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Digitizing Coventry University Estates using Autodesk tools and Retro BIM

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Learning Objectives

- Learn about retrospective modeling and the challenges of digitizing existing and historic buildings.
- Learn about digitizing the Estates and the information management processes.
- Discover the wider application of BIM and systems integration for facilities management.
- Discover the vision for a smart campus and Digital Twin.

Description

Coventry University Digital Campus will be showcased while describing the tools including Autodesk Software applications that have been used and the processes that led to achieve it. Challenges will be discussed on the journey of digitizing Coventry University Estates and updating building information from paper based to CAD and BIM, the information management processes, Management of systems and the integration developments, retrospective BIM modelling of Existing buildings and the creation of a virtual campus model, soft landings and handover challenges, CAFM, CDEs, systems and digital campus achievements with the solutions that helped to unravel the value of BIM for the university as an owner to streamline facilities management and buildings operation and maintenance.

Speaker

Chartered Architectural Technologist & Multi-Award winning BIM specialist promoting the use of Digital Technologies in the AECO industry. Working as a BIM Manager for Coventry University Estates leading the BIM implementation & digital transformation strategy across Estates operation &development projects. Chair of BIM4Estates group, Communities Lead for the UK BIM Alliance, Regional Lead for Women in BIM & Vice Chair of CIAT West Midlands.

Digital Estates

The Digital Twin of Coventry University is being developed to manage building information more efficiently, reduce operational costs and provide accurate building and asset data for all estates and university stakeholders. While it is still at its infancy,It contains large amounts of data that feed into a number of systems and links are being developed between those systems to allow for data integration. The current data sources that make up its main elements include models, systems and data sets that are seeds for the digital twin vision and are yet to be fully integrated. Reaching this stage of having those essential elements prior to looking at integration was not easy and we had a lot of challenges including unstructured legacy data and multiple systems that weren't linked.
Policies had to be developed to support this work for organization information management, Asset information management, Building identification and space numbering and Estates Data Management.
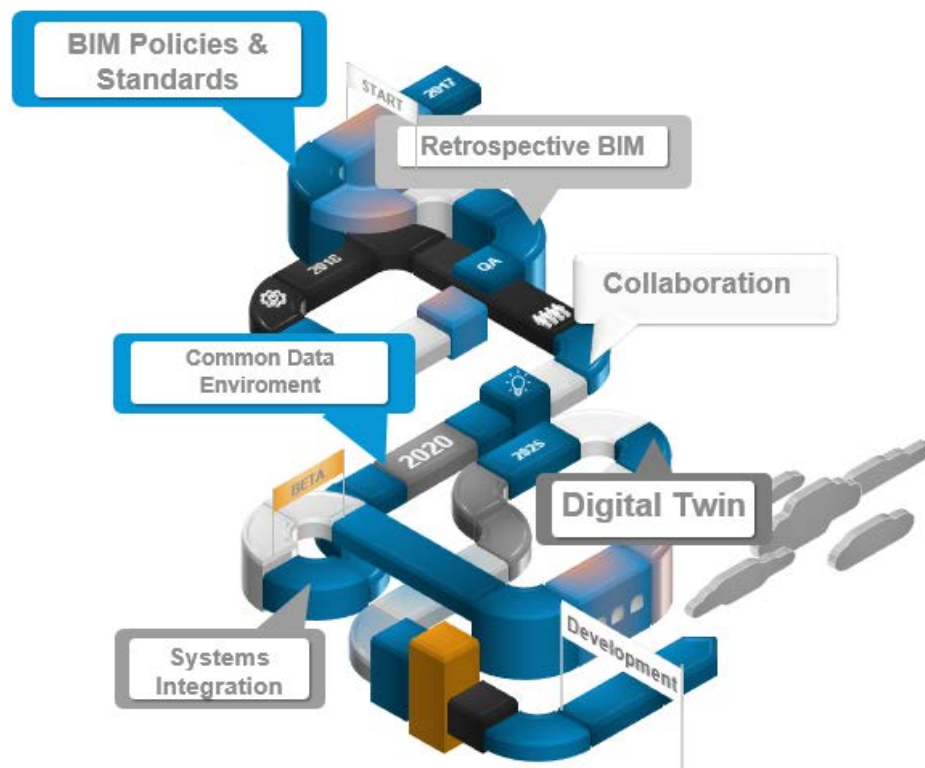
Coventry University Digital Estates Journey

Challenges

Main Challenge is that we are not creating a digital twin of one building. We are digitising the full University Estates which includes 114 individual buildings in the main Coventry Campus with additional campuses with multiple buildings in London and Scarborough, the digital estates is facilitating organization wide holistic information management.
 . Digitalising legacy information
 . Understanding existing systems to facilitate integration and sharing
 . Transforming information between different data schemas to achieve interoperability
Retrospective modeling and digitizing the exisiting building stock was one of our main challenges.

