

Enhancing circular demolition through digitalization

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Significant advancements are underway in the field of circularity. In late May, approximately 100 participants gathered at the headquarters of Buildwise, formerly CSTC–WTCB, to witness firsthand how they could more effectively commit to a circular demolition strategy. Undoubtedly, digital tools already exist, as evidenced by successful pilot projects that have demonstrated their value. The NWE Interreg project titled “Digital Deconstruction” reached this conclusion, and now it’s imperative to gradually integrate these tools into our own way of working.

Spoiler alert! The conclusion of the article is that there is massive potential when we combine digitalization and the circular economy. While our specific focus lies in preserving material value through circularity principles, the integration of digitalization into these processes also enables increased efficiency and therefore profitability. In other words, by using a larger data

volume and advanced digital technology as a basis, we can make the transition to a circular society affordable. Jeroen Vrijders from Buildwise begins by explaining that “urban mining involves extracting materials in a sustainable way and making them *reusable*. Digital tools can pave the way for more circular demolition.”

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BASED ON AN INVENTORY

But which digital tools are we actually talking about? Éléonore de Roissart (Buildwise) answered this question. Efficient deconstruction begins with creating an inventory. The more detailed information we include for each component in this inventory, the easier it becomes to reuse the existing materials. The data collected during site inspections is typically processed in Excel. Therefore, it could be really useful after this step to have an application to collect the information and send it to the right actors automatically. “Of course, this requires a standardized methodology. Nowadays, information exchanges are proliferating as different users have varying requirements. However, sig-

nificant progress can be achieved through harmonized data exchange.”



3D scanning, BIM and inventory tools helped determine the circular strategy and increase reuse during renovation of the Hof Ter Laken buildings. Éléonore de Roissart, Buildwise.

INCREASED EFFICIENCY

The same applies to the available 2D and 3D scanning tools. Éléonore de Roissart explains, “the first step involves determining the specific information needed, the required level of accuracy, and the format in which the information should be presented. Based on this, the appropriate technology can be chosen. With advancements in artificial intelligence, the potential for accurate identification of materials and quantities will only increase. But the cost of this technology and necessary human expertise required for its implementation still weigh heavily on the balance.” These factors are also holding back the broader use of Building Information Modeling (BIM) in demolition projects. However, the demolition of the CCN building in Brussels has showcased how BIM can contribute to defining the circular demolition strategy. It goes without saying that this approach may be less feasible for smaller demolition projects, where demolition and reuse inventories would be a more suitable choice.



Jean-Yves Marié from BIM-Y demonstrating 3D scanning tools.

IMPROVING MARKET FUNCTIONALITY

Finding new applications for these materials is crucial to give them a second life. However, matching supply and demand for reuse remains challenging due to a lack of information, incompatible schedules or lack of storage space. We are witnessing the emergence of an increasing number of digital reselling platforms (or market-

places), aiming to establish a market for reused construction materials. Éléonore de Roissart adds, “In this case, it is also essential to strive for greater standardization. By maintaining a common data structure, it becomes easier for digital platform users to use search and filter functions to find specific materials.”

AN EXAMPLE OF CIRCULARITY: USQUARE.BRUSSELS

The conversion of the former Fritz Toussaint barracks in Ixelles provided an opportunity to put these theories into practice. The project, coordinated by the Société d'Aménagement Urbain (SAU), aims to repurpose 26 buildings spread across a 3.9-hectare site known as 'Usquare.brussels'. Ann-Sophie Doesburg and Bruno Allardin provided a detailed account of the digital tools that

helped integrate circular principles into this project. They explain, “We created an inventory of materials, listing information such as component dimensions, quantities, composition, location, and physical properties. This information was then translated into a BIM model, forming the basis for a reuse strategy that considered the existing environment, as well as economic and techni-

cal aspects. This allowed us to implement a project that incorporates the site's 100-year

history while establishing a foundation for the next 100 years.”

WORKING TOWARDS CLIMATE NEUTRALITY

It is natural for public authorities to highlight these projects as examples. “Urban mining is not financially viable”, concluded Nadja Van Houten, from Bureau Bouwtechniek. “In fact, very few stakeholders are active in



This tool makes it possible to create an inventory of materials and components in a building using digital means. BatiRIM.

this field and there is a lack of digital tools that can gradually integrate this concept.” However, this hasn't deterred the Bureau Bouwtechniek from striving to be a pioneer in this area. Nadja Van Houten believes that circularity is the only way forward, driven by climate plans and resulting regulations. “Europe is investing € 350 billion per year to achieve climate neutrality by 2050. The preservation of heritage is also a priority. For this reason, sufficient materials will be made available. It is up to us to preserve the value of these materials.” This possibility has already been demonstrated through material inventories and the use of BIM, as seen in projects such as the conversion of Paardenmarkt in Antwerp and Gare Maritime in Brussels.

USING ALL AVAILABLE SOURCES

In practice, it is crucial to combine information from various sources. The Digital Deconstruction Platform, created by the Luxembourg Institute of Science and Technology (LIST), represents a significant step in this direction. By integrating data collected by project partners through 3D scans (BIM-Y), reversible BIM (GTB Lab), material inventories and material passports (Block Materials), this tool can help demolition companies make the right decisions. According to Annie Guerriero (LIST): “The platform shows what can be done if all the participants in the value chain share their data. We have tested this technology in various pilot projects and now have

a functional prototype in the demo phase (TRL7).” Nico Mack demonstrated the platform's capabilities through a demonstration of the Etterbrück station demolition project in Luxembourg. The platform enabled scoring for over 1,000 different materials based on their potential for reuse. Nico Mack elaborates: “We had all the necessary elements in place for a detailed analysis, including photos, technical details, and product information sheets.” In the end of 2023, with the Interreg Digital Deconstruction project finalised, the platform will be available for future development under an open-source license.

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WHAT LIES AHEAD ?

After an afternoon of engaging sessions that provided insights into how pioneers are embracing these principles and developing their own tools to offer their services, one crucial question remains: What comes next? How can we encourage the wider use of digital technology in circular demolition? Jeroen Vrijders concludes, "Technology must continue to evolve until we can accurately predict the components of a building. Additionally, it is necessary to support and digitally combine all the individual stages of this process. A circular demolition project will therefore take the form of a closed loop of data that will make it possible to achieve gains.

But, in order to do so, all stakeholders in the value chain must dare to invest in digital technology, based on their own individual needs and requirements, but always within a harmonised framework. Moreover, the platform we have developed should not be seen as the final outcome. There is still work to be done, such as adding data related to the carbon footprint, linking with material databases, making regional adjustments, and more. There is still plenty of work to do and we must continue to implement initiatives, as all the trend analyses show that circularity and sustainable construction are assets for the future", concludes Jeroen Vrijders.



Lessons learned from the Interreg Digital Deconstruction project was shared with participants at the study day. Jeroen Vrijders, Buildwise.