BUILDING INNOVATION
Emerging Technologies Series

Becoming Digital Twin Ready – An Evolution Strategy

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About Your Presenter…

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- Autodesk SME - BIM/VDC/Digital Twins and Delivery
- Autodesk Revit Certified Professional – Electrical/Mechanical
- Autodesk Expert Elite, Certified Instructor
- Presenter - Autodesk University Top Speaker (2011/2016/2019)
- Presenter – NY Build, ASCE, ASHRAE, etc.

Objectives

Learn how we replaced traditional CAD standards/workflows with documentation standards that align with today's technology.

Learn where the project environment is best defined to smoothly manage data, from design through asset management

Explore how to implement modeling content standards to fulfill true lifecycle behavior in a digital-twin deliverable.
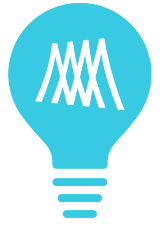
Learn how to review and update workflows to meet the project challenges of delivering digital twin requirements that meet client needs
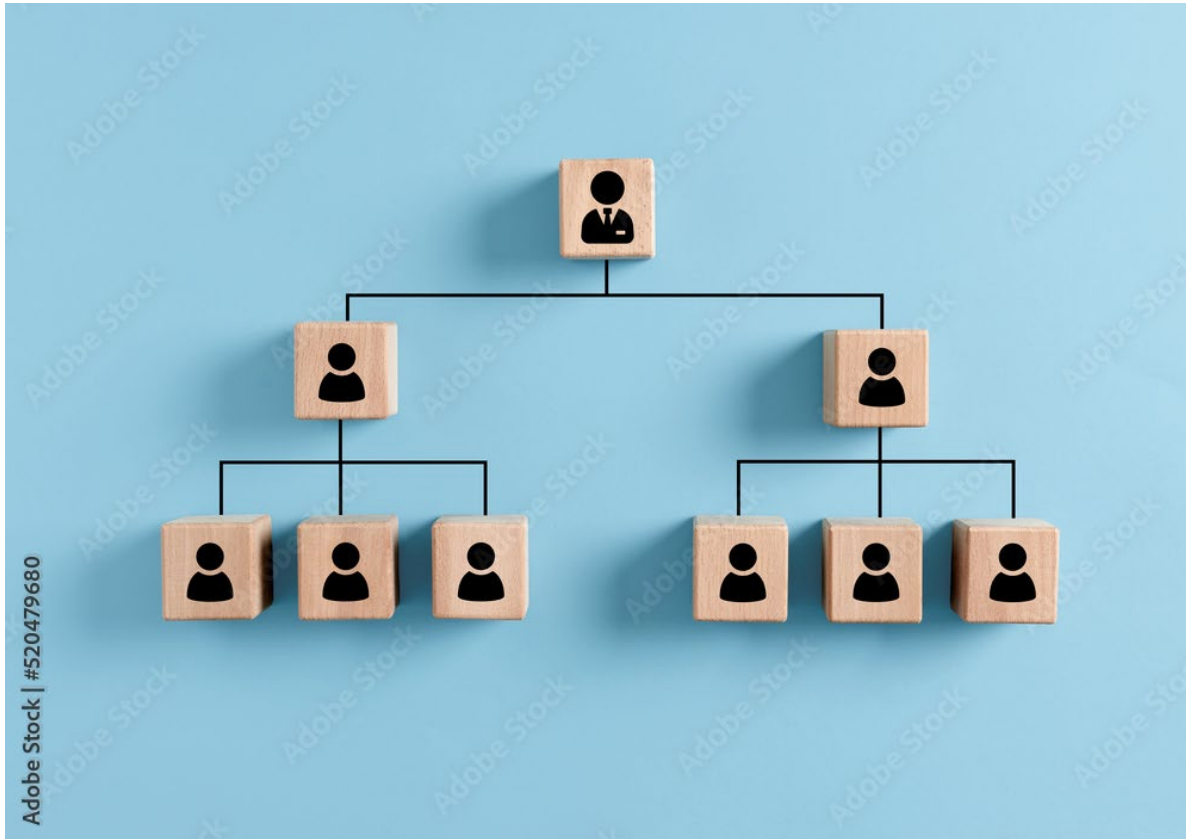
Moving from CAD to Digital Document Standards

Digital Delivery Standards and Workflows

Start with Organizational Changes to Improve Communications...

Digital Delivery Standard and Workflows

The End of the CAD Standard….?

What are the critical items that hold back change? For us…September 2014.

- *NCS Foreword and Administration;*

- *AIA CAD Layer Guidelines;*

- *Uniform Drawing System;*

- *BIM Implementation;*

- *Plotting Guidelines and*

- *NCS Appendixes.*

UNITED STATES NATIONAL CAD STANDARD (NCS)

"The United States National CAD Standard (NCS) streamlines and simplifies the exchange of building design and construction data from project development throughout the life of a facility. It coordinates the efforts of the entire industry by classifying electronic building design data consistently allowing streamlined communication among owners and design and construction project teams. Use of the NCS can reduce costs and produce greater efficiency in the design and construction process."

