MODULAR FIXED SEATING SYSTEM

A project proposed
by
Proto-Design
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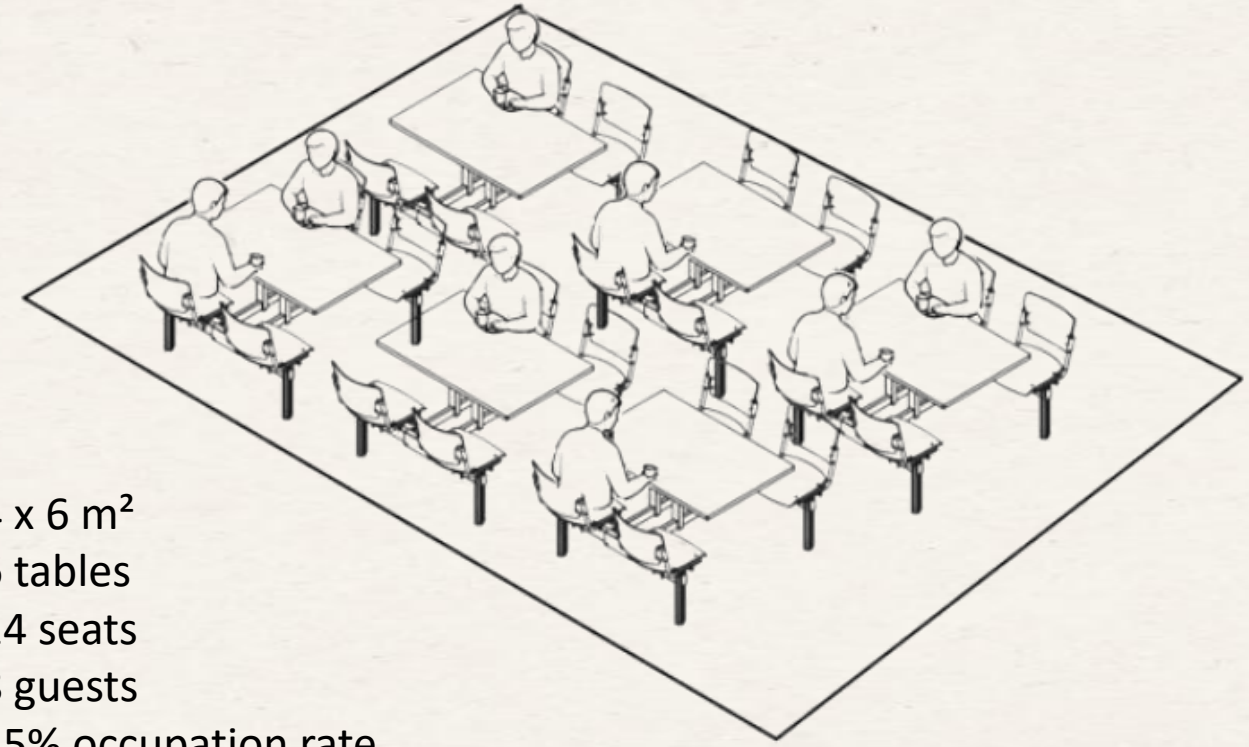
PROBLEM

Inefficient seat usage in high-density spaces

No transition between private and group use

Furniture requires physical reconfiguration

4 seats. 1 user, such a system design creates inefficiency



4 x 6 m²
6 tables
24 seats
8 guests
25% occupation rate

Further guests / incoming group have no space!

KEY INSIGHT

Result: 75% of capacity lost

A single user can block 4 seats - not by intention, but by design.

Other users avoid sitting with strangers

There is a need for a system that prevents table blocking - without forcing interaction

Would you dare to ask dining with a stranger?

