Assignment 2

Focus-Collaboration Border Partition System

Design Development

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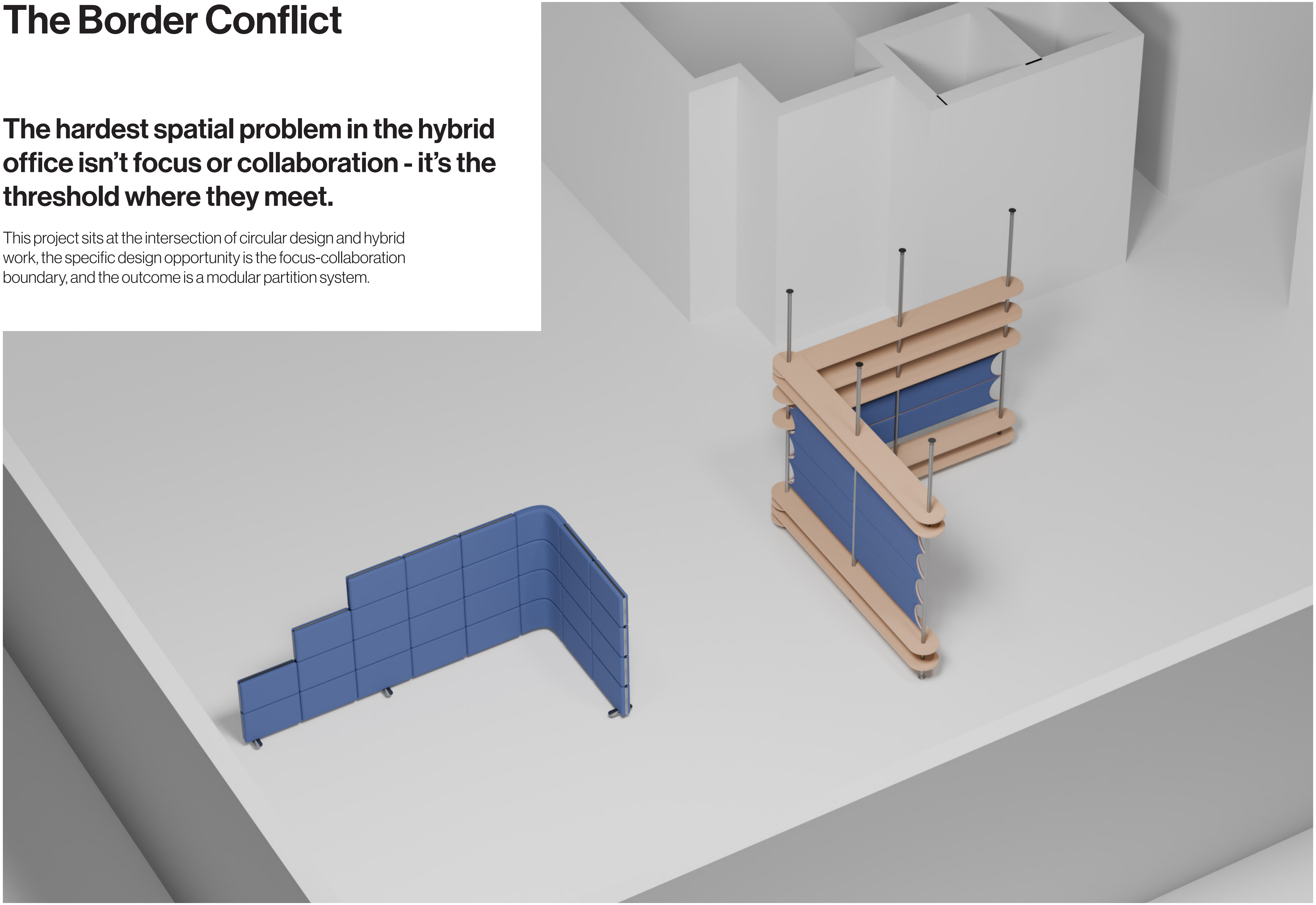
The Border Conflict

The hardest spatial problem in the hybrid office isn't focus or collaboration - it's the threshold where they meet.

This project sits at the intersection of circular design and hybrid work, the specific design opportunity is the focus-collaboration boundary, and the outcome is a modular partition system.



Circularity

How circularity shapes specific design decisions.

A circular economy operates on the principle that materials and products should be maintained at their highest value through continuous cycles of use, recovery, and regeneration, rather than following a linear path from extraction to disposal (McDonough & Braungart, 2002). The Cradle to Cradle framework, developed by McDonough and Braungart provides a foundational structure for this approach, evaluating products across five categories - material health, product circularity, climate protection, water and soil stewardship, and social fairness. Central to this framework is the distinction between biological nutrients, which can safely return to ecological systems, and technical nutrients, which circulate through industrial reuse and recycling (McDonough & Braungart, 2013).

For furniture systems, circularity demands specific design strategies. Design for disassembly requires mechanical fasteners and modular components that allow non-destructive separation at end of life (Bakker et al., 2015). Product-as-a-service models shift ownership from the buyer to the manufacturer, incentivising durability, repairability, and material recovery (Braungart & McDonough, 2002). Lifecycle assessment methods enable designers to evaluate environmental impact across the full product lifespan, from raw material extraction through manufacturing, use, and end-of-life processing (ISO, 2006).

Biological vs Technical Nutrients

Every material must belong to one cycle. No hybrids that can't be separated.

Design for Disassembly

Mechanical fasteners only. No adhesives, no welding. Every joint is reversible.

Product-as-a-Service

Manufacturer retains ownership. Incentivises durability, repairability, and return logistics.

Lifecycle Assessment

Environmental impact evaluated across full lifespan - material extraction, manufacture, use, end-of-life.

Material Passport

Every component identifiable, traceable, and assigned to a recovery stream.

Healthy Material Preferences

Mono-Material Preferences, Recycled Input Priority, Non-Toxic Finishes, Local Sourcing, Sheet Yield Optimisation

Regenerative Intent

Beyond reducing harm. Materials and supply chains actively contribute to ecological restoration.

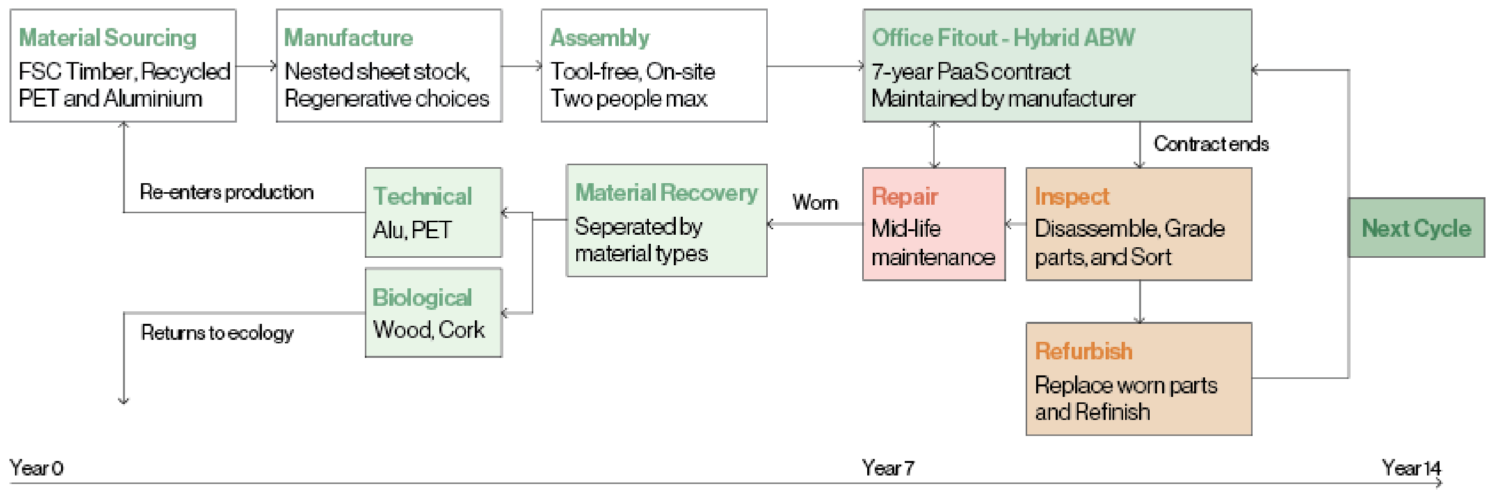


Figure 2 - User to User Product Lifecycle
A partition system designed to outlast any single office.

