Summer Internship Project

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Interaction Design 2012-14
IDC, IIT Bombay

List of things done at IAD, TUD

1. Creating Flexible Workspaces

   A three-week project during which the complete UCD process was followed to provide solutions to the identified problems.

2. Design Recommendations for Proreta

   A one-day workshop on semi-automated driver assistance and accident avoidance systems. The final deliverables were design recommendations.

3. Workshop : Mechanisms for safety of railway linemen (ALARP)

   a. Alarm Concepts for railway linemen

   b. Redesigning the interface of railway testing software

4. Workshop : Understanding the Design Process

   a. PSF Wheel Concept and Matrix Technique

   b. Convaco-Convex Method for Design Feature Explorations

5. Other activities

   One-day workshops that were done to expose the team to various activities other than design

Creating Flexible Workspaces in the IAD context

Contents

Work Life Balance

- Satisfaction and good functioning at the work and home with a minimum of role conflict
- The proper prioritization of work and lifestyle

Flexible Workspaces (FWS)

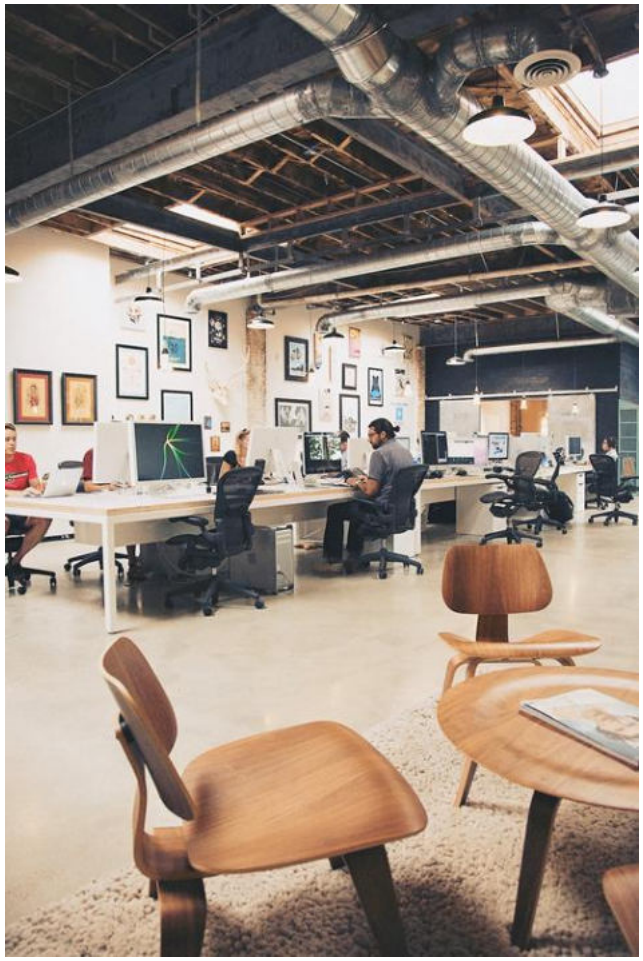
- Supporting the balance between work, relationships, health, spiritual and personal interests
- Maximising the productivity at work
- Creating healthy and aesthetic spaces that can enhance the quality of work done

Our aim

- Balance work and personal interests
- Stress-free productivity

FWS in current scenario

- Flexible workspaces promote **collaboration and innovation**
- Employers formulate flexible workspaces to attract new talent
- Famous methodologies are bullpens and work from home
- FWS has economical, strategic and infrastructural advantages
- Employees have FWS tactics like having home-offices to interact with clients or work during vacation



Project Brief

Need identification and subsequent design intervention through the concept of "Flexible Workplaces" in the IAD context

- Understanding the concept and the need for flexible workspaces
- Identifying the needs of the users and exact point(s) of design intervention in IAD

Process Followed

Research

Primary Research

Context inquiry of five employees at IAD

User Criteria

- Current employees at IAD
- Must be in their early years of their PhD
- Both male and female
- Must be able to communicate in English (for logistical reasons)

Secondary Research

Papers, journals and articles

Insights

Insights were generated after analysing the user interviews and correlating data through affinity mapping

We classified them into six categories

- General Observations
- People Behaviour
- Time Management & Environment
- Technology and Tools
- Weekend/Vacation Preferences
- Group Dynamics

Major Insights

- People are planned and have perfectly set timings even for regular activities, so that they can concentrate on their official work.
- People prefer working in quiet environments especially while doing critical work or work that needs thinking.
- People try to create a distraction-free environment if the elements that cause it are under their control.
- People reserve their weekends/vacations only for personal work, with no intervention from their professional lives
- They prefer not to do official work at home unless it demands a quiet environment to work – like working on a paper

Problem Spaces

- Creating quiet work environments
- Distraction free work environments
- Avoiding spillover due to distractions at office

Creating quiet environments

- People needed quiet environments for crucial tasks and when they did not get such an environment they carried the work home, which affected their personal lives too.
- The problem was affecting productivity, goal accomplishment and personal time The solution had a scope for a larger and indirect impact on various factors.

Scenarios/Instances

- The employee is on 'Do not disturb' while his colleagues in the room are not.
- Employees with different work-profiles require different degrees and durations of interactions with other employees
- Noisy movement of people near the room

Observations

Observations from the user environment

- The levels of noise in the workspace environment varied depending upon the location of the space
- Some employees use earphones to listen to music (probably to isolate themselves)
- Employees took a break and left the room after continuous disturbance from a co-worker in the room

Noise classification

The observed noise has been classified into three categories

Class 1: Ambient noise that is continuous, but not distracting

Class 2: Loud noise but not enough to grab immediate attention

Class 3: Noise too loud to grab immediate attention and cause distraction

Design Brief

Our studies at IAD have shown that though working in a **room of multiple employees** is an advantage, it **has a possible negative impact in certain cases.** Whenever the employee needs quiet time(silence) to concentrate on work, the **noise (intrinsic & extrinsic) due to co-workers** has an immediate **effect on the productivity and efficiency of the employee**. To a certain extent it has an indirect effect on their personal time too.

The project would aim **to create a workplace where employees can work collaboratively or in isolation**.

The **workspace will be more adaptable** to the users needs so that they make better use of their productive time.

Persona : Albert "Mr. Responsible"

Albert, 34 year old is a PhD student from IAD, TUD and also working in a project funded by Ford. He is working here since last 2 years and his research area is around driverless vehicles.

Albert is a young dedicated researcher and is involved in a lot of paper writing which are published in IEEE Journals. He is married and lives with his wife in a rented apartment.

Persona : Albert "Mr. Responsible"

He knows how to manage things and his personal life very well.

