CS500126

Construction site management with advanced workflow in Construction Cloud

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Learning Objectives

- Set up workflows to manage railway's construction sites with Construction Cloud
- Develope integration with other Legacy systems with Construction Cloud Connect and Forge
- Develope dashboards extracting data from Construction Cloud and other systems (for example Microsoft Power BI)
- Migrate data from BIM360 Docs and field to Build

Description

This session is a follow-up of the class presented last year about the "Virtual construction site management with advanced workflow in BIM360" (CS468465). We will describe the improvements made this year through the adoption of the Build module including the PlanGrid Build mobile app for field workers. We've been widely extending the use of Construction Cloud with digitalization of other construction processes in addition of those already implemented. We are focusing our attention on setting up a workflow for safety and environmental check in the work site.Using Forge and Construction Cloud Connect, we are developing integration with other company database and Legacy IT systems, to avoid data redundancy and to build up integrated dashboards. In upcoming years we will be able to manage and improve the construction process of linear infrastructure projects with ConstructionCloud in order to improve data quality, reduce costs and time by 60%, reduce wastefulness and promote sustainability.

Marcella Faraone

[Marcella Faraone employed by FSTechnology. Head of Competence Center BIM GIS, she is responsible for researching new technologies and innovating workflows with BIM and GIS. Together with her team, at the end of 2017, she started the successful project of integration between BIM and GIS. For this work, she received the Special Achievement in GIS Award at the 2019 by Esri. During the last two years she focused her attention mainly on construction phase setting up wotkflows for inspection survey, safety and environmental check in the work site. During last year she took part in "MyOffice" project whose aim is to redesign the work place to ensure the well-being at work of the 73.000 employees of the Italian Railways group. She has a BIM management experience acquired in the Red Line North Underground project in Doha,

where she has worked from 2014 as MEP BIM Coordinator. During 2018/2019/2020 she participated as a speaker at the following events: ESRI Italia conference 2018, Autodesk Rail Summit, European GIS Transportation Summit, Autodesk University Las Vegas.]

Introduction

This session is a follow-up of the class presented last year about the “Virtual construction site management with advanced workflow in BIM360” (CS468465). I will describe the improvements made this year through the adoption of the Build module including the PlanGrid Build mobile app for field workers. We’ve been widely extending the use of Construction Cloud with the digitalization of other construction processes in addition of those already implemented.
Moreover with the use of Forge and Construction Cloud Connect, we are developing integration with other company database and Legacy IT systems, to avoid data redundancy and to build up integrated dashboards.
We are focusing our attention on setting up workflows for safety, environmental, work in progress and quality checks in the work site.

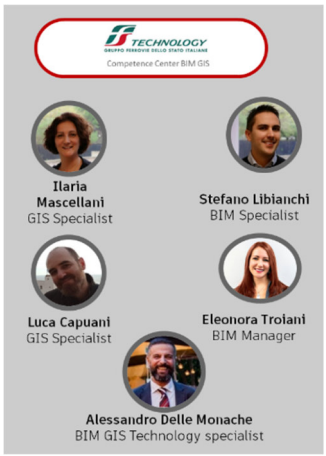
About us

FSTechnology

FS Technology is the hi-tech company of the Ferrovie dello Stato Italiane group. It has been created at the beginning of 2019 and its is to strengthen and support **digital innovation** in the group companies.

The Competence Center BIM GIS

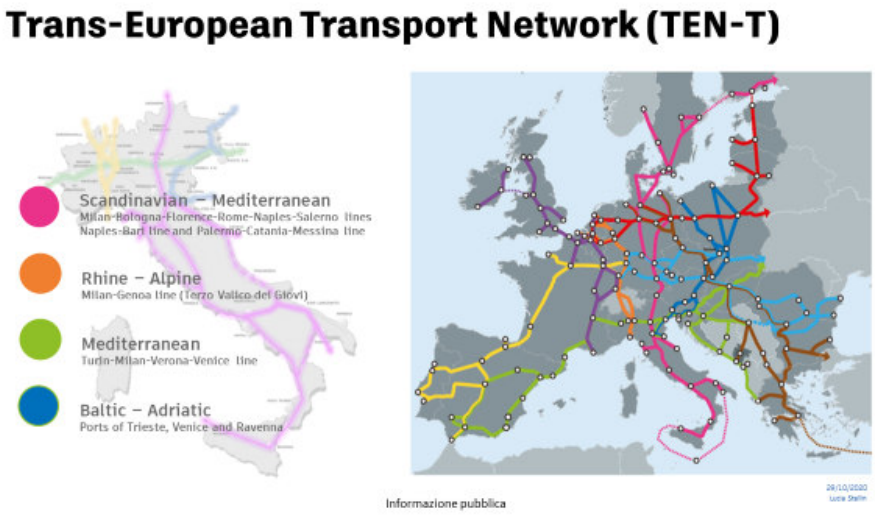
The Competence Center BIM GIS is a team inside FSTechnology. The main objective of our team is the research of new technologies to improve the processes and the workflows for the entire lifecycle management of an infrastructure. Considering the core processes of the group, we mainly support linear infrastructure project especially:
Italferr the engineering company of the Ferrovie dello Stato Italiane Group
Rete Ferroviaria Italiana is the company
of the Ferrovie dello Stato Italiane Group is the owner of entire railway infrastructure



Virtual construction site management with advanced workflow in BIM360 (2020)

