Estimating: The Missing Link in the BIM Evolution - Connecting Design to Execution

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CONNECT & CONSTRUCT SUMMIT

AUTODESK. UNIVERSITY

Presenter today

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Autodesk University

SIGMA ESTIMATES

AUTODESK®

Autodesk Solution Associate

Here’s What We’ll Cover Today

Overview
5D and construction

- Overview 5D
- Why is 5D so important now?

Understanding 5D

- How does it work?
- What techniques?

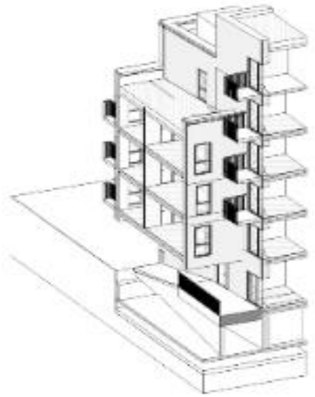
Experience 5D

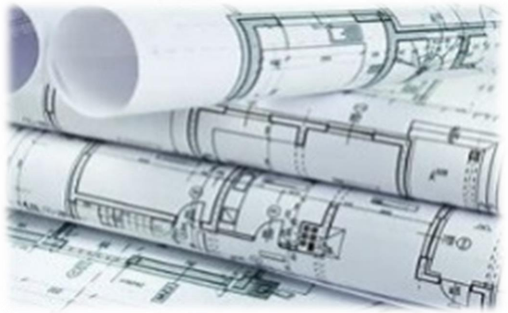
- Examples
- Design -> 5D -> Field

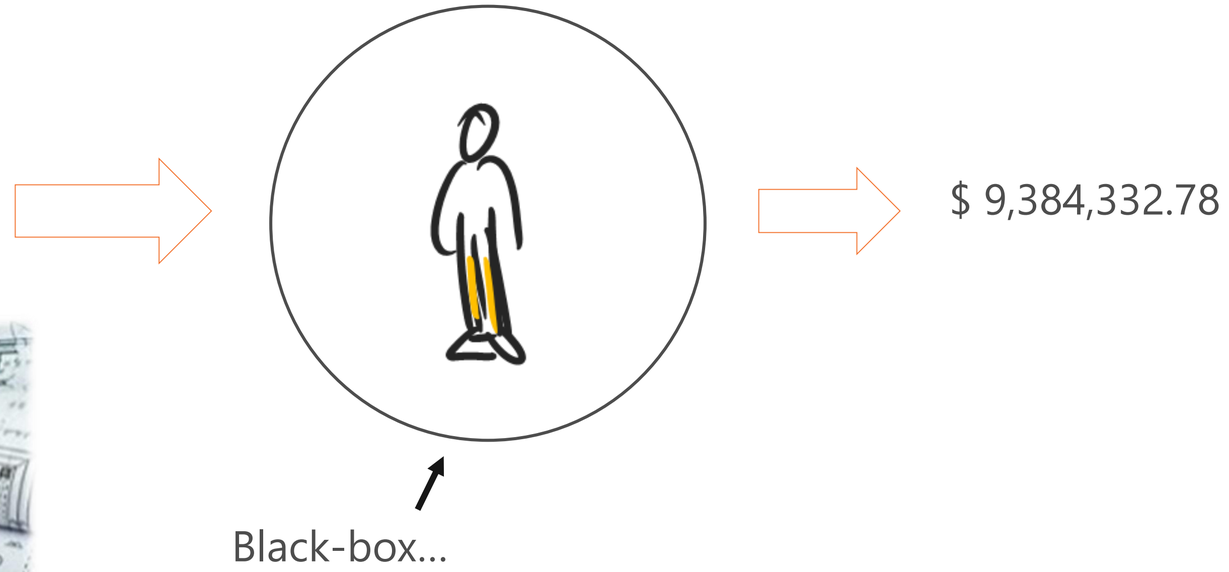
Next Steps

- How to plan and implement?
- Q&A

Is 5D BIM Simply the Cost of a Construction?

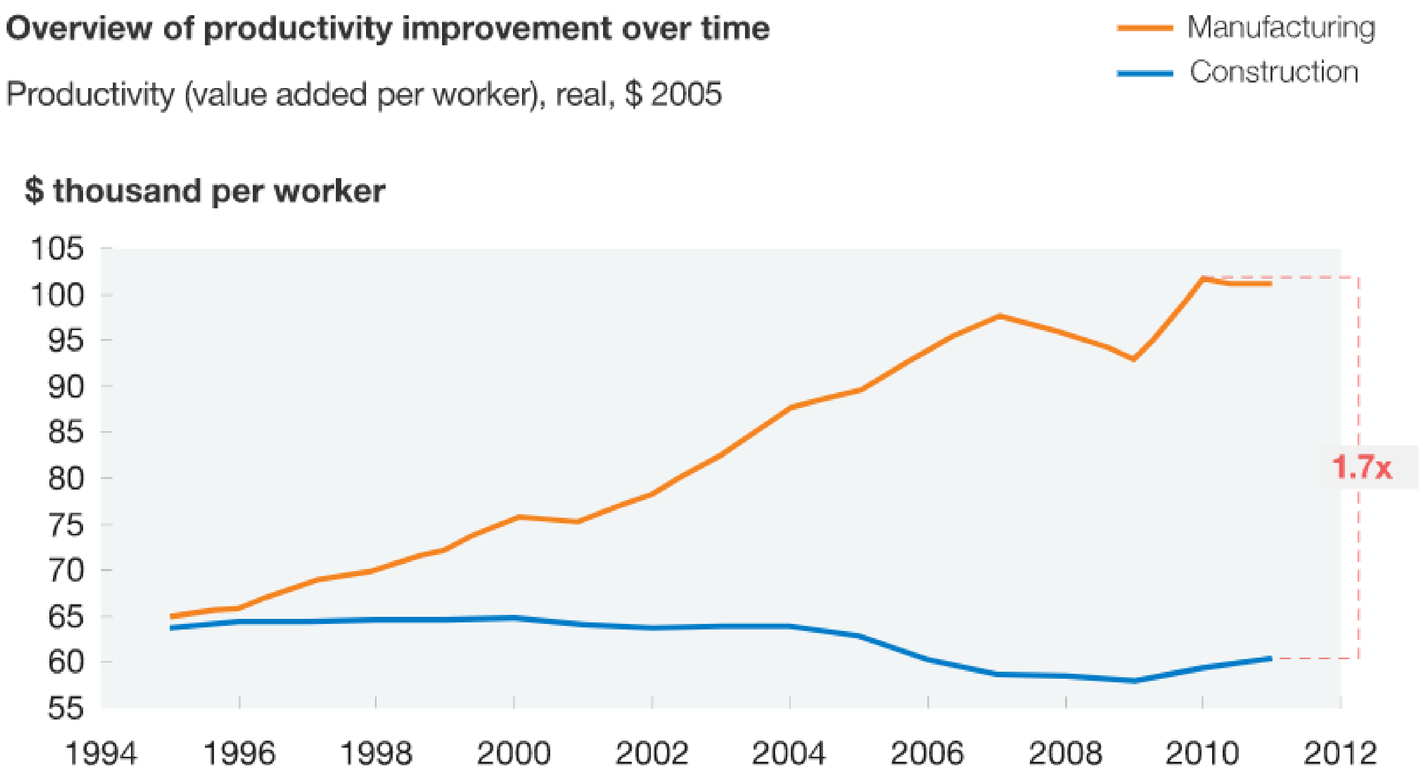






$ 9,384,332.78

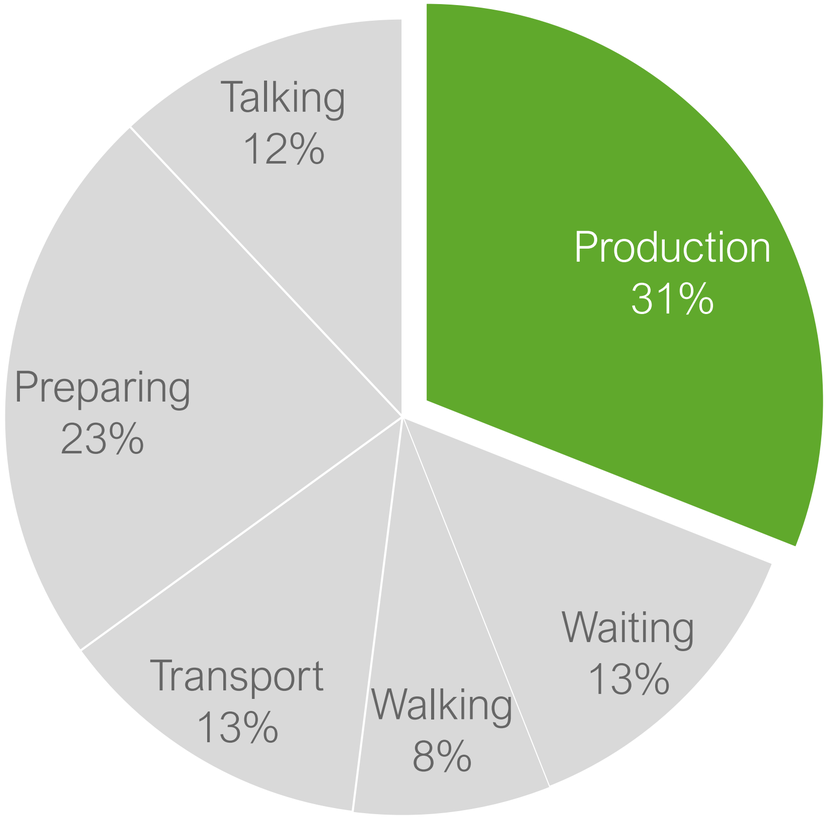
You Have The Opportunity of a Lifetime!