A "responsible worker" who shares good relationship with the colleagues and people around him, Albert is involved in voluntary works like managing internal events at IAD and teaches school students on weekends.

He works on his personal venture in the evenings too.

Scenario

Whenever Albert has some important work, he puts DND as status outside the room. But as he shares room with 3 other colleagues, their team mates keep on coming to have interaction ignoring his DND status

Scenario

At times, they keep on moving and re-adjusting themselves which creates noise and Albert gets disturbed by it.

Scenario

Getting phone call is again an issue, as a desk phone is shared between 4 people; Albert loses all his concentration while doing some serious work.

Scenario

Because of this noise, he takes his work home, which is affecting his personal life too. His productivity is getting affected by noise and disturbances.

Observations

- "No line of sight layout", When employees can see each other, chances are they'll hear one another too each other.
- Having workspace divider of at least 60", lesser then that is ineffective at blocking conversational noise.
- Canopies absorbs noise levels.

http://www.think-furniture.com/product_downloads/Noise_reduction.pdf

http://www.ofusa.com/images/booklets/increaseProductivity.pdf

Assumptions

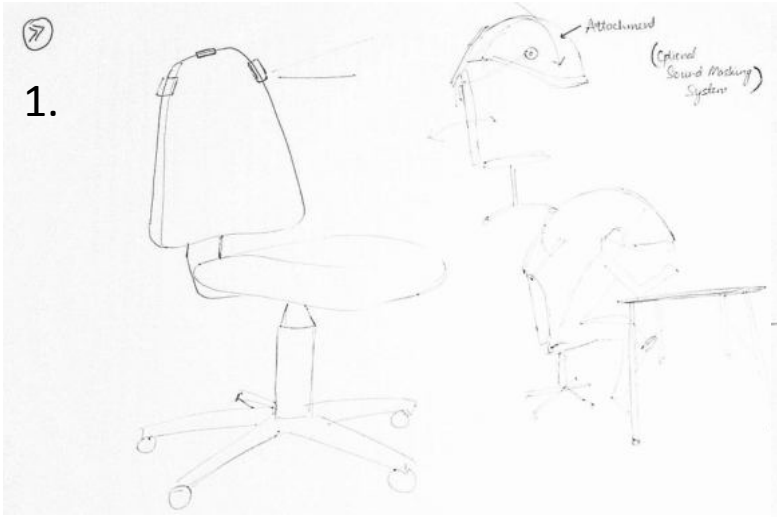
- Designing for the person who really want to concentrate for hours for the works such as research paper writing or doing work which requires concentration.
- People who are using Laptop extensively.
- Enough cabling for extended monitor, keyboard, external devices is given.

Requirement

- Cost should be as minimum as possible.
- Seamless transition
- Scalability : Solution should be as scalable as possible

Explorations

1.



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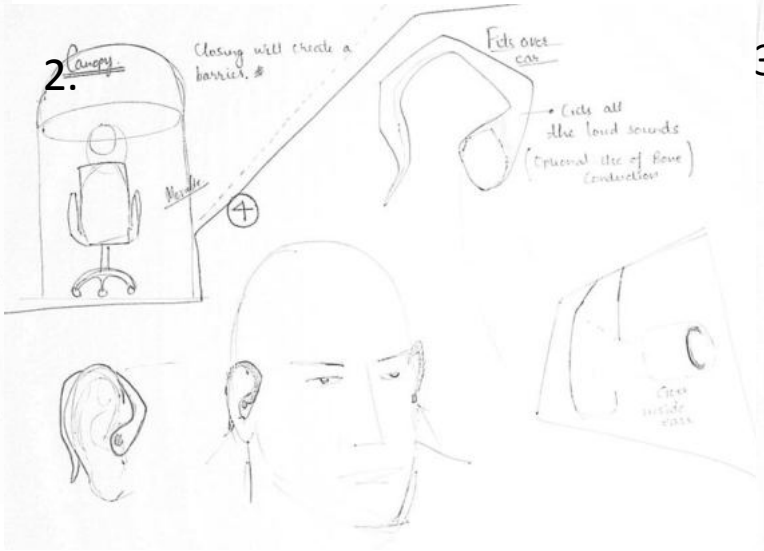

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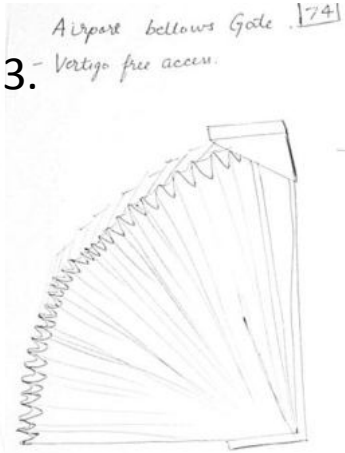
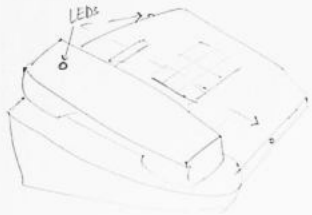
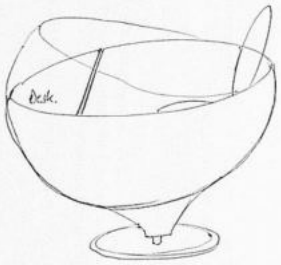


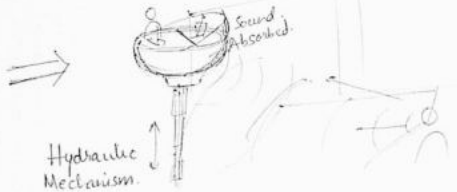
4. Telephone Glow.

Low volume Ringing + Glowing

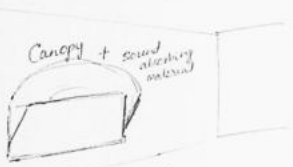


5. Oval furniture with a desk. (Hydraulic Mechanism)





6. Space to talk



Good for
- Mobile phone talks
- Group discussion while having coffee
- Can be reshifted