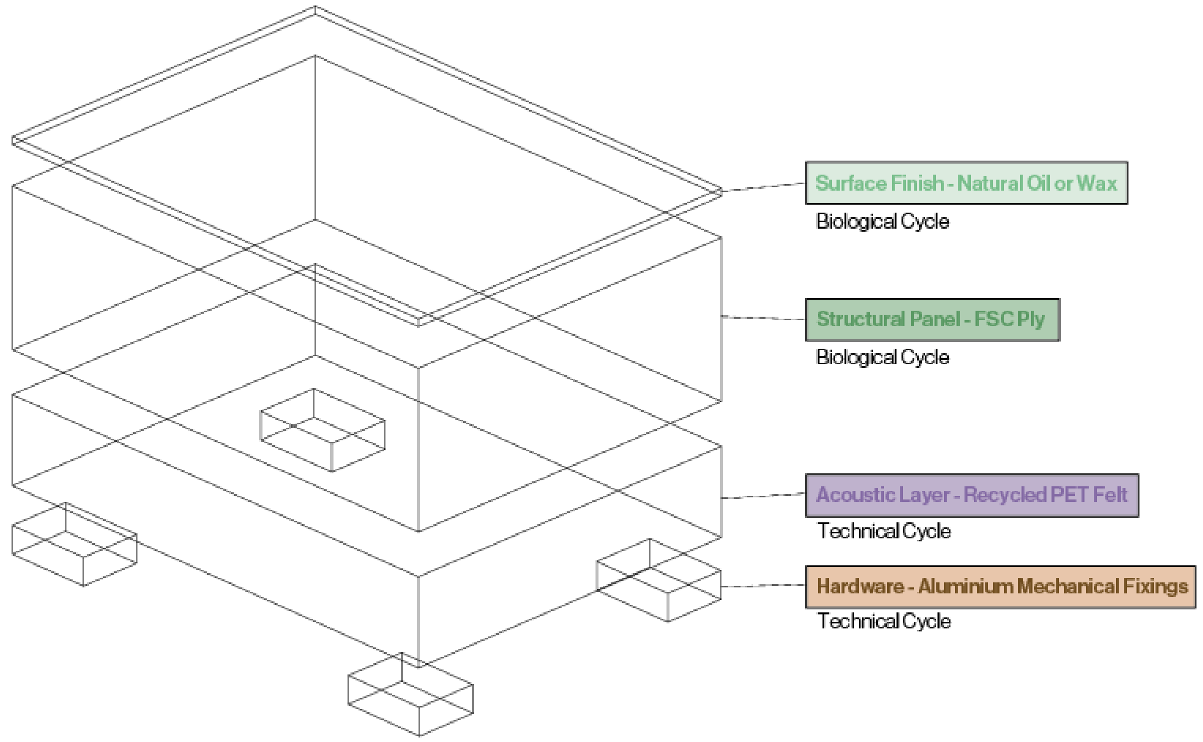


Figure 3 - Material Separation, Responsibility Approach, and Loop Cycle

A partition that transforms between focus and collaboration must be built from components that connect, separate, and reconnect - adaptability through time and space.

Workplace Trends

39% Focus. 27% Collaboration. 275 Daily Interruptions. The transition between work modes is the most occupied space in the office - and the least designed.

The post-pandemic workplace has shifted from a fixed destination to a flexible, activity-driven environment. Office occupancy has recovered to only approximately 71% of pre-pandemic levels, with many organisations reducing their primary footprint (Hensher et al., 2023). Hybrid work, where employees alternate between office, home, and other locations, has become the dominant model across knowledge-work industries (Lauring & Jonasson, 2024).

Contemporary work within these environments is highly fragmented. Employees face an average of 275 interruptions per day, with 60% of meetings occurring ad hoc rather than scheduled (Microsoft, 2025). Nearly half of all employees report their workday feels chaotic and fragmented (Microsoft, 2025). Despite this, employees spend 39% of their time working alone and 27% collaborating in person (Gensler, 2026), confirming that both focused and collaborative modes remain essential. Activity-based work environments respond by providing varied spatial settings rather than fixed desks (Marzban et al., 2022), yet their effectiveness depends on clear spatial legibility and genuine flexibility rather than theoretical modularity rarely exercised in practice (Nanayakkara et al., 2021).

The physical environment itself remains a source of friction. One in four employees have resorted to improvised solutions for ergonomics, temperature, or visual privacy, while noise and meeting space availability remain unresolved (Gensler, 2026). The contemporary office is increasingly understood as a destination for collaboration and culture rather than individual task completion (Hopkins & Bardoel, 2023), placing new demands on furniture systems: they must support fluid transitions between work modes, signal appropriate behaviour through form, and accommodate diverse sensory needs (Balcı et al., 2025; Elsbach & Pratt, 2007).

This project focuses on the spatial condition where these demands converge most intensely: the boundary between focused individual work and collaborative group activity. At this threshold, acoustic requirements conflict, circulation paths intersect, and the furniture system must communicate the transition between fundamentally different work modes. Resolving this boundary through adaptable, circular furniture is the core design opportunity.

The office isn't failing at focus. It isn't failing at collaboration. It's failing at the boundary between them.

This project designs for the transition - not the destination.

Image - 48% of employees describe their workday as chaotic.

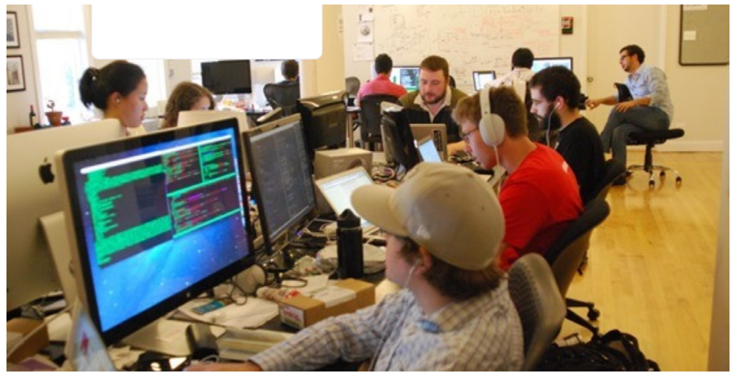


Image - 1 in 4 workers improvise their own spatial fixes, heaphones is a perfect example. When the furniture can't manage the boundary, the user compensates.

Image - 71% occupancy recovery. The furniture assumes full attendance.

While focus and collaboration dominate the workday, the transition between them is constant and unresolved. These transitions occur at shared spatial boundaries, where movement, interaction, and noise intersect.

Personas

Four users, four spatial demands - one boundary condition

Aarav

Age/Gender: 33M
Role: Senior UX Designer
Archetype: Anchor
Pattern: 4 days/week

"I need two hours minimum deep focus or my day is wasted."

Border tension: He's the person being interrupted. His focus is what breaks when the boundary fails.

Patricia

Age/Gender: 35F
Role: Product Manager
Archetype: Drifter
Pattern: 4 days/week

"I'm in a different meeting every hour. I need to grab-and-go."

Border tension: She's the interruption. Her movement through the space is the force that tests the boundary's acoustic and visual performance.

Yuki

Age/Gender: 55F
Role: Senior Developer
Archetype: Anchor
Pattern: 3 days/week

"Open plan is my nightmare. I need walls, silence, and predictability."

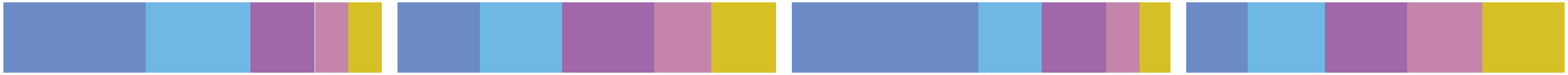
Border tension: She's the benchmark. If the boundary condition works for Yuki, the acoustic strategy is validated. If it doesn't, the system fails its most vulnerable user.

Oscar

Age/Gender: 38M
Role: Account Manager
Archetype: Manager
Pattern: 2-3 days/week

"I'm always in conversation - I don't want to disturb others constantly."

Border tension: He's the external lens. When his client walks through the border between focus areas and the meeting zone, the partition system is doing brand communication, acoustic management, and spatial wayfinding simultaneously.



Activity Bars: Focus Collab Meet Call Social

Aarav needs silence. Patricia is nearby talking to the team. Yuki can hear all of it. Oscar is walking through the middle with a client.

These personas do not need four separate solutions. They need one system that manages the gradient between their competing spatial demands.

Across these four users, 66% of the workday is spent in focus or collaboration. The remaining 33% in meetings, calls, and socialising.

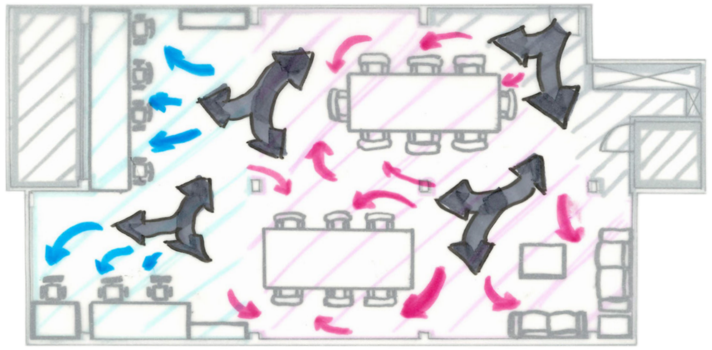
The boundary between work modes is not a gap in the office - it is the design problem. One system, one threshold, four competing demands resolved through a single adaptable partition.

Spatial Study

Three offices - Three scales - One recurring conflict

Small, medium, large scale corporate office spatial study.

