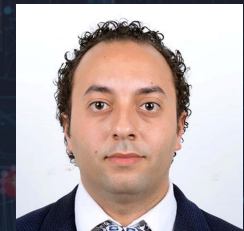


2-5 May 2023, Rotterdam, The Netherlands

Transformative Partnership: Pioneering the Construction Industry through Blockchain, Digital Twins, & Metaverse JV Synergy

Based on the MIT Program:
Data Monetization Strategy: Creating Value Through Data



Abdelrahman Abouhadid

Digital Transformation Manager
Mace Group

Digital Twin in Construction



What is digital twin ?

A virtual replica of a physical asset, process or system



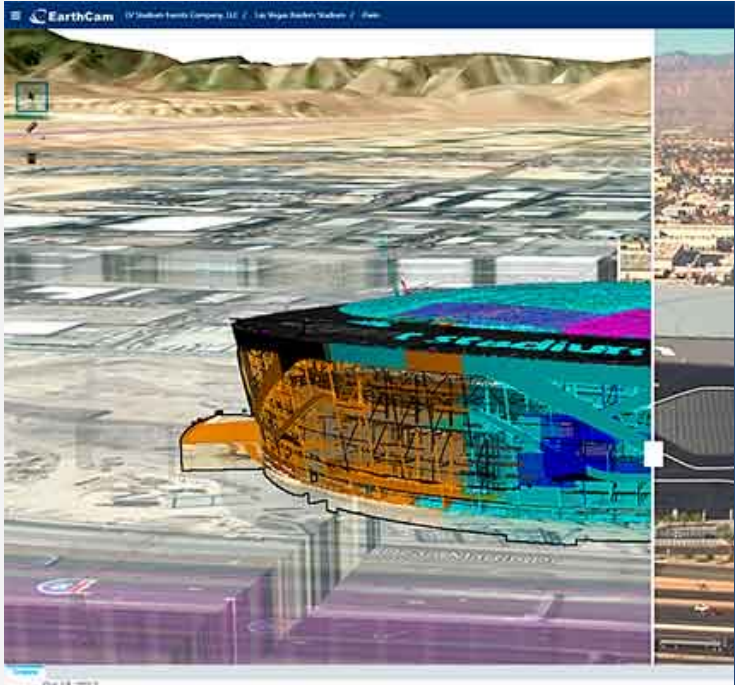
What is digital twin in construction ?

A virtual replica of a physical asset, process or system in construction



What is digital twin in construction ?

A virtual replica of a physical asset, process or system in construction



PLAN	DESIGN	CONSTRUCT	OPERATE
Existing Conditions Modeling			
Cost Estimation			
Phase Planning			
Programming			
Site Analysis			
Design Reviews			
Design Authoring			
Energy Analysis			
Structural Analysis			
Lighting Analysis			
Mechanical Analysis			
Other Eng. Analysis			
LEED Evaluation			
Code Validation			
3D Coordination			
Site Utilization Planning			
Construction System Design			
Digital Fabrication			
3D Control and Planning			
Record Model			
Maintenance Scheduling			
Building System Analysis			
Asset Management			
Space Mgmt/Tracking			
Disaster Planning			

Primary BIM Uses
 Secondary BIM Uses

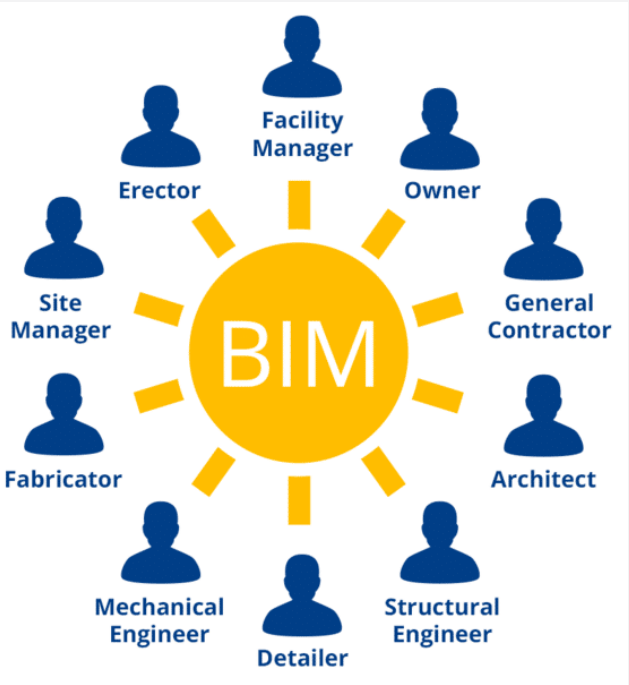


What is digital twin in construction ?

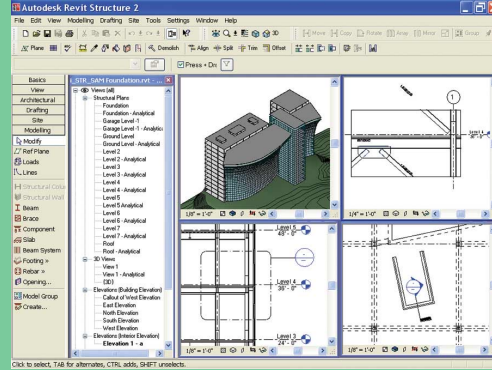
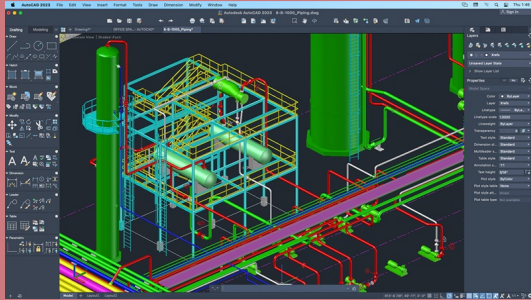
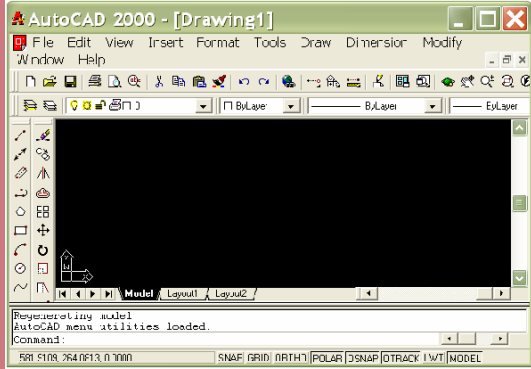
A virtual replica of a physical asset, process or system in construction