SOLUTION

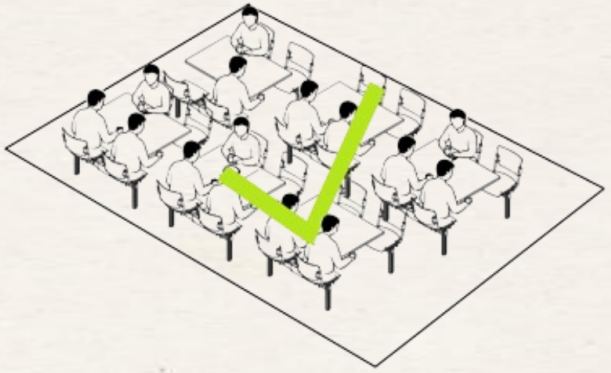
Fixed seating + dynamic partitions

Close → private space

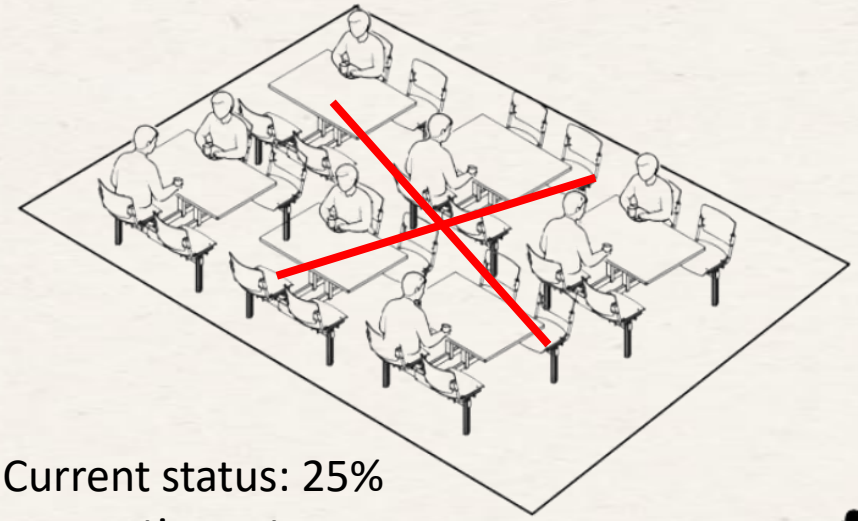
Open → shared configuration

No movement required

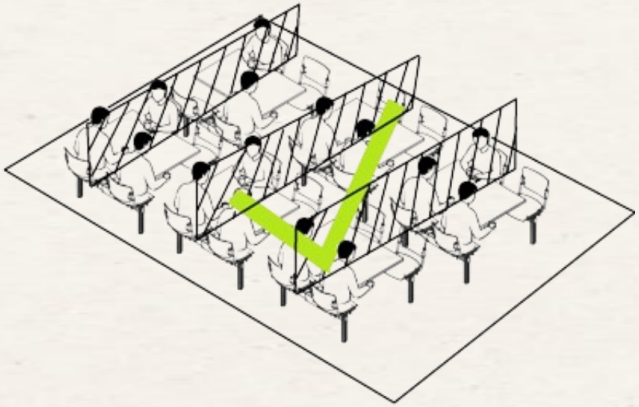
Occupation rate 100% more than before!



This is the goal, >100% more occupation rate



Current status: 25% occupation rate



Like this? Ugly! So how to achieve this goal?

SYSTEM LOGIC #1

Each unit = seat + table + side panels
Panels open/close to define space
Linear expansion across hinged wall

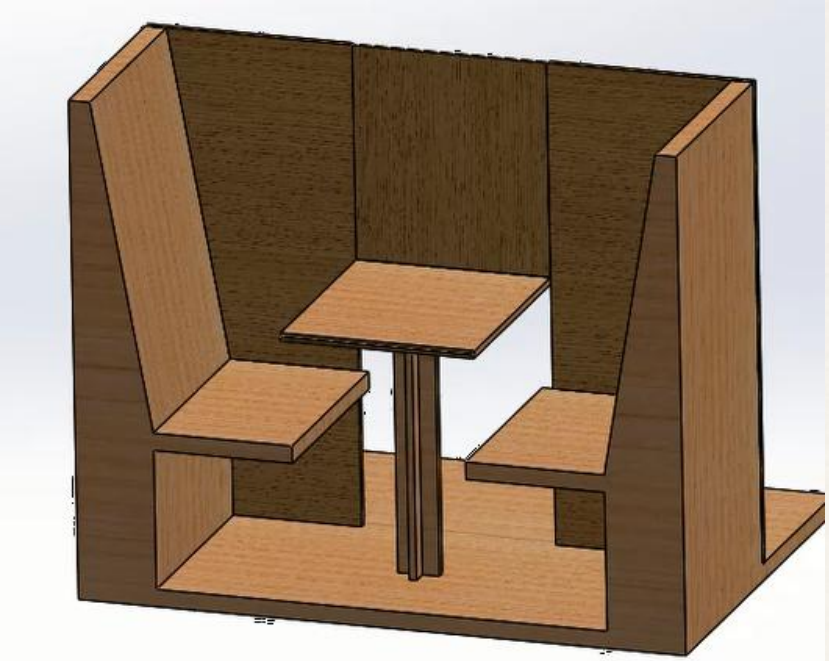
Step# 1:

Small 1x1 Module, comprising of:

2 seats with high back,
opposite to each other

1 Table with central stand
between seats,
with upwards-hinged panel of ca.
table size

Seat-hinged panels as „doors“,
preferably as high as seat back

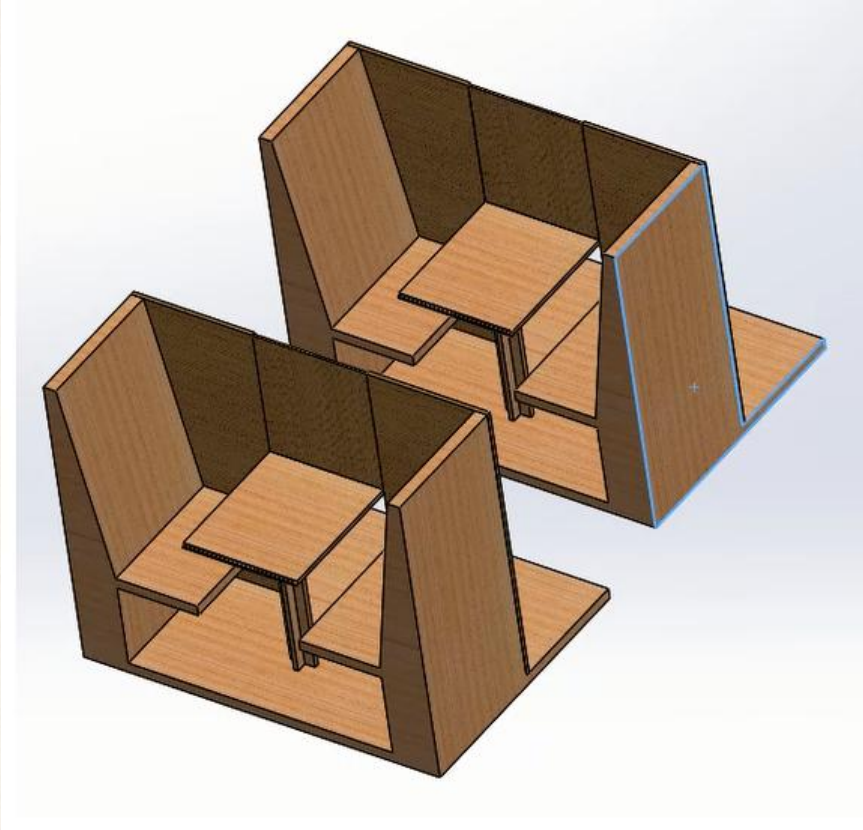


Optional for real module character: base plate, as wide as seat back to seat back, as long as seat back plus hinged panel length