Small



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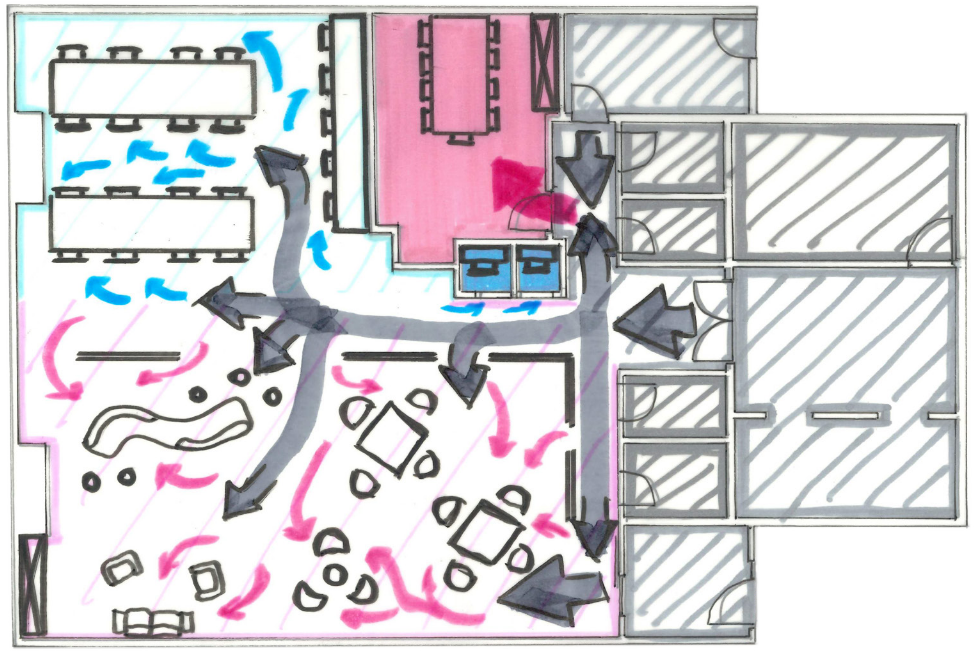
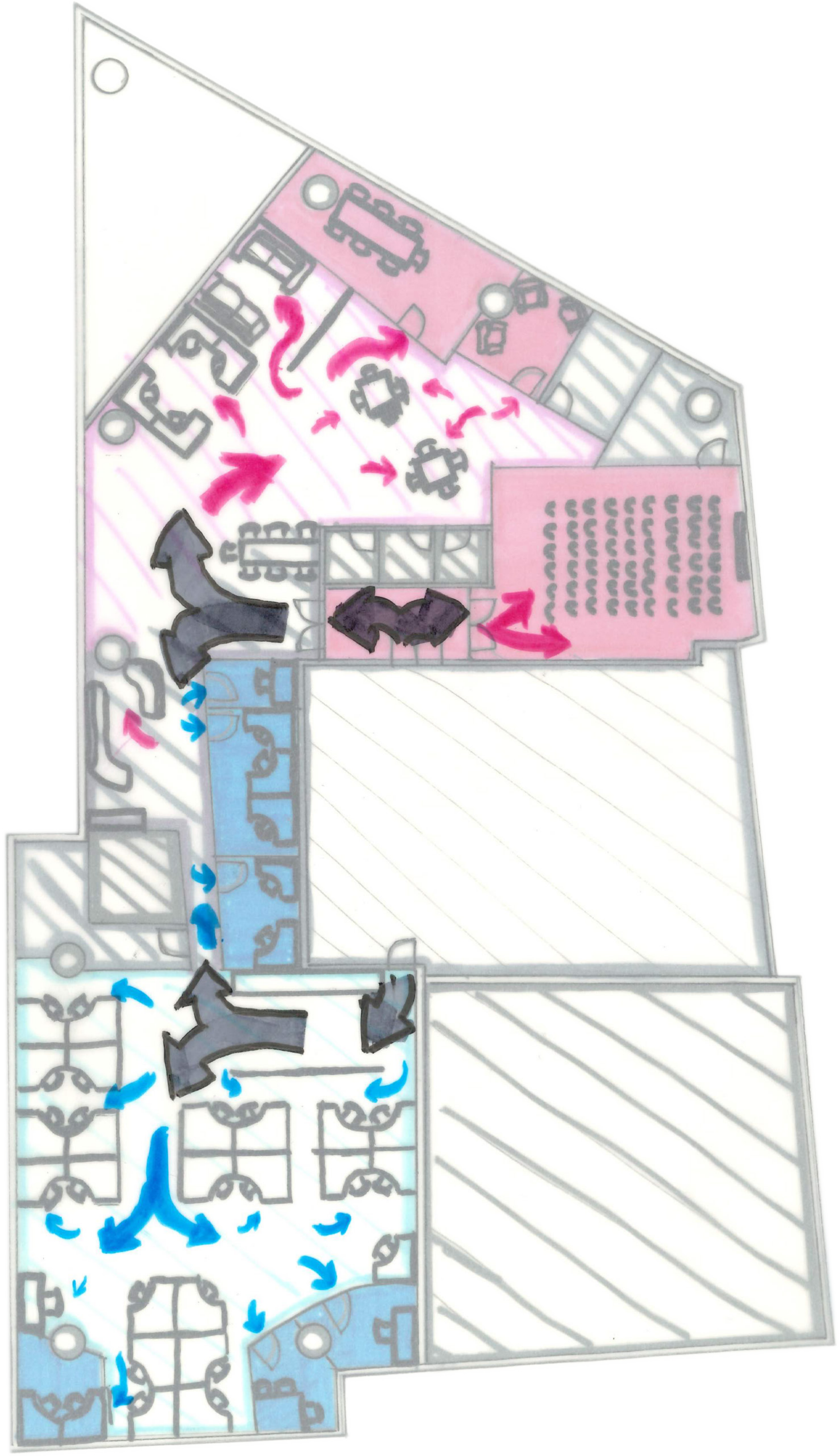


Large



Key

- Deep Focus
- Closed Collab
- Open Focus
- Open Collab
- Amenities
- Focus Traffic
- Collab Traffic
- All Movement

Regardless of office scale, the highest foot traffic and greatest spatial ambiguity occur at the boundary between focus and collaboration zones.

Works modes are not fixed - they fit on a spectrum.

Focus **Collaboration**

Border Design Opportunity

A circular, modular partition system that transitions between focus enclosure and collaborative openness, managing the boundary where work modes, users, and circulation paths converge.

Acoustic Absorption directionally not uniformly.

Mode Switching in under 60 seconds by one person.

Spatial Legibility allows state readable from 5 metres.

Integrated Storage for personal, day-use, and visitor.

Circular Construction with optimised materials and material separation.

Individually Adaptable for accessibility through different users.

Territorial Cues to positively influence behaviour.

This project focuses on the spatial condition where these demands converge most intensely: the boundary between focused individual work and collaborative group activity. At this threshold, acoustic requirements conflict, circulation paths intersect, and the furniture system must communicate the transition between fundamentally different work modes. Resolving this boundary through adaptable, circular furniture is the core design opportunity.

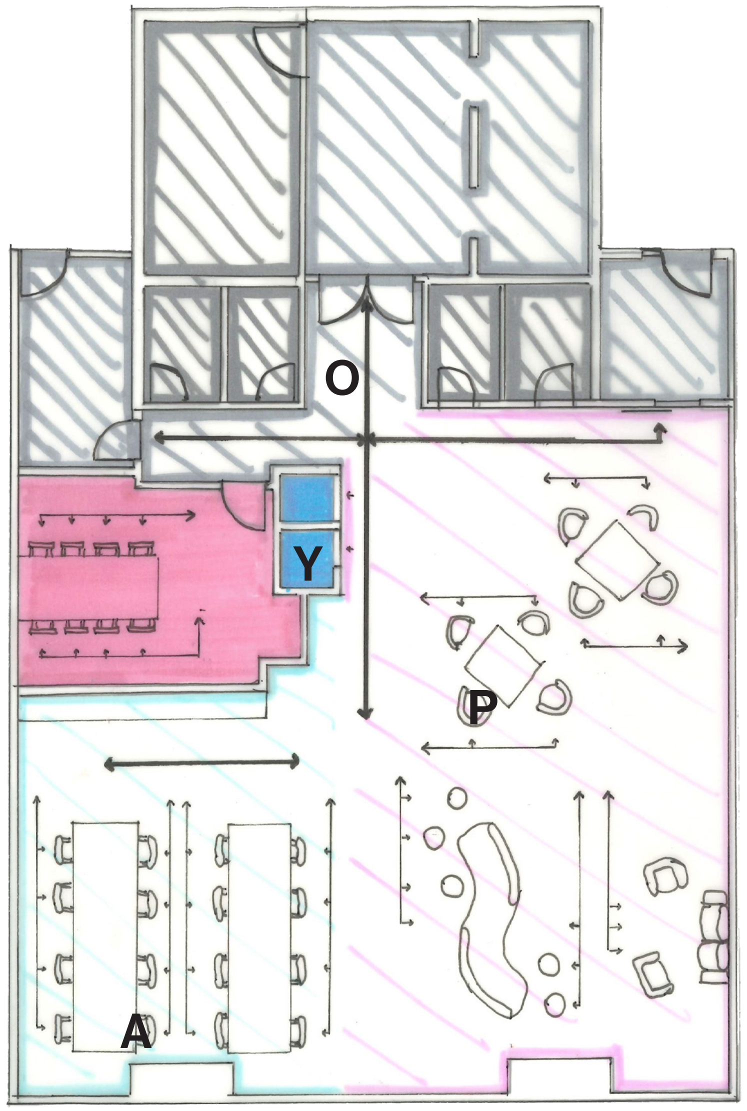


Figure 4 - Primary and Secondary Circulation

Figure 5 - Sound Map

A	**Aarav**	Silently focused
P	**Patricia**	Always different space
Y	**Yuki**	Needs silence
O	**Oscar**	Meeting after meeting