Digital Delivery Standard and Workflows

What is our current deliverable focus, and what drives the CAD standard?
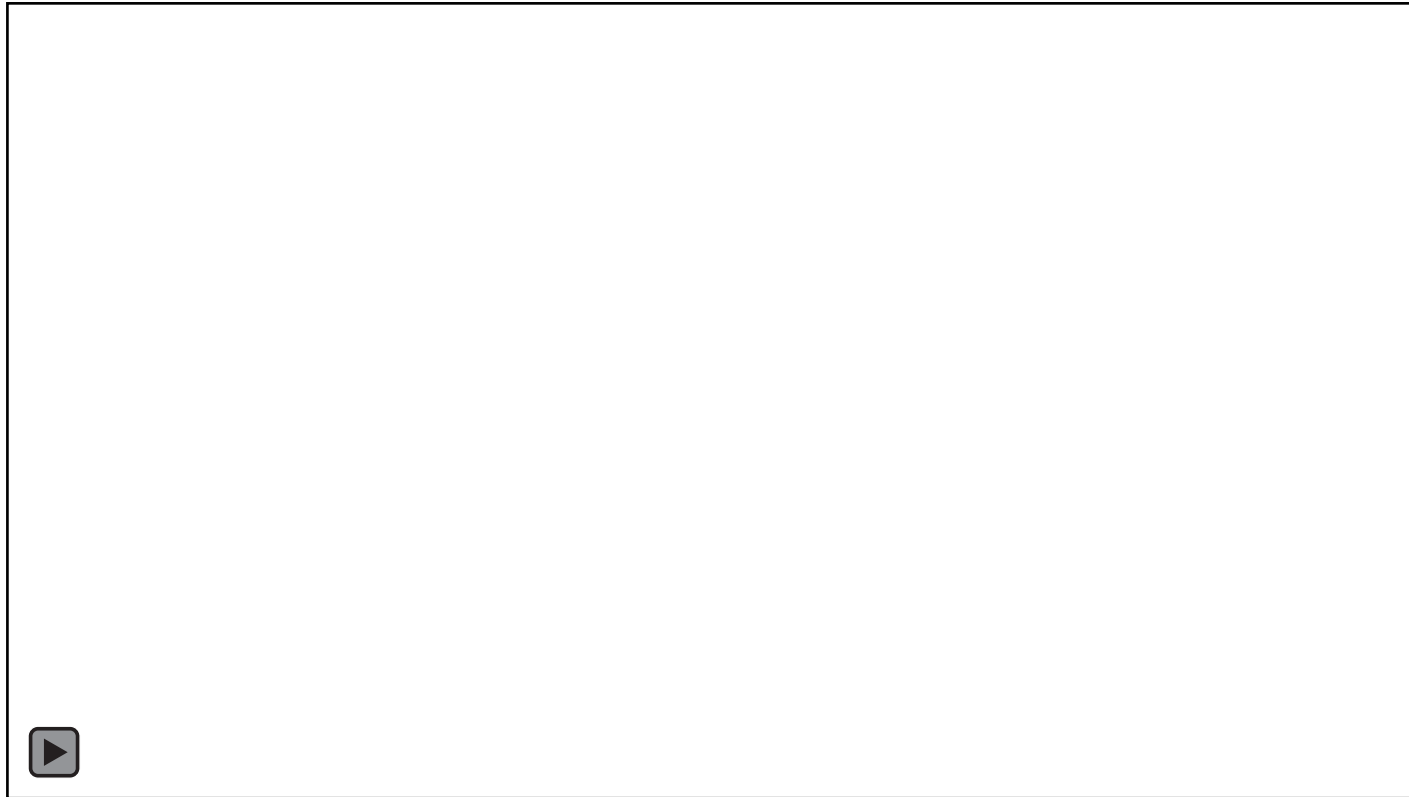
The uniform appearance and consistent presentation of paper documents used to communicate design intent.
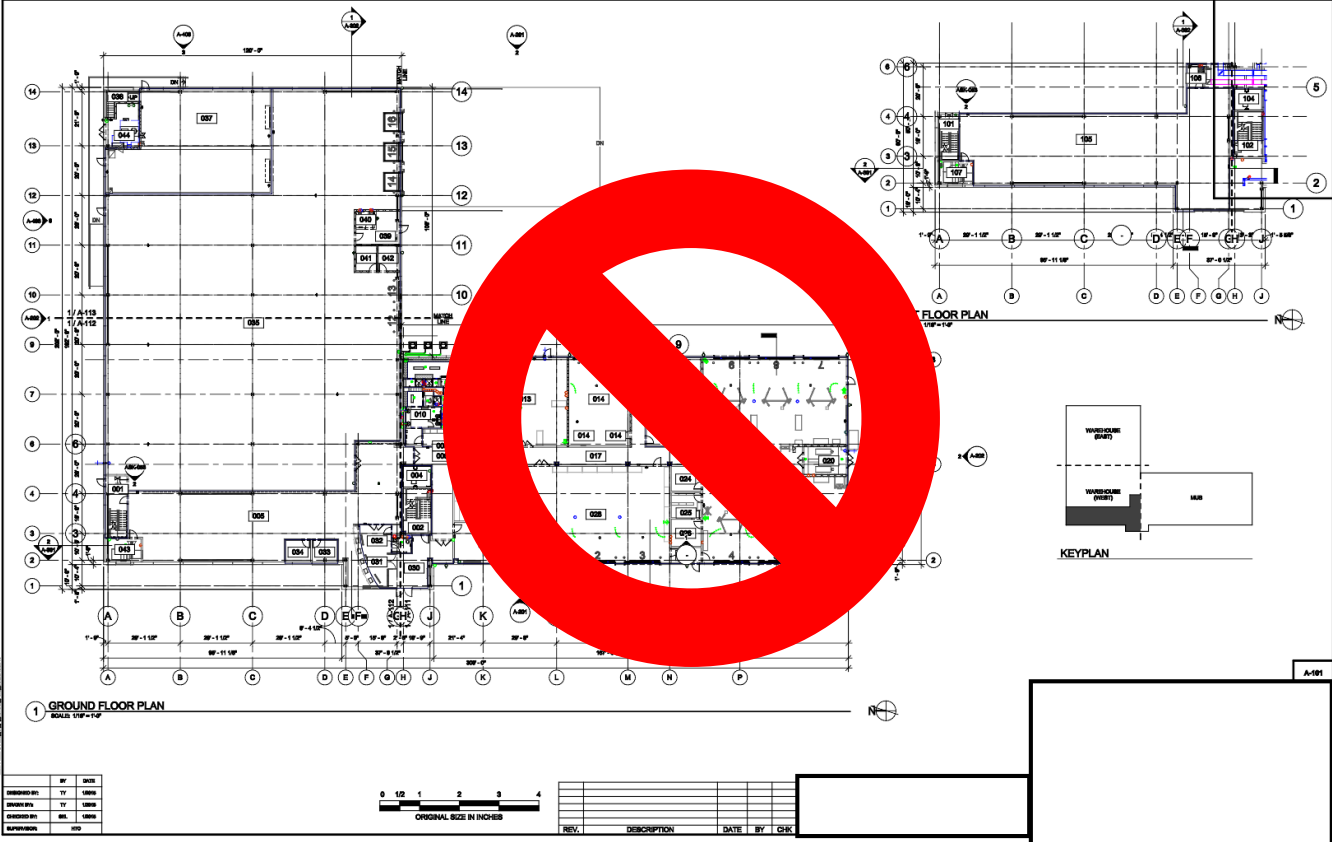
Digital Delivery Standard and Workflows