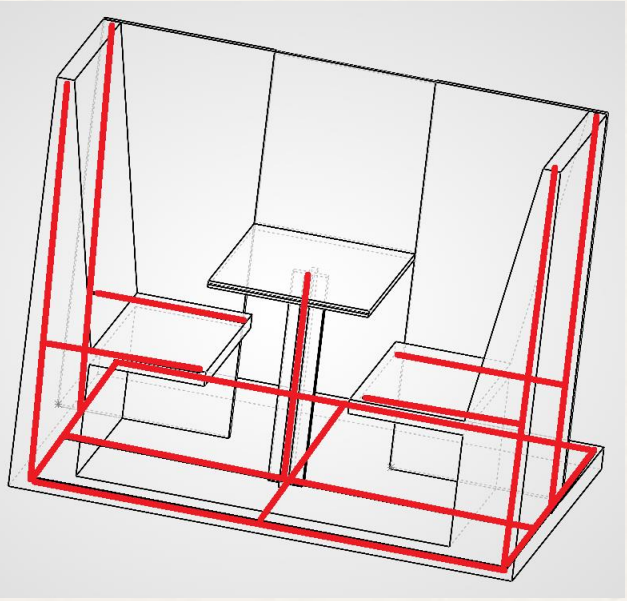
SYSTEM LOGIC #2

Step# 2:

Attach Module 1
to Module 2



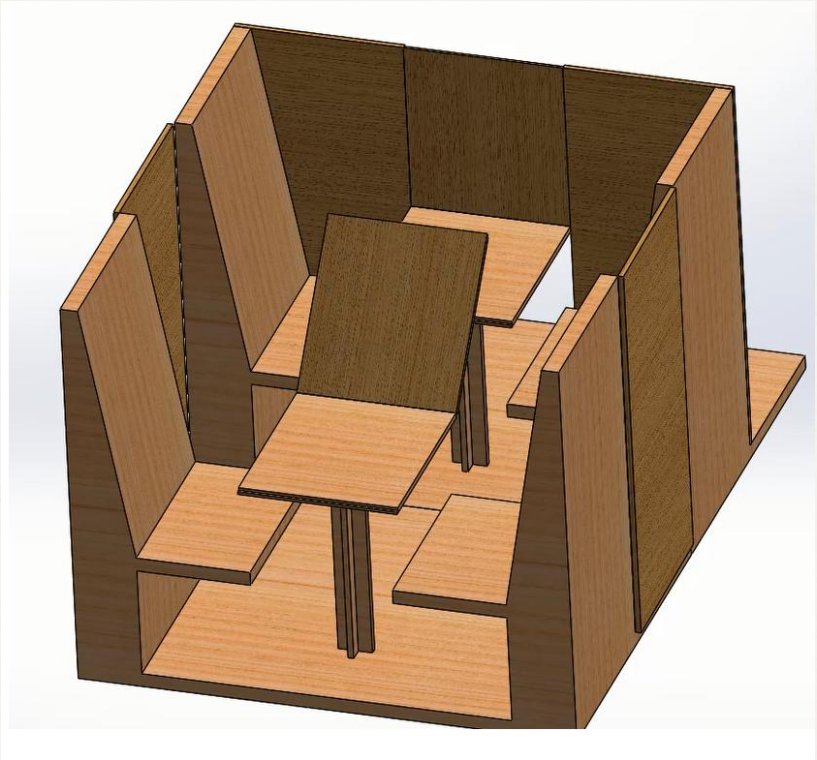
Steel structure, carrying seat, table, panel hinges and base plate



SYSTEM LOGIC #3

Step# 3:

Open panel + Fold down table panel

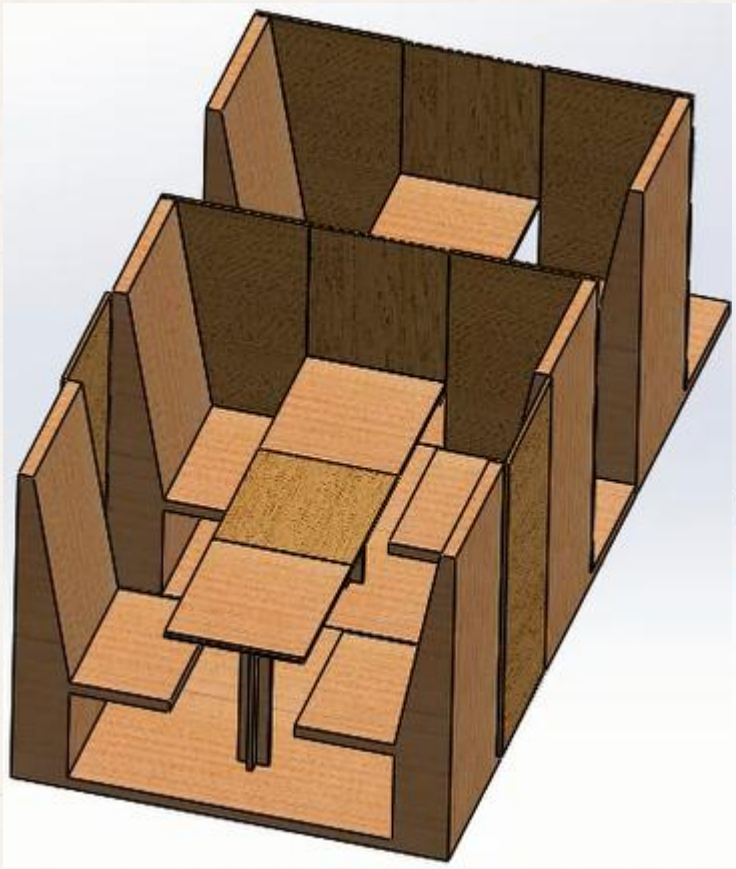


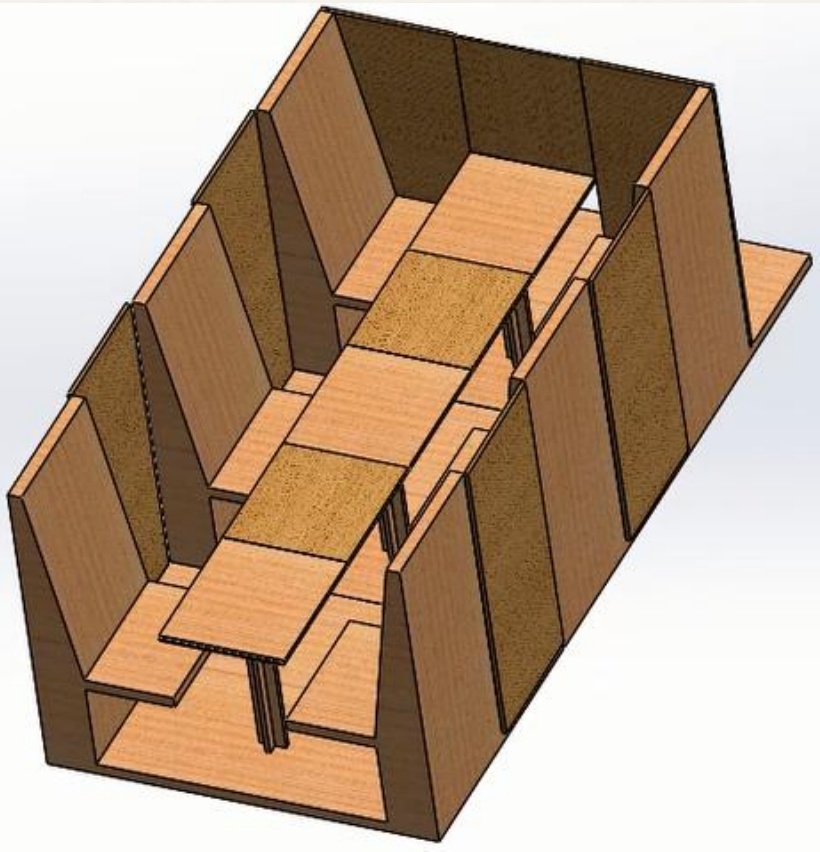
SYSTEM LOGIC #4

Step# 4:

Add as many modules as you want, ie. a 4 seat unit and a 2 seat unit, just convert in seconds

Create 3x 2 seat units, 1x4 seat & 1x2 seat units, 1x6 seat unit or as many group seats as you have modules, w/o any furniture pushing





Film

Structural Concept & Engineering Proof
System Overview

System Logic
- Fully self-supporting steel frame (no anchoring)
- Cantilever seat + cantilever table
- Load transfer via base frame + cross traverses
- Closed load path within module

Seat (RHS 60×30×3)
- Deflection: **0.76 mm**
- Safety factor: **3.33**

Table (RHS 50×30×3)
- Deflection: **1.64 mm**
- Safety factor: **2.27**

Load Case
Design Load (worst case)
120 kg user load
Applied at cantilever tip

Element	Length
Seat	450 mm
Table	500 mm

Structural Validation – Seat & Table

Assumptions: Load = 120 kg = 1177 N; Steel = S235; E = 210,000 N/mm²; Worst case = full load at cantilever tip

Seat Cantilever
Profile
RHS 60×30×3 mm
Length L = 450 mm
Math
M = F × L
M = 1177 × 450
M = 529,650 Nmm
sigma = M / W
sigma ≈ 70.6 MPa

deflection = F × L³ / (3 × E × I)
deflection = 1177 × 450³ / (3 × 210,000 × 225,072)
deflection ≈ 0.76 mm
safety factor = 235 / 70.6
safety factor ≈ 3.33
Result
Max stress: ~71 MPa
Deflection: ~0.76 mm
Safety factor: ~3.3

Table Cantilever
Profile
RHS 50×30×3 mm
Length L = 500 mm
Math
M = F × L
M = 1177 × 500
M = 588,500 Nmm
sigma = M / W
sigma ≈ 103.5 MPa

deflection = F × L³ / (3 × E × I)
deflection = 1177 × 500³ / (3 × 210,000 × 142,132)
deflection ≈ 1.64 mm
safety factor = 235 / 103.5
safety factor ≈ 2.27
Result
Max stress: ~104 MPa
Deflection: ~1.64 mm
Safety factor: ~2.3

All structural components meet safety requirements with low deflection (<2 mm) under extreme loading, conservative case: full user load applied at outer edge / tip.

CONSTRUCTION SYSTEM & MATERIAL OPTIONS

Modular Steel Structure with Interchangeable Surface Layers

Item	Profile	Length (m)	kg/m	Total kg	€/kg	Material €
Base frame perimeter	RHS 60×40×3	5.20	4.43	23.04	0.80	18.43
Vertical side supports	RHS 60×40×3	2.40	4.43	10.63	0.80	8.50
Seat arms (2x)	RHS 60×30×3	2.00	3.43	6.86	0.80	5.49
Main table traverse	RHS 80×40×3	1.10	5.62	6.18	0.80	4.94
Secondary floor traverses	RHS 40×40×2	2.40	2.42	5.81	0.80	4.65
Table arm	RHS 50×30×3	1.00	3.06	3.06	0.80	2.45
Table column	RHS 60×60×3	0.72	5.36	3.86	0.80	3.09
Node / base / connection plates	6–8 mm plate	—	—	9.00	0.80	7.20
TOTAL		**14.82 m**		**68.44 kg**		**54.75 €**

