Beyond Automation: The Next Evolution of Computational Design at ZUTARI

BIM Harambee . Africa 2026

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Beyond Automation:
The Next Evolution of Computational Design at Zutari

Astrid van der Laan
astrid.vanderlaan@zutari.com
Principal Computational Designer
Zutari Digital Practice

MJ Mthimunye
MJ.Mthimunye@zutari.com
Computational Designer
Zutari Digital Practice

“In 20 years every engineer will know Python [coding], and every engineering team will be developing their own tools. That is what is needed to keep up with high demands, whilst also making repetitive work less boring.”

Alexandre Cousin

Head of Generative Design at VINCI Construction

2024, Revisited

It did not take 20 years.

It took two.

And not the way any of us expected: nobody learned Python. AI-assisted coding arrived instead — engineers and BIM staff who have never opened a script editor are generating working code today.

The prediction solved the wrong scarcity

AI made everyone a coder.

It made no one an assurer.

When everyone can generate code, writing it is no longer the scarce skill. **Trusting** it is.

The risk has flipped: from informal scripts on one machine, to plausible, fluent, unverifiable code flowing toward deliverables.

AI is dangerous when we mistake fluency for correctness.

From models & scripts to connected workflows

Computational design encodes design and logic, so design options can be generated, evaluated and documented systematically rather than manually.

BIM as model production → **information-enabled delivery and decisions**
Computational design as scripting → **reusable design logic**
AI as novelty → **controlled workflow assistance**
Tool enthusiasm → **measured delivery value**
Informal use → **reviewed, approved workflows**

Reuse depends on information discipline. Automation cannot compensate for inconsistent model data indefinitely.

The operating philosophy

Build once
Reuse many times
Govern always
Measure continuously

The operating philosophy

Build once. Reuse many times. Govern always. Measure continuously.

The aim is not to create isolated tools. The aim is to convert repeatable engineering knowledge into scalable delivery capability.

1. **Build once** — target repeatable problems, not one-off digital novelties.
2. **Reuse many times** — design workflows that work across projects, teams, markets and disciplines.
3. **Govern always** — make ownership, assumptions, limitations, review and approval clear.
4. **Measure continuously** — track whether the workflow improves delivery outcomes.

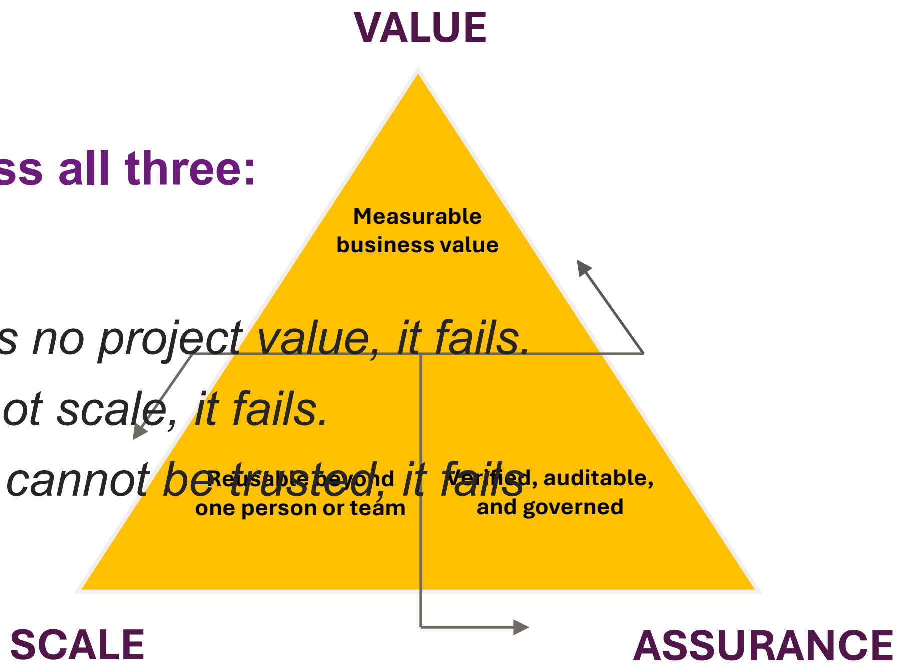
The decision triad

Every digital workflow must pass all three:

Value — *if it is elegant but creates no project value, it fails.*

Scale — *if it works once but cannot scale, it fails.*

Assurance — *if it saves time but cannot be trusted, it fails.*



Trust, made practical

Govern by consequence, not by tool.

