Rubber Duck

Design buildings like a full-suite team from day one.

Problem

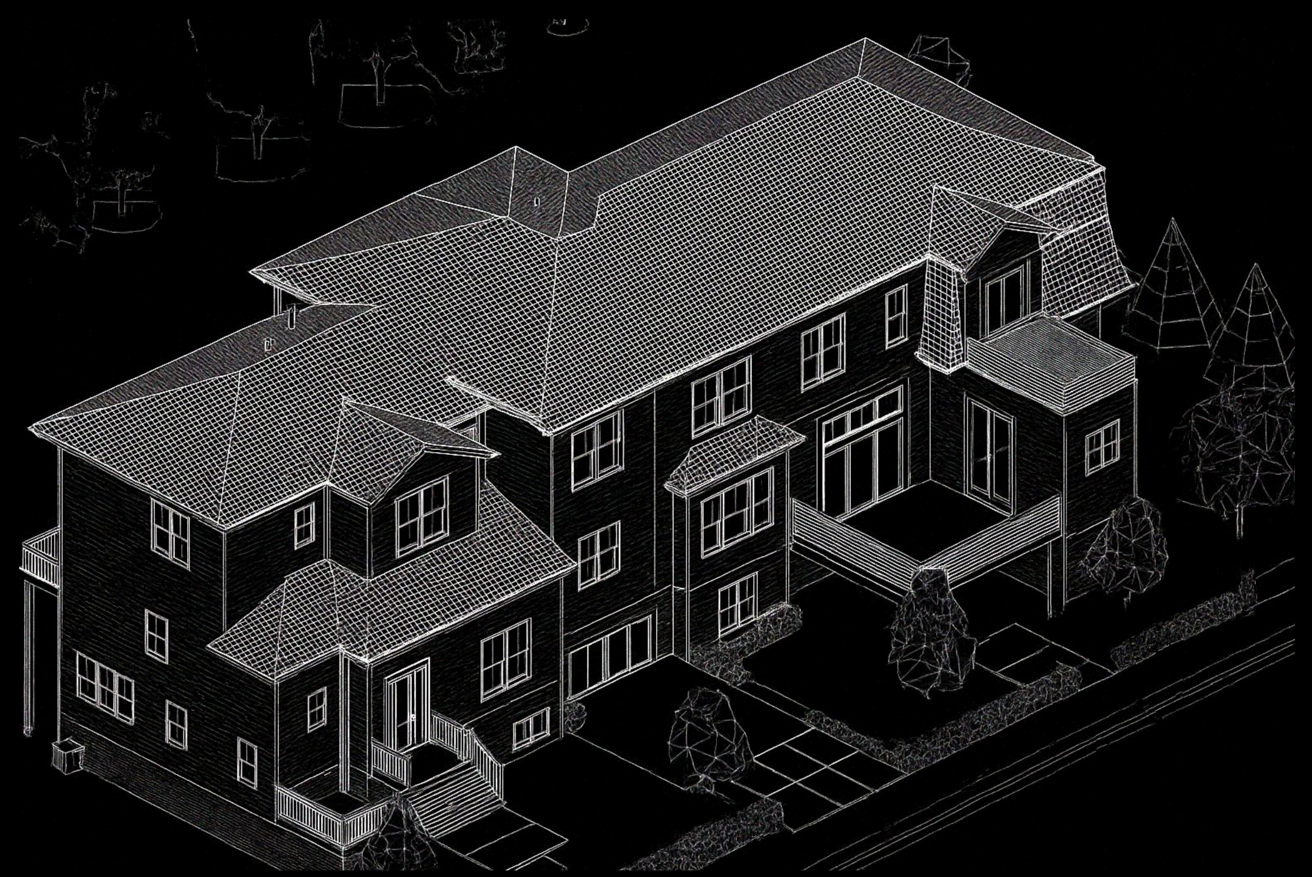
MEP = Mechanical, Electrical, and Plumbing.

