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Empowering Forge with Power BI

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Learning Objectives

- Discover how Forge brings data to the center
- Discover the benefits of a data-centric dashboard accessible to everyone from any device
- Discover how to get the Ms PowerBI dashboard in Forge
- Discover how to facilitate the data analysis

Description

In the big data and artificial intelligence era, Saipem's new business model considers innovation as an integral part of corporate culture. Having a large amount of information available, and, above all, being able to count on a great calculation capacity, which can improve decision speed and managing complexity, are two of the main principles that will make digital and big data analysis increasingly essential, today as in the future. In construction departments, talking about data means to be confrontedwith the complexity of data usability and management. This class will showcase how Forge enabled Saipem to aggregate big data from different sources (SmartPlant 3D, Tekla Structures, Oracle, Navisworks software) in order to analyze them (Microsoft Power BI) and to get an updated dataset of information, while applying a full BIM (Building Information Modeling) approach. This class will describe the steps toward integrating Power BI dashboard directly in Forge, describing the system architecture necessary for this integration.

Speaker(s)

Martina is a Management System and Quantity Manager in Saipem.
She received her Architecture master's degree from Polytechnic of Milano in 2014, with a Thesis about BIM Management in execution phase, collaborating with the municipality of Milan.
She has worked in Construction Department for almost 2 years ensuring the implementation on the projects of the Management/Construction and Mechanical Information Systems (utilized for the management of construction quantities, planning, progress recording, quality assessment and accounting of construction works, including activities of coordination and implementation of spooling, welding and material traceability systems) and contributing to the growth of the in house platform.
Martina focuses her activities approaching a BIM methodology to corporate workflow.

Alex is a Management System and Quantity Manager in Saipem. He has worked worldwide, in Construction for 10 years ensuring the implementation on the projects of the Management/Construction and Mechanical Information Systems (utilized for the management of construction quantities, planning, progress recording, quality assessment and accounting of construction works, including activities of coordination and implementation of spooling, welding and material traceability systems) and contributing to the growth of the in house platform. During the last few years, Alex focused his activities mainly forging a data-centric approach to the Saipem data driven organization.

Luca is a Principal Solution Architect with the EMEA consulting group in Autodesk's Customer Success Organization. He received his Computer Science bachelor's degree from University of Genova, Italy. He has worked in IT as a consultant for the past 20 years, in EMEA and in North America countries, covering different roles and moving from pure software development to solution design and implementation, from gathering requirements to final delivery. Luca joined Autodesk in 2008 based in Italy, he is now working in Europe, where he has been designing and implementing solutions for several Autodesk customers in the AEC and MFG industries. During the last few years, Luca has focused his activities mainly on BIM, Collaboration and Data Management domains, working close to customers to define and implement the technology platform that supports their needs. Luca also started to work with Forge in the early days, and he has been working with the platform for the past 5 years.

Saipem

Headquartered in Milan, Italy, Saipem is a global leader in drilling services, as well as in the engineering, procurement, construction, and installation (EPCI) of onshore and offshore pipelines and complex projects for the oil and gas market. The company is particularly competent at operating in harsh environments, remote areas, and deep water. Providing a full range of services with EPC and/or EPCI contracts on a "turn-key" basis, Saipem also has distinctive capabilities and unique assets with highly technological content.

Among Saipem's goals is to optimize data flows between its people and processes. The customer's Project Managers need support in the decision-making process—and are seeking a tool that can aggregate information from different sources and relate that data in a usable way.

In collaboration with Autodesk Consulting, Saipem has developed the Data-Driven Construction Solution to implement a data-centered BIM (Building Information Modeling) dashboard. The solution is able to handle multiple models, authored by Saipem and Contractors, and to aggregate data coming from different data sources (e.g. SmartPlant Foundation, Oracle, Microsoft SQL Server, Navisworks, and others). These data sources are integrated into a unique environment, orchestrated by Forge, which is the Autodesk cloud-based development platform.

The journey of this solution began in 2017, with the name of Project Data Visualizer, and evolved over the years enhancing its capabilities, expanding features and engaging a higher number of stakeholders. If interested, you can refer to the following two AU Classes to see the solution evolution:

- [Reducing Decision-Making Time with a Forge-Based BIM Dashboard: The Saipem Experience](#) (Industry, Talk, Autodesk University 2018)
- [Construction future – Aggregating and analysing data using Forge and BI platforms](#) (Industry Talk, Las Vegas 2019)

The adoption of the Data-Driven Construction Solution allows Saipem to overcome issues related to data communication, by increasing collaboration between stakeholders, and helps saving time and facilitating the decision-making process.