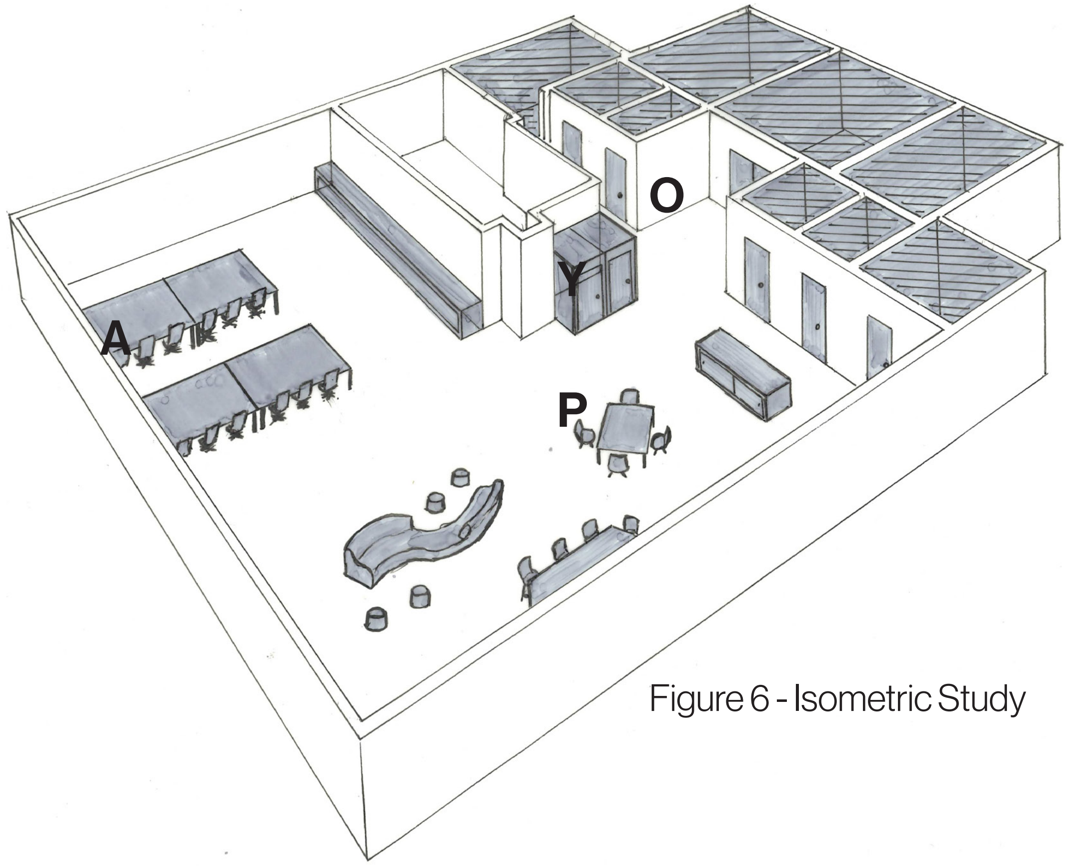
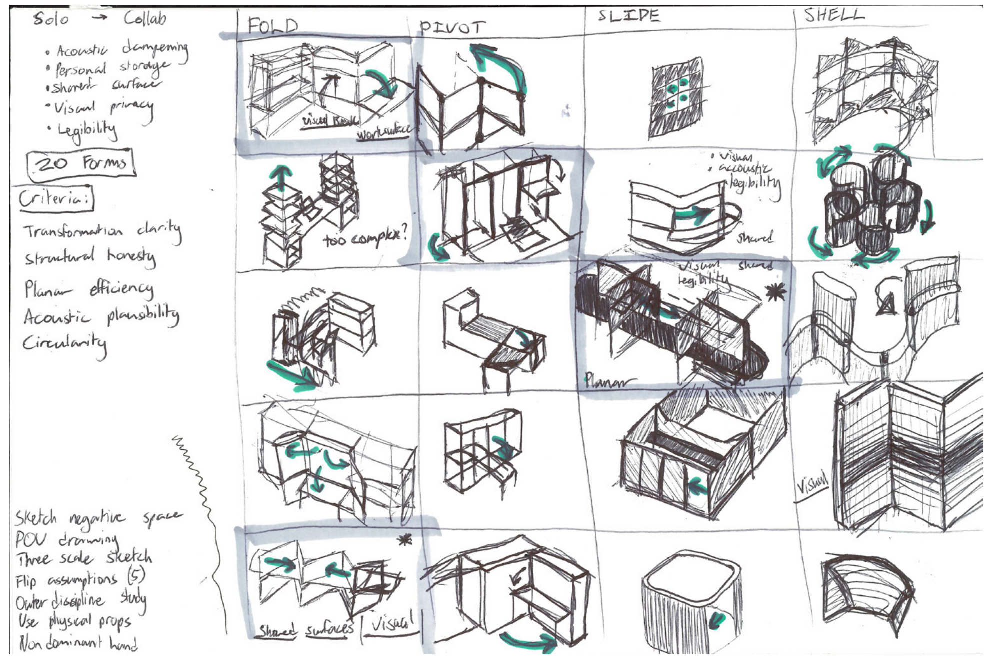


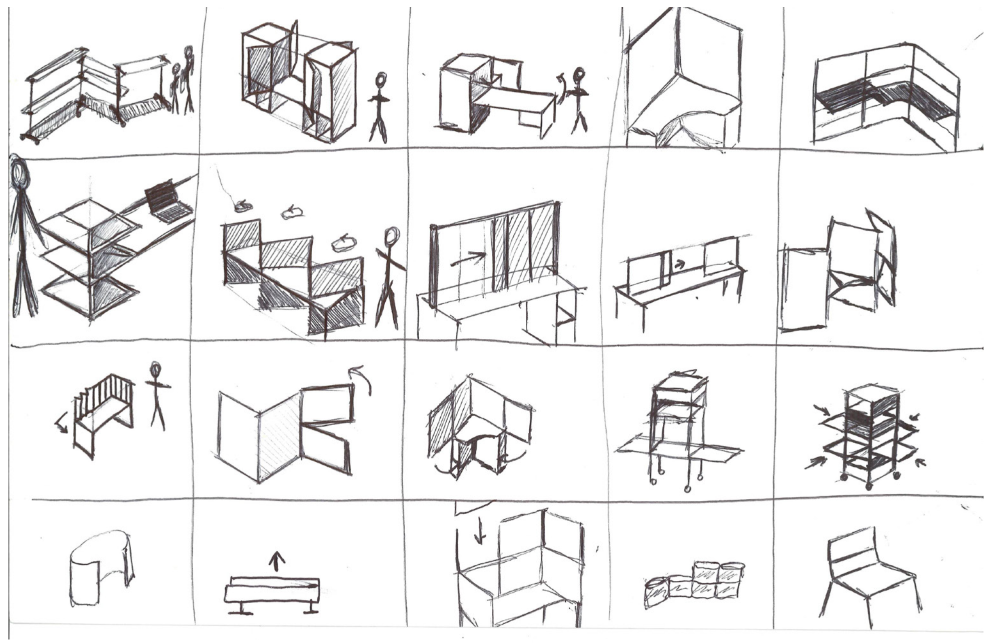
Figure 6 - Isometric Study

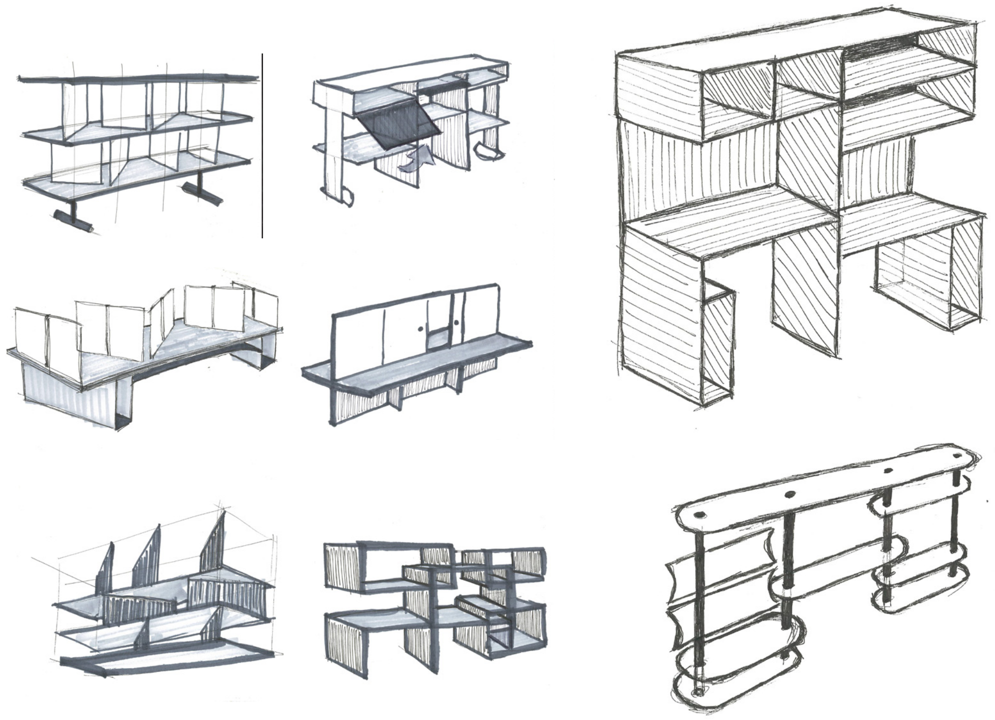
Early Form Development

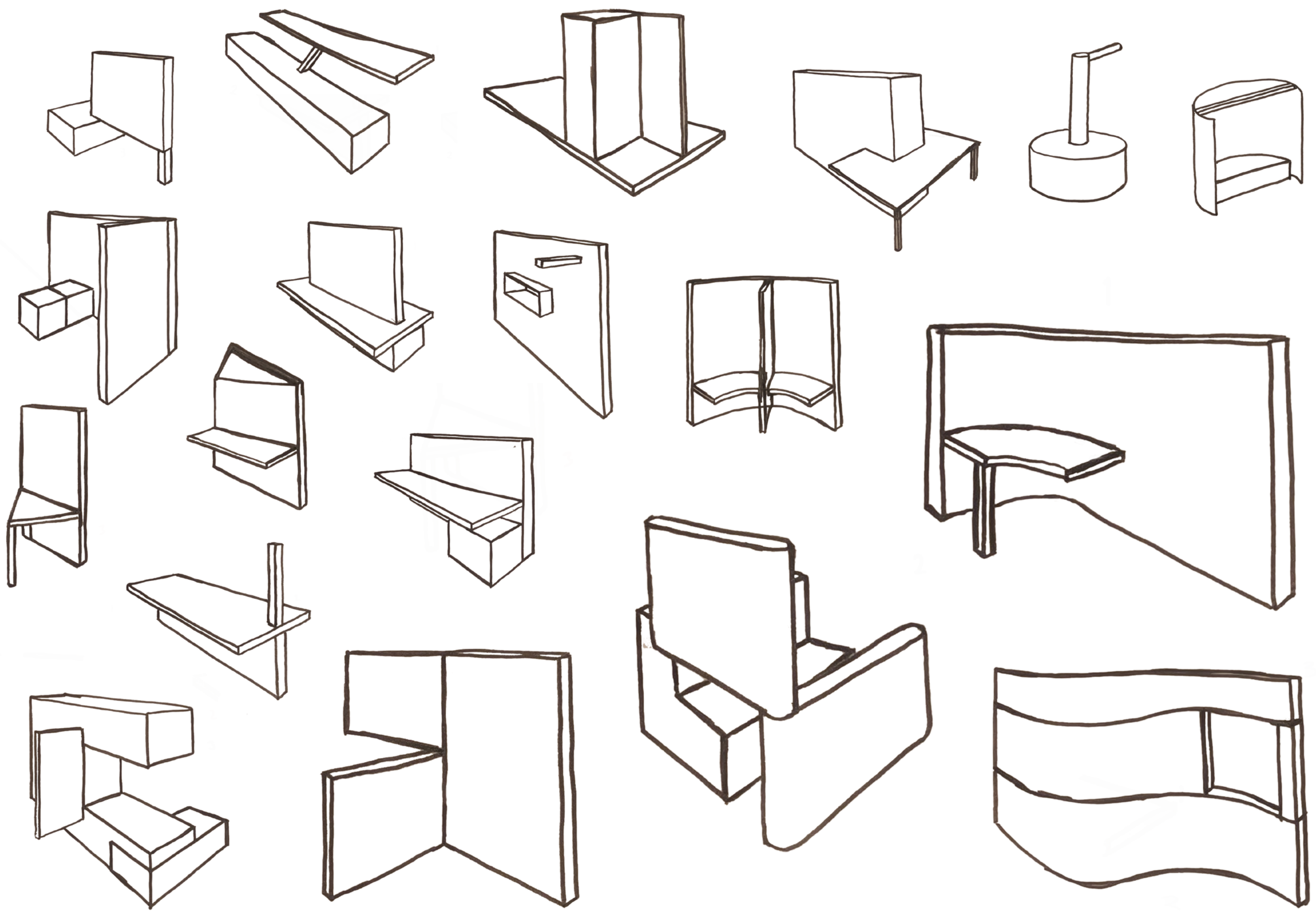
Form development began with a broad divergence across planar operations - fold, pivot, slide, and shell. These were evaluated against five criteria - transformation clarity, structural honesty, planar efficiency, acoustic plausibility, and circularity. Twenty iterations were generated across the matrix, ranging from single-gesture fold configurations to stacked modular shells, testing how different movement logics resolve the focus to collaboration transition. Early fold iterations revealed strong transformation legibility but complex structural requirements. Pivot forms offered the clearest single-gesture operation but introduced comparable assembly complexity. Slide configurations produced the most convincing spatial gradient - particularly the planar screen variants - while shell forms prioritised enclosure quality at the cost of adaptability.