They take up real space, but are often planned by MEP team **after** key decisions are made by architects

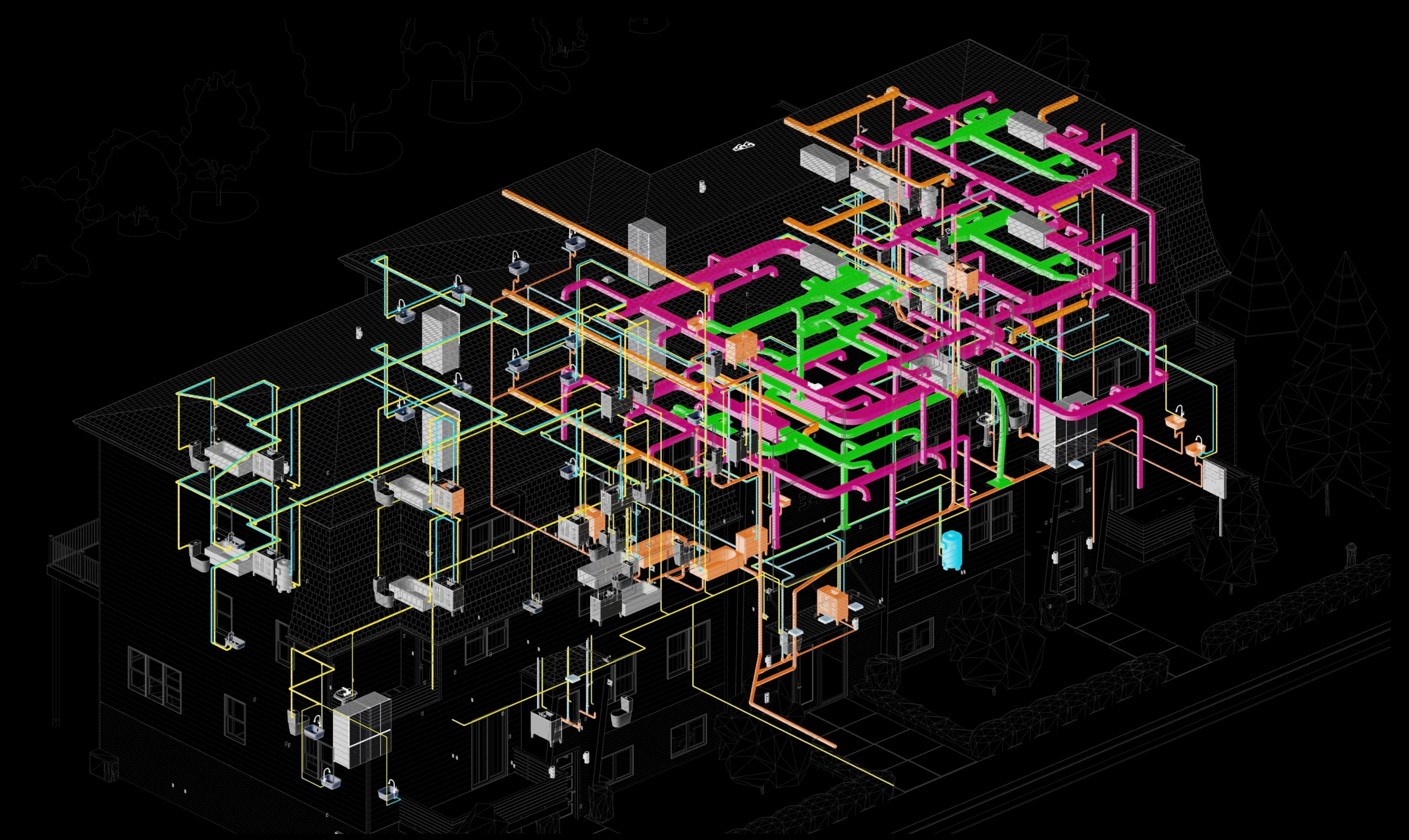
↓ Major design decisions ↓ → Back-and-forth system coordination headaches

Traditional Workflow

Concept Design → Schematic Design → Design Development → Construction Documents → Construction Administration



Architectural Design
Conceptual to Schematic Design



MEP
Mechanical, Electric, Plumbing

When MEP is an **afterthought**:

Time-Consuming Adjustments

Architectural and structural layouts needs to be reconfigured, adding weeks or months of coordination

Compromised Performance

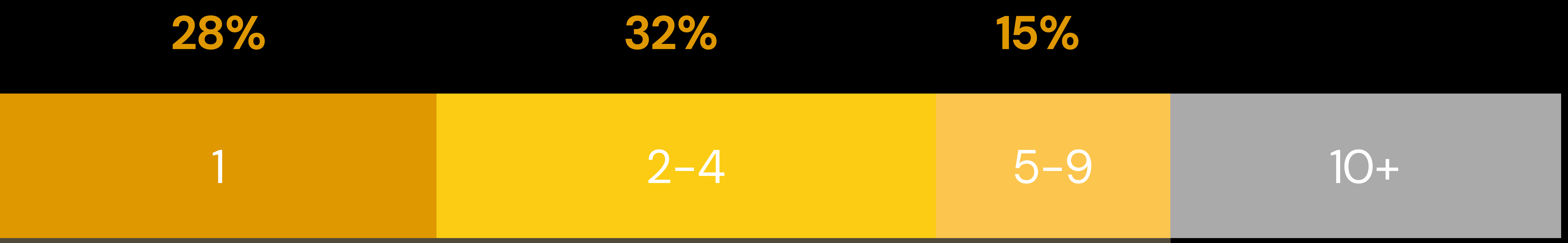
Suboptimal routing leads to oversized systems, awkward runs, and higher embodied carbon

Costly On-Site Rework

MEP-related reworks can add **9% to 20%** of total project cost (**$200B~$400B** in US alone), mostly due to design and coordination errors

The #1 Problem: Not leaving enough space for required MEP ducting/equipment!
However, the changes are **pain-free** in **early architectural design**

Problem



Architecture firms
by employee size

75% architecture firms in US are **under 10 people**
(~15,000 firms)

Small Practice

Too small to staff it

- Budget can’t justify bringing on MEP consultants early
- Absorb the surprises, redesigns, and credibility hits

Big Projects

Too complex to out-staff

- Design exploration outpaces MEP feedback
- Cross-system ripple exceeds what even a senior team can track
- Liability keeps the sharpest input unsaid until change isn't free