Any output that enters model content, quantities, compliance checks or issued information carries deliverable-grade verification: reviewed logic, verified results, human approval, retained evidence.

The gate is method-neutral: visual programming, hand-written code and AI-assisted work pass identical checks — no exemptions, no penalties.

A trusted workflow does not sign the drawing. Accountability remains with professionals

The prediction, rewritten

~~“In 20 years every engineer will know Python [coding]…”~~

Every already codes. The question is no longer who can write the logic… **it is who can trust it.**

Beyond Automation: The Next Evolution of Computational Design at ZUTARI.

FOUR GENERATIONS OF TOOLS: ONE GOAL

ENGINEERS SPENDING TIME ON ENGINEERING.

Computational design at Zutari didn't start with AI. It started with a spreadsheet, grew into visual scripts, matured into a governed web platform — and now designs alongside us, writing directly into Revit.

B25 | fx | 250

	A	B	C	D	E
1		NOTE: ONLY MODIFY RED VALUES, THE OTHERS ARE CALCULATED. ALSO, THIS LINE DOES NOT PRINT			
2		CALCULATION SHEET			
3		**Project**		Test	
4		**Project number**		1000000	
5		**Revision**		0	
6		**Author**		Author	
7	1	GLOBAL INPUTS			
8		ITEM		VALUE	NOTES
9	1	System cooling requirement		1500kW	-
10	2	Supply water temperature		19°C	-
11	3	Return water temperature		28°C	-
12	4	Max water flow for load		39.8l/s	-
13	5	Number of cooling generation modules		2	-
14	6	Cooling generation module redundancy (N+)		1	-
15	3	Are tanks inline or decoupled		Inline	-
16	7	Fluid		Water	Specify if glycol is included
17	8	Glycol %		0%	-
18	9	Fluid cp value		4.19kJ/kgK	-
19	2	CHILLED WATER PRIMARY AND SECONDARY RING PIPING VOLUME CAPACITY (SUPPLY SIDE ONLY)			
20		DIA	AREA (sqm)	LENGTH (m.)	VOL (m3)
21	1	Dia 80mm	0.005sqm	0	0.00m3
22	2	Dia 100mm	0.008sqm	0	0.00m3
23	3	Dia 150mm	0.018sqm	0	0.00m3
24	4	Dia 200mm	0.031sqm	0	0.00m3
25	5	Dia 250mm	0.049sqm	0	0.00m3
26	6	Dia 300mm	0.071sqm	0	0.00m3
27	7	**Total chilled water supply side pipe volume**			**0.0m3**
28	8	NOTES:			
29	*	Only supply side can accommodate buffer, return is not counted			
30	*	Only primary / secondary loops can store buffer as branches may be inactive and thus no flow			

It started with a spreadsheet

A chilled water calculation sheet. An engineer encoding design logic once and reusing it.

What Excel gave us

- **Fast to build, fully engineer-owned, transparent formulas**
- **The first "write the logic once, reuse it every project"**

What it cost us

- **One user, one file, "final_v7_FINAL.xlsx" version chaos**
- **Results re-typed by hand into drawings, models and schedules which is error prone.**
- **No review trail; key-person risk when the author moves on**

- **So we moved the logic to where the model lives. Dynamo and Grasshopper.**
- **Calculation outputs are pushed straight into Revit parameters with no re-typing.**
- **Repetitive modelling automated: what took a day took minutes.**

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Raising the BIM tide

DATA CENTRE ENGINEERING SUITE

ME Design Hub

Integrated mechanical & electrical calculation tools for data centre design — from psychrometrics to cooling system sizing.

