data driven construction.io

mining | visualization | analytics | automation

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DATA > SOFTWARE

The future of construction is **data-centric**

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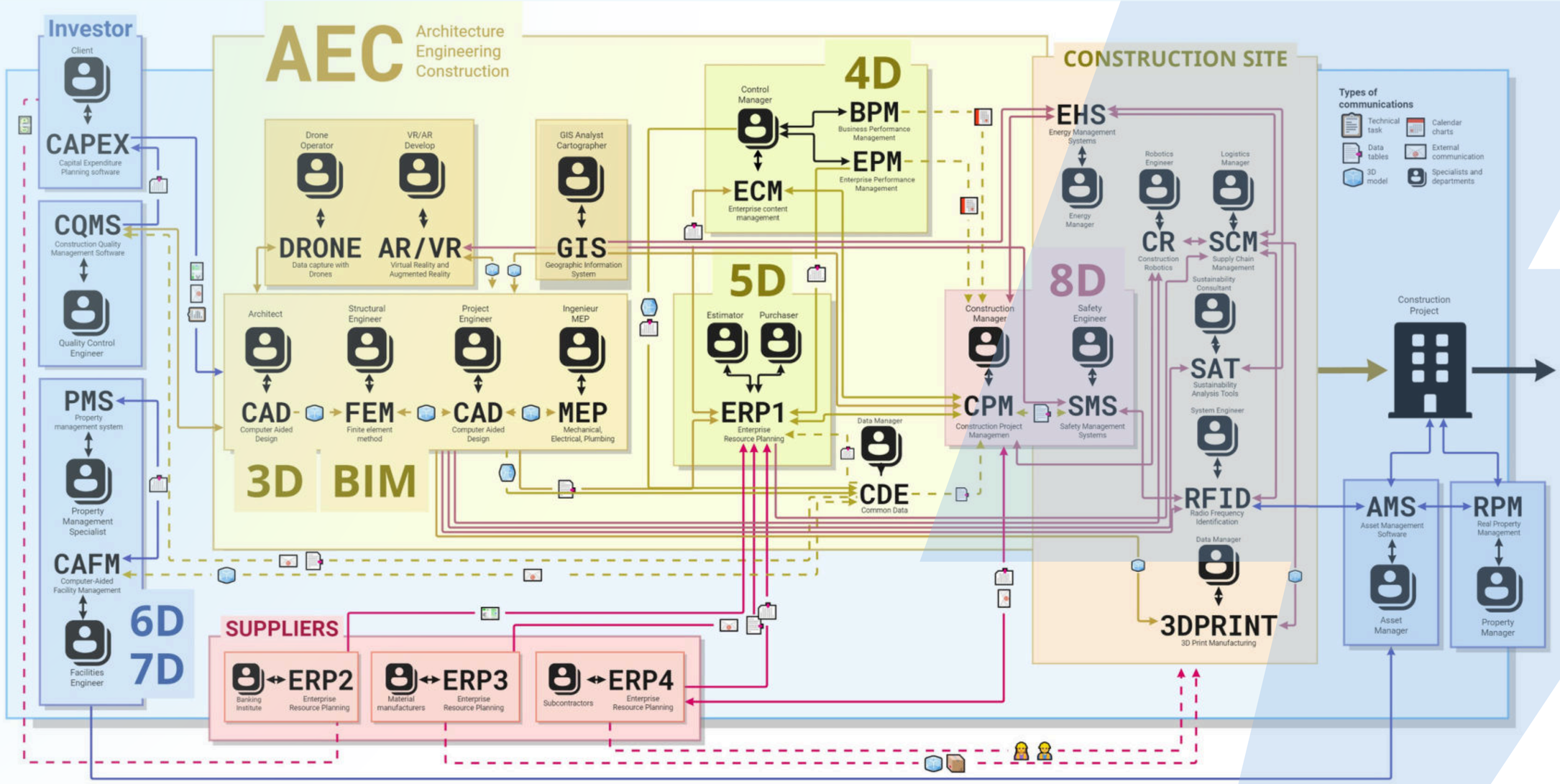
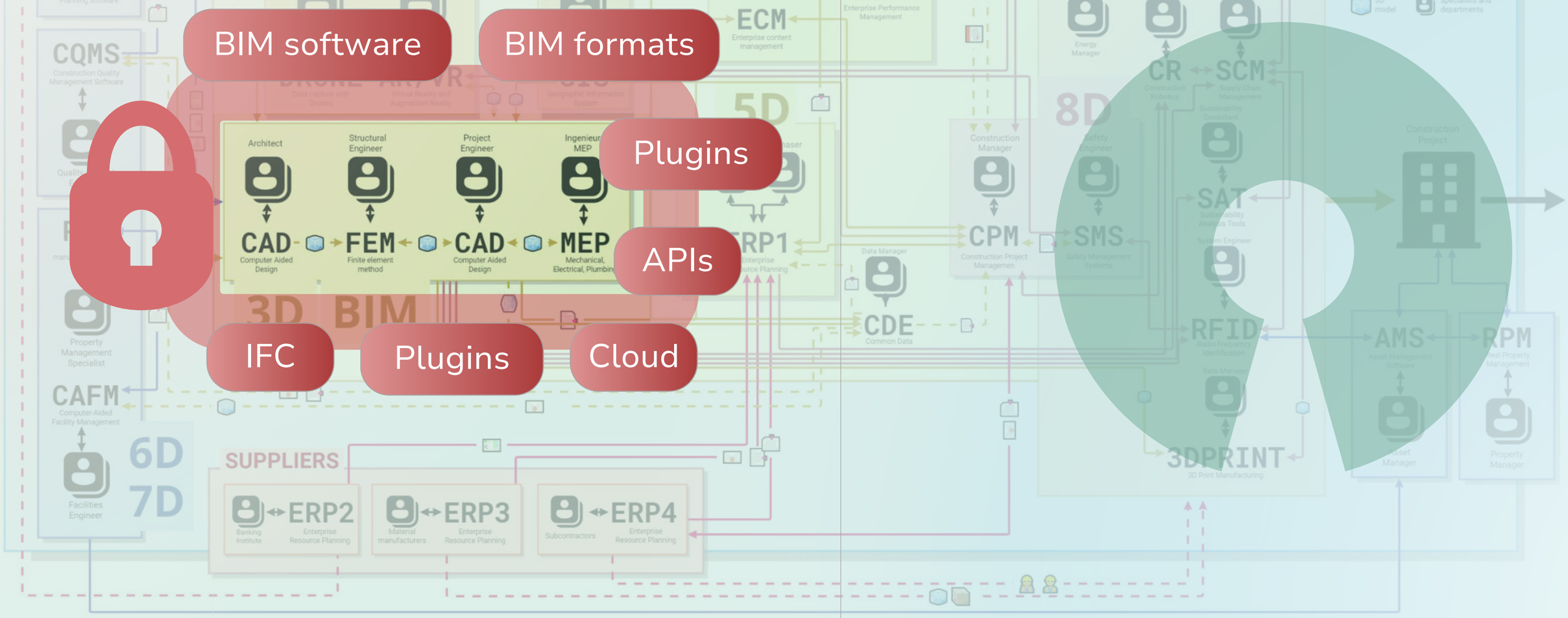
DataDrivenConstruction Toolkit is a powerful tool for exploring construction data without the need for an online connection or the installation of CAD (BIM) software. It supports the offline reading of BIM data and allows for the export of data to various formats such as DAE, USD, OBJ, CSV, Excel, JSON, XML, etc.

The construction business is filled with a lot of systems and data that need to be connected to each other



Closed and complex CAD (BIM) formats force users to use complex and expensive tools to access and process data



CLOSED DATA

converter

SDK

1996-2018

OPEN DATA

- BIM software
- BIM formats
- IFC
- Plugins
- Cloud
- Internet
- APIs

- no BIM software
- no BIM formats
- no IFC
- no Plugins
- no Cloud
- no Internet
- no APIs

Most major construction and design companies, as well as CAD (BIM) vendors, get open data from CAD (BIM) formats using SDKs, reverse engineering

converter

SDK

1996-2018

Hard decisions

Easy life

OPEN DATA

no BIM formats

no Cloud

no APIs

no BIM software

no Plugins

glTF

SQL

DB

XML

CSV

IFC

openBIM ™

APIs

Plugins

BIM formats

BIM software

Cloud

subscriptions

closedBIM

Hard life

BIM

CLOSED DATA

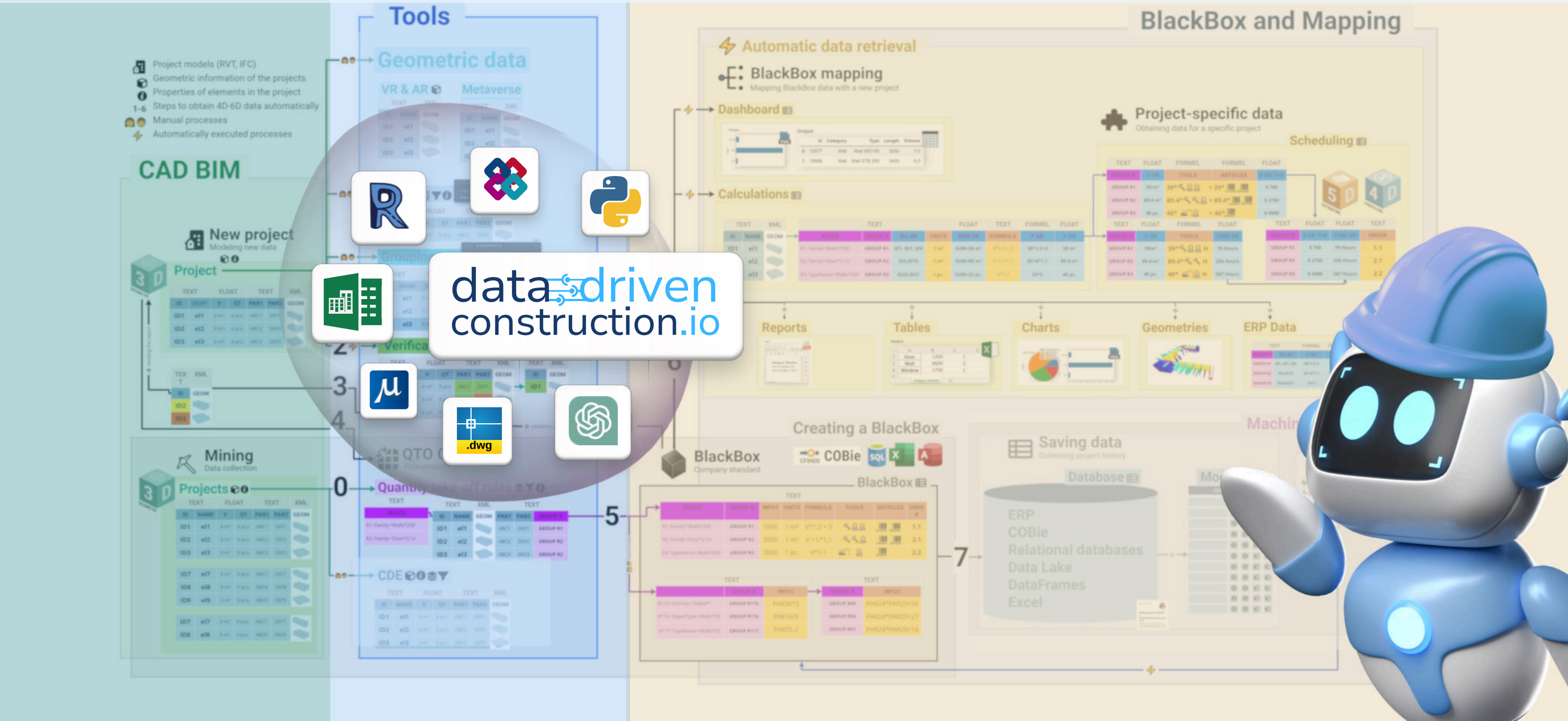
.dwg

Easy decisions

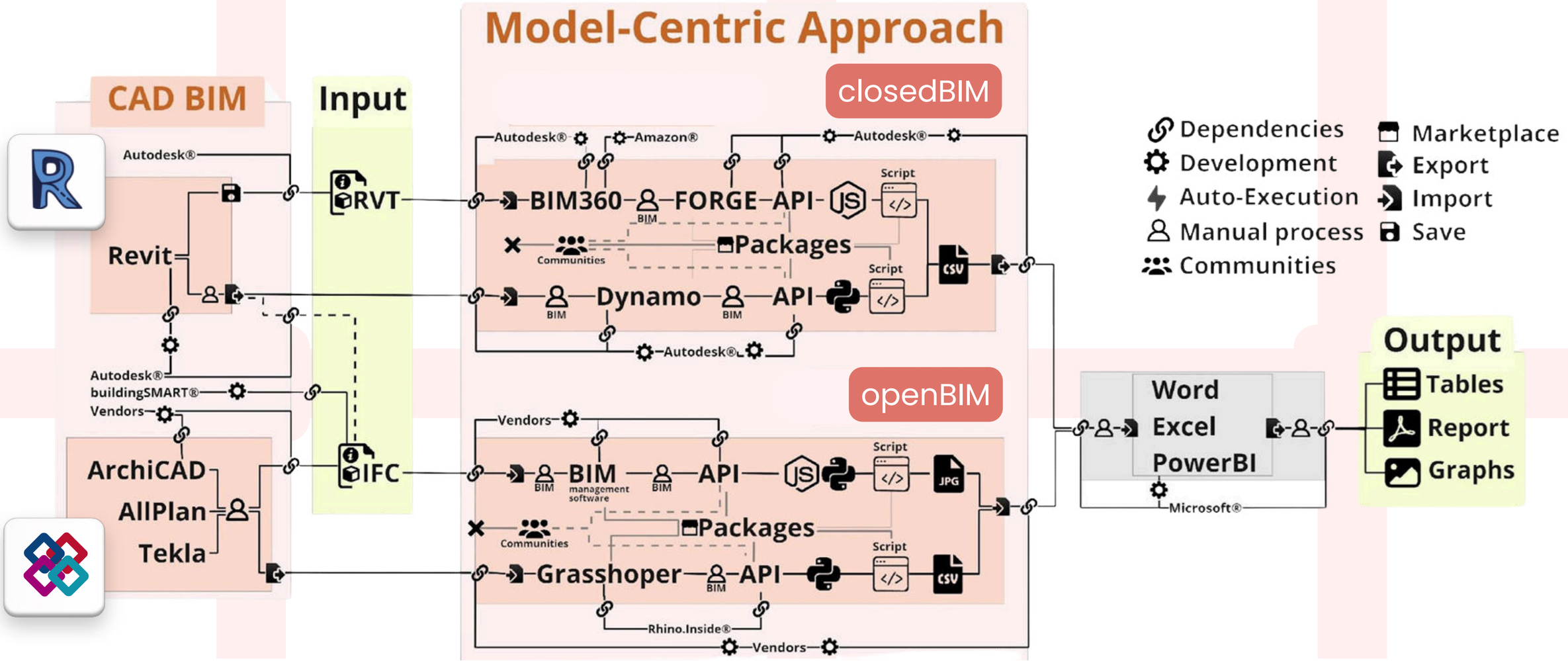
A single CAD (BIM) project

Quality of data

1000000000+ data use cases



THE **LARGE NUMBER OF DEPENDENCIES** WITH CLOSED DATA MAKES IT **DIFFICULT TO CREATE A SEAMLESS PROCESS**



Data-Centric Approach vs Model-Centric Approach in Construction Data

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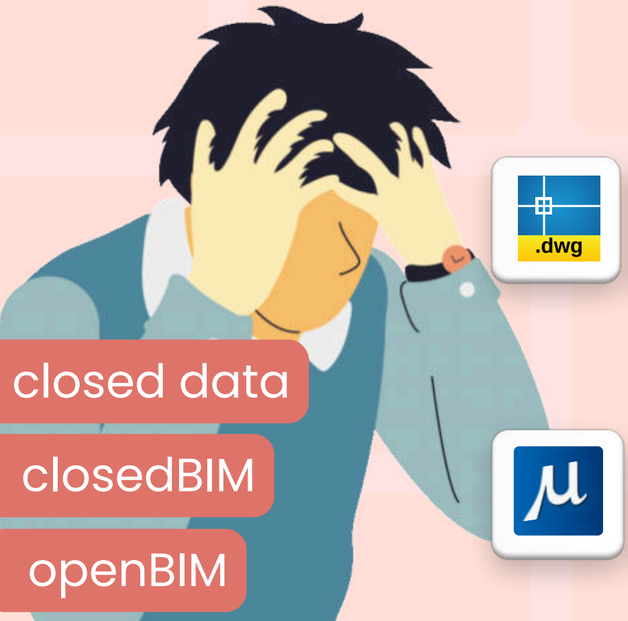
Number of dependencies when working in closedBIM , openBIM and Data-Centric Approach