Additionally, a study of twenty visual relationship forms explored spatial structure through plane, mass, and void configuration. Ranging from simple cubic volumes to rounded organic profiles, the study confirmed that vertical spatial partitions are most effective at addressing the border condition - providing simultaneous acoustic and visual separation, and territorial definition between focus and collaboration zones.









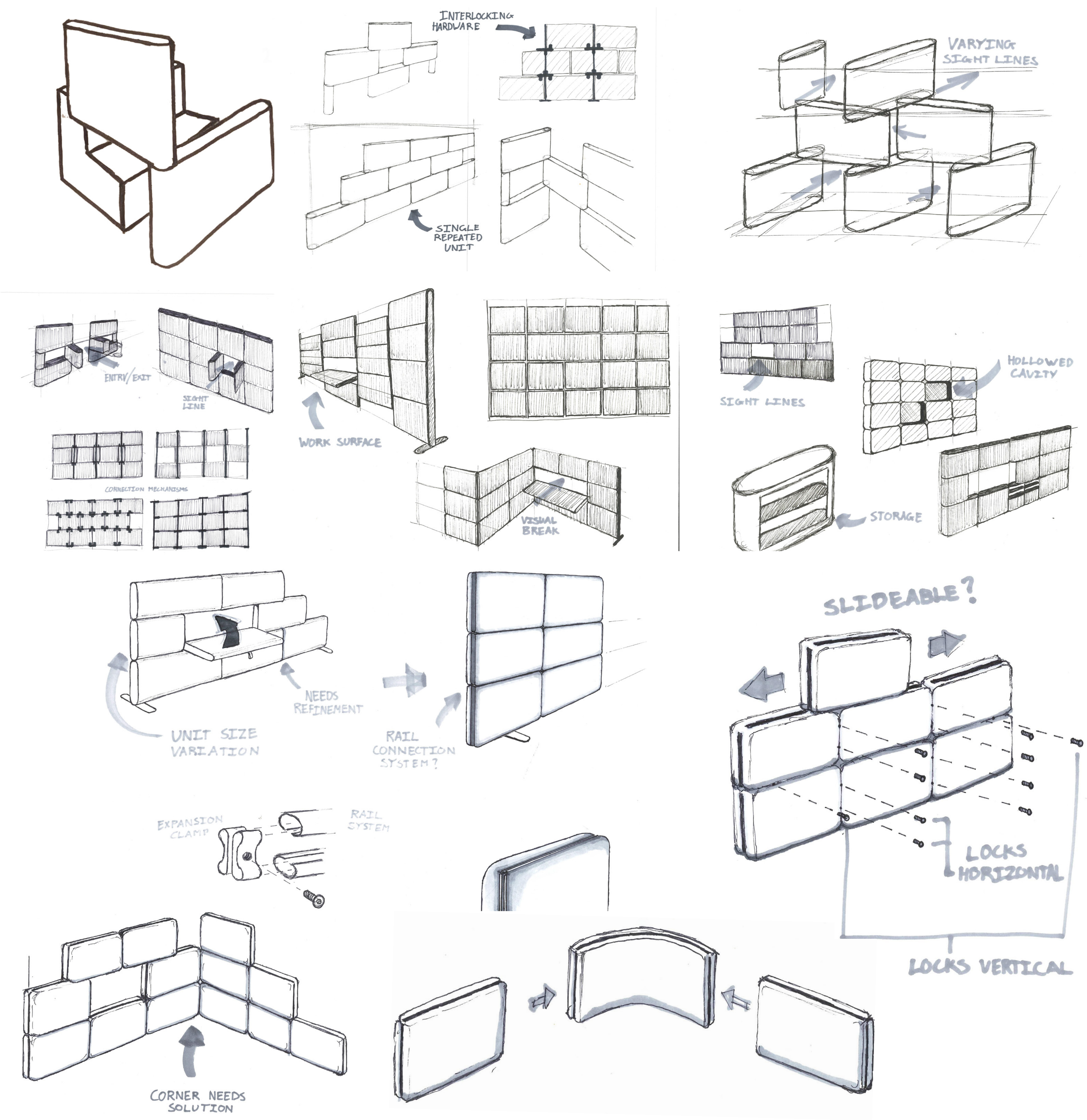
Concept 1 Development

A modular acoustic partition system designed to theoretically expand infinitely. Form development was driven by the project's central narrative - softening the visual and acoustic borders between work zones - through a system of repeated units configured by the end user rather than prescribed by the designer. The starting premise was a single brick-proportioned module, repeated and arranged to form larger partitions. Two questions shaped the early work - how do modules connect, and what configurations does the connection logic permit?

Connection methodologies were explored in parallel. Corner connections - modules turning an angle. End-to-end connections - extending length without visible seam disruption. Brick-like staggered configurations - for visual interest and structural interlock. Spigot inserts - a hidden pin-and-socket connection. Alternating planar orientation - rotating modules 90 degrees between rows to create depth, shadows, and sight lines.
Each approach offered something the others couldn't, and each carried its own compromise. Spigots were clean but limited reconfiguration. Alternating orientation gave visual richness but failed at corners. Brick-stagger read well but needed half-modules to terminate cleanly. No single connection logic could carry the whole system.

Alongside connection studies, the module form itself was iterated along three threads - sight lines, storage integration, and work-surface integration. Feedback from Peter the week before completion identified need for greater system thinking, leading to refinements in corner connection, module size consistency, and focused effort to create a solution that solves the border problem.

Form progression reached its pivotal moment with the rail-clamp system - a horizontal and vertical rail spans each row, and modules attach via an expansion clamp tightened with a single fastener. Individual modules can be moved, restacked, or staggered along the rail without dismantling the assembly. The rail also resolves the ambiguity of corner conditions by allowing the corner to be treated as a dedicated module type. The rail-clamp is an initial concept - but as a system principle it unlocks the assembly, reconfiguration, and disassembly behaviours the project requires.



Concept 1 Development

Module size	Blank	Layout	Per sheet	Utilisation
570 × 770	610 × 810	2 × 3	6	~99%
570 × 570	610 × 610	2 × 4	8	~100%
570 × 448	610 × 488	2 × 5	10	~100%
570 × 366	610 × 406	2 × 6	12	~98%
366 × 770	406 × 810	3 × 3	9	~99%
366 × 570	406 × 610	3 × 4	12	~99%
366 × 448	406 × 488	3 × 5	15	~99%
366 × 366	406 × 406	3 × 6	18	~99%
265 × 570	305 × 610	4 × 4	16	~100%
265 × 448	305 × 488	4 × 5	20	~100%
265 × 265	305 × 305	4 × 8	32	~100%

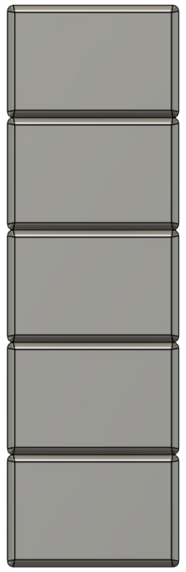
The aesthetic target is a soft, pillowed, modular panel. Exploration surfaced a mono-material story - where possible, recycled PET felt would be used throughout - a closed technical loop. Recycled PET felt is an eco-friendly synthetic made from post-consumer bottles. It dampens sound, is highly durable, and can be dyed for office fit-out customisation. The outer face would be lined with this material, creating a visually warm aesthetic with strong acoustic performance.To further improve performance, a 25mm air gap is introduced between the outer face and the inner structure. EcoZorb - a PET equivalent felt - has been shown to roughly double its absorption when backed by a 25mm gap. Going one step further, a 25mm perforated porous absorber within the gap introduces tortuosity, dissipating more energy than the simple quarter-wavelength reflection a hollow cavity provides.