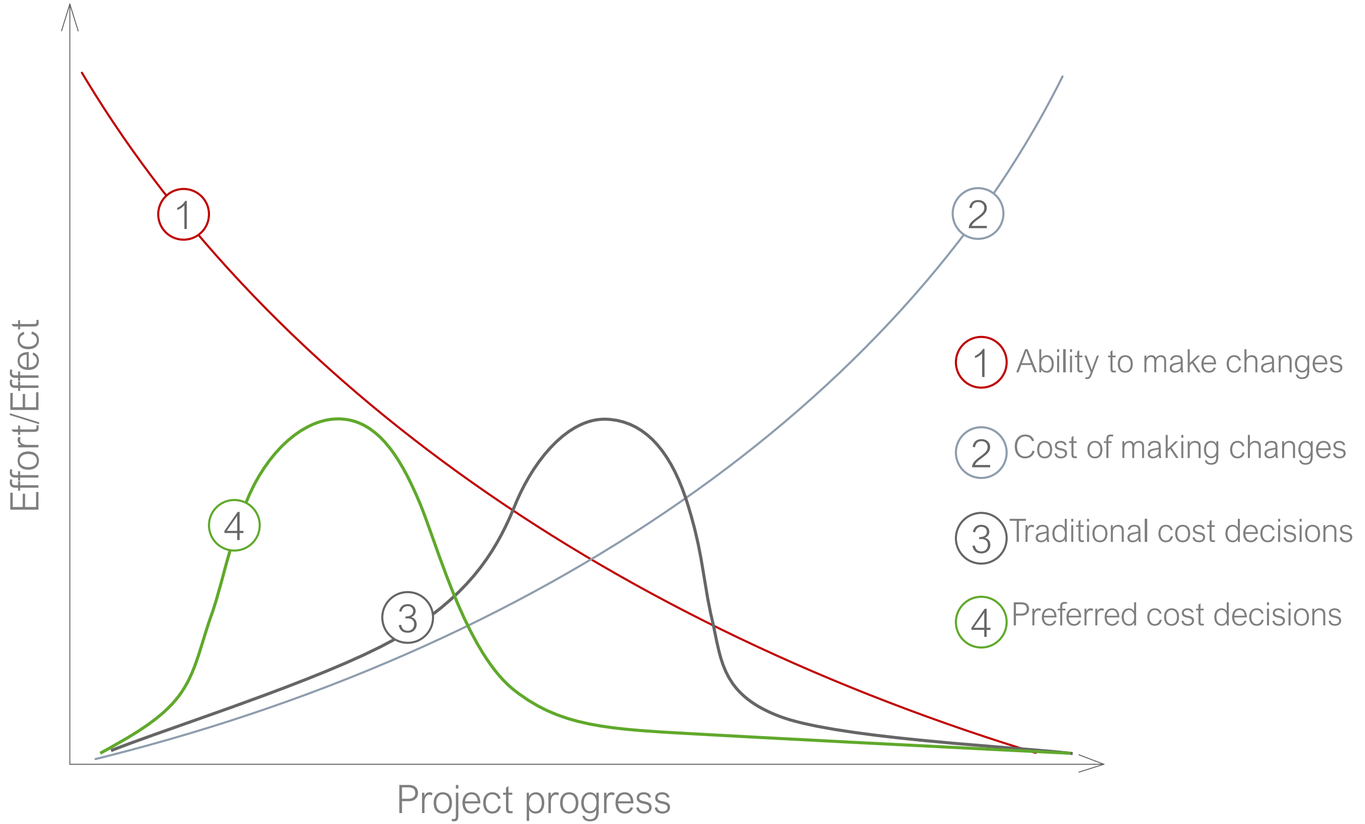


Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

How to Increase Profits?





Does Your Valuable Information Stay at the Office?

Loss of information from office to construction site

Design and estimating

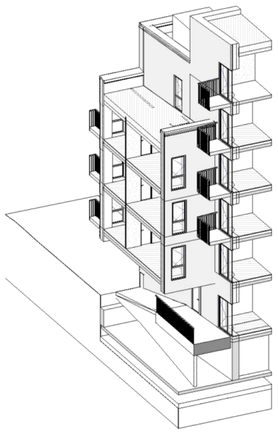
Restarting from 2D...

How to Close the Gap?...
OSW Plant Hire Ltd
KELLER
SOILMEC

5D Estimating Connects Design to Construction – Data and Workflows

Design

Budgeting
Cost simulation
Risk management
Quality Assurance
Documentation

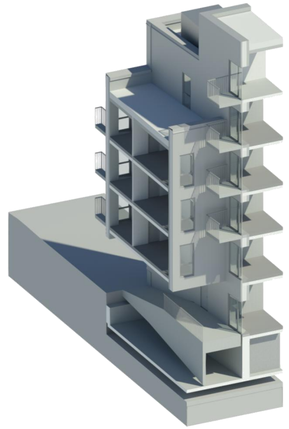


5D Estimating,

Cost and Assemble information

- **Tasks and durations**
- **Labour specializations**
- **Production Materials**
- **Production Equipment**
- **Production Quantities**
- **Assembly descriptions**
- **Risk factors**
- **Cost**

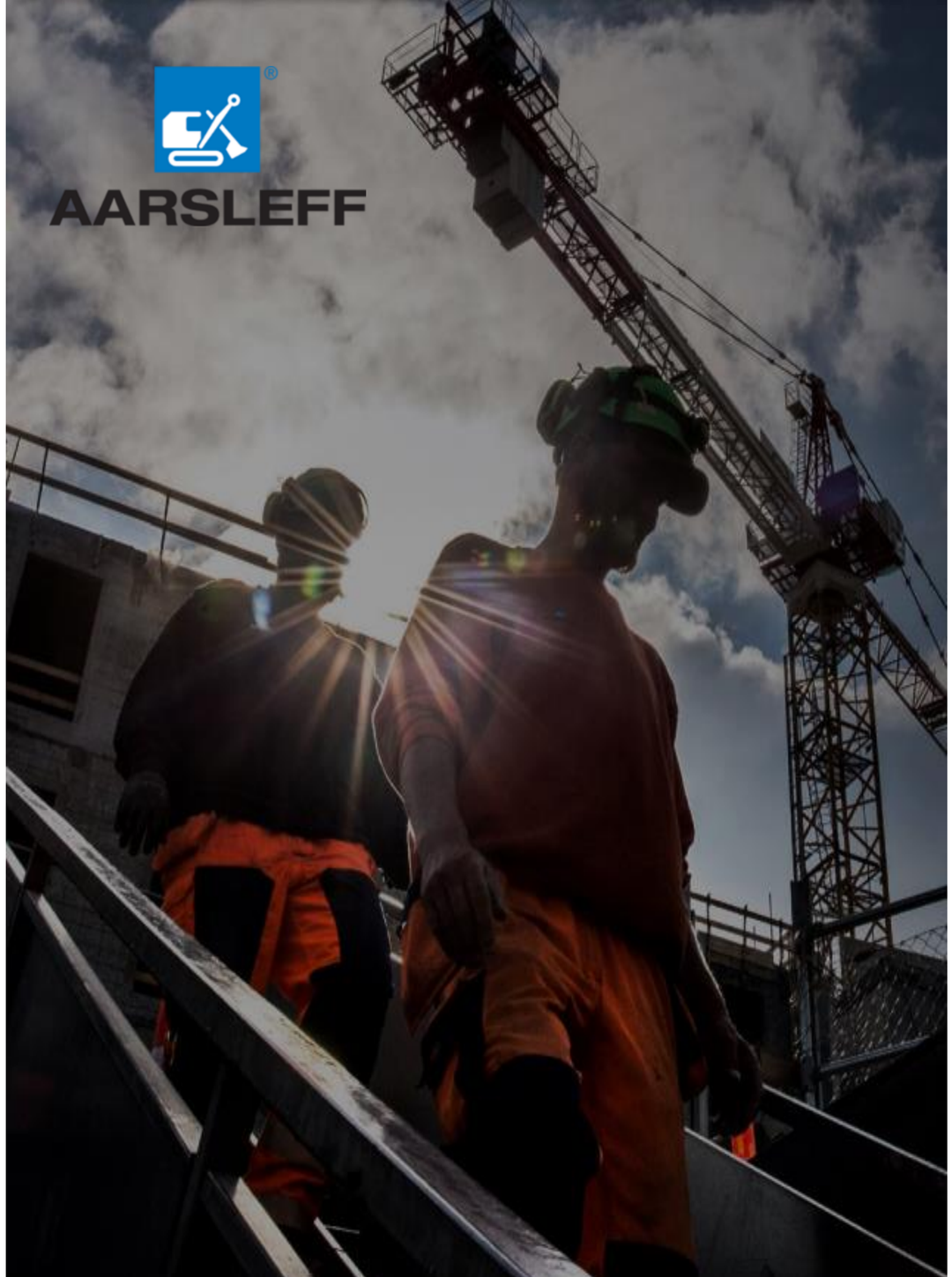
Construction



Bidding
Planning
Purchasing
Subcontracting
Cost Management
Quality Control
Project Close Out

Estimators Have the Knowledge!

