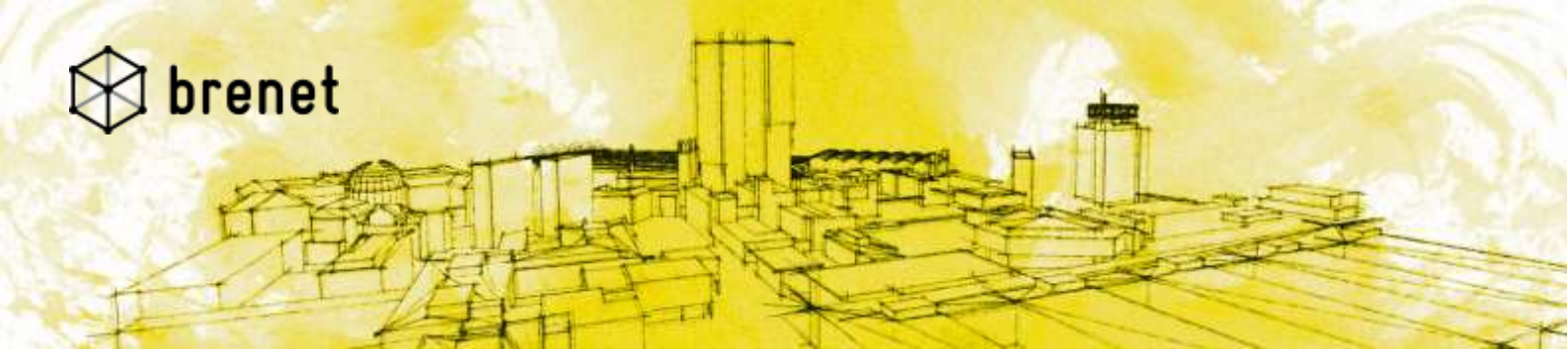

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Mitteilung über Annahme des Papers durch das Scientific Committee	18.06.2020	*Notification de l'acception du résumé par le Comité Scientifique*	*18.06.2020*
Abgabetermin für die Einreichung der Papers	10.08.2020	*Délai d'envoi des publications*	*10.08.2020*

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Vorlage / modèle Abstract

Titel des Beitrages / *Titre de la contribution:*
FM BIM requirements for existing buildings digitisation

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Institute for Applied Sustainability to the Built Environment (ISAAC)
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Ziel des Projekts / *But du projet*
This research aims at providing a robust methodology for the digitisation of existing buildings, with attention to the operational phase and with multiple levels of complexity. The sub-objectives are: a) definition of an Exchange Information Requirements for Facility Management (FM); and b) definition of procedures for the creation of simplified digital twin of an existing building, with a focus on public portfolios.

Bedeutung der Resultate für die Praxis / Importance des résultats pour la pratique
The result of this project is a wide understanding of what is needed for the digitisation of existing buildings, in terms of both geometry and alphanumeric data, with the possibility of creating a digital twin targeted to specific needs.

The building sector is changing and it is necessary to be ready for this change: many institutions, public or private, already saw the benefits of a new approach, but the majority is not ready for the adoption, due to a lack of a clear implementation plan.

This research wants to highlight main requirements to be considered in the transition process. It also wants to highlight recurring issues and how to overcome them.

The result of this research consists in a guideline for successfully implementing a BIM FM strategy in a portfolio made by existing buildings. This result could help both owners and managers, but also professionals and service providers involved in the process. Moreover, this methodology could be replicated to include other important topics, as instance the assessment of the operational carbon footprint of a building.

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Vorlage / modèle Abstract

Abstract / Résumé

BIM cannot be considered a new topic anymore, but its implementation in the whole building lifecycle is still far from being reality. If BIM benefits in the design phase, or even in the construction one, are clear to the majority of players, there are still few examples of BIM adoption in the operational phase, and most of them are pilot projects. The transition from traditional facility management to BIM-oriented one becomes even more difficult when dealing with an existing building stock, heterogeneous and with fragmented information.