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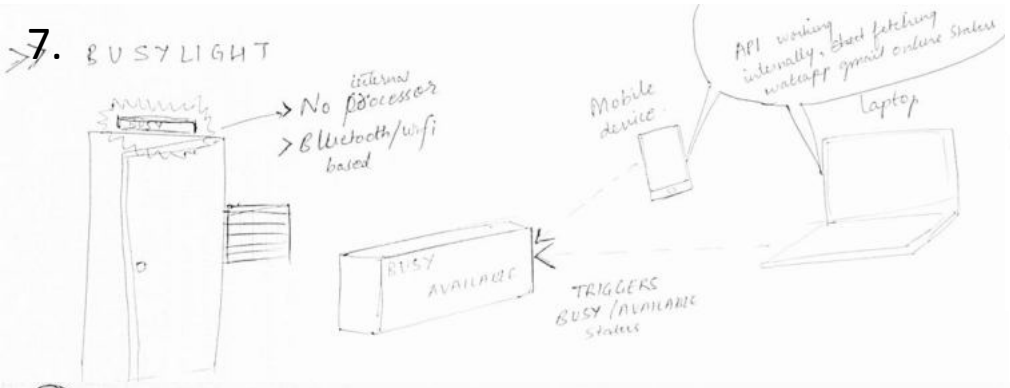
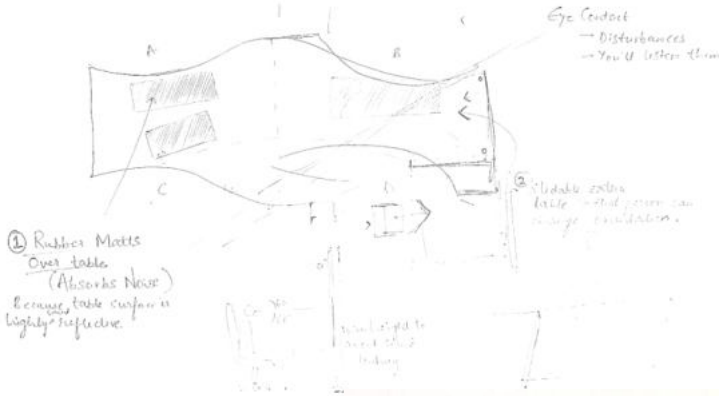
Explorations

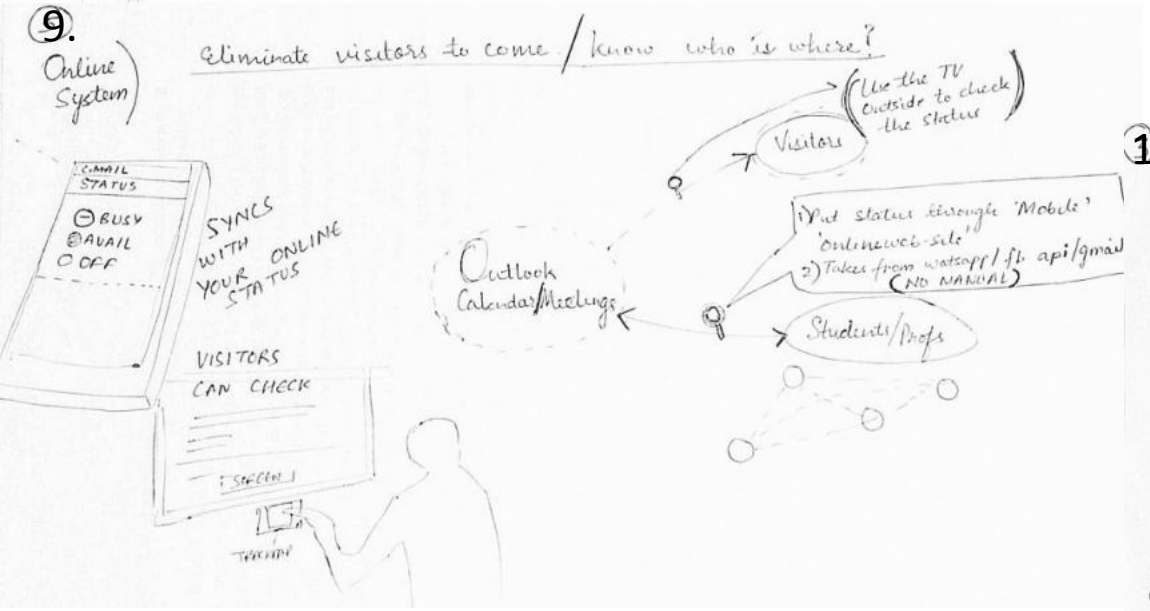
7.





8.

9.



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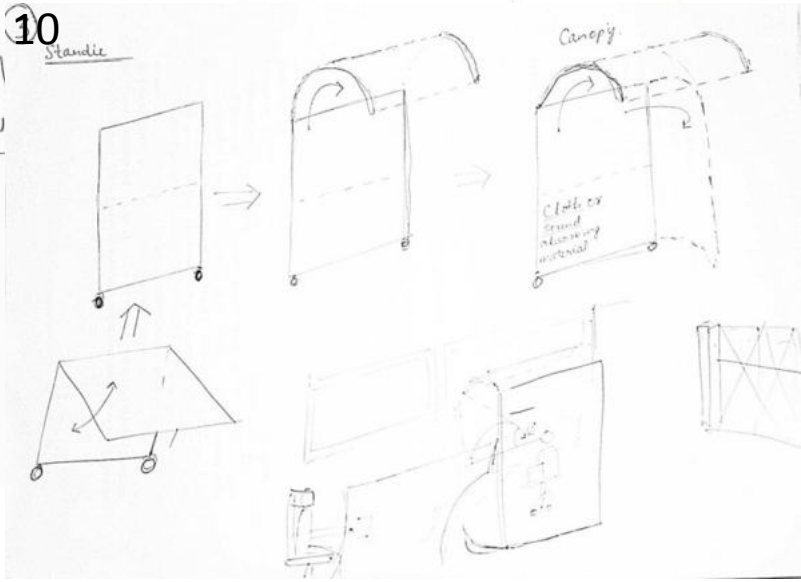


Ideas

1. First idea was to have a detachable canopy like structure which can be attached to your chair. It will automatically re-adjust depending how much you are bending.
2. Ear plug that a person can wear to avoid Class 3 noises
3. Furniture inspired from Airport Bellows Gate, which can be opened
4. Glowing Telephone eliminating high ringer volume
5. Oval Furniture with a desk which has a hydraulic mechanism to go up and go out of sound plane..
6. Space to talk and have discussions in gallery, kitchen area
7. Auto Busy-light – an API which syncs with your gtalk, whatsapp etc
8. Extra furniture over desk
9. Eliminate Visitors : Application to show whether you are busy or not
10. Create your own room using an un-foldable product

Solution

- Consists of a little addition in existing furniture
- A new furniture
- Small circuitry addition to deliver better UX