WOOD (Premium / Hospitality)
Construction
•18–21 mm birch plywood
•HPL or PU coating
•Mounted on steel frame

Characteristics
•Warm, tactile
•Acoustic damping
•High-end interior fit

Use Cases
•Coworking
•Lounges
•Hospitality

One structural platform - multiple surface configurations depending on environment:

STEEL (Public / Heavy Use)
Construction
•2.0–2.5 mm steel sheet
•Powder-coated or stainless
•Supported by steel grid

Characteristics
•High durability
•Easy cleaning
•Vandal-resistant

Use Cases
•Airports
•Fast food
•Public infrastructure

280-450€ is for fabricated steel structure:
•raw steel
•cutting
•drilling / prep
•jigging
•welding
•grinding / cleanup
•coating / powder coat
•handling / scrap / shop overhead

COST STRUCTURE & SCALABILITY

Industrial Cost Model & Scalability

Cost per Module

Wood Variant

Category	Cost
Steel structure (fabricated)	**280 – 400 €**
Components (wood, panels, seat)	220 – 350 €
Assembly & logistics	150 – 200 €
Total	**650 – 950 €**

Steel Variant

Category	Cost
Steel structure (fabricated)	**300 – 450 €**
Components (reduced)	180 – 250 €
Assembly & logistics	120 – 150 €
Total	**600 – 850 €**

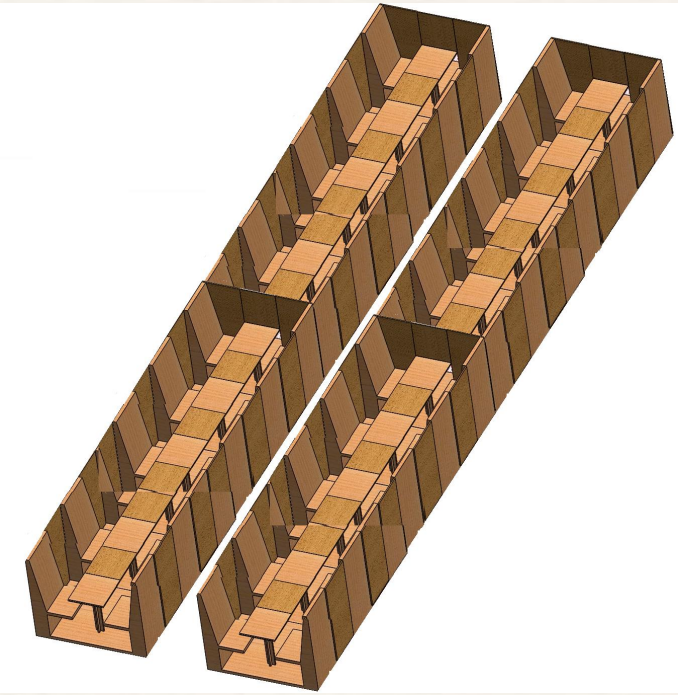
Segment	Variant
Fast food	Steel
Airports	Steel / hybrid
Hospitality	Wood
Offices / coworking	Wood
Public spaces	Steel

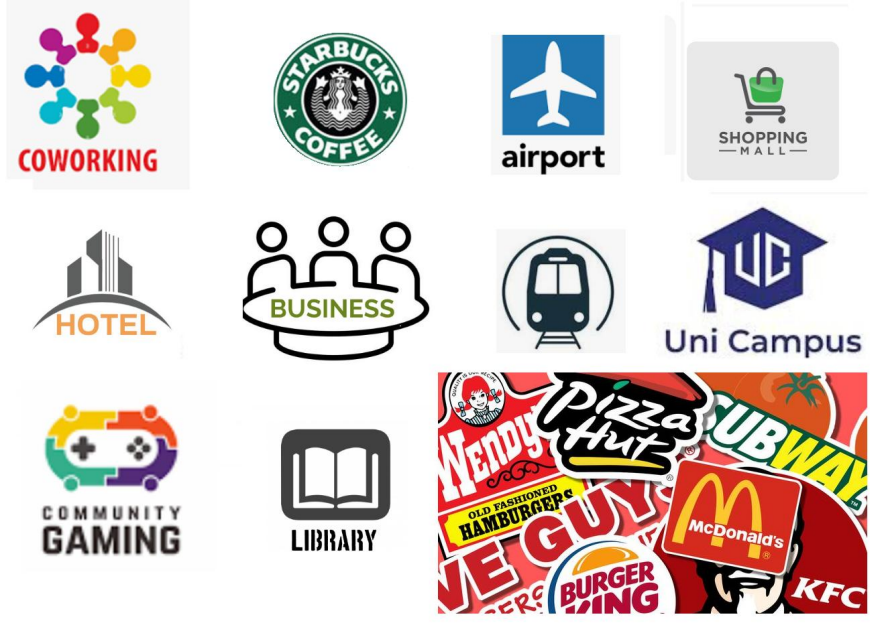
Scaled Production (1,000 units)
Wood variant: 550–750 € per module
Steel variant: 500–650 € per module

Validated engineering + scalable manufacturing + adaptable material strategy = deployable product system

USE CASES

- Co-working: privacy + instant collaboration
- Hospitality (food/coffee-chains): higher seat efficiency
- Airports, Train stations, Malls: controlled + flexible usage





PRODUCT ARCHITECTURE #1

1. STRUCTURAL CORE

Steel backbone inside facade

- Load-bearing rail system fixed to façade-walls
- Transfers all loads (users + dynamic forces) into base plate
- Base plate eliminates floor contact → **cleaning + space efficiency**

Cantilever arms (ie. rectangular steel)

- High stiffness / low deflection design
- Supports seat + table + panel-hinges
- Dimensioned for **2-person dynamic load case**

