



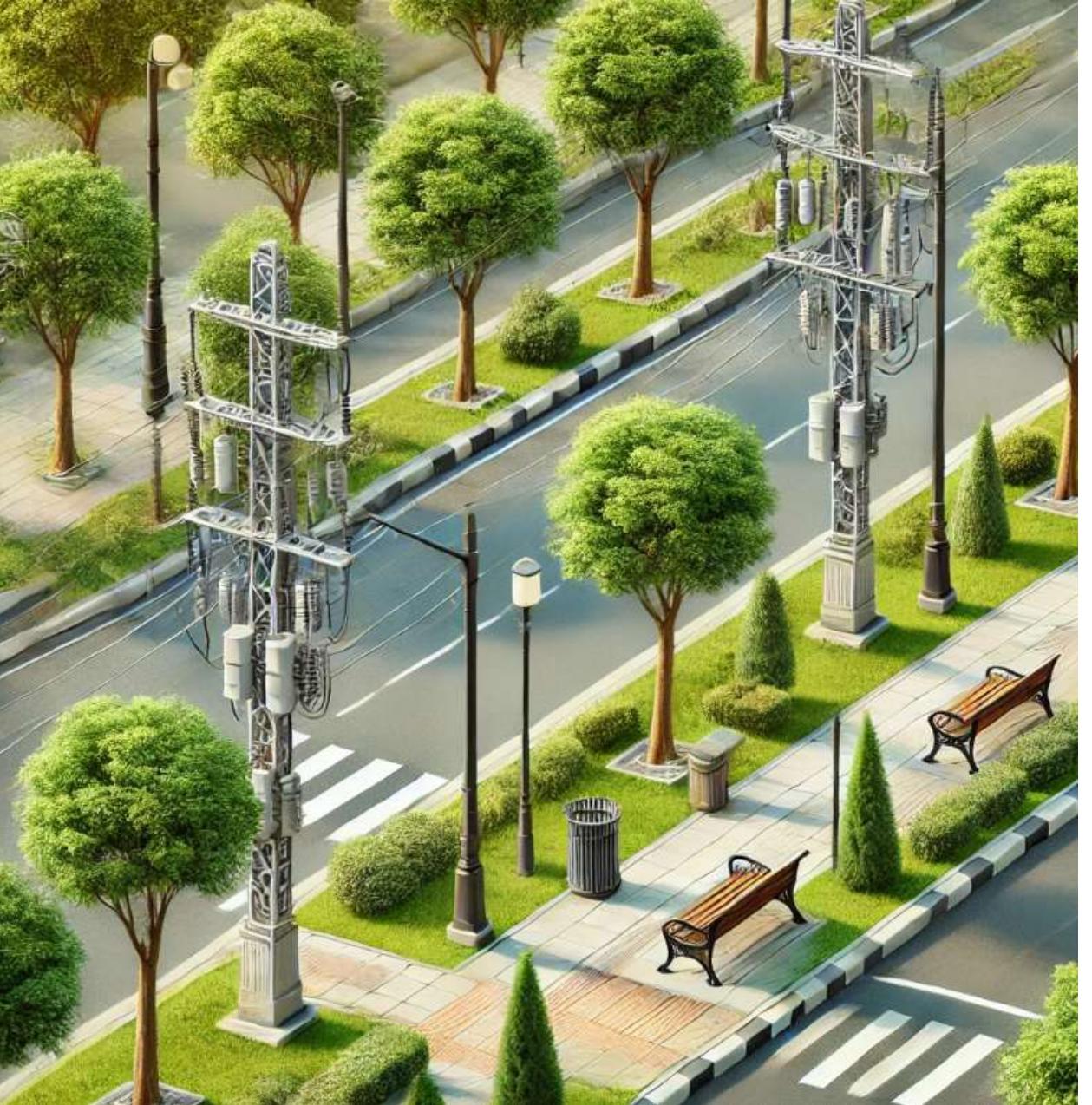
# Converting DWG to Geospatial data

By Medad Hoze



# What?

As-Made (DWG) files are the most used data among surveyors in Israel



# Today?

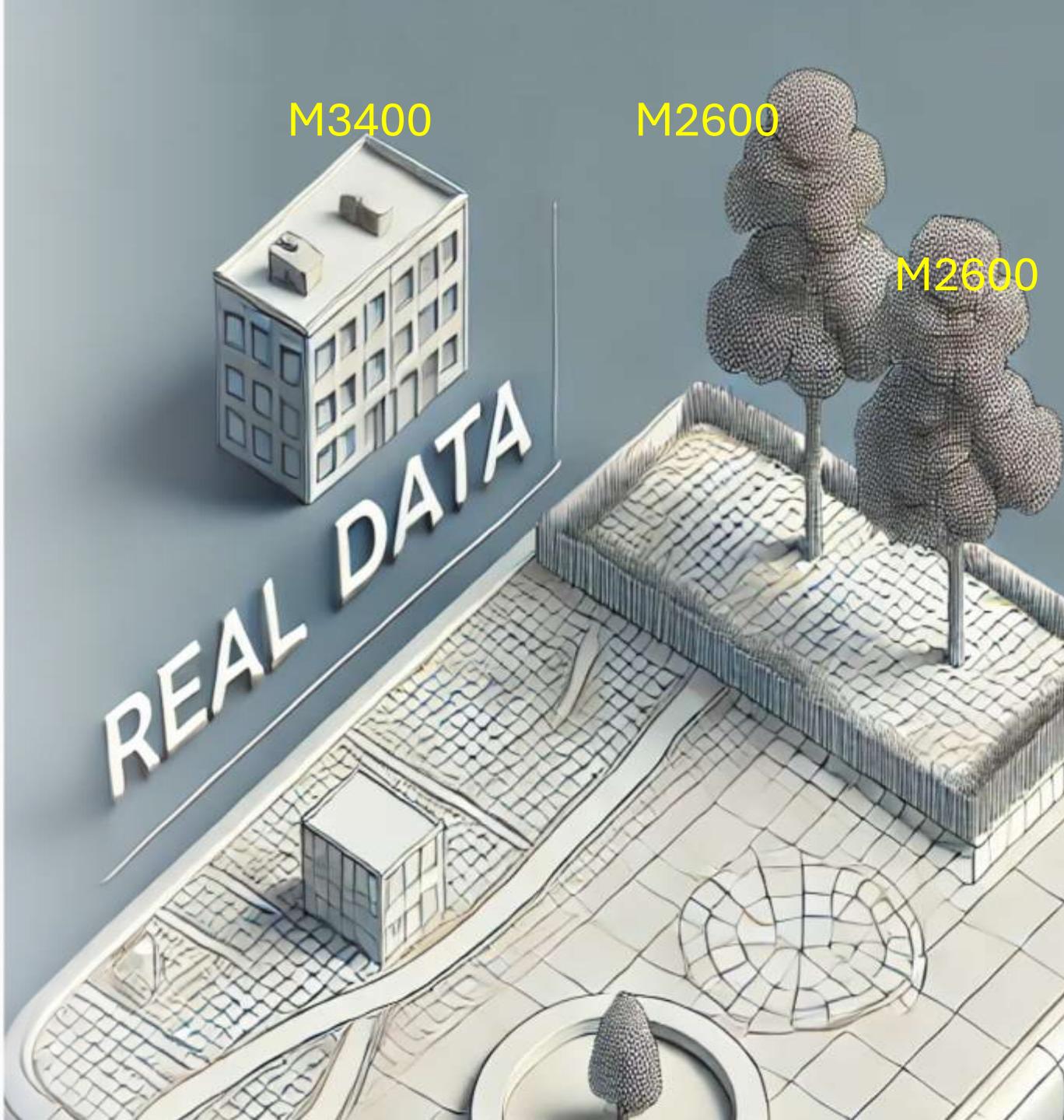
Survey data is often discarded after it fulfills its intended purpose, leading to potential loss of valuable information.



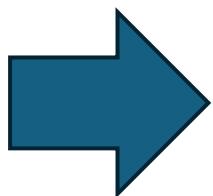
# Why?

Extracting data from drawings is inefficient, even when layers follow agreed-upon specifications and layer names

A	B	C	D	E	F	G	H
1	LAYER	GEOMETRY	BLOCK_NAME	LAYER	BLOCK_NAME	FC	ERROR
2	M4600	POINT	M4600_E		M46_NOTE		תאור
3	M4601	POLYLINE		M4601	M4601_A	M46_PIPE	קעוץ
4	M4601	POINT	M4601_P		M46_GROUND		קרקע
5	M4602	POLYLINE		M4602	M4602_A	M46_PIPE_UNDERGROUND	קרקע
6	M4602	POINT	M4602_P		M46_GROUND		קרקע
7	M4609	POINT	M4609_E		M46_WATER_TAP		טבון
8	M4609	POINT	M4609		M46_WATER_TAP		טבון
9	M4610	POINT	M4610_E		M46_WATER_METER		שען
10	M4610	POINT	M4610		M46_WATER_METER		שען
11	M4611	POINT	M4611_E		M46_HYDRANT		הידראט
12	M4613	POINT	M4613_P		M46_GROUND		קרקע
13	M4613	POINT	M4613_E		M46_WELL_P		חדר מים
14	M4613	POLYGON	M4613_S		M46_WELL		חדר מים
15	M4613	POINT	M4613		M46_WELL_P		חדר מים
16	M4614	POINT	M4614_E		M46_CONNECTOR		חיבור מים
17	M4614	POINT	M4614		M46_CONNECTOR		חיבור מים
18	M4615	POINT	M4615_P		M46_GROUND		קרקע כב. מים