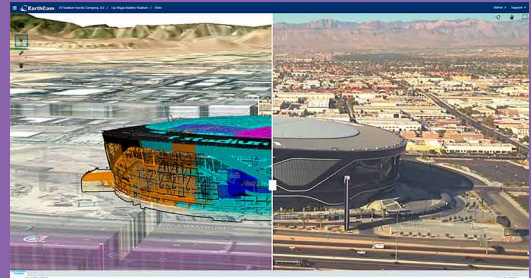
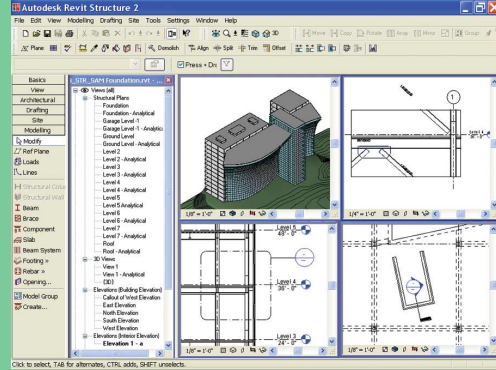
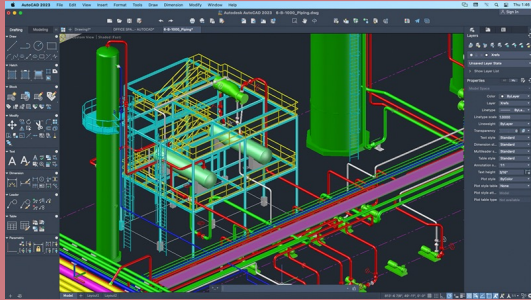
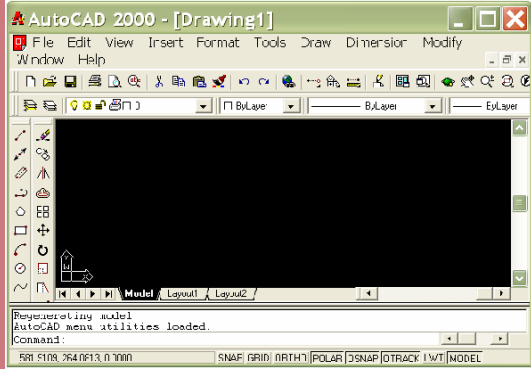
PLAN	DESIGN	CONSTRUCT	OPERATE
Existing Conditions Modeling			
Cost Estimation			
Phase Planning			
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Asset Management			
Space Mgmt/Tracking			
Disaster Planning			

Primary BIM Uses
 Secondary BIM Uses











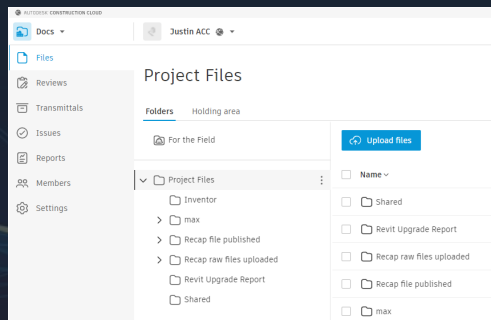
Blockchain-Powered Digital Twin

Blockchain-Powered Digital Twin



Blockchain is a secure, decentralized digital ledger of transactions.

6F7E1E23A0A7D0B1C1B7
E2A9F2A7E2F0C2F7D0A1
E2B3A1C3D0E0F3A9C3B2
F0D0A2E1C7E3B1F3A1D0
B3C7D0E3A9C7E2F1B2A7
D1C3E0F2B1A9C1E2F0D



Decentralization



Encryption



Immutability



6F7E1E23A0A7D
0B1C1B7E2A9F2
A7E2F0C2F7D0A
1E2



Smart Contract

Hash Document Comments Sheet Status Version

B1C1B7E2AE23A0A DA_B6_A10_BEP Under Review 1

Hash Document Comments Sheet Status Version

B1C1B7E2AE23A0A DA_B6_A10_BEP Rejected 1

NNPB7E2AE23AZZ DA_B6_A10_BEP DA_B6_A10_CSR Under Review 2

Hash Document Comments Sheet Status Version

3E81B7E2AE2YY0A DA_B6_A10_BEP Approved 5





Digital Twin Key Components

Digital Twin Key Components



Data Assets



Data Management



Stakeholder Engagement

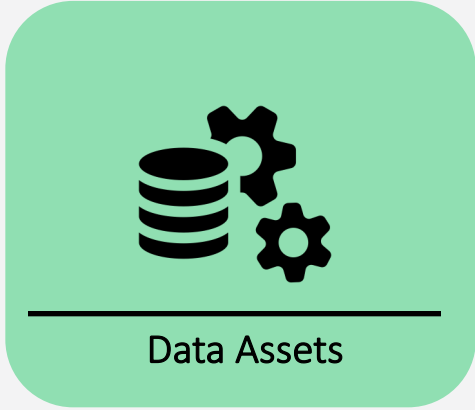


Visualization



Data Science

Digital Twin Key Components



★ Data Collection

★★ BIM & GIS

★★★ IoT

Project Change Request Form

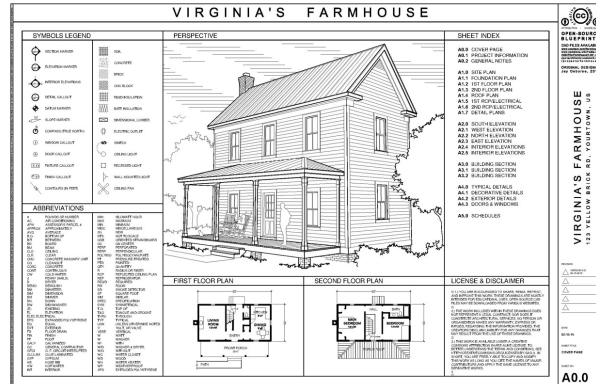
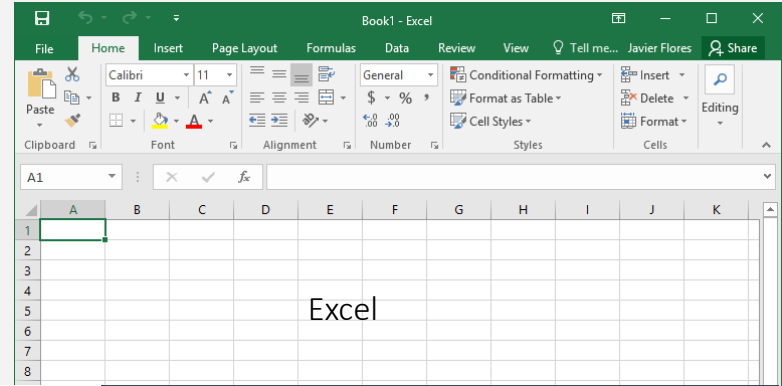
Project Change Request Form
Request of record for a project change request

Project Name: _____
Project Sponsor: _____
Created by: Person submitting the change request
Date of Request: _____

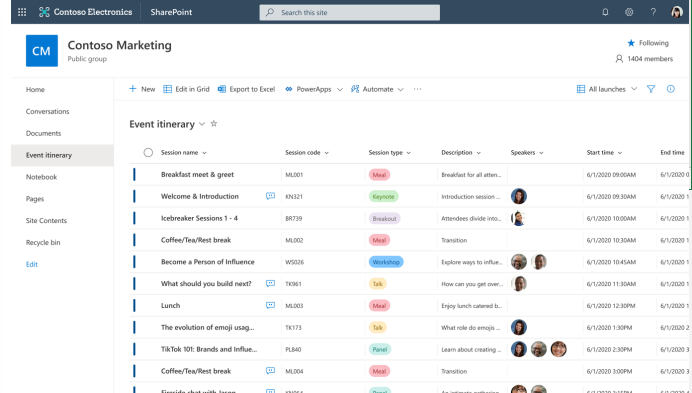
Change Request Detail: The Change Request Form is the document of record for a change request. It provides the business reasons and justification for the change and assesses the risk and impact of the change.