Data Sources, Software and Systems

Data of the digital estates from models and systems is hosted and analysed on multiple data sources using multiple Estates systems. Asset information is held in the CAFM system and PPMs are assigned to assets to ensure users from managers, technicians and maintenance operators use this interface to manage planned preventive maintenance work and the reactive maintenance required for buildings as and when notifications are received for jobs that arise .An integration link is being developed between the CAFM and BMS system to ensure that jobs are raised automatically when major faults are triggered and identified in the BMS such as sudden low room temperatures which may indicate equipment failure, Another integration is being developed to link between the CAFM and CDE to ensure that up to date project information is transferred seamlessly into the CAFM to support building operation post-handover and at the moment all asset information that would come from the models and COBie have been mapped into their matching fields in the CAFM system Planon which was a major step to support this process. Energy data is held within SystemsLink interface which is the energy management system and it is already linked to the BMS system that takes data from sensors in the physical buildings. Space data is stored across all systems and work is underway to explore further integration.
We use different interfaces of the different systems that are utilised at the Estates, Planon is the CAFM interface, GliderBIM is the CDE interface, Desigo CC is the BMS interface, Systems Link showcases Energy and we have multiple other systems for access control, security and timetabling that also use space, buildings and assets data from the Estates digital campus information.

Data sources that our digital twin uses	Technology Solutions and suppliers of our digital twin solution
• BIM Models • Campus Digital Model • Ordnance Survey Data • Asset Information from projects through COBie and from O&M through unified form. • Condition Surveys and scans • Operation and Maintenance Manuals • Legacy Building Plans • Archives • Uniclass 2015 • SFG20 • Etc.	• **Autodesk AEC collection (Revit,AutoCAD, Infraworks,Navisworks,Dynamo..)** • Planon CAFM • GliderBIM CDE • Sharepoint • Siemens Desigo CC BMS • SysetmsLink Energy Management • Esri ArcGIS (To be developed) • IES Virtual Environment (To be developed) • Etc.

Retrospective Modelling of a large campus

The Estates Digital Services team at CU Estates have been surveying and retrospectively modelling the existing campus buildings and also updating the federated models received for new projects at handover to create a digital twin model of the university campus that currently includes 50+ of its campus buildings.
This Digital Twin currently holds space and asset data which will utilise live data once it's linked with the main Estates systems such as the BMS which links to the physical buildings via sensors and CAFM which holds live maintenance job as and operation data. This work is part of a vision to have a smart campus and to digitise all of Estates' buildings and assets information, have a central location for all data and integrate with the university systems to offer more valuable and accurate data for all the various stakeholders and to help facilitate projects development and enhance the Estates services to Coventry University staff and students.
Below are some of lessons learned during our journey to create a digital campus:
•	Start with unified space naming convention with special hierarchy and a budget to rename inconsistent spaces across the campus
•	Create building information and plans straight in 3D models. For this project the 2D stage was an essential transitional phase before we moved to working in 3D as we had to develop pur staff skills as well as an essential part of the process.
•	Understand systems limitations
•	Manage expectations

Benefits of Going Digital

The Digital Estates is continuously being developed to support holistic decision making. The data sets from multiple resources that we've digitised as part of the digital estates play a key

role in the daily facilities management and operational decisions of running the Estates including decisions on when to service assets, dates for planned preventive maintenance, information about Energy and where reduction can be monitored, Occupancy and space utilisation and access control management decisions.

Digitising our Estates data supported us to conduct improved space planning, maintenance management, project management and development of the campus and the importance of the digitised information were evident especially recently during the COVID-19 crisis, if our systems weren't operational and if we hadn't digitised our building plans and updated them with accurate space information we wouldn't have been able to manage our campuses remotely efficiently and plan for the reopening of the campuses. Digital data is supporting decisions on reduction of cost of service, extension of operational life for the regularly serviced assets, improved health and safety and improved overall customer service delivery to our staff and students.

Our digital estates delivered exceptional benefits that allowed for remote management of our campuses. These included having the ability to manage operation, maintenance and work orders, plan for buildings closure and reopening, having confidence in the accuracy of our space data and reduction in time and costs of re-surveying buildings every time a building plan was needed as we've already done the hard work over the past couple of years.

Oportunities for future developments

The digital campus project has further Opportunities:
. To continue the planned systems integration to develop a Digital Twin
. To extend to cover rest of Coventry University campuses in London and Scarborough
. To extend to city scale
. To extend and capture related infrastructure

The National Digital Twin Programme can support in promoting for the digital twin vision and connect members with organisations that are developing digital twins in a similar setting or in a close location. A secure process and platform need to be in place before organisations can share data. From our end it would be great to speak to additional organisations in the near future and discuss how they started building their own twin as the university campus sits at the heart of Coventry City and we also have campuses in Scarborough and London which may support district or city scale twin development and we are willing to work with organisations working in those cities too to explore connection and integration opportunities.