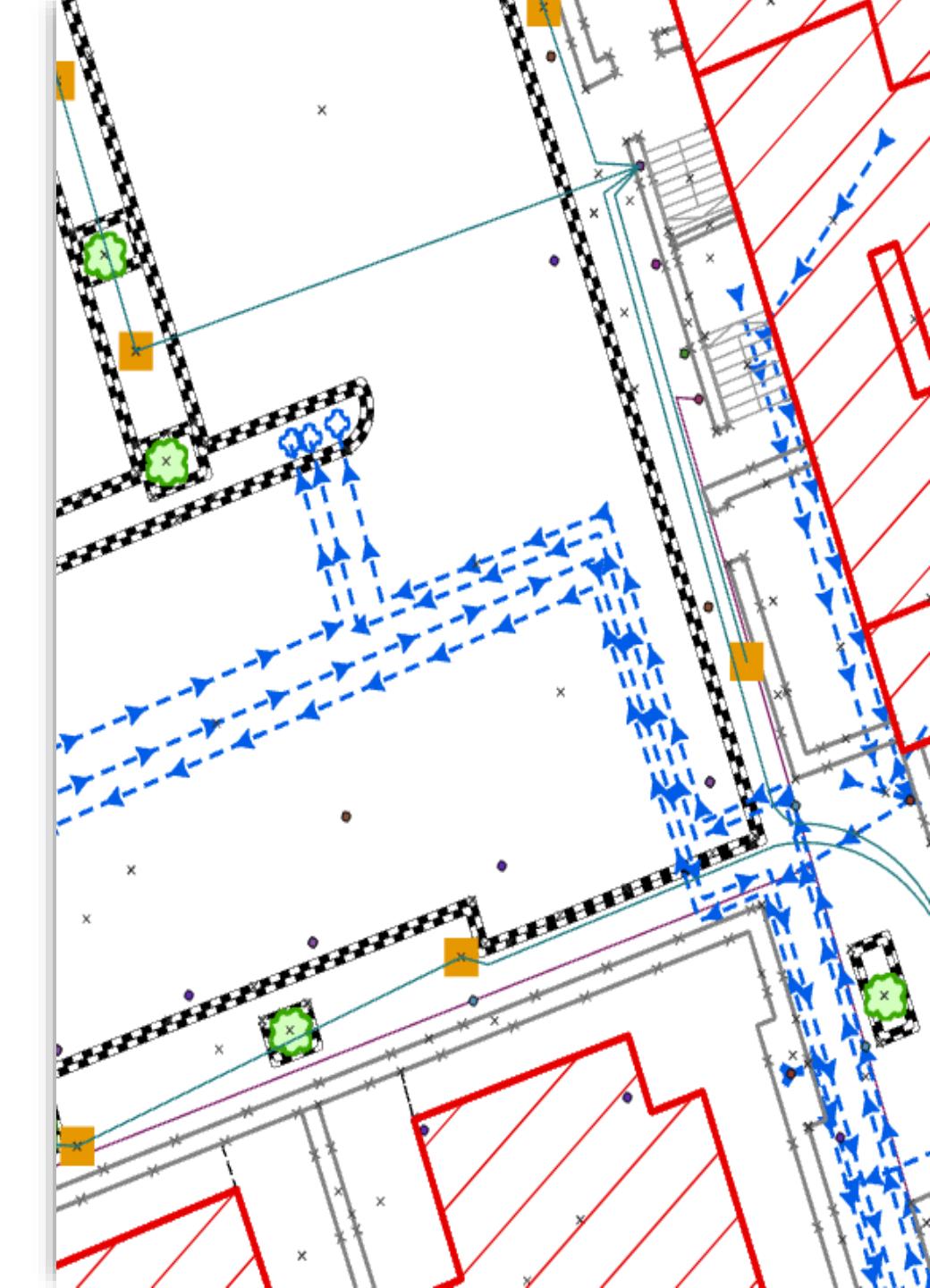


# How?

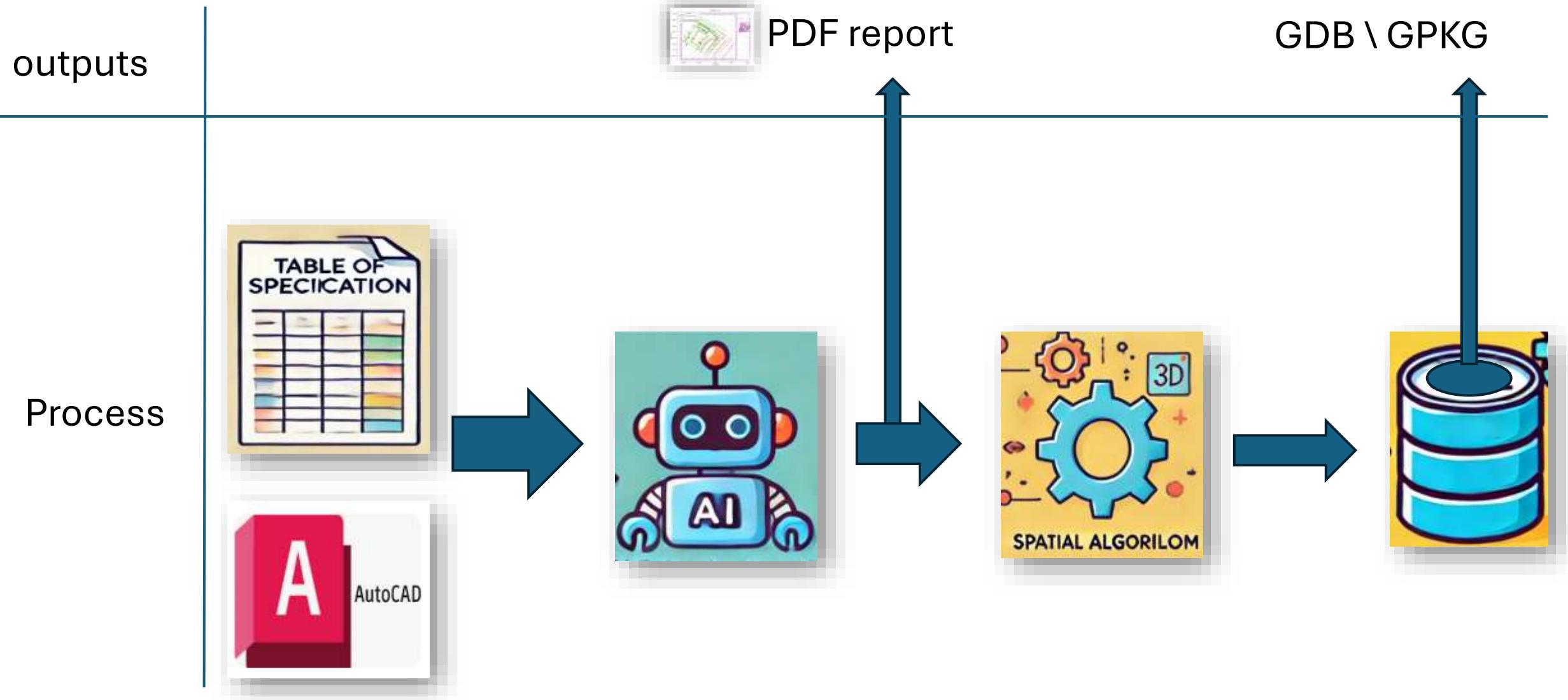


# SmartCAD

- No need QGIS and ArcPro
- Converting DWG to GIS by Given Specification
- Connecting Data from Blocks to Layers
- Removing Graphic Layers
- Closing Polylines to Polygons (If Possible)
- Building a Continuous Database from Multiple Files
- Creating a DEM
- Ensure All Lines Start from Highest Point
- And More



# Tool activity



# Explained

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Check angle in polyline vertices

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Distance from frame

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Elevation Irregularities

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Grouping of vortexes( KNN)