Type of Change	Description of the change requested with rationale
<input type="checkbox"/> Enhancement	
<input type="checkbox"/> Problem	
Priority	<input type="checkbox"/> 1 - Critical "I can't move forward until this change is resolved." <input type="checkbox"/> 2 - High "I'm fix for right now, but unless this change is resolved by the due date, I won't be able to move forward." <input type="checkbox"/> 3 - Normal "I'm fix for the right now, but this may impact my ability to move forward in the near future." <input type="checkbox"/> 4 - Low "This change is not impacting my ability to move forward."
Benefits of Proposed Change	The additional benefits the proposed change would have:
Alternatives	List any alternatives/work-around to the change that exist.
Impact Severity	<input type="checkbox"/> 2 - Critical Impact: Threatens the success of the project. <input type="checkbox"/> 3 - High Impact: Significant disruption to program schedule, cost, or quality. <input type="checkbox"/> 3 - Normal Impact: Program disrupted with manageable exceptions to short term schedule and cost. <input type="checkbox"/> 4 - Low Impact: Exposure is slight.
List of Impacted Deliverables	

Forms



Sheets



SharePoint Lists

Digital Twin Key Components



Data Assets

★ Data Collection

★★★ BIM & GIS

★★★ IoT



Data Management



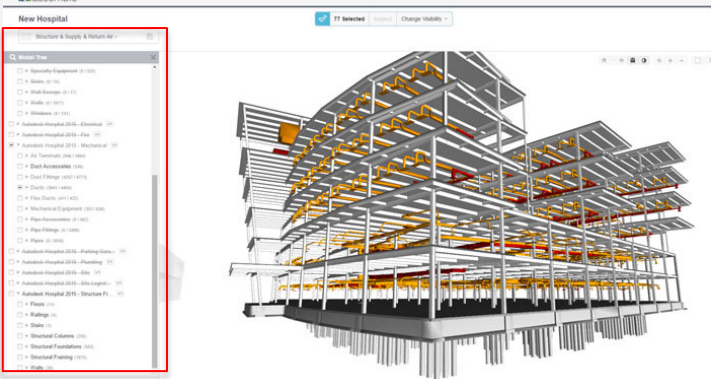
Visualization



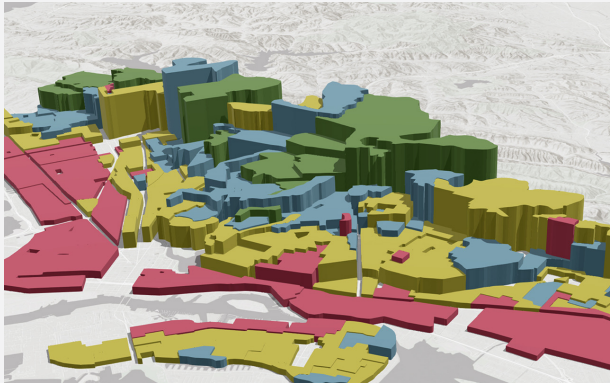
Data Science



Stakeholder Engagement



BIM



GIS

Digital Twin Key Components

★ Data Collection

★★ BIM & GIS

★★★ IoT



Data Assets



Data Management



Visualization



Data Science



Stakeholder Engagement



- Environmental sensors
- Structural sensors
- Equipment sensors
- Safety sensors
- Asset tracking sensors
- Energy management sensors
- Location-based sensors
- Lighting sensors
- Acoustic sensors

