liefooghe's work demonstrates how the concept of 'resilience' can be utilized to interpret museum projects, in their dual capacity as both buildings and institutions.

In the context of modernity, 'resilience' thus provides an alternative vehicle to navigate the intricate histories
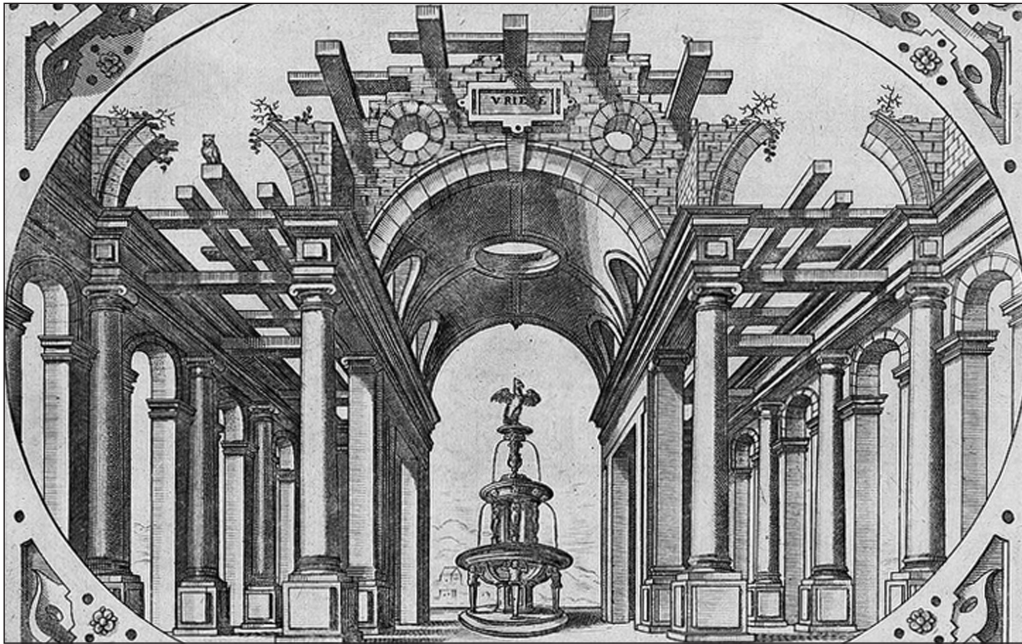
Figure 6: Etching from the architectural studies of Hans Vredeman de Vries (1601).

delineated by a wealth of formal and ideological architectural movements. At the same time, as the articles of the Special Collection show, the idea of resilience is highly malleable, and must be qualified and defined on a case-by-case basis. The articles of Putz and Liefooghe call attention to the tensions implicit in resilience, in which historic conversation is paired with industrialization, and the enduring legacy of the author is threatened with extinction.

Resilient Challenges

This Special Collection showcases the diffuse and encompassing heuristic potential of examining architectural history through the lens of 'resilience'. But revisiting the history of architecture through this conceptual lens not only proffers new insights on the subjects, models and methods of its writing from antiquity to the present; it also introduces new questions. The articles gathered here notably cover nearly two thousand years, and concern topics spread across the global North. The relatively understudied Global South, which is increasingly becoming the locus of novel historical research, can also be expected to further qualify our understanding of resilient architectures, historiographies and modernities in the future (see Stanek 2019; Lim & Chang 2012). While a skeptical reader might question the coherence of the contributions gathered here on the grounds of their limited affinity in method, theme or subject matter, this is also the major strength of 'resilience'. When introduced in architectural history, it emerges as an all-inclusive concept that is not temporally or geographically limited. This enables architectural historians to challenge established historiographical norms and offer new interpretations of previously overlooked material.

But in allowing a wealth of interpretations, 'resilience' also generates partially conflicting ones. Following a storm, for instance, a house left intact might be said to display resilience in its strength, while a largely destroyed structure that still stands also shows resilience in lending itself to reconstruction and modification. Thus, the characteristics of architectural resilience that are often cast in active terms — as possessing strength, agility and endurance — can also prompt associations of their opposites, as in the passive allowance of destruction and adaptability. In this sense, the resilience concept proves problematic, if not contradictory, inciting convoluted thought and prompting questions that echo those related to Theseus's ship.