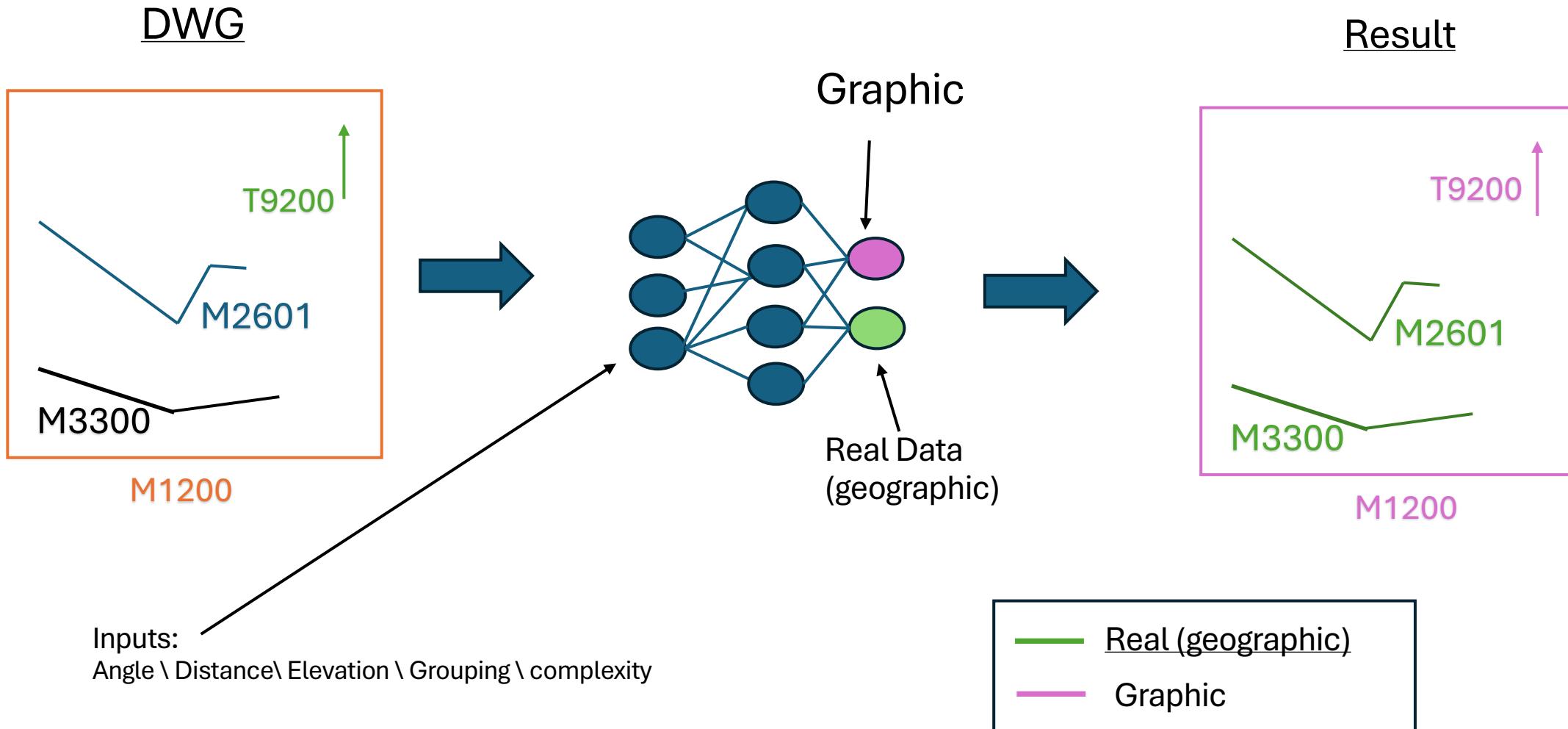
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Shape complexity

Layer	Angle	Distance	Elevation	Grouping	complexity	isGeom
TREE	0	0.11	0.02	0.77	0.45	True
BUILDING	1	0.21	0	0.01	0.2	False
WALL	1	0.21	0.18	0.92	0.9	False
WALL	0	0.7	0.02	0.8	0.1	True

\* Normalized values

## Stage 1 – remove graphic layer



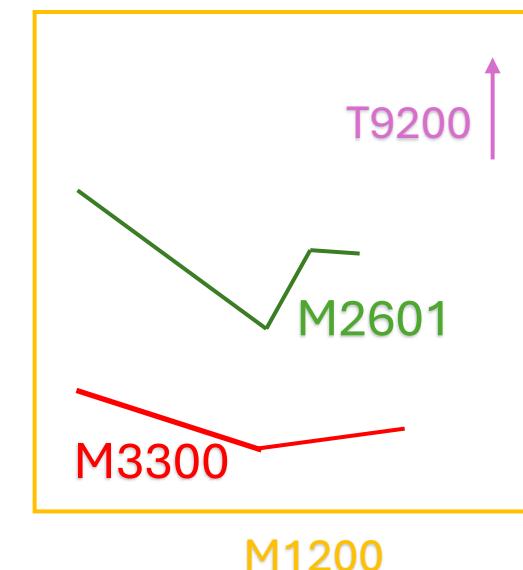
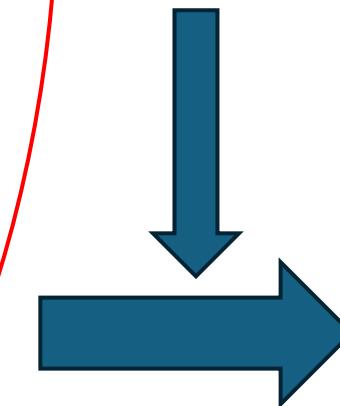
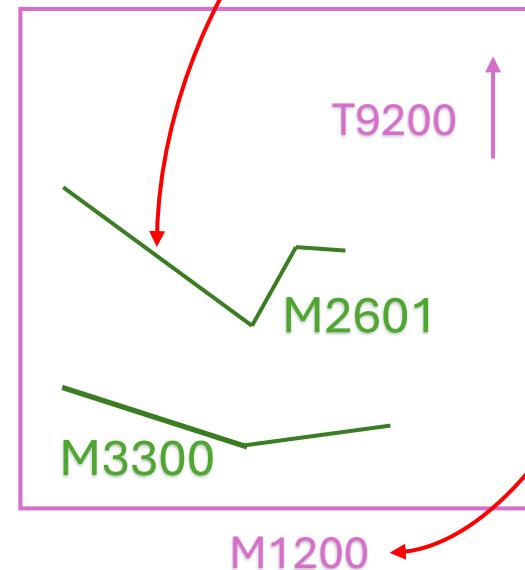
## Stage 2 – compare with format