ACTIVE PROJECT

Project-DataCentre-13443

LOCATION	PROJECT NO.	ENGINEER
Abu Dhabi	PRJ-13443	MJ Mthimunye

Calculation Tools

All   Cooling   Airflow   Power

COOLING   ACTIVE

Buffer Tank Sizing

Thermal buffer tank volume & stratification analysis

Launch →

COOLING   ACTIVE

Critical Cooling Calc

N+1 / 2N critical cooling load sizing for IT halls

Launch →

AIRFLOW   ACTIVE

Psychrometric Analysis

AHU psychrometric design & ASHRAE envelope plotting

Launch →

COOLING   ACTIVE

AI Schematic Generator

Natural-language brief → chilled water plant schematic with Revit MCP export

Launch →

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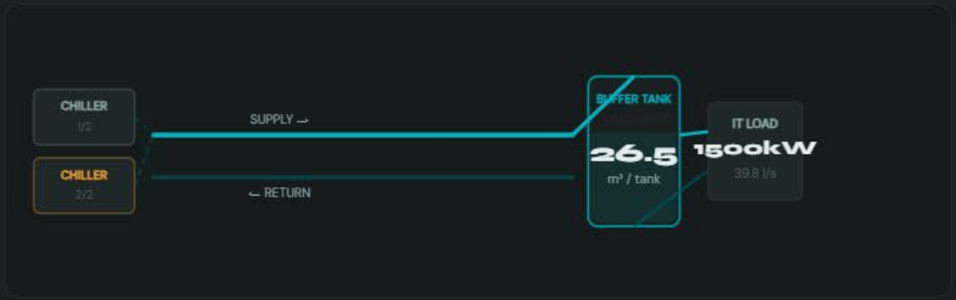
ME DESIGN HUB

DATA CENTRE ENGINEERING

Project Settings | MJ Mthimunye | Sign out | v0.1.0

VOLUME / TANK active tanks	TOTAL GROSS CAPACITY	RIDE-THROUGH POSSIBLE	MAX SYSTEM FLOW
26.5 m³	26.5 m³	1200 s	39.8 l/s

SYSTEM SCHEMATIC



1 SYSTEM PROPERTIES

Max water flow for load	39.82 l/s
Fluid cp value	4.186 kJ/kgK
Temperature differential	9.0 °C

2 SUPPLY-SIDE PIPING VOLUMES

No pipe lengths entered	—
Total supply-side pipe volume	0.000 m³

3 THERMAL STORAGE SIZING

Total thermal storage volume required	23.89 m³
Net volume (less pipe storage)	23.89 m³
Stratification safety factor applied	100%
Gross capacity — all tanks combined	26.54 m³
★ Gross capacity per tank (N capacity)	26.54 m³
Ride-through time possible	1200 s

4 RECHARGE ANALYSIS

STANDARD SYSTEM

Flow per chiller (max flow)	39.82 l/s
Excess flow (all R chillers running)	39.82 l/s
Recharge time (full load)	11.1 min

N+N SYSTEM

Flow per chiller	39.82 l/s
Flow available to charge N side	79.63 l/s
Recharge time (full recharge)	5.6 min