The story of Theseus's ship, now well over 2000 years old, continues to incite dialogue as a thought experiment that finds no definitive, correct answer. The resilience concept seems to do the same. Introducing provocative questions — especially in terms of the methods and methodologies of architectural historians, the objects and subjects they study, the histories they write and their role in the centuries-long course of historiography — resilience takes the study of architecture beyond textbook-like discourses regarding dates, authorship and delineated design epochs. The great advantage of the concept is its adaptability. As a subjective criterion — it is impossible to quantitatively measure 'resilience' in architecture — the concept must continually be recalibrated, depending on different contextual scales. This Special Collection showcases how the concept urges architectural historians to adopt a dual kind of vision. When the same buildings return as architectural exemplars at different moments and contexts, it draws attention to the diverging discourses that are woven around them. And when it invites the study of overlooked subjects and objects of architectural history, it lays bare the long-standing schemata and conceptual frameworks that are less visible, because they are deeply embedded in the thinking and training of modern historians. Hinting at the contingency of what is conventionally regarded as a given, 'resilience' not only encourages fresh and alternative interpretations of historically established

examples, but it also abrogates a hierarchical understanding of historical narratives. This is why it itself remains a resilient challenge for 21st-century architectural historians who will aim to develop it further in the future.

Acknowledgements

Competing Interests

References

Abramson, D. 2016. *Obsolescence: An Architectural History.* Chicago: University of Chicago Press. DOI: https://doi.org/10.7208/chicago/9780226313597.001.0001

Acocella, A. 1992. An Architecture of Place. Trans. C. Lambert. Rome: Edizioni Laterconsult.

Allen, A, Griffin, L and **Johnson, C.** (eds.) 2017. *Environmental Justice and Urban Resilience in the Global South.* New York: Palgrave Macmillan. DOI: https://doi.org/10.1057/978-1-137-47354-7

Awotona, A. (ed.) 2017. *Planning for Community-based Disaster Resilience Worldwide: Learning from Case Studies in Six Continents.* London: Routledge.

Beinart, J. 1998. Introduction. 1994: Architecture, History & Memory. In: Frampton, K (ed.), *Technology, Place & Architecture.* New York: Rizzoli. DOI: https://doi.org/10.4324/9780203938720

Bosher, L. (ed.) 2008. *Hazards and the Built Environment: Attaining Built-in Resilience.* Abingdon, Oxon: Routledge.

Brundtland, O. 1987. *Our Common Future.* Online: http://www.un-documents.net/our-commonfuture.pdf (accessed 19 February 2019).

Carpo, M. 2011. *The Alphabet and the Algorithm.* Cambridge, MA: MIT Press.

Casey, ES. 1997. *The Fate of Place: A Philosophical History.* Berkeley: University of California Press.

Chandler, D. 2014. *Resilience: The Governance of Complexity.* Abingdon, Oxon: Routledge. DOI: https://doi.org/10.4324/9781315773810

Ching, FDK, Jarzombek, MM and **Prakash, V.** 2007. *A Global History of Architecture.* Hoboken, NJ: Wiley.

Coaffee, J. 2009. *Terrorism, Risk and the Global City: Towards Urban Resilience.* Rev. (ed.), Farnham: Ashgate.

Coaffee, J. 2016. *Urban Resilience: Planning for Risk, Crisis and Uncertainty.* London: Palgrave Macmillan. DOI: https://doi.org/10.1007/978-1-137-28884-4

Cresciani, M and **Forth, J.** 2014. Three Resilient Megastructures by Pier Luigi Nervi. *International Journal of Architectural Heritage: Conservation, Analysis and Restoration,* 8(1): 49–73. DOI: https://doi.org/10.1080/15583058.2012.669023

de Vries, HV. 1601. *Variae Architecturae Formae.* Antverpiae: excudebat Theodorus Gallaeus. ETH-Bibliothek Zürich, Rar 9249 q.

Giedion, S. 1967. *Space, Time and Architecture.* 5th edn. Cambridge, MA: Harvard University Press.

Grove, K. 2018. *Resilience.* Abingdon, Oxon: Routledge. DOI: https://doi.org/10.4324/9781315661407

Gunderson, LH and **Holling, CS.** (eds.) 2002. *Panarchy: Understanding Transformations in Systems of Humans and Nature.* Washington, DC: Island Press.

Hamnett, S and **Forbes, DK.** (eds.) 2011. *Planning Asian Cities: Risks and Resilience.* London: Routledge. DOI: https://doi.org/10.4324/9780203804247

Holling, CS. 1973. Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics,* 4: 1–23. DOI: https://doi.org/10.1146/annurev.es.04.110173.000245

Hollis, E. 2010. *The Secret Lives of Buildings: From the Parthenon to the Vegas Strip in Thirteen Stories.* London: Granta Books.

Hopkins, R. 2008. *The Transition Handbook: From Oil Dependency to Local Resilience.* Totnes: Green Books.

Lafreri, A. 1549. *Speculum Romanae Magnificentiae.* Rome.