### Format

Layer Code	Layer name
M2601	Pipeline
M1200	Frame
99000	wall

- Format + real
- Not in Format + real
- Not in Format + Not real
- Format + Not real

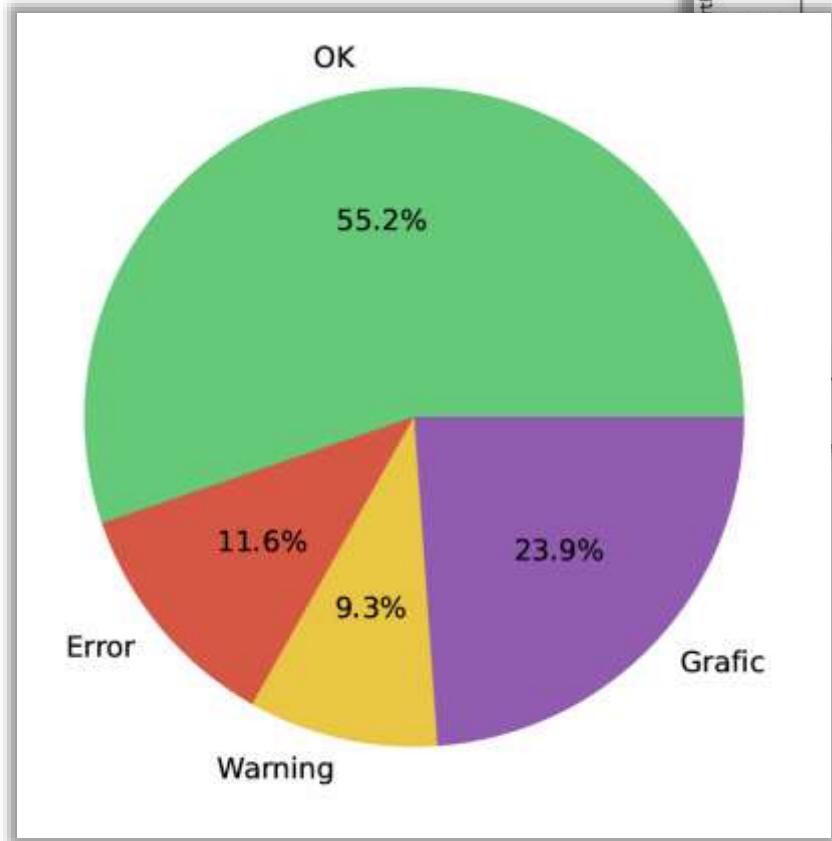
### Result (graphic \ real)



	Found as Graphic (AI)	Found as Real (AI)
In format	Not passing to Database	Pass to Database
Not in format	Not passing to Database	Not passing to Database