Calculated at 08:26:22

⬇ Export Excel Report

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DATA CENTRE ENGINEERING

Project Settings | MJ Mthimunye | Sign out | v0.1.0

Design | Schematic | Annual Hours | Pressurisation

DOAS INPUTS

82.562 kPa

1 PROJECT INFORMATION

2 OUTDOOR DESIGN CONDITIONS (ASHRAE)

3 ROOM TARGETS / ENVELOPE

4 AIR CONFIGURATION — RETURN AIR & HEAT RECOVERY

5 HOT AISLE / CRAC

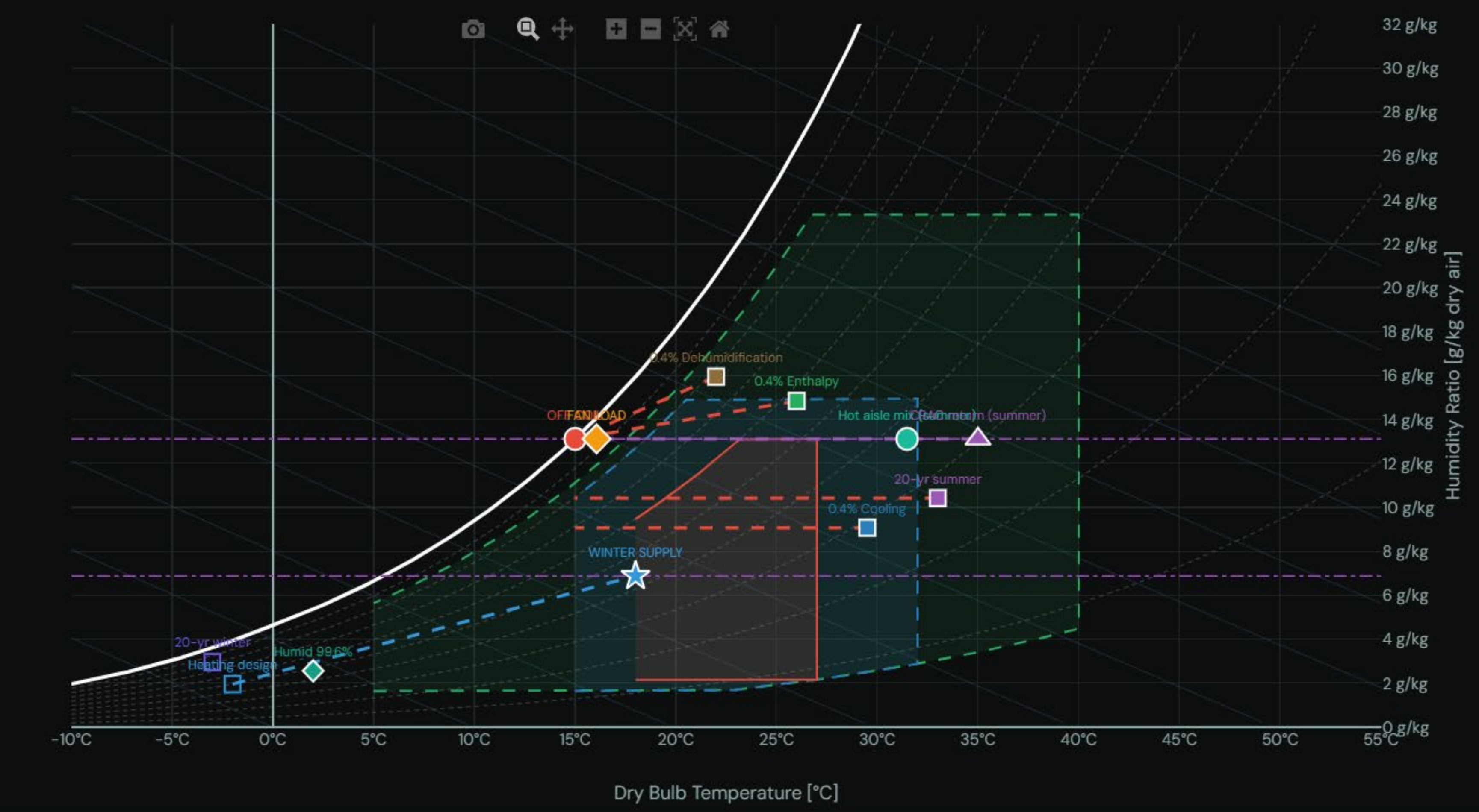
AISLE / CORRIDOR NAME	CRAC SUPPLY TEMP
Hot aisle	22.0 °C
CRAC RETURN TEMP	**CRAC AIRFLOW (TOTAL)**
35.0 °C	25000 L/s

DOAS discharges into this aisle. CRAC is sensible (constant HR). Mix HR ≈ DOAS supply HR under steady state with negligible internal moisture gain.

6 DX COIL & COMPONENTS

Psychrometric Chart | Design States

Export Sheet | Legend



Site pressure: 82.562 kPa · Envelope: Recommended

Chilled Water Schematic Generator

Write the plant description in plain English and get a coordinated chilled water schematic: equipment laid out, pipework routed, and valves and instrumentation tagged. Review it, then send it straight to Revit for detailing.

ACTIVE COOLING

DESIGN BRIEF

Load example

DESCRIBE THE SYSTEM TO BE DRAWN

Design a primary-secondary chilled water plant serving six CRAHs.
2 x 100% chillers
3 duty + 1 standby secondary pumps
450 mm headers
CHWS 8°C, CHWR 14°C
Include a buffer tank on the return.
Provide isolation valves, balancing valves, DP sensors and temperature sensors.

State topology, chillers, pumps (duty/standby), terminal units, header sizes and temperatures. Anything omitted is inferred from conventional practice and recorded as an assumption.