In the following just a brief recap of where we were in 2020

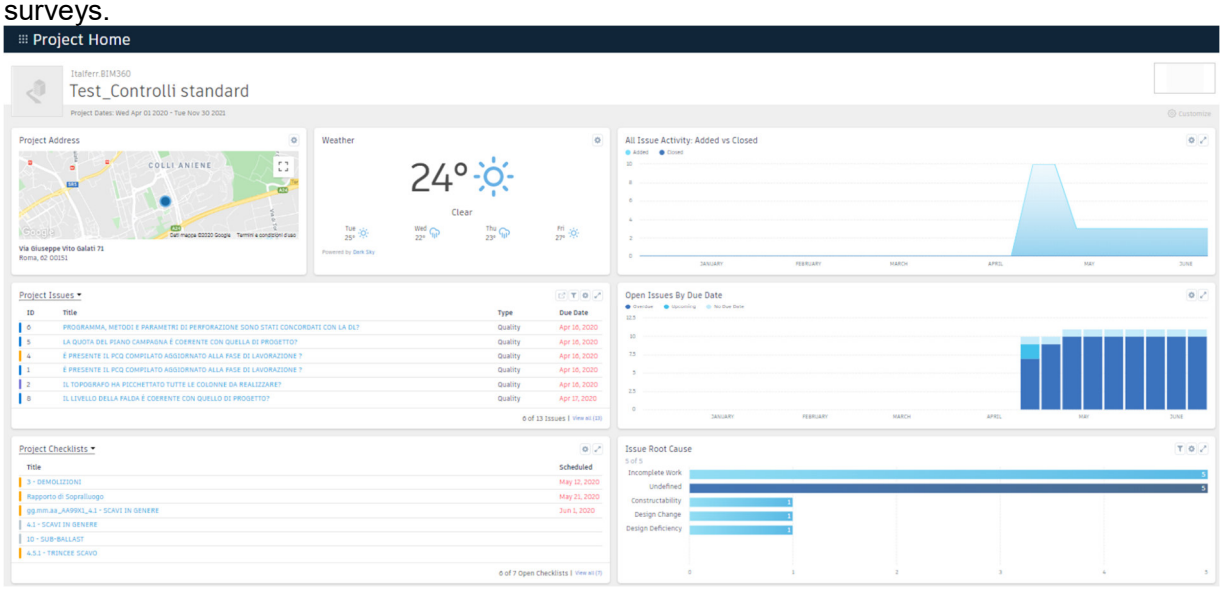
Trans-European Transport Network (TEN-T)



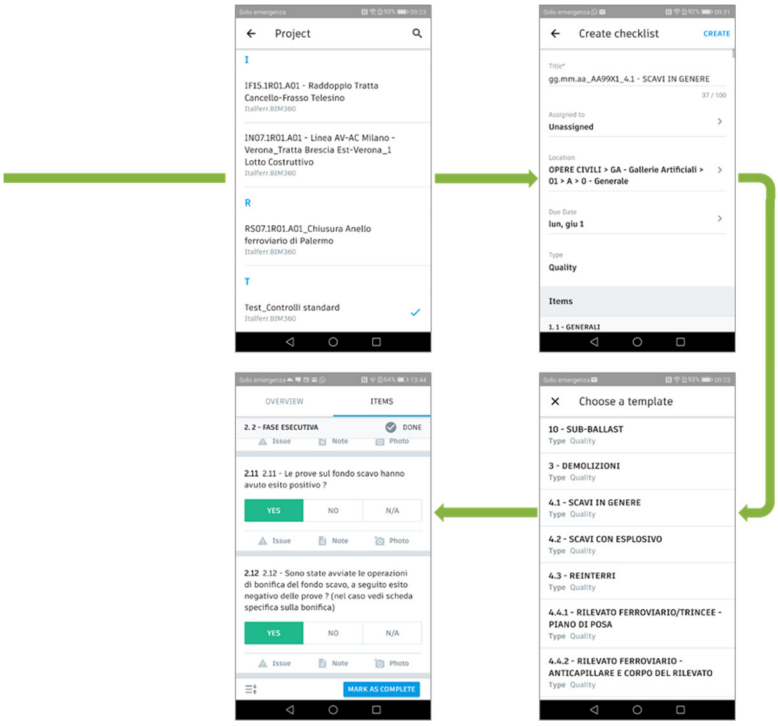
In July 1996, the European Commission adopted a resolution to implement the Trans-European Transport Network (TEN-T). The intent of this multi-phased project is to provide coordinated improvements to primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems throughout Europe.
When complete, the Scandinavian–Mediterranean Corridor of the TEN-T project will stretch from Helsinki, Finland to Valletta, Malta. The Napoli-Bari high-speed railway project is part of this corridor and was initiated in 2015 by the FS Italiane Group, the government agency responsible for Italy's railway network.
We've been focusing our activity mainly on this projects.

Quality Checks and Inspection Surveys

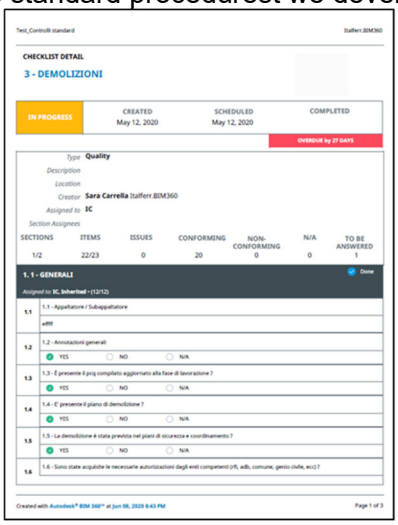
With BIM360 document management and Field we implemented Quality checks and Inspection surveys.



We are talking about all those controls that the construction management must do onsite to check works are built onsite according to the executive design

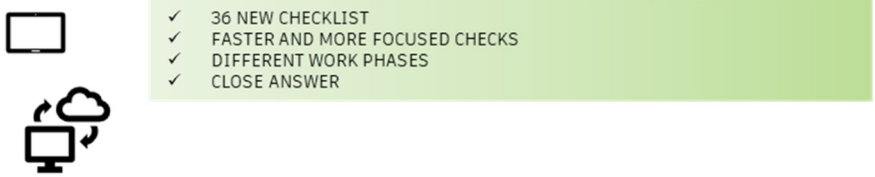


Starting from the standard procedurest we developed a series of checks lists



The control activities were divided for every work into different phases,

- preliminary activities
- Construction phase
- After construction
- Final check documentation
- Every items with close answer



Adoption of the Autodesk Build and advantages (2021)

Despite of the good feedbacks from the field, there are some lack of capabilities in the use of Autodesk BIM 360 that convinced us for the adoption of Autodesk Build during this year