Digital Twin Key Components



Data Assets



Visualization



Data Management



Data Science

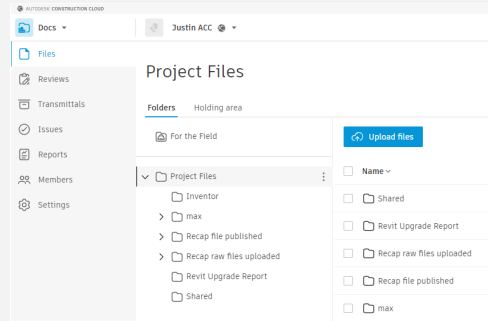


Stakeholder Engagement

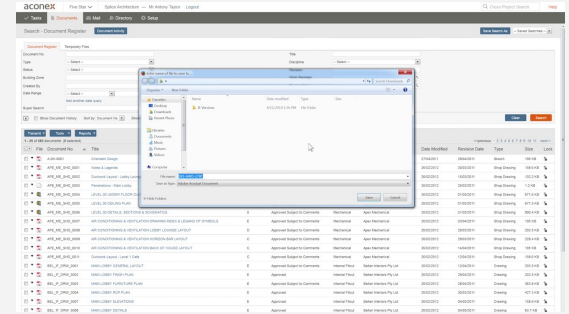
★ Integration

★★ Customization

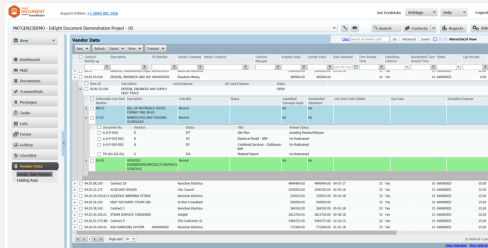
★★★ Blockchain



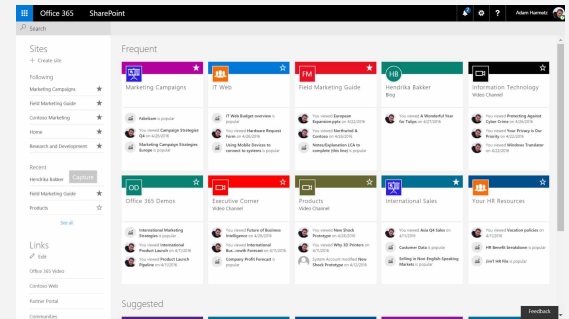
ACC/BIM 360



Aconex



- Ineight
- Procure
- Trimble Connect
- Project Wise



SharePoint

Digital Twin Key Components



Data Assets



Visualization



Data Management



Data Science

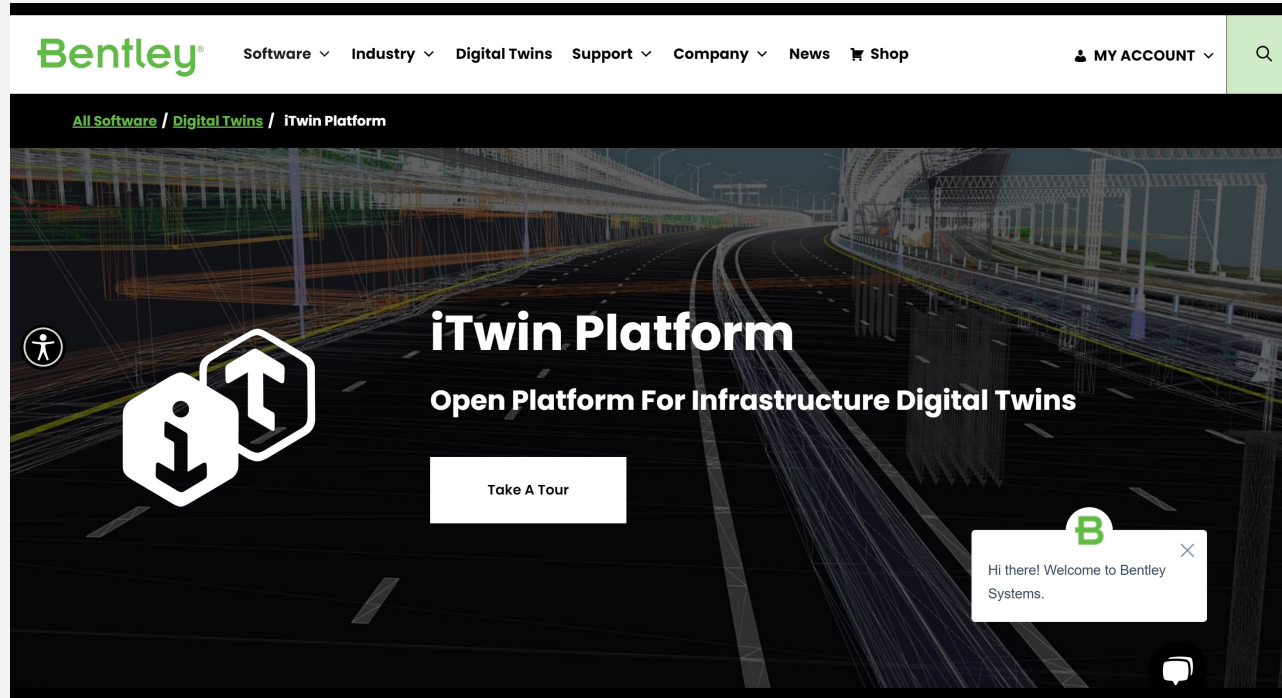


Stakeholder Engagement

★ Integration

★★★ Customization

★★★ Blockchain



Digital Twin Key Components



Data Assets



Visualization

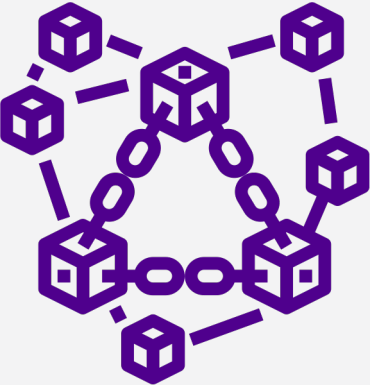
★ Integration

★★ Customization

★★★ Blockchain



Data Management



Decentralization



Encryption



Immutability



Data Science




Stakeholder Engagement



Smart Contract

Digital Twin Key Components

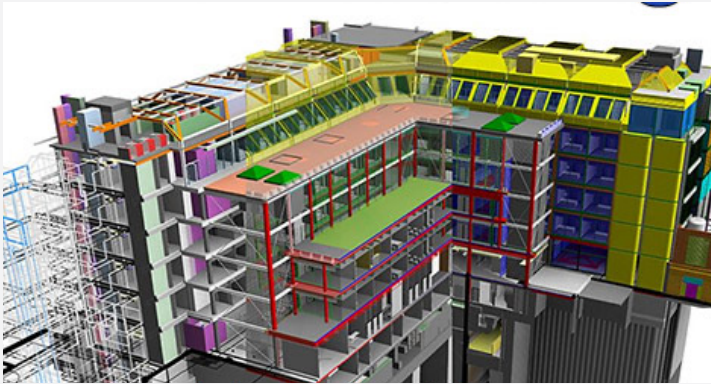


Visualization

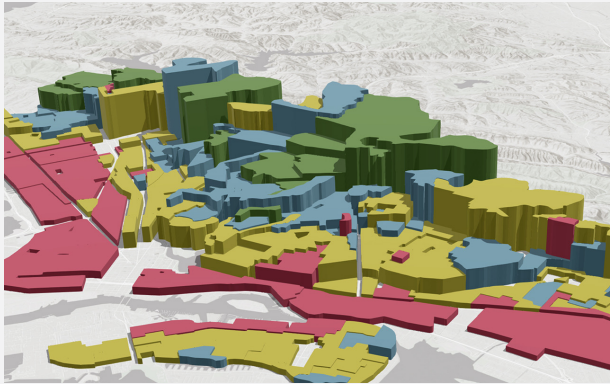
★ BIM & GIS

★★ AR/VR

★★★ Metaverse



BIM



GIS



Data Assets



Data Management




Data Science