Over the years, to further enhance the solution, Saipem decided to add and extend functionalities of Data-Driven Construction Solution by integrating it with Autodesk BIM 360 Docs Platform and more analysis tools. The solution helps to evaluate construction site status and progresses, to support the adoption of the Advanced Work Packaging (AWP) methodology and to enhance the reporting functionalities by integrating Microsoft Power BI dashboards.

Session Details

This session is delivered in the form of an Industry Talk of about 45 minutes, during which the speakers will describe their experience in defining a solution that supports different stakeholders to easily review and understand the current status of projects, relying on a data-centric dashboard, accessible to everyone and from any device.

The session aims to describe the reasons which led Saipem to take the specific decision as well as the role played by Autodesk Customer Success Organization Team.

After the overview of the business drivers and goals, the speakers will present some technical details, with particular focus on the role played by the [Autodesk Forge Platform](#) to link the models with the data coming from Microsoft Power BI reports, in support to the Advanced Work

Packaging (AWP) methodology. Together with this key feature of the solution, the presenters will also describe how different disciplines models are presented and aggregated in the same instance of the [Forge Viewer](#). Lastly, some other key technical features of the solution will be illustrated (for example the integration with Autodesk BIM 360 Docs, tokens management to leverage security, etc.).
The following is a deeper overview of the Learning Objectives of this class.

Discover how Forge brings data to the center
One of the challenges Saipem faced in the past, and is still facing to some extent, is the traditional approach to manage documents, rather than data.
There are many problems with a document-centric approach; the most common ones are the use of documents as databases, which ends up in the creation of data silos, the increased number of entry points for individual portions of data, and an almost not quantifiable amount of wasted effort and redundant processes.
In few words, the old document-centric approach led all departments involved in a project to rely on redundant emails, calls, folders, hundreds of different storage locations, siloed and inconsistent document databases, preventing a good and smooth collaboration.
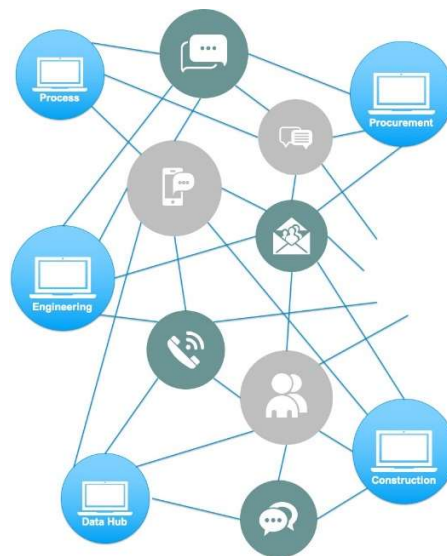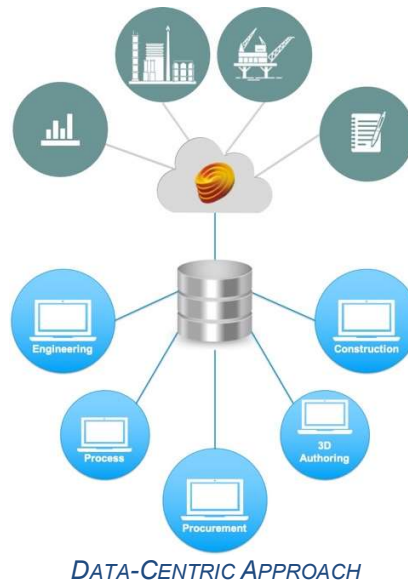

DOCUMENT-CENTRIC APPROACH

Moving to a data-centric approach, gives the possibility of accessing data instead of documents in a seamless way, while being sure to always have access to the latest and most significant data and information. Transforming the internal processes from a document-centric model to a data-centric one has not been easy though; it required a huge commitment from different stakeholders, as well as changes in processes and workflows which, for many years, were accepted and fully adopted by all users.
The chosen approach was to start by identifying few disciplines at first (e.g. Piping and Structural), then the tools that are used to elaborate complex analysis related to costs, material availability, orders and scheduling, with the objective to try exporting this information to a database in an easy way.

By leveraging Saipem internal initiatives, and thanks to the deep know-how and expertise of Saipem experienced engineers, data has been made available and usable in a central repository, which has been conceived with the active support of Autodesk Consulting.