Today's Tools Are **Reactive, Not Preventive**

skipping the phase where mistakes are cheapest

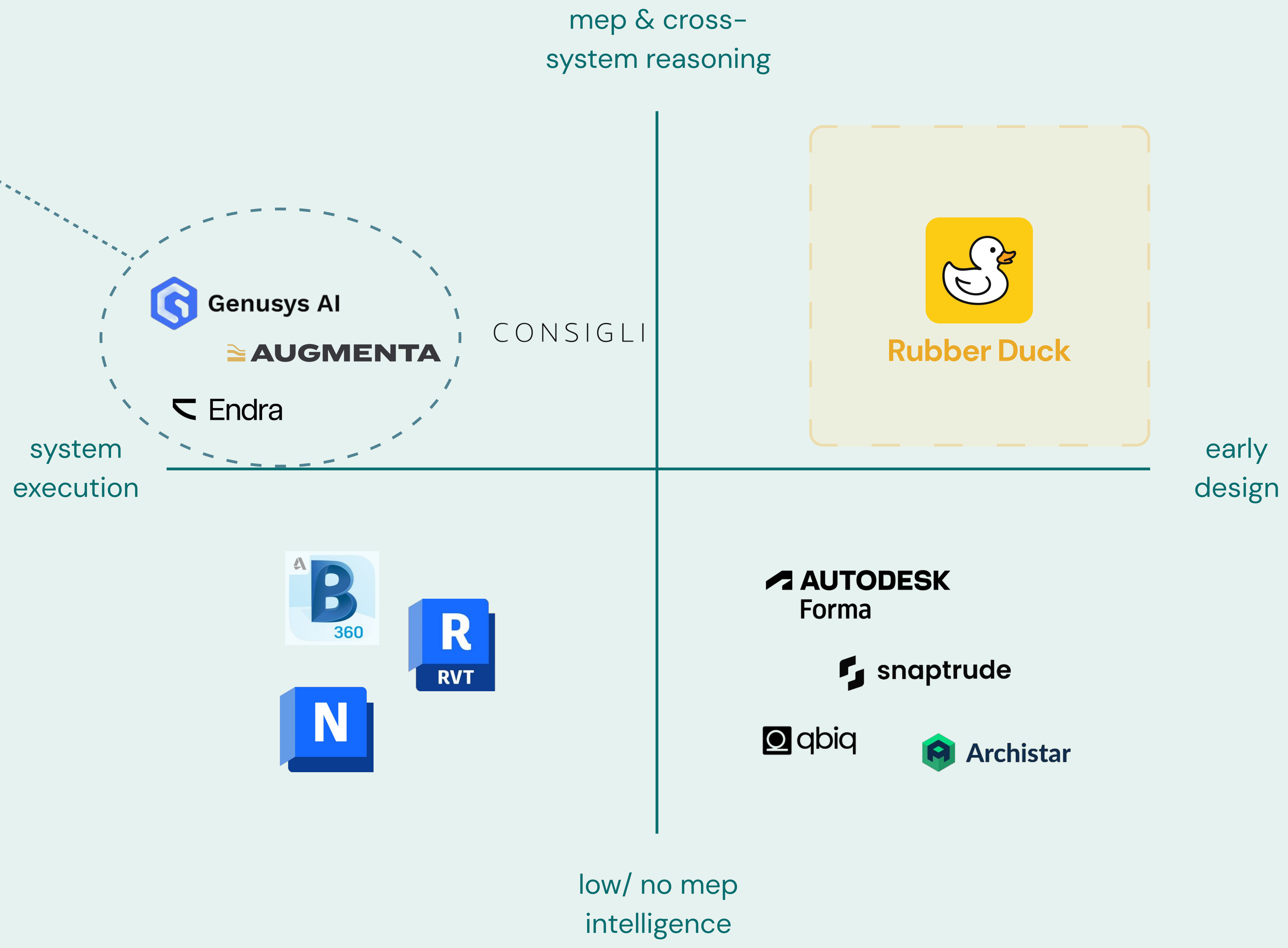
AI MEP generators

- Requires detailed model
- Built for engineers
- Retrofits systems into "frozen" arch design → excess fittings & compromised efficiency

Ryan Ortega · 2nd · 2d
MEP BIM Lead at Zutari | RICS BIM PM Certified | BIM ISO 19650 Certifi...

In my experience, automated MEP design often results in an increased number of fittings being placed in the model. While this approach helps avoid clashes, it can lead to excessive fittings over short pipe runs—something that's typically avoided through manual coordination.

More fittings mean higher flow friction, which in turn causes greater pressure losses in piping systems. The same principle applies to ductwork, where airflow is similarly affected.



Design at the Speed of Intent.

TRADITIONAL WORKFLOW		WITH RUBBER DUCK	
17x	weekly coordination meetings	3x	focused reviews
↻	tedious late-stage redesign	✓	issues avoided early
⏳	delayed or withheld MEP insight	⚡	fast and cheap trials & errors, 24/7

Most wanted use cases from 52 interviews:

- **Commissions** (SD)
- **Competitions**
- **Teaching**
- **Retrofit feasibility studies**