Lack of capabilities in BIM360 Build

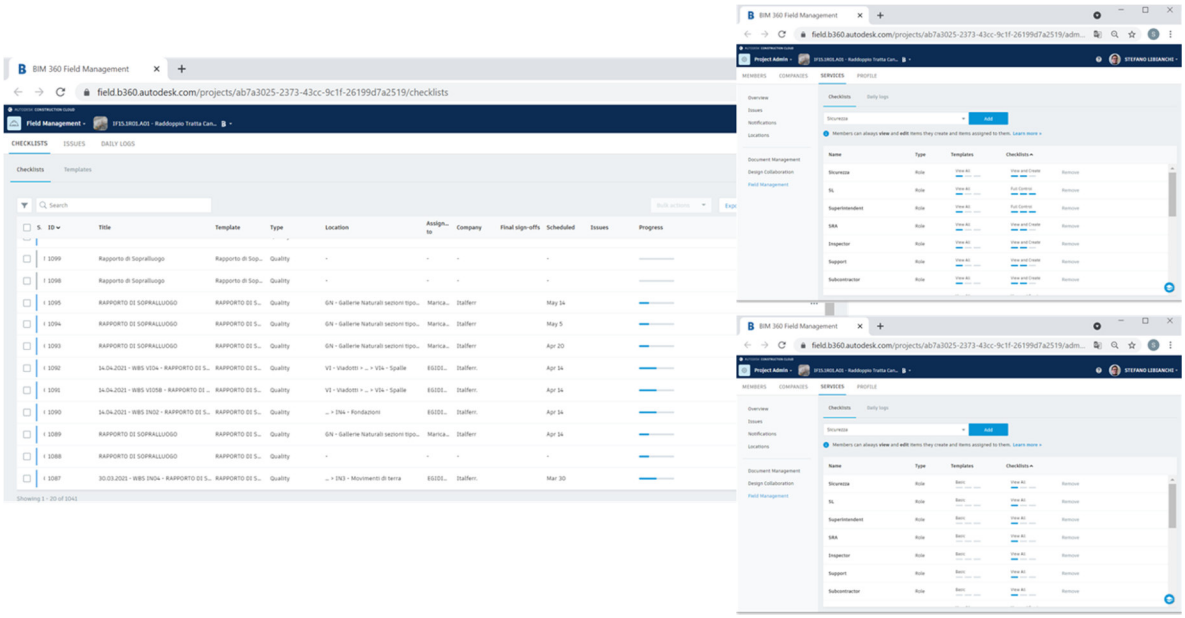
Analysing the outcome exepted from Italferr costruction managers, we listed the lack of capabilities in autodesk BIM360 to understand in which we way we could fix the issues:

- For example, major issue was the difficult to synchronice the check lists in absence or weak internet signal with the consequent loss of data
- Some limits in adding different sections inside the check lists (workers, vehicles or meteo)
- Or lack of information about the activities made from the users on the check lists, or the availabity of some kind of report or format

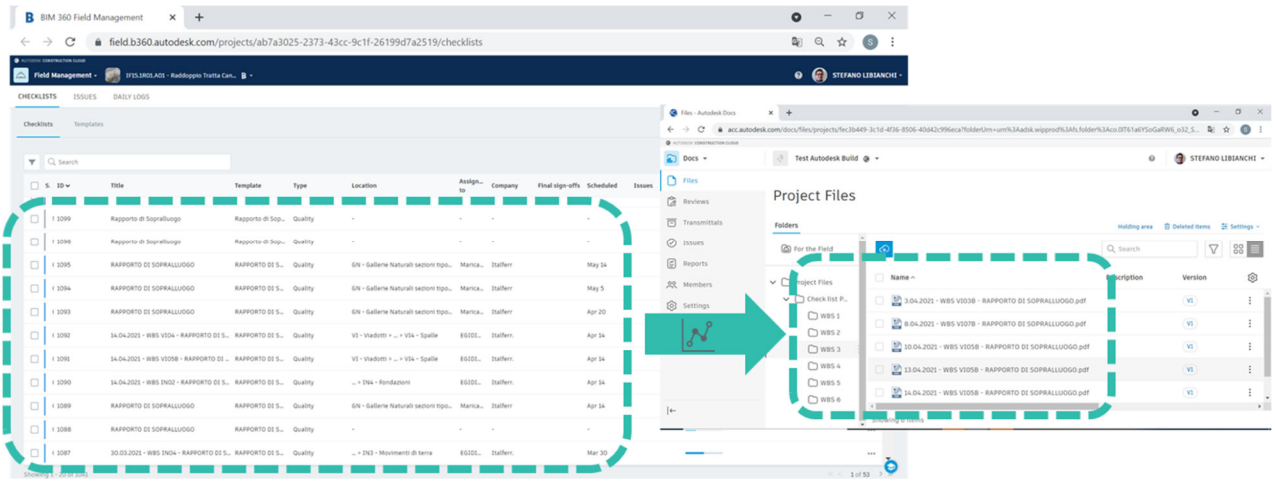
From BIM360 Build to Autodesk Build

Check list

Starting from this analysis, we decided for the adoption of autodesk build. In order to avoid loss of data in the passage to autodesk build, we had to do some technical step:
First of all change permissions on bim360 and made all projects read only to avoid creation of new check lists in the old environment.

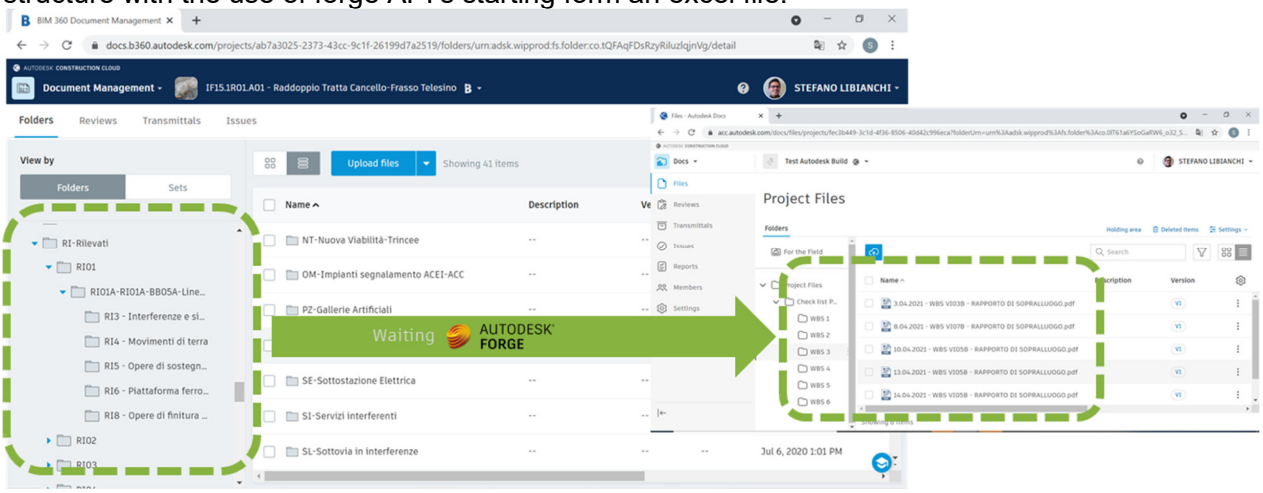


Second step:
With the use of insight we downloaded the old check lists from bim360 and uploaded them inside a proper folder structure in Build. All of these check lists has been saved in pdf format. The use of insight allow us to maintaine inside the pdf the links to the check lists in BIM360



