A Research Framework of Digital Leadership

Tadeja Zupancic1, Aulikki Herneoja², Yves Schoonjans³, Henri Achten⁴
1University of Ljubljana ²University of Oulu ³Katholieke Universiteit Leuven ⁴Czech Technical University in Prague
1Tadeja.Zupancic@fa.uni-lj.si ²Aulikki.Herneoja@oulu.fi ³yves.schoonjans@kuleuven.be ⁴achten@fa.cvut.cz

In leading architectural offices where digital technologies have become de facto part and parcel of the architectural design process, it has become pointless to talk about "architectural design" and "digital technology" as separate phenomena. In fact, those offices showcase advances in their designs through combined developments in process, tools, teams, materials, and research. Far from being a passive addition to conventional processes, digital technologies transform the whole spectrum of architectural endeavour. Architects and offices in the front of these development showcase a particular competence set that is distinct from others, which we propose to call "digital leadership." We define "digital leadership" as the "integration of distributed knowledge from social sciences/humanities and digital technologies through the integrative artistic power of Architectural Design applied to the built environment as a real-world research and design laboratory." Although there have been many digital pioneers since the early 1960'ies, we can now see digital leadership as a more mainstream movement. However, there is no unified framework or theoretical understanding of digital leadership. In this paper we report on work carried out on four universities which has the aim to build such a framework.

Keywords: Digital leadership, Architectural design process, Collaborative environments, Digital ecologies, Human resources

INTRODUCTION

Digital technologies came into being seven decades ago. Alan Turing (1936) and John van Neumann (1945) laid the foundations for computers. It took less than 20 years before first digital technologies were adopted in engineering and architecture. Ivan Sutherland's groundbreaking (1963) PhD thesis Sketchpad laid the foundations for the graphic user interface and many other basic technologies of CAD systems. DAC-1, for the car industry, was developed in 1964 by General Motors and IBM. In architecture, Urban5, developed by Nicholas Negroponte in 1967, was one of the first architectural CAD systems. Architects were among early adopters and pioneers in digital technologies, for example Christopher Alexander (1964), Charles Eastman (1970), Philip Steadman...
Digital technologies have increased exponentially in volume, variety, and tools in almost all spheres of human activity. In architecture we can note for example animation, simulation, virtual reality, robotics, rapid prototyping, and so on. At the same time architectural offices such as Foster + Partners, UN Studio, MVRDV, Zaha Hadid Architects, and Gehry Partners have taken the lead in the application of advanced digital technologies in their projects (see for example van Berkel and Bos 2016). These offices and architects have taught and inspired a new generation of younger architects that apply digital technologies on an everyday basis, for example Bjarke Ingels Group, Synthesis Design + Architecture, Span, Kokkuggia, to name a few (see for example Del Campo 2016). Additionally, new generations of researchers and educators investigate digital technologies tightly connected with architectural development at both academic and commercial institutes, for instance ICD Stuttgart, CITA Copenhagen, Self-Assembly Lab Massachusetts, Woods Bagot, Arup, and HOK (see for example Menges, Sheil, Glynn and Skavara 2017).

Digital tools are now embedded within all aspects of our global professional culture. Specifically these continuously changing tools are positively revolutionizing the nature of the architectural creative industries. Most reports on digital practice describe developments through the technological lens. However, there is an overt lack of knowledge-integration between the interconnected disciplines where the digital revolution is taking place. The theme of this paper is “digital leadership,” which we concisely define as the “integration of distributed knowledge from social sciences/humanities and digital technologies through the integrative artistic power of Architectural Design applied to the built environment as a real-world research and design laboratory.” Digital leadership is informed by many disciplines, with as binding force architectural creativity enabled through digital and socio-spatial literacy. Key to digital leadership is that digital technologies have moved from background support to frontstage presence (Adams et al. 2011; Buhse 2012). Additionally, digital leadership evolves not from a pure software-programming point of view (technology pushed) but from an active integration in the architectural design process and having an equal status. Thus, digital leadership evolves from technology, academia, practice in equal proportion, and tying together with the many stakeholders in society. It is in fact the integration at the architectural level that makes digital leadership a prominent phenomenon. Since the early work of many digital pioneers mentioned earlier, we can now see digital leadership as a more mainstream movement. In this paper we report on work carried out on four universities with the aim to build such a framework.