DATA-CENTRIC APPROACH

To summarize, being based on one single version of the truth, a data-centric approach enables an optimized data flows between people and processes.
Once data has been made available, the next step has been to try linking it to model geometry, thanks to the Autodesk Forge Platform and a web solution accessing the platform APIs.

Discover the benefits of a datacentric dashboard accessible to everyone from any device
The target users for this solution are mainly Project, BIM or Discipline managers who not necessarily have deep technical skills. Historically, the use of authoring tools, or even 2D or 3D desktop viewers, was to them a kind of showstopper. Moreover, understanding geometry and related information coming from other systems, both in a digital and paper-based format, was a very time-consuming task, that, most of the time, was the primary cause of headaches, mistakes and inaccurate analysis.

The new solution helped speeding up the decision-making process and data reporting by at least 30%. The solution also helped increasing data accuracy and easing daily-activities planning. Thanks to the new solution, the users can access all needed information already related to the model, from any device and everywhere, in an easy-to-use interface that doesn't require any specific technical skill.

Discover how to get the Ms Power BI dashboard in Forge
Integrating Microsoft Power BI reports into Forge allows users to move from a legacy system to a smart solution, for managing standard reporting and dashboards in a simple way, with the possibility to customize and to share them worldwide in any kind of hardware/device.

Microsoft Power BI is widely used in Saipem and integrates easily with the existing Forge solution, allowing to enhance analytics and reporting capabilities with few configuration settings. The various Microsoft Power BI dashboards used in Saipem collect data from the same data sources as the Forge Data-Driven Construction solution; therefore, to avoid duplication of work, such dashboards have been integrated with the Forge based application, embedding interactive visuals in the application in a smarter and more productive way. During the class presentation, we will focus on a couple of such dashboards with specific relevance for Construction Progress Information and AWP data.

Thanks to the solution, for an operator working on site, it is immediately clear if it is possible to install a rack or a spool thanks to the 3D visualization of the model, rather than having to use a printout list of materials.

Another important achievement is related to the standardization of Enterprise reports, enabling overview of project progresses on Construction Site (e.g. highlighting in the Forge Viewer all the welding to be completed, will give the possibility to sort all the information by material, unit, contractor or other topics, exploding all data as needed).
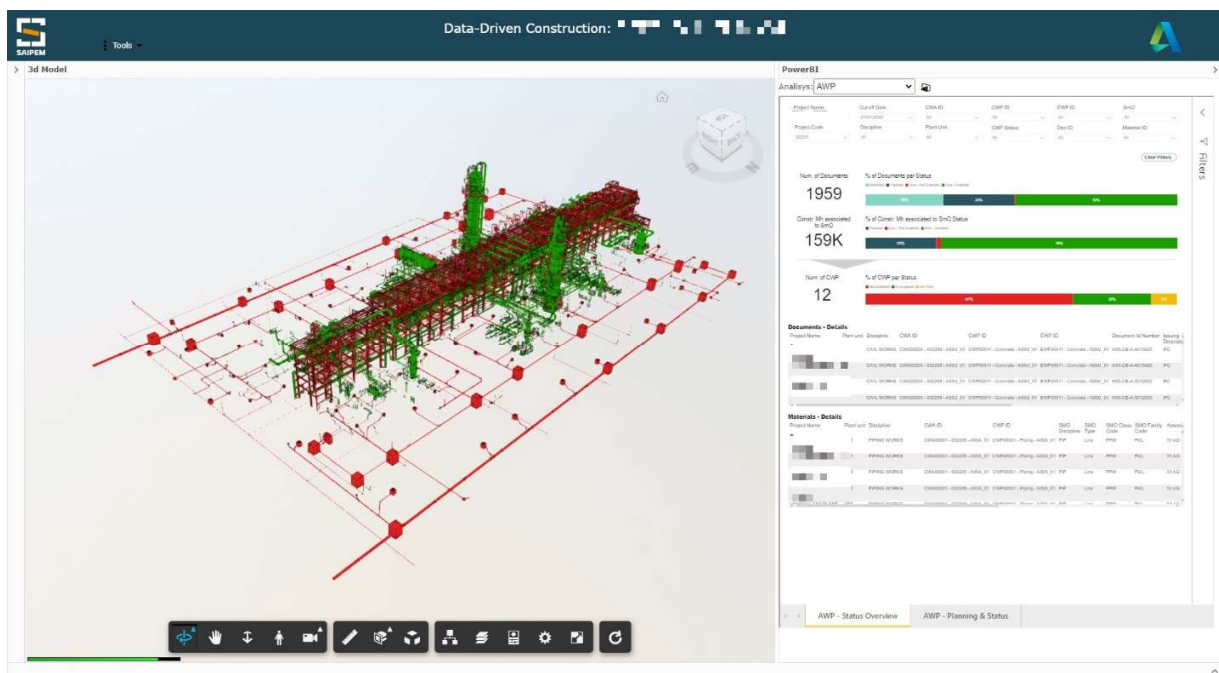