Folder structure

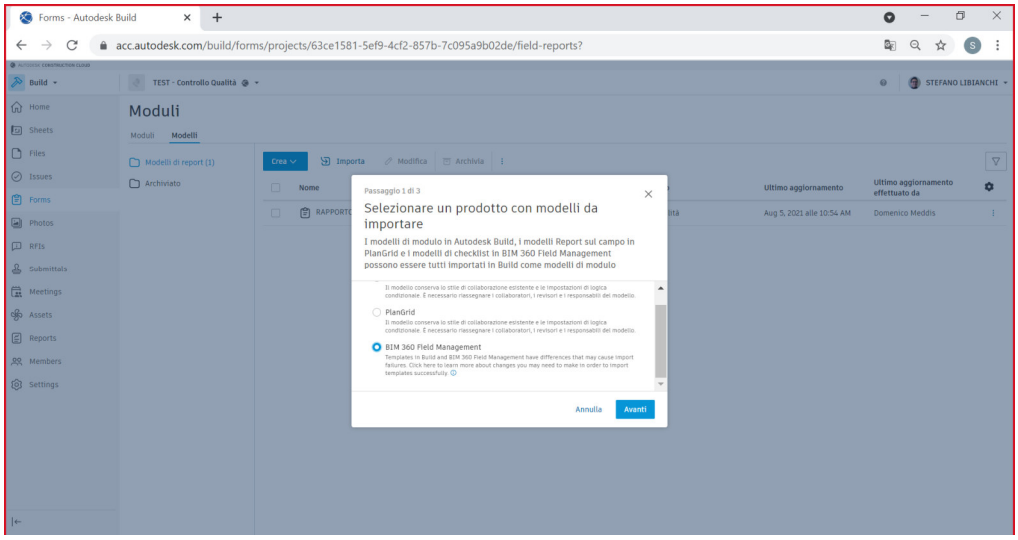
We want to highlight only one point that can create some difficult in this passage.
In BIM 360 build we have the possibility to automatically create the project and its folder structure with the use of forge API's starting form an excel file.



At the moment, in Build we have to create manually the fodelr structure using desktop connector because same APIs are still not available

Template import from Field Management

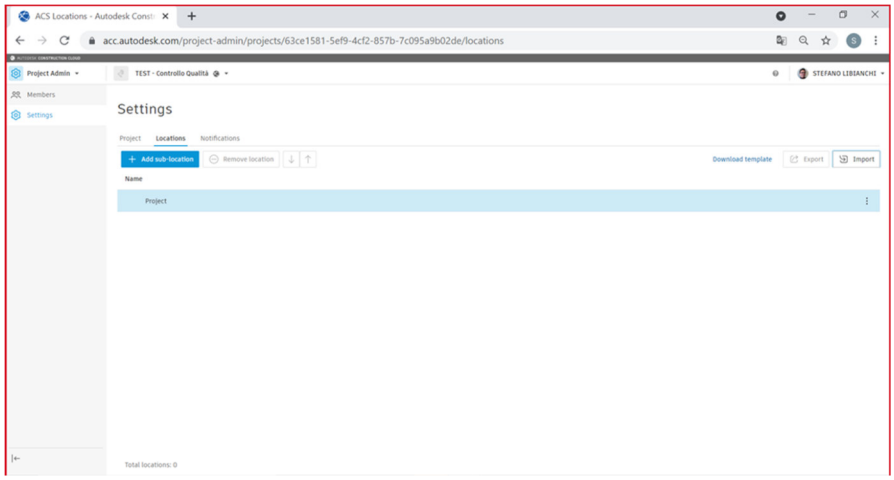
Anyway, in one of the latest release of Autodesk Build, the functionality of import of check list template has been released. Obviously this functionality will help us to avoid the rework in creating check list templates again



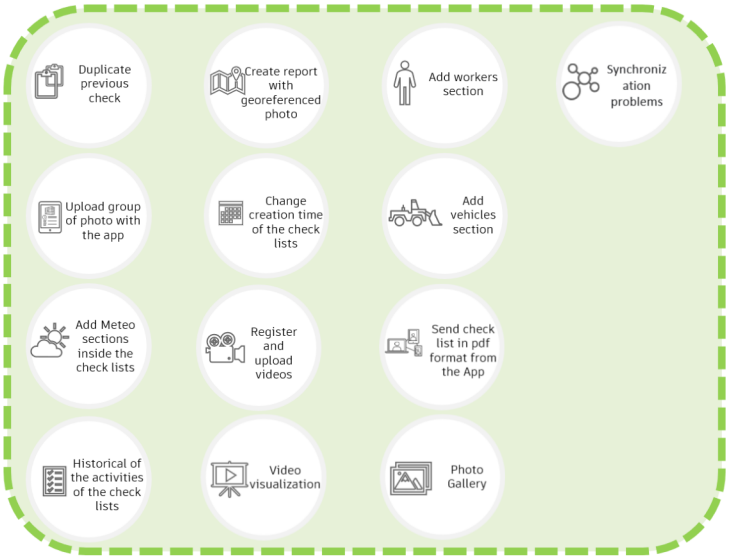
Location import Field Management

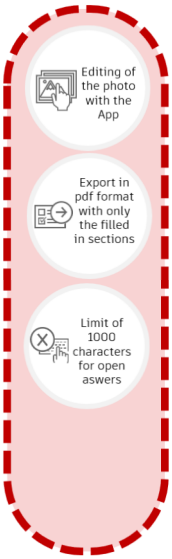
Another useful functionality recently released in Autodeks build is possibility to import locations using the same excel file used to create locations in BIM360. Moreover in this case we also

have the possibility to update these locations due to the fact that an ID is assigned to a single WBS.