2. FUNCTIONAL ELEMENTS

•**Seat** module (sheet metal + padding optional), or MFC, or multiplex, or injection-molded seat shell from existing production
Thin, durable, vandal-resistant
Optimized for high-frequency public use

•**table**
Integrated into structure, super rigid if stand is welded to bar structure in base plate

•**Rotating side and table panels**
Metal or MFC or particle board with cover like leather etc, simple hinge mechanism (low failure risk)
Converts instantly between: closed=private mode
open=shared mode

PRODUCT ARCHITECTURE #2

3. SYSTEM PRINCIPLE

No moving furniture

→ transformation happens *within the module*

Discrete states (binary logic)

•Closed → 1–2 users (private)

•Open → group configuration (shared)

Linear scalability

•Modules connect seamlessly along wall, also for electricity (chain-connection)

•Unlimited expansion without redesign

4. INDUSTRIAL

Manufacturing compatibility

•Laser-cut metal sheets or CNC-beam-sawn MFC

•Standard steel profiles

•Simple hinge components

Assembly

•Fast wall installation

•Pre-assembled modules

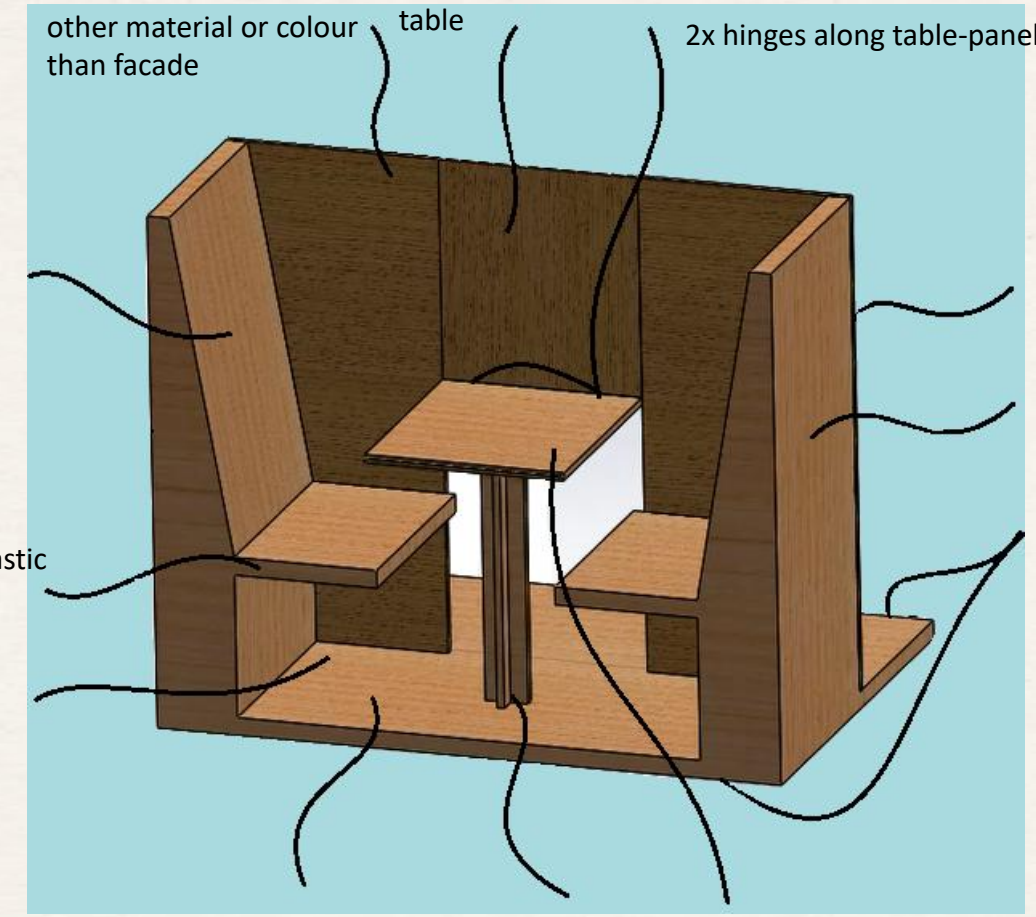
Maintenance

•Minimal moving parts

•Easy replacement of single elements

•Easy to clean (no chair legs)

PRODUCT ARCHITECTURE #3



Economics #1

Market Definition (TAM / SAM / SOM)

Global Contract Furniture Market (TAM)

- ~70–80 Mrd. USD (2024 real market size)
  Contract seating segment: ~20–40 Mrd. USD
  Includes office, hospitality, and public environments

Relevant Target Segment (SAM)

- HoReCa, co-working, public waiting areas
  ~8–20 Mrd. USD
  (~40–60% of contract seating)

Serviceable Market Entry (SOM)

- Initial reachable niche (with industrial partner)
  ~100–500 Mio. USD

Positioning: A new sub-category within seating systems:

Dynamic privacy + collaboration without reconfiguration

Economics #2

Revenue Potential (3–5 Years)

Market focus: Germany, France, Italy
Combined SAM: ~5–15 B USD

Realistic market penetration:
0.05% – 0.15%

Estimated annual revenue:
→ **3 – 15 Mio. USD**

Ramp-up scenario

- Year 1–2: **0.5 – 2 Mio. USD**
- Year 3–4: **5 – 12 Mio. USD**
- Year 5: **~10 – 15 Mio. USD**

Economics #3

Cost-Engineered for Scalable HoReCa Deployment

Core Principle:

- **MFC-dominant architecture** (80–90% of visible volume)
- **Minimal steel core** for structural load paths only
- **No complex mechanics** → hinge-based transformation
- **Designed for batch production, not craftsmanship**
- **Industrial Cost Structure (per module)**
- **Target production cost:**
  → **530 – 750 € (series production)**
- **Current estimate:**
  → **600 – 950 € (low–mid volume)**