SHEET SIZE

A1 (landscape)

PROJECT NAME

e.g. DC Phase 2

PROJECT NUMBER

e.g. ZUT-2026-001

Generate Schematic

Zutari
ME DESIGN HUB

DATA CENTRE ENGINEERING

Project Settings | MJ Mthimunye | Sign out | v0.1.0

GENERATED DRAFTING VIEW

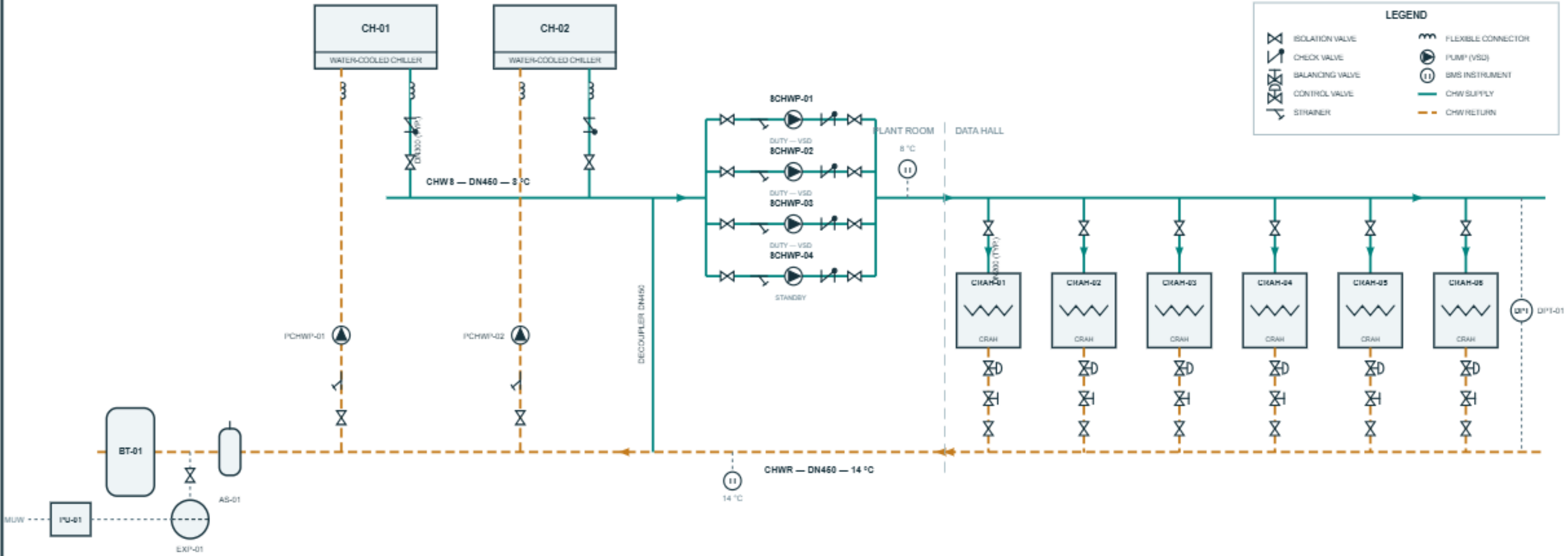
✓ VALIDATION PASSED | - | Fit | + | SVG | Revit MCP Package | Send to Revit

Buffer tank **Yes** · Chillers **2 × 100% (2N)** · Flow meter **No** · Headers **DN450** · Terminal units **6 × CRAH** · Primary pumps **2 × constant speed (1 per chiller)**

Secondary pumps **3 duty + 1 standby, VSD** · Sheet **A1 landscape** · Temperatures **CHWS 8 °C / CHWR 14 °C** · Topology **Primary Secondary**

CHILLED WATER SYSTEM — SCHEMATIC DIAGRAM

PRIMARY SECONDARY PLANT — 2 CHILLERS (2N) SERVING 6 × CRAH



NOTES

1. Install automatic air vents at all system high points.
2. Install drain valves at all system low points.
3. Schematic diagram only — not representative of physical layout.
4. All equipment to be provided with isolation valves for maintenance.
5. Primary (constant-flow) pump per chiller inferred from primary-secondary topology.
6. 2-port modulating control valve at each terminal unit assumed.
7. Check valves at pump discharges added per good practice.
8. Strainers upstream of pumps and chillers added per good practice.
9. Expansion vessel & pressurisation unit on the return header assumed (system pressurisation).
10. Air/dirt separator on the common return assumed.
11. Branch sizes inferred from DN450 headers by equal-velocity split: chillers DN300, pumps DN250, terminals DN200. Verify against actual flow rates.

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refresh families

No model synced

create in revit

Incoming schematic from the ME Design Hub CHW SCHEMATIC — UNNAMED · 79 placements

✓ accept & load

No model synced yet

Generate a chilled water schematic in the ME Design Hub and click “Send to Revit”. It appears here for review before you create it in the model.