The objective of this project is to define a set of procedures and requirements for efficiently implementing a BIM strategy in the operational phase, with attention to existing buildings. This methodology enables public portfolio owners and managers in the definition of: a) Exchange Information Requirements (EIR) targeted to their needs, in terms of both geometry and alphanumeric data; b) procedures and instruments to create digital twins as the combination of point clouds and BIM objects; c) Key Performance Indicators (KPIs) to monitor their portfolio condition. The focus of this part of the research is on how to digitise an existing asset of the building stock using current technologies, but also about the minimum information to be gathered for implementing a proper BIM-FM strategy. Thus, the idea is to create a simplified digital twin by merging a BIM model with LOG200 and LOI300 in association with point clouds of the inside of the building. In the paper, other possible solutions are discussed, namely for creating a:

- simplified digital twin composed only by 3D spaces (LOG100);
- digital twin composed by the main architectural components (LOG200);
- digital twin composed by main architectural components and MEP placeholders (LOG250).

The final objective is to provide stakeholders with a guideline and a set of processes for an optimal use of digital models in the operational phase; this guideline could become a proprietary guideline, if developed by the owner (or on behalf of the owner) and targeted to specific needs. This ultimately allows for an efficient implementation of a BIM-based CAFM (Computer-Aided Facility Management) system. Digital processes should be implemented in all the main FM activities, especially the ones related to geometric information and with specific visualisation needs (e.g. space management, cleaning, fault-based maintenance).

The methodology for the creation of this digital twin has three leading principles:

a) using a point cloud to recreate an accurate internal environment of the building;
b) modelling only element useful for FM activities, planning and reporting;
c) associating BIM objects with customised property sets coming from the EIR.

The second step of this methodology is developed with a generalised approach, as the actions to be taken could significantly vary according to owner’s and manager’s strategies. The connection between CAFM and digital twin can be performed in multiple ways (e.g. by importing the model, using plugins, using third-party apps), as well as the connection with an issue tracker, a collaboration tool or a simpler ticketing system. This methodology implies that the digital twin must be live and not a one-time “static” source of information (e.g. geometric data); that is the reason why it is required for both CAFM and digital twin to constantly updated. This constant update could be carried out by IoT sensors, which are not implemented yet in this process, but authors are currently working on it. Moreover, LOG and LOI should increase proportionally, with the possibility of using sensors and additional datasets:

Vorlage / modèle Abstract

- sensors for internal air quality, comfort and occupancy in combination with 3D rooms;
- additional information about materials, cleaning cycles and maintenance in combination with main architectural components;
- sensors connected to MEP components, to better understand usage of equipment and systems.

The result is a digital twin with a low LOG and a higher LOI. The low LOG has been a choice dictated by two main reasons:

a) economic constraint: creating a high LOG BIM model would require too much hours of modelling and so it would be too expensive;
b) data are not always available and places not easily accessible (e.g. exact position of pipes and main ducts, material layers).

Therefore, the digital twin becomes a unique centraliser of information, with third-party software enabling users to easily access them according to their needs and skills. This methodology allows for the interaction with the model in multiple ways and at different scales:

- Daily and recurring activities;
- Visualisation and benchmarking;
- Monitoring (real time data, consumptions, occupancy, etc.);
- Historical data management (modifications occurred, trends, knowledge, etc.);
- Management (spaces usage, maintenance, cleaning, inventory, etc.);
- Planning (spaces, maintenance, renovation).

It is important to notice that this methodology is not connected to a specific software, but it has been kept the most general as possible, so to be adapted by facility managers and owners according to their structure. This project applies to public medium-large portfolios and is not targeted to private owners. The research started from a collaboration that has been going on since some years with public partners in the Canton Ticino. With these partners, it has been possible to organise processes and workflows and to propose a proper methodology enabling the implementation of such data in an intelligent system linked to digital models.