# Result

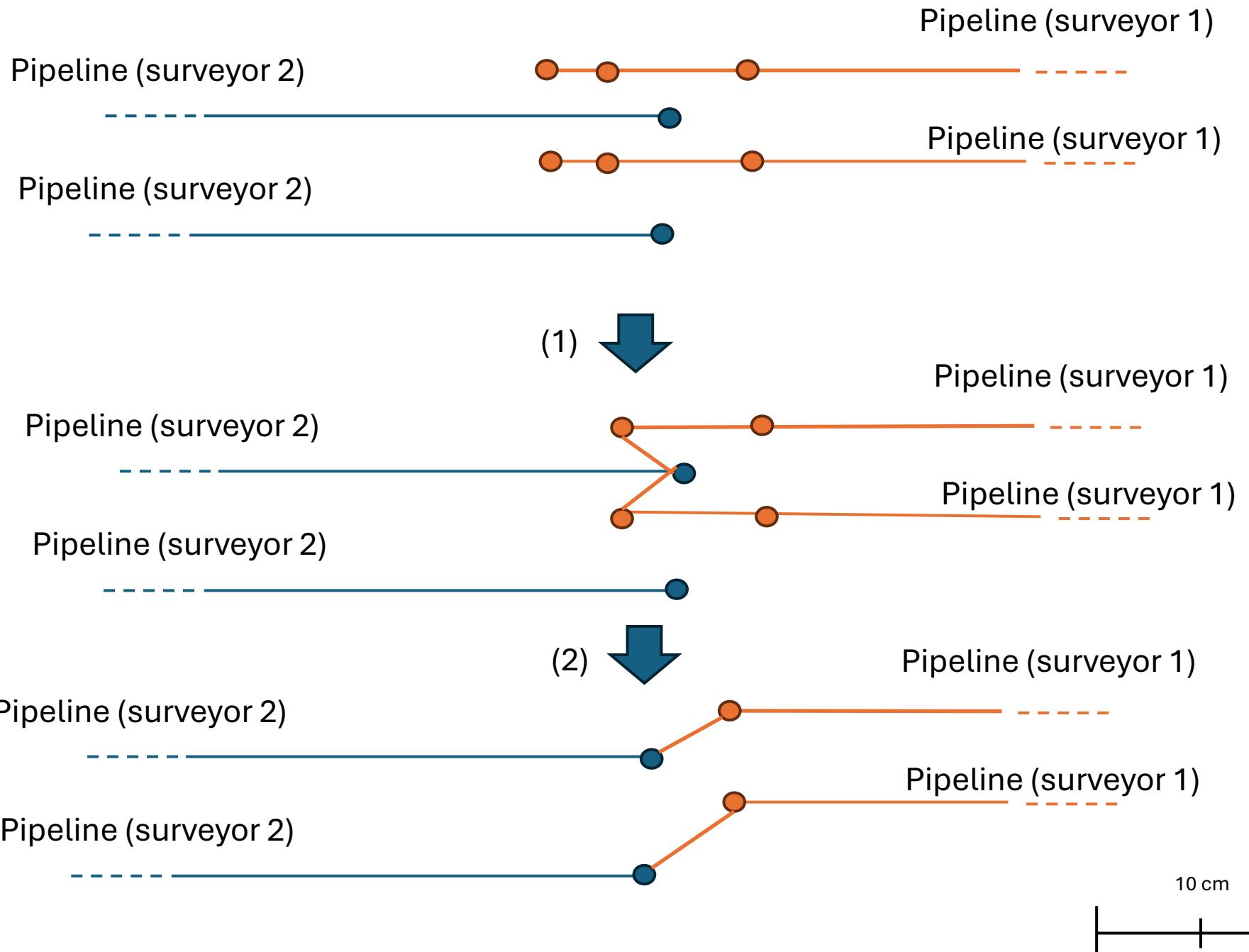
Report – Layers based on MAVAT specifications.