A schematic is waiting — click “Accept & Load” above.

FAMILY MAPPING

2D Drafting view 3D Model Scale × 25 Pipe elev. 1200 mm

PACKAGE FAMILY	QTY	MAP TO DOCUMENT FAMILY	STATUS

Unmapped families import as box placeholders — load the family, Refresh, remap and re-import. 3D mode places real families on the lowest level and routes sized pipes.

Incoming schematic pushed from the ME Design Hub — click Accept to load it.

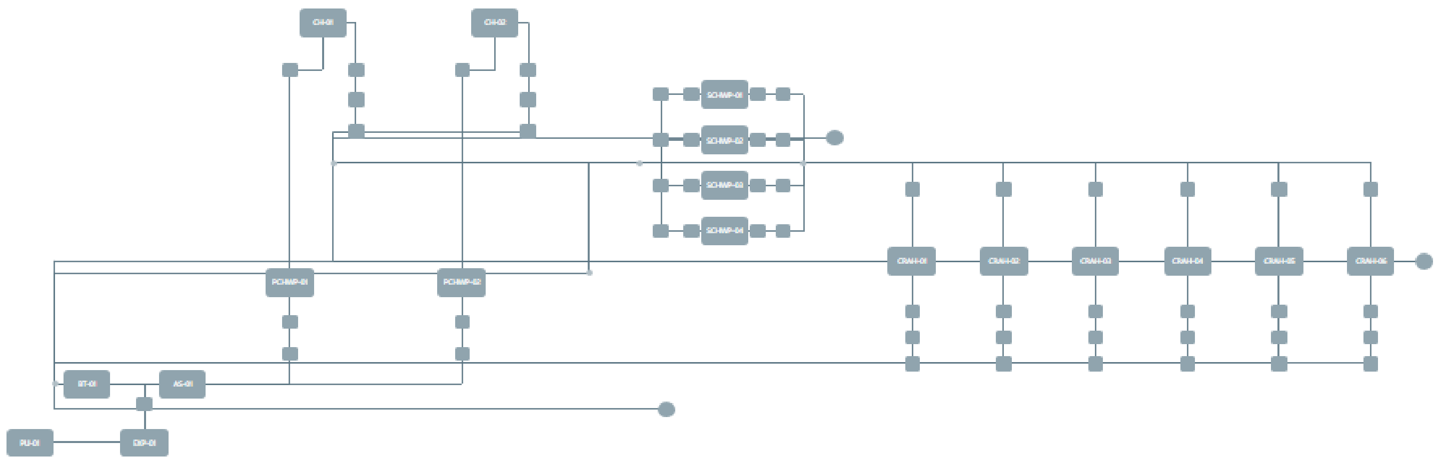
ZUTARi

refresh families

CHW SCHEMATIC — UNNAMED · A1 · 2 chillers / 6 CRAH · 79 placements

create in revit

– fit +



Pending Placed Placeholder / missing

FAMILY MAPPING

2D Drafting view 3D Model Scale × 25 Pipe elev. 1200 mm

PACKAGE FAMILY	QTY	MAP TO DOCUMENT FAMIL'	STATUS
Air Separator	1	Air_Dirt_Separator	matched — ready
Balancing Valve	6	Automatic_flow_ra	matched — ready
Buffer Tank	1	Hot Water Calorifi	matched — ready
Check Valve	6	Plumbing_Valves_	matched — ready
Chiller	2	M_Screw Chiller -	matched — ready
Control Valve	6	Z_01_MM_PAc_Val	matched — ready
CRAH	6	Z_01_MM_MEq_H'	matched — ready
DP Sensor	1	Z_01_MM_MEq_H'	matched · SENSOR - DP - DIFFERE.
Expansion Vessel	1	Welded_expansior	matched — ready
Flexible Connector	4	— map family —	no match — will box
Isolation Valve	25	Automatic_flow_ra	matched — ready
Pressurisation Unit	1	— map family —	no match — will box

Unmapped families import as box placeholders — load the family, Refresh, remap and re-import. 3D mode places real families on the lowest level and routes sized pipes.

Package received from the ME Design Hub — review the family mapping, then Import to Revit.