Stakeholder Engagement

Digital Twin Key Components



Visualization

★ BIM & GIS

★★ AR/VR

★★★ Metaverse



Data Assets



Data Management



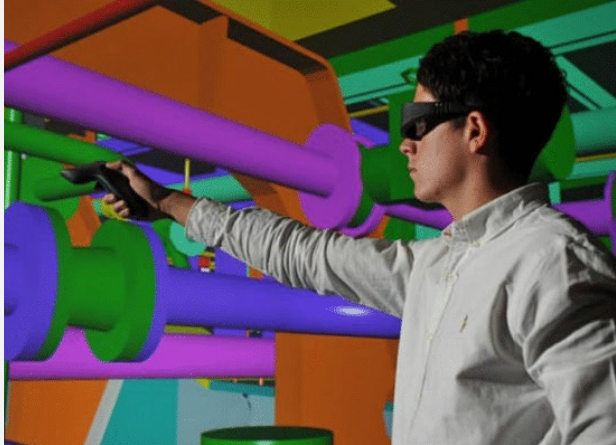
Data Science



Stakeholder Engagement




AR



VR

Digital Twin Key Components



Visualization

★ BIM & GIS

★★ AR/VR

★★★ Metaverse



Data Assets



Data Management



Data Science



Stakeholder Engagement



Metaverse

Digital Twin Key Components



Data Assets



Data Management



Visualization



Stakeholder Engagement

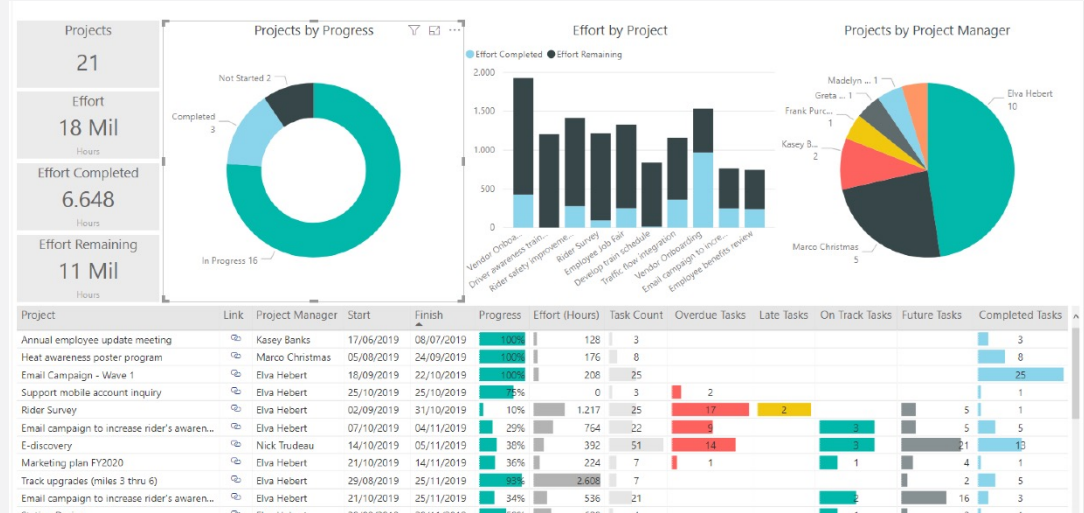


Data Science

★ BI Reporting

★★ Analytics

★★★ ML/AI



Get inspired by: novypro.com

Digital Twin Key Components



Data Assets



Data Management



Visualization



Stakeholder Engagement

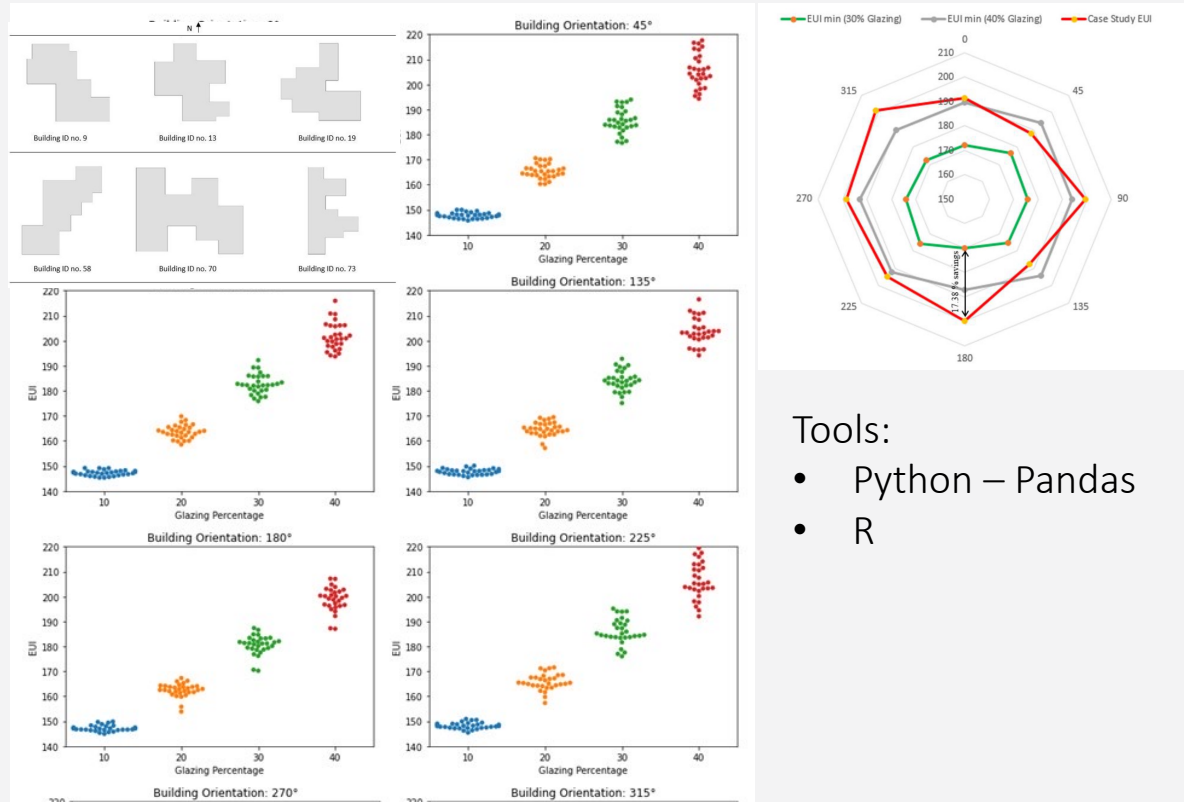


Data Science

★ BI Reporting

★★★ Analytics

★★★★ ML/AI



Tools:

- Python – Pandas
- R

Digital Twin Key Components



Data Assets



Data Management



Visualization



Stakeholder Engagement

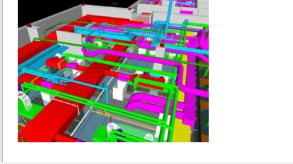
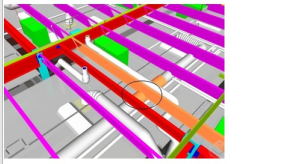
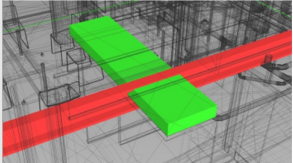
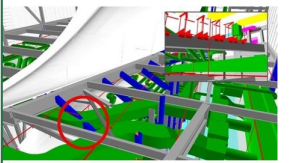