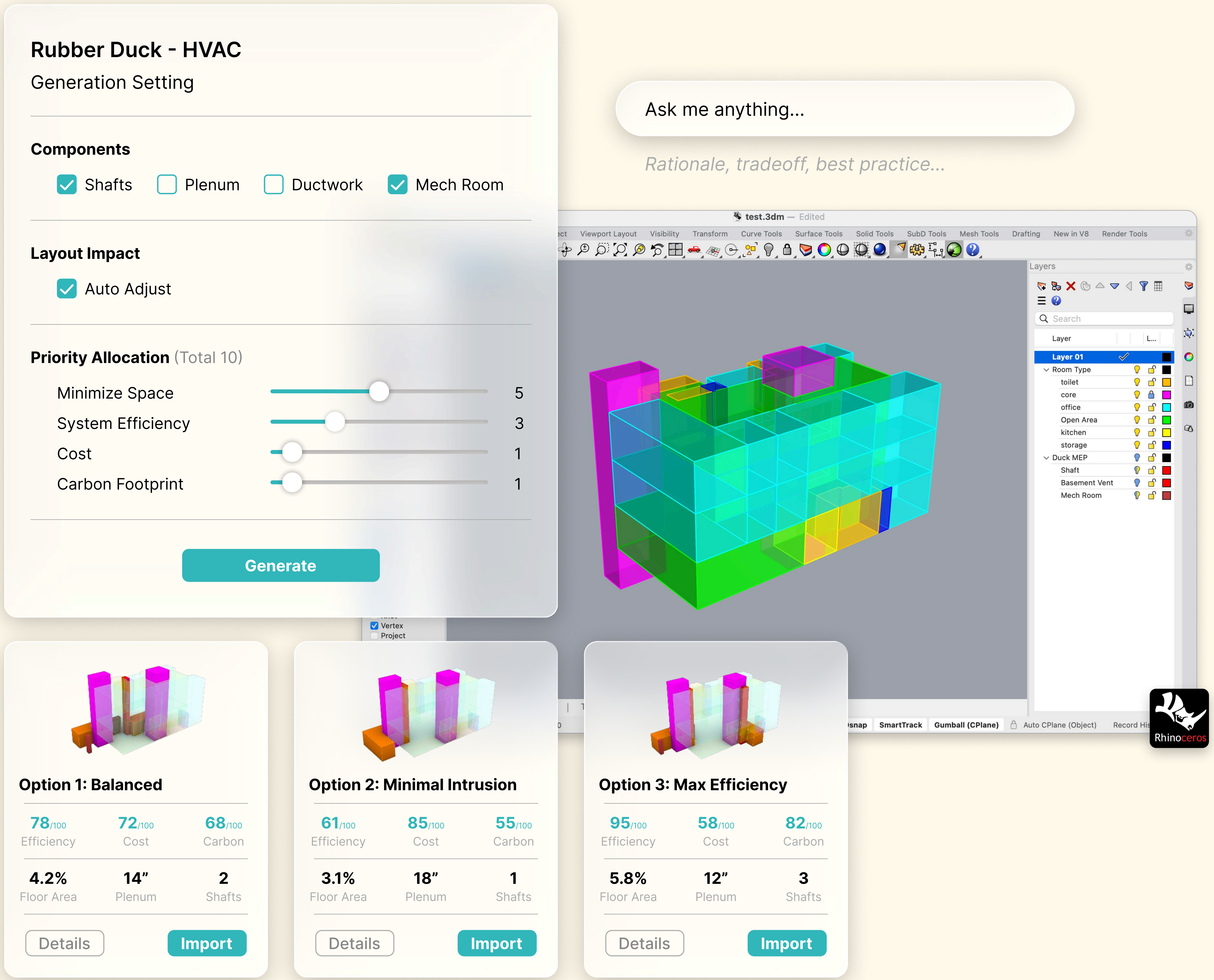
Full-Suite Spatial Awareness from Day 1

Starting with HVAC Intelligence in early architectural design

Early & flexible: Works with schematic boxes, 2D or 3D, on whatever platform you're at

Focused on what matters: Surfaces spatial requirements for high-impact elements (e.g., shafts, plenums, mech rooms, zoning conflicts)

Multi-objective priority control: Front-loads negotiation between competing goals to minimize costly late-stage changes