Cost Breakdown Logic

- **Steel structure (hidden core):** 280 – 450 €
  → vertical back supports + central traverse + welded table arm
- **MFC components (major share):** 200 – 320 €
  → seats, backs, panels, table surfaces
- **Hardware & hinges:** 50 – 120 €
  → standard, low-complexity components
- **Assembly & packaging:** 100 – 150 €
  → optimized for repeatable installation

Why This Works

•Fully compatible with **existing MFC production lines**
•No new manufacturing ecosystem required
•High **material cost efficiency (panel-based design)**
•Steel reduced to **pure function (not volume)**
•Enables **price competitiveness for chains like McDonald's**

Industrialization Strategy

•Flat panel logic → CNC / beam saw ready
•Repetitive geometry → **scalable series production**
•Pre-assembled steel core + plug-on MFC parts
•Optional: **flat-pack logistics (cost reduction in transport)**

Margin Potential

Target selling price: **1,500 – 2,500 € per module**
Production cost target: **550-750 €**
→ **Gross margin: 50–70%**

Bottom Line

Designed like a system , not furniture, with predictable cost, scalable production and high-margin category expansion

Economics #4

Unit Cost Structure - Per Module (2 Seats)

Cost Table (Industrial Estimate)

Component	Description	Cost (€)
Steel Core Structure	Vertical back supports, central traverse, welded table arm	**280 – 450**
MFC Components	Seats, back panels, side panels, table surfaces	**200 – 320**
Hardware & Hinges	Standard hinges, connectors, inserts	**50 – 120**
Assembly & Packaging	Factory assembly, logistics preparation	**100 – 150**

Total Production Cost
→ **Low–mid volume: 600 – 950 €**
→ **Target (series production): 550 – 750 €**

Cost Efficiency Logic
80–90% panel-based (MFC) → low material cost
Steel only where structurally required
Standard components only (no custom mechanics)
Repeatable modules → economies of scale

Economics #5

Manufacturing Flow - Designed for Industrial Scale

1. Steel Core Fabrication (Structural Backbone)
Laser-cut standard steel profiles
Welded into **modular core frame**:
- vertical back supports
- back-to-back traverse
- central table arm

Surface treatment (powder coating or anti-corrosion)
→ **Output:** 1 pre-assembled structural unit per module

2. MFC Panel Production (High-Volume Core)
Standard **MFC boards (18–25 mm)**
CNC cutting / beam saw processing
Edge banding (industrial standard)
Components:
seat panels
back panels (with steel interface cut-outs)
side panels (hinged)
table surfaces
→ **Output:** flat, stackable panel kit

3. Hardware Integration (Pre-Assembly)
Installation of:
- hinges (panels + table)
- threaded inserts / connectors
- stop elements / dampers (optional)

Pre-drilled interfaces → **no manual alignment needed**
→ **Output:** ready-to-mount panel system

4. Final Assembly (Factory or On-Site)
Option A - **Factory pre-assembly**
Steel core + MFC panels fully assembled
Delivered as plug-and-install module
Option B - **Semi-knocked-down (SKD)**
Steel core pre-assembled
MFC panels mounted on-site
→ reduces transport volume

5. Installation (Customer Site)
Wall-mounted or base-plate positioning
Linear module connection (plug-in logic)
Optional electrical chain integration
→ **No floor fixing complexity / no moving furniture**

Industrial Efficiency Drivers
Repetition of identical modules
Separation of **structure (steel)** and **volume (MFC)**
No tight tolerances between moving parts
Low-skilled assembly possible

Scalability Logic
Same production for:
- 2-seat module
- 4-seat / 6-seat configurations (via combination)

→ **No redesign required for scaling**

Key Message (Bottom Line)
Built like a modular system architecture
- not traditional furniture production
→ faster ramp-up
→ predictable costs
→ industrial scalability from day one

Economics #6

Unit Economics (per module)

Selling price
€1,500 – €2,500
Production cost low volume
€600 – €950
Production cost 1000 units
€550 – €750
Target in series: €550 – €750
Realistical gross margin
50 – 70%
Additional revenue
Installation: €200 – €500
Transport: project-dependent
Industrial relevance
Compatible with existing MFC production
Minimal steel core structure
Scalable in modular series

Economics #7

ROI for Customer (Hospitality Example)

Initial situation
50 m² space
20 seats
~2,000 € daily revenue

With system
Optimized seat usage
~30 seats
~3,000 € daily revenue

Impact
+50% revenue on same floor space
No layout reconfiguration required
Financial Impact (realistic)

Incremental revenue:
→ **~1,000 € per day**

Estimated contribution margin:
→ **20-30%** *(>industry typical for QSR)*

Incremental profit:
→ **~200 – 300 € per day**

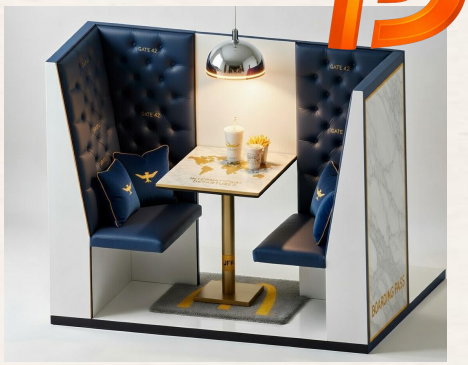
Payback Period
Investment:
→ **~20,000 €**
Return:
→ **~200 – 300 € per day**
Payback:
→ **~70 – 100 days**
(~10–14 weeks)
After payback
→ **Direct profit increase for operator**