Data Science

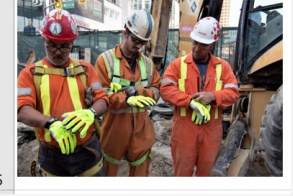
★ BI Reporting

★★ Analytics

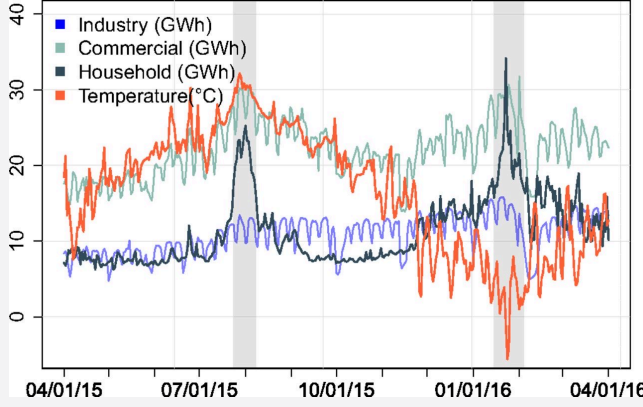
★★★ ML/AI



Issues Identification



Site Safety



Energy Consumption Prediction

Digital Twin Key Components



Data Assets



Data Management



Stakeholder Engagement



Visualization

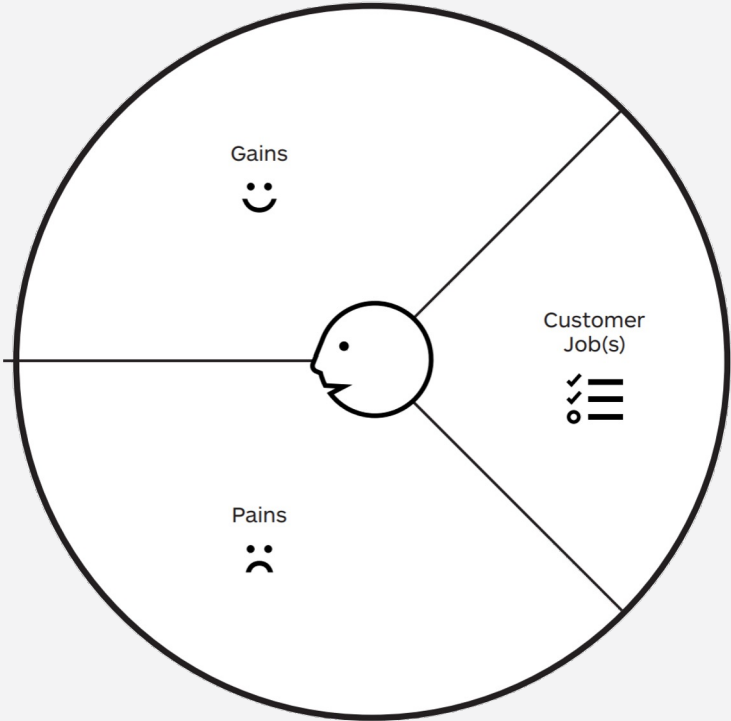


Data Science

★ Understand

★★ Co-creation

★★★ Experimentation



Stakeholder Journey Mapping

Digital Twin Key Components



Data Assets



Data Management



Stakeholder Engagement



Visualization



Data Science

★ Understand

★★★ Co-creation

★★★ Experimentation



Co-creation & Engagement

Digital Twin Key Components



Data Assets



Data Management

★ Understand

★★ Co-creation

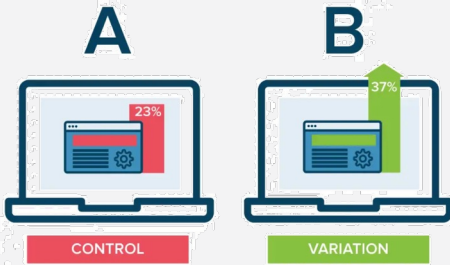
★★★ Experimentation



Stakeholder Engagement



MVP



A/B Testing



Visualization



Data Science

Digital Twin Key Components



Data Assets



Data Management



Visualization



Data Science



Stakeholder Engagement

★ Data Collection

★★ BIM & GIS

★★★ IoT

★ Integration

★★ Customization

★★★ Blockchain

★ BIM & GIS

★★ AR/VR

★★★ Metaverse

★ BI Reporting

★★ Analytics

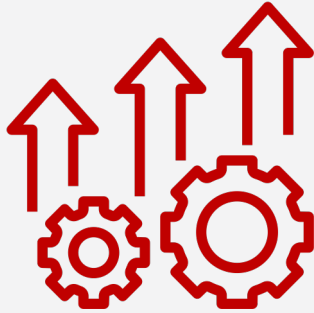
★★★ ML/AI

★ Understand

★★ Co-creation

★★★ Experimentation

How to create Financial Value? [I-W-S Approaches]



Improve

(Indirect)

by improving operational processes, making them better, faster, and cheaper, and improving decision-making quality



Wrap

(Indirect)

by enhancing the customer value proposition of existing products through data analytics features



Sell

(Direct)

by delivering new information offerings such as raw data, packaged insights, and information services

How to create Financial Value? [I-W-S Approaches]



	Improving	Wrapping	Selling
Financial Value	Change the economics of work	Change the economics of product	Deliver new information offerings
Common Outcomes	Better, faster, cheaper production	Increased customer willingness to pay	New revenue streams
People accountable	Process owner	Product owner	Profit and loss (P&L) owner
Primary metrics	<ul style="list-style-type: none">Operational efficiencyDecision quality	<ul style="list-style-type: none">Customer satisfactionDecision quality	<ul style="list-style-type: none">Profit and loss
Top risk	Adoption risk	Service level risk	Sustaining competitive advantage

How to create Financial Value? [I-W-S Approaches]



	Improving
Data Assets	★★
Data Management	★
Visualization	★
Data Science	★
Stakeholder Engagement	★



How to create Financial Value? [I-W-S Approaches]



	Improving	Wrapping
Data Assets	★★	★★
Data Management	★	★+
Visualization	★	★
Data Science	★	★★+
Stakeholder Engagement	★	★★+

How to create Financial Value? [I-W-S Approaches]



	Improving	Wrapping	Selling
Data Assets	★★	★★	★★+
Data Management	★	★+	★★+
Visualization	★	★	★+
Data Science	★	★★+	★★+
Stakeholder Engagement	★	★★+	★★★