Data-Centric Approach

CAD BIM

Autodesk®
Revit
ArchiCAD
AllPlan
Tekla
Vendors
buildingSMART®

Input

RVT
IFC

noBIM

Communities
Packages
Vendor
Data Engineer
Data Analyst
Open Data
Converter
CSV
DAE
id
JSON
XML
XLSX
Script
Script

Dependencies
Development
Auto-Execution
Manual process
Communities

Marketplace
Export
Import
Save

Data Engineer
Data Analyst
Communities and experts
50x
Technology Stack
DataFrame
Pandas Python

DDC

Model-Centric Approach

CAD BIM

Autodesk®
Revit
Autodesk®
buildingSMART®
Vendors
ArchiCAD
AllPlan
Tekla

Input

RVT
IFC

closedBIM

Autodesk®
Amazon®
Autodesk®
BIM360
FORGE
API
Script
Communities
Packages
Script
Dynamo
API
Autodesk®

openBIM

Vendors
BIM
API
Script
Communities
Packages
Script
Grasshoper
API
Rhino.Inside®
Vendors

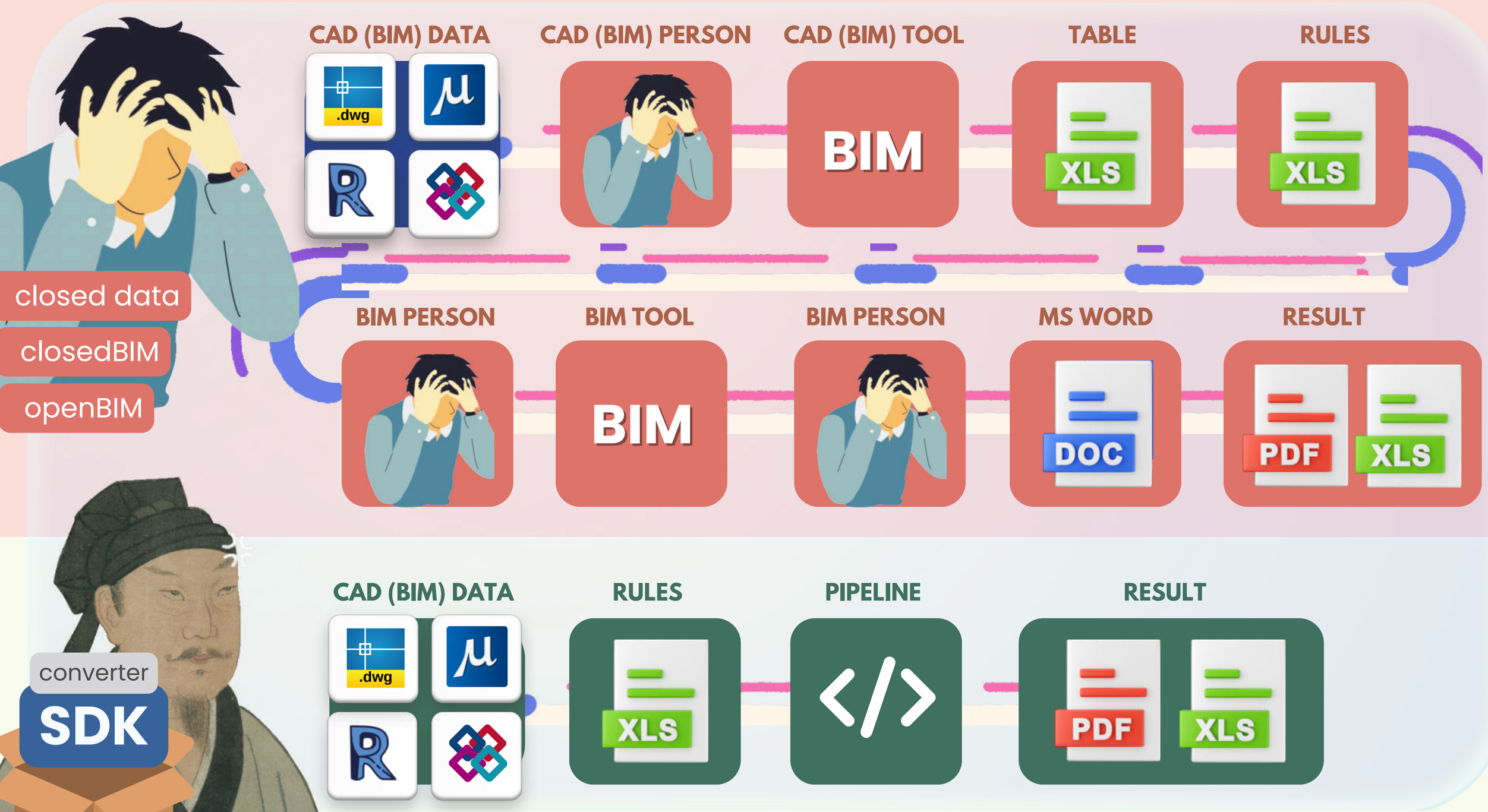
Word
Excel
PowerBI
Microsoft®

Output

Tables
Docs
Graphs
Dashboard

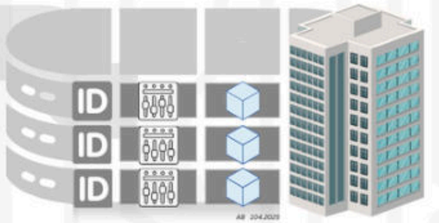
BIM

BIM Manager
BIM Coordinator
Communities and experts
1x
Technology Stack
Dynamo
API Revit
BIM360
Forge API
Python
API BIMs
API Revit
Rhino API
CAD API


CAD (BIM) DATA
CAD (BIM) PERSON
CAD (BIM) TOOL
TABLE
RULES
.dwg
BIM
XLS
XLS
closed data
closedBIM
openBIM
BIM PERSON
BIM TOOL
BIM PERSON
MS WORD
RESULT
BIM
DOC
PDF
XLS
converter
SDK
CAD (BIM) DATA
RULES
PIPELINE
RESULT
.dwg
XLS
PDF
XLS

EVOLUTION OF

CONSTRUCTION CAD (BIM) DATA STORAGE FORMATS



In construction projects, data manipulation begins with the collection of attribute and geometry requirements for project entities. Using parametrized CAD systems, the project is populated with data on the geometric parameters of the entities, which allows to confirm volumes and prepare data to be transferred to systems for handling the attribute parameters of the project entities.

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Geometric properties of project entities

Attribute properties of project entities

COMPARATIVE ANALYSIS OF FILE FORMATS FOR CONSTRUCTION PROJECTS

	XLSX	DWG	DGN	DXF	DBI	PLN	IFC	FBX	NWC	SKP	RVT	BLEND	SVF	XML	BX3	SPX	GEOXML	CPIXML	XER	CLOUD	PROCORE	GLTF	UASSET	USD	XLSX & DAE
Year published	XLSX 1995, XLSX 2007	1982	1982	1982	1987	1987	1997	1996	2007						2010	2008	1998	2004	1992	2000	2010	2015	2016	2016	1987 & 2004
Developer	Microsoft®	Mike Riddle / Autodesk®	Microstation® (Intergraph®	Autodesk®	Tekla Corporation®	Graphisoft®	Tri-Iskanch	Keyshot® / Autodesk®	Lightwork D / Autodesk®						BIXEL Consulting®	Synchro Software	Green Building Studio, Inc	IBE Software®	Keypedman & Fiala	Aconex (Inc®, Oracle®	Craig "Casey" Courtemanch	Khronos Group® (Google, Apple, Intel, NVIDIA ...)	Epic Games®	Pixar®	Microsoft® & Khronos Group®
Purpose of creation	Calculations, analysis and visualize data	Used in CAD applications	Used in CAD (BIM) applications	Interoperability between CAD software	Used in CAD (BIM) applications	Used in CAD (BIM) applications	Interoperability between CAD (BIM) software	Exchange of data between 3D application	Data management and 4D-5D use cases						Data management and 4D-5D use cases		Environmental analysis data	Data management and 4D-5D use cases	Data management and 4D-5D use cases	Project management and collaboration tools	Data management and 4D-5D use cases	Simulations, visualization and project assets	Simulations, visualization and project assets	Simulations, visualization and project assets	Data management and 4D-5D use cases
Importing data from formats	RVT, IFC, DWG, DXF, ...	DXF, DGN, STP, ...	DWG, DXF, IFC, ...	DWG, DGN, RVT, IFC, ...	IFC, DWG, DXF, ...	RVT, DWG, IFC, SKP, ...	RVT, DWG, PLN, DGN, DXF, ...	RVT, IFC, OBJ, DAE, ...	RVT, DWG, DXF, DGN, ...						RVT, IFC, DWG, NWC, ...	RVT, IFC, DWG, DGN, NWC, ...	RVT, IFC, DXF, ...	RVT, IFC, DWG, NWC, ...	N/A	RVT, IFC, DWG, NWC, ...	RVT, IFC, DWG, DGN, NWC, ...	RVT, IFC, DXF, NWC, ...	RVT, IFC, FBX, OBJ, ...	RVT, IFC, DWG, DGN, NWC	RVT, IFC, DWG, DGN, NWC
Storage	Tabular	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Hierarchical	Hierarchical						Hierarchical	Hierarchical	Hierarchical	Hierarchical	Tabular	Cloud-based	Cloud-based	Hierarchical	Hierarchical	Hierarchical	Tabular & Hierarchical
Data structure	Structured Data	Closed Data	Closed Data	ASCII	Closed Data	Closed Data	Semi-Structured Data	ASCII	Closed Data						Semi-Structured Data	Closed Data	Semi-Structured Data	Semi-Structured Data	Structured Data	Closed Data	Closed Data	Semi-Structured Data	Closed Data	Semi-Structured Data	Structured Data
Open format	●	○	○	●	○	○	●	●	○						●	●	●	●	○	○	○	●	○	●	●
Don't need the internet to work	●	●	●	●	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Parametric geometry creation	○	○	●	○	●	●	●	○	○						○	○	○	○	○	○	○	○	●	○	○
Creating & modifying entity geometry	○	●	●	●	●	●	●	○	○						○	○	○	○	○	○	○	○	●	○	○
Checking geometric collisions	○	○	●	○	●	●	●	○	○						●	●	●	●	●	●	●	○	●	●	●
Creating & modifying entity attribute	●	●	●	●	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Quality of data	●	●	●	●	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Visualization of entity geometry	○	●	●	●	●	●	●	●	●						●	●	●	●	○	●	●	●	●	●	●
Completeness of geometry	○	●	●	●	●	●	●	●	●						●	●	●	●	○	●	●	●	●	●	●
Creation of drawings	○	●	●	○	●	●	○	●	○						○	○	○	○	○	○	○	○	○	○	○
Integration with other tools	●	●	●	●	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Community	●	●	●	●	●	●	●	●	○						○	○	○	○	○	●	●	●	●	●	●
Grouping & filtering	●	○	○	○	●	●	●	●	●						●	●	●	●	●	●	●	●	●	●	●
Calculations 4D, 5D, 6D, 7D	●	●	●	●	●	●	●	○	●						●	●	○	●	●	●	●	○	○	○	●
No API Restrictions	●	○	○	●	○	○	●	○	○						○	○	●	●	○	○	○	●	○	●	●
Batch Processing	●	○	○	○	○	○	●	○	○						○	○	●	●	○	●	●	○	○	○	●
Don't need CAD (BIM) tools to work	●	○	○	○	○	○	●	○	○						○	○	●	●	●	●	●	●	●	●	●
Difficulty in handling data	●	○	○	○	○	○	●	○	○						○	○	●	●	●	●	●	●	●	●	●
Versioning and change management	●	○	○	○	○	○	●	○	○						○	○	●	●	○	●	●	○	○	○	●
Support for data analytics	●	○	○	○	○	○	●	○	○						○	○	●	●	●	●	●	●	○	●	●
Creating dashboards	●	○	○	○	○	○	●	○	○						○	○	●	●	●	●	●	●	○	●	●
Easy to create data processing tools	●	○	○	○	○	○	●	○	○						○	○	●	●	●	●	●	●	○	●	●
Compatible with ERP Systems	●	○	○	○	○	●	●	○	○						○	○	●	●	●	●	●	●	●	●	●
The ability to create Big Data	●	○	○	○	○	○	●	○	○						○	○	●	●	○	●	●	●	○	●	●
ML and AI support without ETL	●	○	○	○	○	○	○	○	○						○	○	●	●	○	●	●	●	○	●	●
Usage in ChatGPT	●	○	○	○	○	○	○	○	○						○	○	●	●	○	●	●	●	○	●	●
Primary application ecosystems	Almost any sector requiring data analysis	CAD Software	CAD Software	CAD Software	CAD (BIM) Software	CAD (BIM) Software	CAD (BIM) Interoperability Format	Interop-ability, 3D modeling, animation, and game development	Project Review Software	CAD (3D Modeling) Software	CAD (BIM) Software	3D modeling and animation software			Cloud-based Viewing and Data Management Platform	Cloud-based Viewing and Data Management Platform	4D-5D use cases, Construction Project Information Management	4D-5D use cases, Construction Project Information Management	6D-7D use cases, Energy analysis in building design	ERP, 4D-5D use cases, Construction Project Information Management	4D Project scheduling, Tracking, and Management	Managing documents, processes, and communications in large-scale projects	Project management, resource allocation, and communication in construction projects	3D rendering and virtual reality platforms	Real-time Rendering Engine	High-end rendering and animation platforms	ERP, 4D-5D use cases, Construction Project Information Management
Main users of the format	Project Managers, BIM Coordinators & Managers	Planners, Architects, Designers	Planners, Architects, Designers	Planners, Architects, Designers	Planners, Architects, Designers	Planners, Architects, Designers	BIM Coordinators, BIM Managers	All/VR, Game Developers, 3D Designers	Project Managers, BIM Coordinators & Managers	Architects, Interior Designers	Planners, Architects, Designers	Planners, Architects, Designers			Project Managers, BIM Coordinators & Managers	Project Managers, BIM Coordinators & Managers	Project Managers, BIM Coordinators & Managers	Project Managers, BIM Coordinators & Managers	Environmental Engineers, Sustainability Consultants	Projects', Estimatings', Logistics Managers, Construction Project Managers	Projects Managers, Logistics Managers, Construction Project Managers	Projects Managers, Logistics Managers, Construction Project Managers	Projects Managers, Logistics Managers, Construction Project Managers	Simulation creators, All/VR, Game Developers, 3D Designers	Simulation creators, All/VR, Game Developers, 3D Designers	Simulation creators, All/VR, Game Developers, 3D Designers	Project, Estimating, Logistics Managers, Construction Project Managers
Usage	Widely used across all platforms	Autodesk® AutoCAD®	Bentley® Systems MicroStation®	Autodesk® AutoCAD®	Tekla Structures	Graphisoft® ArchiCAD®	OpenBIM®, ARCHICAD®, Tekla®, Revit®, Vectorworks®, BlenderBIM	Autodesk® 3ds Max, Maya®, and Unity®	Autodesk® Navisworks®	SketchUp®, Trimble Connect®	Autodesk® Revit®, Autodesk® BIM 360®	Blender	Autodesk® Forge®, Autodesk® BIM 360®, Autodesk® Construction Cloud™	BIM 360®, Forge-based, Bentley® ProjectWise®, Trimble® Connect, Procore® and others	Revit® Manager	Bentley® ecosystem, Synchro® software	Autodesk® Green Building Studio	RIB® iTWO, MTWO Construction Cloud	Oracle® Primavera P6	Oracle® Construction and Engineering suite	Mobile applications, enabling use on various devices in the field or office	Microsoft® Mixed Reality Toolkit, Facebook® 3D Photo, MatchMesh, Three.js	Unreal Engine®	Khronos® Group, Apple® ARKit, Pixar's® USD tools	Excel®, Python Pandas, Unreal Engine®, Power BI, Chaos®, Unreal Engine
Popular usage platforms			2D	2D	2D		3D		BIM		4D 5D	3D			BIM	BIM	4D 5D	4D 5D	BIM	6D 7D	BEM	4D 5D	ERP	4D	4D 5D	4D 5D	4D 5D				4D 5D

https://datadrivenconstruction.io/?sdm_process_download=1&download_id=3231

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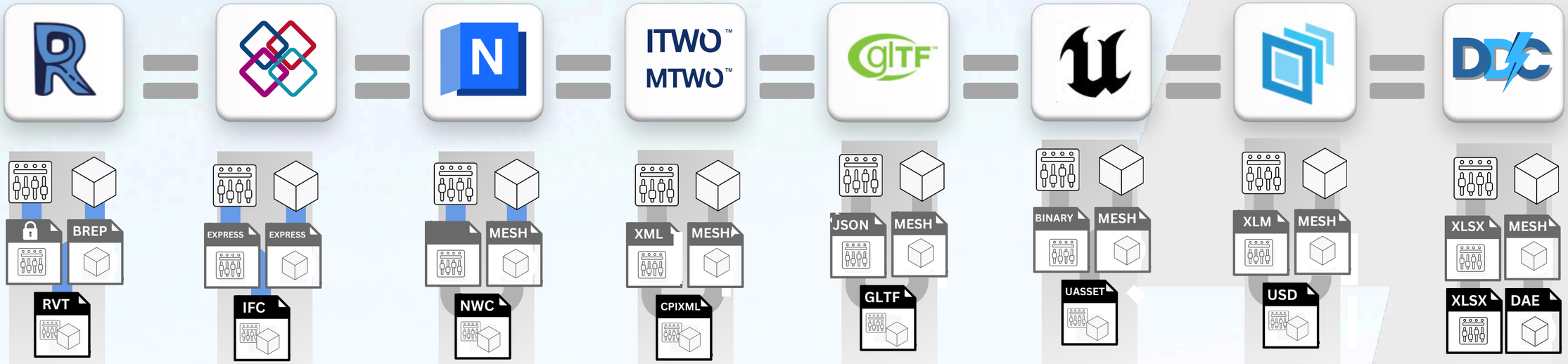
Thanks to SDKs and converters, different formats including complex closed formats, parametric formats and simplified flat formats **now contain identical information** about the same construction project

