



Ms Erika A. Pärn
BIM Coordinator at Exergy

[BSc (Hons), PgCE, PgCR, PhD Candidate] graduated with a degree in Architectural Technology and commenced an international career as a BIM Co-ordinator, working in Finland, India and UK.

During this period, she worked for **Chetwood Architects** and oversaw the implementation of large-scale global warehouse developments and associated generative BIM models. E.A. Pärn was employed as an Architectural Technology Lecturer at **Birmingham City University** in 2014 and commenced her PhD studies in 2016. Her PhD will utilize BIM and cloud-based technologies to streamline FM related semantic information into the as-built BIM via use of 'information totems'. To date, E.A. Pärn has published her research in several peer-reviewed academic journals and has been a keynote speaker at several preeminent industrial and conference events. Erika's own research interests focus predominantly upon the multi-disciplinary area of 'digital built environment and smart city developments' but she remains actively involved in other broader 'construction and civil engineering management' topics whilst working with her international colleagues. Research investigations have thus far included: BIM and FM integration; design development automation; clash detection;

laser-scanning; engineering design; construction management in developing countries; cyber-security; and networked and sensor-based BIM integration.

Presently working at **Exergy**, the business is looking to expand its commercial activities outside the scope of BIM into new areas of hybridization within the construction 4.0 sector. Namely the development of cybersecure BIM platforms for construction SME's whom are not as well versed in the security of their building and construction data. Our ongoing research projects with **EU commission on BIM are centered in the renovation market and BIM for existing buildings**. Exergy is currently a partner on three BIM related EU projects entitled: SeismandPrecast (<http://seismprecast.eu/>), GreenInstruct (<https://www.greeninstruct.eu/>) and BIMERR.

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“Cyber threats and vulnerabilities of Construction 4.0”

ABSTRACT

Smart cities provide fully integrated and networked connectivity between virtual/digital assets and physical building/infrastructure assets to form digital economies. However, industrial espionage, cyber-crime and deplorable politically driven cyber-interventions threaten to disrupt and/or physically damage the critical infrastructure that supports national wealth generation and preserves the health, safety and welfare of the populous. **The purpose of this presentation** is to present a comprehensive review of cyber-threats confronting critical infrastructure asset management reliant upon a common data environment (CDE) to augment building information modelling (BIM) implementation. **BIM is expounded to provide newfound efficiency and productivity for the Architecture, Engineering, Construction and Operations (AECO) sector** throughout the building life cycle. Presently the AECO sector is witnessing unprecedented pace of digitalization of built assets much of which is reliant upon cloud-based systems to provide access to data rich 3D representations of physical built assets.

This presentation reports upon case studies of cyber-physical attacks; reveals distinct categories of hackers; identifies and reports upon the various motivations for the perpetrators/actors; and discusses the areas of digitalization with BIM and the CDE. While **cyber security and digitization of the built environment** have been widely covered within the extant literature in isolation, scant research has hitherto conducted a holistic review of the perceived threats, deterrence applications and future developments in a digitized AECO sector reliant upon BIM and CDE's.

The presentation will conclude with a direction for future research work and a recommendation to explore the use of block chain technology as a potential risk mitigation measure for digital built environment vulnerabilities. This presentation offers a concise and lucid reference guidance that will intellectually challenge, and better inform, both practitioners and researchers on the newfound vulnerabilities of the AECO sector.