Eliminating the Barriers and Outdated Practices with a new deliverable!

The Model IS the deliverable. The Intelligent view that contains the data, and its relationship to other views and objects, is readily available...so why do we need a sheet?
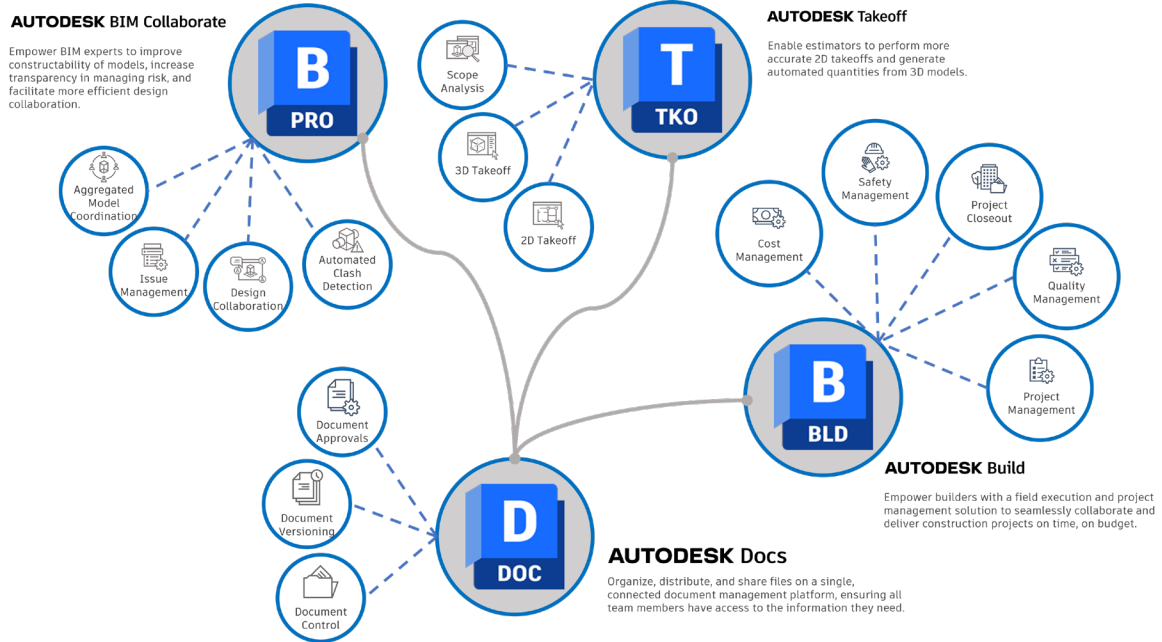
The Digital Twin Design Environment