CAD (BIM) DATA

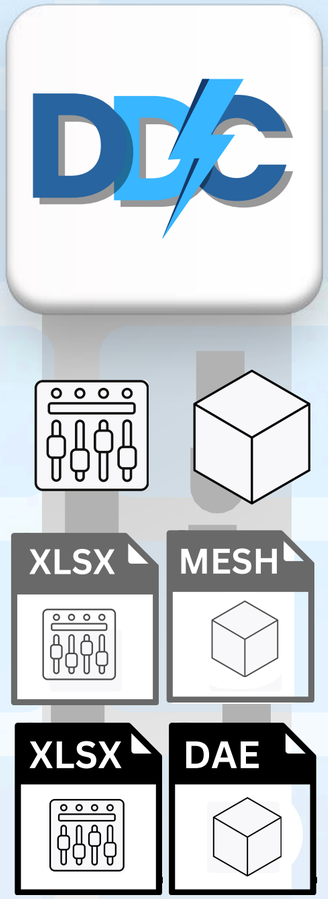
In construction projects, data manipulation begins with the collection of attribute and geometry requirements for project entities. Using parametrized CAD systems, the project is populated with data on the geometric parameters of the entities, which allows to confirm volumes and prepare data to be transferred to systems for handling the attribute parameters of the project entities.

Geometric properties of project entities

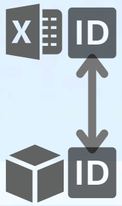
Attribute properties of project entities



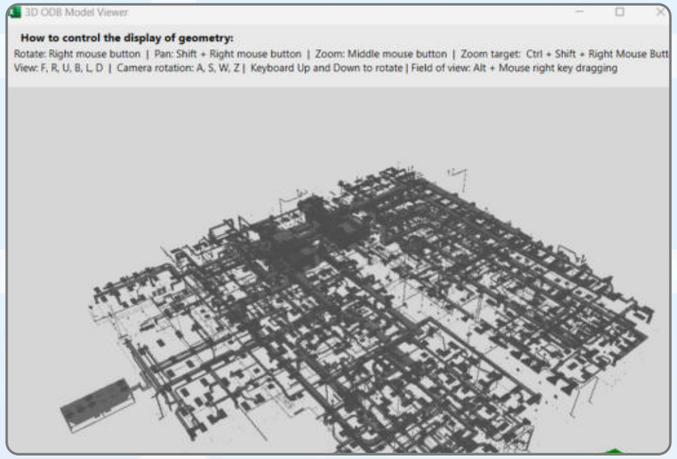
A project, is a set of elements where **each element has a set of properties** and parameters and where geometry is an optional attribute



XLSX



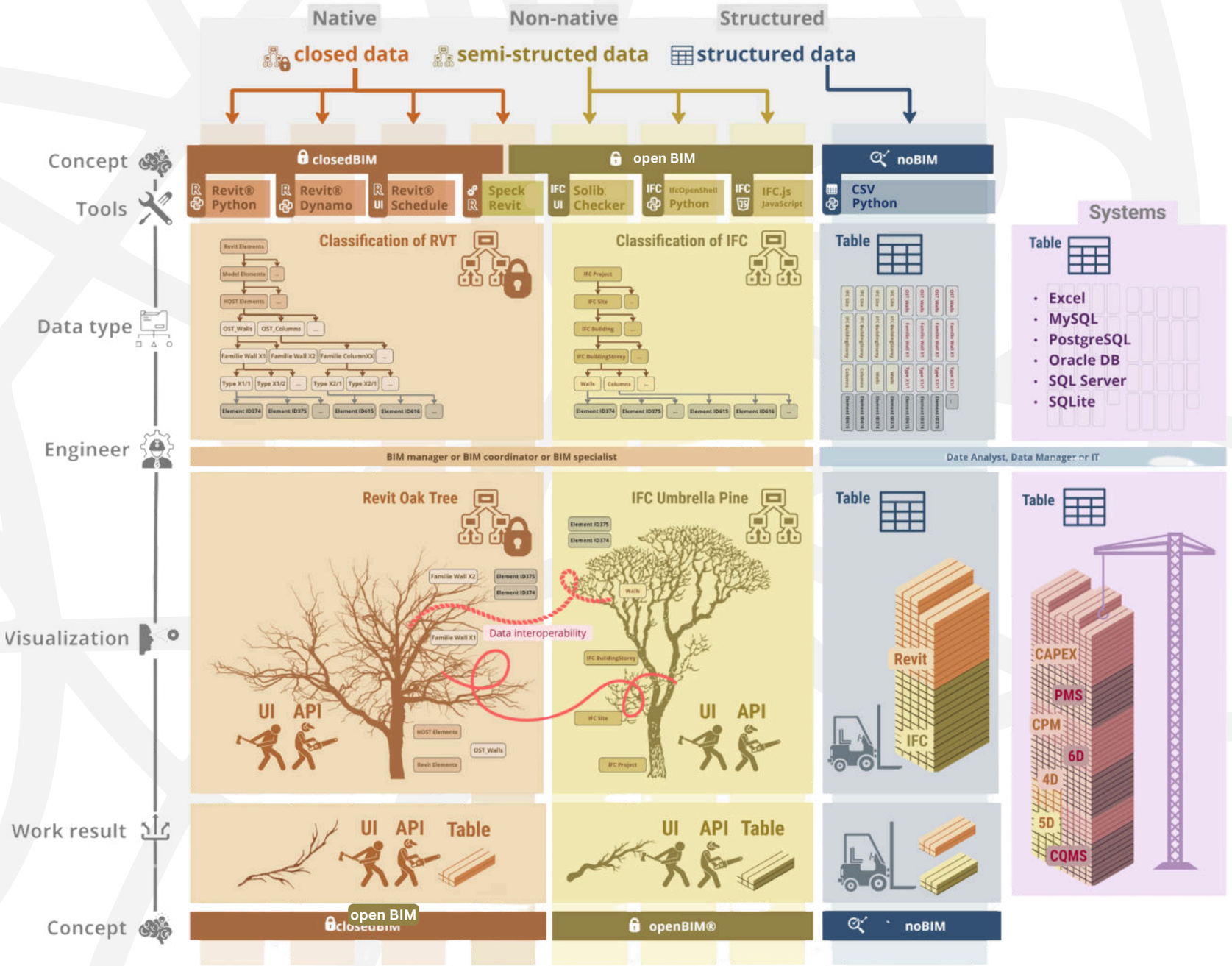
ID	Name	Category	Volume	IfcGUID
176804	Floor	OST_Floors	561.0052641	0WFFycJ9rEj9FbADAA0q3o
198694	Basic Wall	OST_Walls	159.4707199	3lLx0gNe59vvExhby0Bfew
198749	Basic Wall	OST_Walls	42.87248164	3lLx0gNe59vvExhby0Bff1
211850	Sink-Offset-Kohler-Vaul	OST_PlumbingFixtures	0.140436811	28i3i5WDD8Ju0YHnzXOtS7
213811	Faucet-8inch_Reach-Kc	OST_PlumbingFixtures	0.011825773	28i3i5WDD8Ju0YHnzXOm__
234869	Basic Wall	OST_Walls	153.1897499	28i3i5WDD8Ju0YHnzXOzdu
243274	Basic Roof	OST_Roofs	1235.098039	2cgXCjpDT0ZxBvxM5r3pfm
414482	M_Concrete-Round-Co	OST_StructuralColumns	144.8376535	3llj7B0LnBjf0mvxk2zuuc
418079	Basic Wall	OST_Walls	61.63398154	1oPutv5ADAxgWEbAZbN6Wv
418183	Floor	OST_Floors	1064.663482	3OLNF2_DL6hfPgh8Bw7fI7
418977	M_Wind Power Genera	OST_Site	8.431030183	3OLNF2_DL6hfPgh8Bw7f6X
418985	M_Wind Power Genera	OST_Site	8.431030183	3OLNF2_DL6hfPgh8Bw7f6f
420270	Bathtub-TOTO-Nexus-F	OST_PlumbingFixtures	9.049002553	21MLmufC9A8ftVM8JLuL62
422243	Basic Wall	OST_Walls	42.6965127	1PDnLIM013wvkZO9Lb4$wc
422466	Single-Flush	OST_Doors	3.84110567	1PDnLIM013wvkZO9Lb4$s7
423100	System Panel	OST_CurtainWallPanels	3.82334098	1PDnLIM013wvkZO9Lb4$jv
423107	Entrance door	OST_Doors	3.591789773	1PDnLIM013wvkZO9Lb4$i6
423134	Rectangular Mullion	OST_CurtainWallMullio	0.20341248	1PDnLIM013wvkZO9Lb4$iR
423136	Rectangular Mullion	OST_CurtainWallMullio	0.20341248	1PDnLIM013wvkZO9Lb4$ib
423138	Rectangular Mullion	OST_CurtainWallMullio	0.423776001	1PDnLIM013wvkZO9Lb4$id



Projects

TEXT		FLOAT		TEXT		XML
ID	NAME	V	QT	PAR1	PAR2	GEOM
ID1	el1	X m³	X pcs.	ABC1	DEF1	
ID2	el2	X m³	X pcs.	ABC2	DEF2	
ID3	el3	X m³	X pcs.	ABC3	DEF3	
ID7	el7	X m³	X pcs.	ABC7	DEF7	
ID8	el8	X m³	X pcs.	ABC8	DEF8	
ID9	el9	X m³	X pcs.	ABC9	DEF9	

Complex structured formats in **semi-structured form make it difficult** to access element properties



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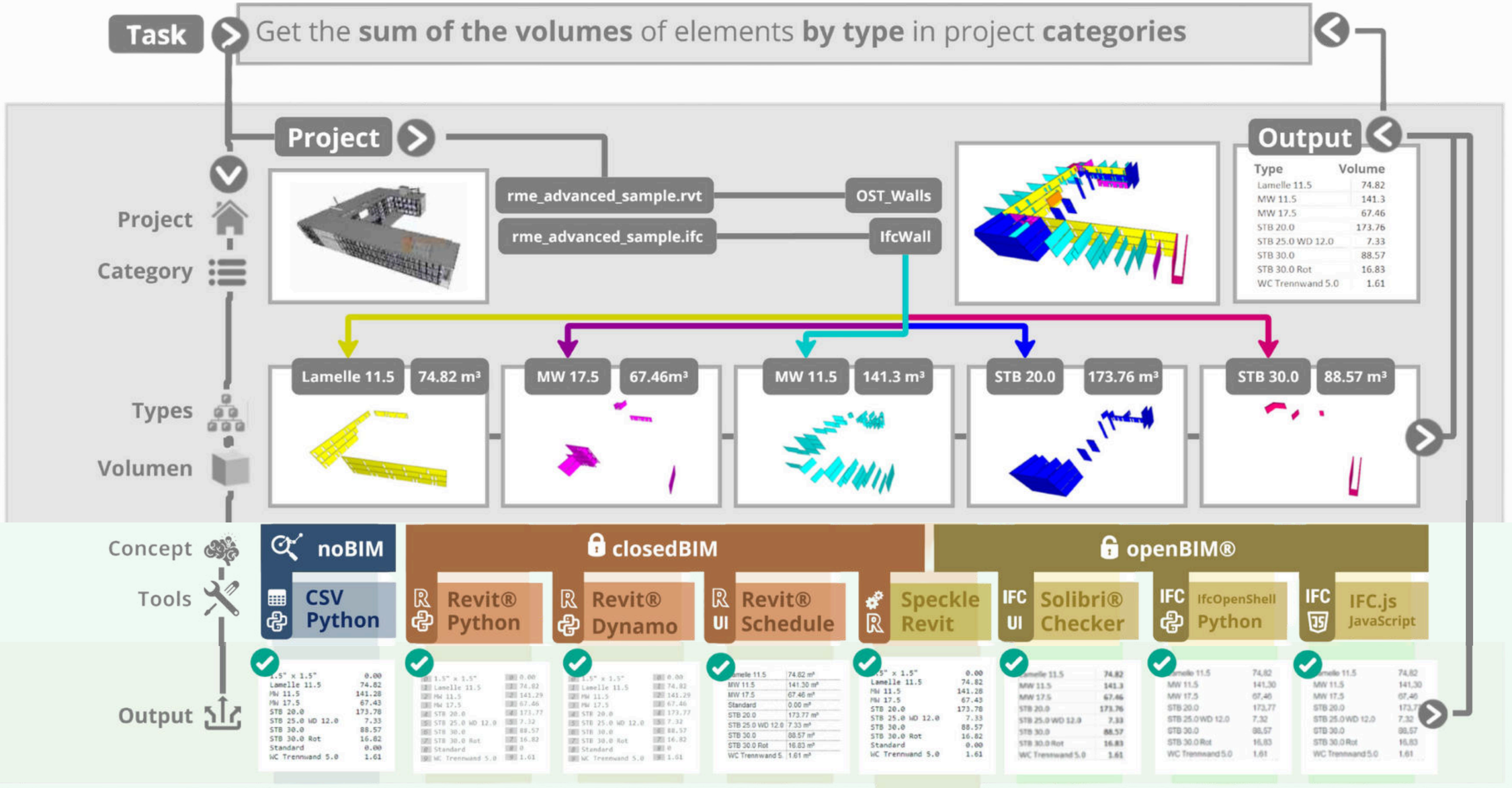
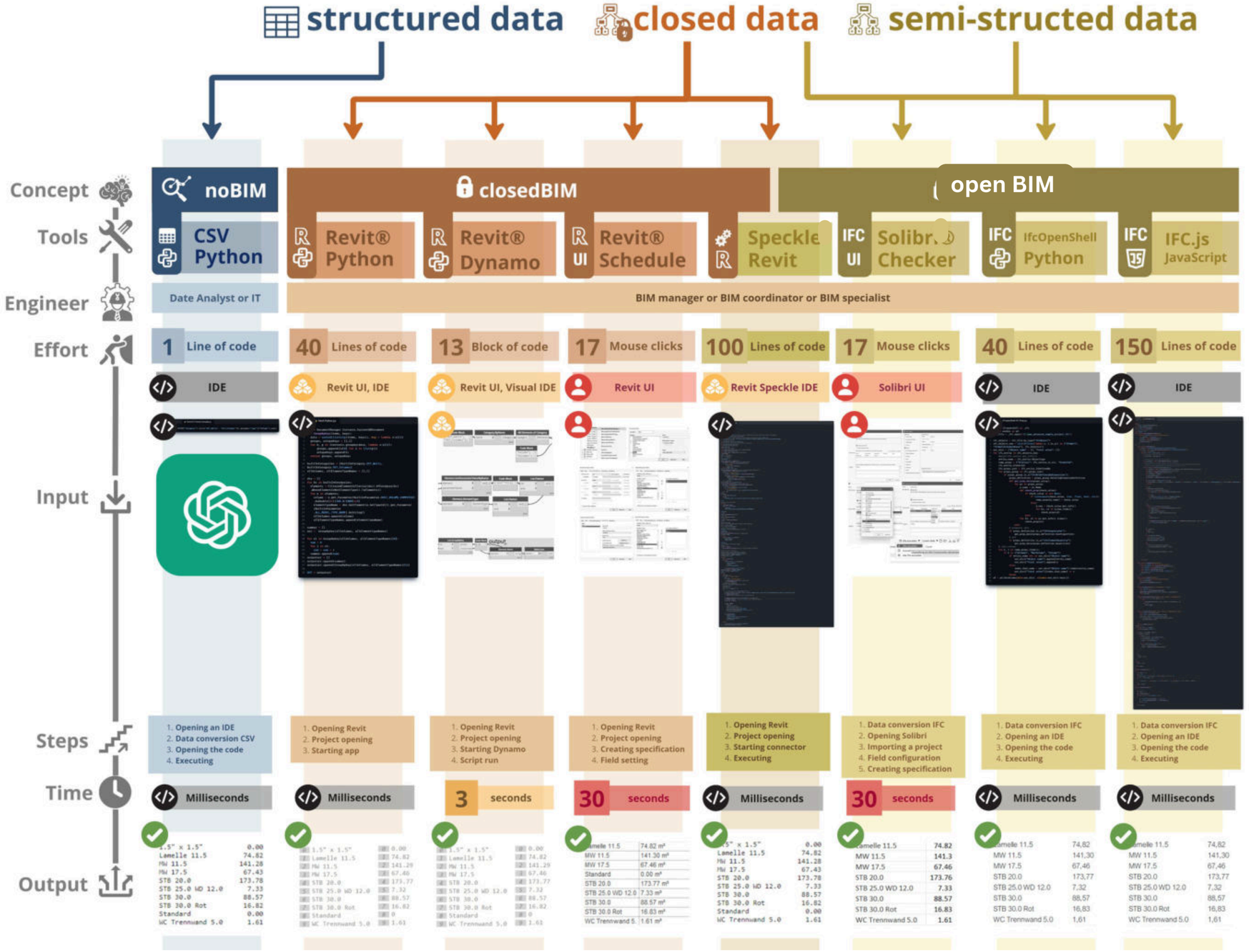
GET DATA FROM A MODEL