"You have to build it mentally before anything happens on the construction site"



Case Study – Aarsleff

Leading GC	**Revenue** USD 1.8BN	**Employees** 6,500	Global

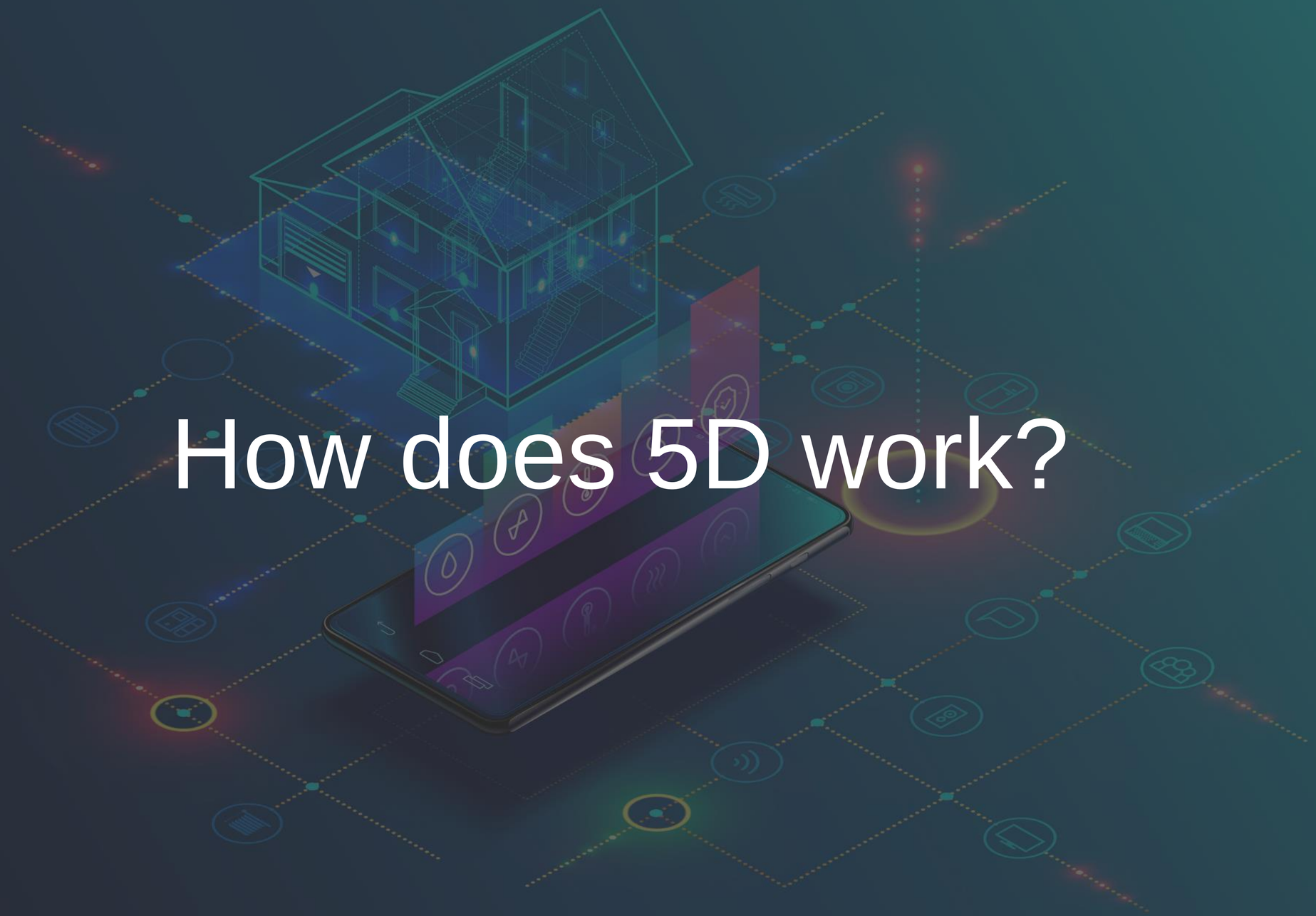
Higher profits than competitors in the market

Estimators and project managers working together on estimates

Information from the estimate used in production – and feedback provided for future projects

“Whether you‘re a small construction company with a few employees or you‘re a large and growing business like Per Aarsleff, Sigma is the ideal construction project estimation software.”

Jesper Jacobsen
CEO, Aarsleff



How does 5D work?

What is 3D?

Height
20 ft

Type
Concrete wall

Location
Level 5

Net area
300 sf

Estimator Power Tool: 5D Assemblies

Windows Openings

Fittings

Plates

Screws

Cleaning

Labor

Ladder

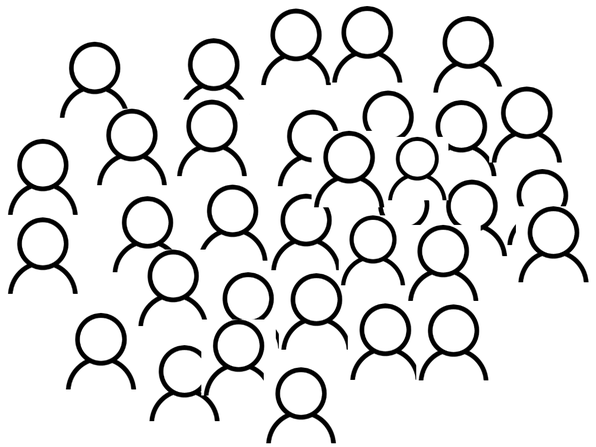
Framing

Insulation

Assembly: A recipe on how to construct a building element, including work operations, labor types, materials, equipment, …

Appetizer…

Quantity



Recipe

Ingredients

- 1 1/2 cups all-purpose flour
- 1 1/4 cups milk
- 3 1/2 teaspoons baking powder
- 1 egg
- 1 teaspoon salt
- 3 tablespoons butter, melted
- 1 tablespoon white sugar
- Add all ingredients to list