AUTODESK BIM Collaborate

Empower BIM experts to improve constructability of models, increase transparency in managing risk, and facilitate more efficient design collaboration.

AUTODESK Takeoff

Enable estimators to perform more accurate 2D takeoffs and generate automated quantities from 3D models.

AUTODESK Build

Empower builders with a field execution and project management solution to seamlessly collaborate and deliver construction projects on time, on budget.

AUTODESK Docs

Organize, distribute, and share files on a single, connected document management platform, ensuring all team members have access to the information they need.

Image Credit © Copyright 2022 Gareth Spencer, Man and Machine
https://www.manandmachine.co.uk/autodesk-docs/autodesk-construction-cloud-solutions/

Understanding IpaaS in Digital Environment

It's not just the tools...it's also where we work, and a stepping stone for Digital Twins...

Paas = Platform as a Service

Iaas – Infrastructure as a Service

Ipaas – Best of Both Worlds:

"It is an intuitive, ready-to-use integration platform that allows customers to create flexible integrations without writing code."
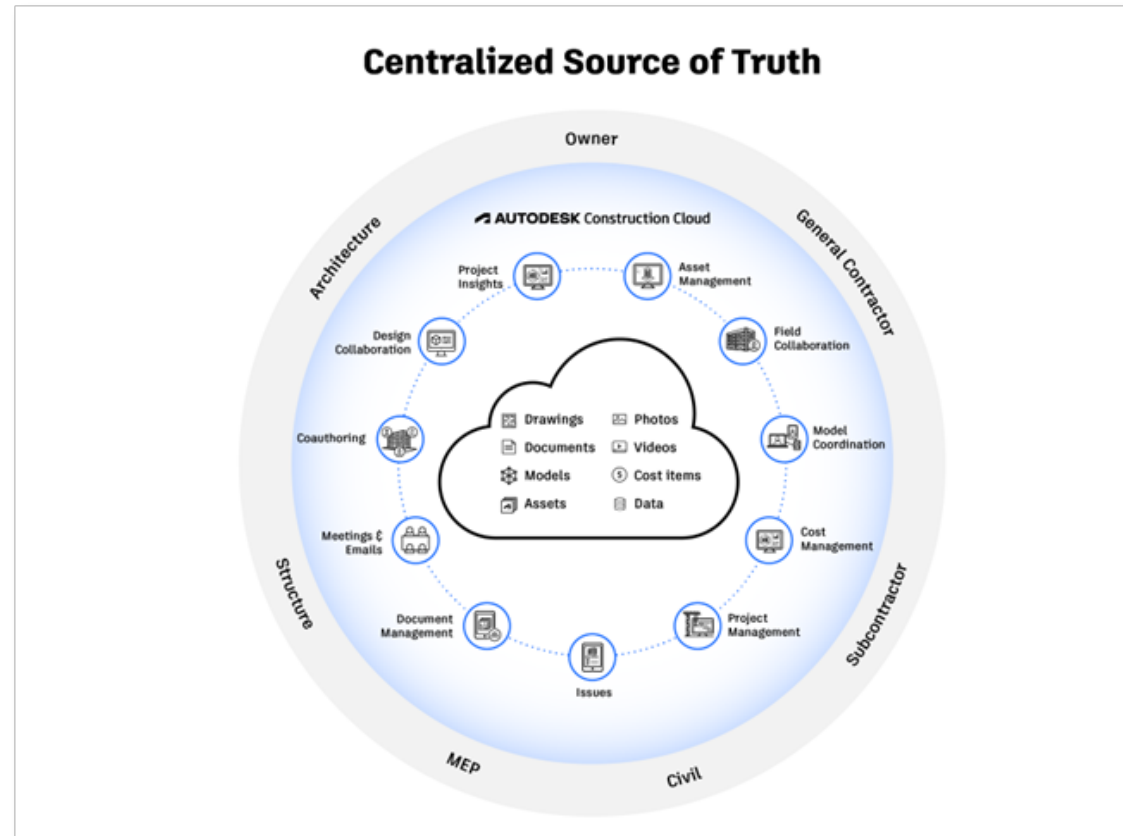
The Digital Twin Environment…is not <u>one</u>.