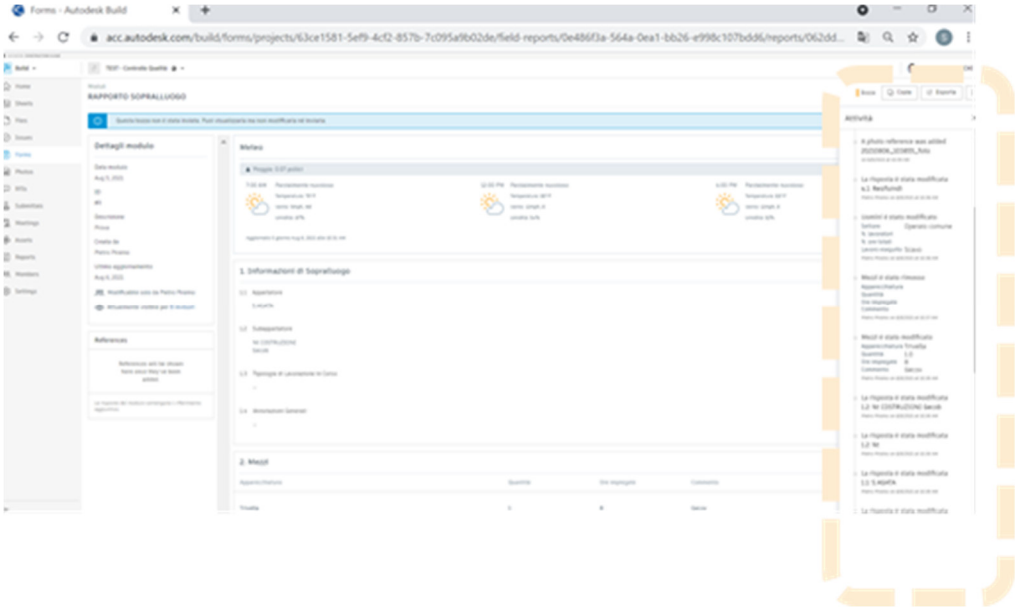
Autodesk Build: improvements



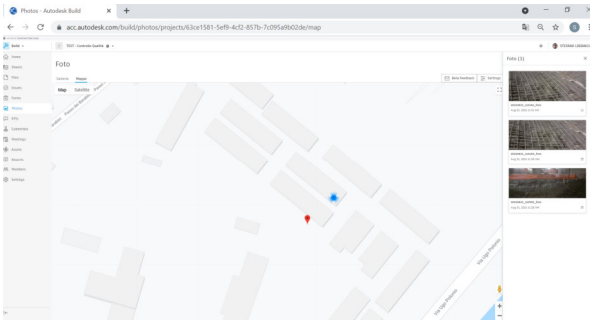


Data loss during weak or absence of internet signal. With the use of the new app we can download data and use the app offline, for example inside a tunnel. The data are stored till the app is again online allow the workers in filed to upload data.

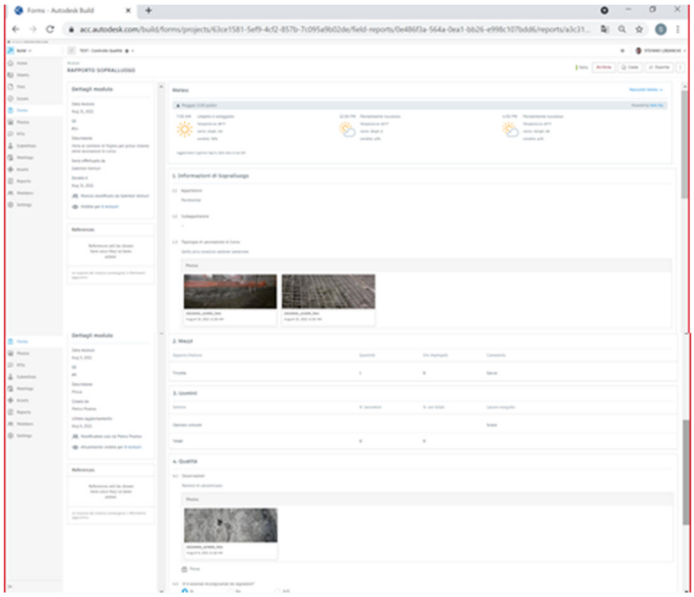
Another important improvement: now we have the list of all activities made by users on the check list



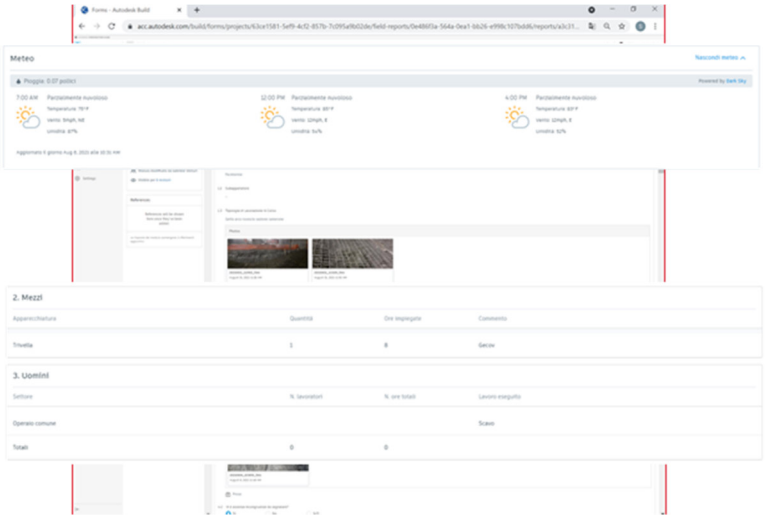
We have the possibility to visualize the photo not only inside the check list, but also in a section that allow us to share them, made report and visualize a map with the right position of the photo.



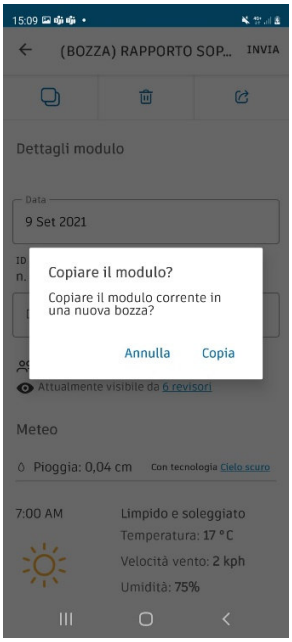
Is very simple now for the field workers to insert section like weather, workrs and vehicles.