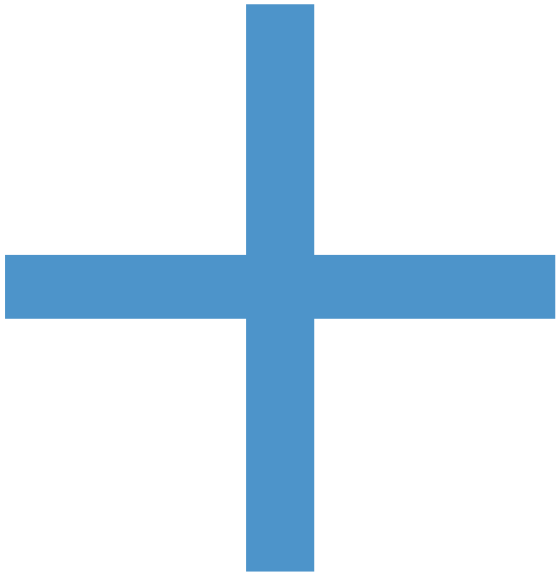
Existing Scenario and Arrangement

Existing Scenario and Arrangement

Existing Scenario and Arrangement

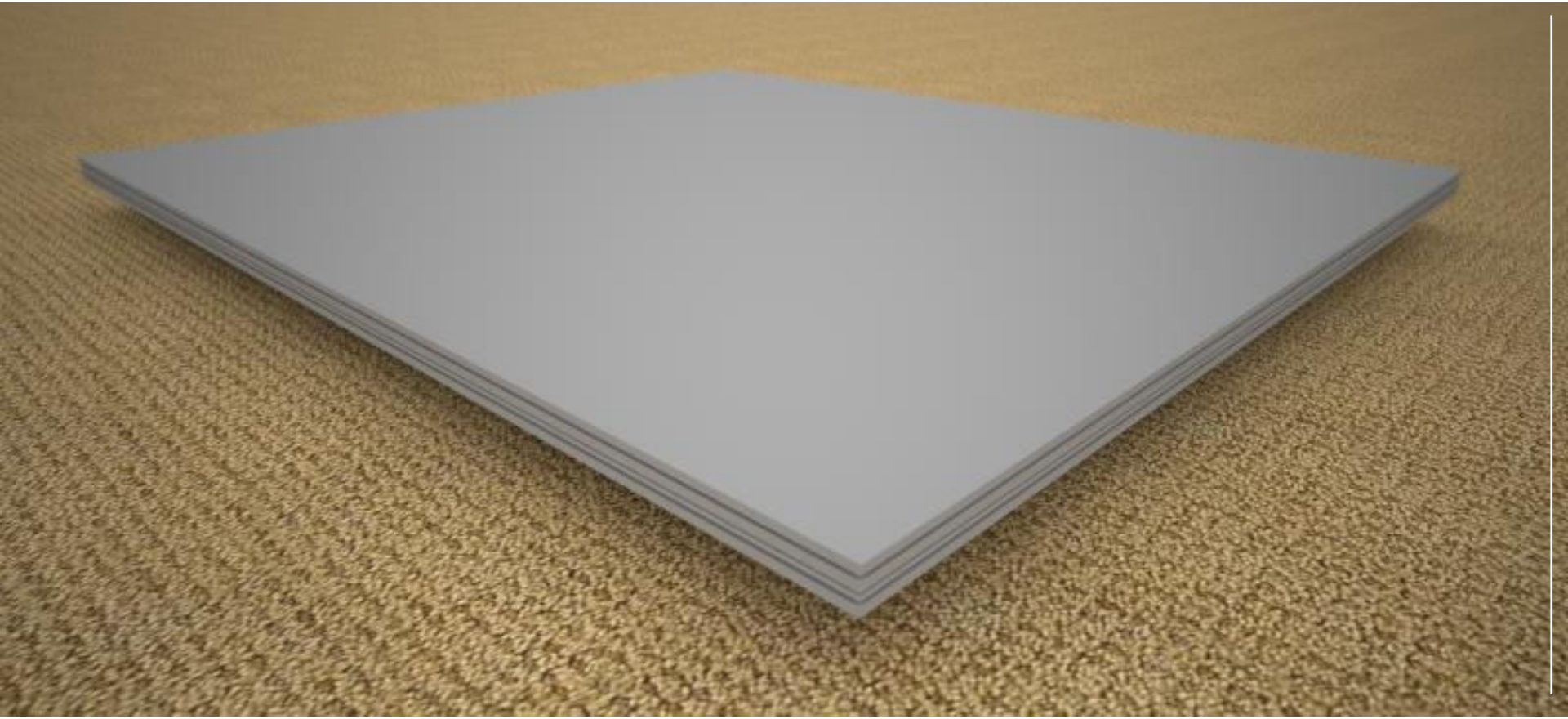
Existing Scenario and Arrangement

- An extension in existing table which comes out