Understanding current Technology's role in digital delivery…

There are a host of platforms used for today's design environment:
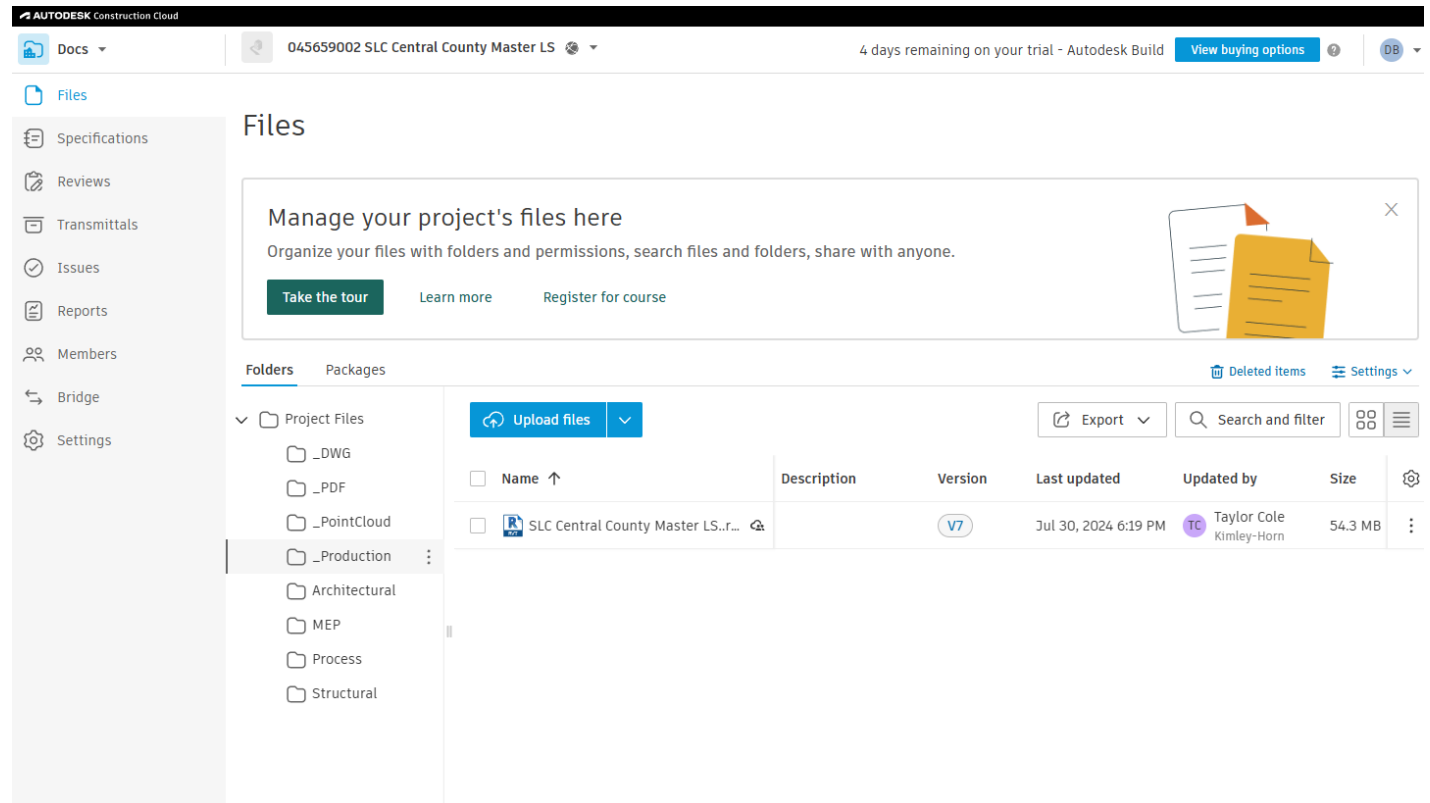
The Digital Twin Environment…
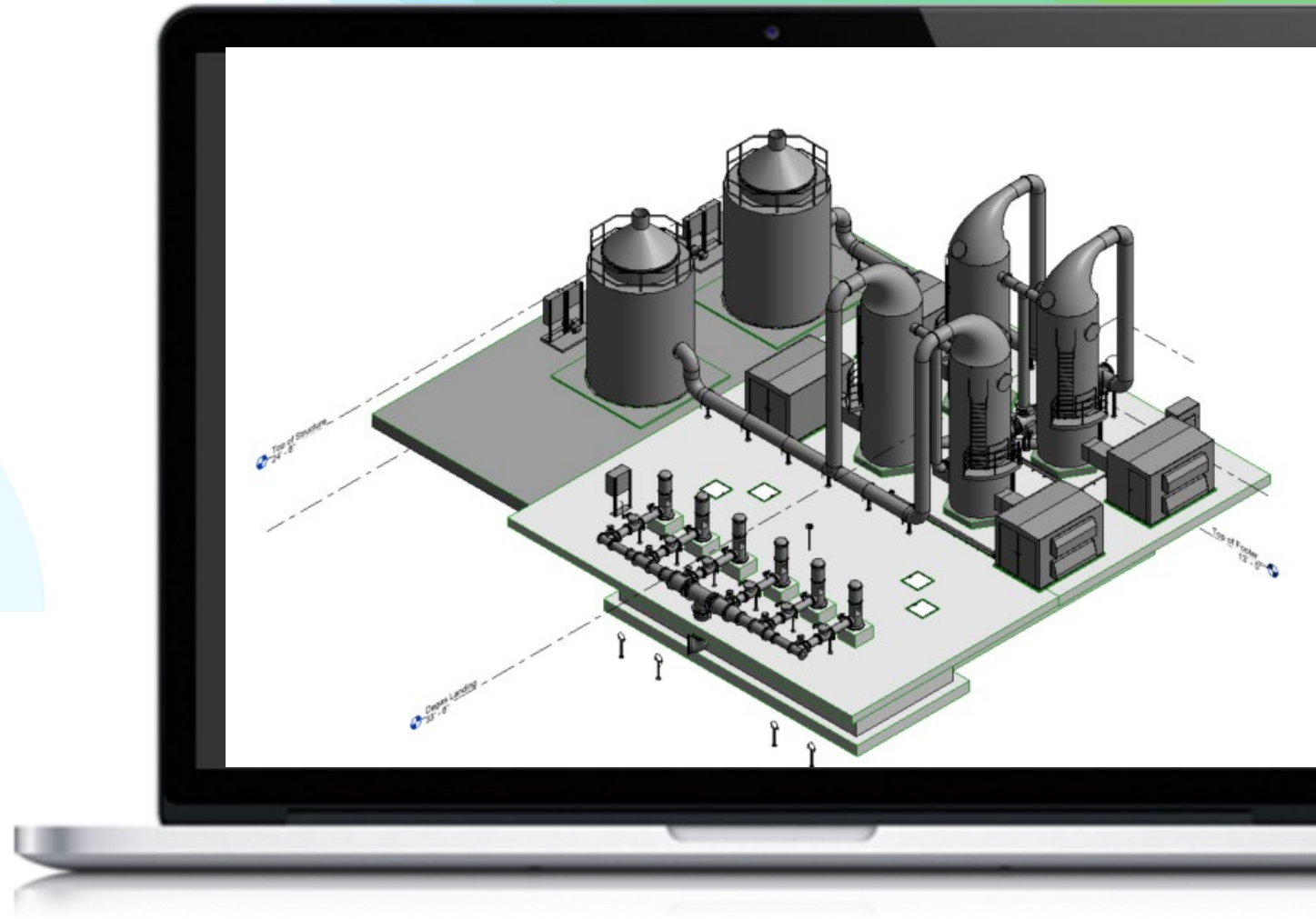# is a collaborative platform.