Identifying Your Place in the Digital Landscape



Consultant



Contractor



PMO/PMC



Software Provide



Client



Improve



Sell



Improve



Improve



Wrap



Sell



Sell



Improve

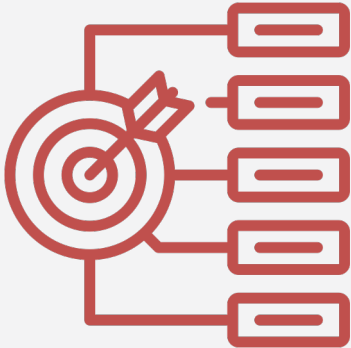


Wrap



Sell

Align with your Business Goals & Objectives

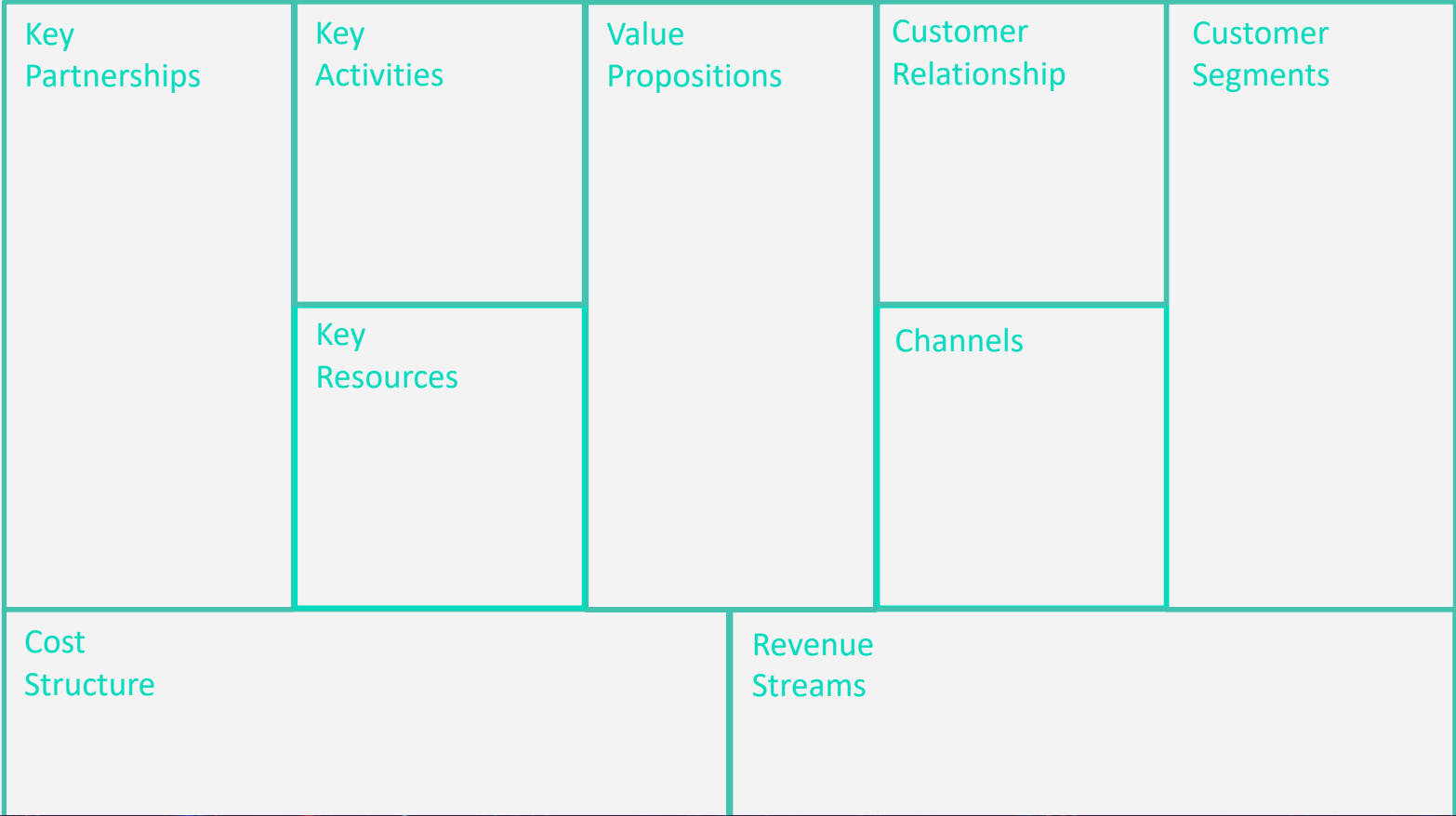


Current Situation Assessment

	Improving
Data Assets	★★
Data Management	★
Visualization	★★
Data Science	★
Stakeholder Engagement	★