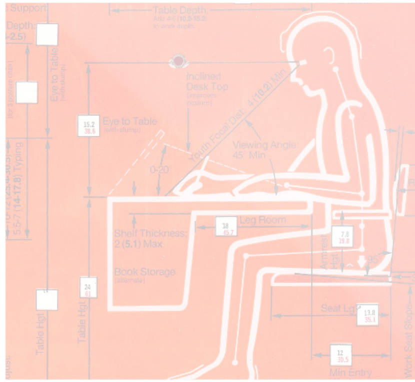
On the biological cycle side, cork offers a compelling alternative. Harvested from living trees without harming them, carbon-negative, antimicrobial, and inherently fire-resistant, cork carries a strong set of natural credentials. These come at a cost - cork is 2-3x the weight of PET felt, increasing freight cost and compromising user ergonomics during installation. Cork's closed-cell structure also reflects sound rather than absorbing it, though this can be addressed by perforating the outer face and relying on the same internal absorbing structure used in the PET version.

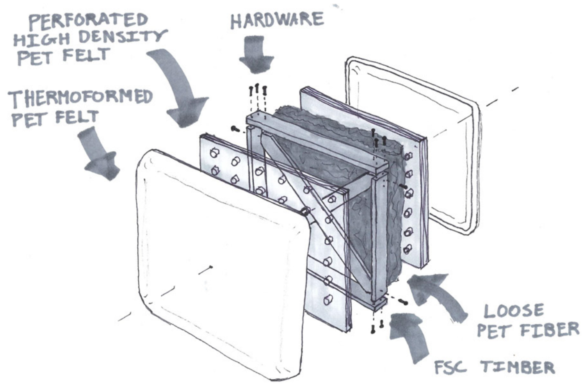
Both pathways offer a plausible material solution. A full LCA is required to determine which delivers the stronger environmental case across manufacture, transport, use, and end-of-life.

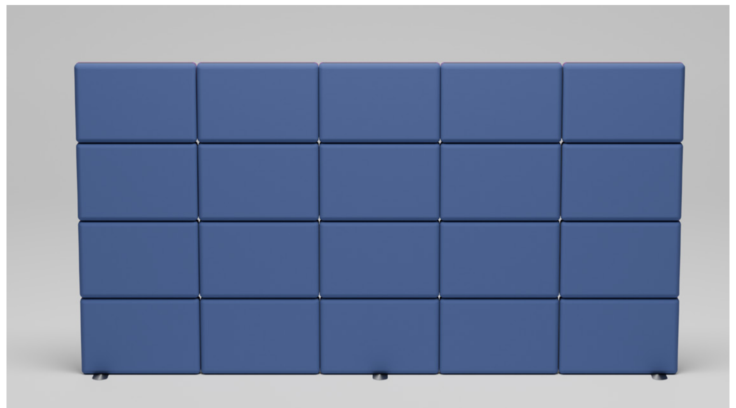
The sizing of the module requires deeper exploration, however, initial iteration and research found a comfortable cohesion between module size and sheet yield. Sizing of the module was also driven by the aesthetic of bricks at distance, and useful partition height without requiring too many modules.
The target was a 400 x 800mm module - four modules tall - 1600mm partition - full visual privacy at seated head height - five modules tall - 2000mm partition - full standing privacy. Large enough to easily create seperation between spaces, but easy enough for a single person to move around.

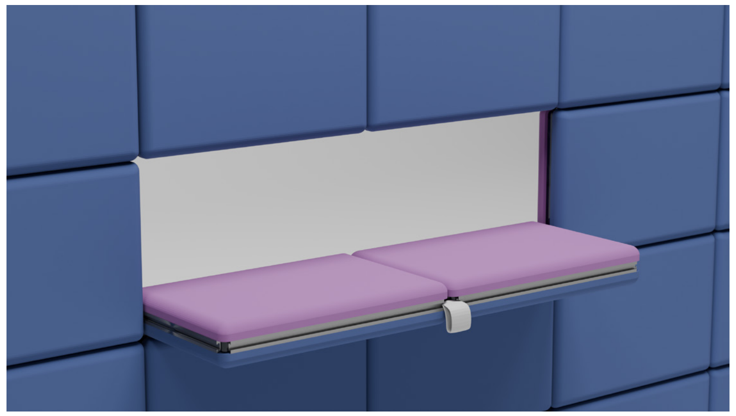
Introducing CNC laser cut and thermoformed outer manufacturability into the light presented an issue with the 2 to 1 800 x 400mm module. With 1220 x 2440mm PET felt sheets standard - modules would fit almost perfectly until a thermoform mold allowance of 10-20mm is introduced - 62 percent yield. Reducing the module size to 520 x 380mm allows for better sheet yield of 79 percent. The optimal module dimension is 570 x 366mm, yielding 12 modules per sheet at 99 percent utilisation. Thermoform allowance is a live variable that will require deeper exploration.

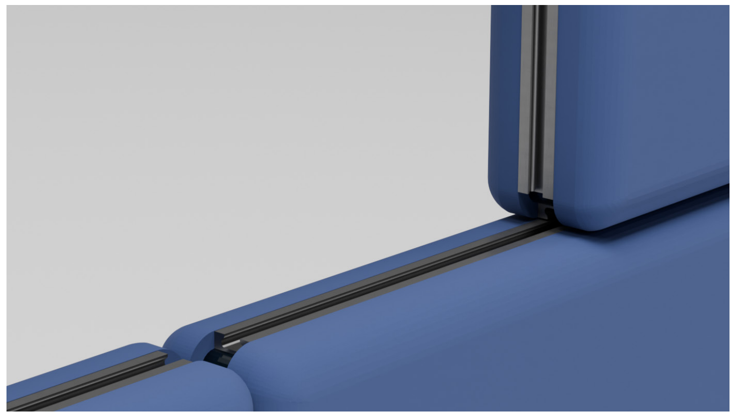










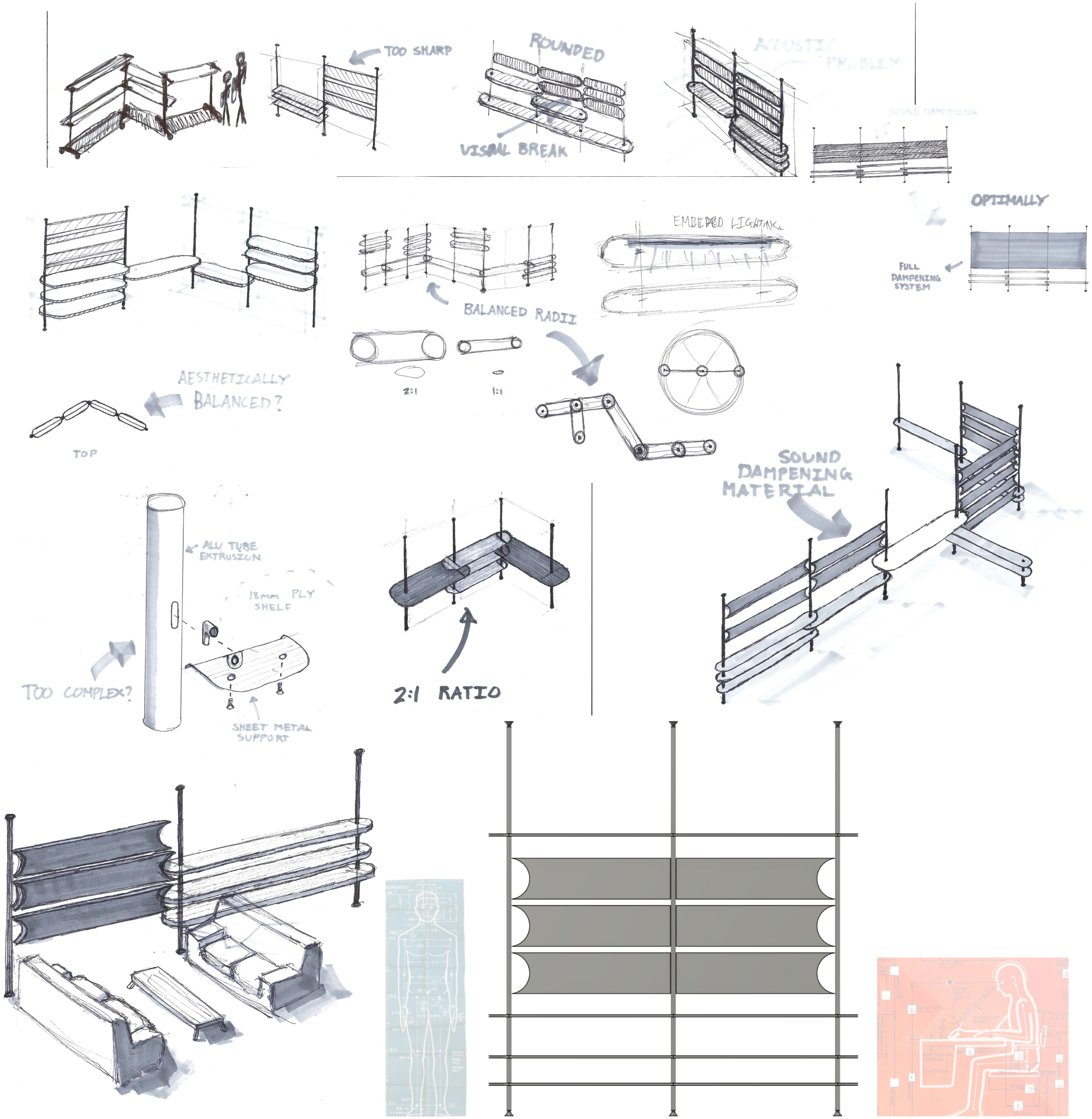


Concept 2 Development

Where Concept 1 resolves the boundary through repeated mass - bricks stacked into a wall - Concept 2 takes the opposite approach. The starting premise was a structural skeleton of vertical poles supporting horizontal planes. Acoustic and visual separation through density and gradient rather than solid wall.
The earliest iteration was a free-standing shelving unit on four legs - heavy, self-bracing, and visually closed. Two issues surfaced immediately. The footprint was too large for the boundary condition the project targets and the four-legged base meant the unit could only sit in a room, never define a room. The form was occupying space rather than dividing it.
The first real pivot was vertical tension. Replacing the legs with floor-to-ceiling tension poles eliminated the footprint problem entirely - the system now occupied a vertical line rather than a floor area, resolved lateral stability without diagonal bracing. Floor-to-ceiling compression resolves both simultaneously. The principle came from existing systems - string shelving, Vitsoe 606 - but the application to a focus-collaboration boundary, rather than to storage alone, was the meaningful shift.