The ideas embedded in this research project do not derive solely from the domain of CAAD. It is our aim to create an international, inter-sectoral and interdisciplinary community on this topic integrating two European research traditions: the first derived from the technological research in CAD (represented by eCAADe and its PhD workshops) and the second linking the artistic/professional approaches (represented by CA²RE , the Community for Artistic and Architectural (doctoral) Research in association with ARENA - Architectural Research Network, EAAE - European Association for Architectural Education and ELIA - The European League of Institutes of the Arts).

**COMPETENCES AND EXPERTISE FOR DIGITAL LEADERSHIP**

All developments in digital technologies mentioned above, converge to a point where technology, architecture, process, and people come together in a novel way of designing and managing the architectural design process (Dóci et al 2015). In earlier work (Zupancic et al 2017) we identified six competences critical for digital leadership: “technological ecologies”; “creativity, knowledge processes and experimentation”; “design and research”; “human resources and leadership”; “collaborative and explorative environments”; and “impact of digital leader-
We found that “creativity” and “design and research” were actually manifestations of the architectural design process, and that “human resources” and “impact” basically dealt with the social-human aspects. Thus we condensed the six competences to four competence areas: (1) human resources and leadership; (2) architectural design process; (3) digital ecologies; and (4) collaborative environments.

1. **Human resources and leadership** deals with the dynamic interrelations of people in the architectural design process and their public behaviour. It relates human resources ("social and cultural capital"), innovative and transformative leadership and design/research process. It investigates leadership models based on facilitating skills of group integration and individual autonomies in architectural design.

2. **Architectural design process** deals with the creative pathway through which knowledge is borne. This continuously emergent knowledge becomes a harbinger of experimental developments and critical practices defining new and creative products. Brought forth by the tide of digital design tools, manifold possibilities and opportunities have come into being, yet they are still not fully realized within the architectural profession and associated disciplines. Digital leaders need to be able to incorporate the possibilities and opportunities offered by powerful digital tools and media to enhance the underlying fundamental aims, developments and knowledge processes of architectural design and research.

3. **Digital ecologies** see technology not as subordinate or servicing activity to traditional design. Digital ecologies acknowledge all the technologies available to architects, the reciprocal relationship between these technologies and the architectural design process, and the transformation of architectural knowledge and craftsmanship through this process.

4. **Collaborative environments** deal with the context of technology-rich environments for communication in the design process. To design, build and maintain the built environment, integrated processes and methods are essential. Cross-disciplinary teamwork enables one to take full advantage of digitalization in architectural design through knowledge integration. The great potentiality of digital processes and solutions relies on increasing well-being and quality of life as well as creating user-friendly adaptive solutions. Collaboration extends in the broadest sense, not only within the team, but also concerning the built and the social (socio-cultural) dimensions; thus it includes the dialogue with spaces/places as well.

As can be inferred from these four competence areas, it is critically important to understand that digital leadership is not based on “more technological competence in X.” It really is about the integrative value through the architectural design process (2 above), understanding social dynamics (1 above), operating in rich digital environments (3 above), and responsive to sensitive spatial conditions (4 above).

**RESEARCH FRAMEWORK OF DIGITAL LEADERSHIP**

In the past two years, our team from four universities (University of Ljubljana, University of Oulu, Katholieke Universiteit Leuven, and Czech Technical University in Prague) has developed the research framework for investigating digital leadership. We put strong emphasis on both academic work and practice-based research. We are aware that a lot of implicit knowledge and skill is being deployed at architectural firms, engineering firms, and governmental bodies. Therefore, investigating digital leadership should also take place in the field in practice (Verbeke 2017, pp. 265-333; Zupančič and Pedersen 2017, pp. 9-14). In our research we integrate artistic experimentation and technological investigations, through the development of hybrid methods that integrate
traditional design research paths and more qualitative holistic research. We develop explicit, tacit and relational knowledge modes for design and through design. Thus, we include research by design, creative practice research and borrow specific research methods such as action research and grounded theory development.

The four areas identified above (human resources and leadership; architectural design process; digital ecologies; and collaborative environment) are not only competences of digital leaders, but form at the same time the main expertise areas for scientific research on digital leadership. Since the critical capacity of a digital leader is the integration of skills and knowledge from all four areas, research is always carried out in a combination of at least two competence areas, and fed from both academic-based and practice-based perspective from all the four areas (see Figure 1).