- Detachable mechanism

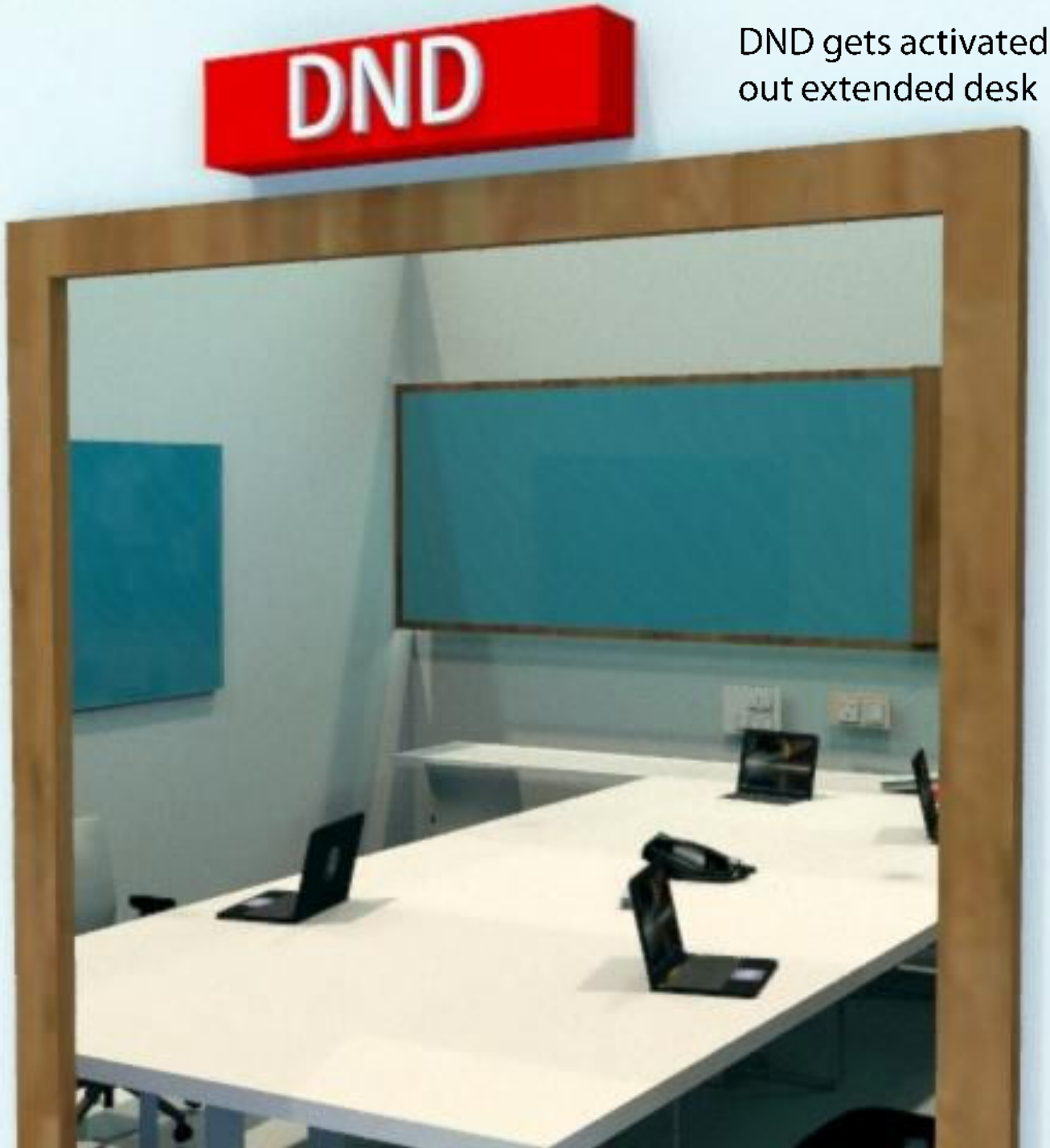


Ich-tandie

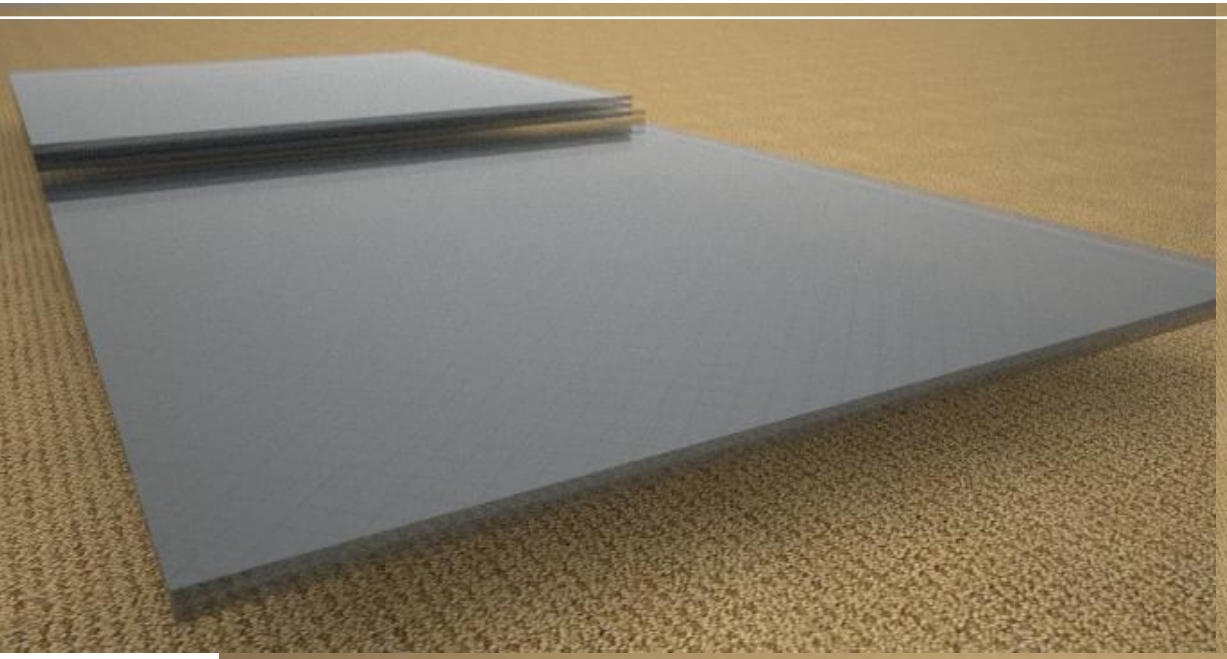
my-Standy

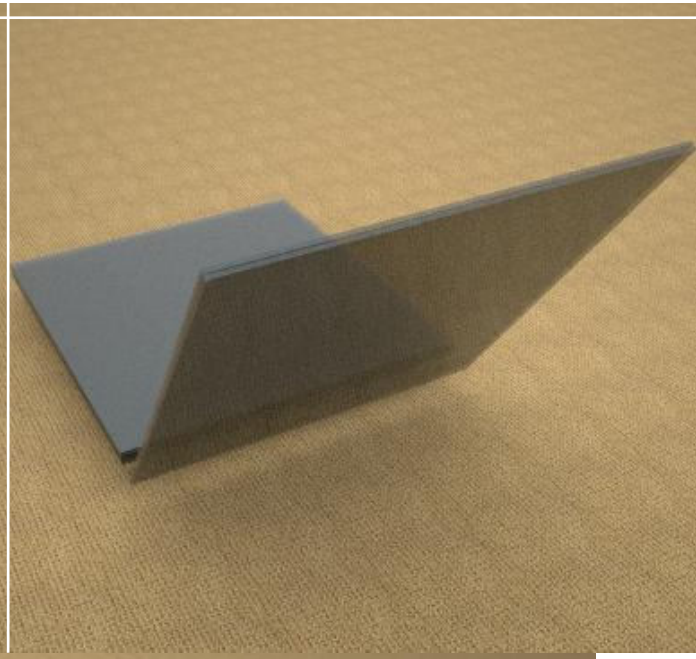


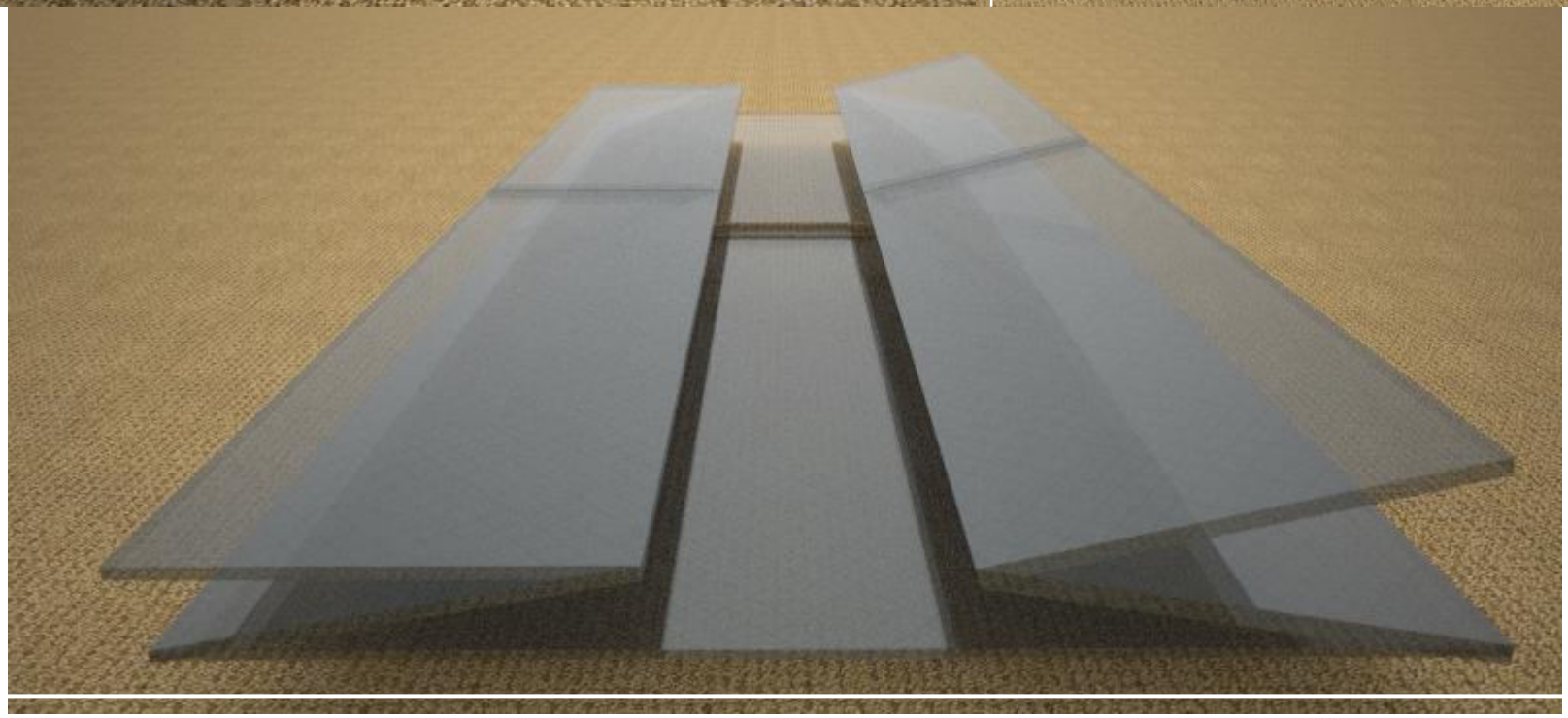
View from main door :