Le Goff, J. 2015. *Must We Divide History into Periods?* Trans. by M DeBevoise. New York: Columbia University Press. DOI: https://doi.org/10.7312/le-g17300

Lim, WSW and **Chang, JH.** (eds.). 2012. *Non-West Modernist Past: On Architecture and Modernities.* Singapore: World Scientific. DOI: https://doi.org/10.1142/8233

Marder, T and **Wilson Jones, M.** (eds.) 2015. *The Pantheon: From Antiquity to the Present.* Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139015974

Masterson, JH. 2014. *Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters.* Washington, DC: Island Press.

McGreavy, B. 2015. Resilience as Discourse. *Journal: Environmental Communication: A Journal of Nature and Culture,* 10: 104–21. DOI: https://doi.org/10.1080/17524032.2015.1014390

Nagel, A and **Wood, C.** 2010. *Anachronic Renaissance.* New York: Zone Books.

Newman, P. 2017. *Resilient Cities: Overcoming Fossil Fuel Dependence.* 2nd ed. Washington, DC: Island Press.

Norberg-Schulz, C. 1980. *Genius Loci: Towards a Phenomenology of Architecture.* London: Academy Editions.

Nucera, F. 2016. Model of Resilience for the Cultural Heritage in Umbria: The Earthquake of 1997. *Resilienza delle città d'arte ai terremoti. Atti dei Convegni Lincei,* 306: 109–25.

Pelling, M. 2003. *The Vulnerability of Cities: Natural Disasters and Social Resilience.* London: Earthscan.

Plutarch. 1914. *Lives, Volume I: Theseus and Romulus. Lycurgus and Numa. Solon and Publicola.* Trans. Bernadotte Perrin. Loeb Classical Library 46. Cambridge, MA: Harvard University Press. DOI: https://doi.org/10.4159/DLCL.plutarch-lives_comparison_theseus_romulus.1914

Rawes, P. (ed.) 2013. *Relational Architectural Ecologies: Architecture, Nature and Subjectivity.* Abingdon, Oxon: Routledge.

Rogers, P. 2012. *Resilience and the City: Change, (Dis)order and Disaster.* Farnham: Ashgate.

Shah, F. 2012. *A Workbook on Planning for Urban Resilience in the Face of Disasters: Adapting Experiences*

from Vietnam's Cities to Other Cities. Washington: World Bank. DOI: https://doi.org/10.1596/978-0-8213-8878-5

Skansi, L. 2014. The Remnants of the Miracle. In: *Fundamentals: 14th International Architectural Exhibition.* Venice: Marsilio.

Stanek, L. 2019. *Architecture in Global Socialism. Eastern Europe, West Africa, and the Middle East in the Cold War.* Princeton, NJ: Princeton University Press.

Tabb, PJ and **Deviren, AS.** 2014. *The Greening of Architecture: A Critical History and Survey of Contemporary Sustainable Architecture and Urban Design.* London: Ashgate.

Tournikiotis, P. 1999. *The Historiography of Modern Architecture.* Cambridge, MA: MIT Press. DOI: https://doi.org/10.7551/mitpress/3527.001.0001

Tournikiotis, P. 2016. Quoting the Parthenon: History and the Building of Ideas. *Perspecta*, 49: 153–66.

Trogal, K, et al. (eds.) 2018. *Architecture and Resilience: Interdisciplinary Dialogues.* Abingdon, Oxon: Routledge.

Tuan, Y-F. 1977. *Space and Place: The Perspective of Experience.* Minneapolis: University of Minnesota Press.

Turan, N. 2019. *Architecture as Measure.* Barcelona: Actar.

Turpin, E. (ed.) 2013. *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy.* Open Humanities Press. DOI: https://doi.org/10.3998/ohp.12527215.0001.001

Van der Heijden, J. 2014. *Governance for Urban Sustainability and Resilience: Responding to Climate Change and the Relevance of the Built Environment.* Cheltenham: Edward Elgar.

Van Schaik, L. 1994. Architectural Reality: A Continuum Concept. *AA Files*, 28: 12–14.

Vitruvius. 1999. *Ten Books on Architecture.* Trans. Ingrid Rowland. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511840951

Walker, B, et al. 2004. Resilience, Adaptability and Transformability in Social-Ecological Systems. *Ecology and Society*, 9(2): 5. DOI: https://doi.org/10.5751/ES-00650-090205

Walker, B and **Salt, D.** 2006. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World.* Washington, DC: Island Press.

Walker, B and **Salt, D.** 2012. *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function.* Washington, DC: Island Press.

Washburn, A. 2013. *The Nature of Urban Design: A New York Perspective on Resilience.* Washington, DC: Island Press.

Zolli, A and **Healy, AM.** 2012. *Resilience: Why Things Bounce Back.* New York: Simon and Schuster.