The popular case study “Quantitative Takeoff



Structured data leads the way: simpler, faster, more efficient



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CAD (BIM) Maturity Levels: From Stage 0 to Structured Data

BIM Level 0

unstructured data

DWG
JPEG
PDF

CAD

Lines, Texts

1990s

BIM Level 1

closed data

RVT
PLN
TSK

2D,3D

Models, Objects

2000s

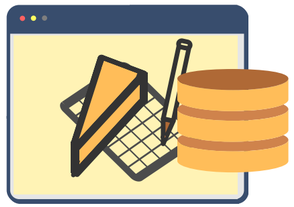
BIM Level 2

semi-structured data

IFC
XML
JSON

BIM

Collaboration



2010s

SDK Converter

structured data

CSV
XLSX
SQL

iBIM, BLM

Interoperable Data

Structured Data

Database

Process analytics

Analysis

Reporting

2020s

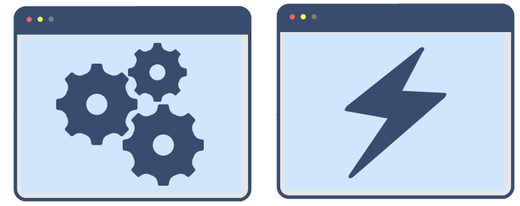
Data Storage

Data Lakehouse

Digitalization

Automation

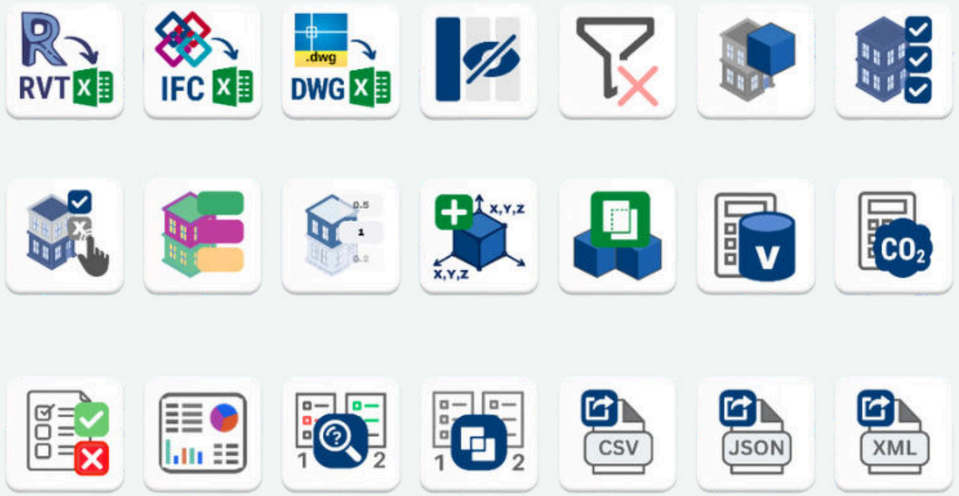
ML & AI



data driven construction.io

excel

plugin



converters

converter with UI

terminal version

Input

```python
# The bar plot can be created as follows

dfp = df.groupby('Category')['Volume'].sum()
dfp.plot(kind='barh')
```

Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0
3	74456	Window	Window 1700w	1700	0.5

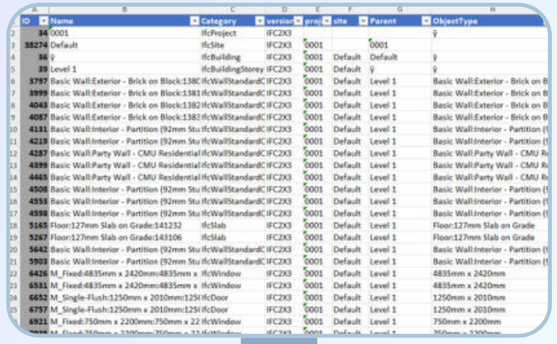
Input

```python
# Whether each element contains the values

df[df['Category'].isin(['Wall', 'Window'])]
```

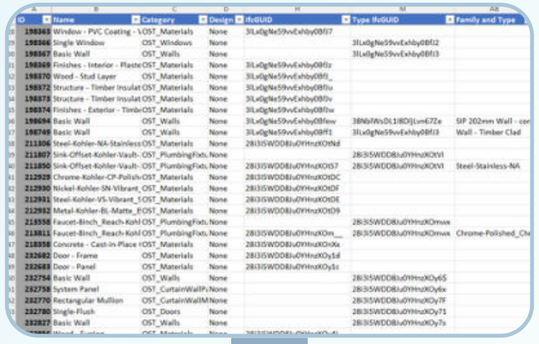
IFC

STRUCTURED DATA



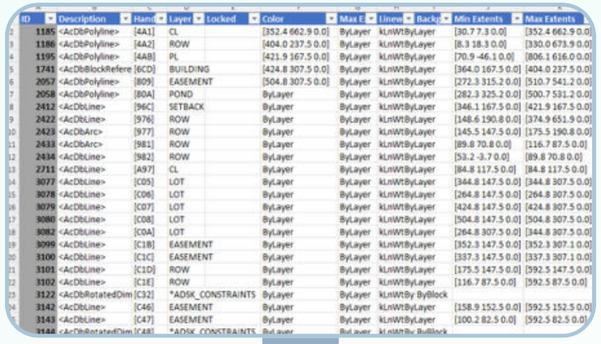
RVT

STRUCTURED DATA



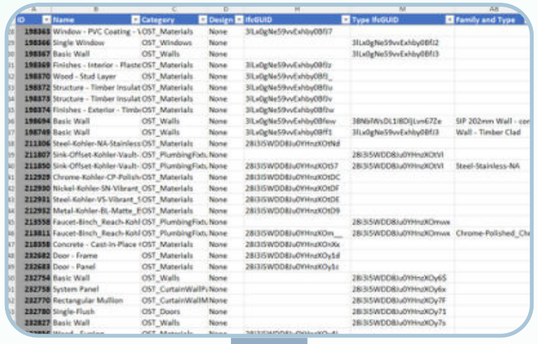
DWG

STRUCTURED DATA

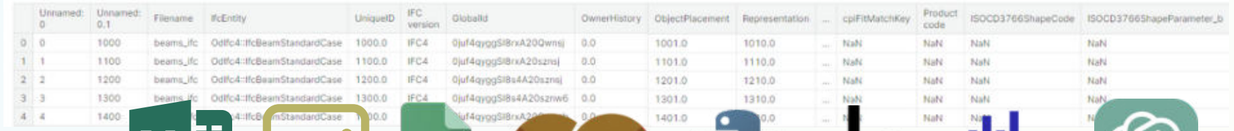


DGN

STRUCTURED DATA



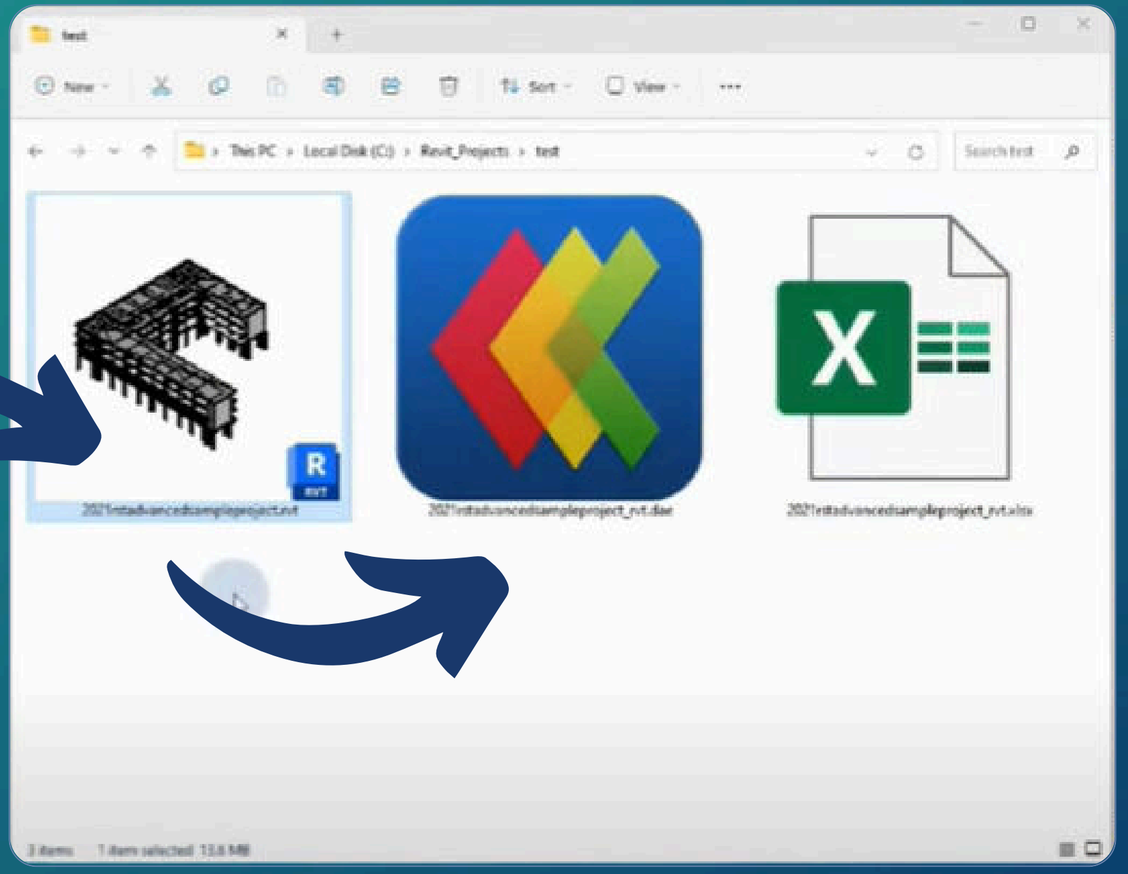
STRUCTURED DATA



Excel PowerBI Sheets Google Colab Python Kaggle Pandas ChatGPT

Converter with UI

Conversion from CAD (BIM) formats in two clicks



Converter

terminal version

Hundreds of applications allow you to embed the conversion process into your use cases

Command Promt

PowerShell

VS Code

jupyter

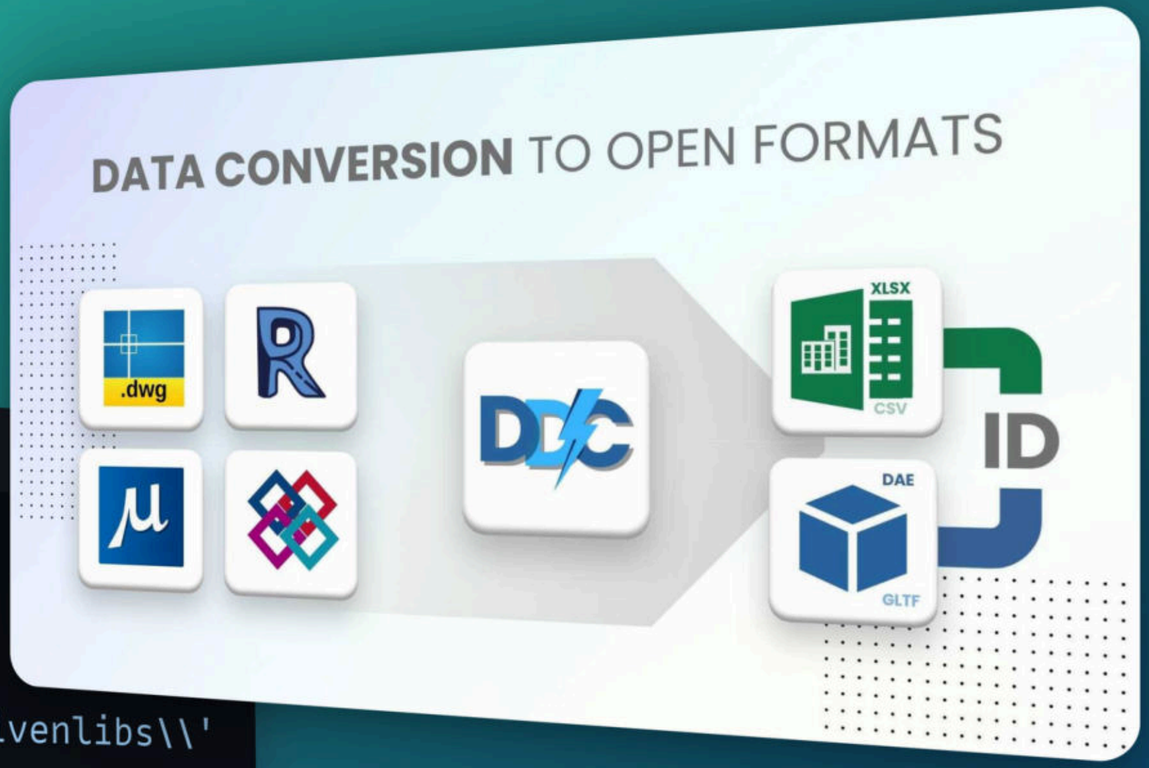
kaggle

Google colab

eclipse

Azure Notebooks

From **multi-format CAD (BIM)** data into a structured format 🤗



RVT | IFC | DWG conversion.py

```python
import os, subprocess

# Folder where the DDC converter is located
path_conv = r'C:\DDC_Revit_Community\datadrivenlibs\\'
# Path address RVT | IFC | DWG  project are located
file_path = r'C:\DDC\rstadvanced_sample.rvt'

# Conversion of one RVT project
process = subprocess.Popen([os.path.join(path_conv,
'RvtExporter.exe'), file_path], cwd=path_conv)

print("DDC Conversion process finished")
```