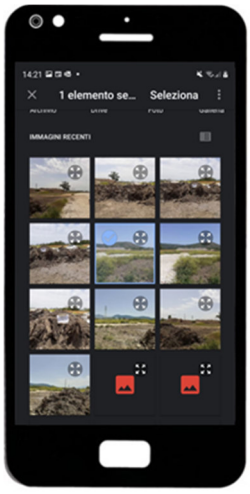
weather can be inserted directly on the check list and not only on the project



We have the possibility to duplicate a check list already filled in



And upload many photos at once



And These are the remaining expected capabilities we hope to have soon available in Autodesk Build:

- the possibility to edit the photo in the app
- the export in pdf format of the check list with only the sections filled in
- and the possibility to insert a larger number of characters insiede the open answers

Autodesk Build: first feedback from the field

The new app has been seen as an improvement of the previous and not as a new app and a new way to works on this:

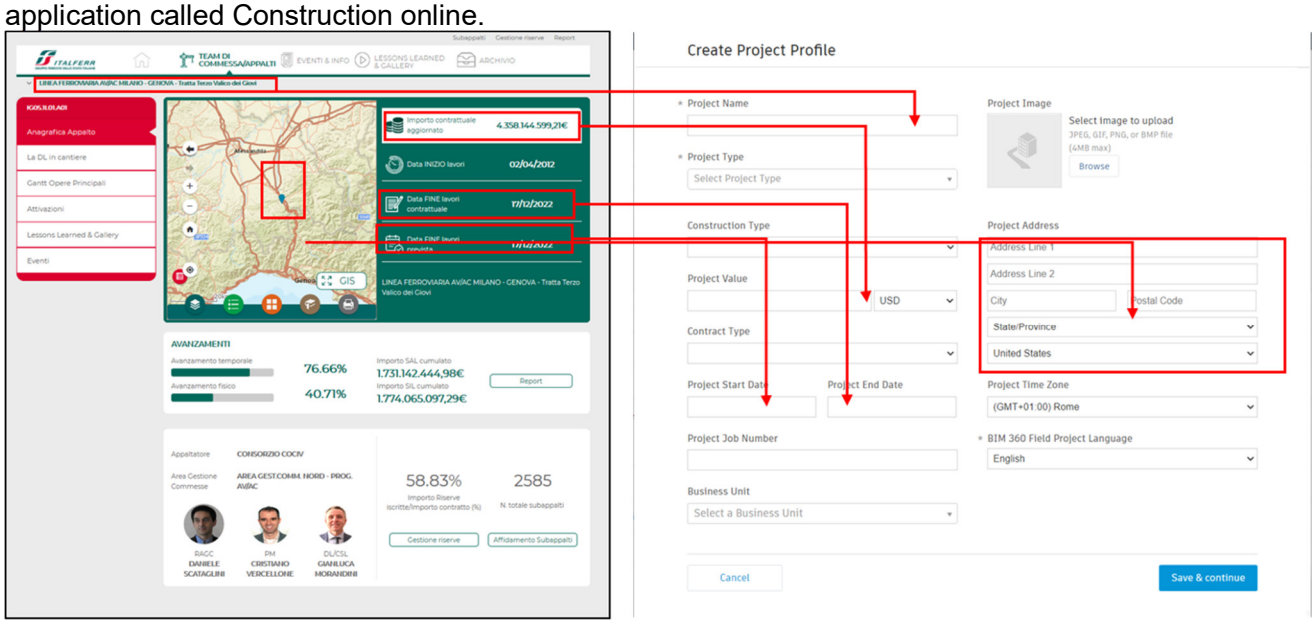
- very much appreciated are the resolution of synchronization issues and the fact that we have no more difference between the IOS and Android app
- very much appreciated are also the new functionalities:
- video functionality to record as is status of the construction site (important feaut
- upload standard check list through pdf file
- integration of the app with other instruments like winzip and sending pdf

Integration with other company database and Legacy IT systems with Forge and Construction Cloud Connect

At the moment we are waiting for the release of a series of Forge API to connect other company databases and legacy IT systems to avoid data redundancy and to build up integrated dashboards. Some of these already mentioned above.

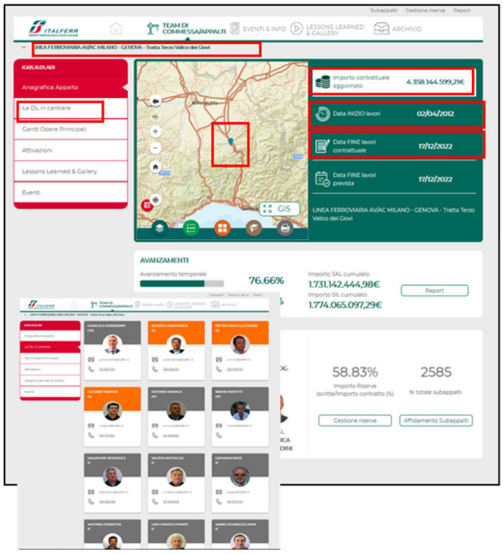
Import of project data

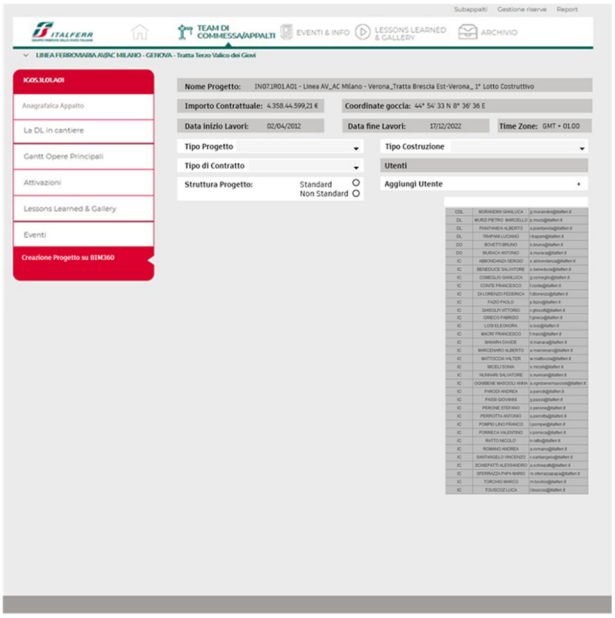
Now I just want show you two examples of what we are going to develop through Construction Cloud connect and forge: creation of a new project profile filled in with data from another application called Construction online.



Import of users and roles

Definition of users and roles from the same application.





Use case
Waiting for GeoBIM: Virtual Construction site supervision

During this year we've started to develop a new workflow including Autodesk Build and the Esri platform as a part of a project we called "The virtual construction site supervision".
As we understood, we can use GeoBIM in the future to optimize the workflow we are setting up
The aim of the **Virtual Construction site supervision** project is to support the activity of Italferr in costruction site with innovative workflow and technologies.