POWERBI DATA PRESENTED IN THE CONTEXT OF THE MODEL

In the figure above it is possible to see an embedded Ms PowerBI dashboard on the right, which controls the theming of the elements matching criteria set in the third bar,and displays element status accordingly in the Forge Viewer.

Discover how to facilitate the data analysis

As described in the previous paragraphs, one of the goals achieved since the very first release of the solution has been the possibility of linking information to geometry. Besides this, the most important achievement has been the possibility to validate the accuracy of the information coming from all systems, as well as the quality of the modelling and drawing process. Users begun to see

data represented in the context of the model thanks to Forge adoption, and they were able to see discrepancies between the different data, allowing them to take initiatives to identify and solve quickly such gaps. With the evolution of the solution, new objectives have been achieved, scaling it up with new components and involving new stakeholders. The solution is fully integrated with Autodesk BIM 360 Docs, who acts as the Common Data Environment and the repository for all the files. More than one model can also be loaded now in the same instance of the viewer, integrating information coming from different departments; as an example consider that for each area of a plant two types of model are currently managed, one with Engineering and one with Construction information, loading at the same time those models, more accurate analysis can be performed, for instance having detailed information on each element that has been erected on site.
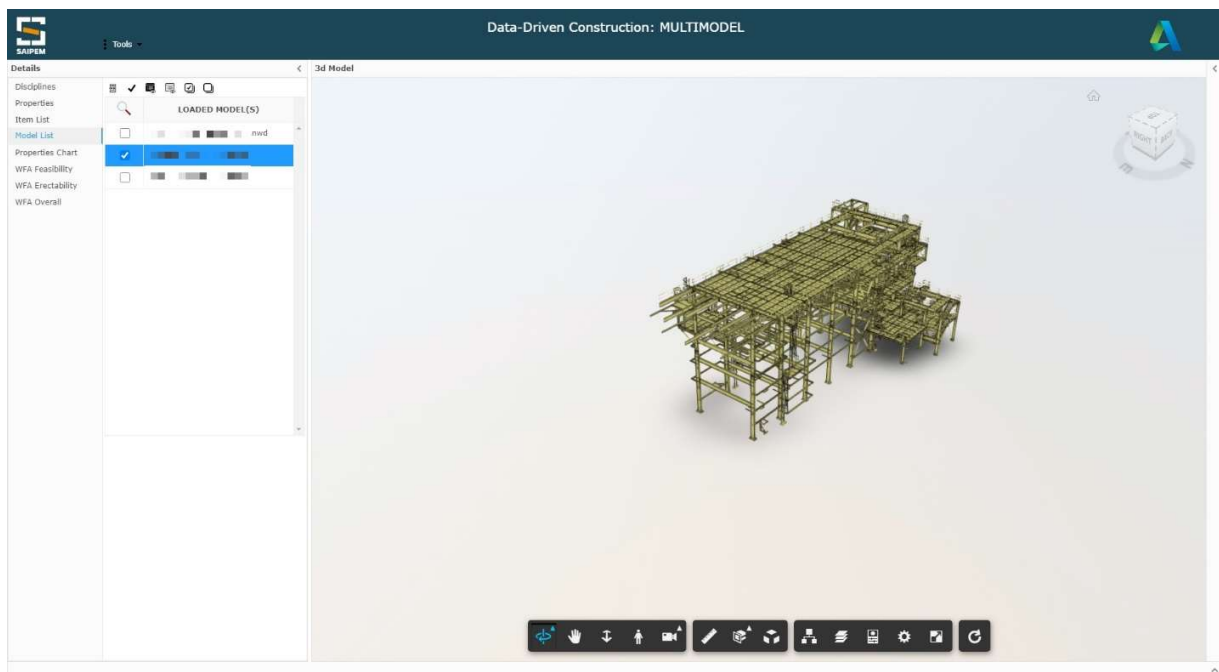