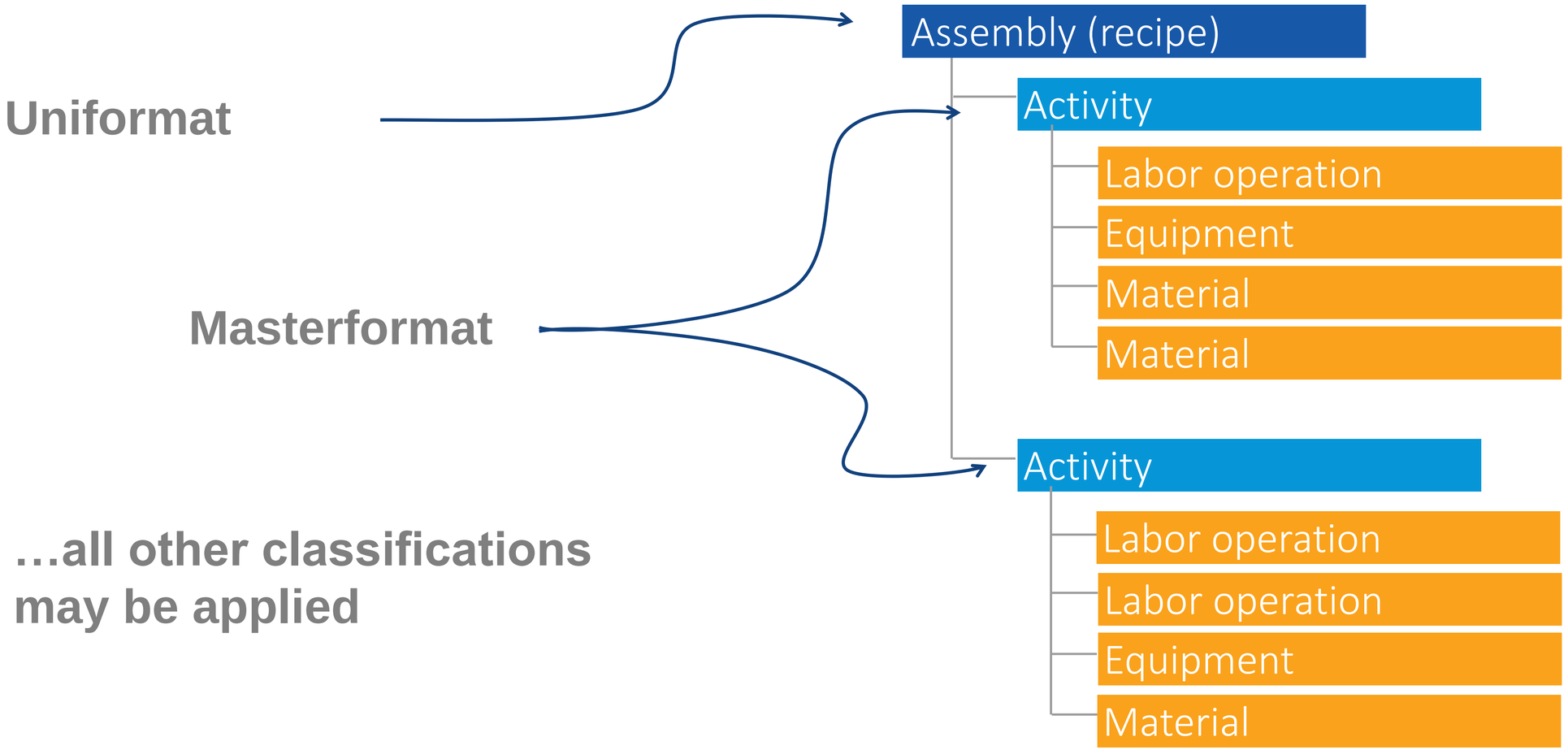
Directions

Prep	Cook	Ready In
5 m	15 m	20 m

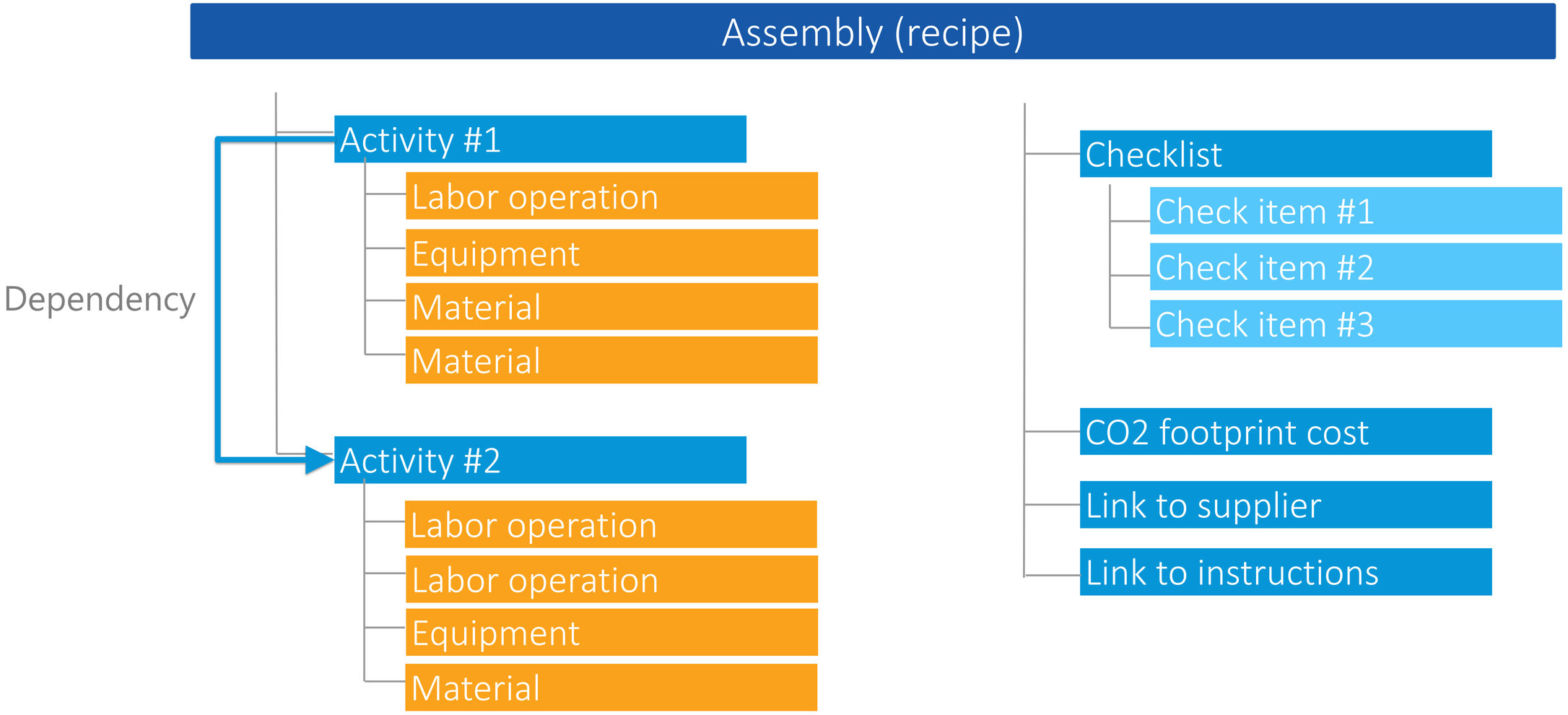
1. In a large bowl, sift together the flour, baking powder, salt and sugar. Make a well in the center and pour in the milk, egg and melted butter; mix until smooth.
2. Heat a lightly oiled griddle or frying pan over medium high heat. Pour or scoop the batter onto the griddle, using approximately 1/4 cup for each pancake. Brown on both sides and serve hot.