Home Classic

Home Modern/**Ho**tel

Fast Food: Mc Donalds

Airport Restauran

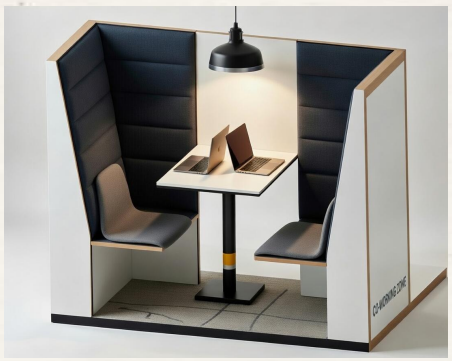


Café very classic

Gaming Café

Café chain: Starbucks

Co-working spaces

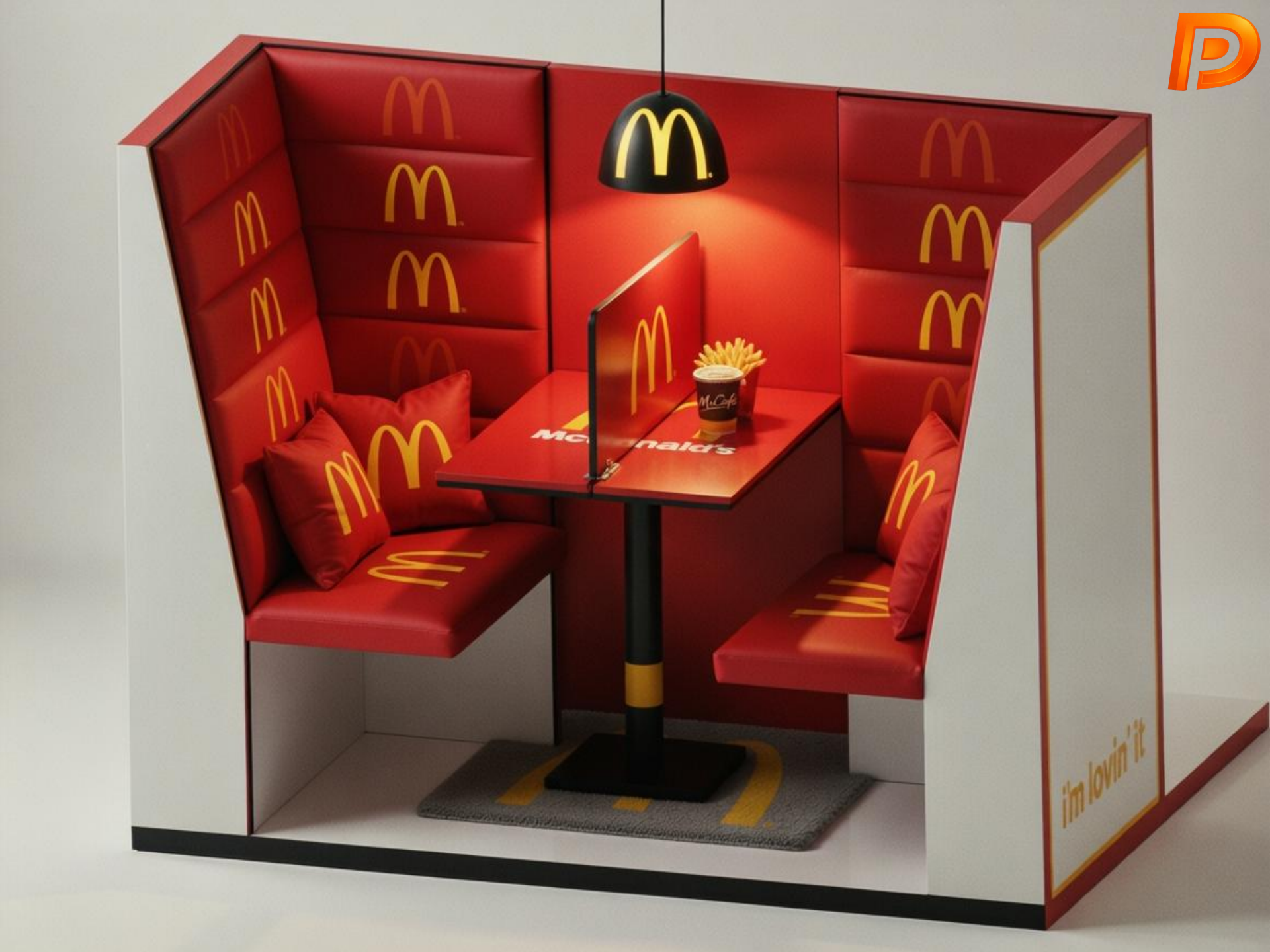


Lounge Style

Solid Restaurant/Bar 4&2 modules

cheap **Re**, 4 modules, 2 seat config

10 modules for Starbucks=**Ca**


i'm lovin' it


GATE 42
GATE 42
GATE 42
GATE
INTERNATIONAL DEPARTURES
JFK
BOARDING PASS


Kaffeehaus
Wien
Kaffeehaus Alt-Wien
Kaffeehaus
TAGESZEITUNG


GAMER ZONE
GAME LOUNGE
STREAMER HUB
LEADERBOARD


STARBUCKS
COFFEE
STARBUCKS
COFFEE
STARBUC
COFFE


CO-WORKING ZONE


STARBUCKS
COFFEE

WHY THIS WORKS, Business OPPORTUNITY

- From furniture → spatial system, Expands seating into a new product category
- New scalable product category
- Fits existing production capabilities
- High-margin modular system
- Strong demand in HoReCa and co-working
- Clear ROI for customers

Make a pilot: 4–10 modules!!!

I would like to pursue a dual training program alongside my two-year master's degree (one week of study at Besign in Nice, followed by three weeks working with the company, alternating between Nice and ?), in order to work on this project with you during that time. **Would you be interested?**

Thank you, questions?