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ACTIVE
COOLING

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• Revit connected — MCPtest
Load example

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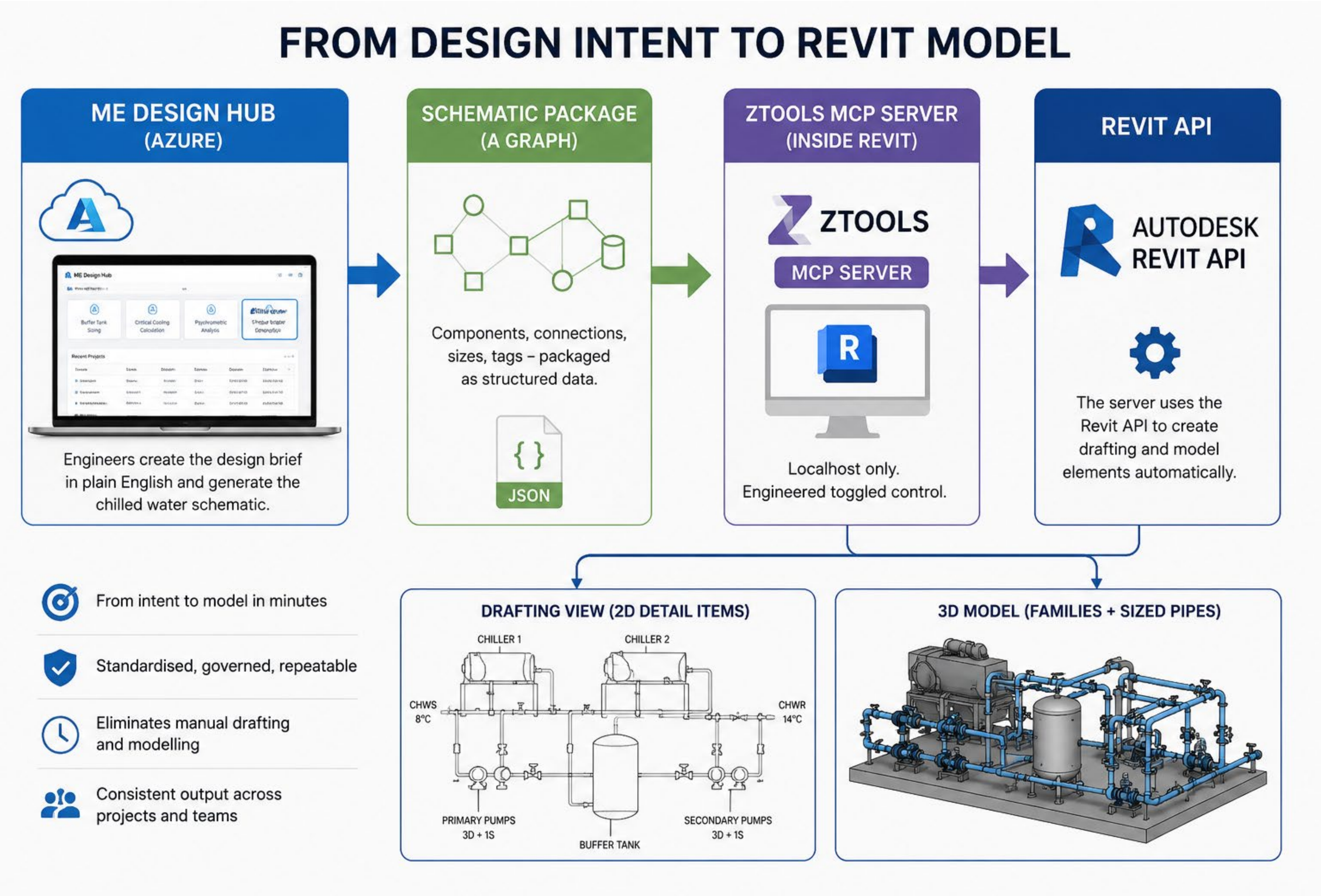
DC Phase 2

PROJECT NUMBER
ZUT-2026-001

Generate Schematic



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Conclusion

Four iterations, one pattern: each kept its predecessor's strength and fixed its weakness
the spreadsheet's *logic*,
the script's *speed*,
the platform's *governance*,
…and now an engineer-controlled line from design intent to the Revit model.

None of it shipped just because it was clever. It shipped because it passed the three tests: value, scale, assurance.

Beyond automation is not more tools. It is trusted, governed, reusable capability, with professionals accountable at the end of it.

Thank you

Questions?

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