The second iteration challenge was the horizontal plane logic. Equal shelf spacing at equal depth reads as storage, not as a spatial partition - the system needed internal hierarchy. A vertical gradient resolved this - dense lower clusters provide acoustic mass and personal storage at seated height, opening progressively toward standing height, transitioning the system from storage wall to visual screen. The gradient encodes the acoustic argument spatially - densest where sound is generated, semi-open where visual connection to the collaboration zone is appropriate. Open shelving alone could not deliver the acoustic performance the boundary condition demands, so Concept 1's acoustic logic was carried across - PET felt applied to the vertical ply surfaces, turning the structural shelves into absorptive ones.

This concept was a system rather than a form - structural pole, repeatable shelf profile, dense-to-open vertical gradient, and floor-to-ceiling compression.

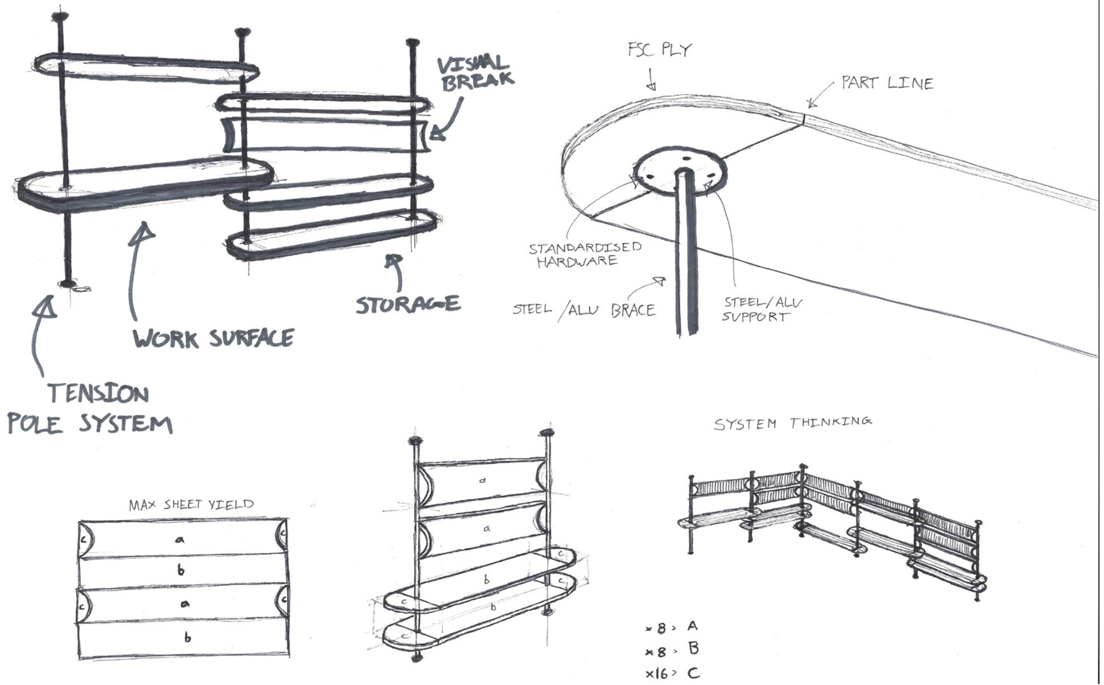


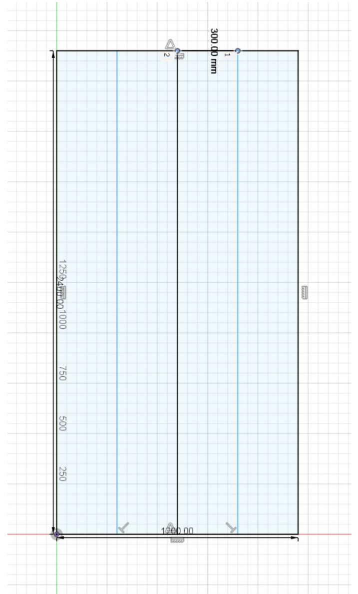
Concept 2 Development

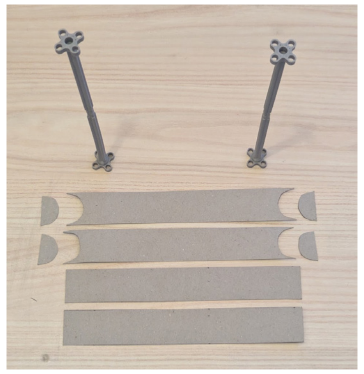
Structural panels are cut from FSC 18mm plywood - a biological nutrient, sourced from certified forests with verified chain of custody. A standard 2400 x 1200mm sheet divided into four equal lengthway strips yields 300mm wide shelves with minimal offcut. Work surfaces are formed from two half-panels joined at the centre pole, producing a 600mm depth - a 2 to 1 ratio consistent with the sketch iteration development. All profiles are CNC-routable on a standard 3-axis flatbed router, the most common machine in local fabrication.

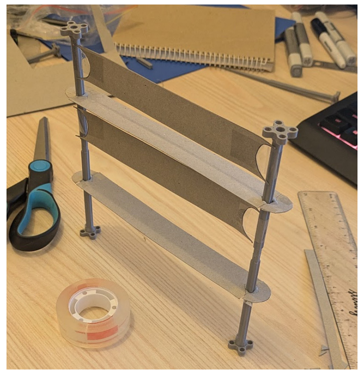
Structural poles are aluminium 6063-T5 extrusion - a standard catalogue section requiring no custom tooling, assigned to the technical nutrient cycle and replaceable as an individual component. Two section profiles are under consideration - a 40mm slotted T-track extrusion, which allows shelf brackets to engage and reposition at any height without drilling via T-slot fasteners, and a 40mm round tube, which requires post-processed fastener holes but offers a lighter visual profile more consistent with the circular design intent. Both options break down to 1200mm sections- matching the ply sheet dimension, within courier freight limits, and within standard elevator clearance. No component in the system exceeds 1200mm in any axis. The entire system ships flat. The tension pole mounting system operates on floor-to-ceiling compression - a foot plate on the base pole distributes load across the floor, and a ceiling pad on the upper pole protects the ceiling surface while generating the clamping force that holds the system upright. No wall fixings, no penetrations, no structural modification to the tenancy. The system is fully removable and leaves no trace - critical for PaaS return logistics and end-of-lease compliance in commercial fitouts.

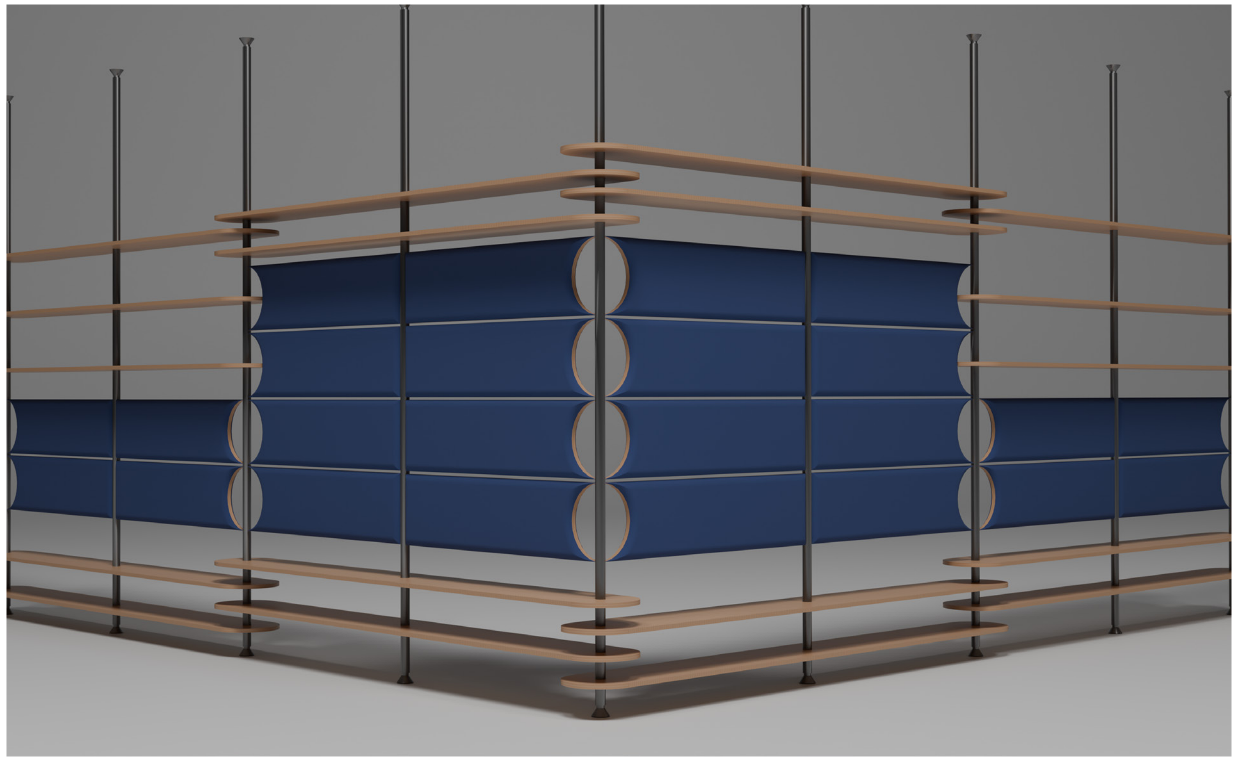
Final pole section selection will be informed by LCA comparison and further structural refinement.