Awesome results

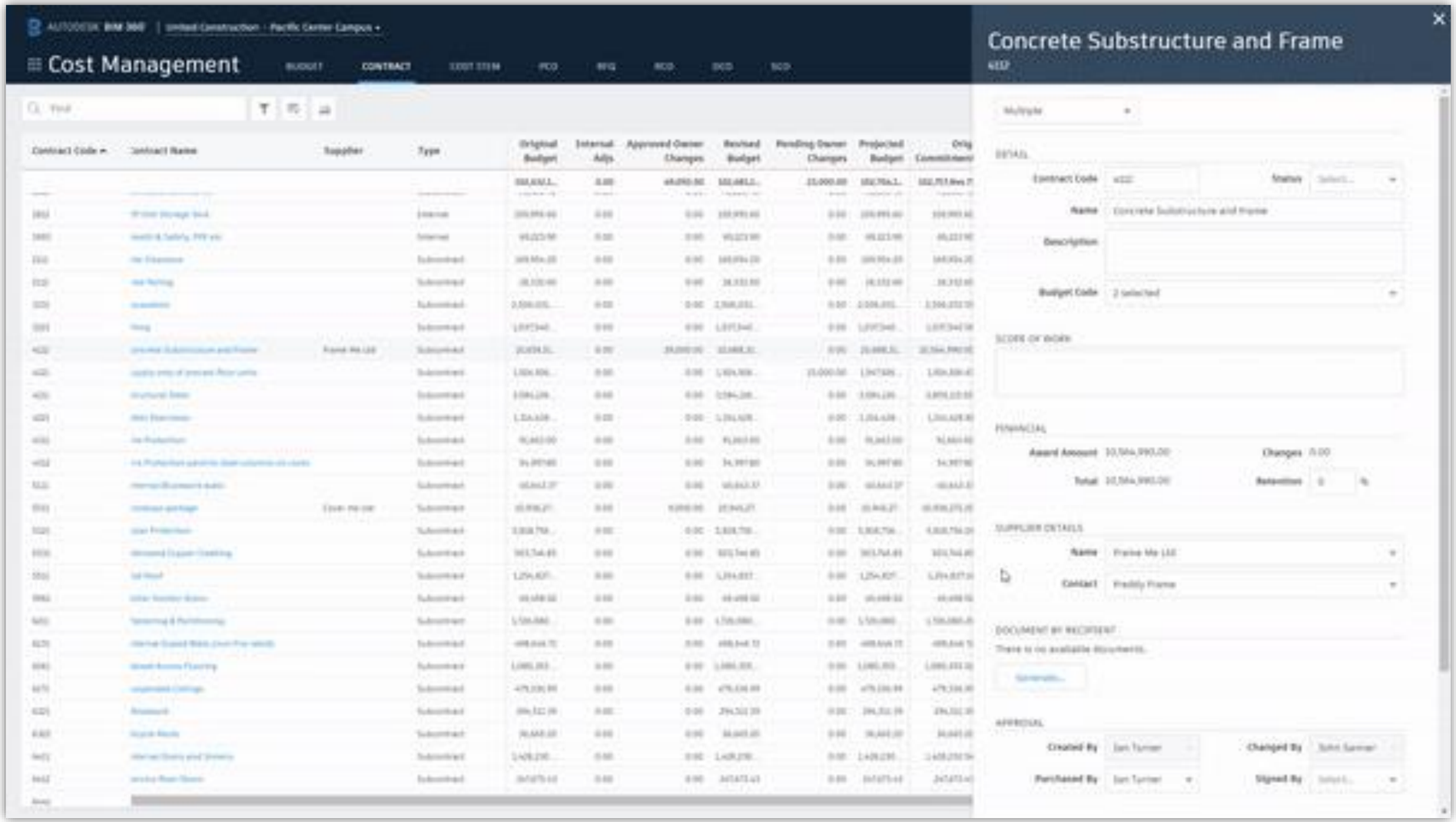
Common Assembly / Recipe Structure



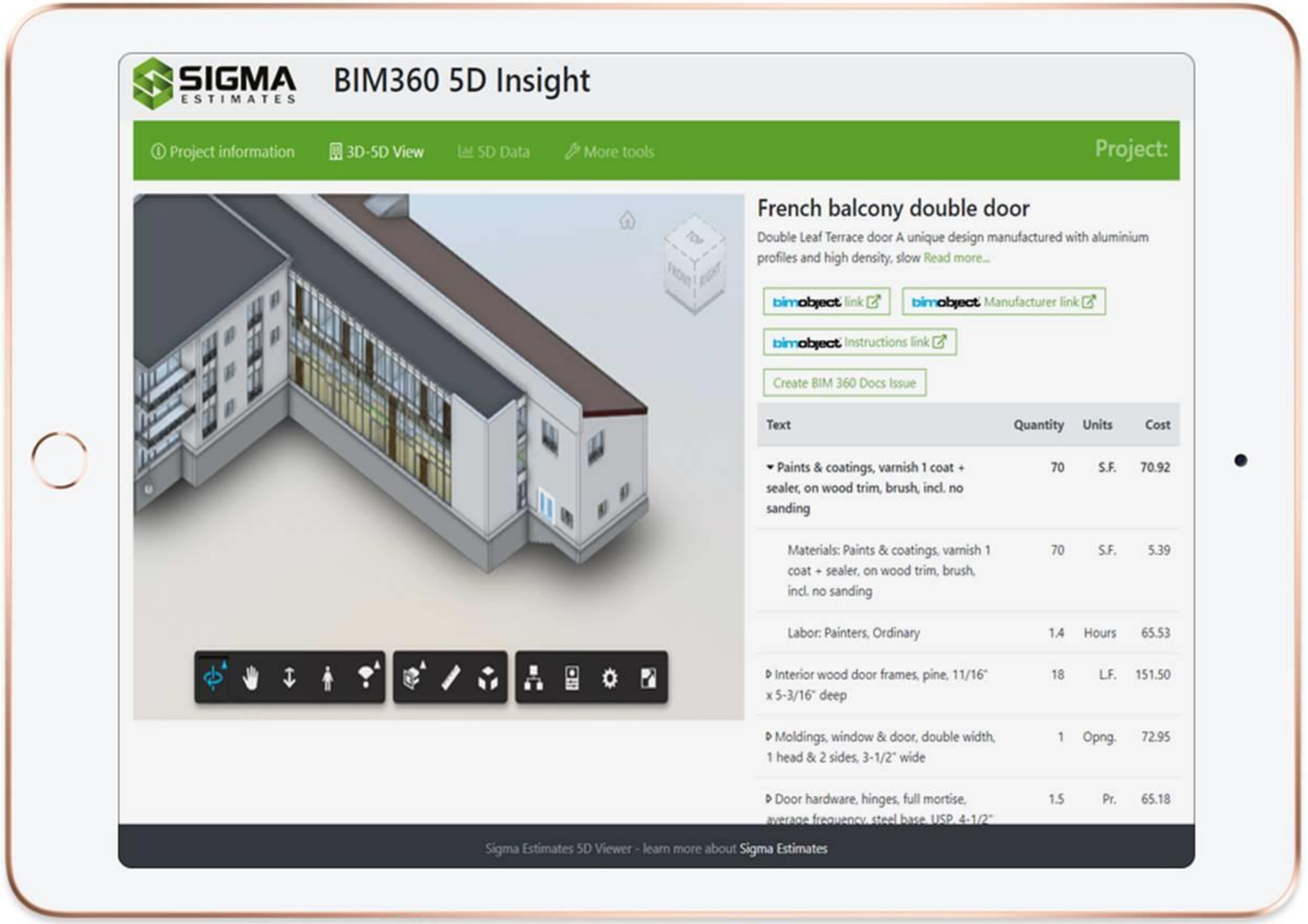
Enhanced 5D Assembly Content



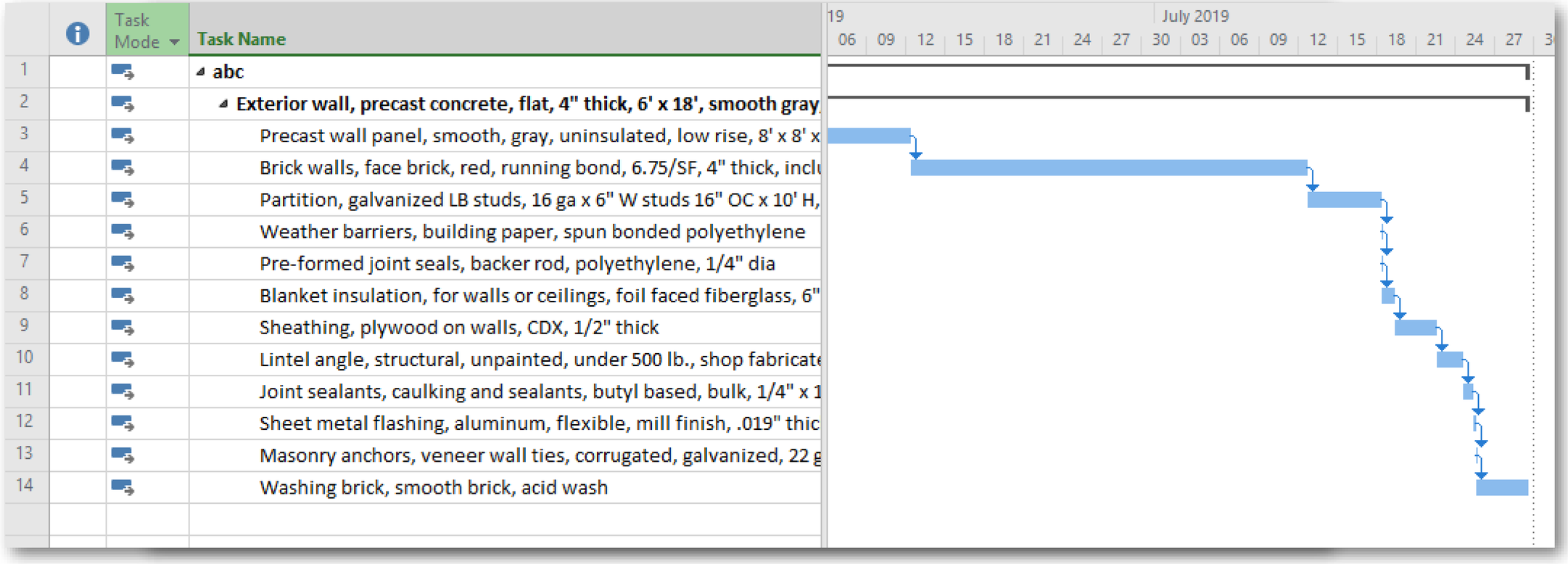
Example: Budget for Cost Management During Construction