SINGLE CONSTRUCTION MODEL LOADED
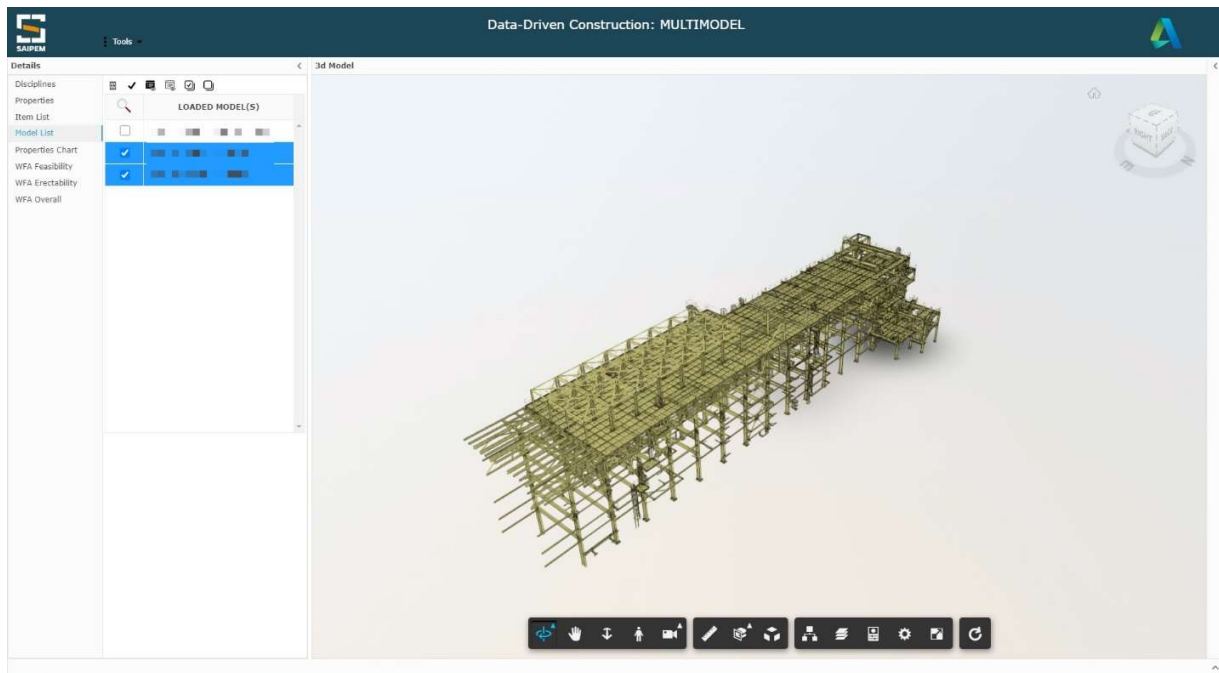
TWO CONSTRUCTION MODELS LOADED
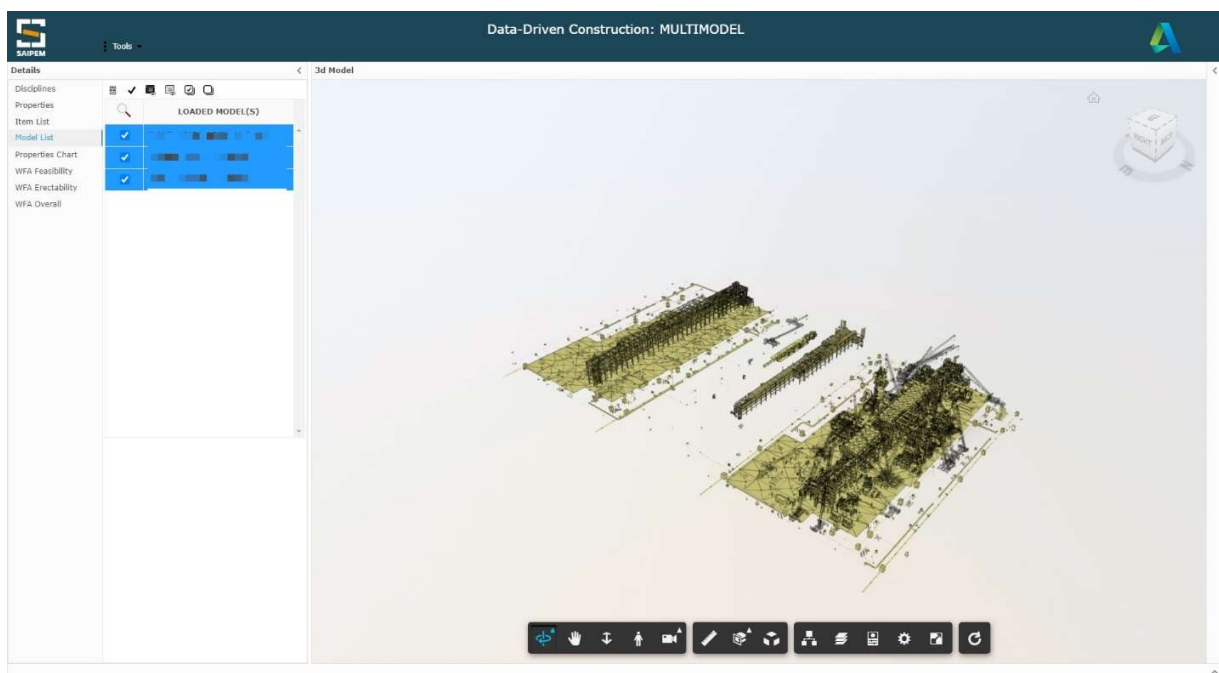
WHOLE PLANT ENGINEERING MODEL AND PREVIOUS TWO CONSTRUCTION LOADED