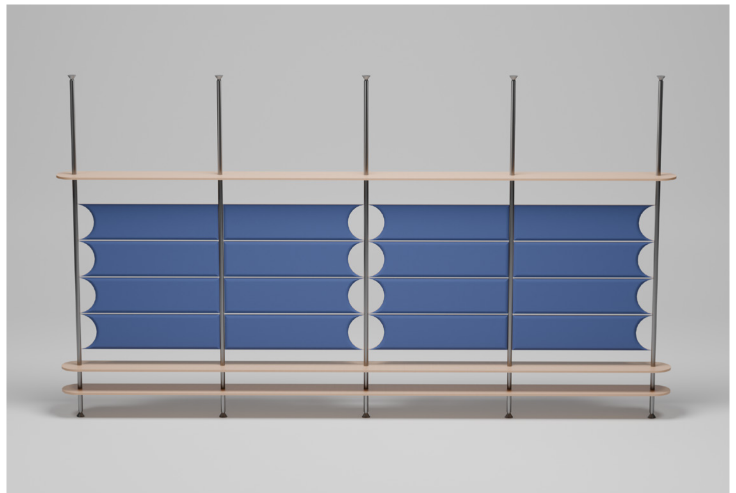


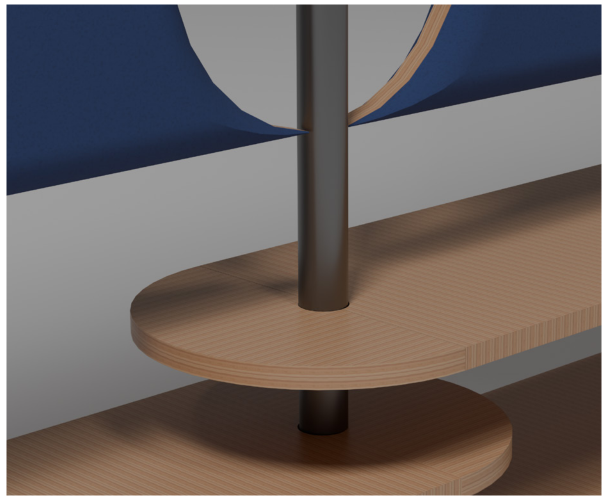


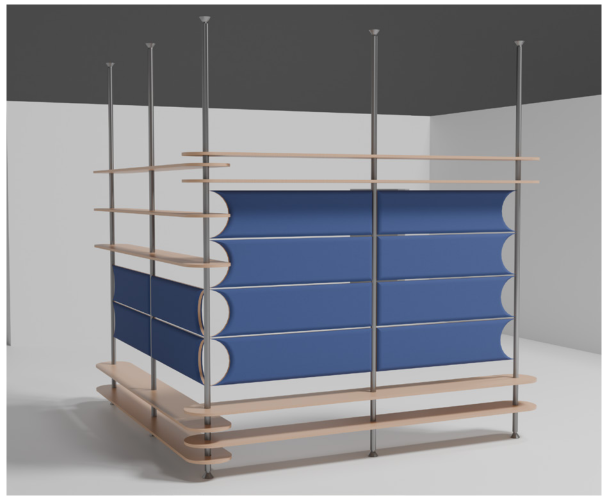












Concepts Circularity Consideration

Circularity is not an end-of-life consideration - it is the constraint that shaped every design decision.

The two concepts share a common circularity logic. Every component is assigned to one cycle - biological or technical - with no hybrid materials that cannot be separated mechanically. Every joint is reversible. Every part is replaceable individually. The system is designed to be returned, refurbished, and redeployed across multiple tenancies rather than disposed of at end-of-lease.

Both concepts are designed for a 7-year PaaS contract cycle - manufactured, deployed, maintained for 7 years, returned, inspected, refurbished, redeployed. Mid-life maintenance - replacing worn felt faces, refinishing timber surfaces, replacing damaged fasteners - extends total system life across multiple tenancies. The manufacturer retains material ownership throughout, which directly incentivises durability, repairability, and effective return logistics.

The systems are designed for non-destructive disassembly by one person with a single hex tool.

Disassembly order
1 - Release expansion clamps or T-slot fasteners.
2 - Lift modules or shelves clear of poles or rails.
3 - Release tension poles from floor-ceiling compression.
4 - Separate frame from acoustic insert.
5 - Sort by material stream. No adhesives, no welds, or destructive cuts required at any stage.

Cost structures differ between the two concepts. Concept 1 is material-dominant, with PET felt driving roughly 70 percent of unit cost - the cork variant adds approximately 2.5x to that line and introduces single-source supply risk. Concept 2 is hardware-dominant, with the pole profile - T-slot extrusion versus round tube - as the primary cost differentiator. T-slot adds 50 percent over round tube but eliminates field drilling, likely net-positive once installation labour is costed.

As mentioned a full LCA is required to confirm material selection across both concepts. The assessment will measure embodied carbon, energy, water use, and end-of-life recovery rate across four life-cycle stages - raw material extraction, manufacture, transport including recurring PaaS return logistics, and end-of-life processing. Throughout this assignment small indicators were found.

Recycled PET felt - Low embodied carbon per kg, recycled feedstock, established infrastructure, but moderately low recovery rate due to limited fibre-to-fibre recycling at scale. Strong on extraction and manufacture, weak on closed-loop end-of-life.

Cork - Carbon-negative at extraction, active forest sequestration, but heavy freight footprint from Portugal to Australia and limited recovery infrastructure outside Europe. Strong on extraction - weak on transport.

FSC plywood - Low embodied carbon, end-of-life compostable with correct finishing during manufacture. Strong across all stages.

Aluminium extrusion - High embodied carbon per kg in primary form, but recyclable infinitely without quality loss. Strong on technical-cycle recovery - weak on initial-cycle production.

Conclusion

This project began with a single spatial observation - the hybrid office is not failing at focus or collaboration, it is failing at the boundary between them. Through research into circular design frameworks, hybrid workplace behaviour, and the spatial demands of four distinct user archetypes, the border condition emerged as a site of genuine design opportunity - where acoustic requirements conflict, circulation paths intersect, and furniture systems are asked to communicate the transition between fundamentally different modes of work.
Two concepts have been developed in response. The modular brick system resolves the boundary through mass, subtraction, and material gradient - a single repeated module that encodes enclosure on the focus side and openness on the collaboration side through configuration alone. The tension pole system resolves the same boundary through layered horizontal and vertical planes - a flat-pack, ceiling-mounted structure that transitions from dense storage at low height to open visual screen at standing height, with no wall fixings and no permanent modification to the tenancy. Both share a common circularity logic - mechanical fasteners only, material separation maintained throughout, all components replaceable as individual items, and a maximum component dimension of 1200mm across every axis. The system ships flat, installs without specialist trades, and returns to the manufacturer at end of lease.

Both concepts worked towards resolving the boundary condition issue for four user archetypes to test whether the system genuinely works.

Concept 1 - Modular Stack

Aarav - Deep Focus
Acoustic dampening, visual enclosure, and adaptable sight lines work well for their needs.

Patricia - Moves Around A Lot
Reconfigurability slightly support her movement but might be unlikely to adapt the modules.

Yuki - Needs Silence
Dense acoustic performance works for her.

Oscar - Client Facing
Reads as static wall without brand-communication or 'wow' factor.

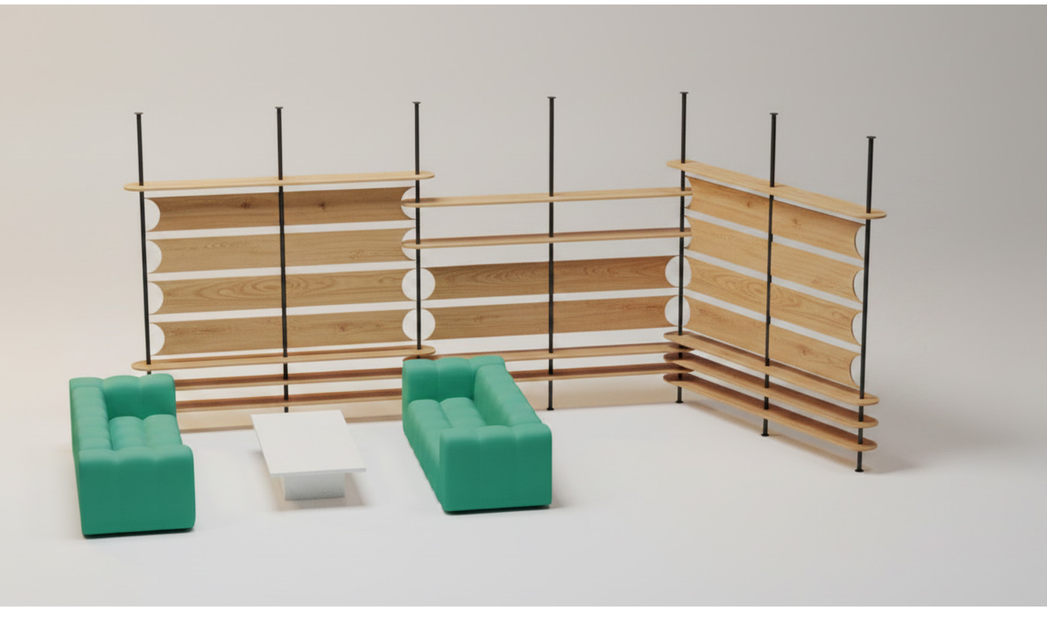
Concept 2 - Tension System

Aarav - Deep Focus
Gradient reduces noise and visual disruption - needs headphones for deep focus.

Patricia - Moves Around A Llot
Provides privacy in various different location with multiple different surfaces available.

Yuki - Needs Silence
Less acoustic dampening, however, does reduce noise.

Oscar - Client Facing
Supports wayfinding and visual openness.



The two concepts deliberately serve different ends of the user spectrum. Concept 1 has the stronger acoustic performance. Concept 2 is the stronger spatial communicator. Neither resolves the boundary for all four users equally - a finding that confirms the original brief's framing - the boundary is a gradient, not a line. A resolved system may eventually combine principles from both to create a cohesive solution.

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