Autodesk Construction Cloud.

- Primary platform for hosting project files, including Revit, AutoCAD, Civil 3D, Inventor, Infraworks, Microsoft and more

- Any linked files in one structure

- Key Features include:
  - Naming Standards
  - Compare Published Versions
  - Reviews/Markups/Issues
  - Reports
  - Bridge between Projects

Implementing Modeling Standards

Digital Delivery Standard and Workflows

The Evolution of Standards...and the resources available...

# Implementing Modeling Content Standards

An Overall Industry-based Approach...and Content Consistency

Industry is overdue for data standards

- *Formatting*

- *Units*

- *Naming*

- *Correct Parent/Child relationships*

A renewed understanding of level of development must be defined

- *Design versus Fabrication Level Content*

- *Vendor/Industry Engagement – Shell versus Complete Component*
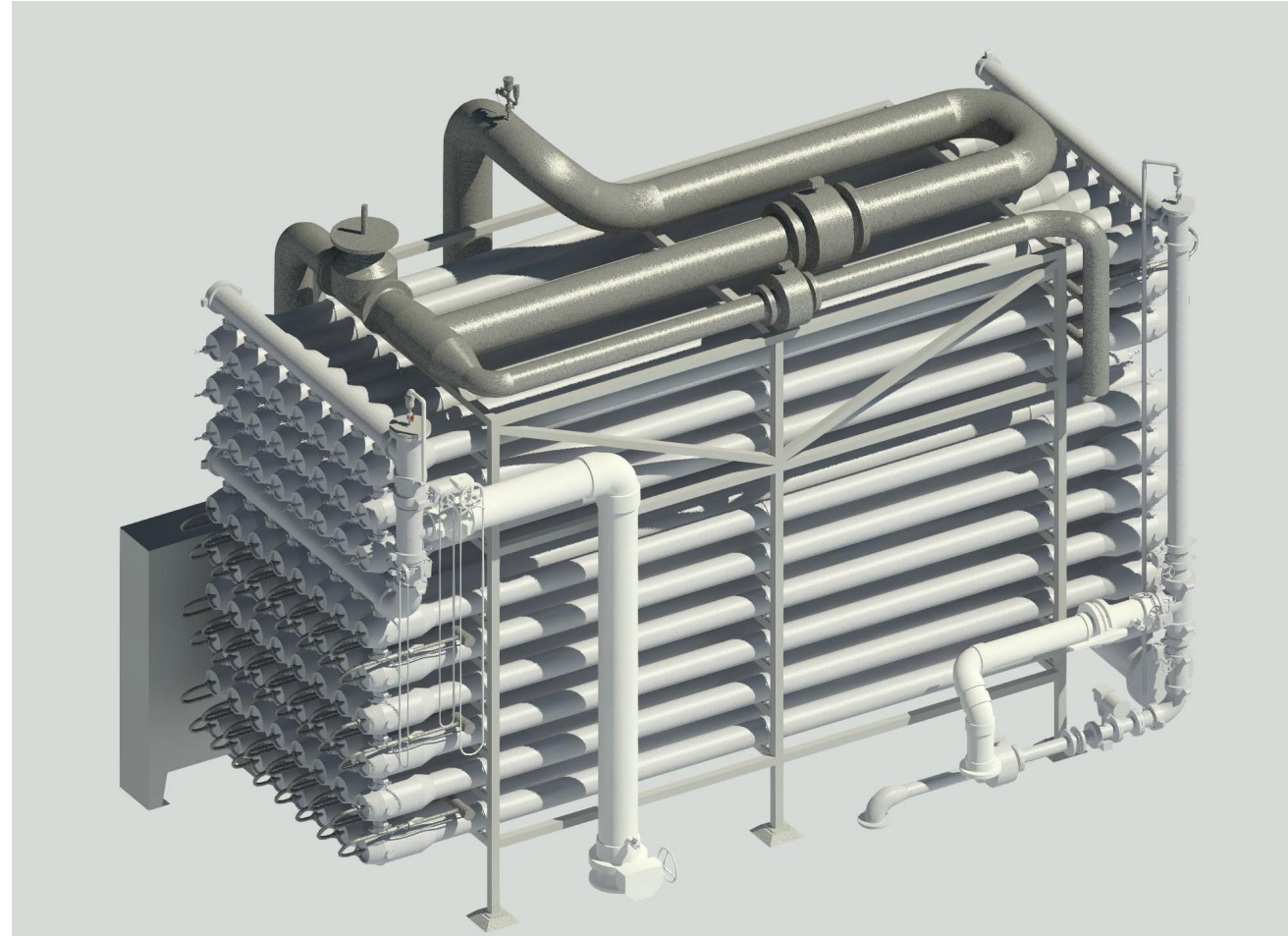
Replacing the CAD Standard with PIM Standard

The PIM Standard Integration...

- *Begin with new expectations and concepts*

- *Identify Core Standards/Shared Resources*
    - *Agnostic Naming*
    - *Simplified Project Structure*
    - *Modeling Guidelines (LOD, Data, etc.)*
    - *File Structure (links, etc.)*
    - *Content Baselines (families, details, views, etc.)*
    - *Agnostic Graphic Guidelines*

- *Start thinking collaboratively!!!*

BEFORE YOU BEGIN; HOW TO USE THE PIMxP

Read each section carefully, add your specific project data where applicable; there are text fields, check boxes, and pull-down menus to select from. If you have a unique circumstance on your project include the information in this document where required or add a new section. Delete this section and other sections not used to accurately reflect your projects deliverables.

1.0 GENERAL

1.1 OVERVIEW OF THE PIM EXECUTION PLAN

The purpose of this document, the Project Information Modeling Execution Plan (PIMxP) is to define and describe the shared Building Information Modeling (BIM) workflows on this project. It describes the standards, modeling scope, and collaboration procedures between team members. Refer to the contractual documents for specific information regarding project content, delivery methods, and scope of work.

The intent of the PIMxP is to define a foundational framework to ensure successful deployment of advanced design technologies on your Project Information Modeling (PIM) enabled project. The PIMxP is about optimizing work and model flow across the project, as contrasted with optimizing siloed interests. The key is good planning of the design-to-engineering-to-construction processes to minimize downstream surprises, rework, redundancies, or gaps in the flow of electronic model-based information.