conversion in just 4 lines of code

data-driven construction.io

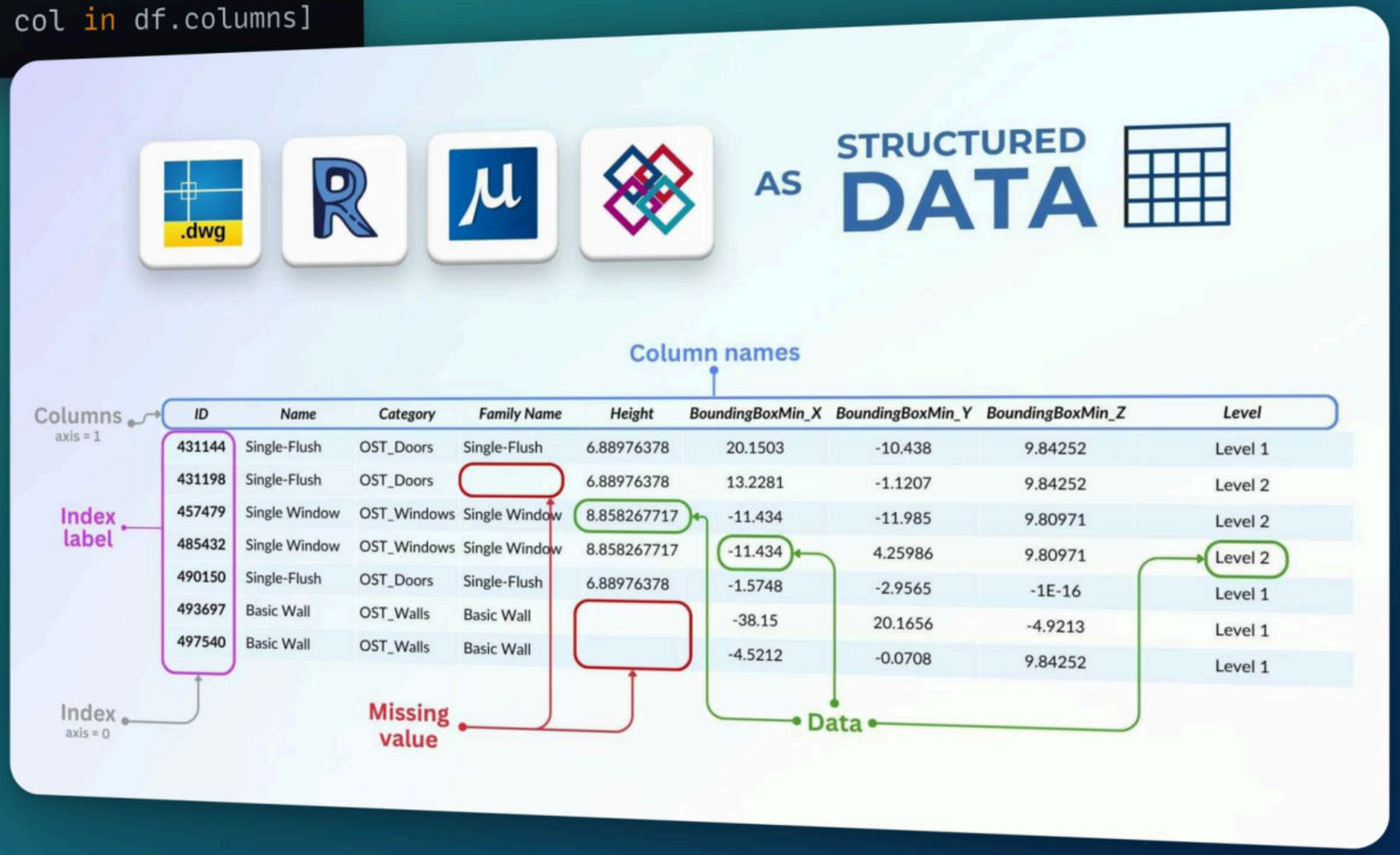
RVT | IFC | DWG as DataFrame.py

```python
# RVT | IFC | DWG project file name in XLSX format
output_file = file_path[:-4] + "_rvt.xlsx"
# Read the converted Excel file
df = pd.read_excel(output_file)
# Update column names to remove storage type in parameter
df.columns = [col.split(' : ')[0] for col in df.columns]
```

🚀 Structed format is ideal for analytics, visualization and automation

two-dimensional project data

.dwg AS STRUCTURED DATA



	ID	Name	Category	Family Name	Height	BoundingBoxMin_X	BoundingBoxMin_Y	BoundingBoxMin_Z	Level
0	431144	Single-Flush	OST_Doors	Single-Flush	6.88976378	20.1503	-10.438	9.84252	Level 1
1	431198	Single-Flush	OST_Doors		6.88976378	13.2281	-1.1207	9.84252	Level 2
2	457479	Single Window	OST_Windows	Single Window	8.858267717	-11.434	-11.985	9.80971	Level 2
3	485432	Single Window	OST_Windows	Single Window	8.858267717	-11.434	4.25986	9.80971	Level 2
4	490150	Single-Flush	OST_Doors	Single-Flush	6.88976378	-1.5748	-2.9565	-1E-16	Level 1
5	493697	Basic Wall	OST_Walls	Basic Wall		-38.15	20.1656	-4.9213	Level 1
6	497540	Basic Wall	OST_Walls	Basic Wall		-4.5212	-0.0708	9.84252	Level 1

data-driven construction.io

converters

FULL ACCESS
TO YOU DATA

download
without
registration

PRO version

- RVT 2023-2024
- IFC 4x1 - 4x3

ad-free

Buy Add-Free
Excel Plugin

community edition

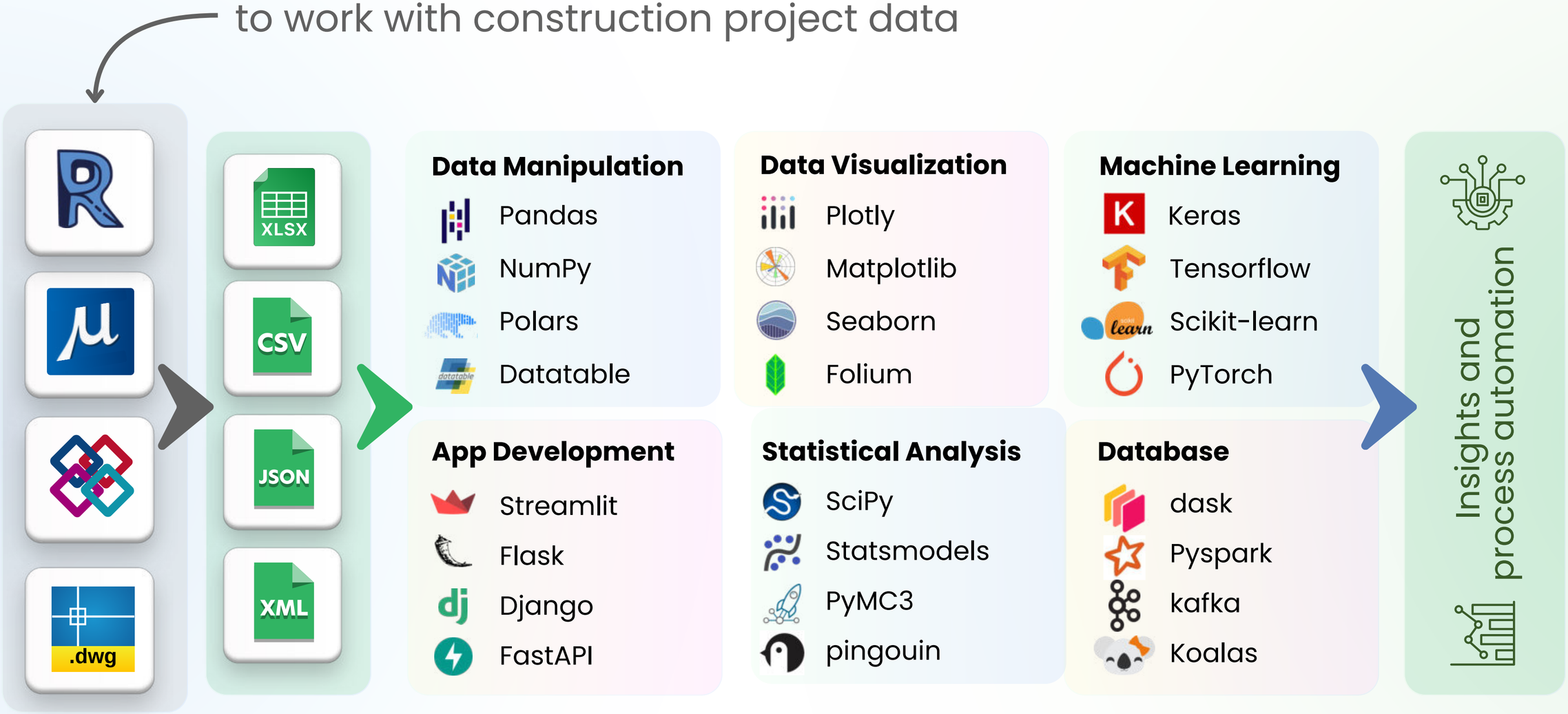
- RVT 2015-2022
- DGN V7-V8
- IFC 2x3
- DWG 1983-2023

+ ads

Life Is Short, Use Python

to work with construction project data

data driven construction.io



easy to learn, easy to develop

STRUCTURED
DATA

Pandas: The leading library for data manipulation and a key tool for building pipelines

8811040

Number of downloads of the Pandas Pipeline library each day

70%

Data engineers using Pandas Pipeline as their primary tool

200k

Questions on Stack Overflow tagged with Pandas Pipeline

LOAD

Input

Importing Revit and IFC data.py

```python
# Importing data for processing

import pandas as pd
df = pd.read_csv('C:\Revit_Sample.csv')
```

Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0
2	76554	Door	Glazed Back Door	1300	0.3
3	74456	Window	Window 1700w	1700	0.5

FILTER

Input

Filtering data in Revit and IFC projects.py

```python
# Whether each element contains the values

df[df['Category'].isin(['Wall', 'Window'])]
```

Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0
3	74456	Window	Window 1700w	1700	0.5

GROUP

Input

GroupBy Revit IFC.py

```python
# Grouping a Revit or IFC project by parameters

df.groupby('Category')['Volume', 'Length'].sum()
```

Output

Category	Volume	Length
Door	0.3	1300
Wall	7.0	8600
Window	0.5	1700

PIE chart

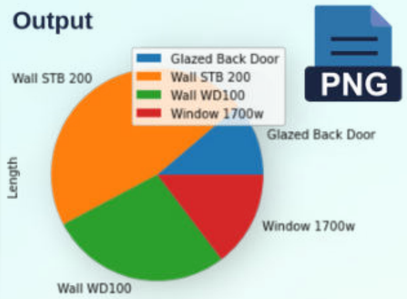
Input

Pie chart.py

```python
# Create a basic pie chart

df.groupby(['Type']).sum().plot.pie(y='Length')
```

Output



BAR chart

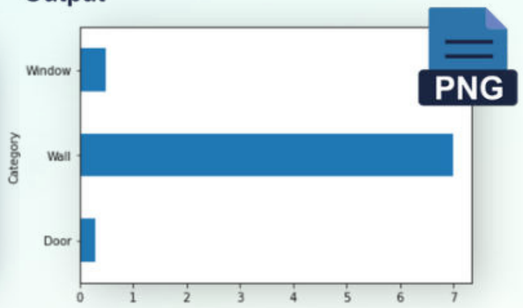
Input

Bar plot.py

```python
# The bar plot can be created as follows

dfp = df.groupby('Category')['Volume'].sum()
dfp.plot(kind='barh')
```

Output



Regular **Ex**pression

Input

RegEx.py

```python
#Regular expression in Revit and IFC

df[df['Category'].str.match('Wal*')]
```

Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0

QTO TakeOff

Input

QTO by RegEx.py

```python
#QTO - Finding volumetric quantities for the group

dfq = df[df['Category'].str.match('Wal*')]
dfq = dfq.groupby('Category')['Volume', 'Length'].sum()
```

Output

Category	Volume	Length
Wall	7.0	8600

EXCEL Data Export

Input

Export to Excel.py

```python
# Creating a grouping and saving as Excel

dfe = df.groupby(['Category'])['Length'].agg(['sum', 'count'])
dfe.to_excel("output.xlsx",sheet_name='Category_estimate')
```

Output

	A	B	C	D
2	Door	1300	1	
3	Wall	8600	2	
4	Window	1700	1	
5				

Category_estimate

PDF Document

Input

Creating a PDF document.py

```python
from fpdf import FPDF

# Determining the volumetric characteristics of the group
s_cat = 'Window'
dfq= df[df['Category'].str.match(s_cat)]
dfq = dfq.groupby('Category')['Volume', 'Length'].sum()
cat_len = str(dfq.iloc[0]['Length'])
cat_vol = str(dfq.iloc[0]['Volume'])

# Creating a PDF document based on the parameters found
pdf = FPDF()
pdf.add_page()
pdf.set_font('Arial', 'B', 16)
pdf.cell(190, 8, 'Category: ' + s_cat, 2, 1, 'L')
pdf.set_font('Arial', '', 14)
pdf.cell(190, 8, 'Sum of volumes: ' + cat_vol, 2, 1, 'L')
pdf.cell(190, 8, 'Sum of lengths: ' + cat_len, 2, 1, 'L')

# Saving a document in PDF format
pdf.output(' c:\Report_DataDrivenConstruction.pdf ', 'F')
```

Output

Report_OpenDataBIM.pdf - Adobe Acrobat Reader DC (...

File Edit View Sign Window Help

Home Tools Report_Op... Sign ...

1 / 1 125%

Category: Window

Sum of volumes: 0.5

Sum of lengths: 1700.0

8.27 x 11.69 in

FILTER

Input

Filtering data in Revit and IFC projects.py

```python
# Whether each element contains the values

df[df['Category'].isin(['Wall', 'Window'])]
```

Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0
3	74456	Window	Window 1700w	1700	0.5

Filter the data in the project to keep the wall category items in the project

GROUP

Input

GroupBy Revit IFC.py

```python
# Grouping a Revit or IFC project by parameters

df.groupby('Category')['Volume', 'Length'].sum()
```

Output

Category	Volume	Length
Door	0.3	1300
Wall	7.0	8600
Window	0.5	1700

Group the project by the "Type Name" parameter and show the volume of each group

PDF

Input

Creating a PDF document.py

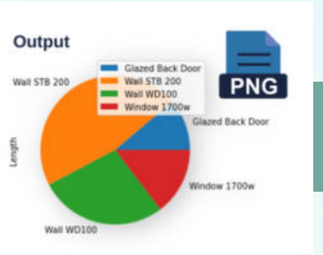
```python
from fpdf import FPDF

# Determining the volumetric characteristics of the group
s_cat = 'Window'
dfq= df[df['Category'].str.match(s_cat)]
dfq = dfq.groupby('Category')['Volume', 'Length'].sum()
cat_len = str(dfq.iloc[0]['Length'])
cat_vol = str(dfq.iloc[0]['Volume'])

# Creating a PDF document based on the parameters found
pdf = FPDF()
pdf.add_page()
pdf.set_font('Arial', 'B', 16)
pdf.cell(190, 8, 'Category: ' + s_cat, 2, 1, 'L')
pdf.set_font('Arial', '', 14)
pdf.cell(190, 8, 'Sum of volumes: ' + cat_vol, 2, 1, 'L')
pdf.cell(190, 8, 'Sum of lengths: ' + cat_len, 2, 1, 'L')

# Saving a document in PDF format
pdf.output('c:\Report_DataDrivenConstruction.pdf', 'F')
```

Output



Choose the first 20 types by volume and show the result as a Pie chart

PDF

Create a PDF report with a table and a graph

ChatGPT
LLmA, Alpaca

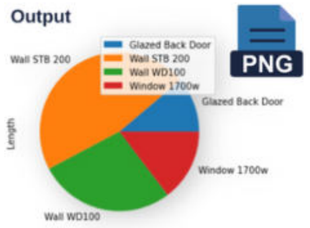
Output

	Id	Category	Type	Length	Volume
0	12577	Wall	Wall WD100	3200	1.0
1	15889	Wall	Wall STB 200	5400	6.0
3	74456	Window	Window 1700w	1700	0.5

Output

Category	Volume	Length
Door	0.3	1300
Wall	7.0	8600
Window	0.5	1700

Output



PDF

Show the differences between the new version of the project and the latest version

Filter the data in the project to keep the wall category items in the project

Group the project by the "Type Name" parameter and show the volume of each group

Choose the first 20 types by volume and show the result as a Pie chart

Create a PDF report with a table and a graph

PANDAS

1 Line of code

IDE

QTO.py

```
df[df['Category'].isin(['OST_Walls',
'OST_Columns'])].groupby('Type')['Volume'].sum()
```

Milliseconds

1.5" x 1.5"	0.00
Lamelle 11.5	74.82
MW 11.5	141.28
MW 17.5	67.43
STB 20.0	173.78
STB 25.0 WD 12.0	7.33
STB 30.0	88.57
STB 30.0 Rot	16.82
Standard	0.00
WC Trennwand 5.0	1.61