Another aspect where the solution simplifies the analysis is given by the possibility of filtering view of the loaded model(s) based on the discipline they belong to. As an example, the following figure

shows the same model already presented, filtered by its "Civil Works", "Commissioning" and "Special Lining" disciplines.
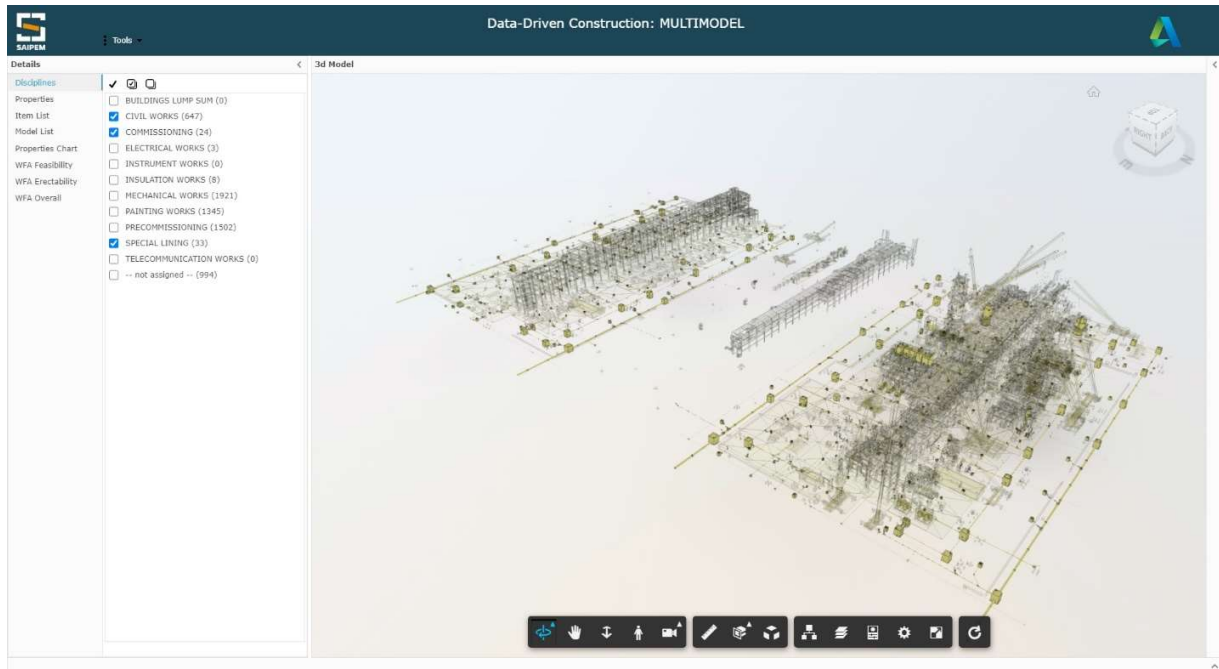
VIEW BASED ON DISCIPLINE FILTERING

Once a view has been filtered, then all analysis can be done on the available elements, making it easier to evaluate and make decisions