Example: In the Field Construction and Assembly Information

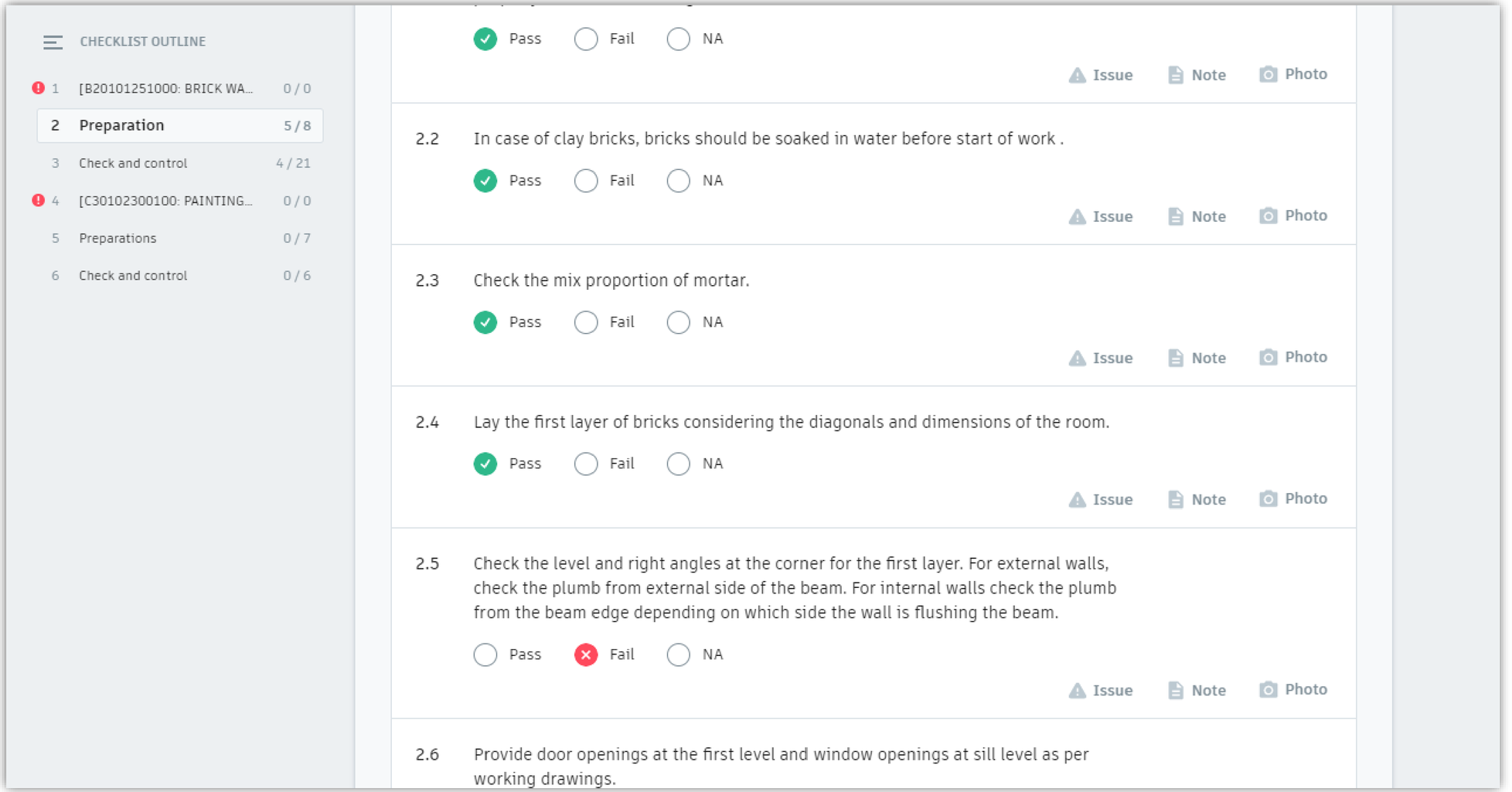


Example: Dependencies from the Estimate to Planning

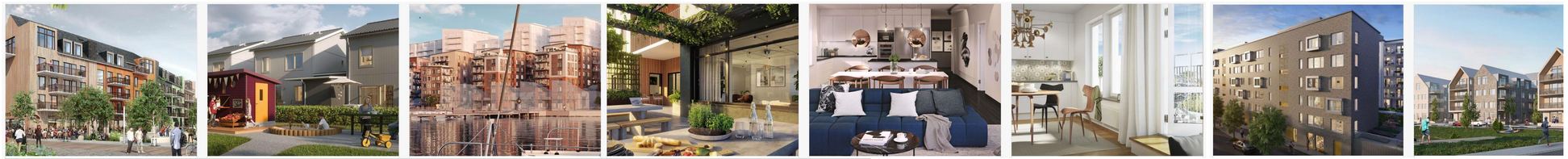


	Task Mode	Task Name
1		abc
2		Exterior wall, precast concrete, flat, 4" thick, 6' x 18', smooth gray
3		Precast wall panel, smooth, gray, uninsulated, low rise, 8' x 8' x
4		Brick walls, face brick, red, running bond, 6.75/SF, 4" thick, inclu
5		Partition, galvanized LB studs, 16 ga x 6" W studs 16" OC x 10' H,
6		Weather barriers, building paper, spun bonded polyethylene
7		Pre-formed joint seals, backer rod, polyethylene, 1/4" dia
8		Blanket insulation, for walls or ceilings, foil faced fiberglass, 6"
9		Sheathing, plywood on walls, CDX, 1/2" thick
10		Lintel angle, structural, unpainted, under 500 lb., shop fabricate
11		Joint sealants, caulking and sealants, butyl based, bulk, 1/4" x 1
12		Sheet metal flashing, aluminum, flexible, mill finish, .019" thic
13		Masonry anchors, veneer wall ties, corrugated, galvanized, 22 g
14		Washing brick, smooth brick, acid wash

Example: Check Lists in Assemblies (Prototype)



BONAVA



"With Sigma implemented across all countries, our design and development teams will get a digital estimation workflow, **with everyone having instant access to updated data**"

"The production managers will gain a better financial overview throughout the entire construction process because **data can now flow freely between Sigma and our other systems**"

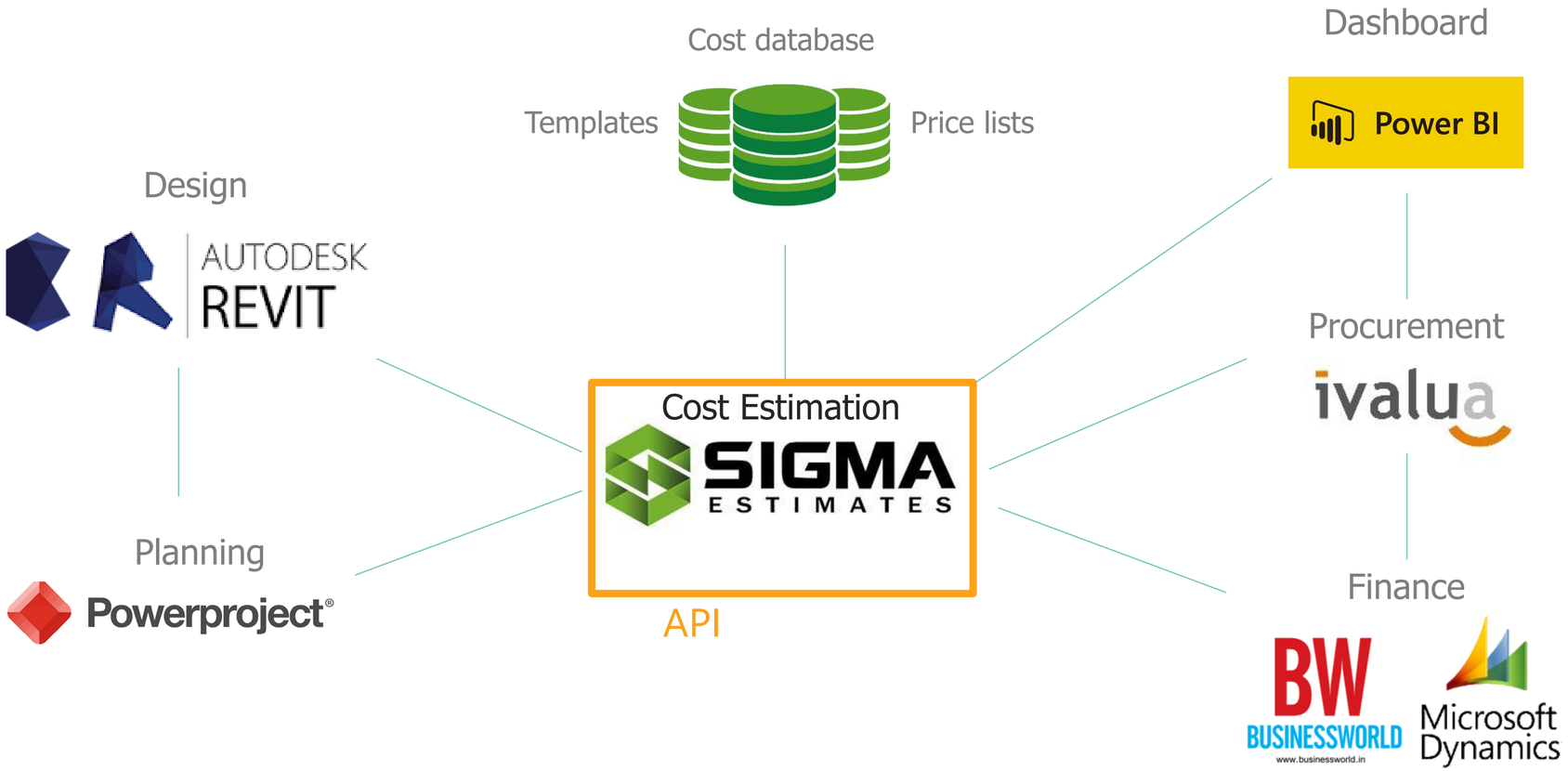
- Patrik Lindvall, Global Head of VDC at Bonava