Effort

Input

Time

Output

1 Sentence

LLM Chat

Sum the 'Volume' column, grouped by 'Type', but only for rows where 'Category' is either 'OST_Walls' or 'OST_Columns'

Seconds

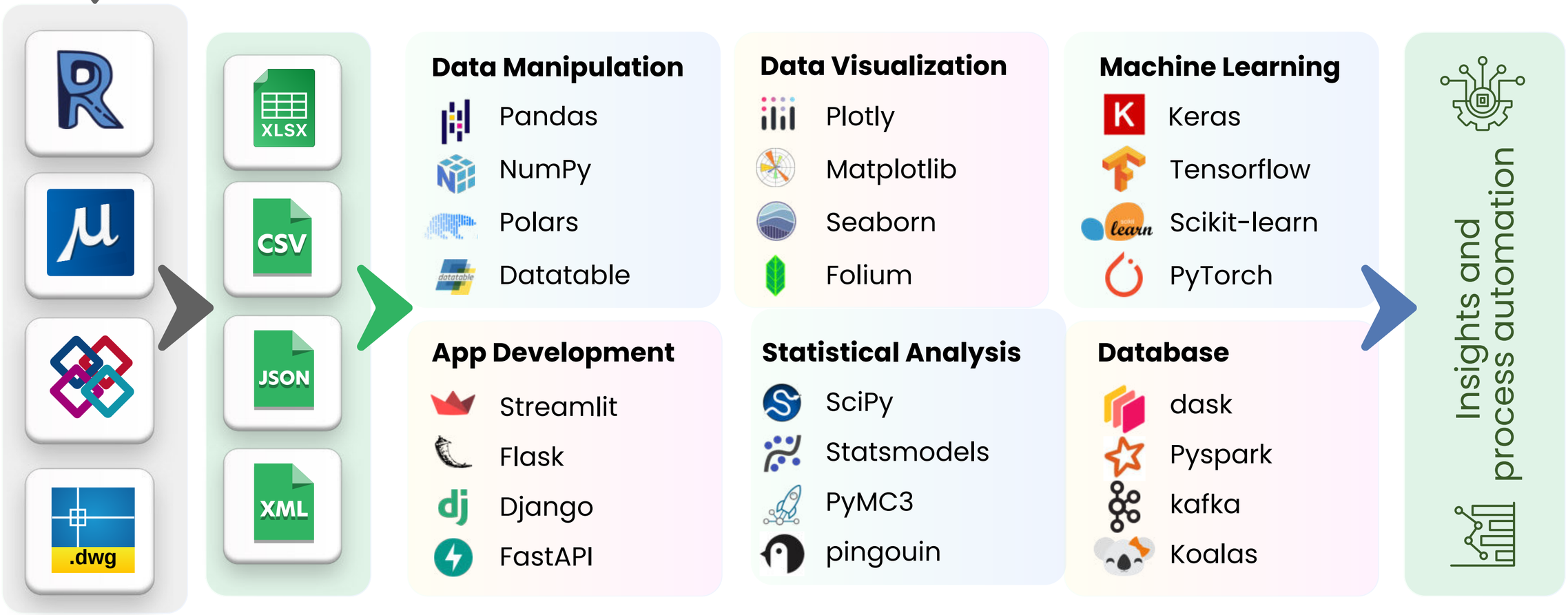
1.5" x 1.5"	0.00
Lamelle 11.5	74.82
MW 11.5	141.28
MW 17.5	67.43
STB 20.0	173.78
STB 25.0 WD 12.0	7.33
STB 30.0	88.57
STB 30.0 Rot	16.82
Standard	0.00
WC Trennwand 5.0	1.61