The main objectives are:

- Environmental check during construction
- Construction safety check
- Quality check of the works

To do this we are:

- processing surveys made with drones and total stations (point clouds, orthophoto, fotogrammetry, termic camera, etc.)
- Setting up a workflow with Autodesk build and Esri platform

This project started with a POC at the end of 2019 and is now Work in progress. Is an experimental project. Final results will be available in 2022 at the end of May.

Cloud Collaboration: Setting up a workflow with Autodesk Build and Esri platform

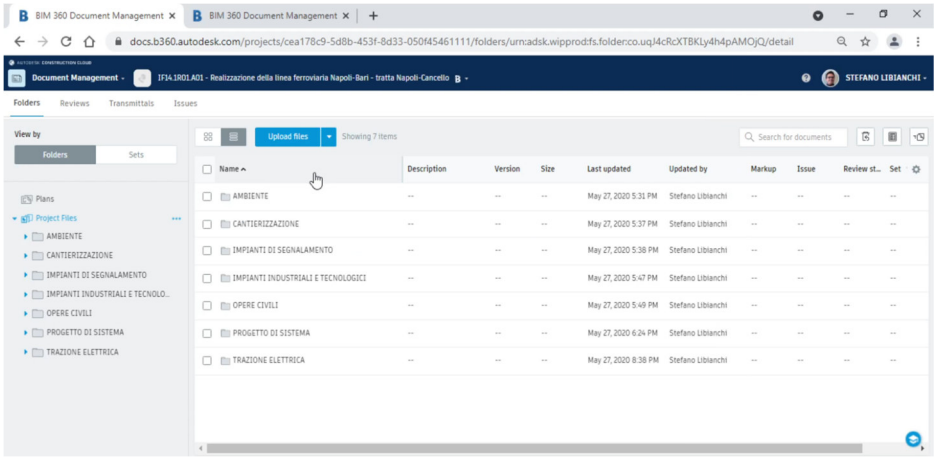
This is the current worflow. We start from: the Project creation in Autodesk Build
With Automatic creation of the project with the use of Forge and ACC connect
The Update of all information regarding the project from other systems and tools with the use of Forge and ACC connect (Codification and description of the project, Costruction site description, folders structure)

- Automatic authorization of the users on document management (API available for BIM360, we are waiting for Build API's)
- Upload of all project data (models, CAD, ecc)

- Next step is the Project publication in Esri platform and creation of GIS webapp through ArcGIS Pro (Connection BIM cloud)

- And then the Plan of the surveys through the use project management and the creation of the RFIs to to identify the areas and part of the works to be surveyed (both in GIS web app and Project management).

First step: setting up a workflow with Autodesk Build



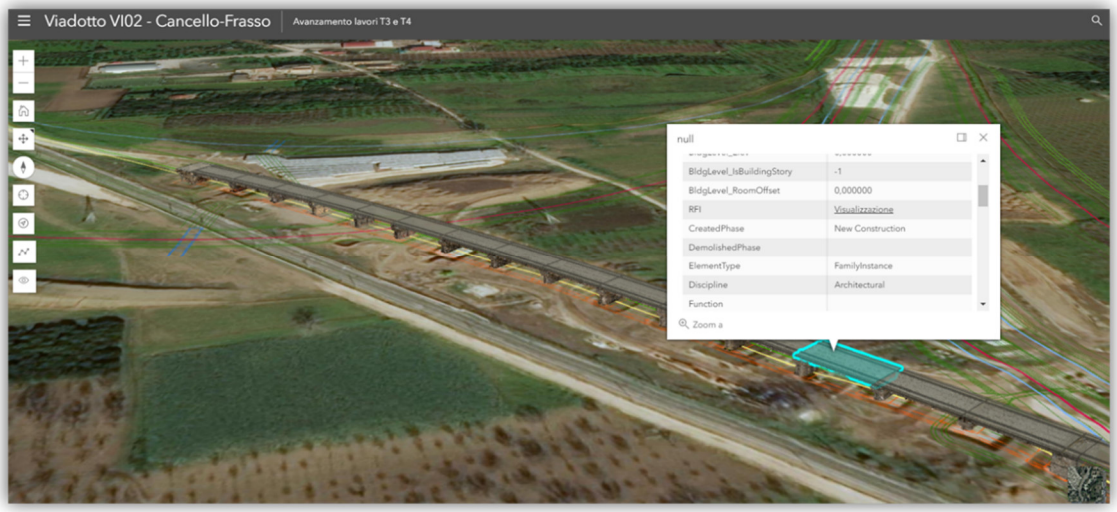
So we start with standard folders structure.

This an example of an existent project and this folder structure
Instead for the drone surveys project we have to still define the standard structure. After this definition we will add this part of the structure to main structure of the project.
At the moment project such as drawings and revit file are still not codify and non metadata are associated to these files.
Inside the document management we use a different folders where we upoad a dwg with an images to identify the areas to be surveyed to create the RFI. Inside the RFI we add as data the link to the GIS esri platform.
With RFI we can follow the survey activity.
In conclusion what we need to define the standard is your help to uderstand the best folder structure e the right metadata that we need to associate to file. It's important to uderstand that we have to follow the standard codification of italferr

Project publication in Esri platform

And now we show how to set up and to publish the project inside the Esri platform
To publish the project data (such as Revit models, Civil 3D models and drawings) in ArcGIS Pro scene, we used the Connection cloud functionality following this steps:

- First Creation of a Local Scene in ArcGIS Pro 2.7
- Then the Connection to Autodesk Construction Cloud with the new Tool Connection>New Cloud BIM Connection
- To connect the RFI created inside the project management, currently we have to add the link of the RFI directly inside local scene database as a metadata