← Read more here

- **Design build residential housing developer**
- **$1.7B in revenue**
- **2000 employees / 9 countries**
- **300+ Sigma Users**

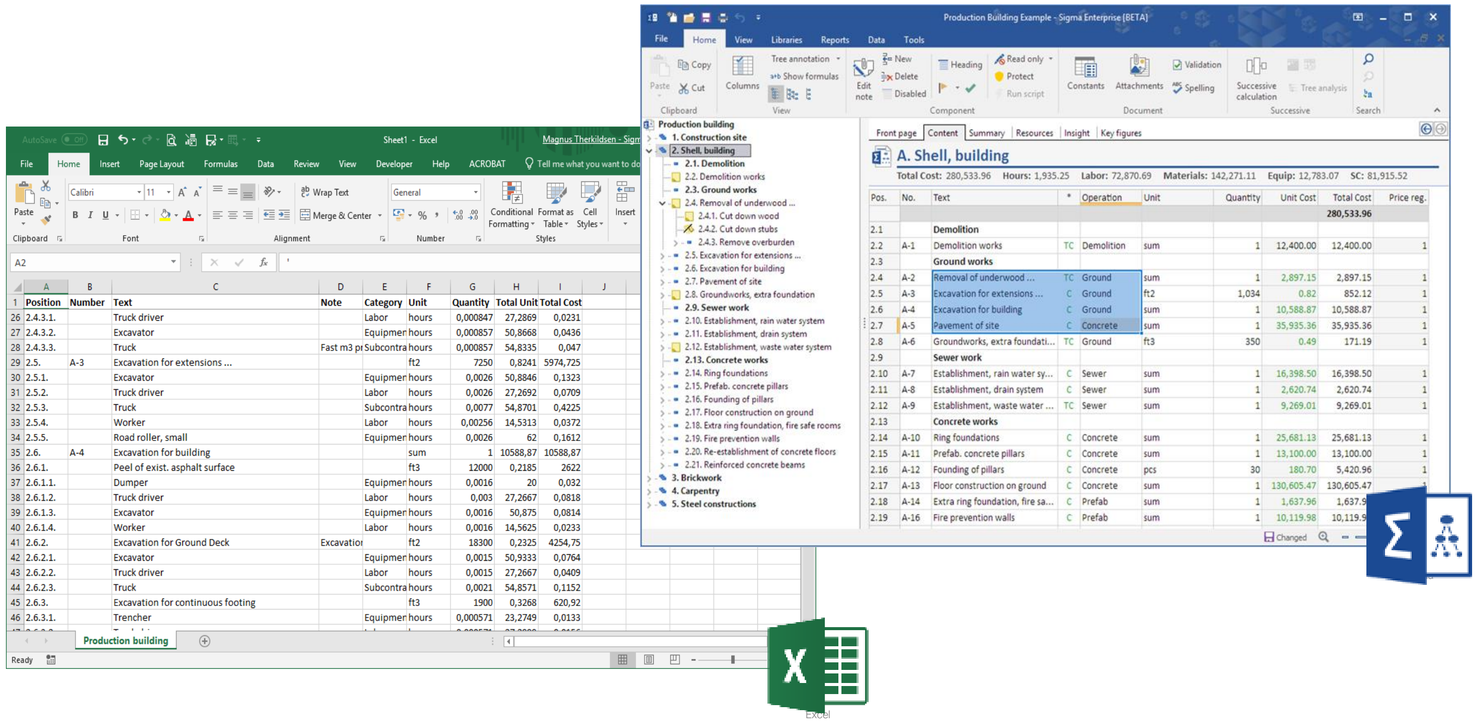
BONAVA

Integration chart



How Does Sigma Create and Connect 5D Information?

A Look at the Sigma Estimates Application



- ✓ **Ease-of-use**
- ✓ **Flexible and configurable**
- ✓ **Open + api**
- ✓ **Native BIM**

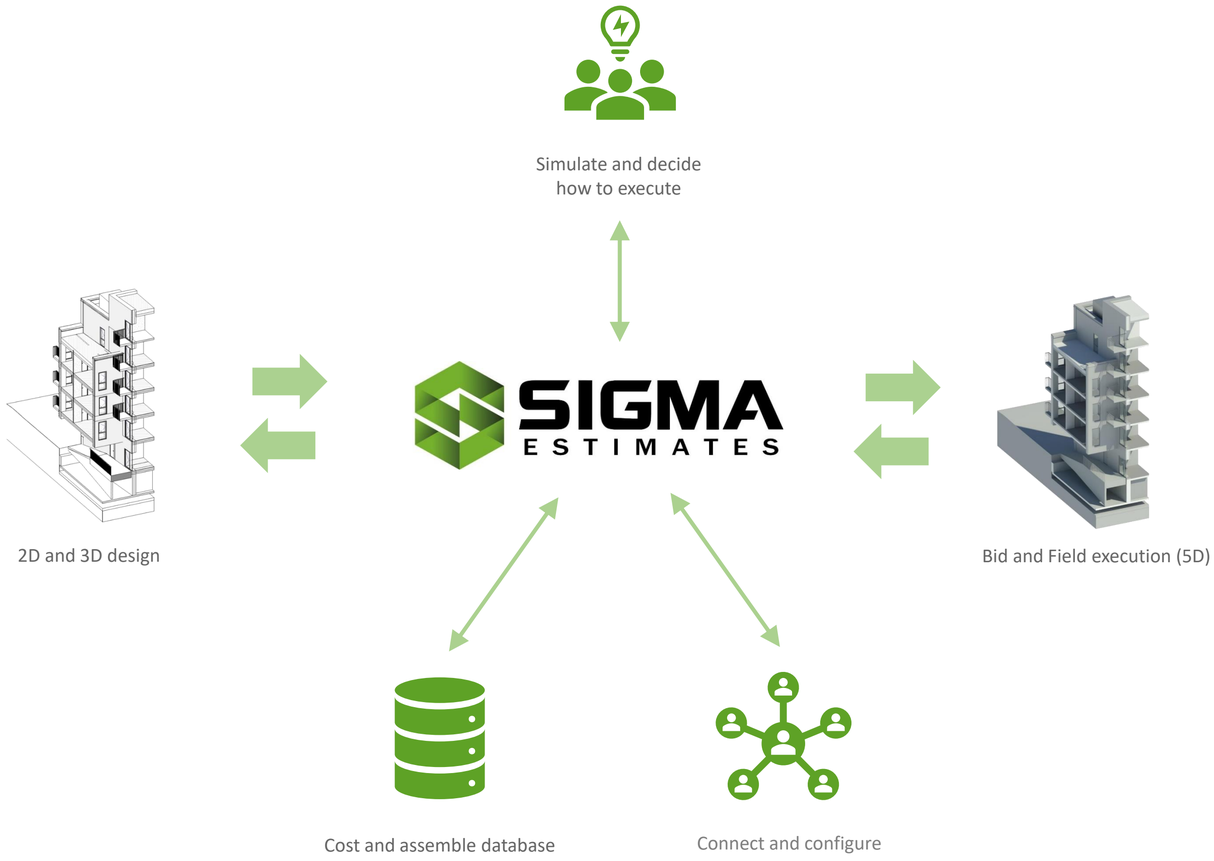
Key features

- Cost and risk estimation for any WBS/CBS and detail
- Activity, Rate and Resource quantity listing
- Cost database and lists, own and commercial
- 2D/3D and non-design quantities and properties
- Slice and Dice views, Analysis and Simulation
- Reporting, Documentation, Tender list, etc
- Project and assembly descriptions
- Validation and QA estimation and data

What is Estimating with Sigma …?