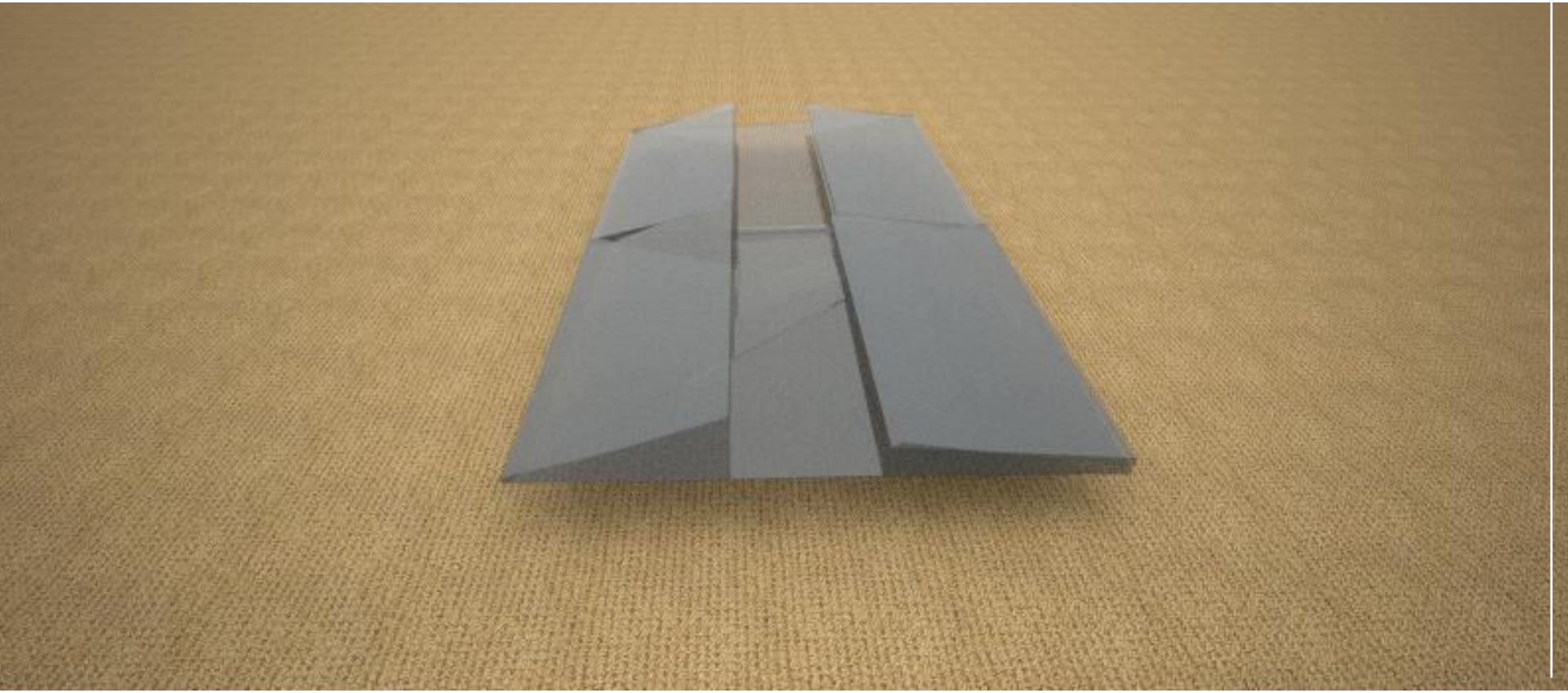


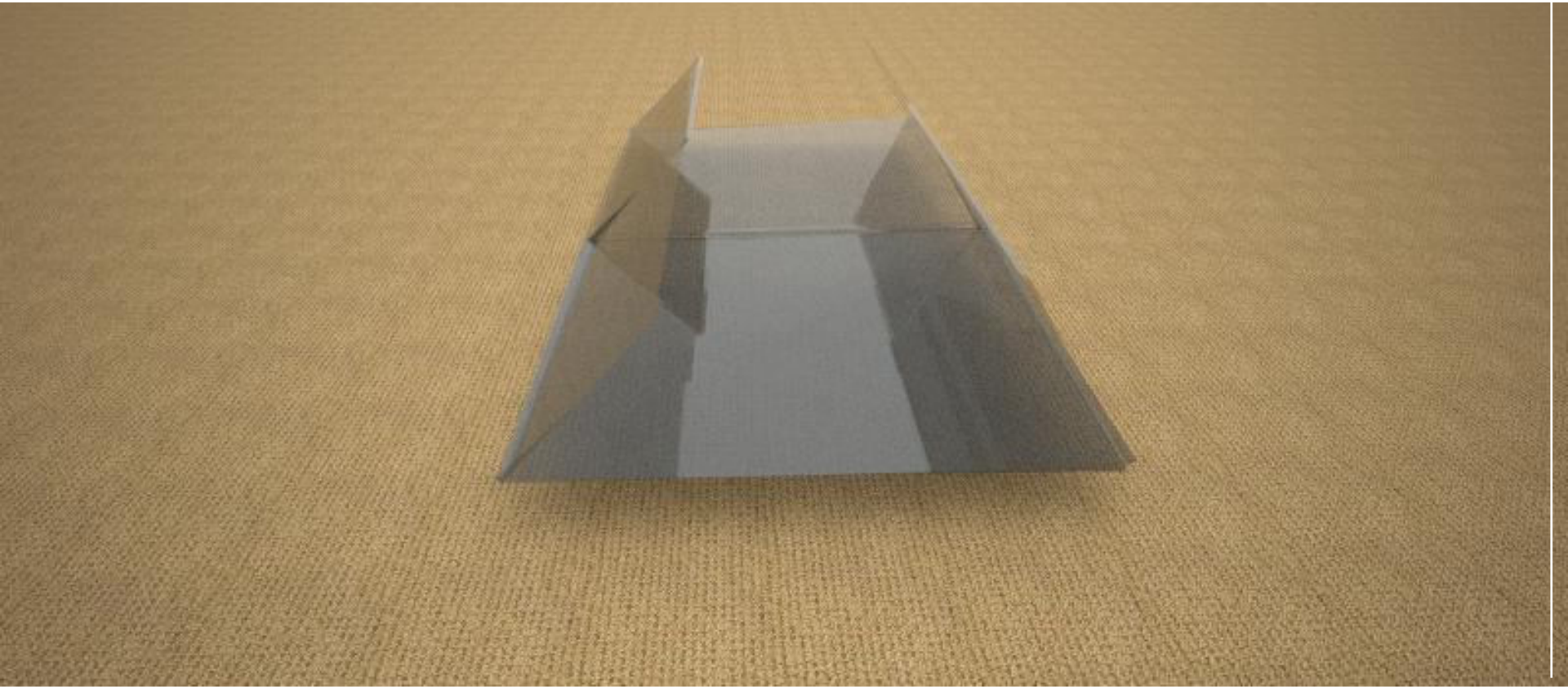
DND gets activated once you take out extended desk