Technology

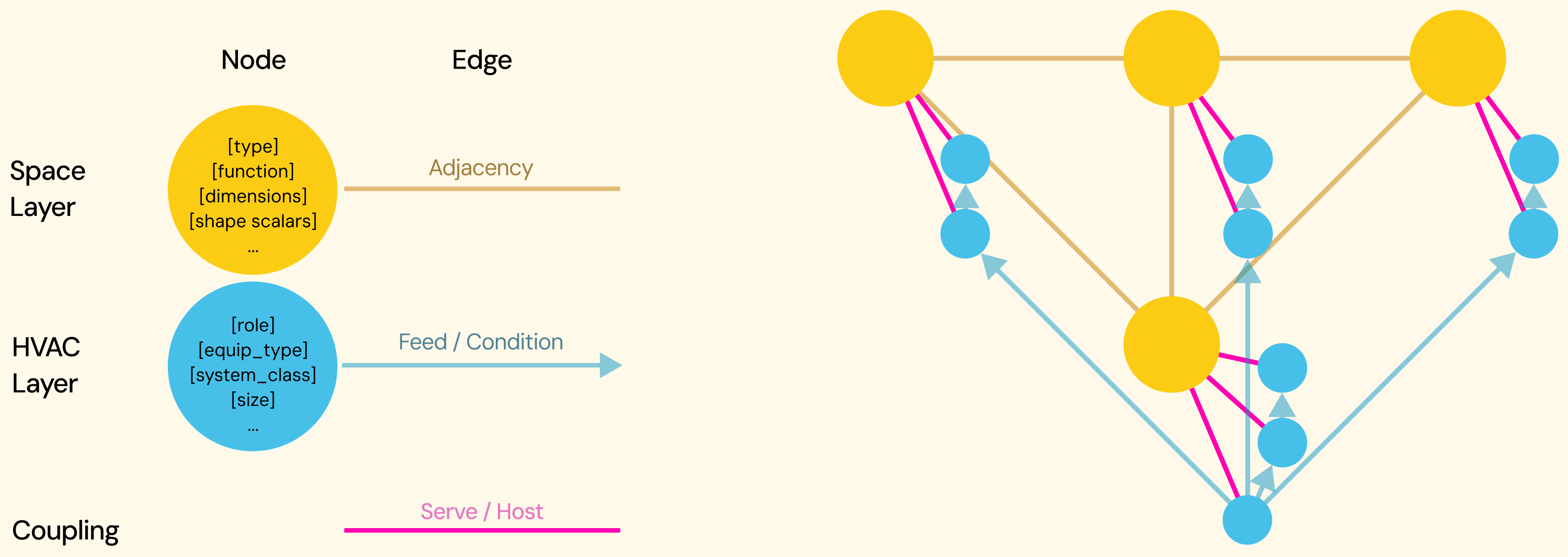
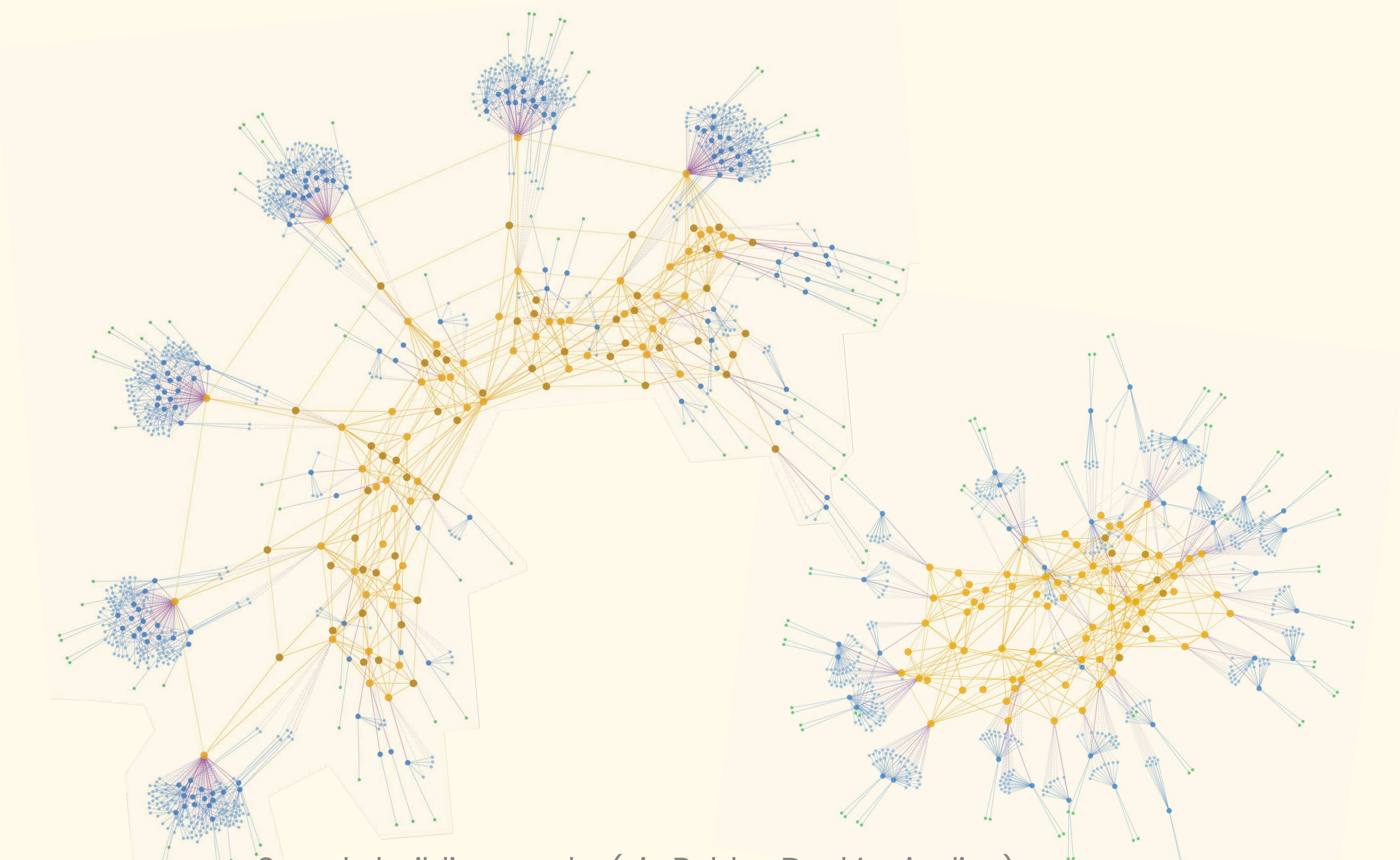