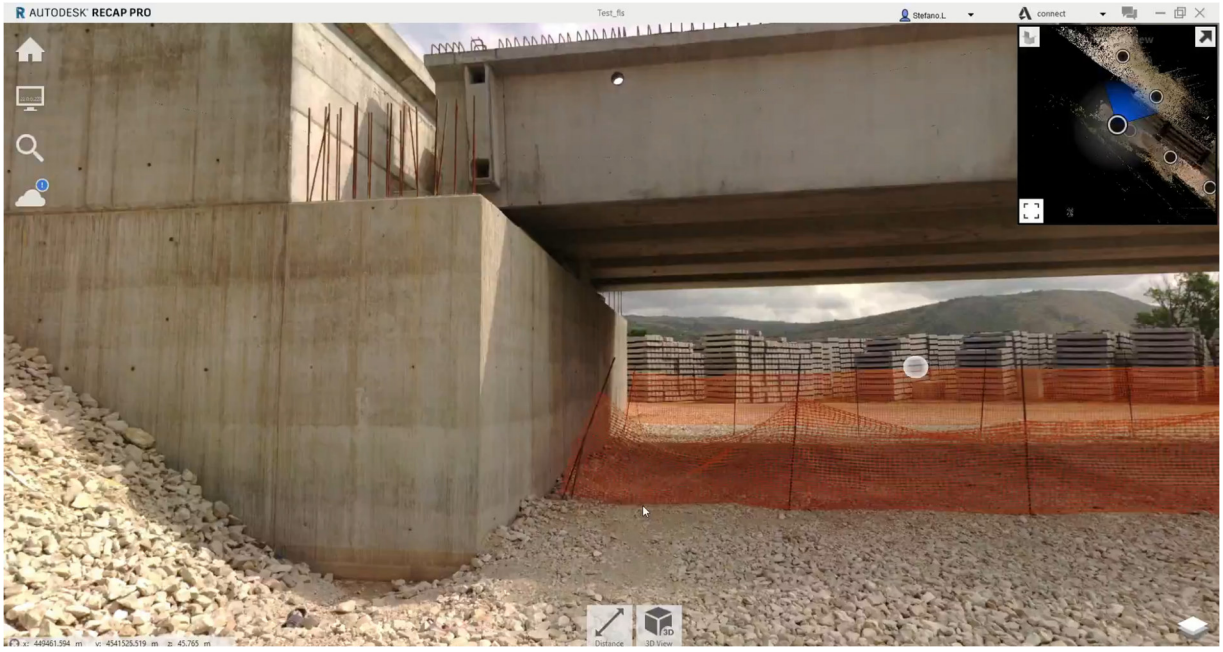
This is an example of the published local scene completed with all project data: the track, the works, construction site areas and viaduct models.
The areas to be surveyed are indentified through layer inside the local scene and connected with the RIFs created inside Autodesk Costruction Cloud.

With GeoBIM we expected that once the areas are identified inside the local scene, we will be able to create the RFIs directly in theis local scene.

Visualization of the results for further analysis

The users in field and the users from remote site need to have visualization of the results for further analysis.
This what we thought to help them with the instruments available at the moment.

- Power BI dashboard
- Point cloud publication on ACC (Bubble view)
- Publication on GIS Local scene
- Site analysis with Hololens:
- Remote Final testing of the works for handover
- Remote analysis of the surveys

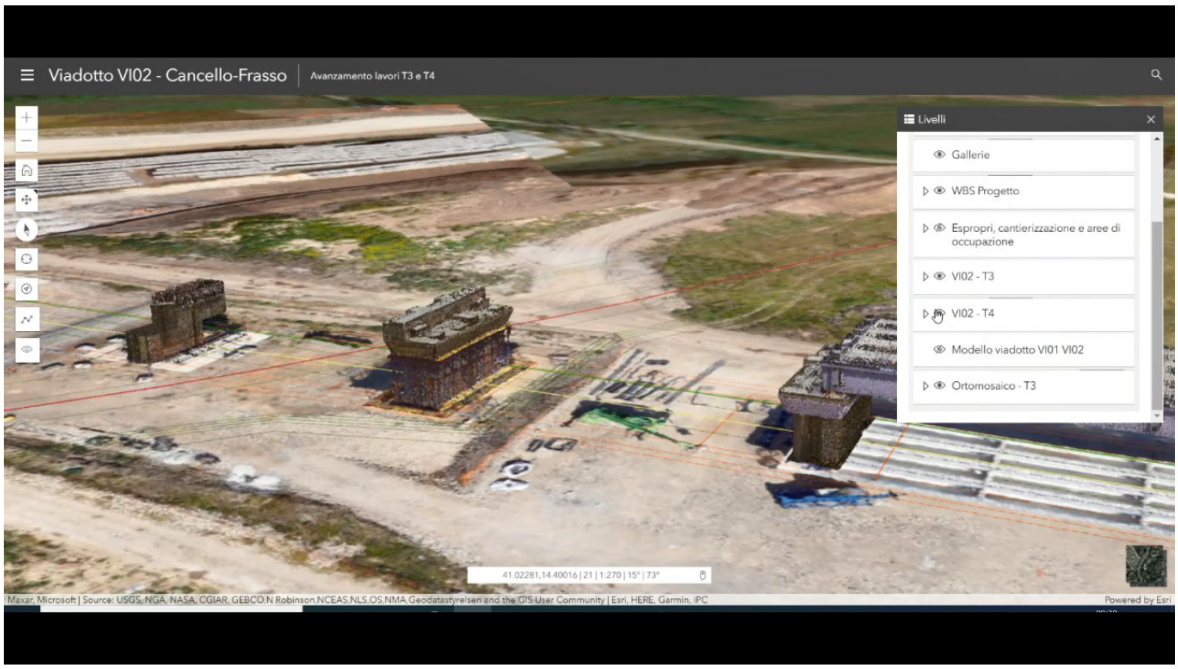


PUBLICATION OF BUBBLE VIEW POINT CLOUD IN ACC

Publication of Point Cloud in Esri local scene

Step by step the procedure followed for publication ArcGIS Pro

- Add the Las to the local Scene (drag and drop from the Document Management)
- Use of the tool define projection. Creation of prj files inside the Document Management
- Use of the tool "Tile Las" e "Create Dataset Las" to trasform the Las in dataset Creation of lasd files inside the Document Management
- Use of the tool "Create package layer" for every las layer to create the slpk files inside Document Management
- ArcGis Enterprise
- Upload the slpk files inside the Enterprise Portal (create packages e services as hosted layer)
  Last step: upload of the created layer inside web scene



PUBLICATION OF POINT CLOUD IN ESRI LOCAL SCENE

This is an example of the resulting web scene with all project data: the track, the works, construction site areas and viaduct models overlapped with the resulting surveys taken at different times.
As you can see we can check the work in progress turn on/off the point cloud layers at different times and compare the difference also with the models.

Conclusions

At the moment we are collaborating with Autodesk to optmize the workflow and to be ready when GeoBIM will be available.
Expectations is to to manage and improve the construction process of linear infrastructure projects in order to improve data quality, reduce costs and time by 60%, reduce wastefulness and promote sustainability in upcoming years.