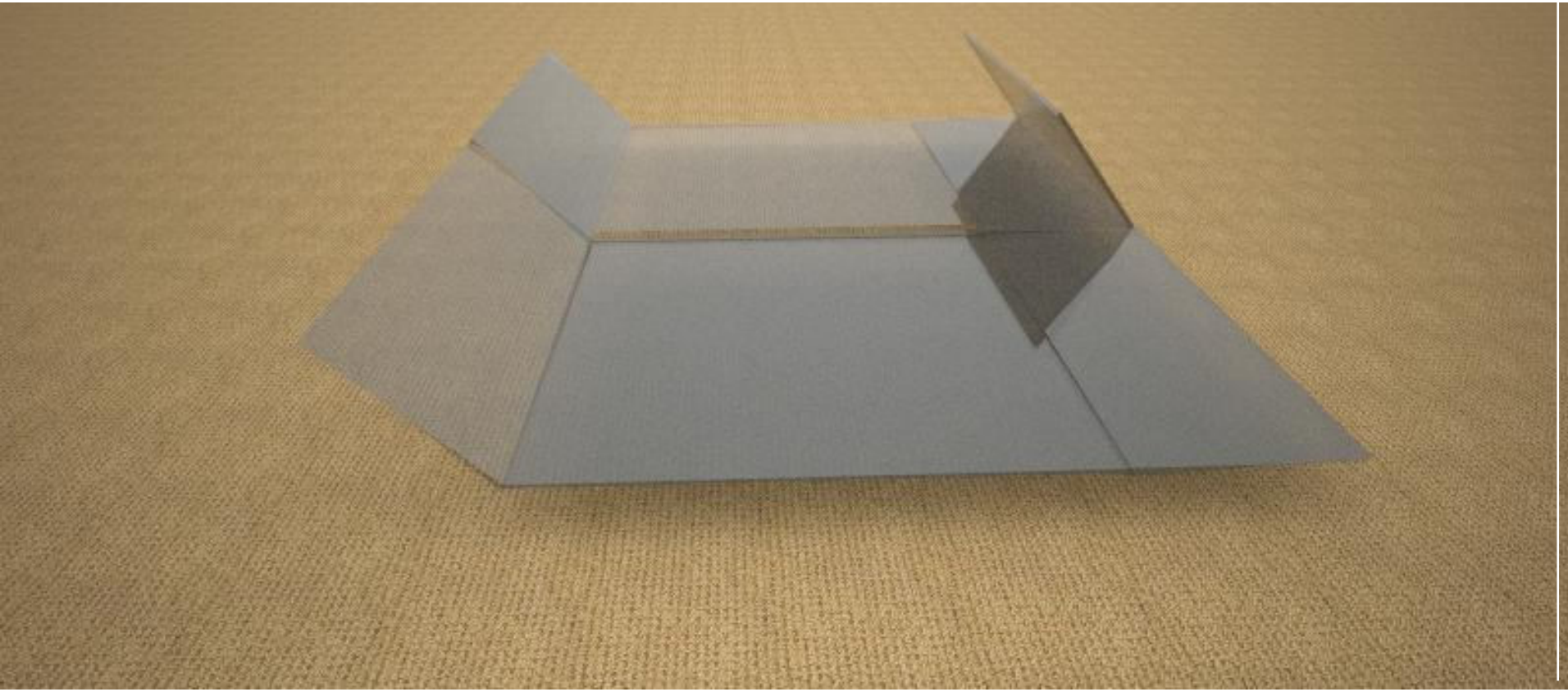


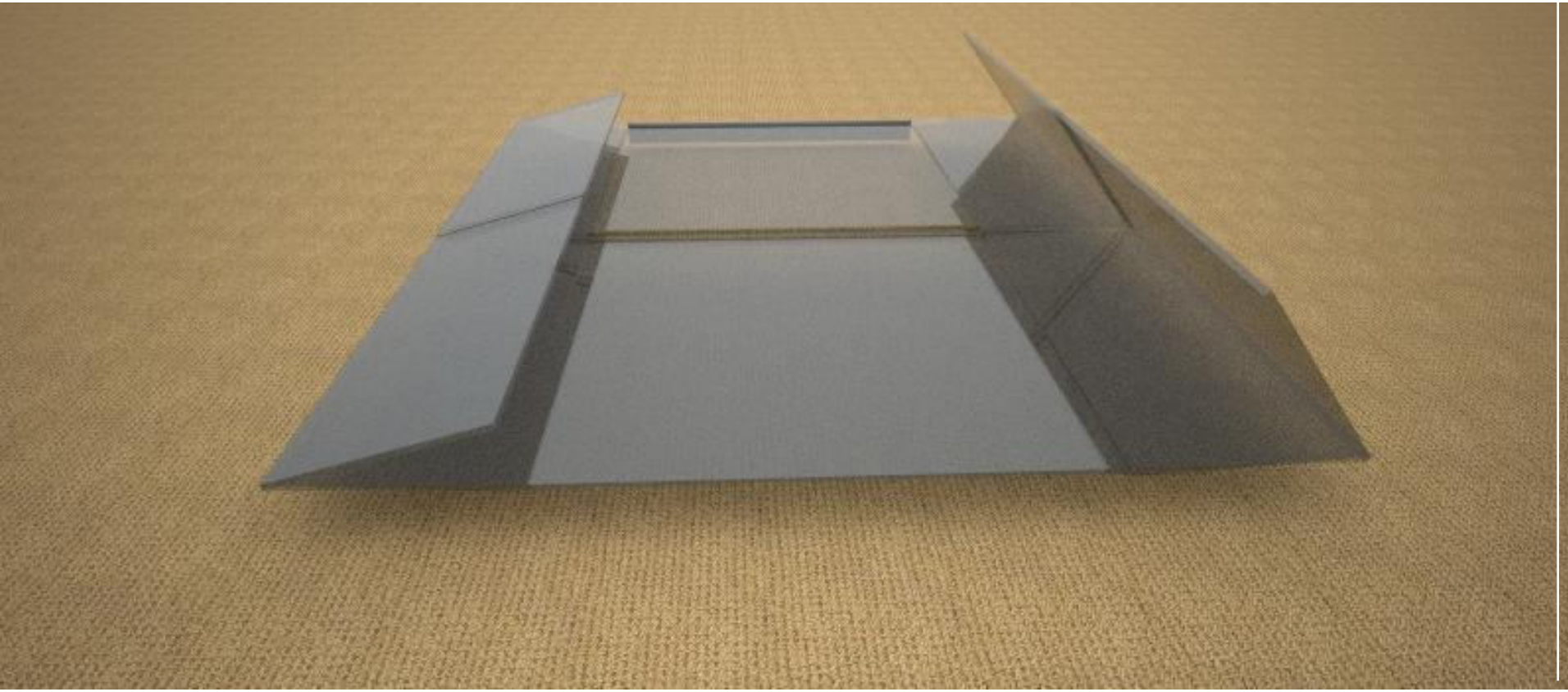