Diagram of Graph Structure



Sample building graphs (via RubberDuck's pipeline)

Joint-System Graph Learning

Fast, scalable, cross-system reasoning

Efficient form. Buildings are relational; so are graphs. Captures system relationships natively.

Versatile inputs. Extractable from 2D drawings, 3D massing, or full BIM.

Fast inference. A pretrained model predicts in a single forward pass. No agents, no solver.

Multi-objective. Scores a configuration against several objectives at once.

Business Model / Financial Projection

Project-based pricing for minimal friction

- **$0.01/sqft**, unlimited use within project (national avg. construction cost: $200/sqft)
- ~~Overhead~~ → project expense
- **$1M ARR in sight with 3.7% penetration**
- Tapping into the massive long-tail market

<0.3%
of MEP consultant fee

$4B
Serviceable Available Market (SAM)*

2.7B sqft
Residential/Commercial Construction starts in US, 2025

3.7%
Penetration Needed to reach **$1M ARR!****

*SAM = TAM ($62B total annual US architectural services) x 20% spent on MEP (industry standards) x 32% of frontend/automatable work
** 2.7B sqft x $0.01/sqft (our pricing) x 3.7% = $1M

Path to Scale

#1 Pilots: training as a service

- Pilot with early-adopter firms: fine-tune the model on their BIM archive, for their use only; validation + flagship references
- Evolves into its own service revenue line, esp. for firms with rich data

#2 Direct to small/mid-size architecture firms

- LinkedIn campaigns
- Partner webinars with AIA, Monograph, Hypar
- AEC trusted media (ArchDaily, AEC Hive)
- Trial access via AIA member firms

#3 Expand through tech ecosystem

- Strategic partnerships with design platforms like Forma
- API-based access via BIM tools
- Lead-gen from real restate developers

Future

“Speeding up the world’s slowest, most vital industry — to serve more, faster”