In the research, we address the integration of distributed knowledge from social sciences/humanities and digital technology through the integrative artistic power of architectural design. Thus, although specific knowledge and skills for digital leadership are always fed from specialised areas, it is the integrative and holistic approach that enables the parts take on the quality of leadership. To test and verify our assumptions, we take both real world and more speculative situations into consideration. We develop place-based solutions through comparative culturally rooted studies and experiments.

We form research teams based on the combination of two expertise/competence areas, which is investigated from both practice-side as academic viewpoint. This leads to six principle pairs of themes, which, combined with a principled emphasis on one expertise, leads to a total of twelve research tracks on digital leadership. For every track, we build upon the following methodology:

- Integration of design and research methods, digital technologies, and management theory through defined or even shared methodological framework.
- Refining research goals and questions, hypothesis, and research methods.
- Fieldwork in creative practice (including interventions in academic studies): observations and experiencing architectural practice, through means of (deep) interviews, questionnaires, evaluative probes and experiments through qualitative methods such as (applied) ethnography.
- Data analysis: coding, extraction of categories through quantitative methods.
- Critical reflection and discussion: establishment of theories and methodological frameworks, contextualization and/or validation.

An important part of our methodological foundation is taken from grounded theory. Grounded theory is linked to sociology and research within the social sciences. Coined by Barney Glaser and Anselm Strauss in their book publication of *The Discovery of Grounded Theory* of 1967, they did not believe that all research could start from a pre-existing theory. In contrast of the existing research that is dominated by existing theories, they argued that is was more interesting to start from collected data and the research questions themselves. Progressing from data to theory was a better guarantee to develop new theories that were more ‘grounded’ within the context of the research. Of course in the following decades until today many different ways were formulated, methodological discussions held how grounded theory would work, and what the precise imposition was of the used categories of meaning upon the data by the researcher and the linked deduction. Also questions on the impact of individual experience rose. Many researchers elaborated on how to use grounded theory-methodology(1). Interesting for this research however, is the work of professor Kathy Charmaz (2006) in her book *Constructing Grounded Theory* were she states that the theory out of data is not emerging but constructed. She states that using grounded theory one traces out processes but also the way how to handle them. Observations in practice through fieldwork and data mining (coding,
Research is always a combination of any two competence areas.

extraction of categories) through practices (and not only through theory) will create new methods to extract and develop knowledge residing in creative industries and will consolidate new knowledge base for strategic digital leadership. Integrated understanding, methods and theory can be developed through collaborative environments for creative industries in architecture.

The work presented above gives a partial outline of the research framework for digital leadership. The work is not final for sure, but gives the team members concrete starting points to investigate in more specific research project the various aspects of digital leadership. This phase still has to start, so now is too early to report on this. Nevertheless, we feel the framework is robust and solid enough to we can communicate the framework itself as a first result of theoretical investigation.

ACKNOWLEDGEMENTS
The research project on digital leadership started in 2015 with Johan Verbeke, Tadeja Zupancic, Henri Achten, and Aulikki Herneoja. The first phase of the work resulted in two workshops (eCAADe 2015 Vienna and eCAADe 2016 Oulu) and submission of a European Horizon2020 project in January 2017. After rejection of the proposal, we quickly decided to improve the project proposal and resubmit the project. On August 6th 2017, Johan Verbeke passed away. We dedicate this paper and the work in the research
group to his memory.

The development of the research framework also benefited from contributions by Aarhus School of Architecture. We acknowledge the critically important contribution from practice, which comes from committed offices in the four participating countries: *Sadar+Vuga* (Slovenia), *Mouton* (Belgium), *Pavlíček Hulín architekti* (Czech Republic), and *Arkkitehtitoimisto ALA Oy* (Finland). Additionally, we are fortunate that the eCAADe community is a critical sounding board for our ideas.

REFERENCES

Adams, RS, Daly, SR, Mann, LM and Dall, G 2011, 'Being a Professional: Three Lenses into Design Thinking, Acting, and Being', *Design Studies*, 32, pp. 588-607


van Berkel, B and Bos, C 2016, *Knowledge Matters: UN Studio*, Frame Publishers