CHATGPT

Life Is Short, Use Python

to work with construction project data

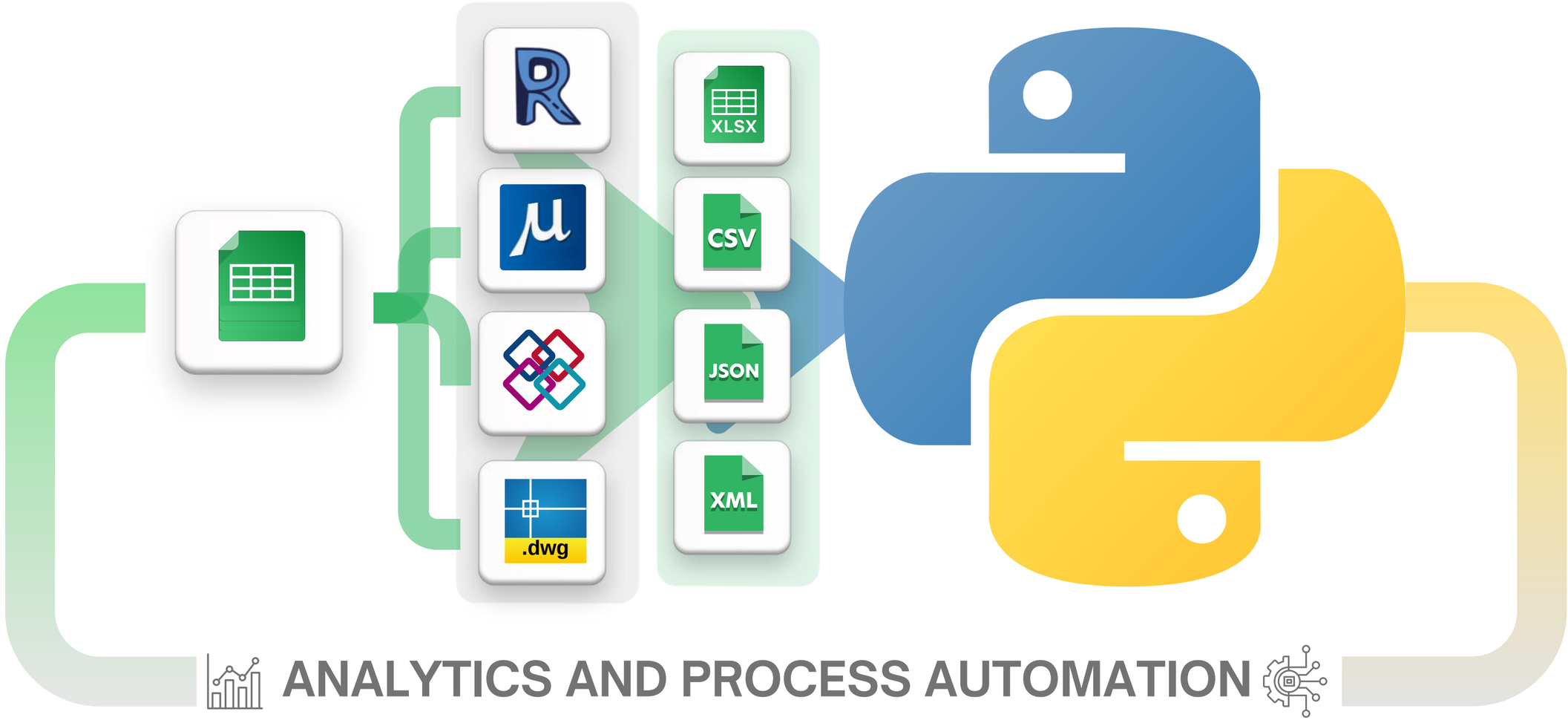
data driven construction.io



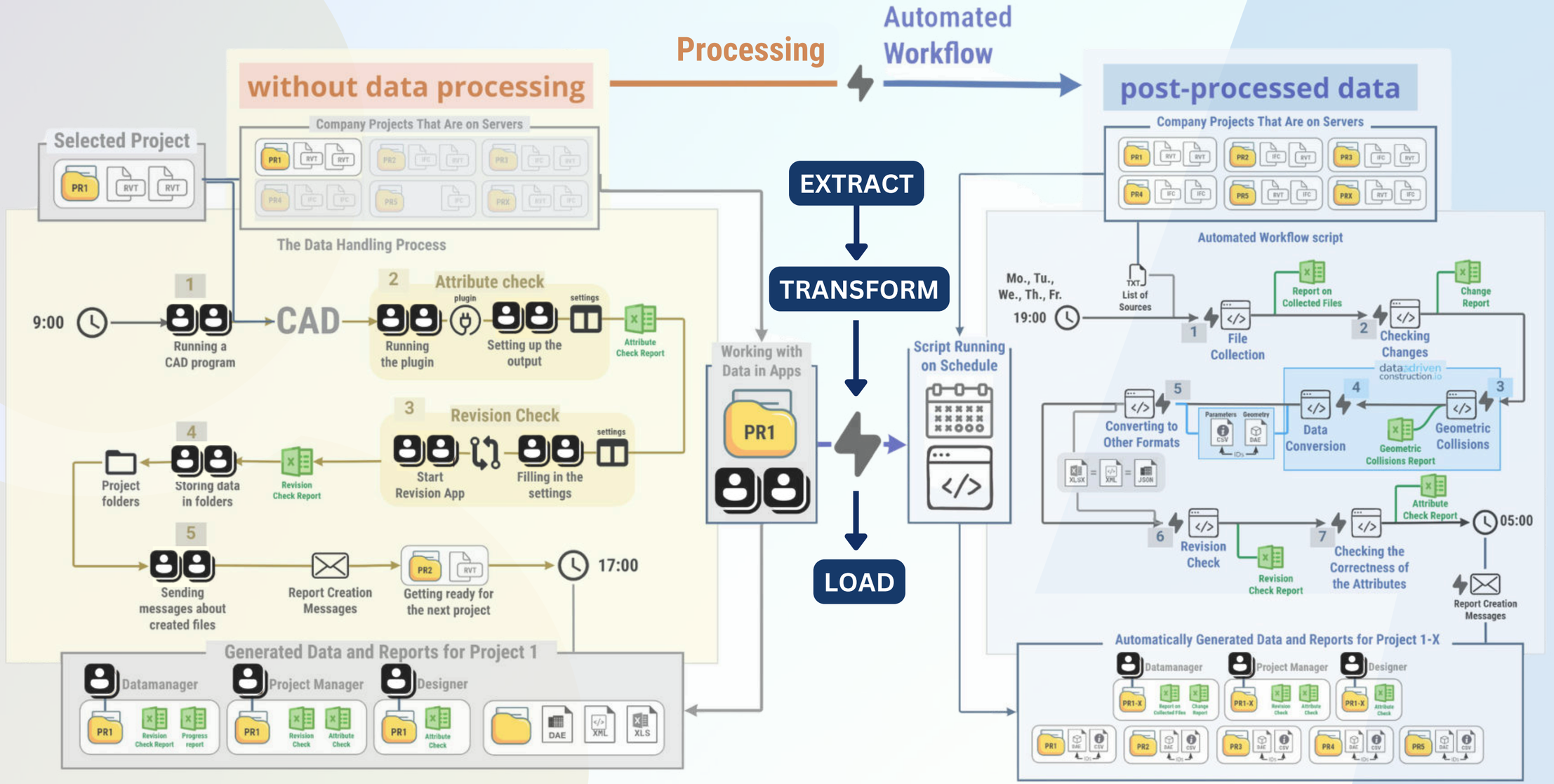
easy to learn, easy to develop

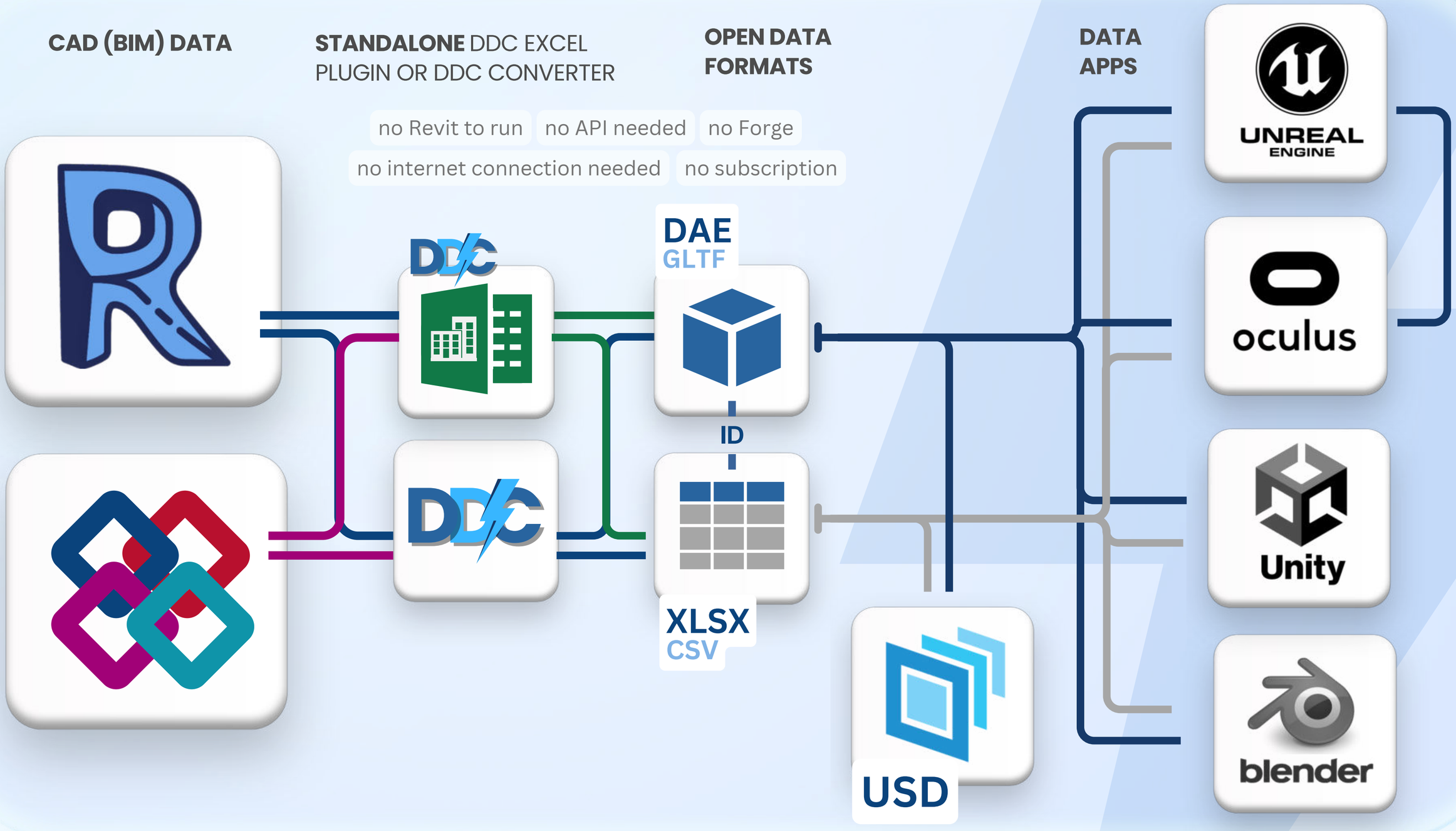
Life Is Short, Use Python

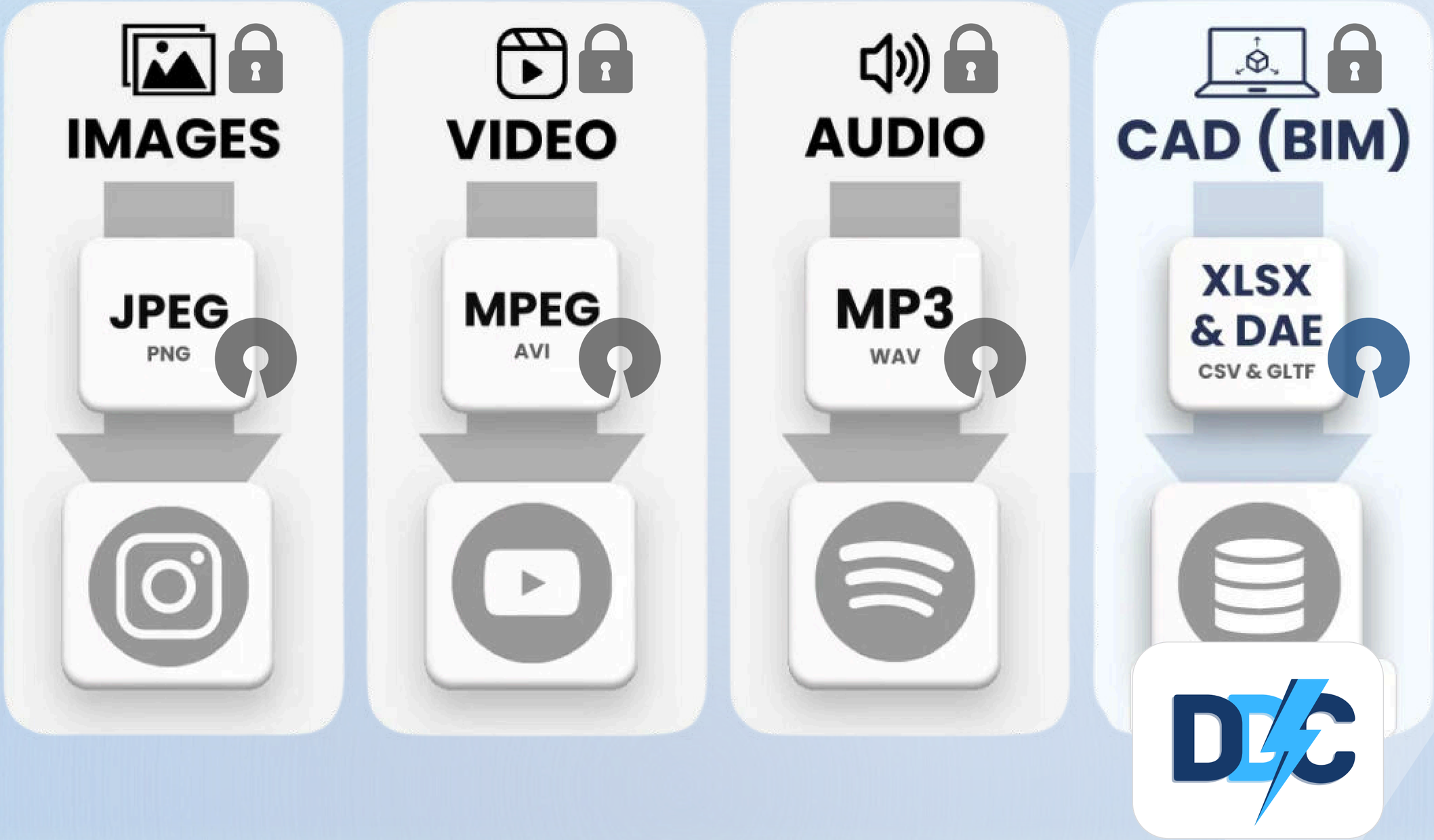
to work with data in construction



ANALYTICS AND PROCESS AUTOMATION


Processing
Automated Workflow
without data processing
post-processed data
Selected Project
Company Projects That Are on Servers
The Data Handling Process
EXTRACT
TRANSFORM
LOAD
Working with Data in Apps
Script Running on Schedule
9:00
Running a CAD program
CAD
Attribute check
Running the plugin
Setting up the output
Attribute Check Report
Revision Check
Start Revision App
Filling in the settings
Revision Check Report
Storing data in folders
Project folders
Sending messages about created files
Report Creation Messages
Getting ready for the next project
17:00
Generated Data and Reports for Project 1
Datamanager
Project Manager
Designer
Automated Workflow script
Mo., Tu., We., Th., Fr.
19:00
List of Sources
File Collection
Report on Collected Files
Checking Changes
Change Report
Converting to Other Formats
Data Conversion
Geometric Collisions
Geometric Collisions Report
Revision Check
Revision Check Report
Checking the Correctness of the Attributes
Attribute Check Report
05:00
Report Creation Messages
Automatically Generated Data and Reports for Project 1-X


CAD (BIM) DATA
STANDALONE DDC EXCEL PLUGIN OR DDC CONVERTER
OPEN DATA FORMATS
DATA APPS
no Revit to run
no API needed
no Forge
no internet connection needed
no subscription
DDC
DDC
DAE
GLTF
ID
XLSX
CSV
USD
UNREAL ENGINE
oculus
Unity
blender


IMAGES
JPEG
PNG
VIDEO
MPEG
AVI
AUDIO
MP3
WAV
CAD (BIM)
XLSX
& DAE
CSV & GLTF
DDC

data driven construction.io

Platforms for working with data from

Processing and visualization

Excel »

Automation and Pipelines

Python and JN »

Visualize geometry

UE and Unity »

Training and simulation

USD and Omniverse »

And 10+ more popular data platforms

Nicolas Merot

Ingénieur BIM | Caeli Ingénierie

★★★★★

DataDrivenConstruction products revolutionize data management in construction! Their IFC and RVT to Excel converters enable smooth data analysis and extraction, optimizing...

Read more

Daniel Glober

BIM-Manager | SCHOLZE-THOST GmbH

★★★★★

Revit and IFC reports that used to take me almost weeks to create are now updated in just a few minutes. I was able to quickly understand what the DataDrivenConstruction did and thu...

Read more

Dmitri Garbuzenko

BIM and AIM Coordinator | RB Rail AS

★★★★★

With the help of Python and especially the pandas library, as the DataDrivenConstruction team does, we are now able to perform delivery checks four times faster....

Read more

Prof. Dr.-Ing. Michael Bühler

Co-Owner GemeinWerk Ventures

★★★★★

Be part of the movement with DataDrivenConstruction! Let's make true freedom in data formats a reality and catalyze a new era of productivity and innovation in construction....

Read more

Abdelrahim (Mohamed) Deghidy

BIM Manager I Consolidated Contractors Company

★★★★★

DDC converter and Plugin is a fantastic and helpful tool for visualisation and quantification the meta data from Revit. Thanks for sharing such helpful tools!

Jānis Dzenis

BIM Coordinator | Merks, SIA

★★★★★

This is a fantastic tool, haven't seen one like this in a long time. In this era, we have countless tools and methods for creating models, drawings, tables, and other forms of data....

Read more

Valerio Spini

Settore RVCS

★★★★★

Great experience: Until now, I used to open IFC files in Blocknote to check the parameters and their structure. Thanks to the DataDrivenConstruction converter I can check the parameter...

Read more

Irina Fischer

BIM Coordinator | OBERMEYER Group

★★★★★

The decision to use Jupyter Notebook for results verification turned out to be highly beneficial. Our experience with solutions from Data Driven Construction and Jupyter Notebook...

Read more

Excel Add-in

free basic functions for working with data

FUNCTIONAL APPLICATIONS AVAILABLE IN THE DATADRIVENCONSTRUCTION PLUGIN FOR EXCEL

RVT to Excel

IFC to Excel

DWG to Excel

Hide Columns

Remove Filters

Project Geometry

Visible Rows

Selected Elements

Change Colors

Change Transparency

Add BBox Data

Check Duplicate

QTO Table

CO2 Emissions

Check Parameters

Create Dashboard

Comparing Versions

Merging Projects

Export to CSV

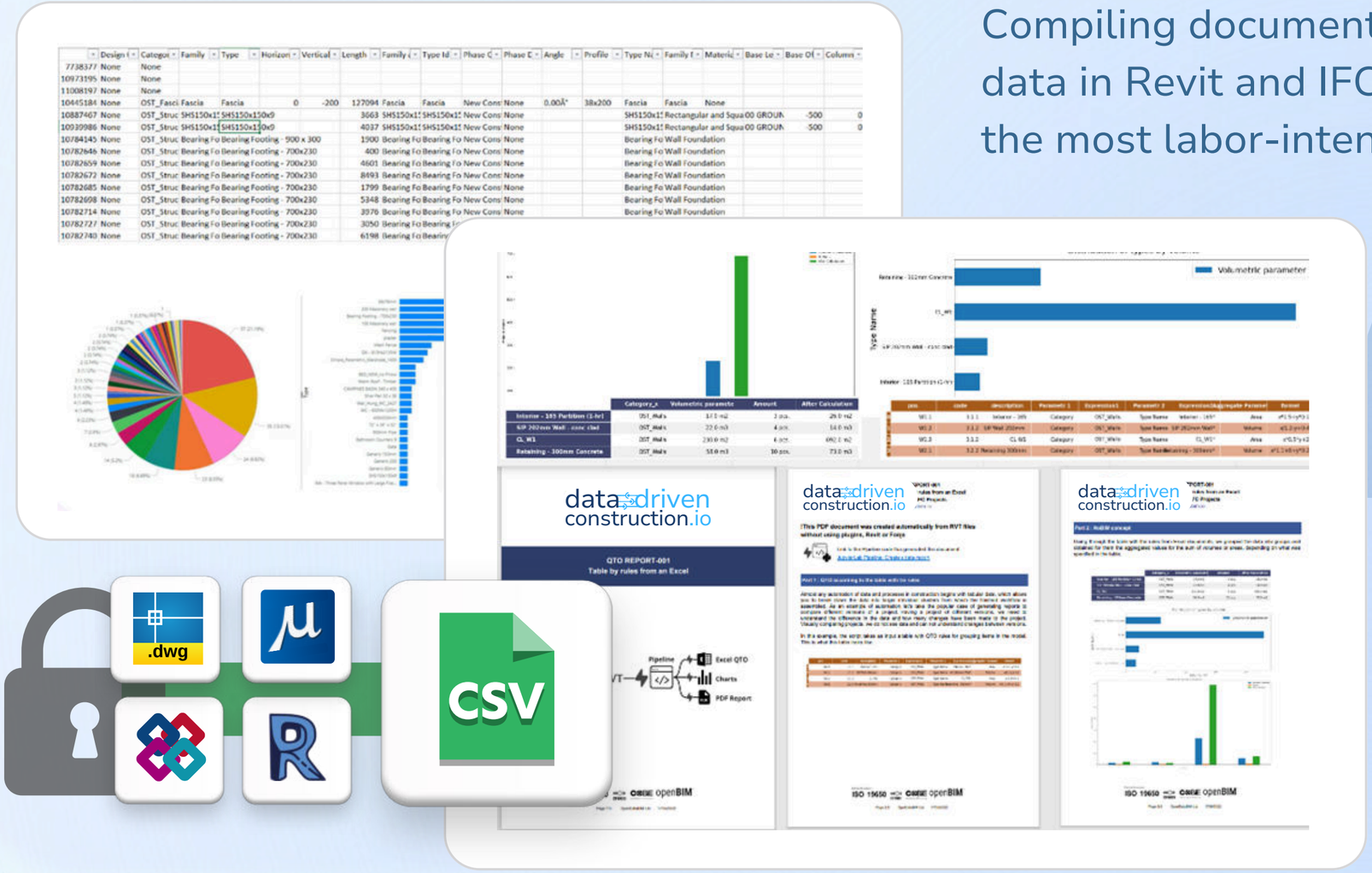
Export to JSON

Export to XML

data driven construction.io

Use case

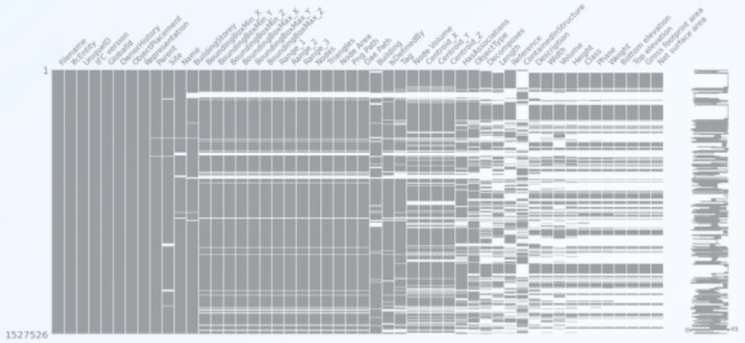
Data quality and automatic checks

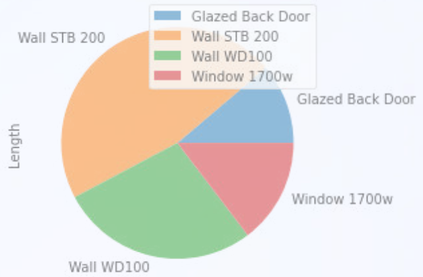


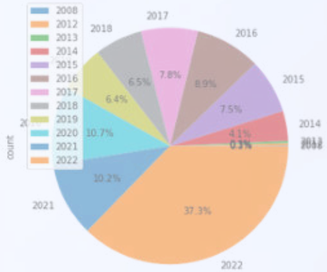
Compiling documentation from BIM model data in Revit and IFC formats ranks among the most labor-intensive tasks for managers

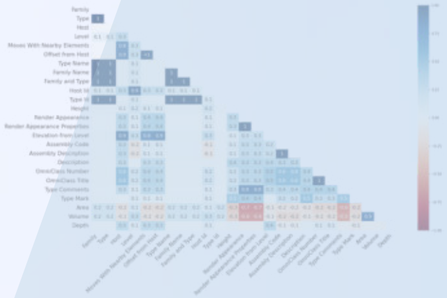
Benefits of automated documentation:

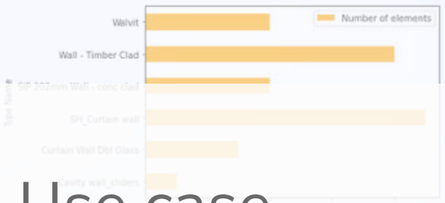
- Consistency
- Efficiency
- Accuracy
- Scalability
- Time Savings
- Up-to-date
- Customization
- Cost-Efficiency
- Traceability
- Adaptability