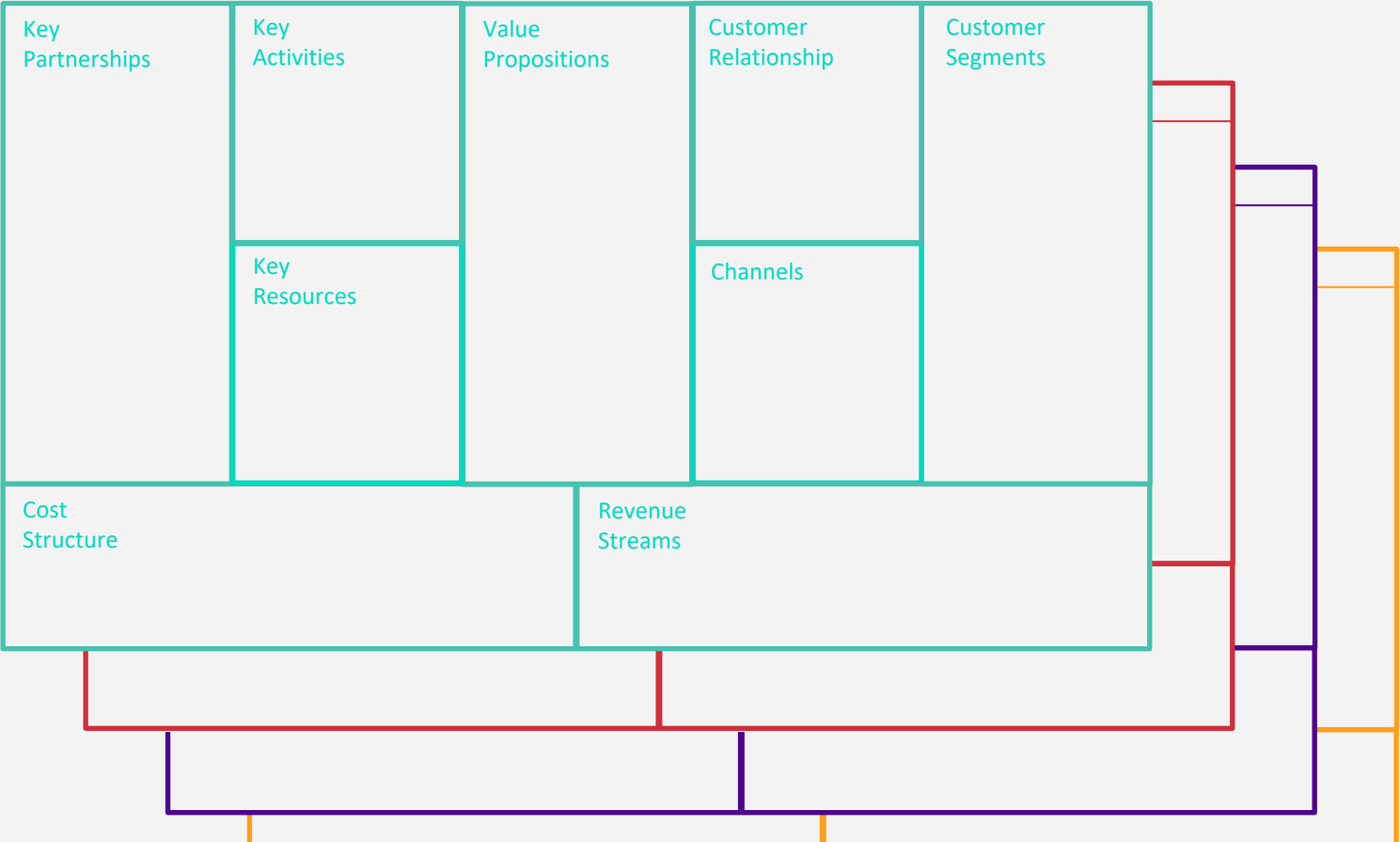
Business Testing

Create a Business Model



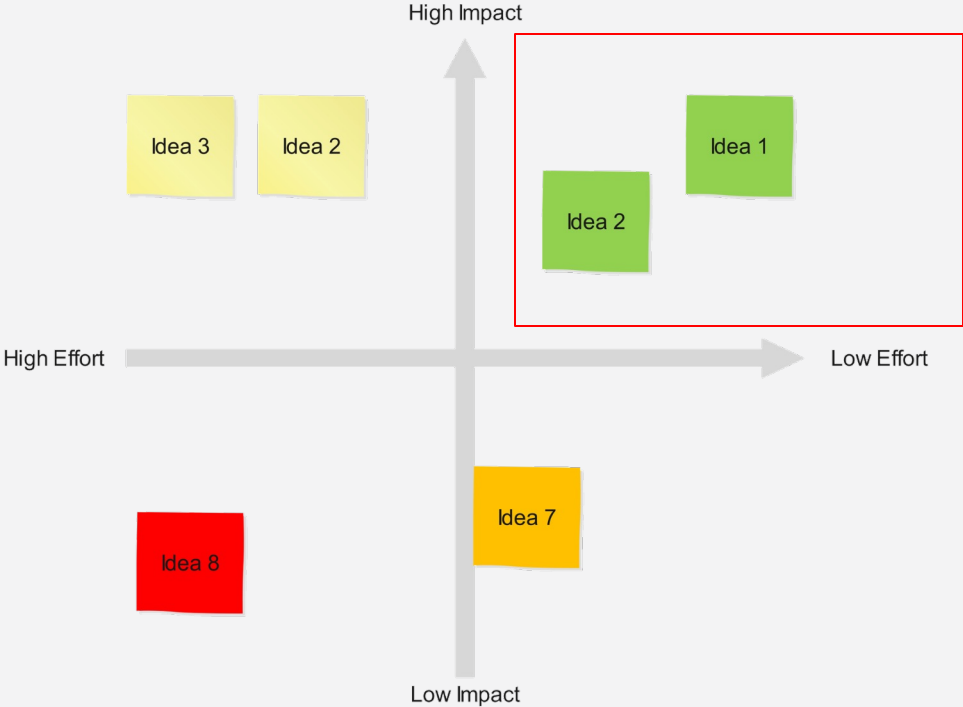
Business Testing

Create a lot of quick business models



Business Testing

Quick Wins



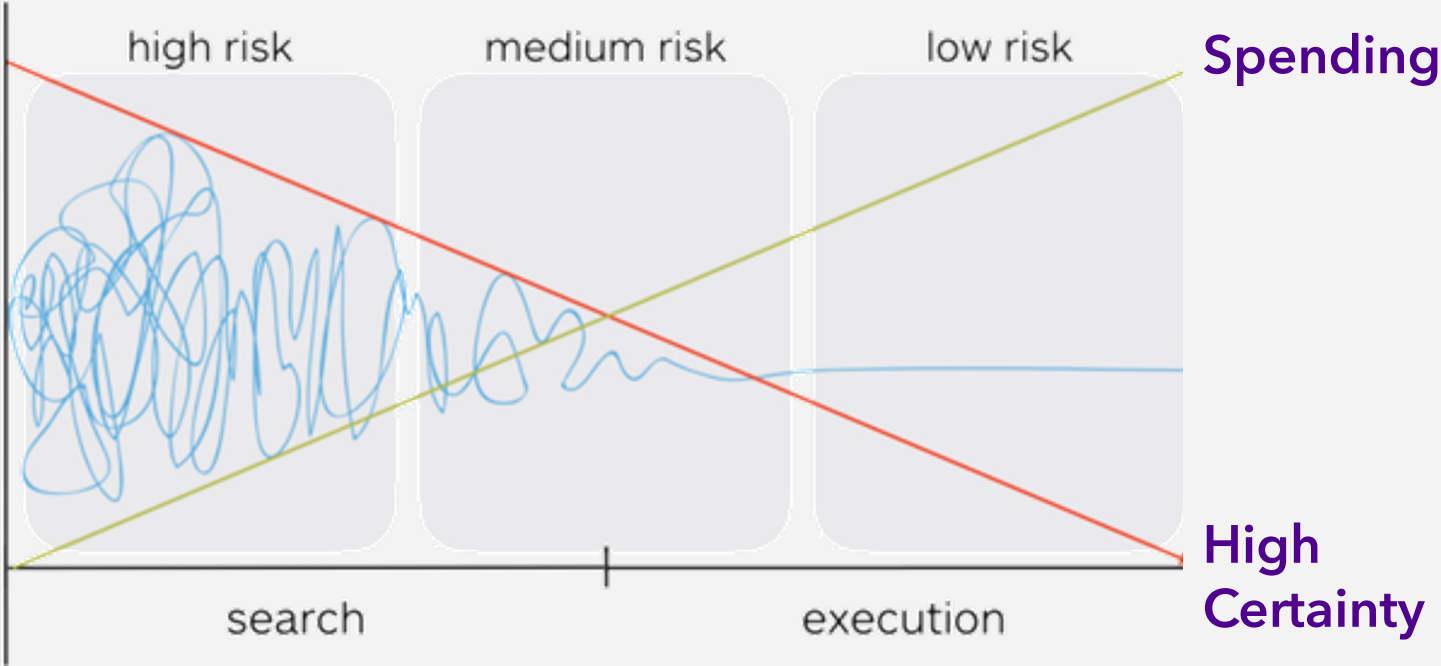
Impact-Effort Matrix



Business Testing

Quick Wins

High
Uncertainty



The background of the image is a complex, glowing digital network. It consists of numerous interconnected nodes and lines, creating a sense of a vast, interconnected system. The nodes are primarily blue, with several prominent red nodes scattered throughout. The lines are thin and light blue, forming a dense web. The overall color palette is dark blue and black, with the glowing elements providing a high-contrast, futuristic aesthetic. The text is centered in the upper half of the image, rendered in a clean, white, sans-serif font.

Transformative Partnership: Pioneering the Construction Industry through Blockchain, Digital Twins, & Metaverse JV Synergy



Abdelrahman AbouHadid

BIM Manager at Mace | Digital
Transformation | AI/ML



THANK YOU



2-5 May 2023, Rotterdam, The Netherlands