The goals of using this guide are:

- Have virtually zero constructability and field conflicts between various systems
- Improve productivity of the project for the designers, contractor, and sub-contractors
- Limit the amount of redesign required
- Maintain a 3D federated model for coordination
- Create a 100% clash free models, and constructable 2D and 3D files
- Prevent RFI's from slowing down the construction progress and design rework

1.2 PROJECT INFORMATION

Client Name	Click or tap here to enter text.
Project Name	Click or tap here to enter text.
Project Number	Click or tap here to enter text.
Consultant Project Number	Click or tap here to enter text.
Client Contract Number	Click or tap here to enter text.
Building Type	Click or tap here to enter text.
Project Description	Click or tap here to enter text.

1.3 PROJECT DELIVERABLES AND LEVEL OF DEVELOPMENT

Project Deliverables

The PIM Execution Plan (PIMxP) specifies what the client deliverables include. At distinct stages in a project, these submittals may require additional file types as part of the contract. Select the appropriate deliverable formats from the table below.

Electronic delivery file formats may include:
- Revit (RVT)
- AutoCAD (DWG)
- Infraworks (IWM)

3 | P a g e

Improving Process and Workflow for Digital Delivery

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The Digital Twin Environment…
is a collaborative team.

- *Process and workflow changes have to start with the team.*

- *Be willing to look outside the box at new learning tools and methods*

- *Provide Contemporary Training tools to cover all types of learners*

The Digital Twin Environment…
begins with an informed partner.

The key to success starts with onboarding new hires and reinforcing existing colleagues…to implement the changes.

- *Set the ground rules early in the hiring process and reinforce throughout the career.*

- *Provide tools for self assessment as well as skill and career goals for technology.*

- *Encourage and support design teams to own the changes.*

- *Provide clear instructions and communication about changes to platforms, workflows and design tools.*

- *TRAIN. TRAIN. TRAIN.*

Improving the Process…

Technology adoption requires different workflows and processes…

Engage the client early and often:

- Don't limit yourself to deliverable meetings

- Invite the client and contractor in (when appropriate)

- Leverage cloud-based tools that can associate issues, comments, reviews and reports in the same platform as the design documents

- Be prepared to work in the client hub!!! The single location for models and data are coming on fast….

- Focus on model centric delivery and the single source of truth.

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Improving the deliverable…

Technology adoption requires different workflows and processes…

- **Start by identifying tasks that frequently get missed when applying 2D based workflows:**

- Get your surveys/as-built conditions addressed first – leverage reality capture to better capture "point in time" data

- Conduct Analytical studies at the beginning

- Define and validate schematics for design intent and confirm BEFORE modeling systems

- Identify tasks in your current WBS that relies on "copying from another project"

- Build out your content library with the correct LOD content

- Apply vendor content when applicable and available, as required by client
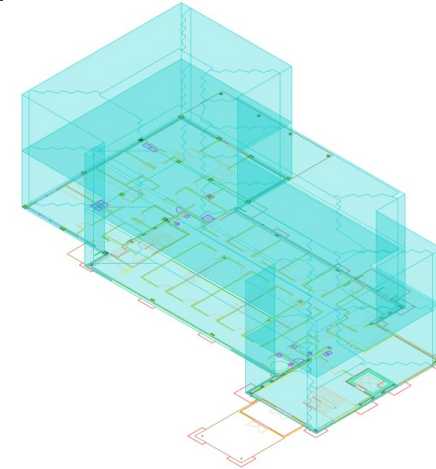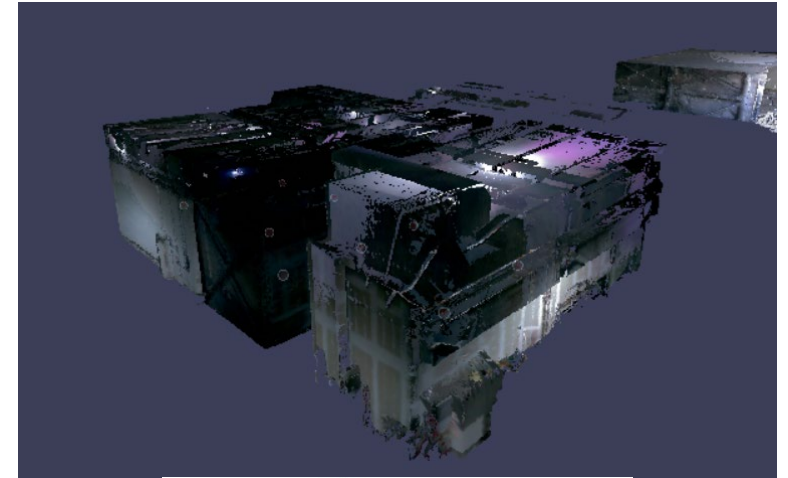
Change is not coming…
it's already here!

- Awareness of your resources and situation is critical;

- Address dependency on outdated methods and tools;

- Ask and engage the client/owner;

- Approach this as a team!

Thank You