# Update database automatically

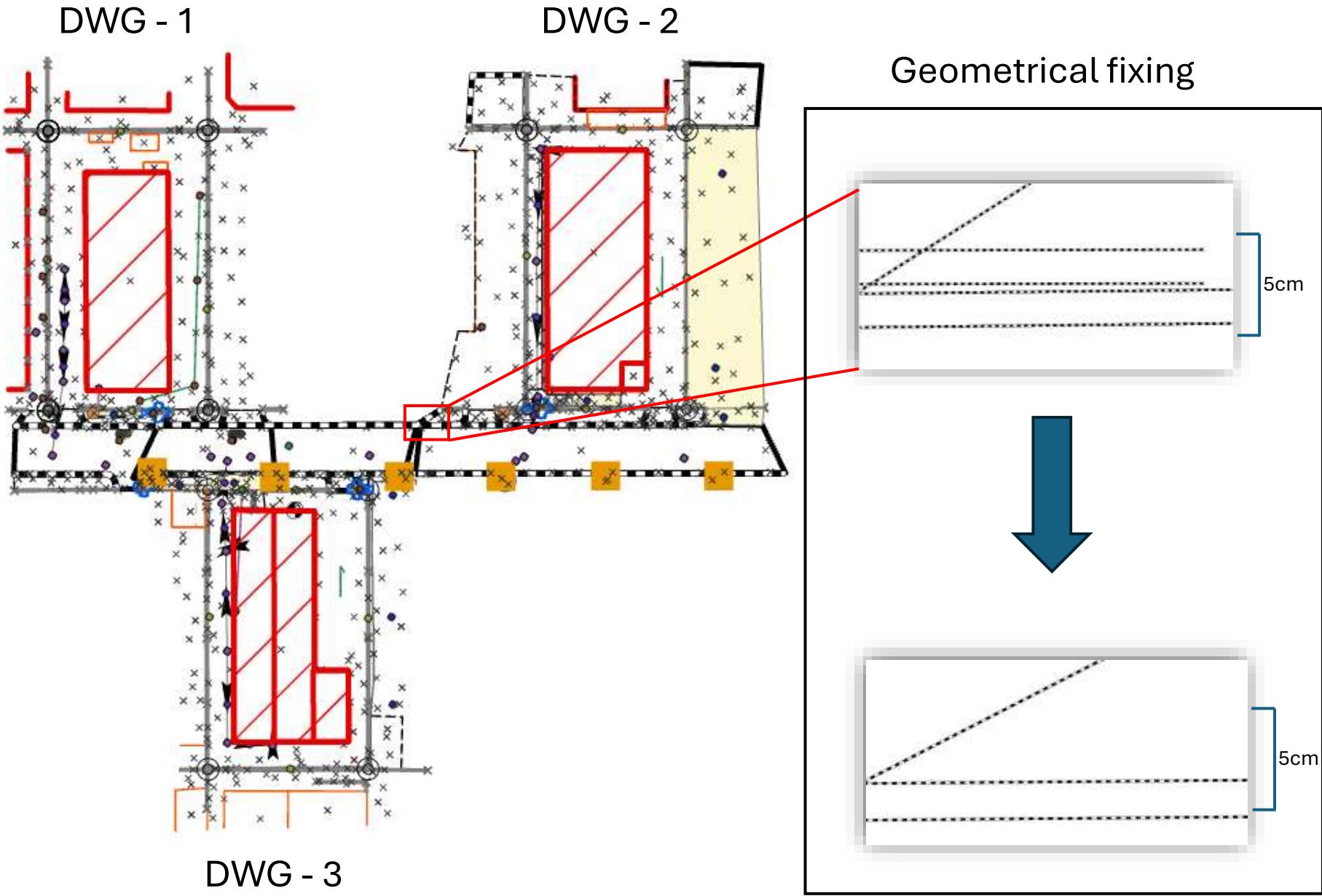
So how do we do it?

- 1) Checking the closest vertices from similar type
- 2) Only 1 connection between nodes are allowed
- 3) Checking angel of vertices before, if angel changed to much, deleted



# Example

After extracting the DWG layers into geographical layers, a following algorithm will be activated to integrate data from various surveyors into a unified, continuous database.



# Database result -

All your layers from DWG, with only the relevant columns in 1 continuous Database.

The screenshot shows a desktop application interface for managing geospatial data. On the left, there's a 'Contents' pane with a 'Search' bar and icons for files, databases, and maps. A red arrow points from the 'main.M26\_FANCE' entry in the 'Drawing Order' list to a larger window on the right. This window has a title bar 'main.M26\_FANCE X'. Below it is a toolbar with buttons for Field, Add, Calculate, Selection, and various map-related functions like Select By Attributes, Zoom To, and Switch. The main area is a table with the following data:

	fid *	geom *	Entity	Layer_NUM	Inside_Israel	FC	Sheet_Name	Elevation
1	1194	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
2	1197	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
3	1201	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
4	2058	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
5	2061	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
6	2065	Polyline	LWPolyline	2601		1	M26_FANCE	229.5
7	1200	Polyline	LWPolyline	2601		1	M26_FANCE	229.36

Below the table is a map view showing several purple line features representing fences. To the right of the map is a file browser window titled 'line.gpkg' containing a list of other database entries:

- main.ASFALT
- main.AVNEI\_SHEFA\_ACHERIM
- main.BAYITAN\_ASHPA
- main.defualt\_POLYLINE
- main.DESHE
- main.EVEN\_SHEFA
- main.EVEN\_SHEFA\_MESHUFAT
- main.EVEN\_SHEFA\_MONMEKET
- main.EVEN\_TAALA
- main.EVEN\_TZAD\_GANANIT

# Thanks for listening...



## For more GeomAI work:

ArcPro + ChatGPT

<https://www.youtube.com/watch?v=pF17FTzHR68&t=197s>

Nnetwork analysis:

<https://www.youtube.com/watch?v=zfWg2aXYZV0>

web:

<https://gisdocs.netlify.app/>



Linkedin:

Medad Hoze