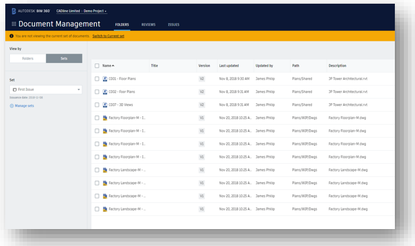
Understanding the project and make decisions on how it is to be built – hereby ensuring accurate bids and creating valuable data for field execution and design choices

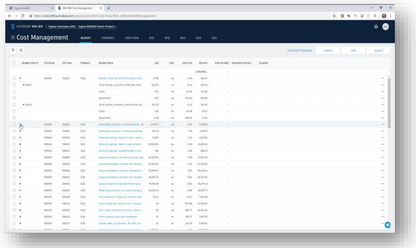
- Create transparency and simulate to find an optimal solution and accuracy in cost and planning
- Connect and utilize data with 2D and 3D design
- Create and deliver data for planning and field execution – 5D data
- Build up and share cost and assemble knowledge from historical projects
- Extend functionality and connect to relevant workflows with the an open API

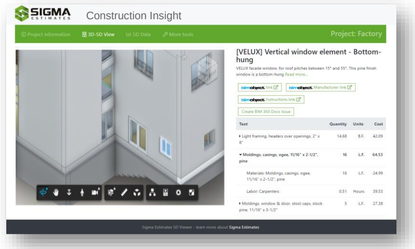


Sigma Estimates - Autodesk BIM 360

- Model quantity takeoff
- Cloud storage and sharing
- Cost Management
- Construction Insight



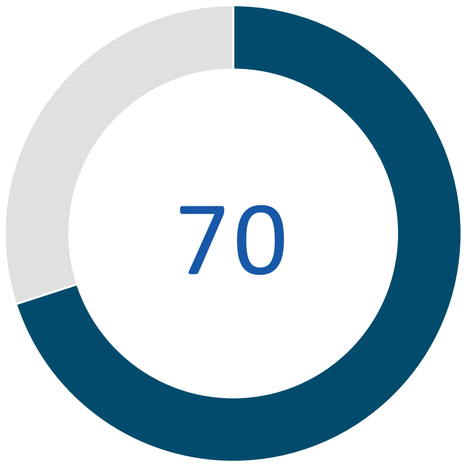




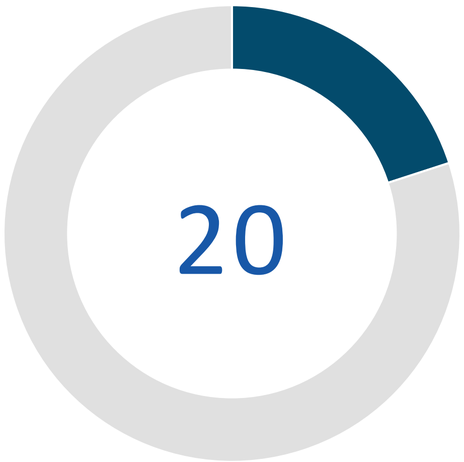
AUTODESK® BIM 360™

Let's take a Look

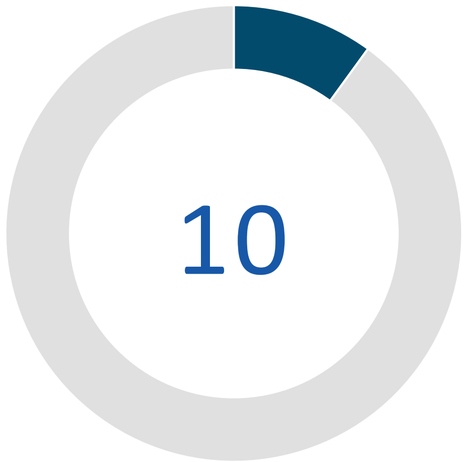
Invest Wisely When Moving Forward



NOW

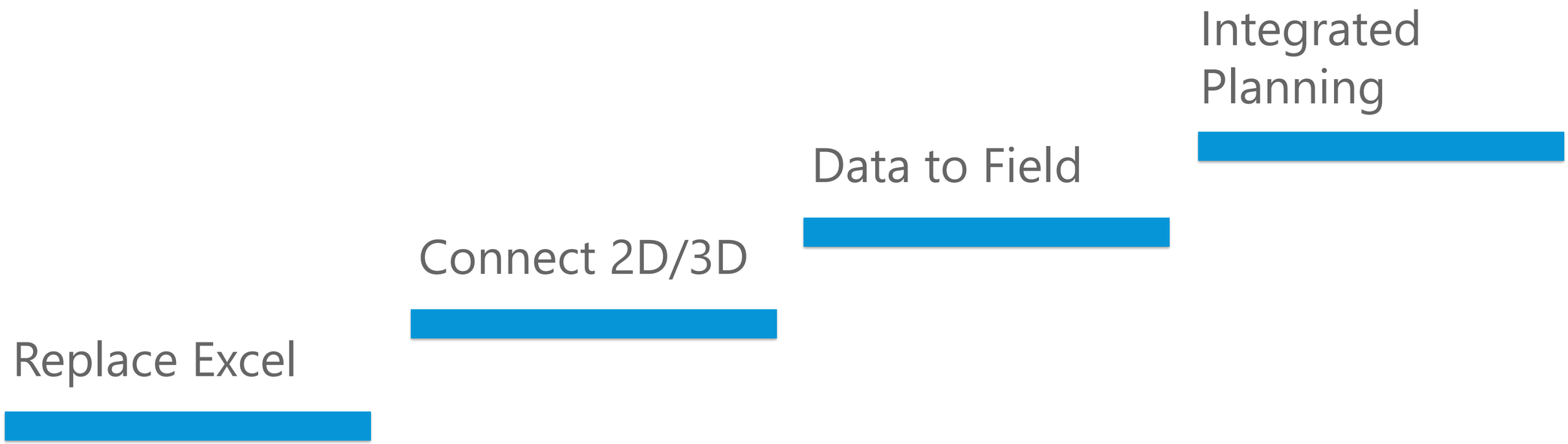


NEXT

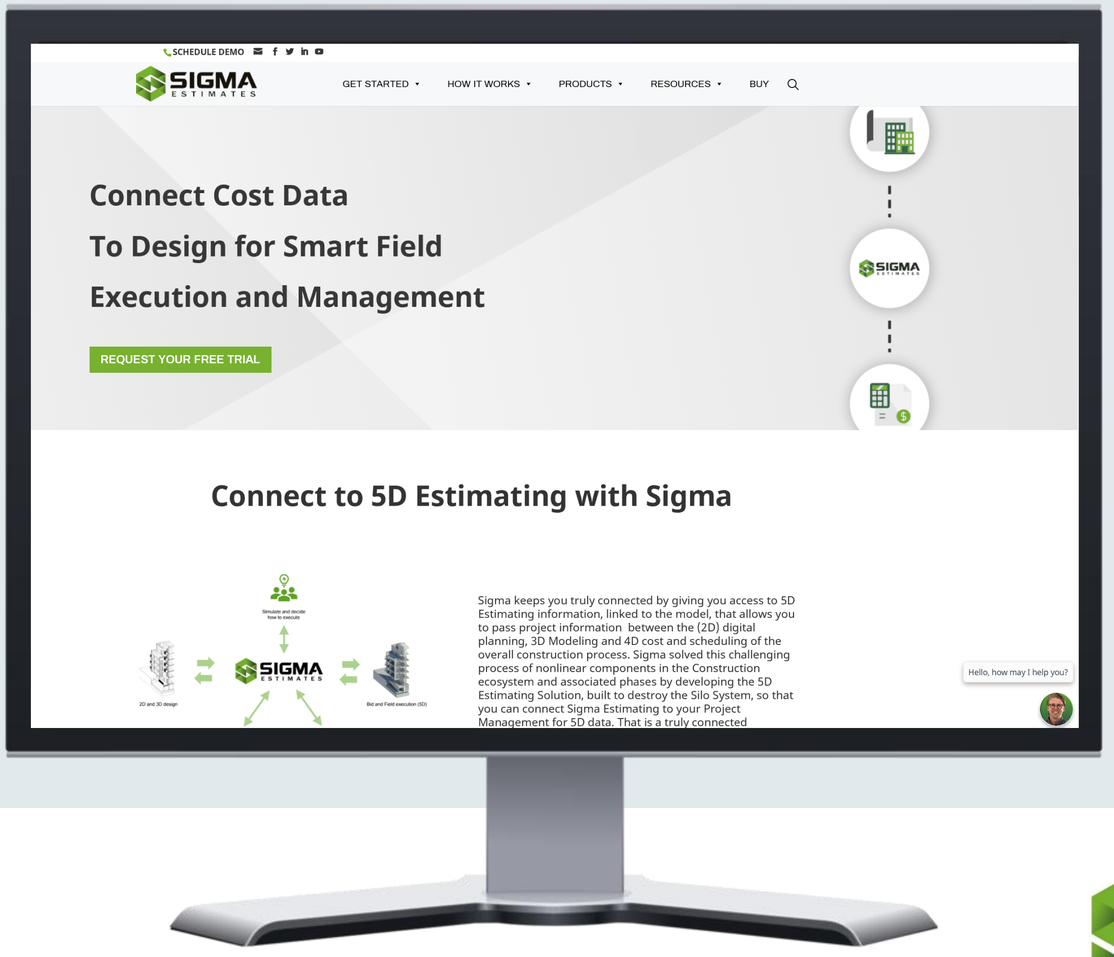


NEW

The Path to 5D Estimating
Where Are You?



Get Started Now



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- Booth # P18 in The Village

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www.SigmaEstimates.com/5D

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