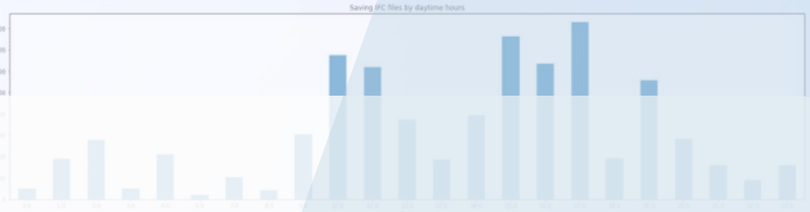












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Use case

Data visualisation of project data

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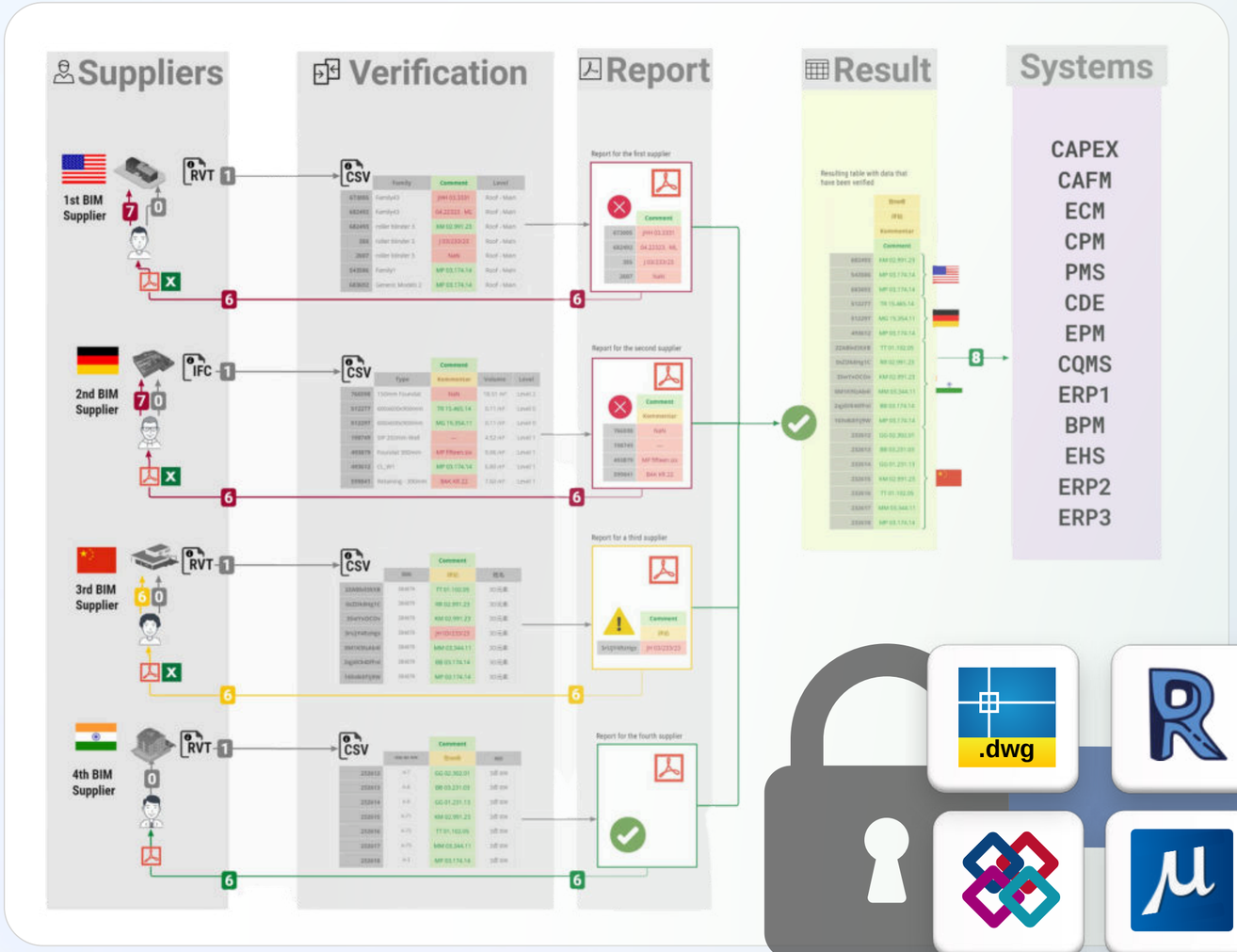
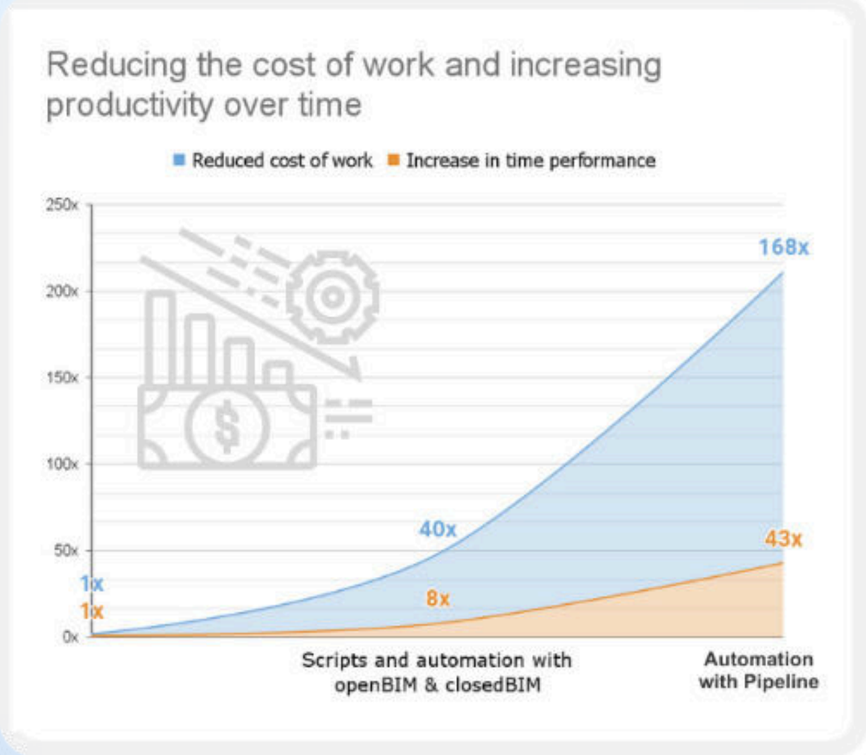
Use case

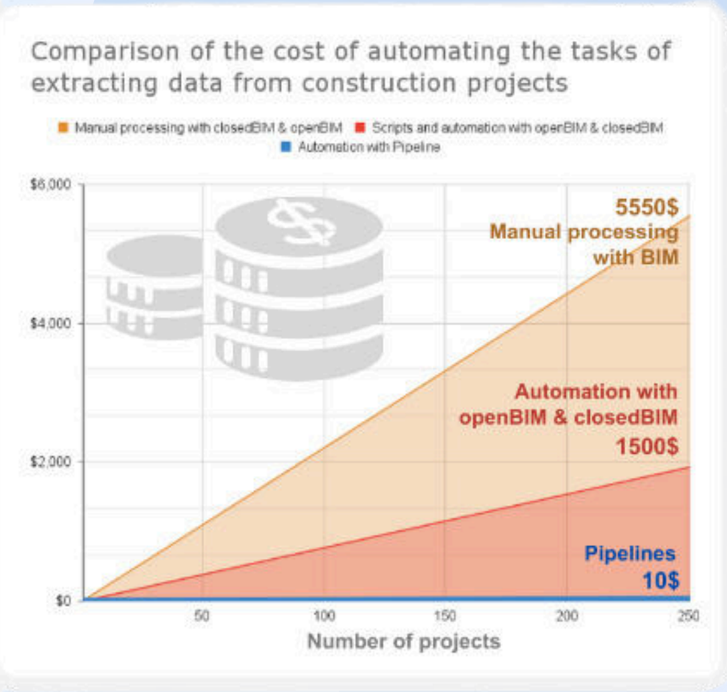
Automatic reporting for BIM model



Automated validation, utilizing logic and code, empowers a company to efficiently and accurately process 100s of files at once, ensuring consistent quality while reducing costs and human errors

Utilizing Pipeline provides an exponential increase in productivity





Tools for working and processing project data in Revit™ and IFC formats

	DDC	Revit	IFC	BIM 360 & ACC
Open Format	✓	✗	✓	✗
Quality of Data	▂▄▆	▂▄▆	▂	▂▄▆
Don't Need CAD to Get Data	✓	✗	✗	✓
Don't Need the Internet	✓	✓	✓	✗
Data Structure	Structured Data	Closed Data	Semi-Structured Data	Closed Data
Data Form	Table	Graph as a classifier	Graph as a classifier	Graph as a classifier
Batch Processing	✓	✗	✗	✓
Automate Data Mining	1 line of code	100+ lines of code	100+ lines of code	100+ lines of code
No API Restrictions	✓	✗	✓	✗
Community	▂▄▆	▂	▂	▂
Ready-made solutions	▂▄▆	▂	▂	▂
Easy to Work	▂▄▆	▂▄	▂	▂▄
No BIM skills required	✓	✗	✗	✗
Basic Work Tool	Excel	Revit	OpenBIM Tools	Forge
Compatible with ERP Systems	✓	✗	✗	✓

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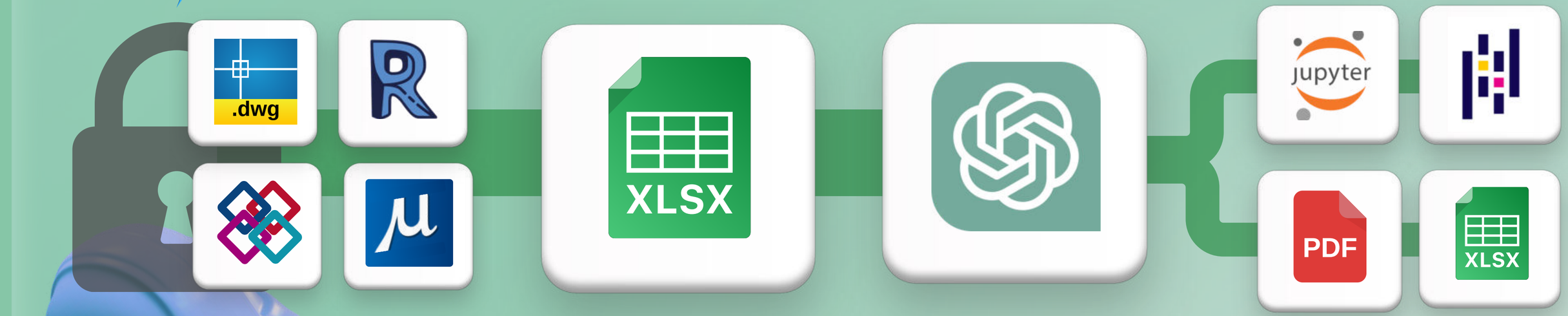
- no Revit to run
- no plugins
- offline
- no BIM software
- standalone application
- no BIM formats
- no APIs

Democratizing access to data from CAD software

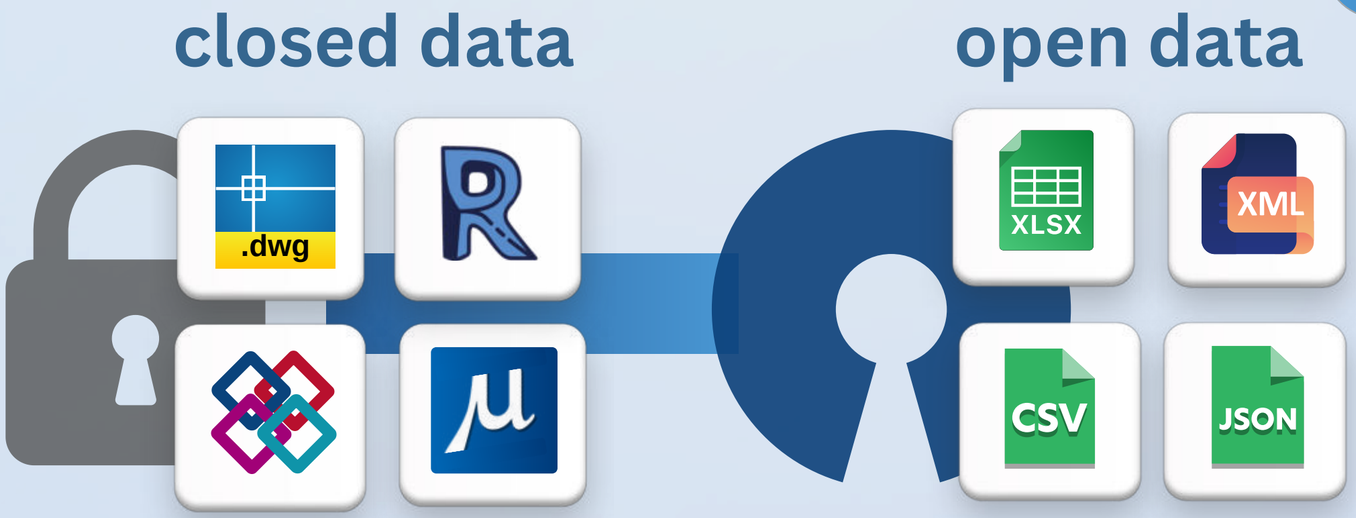
WORK WITH DATA FROM CAD (BIM) DIRECTLY INTO CHATGPT



Code for converting ⚡ data stream into required formats and documents

How Secure is My Data?

Your information remains strictly yours

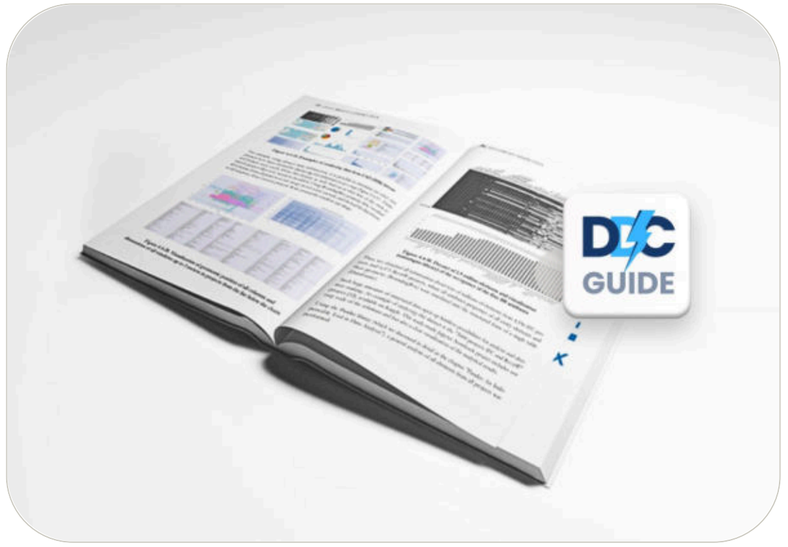


- no Revit to run
- no plugins
- offline
- no BIM software
- standalone application
- no APIs
- no BIM formats
- no extra costs

DDC BOOK

"**DATA-DRIVEN CONSTRUCTION: Navigating the Data Age in the Construction Industry**" opens the door to the world of digital innovation in construction for a wide audience, offering insights into the latest technological advancements shaping the industry.

DDC guidebook



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Dedicated Post-Implementation Support

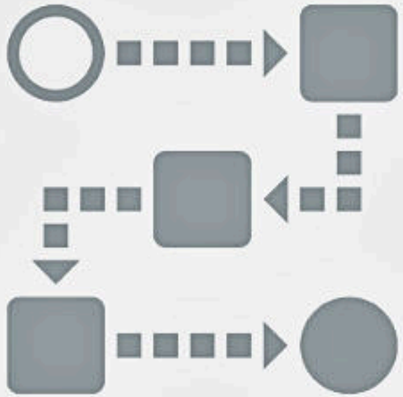
Training Modules to Get You Started

Customer-centric approach

you have the freedom to describe your task precisely, down to the smallest detail

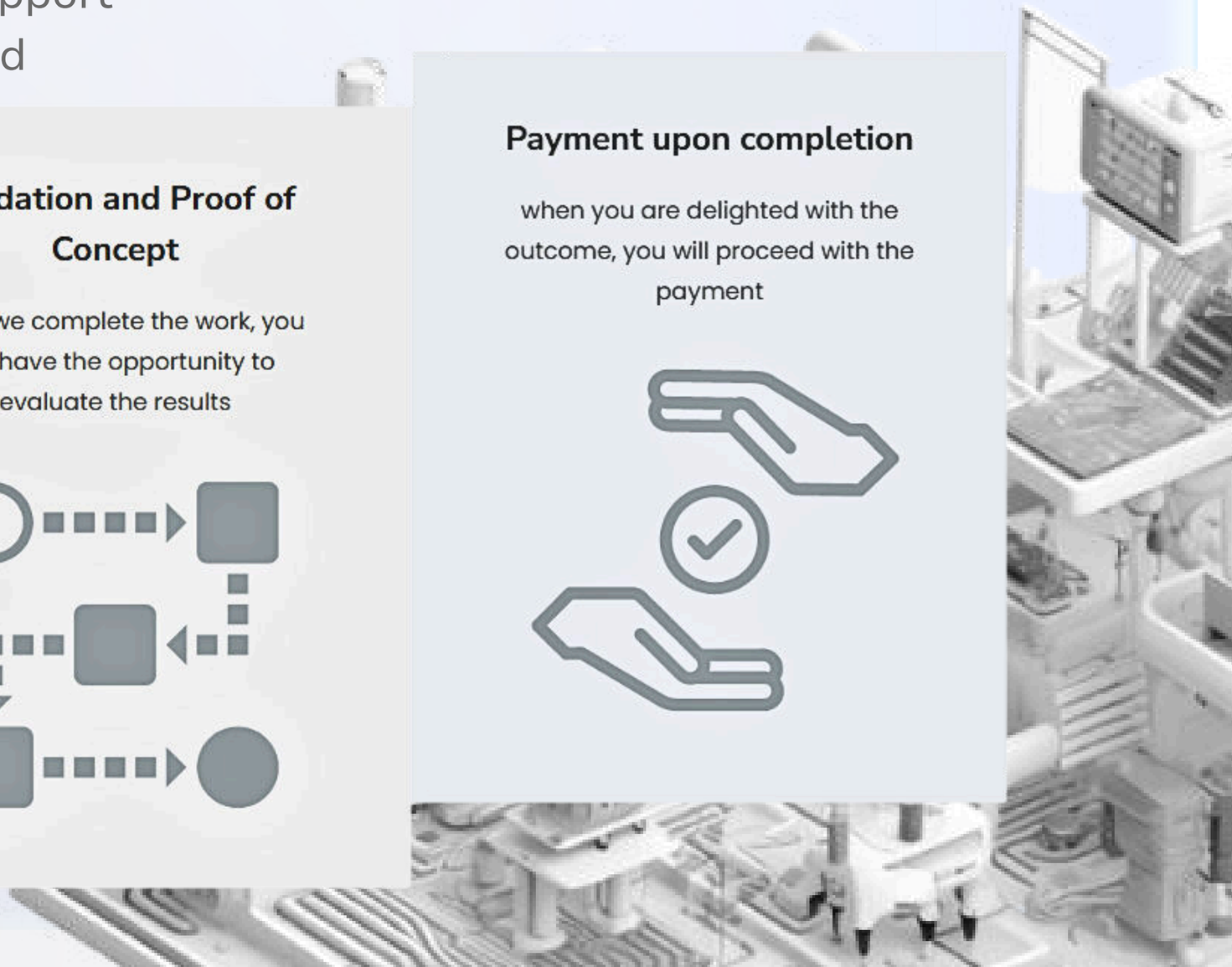
Validation and Proof of Concept

once we complete the work, you will have the opportunity to evaluate the results



Payment upon completion

when you are delighted with the outcome, you will proceed with the payment



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Together, Let's Build the
Future of Construction