Concerning the doctoral dissertation
mgr inż. arch. Marty Kręskiej-Pyrz
entitled "Elimination of Risks in the Design Process as Determinants of Creating Models of a Friendly and Safe Living Environment"

This doctoral dissertation was prepared within the framework of an industrial doctorate and focuses on one of the key challenges in contemporary architecture and urban planning – **risk management in the design process**. Architecture is inherently interdisciplinary, combining art, technology, law, social sciences, and environmental studies. The design process takes place at the intersection of many interests: investors, designers, public institutions, contractors, and ultimately, future users. Under such conditions, numerous risks naturally emerge – legal, environmental, technical, economic, and social. Ignoring them may lead to design errors, project delays, increased costs, and even tangible threats to the health and safety of building users.

In traditional design practice, risk elimination tends to be treated fragmentarily. Safety procedures, fire safety regulations, structural standards, and environmental requirements exist, but they are rarely integrated into a single tool. What is lacking are instruments that would enable architects to holistically assess design risks at early stages, before documentation is submitted for approval or construction begins.

The dissertation by MSc Arch. Marta Kręska-Pyrz seeks to fill this gap by developing the **Project Checklist (LKP)** – a seven-module tool for **ex-ante auditing** of design documentation. Combined with digital tools (BIM, CDE, VR/AR), the LKP supports risk elimination, improves design quality, shortens project delivery times, and enhances user safety.

Research background and knowledge gap

While the issue of risk in construction has long been present in international literature, it mainly concerns **construction management** and focuses on the execution phase. Considerable attention is devoted to financial, contractual, scheduling, and site safety risks. In contrast, **design risks** – those arising during conceptual and documentation phases – receive far less attention, despite their decisive influence on investment quality. In Poland, the subject of design risk management in architecture is virtually absent from the scientific literature, with practitioners relying primarily on legal requirements and personal experience. The identified gap concerns:

- the absence of an integrated model combining legal, technical, environmental, social, and user-oriented risks,
- limited use of digital tools (BIM, CDE) for systematic risk elimination,
- a lack of empirical research on the effectiveness of checklists in architectural practice.

Research aims and hypotheses

The primary aim of the dissertation was to develop a model for risk elimination in the design process in the form of the Project Checklist (LKP) and verify its effectiveness in practice. The specific objectives included: identification and classification of risks; development of a seven-module checklist covering legal, technical, environmental, safety, and user aspects; integration with digital tools (BIM, CDE, VR/AR, 4D/5D simulations); validation on **30 diverse architectural projects**; iterative development in line with **Agile methodology**; and evaluation of measurable effects.

The hypotheses assumed that: (H1) systematic use of the checklist enables earlier risk identification; (H2) digital integration improves efficiency and team communication; (H3) iterative (Agile) development adapts the tool to real needs; and (H4) checklist use translates into measurable benefits – higher documentation quality, fewer errors, and time and cost savings.

Methodology and empirical base

The dissertation combined theoretical analysis with empirical verification. Legal and normative analysis of over **55 acts and regulations** was complemented by heuristic methods, risk analysis (including FMEA, bow-tie diagrams, Monte Carlo simulations), quasi-experiments, and case studies. The empirical base consisted of **30 architectural projects** of varying type and scale (residential, educational, public, commercial, adaptive, and urban planning projects).

Key findings

The results confirmed that the LKP:

- reduced formal errors and omissions in documentation,
- shortened approval and coordination time by 15–20%,
- lowered correction costs during construction by up to 30%,
- improved interdisciplinary collaboration,
- enhanced user safety through accessibility, ergonomics, and environmental psychology.

The checklist consists of **seven modules**: site development (PZT), architectural-building design (PA-B), technical design (PT), health and safety (BIOZ), legal-formal compliance, environmental performance, and user/operational quality. Its iterative development within Agile cycles proved effective, while integration with **BIM and CDE** ensured automation, traceability, and quality control.

Scientific and practical significance
The dissertation contributes to architecture and urban planning by introducing an interdisciplinary model of risk elimination that integrates legal, technical, environmental, and social aspects with digital tools. It demonstrates that risk elimination is not a peripheral activity but a determinant of architectural quality and a prerequisite for creating safe and sustainable built environments. Practically, the LKP was validated on real projects, showing scalability and adaptability in Polish and international contexts.

International perspective
The study situates the LKP within global trends: regulatory frameworks in Germany and the UK (HOAI, PAS 1192/ISO 19650), flexible collaborative approaches in the Netherlands, Canada, and Australia, and the hybrid needs of the Polish context.

Conclusion
The LKP represents a novel, practical, and scientifically grounded solution for risk management in architectural design. It strengthens documentation quality, supports digital transformation in construction, and fosters a culture of proactive risk elimination. The dissertation thus serves as an example of an **industrial doctorate with both scientific and implementation value**.

Keywords: Project Checklist (LKP), risk management, design process, architecture and urban planning, BIM, CDE, VR/AR, Agile project management, design checklist, digitalisation of construction, documentation quality, interdisciplinary coordination, risk elimination, building law and technical standards, innovation in architecture.

7. SUMMARY.

The doctoral dissertation addresses the problem of risk management in the design process, with particular emphasis on eliminating formal, technical, and environmental threats at the stage of preparing architectural documentation. In response to the lack of integrated tools supporting architects and engineers, the Project Checklist (LKP) was developed – a seven-module ex-ante auditing tool covering the following aspects: site development, architectural and construction design, technical coordination, health and safety (BIOZ), legal and regulatory compliance, environmental impact, as well as user and operational requirements.

The methodology combines the analysis of legal acts, standards, and technical guidelines with the practical testing of the tool in 30 architectural projects of varied function and scale. An Agile approach was adopted, allowing the tool to be developed iteratively, with successive versions adapted to the needs of design offices and investors. The LKP was integrated with digital tools – BIM, CDE, VR/AR, and 4D/5D simulations – which enabled partial automation of control procedures and faster identification of risks.

The research results demonstrate that applying the LKP enables:

- *a reduction of formal and technical errors,*
- *shorter approval times with institutions and improved interdisciplinary coordination,*
- *cost savings during construction by limiting corrective work,*
- *enhanced user safety through the implementation of accessibility, ergonomics, and environmental psychology principles.*

The proposed model is aligned with international trends in the digitalisation of construction, combining regulatory rigour with the flexibility of digital tools. It represents both a theoretical contribution to the discipline of architecture and urban planning, and a practical solution with high implementation potential in Polish design offices.