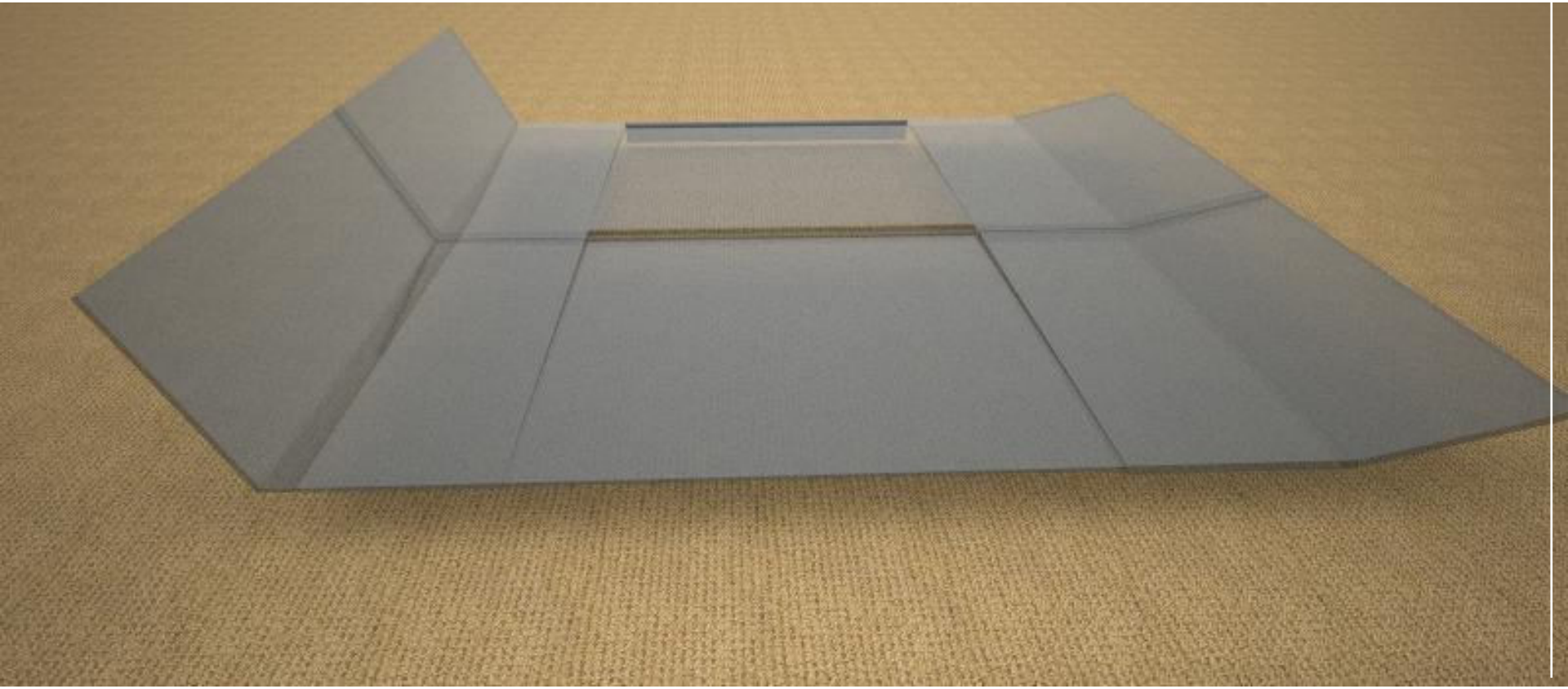


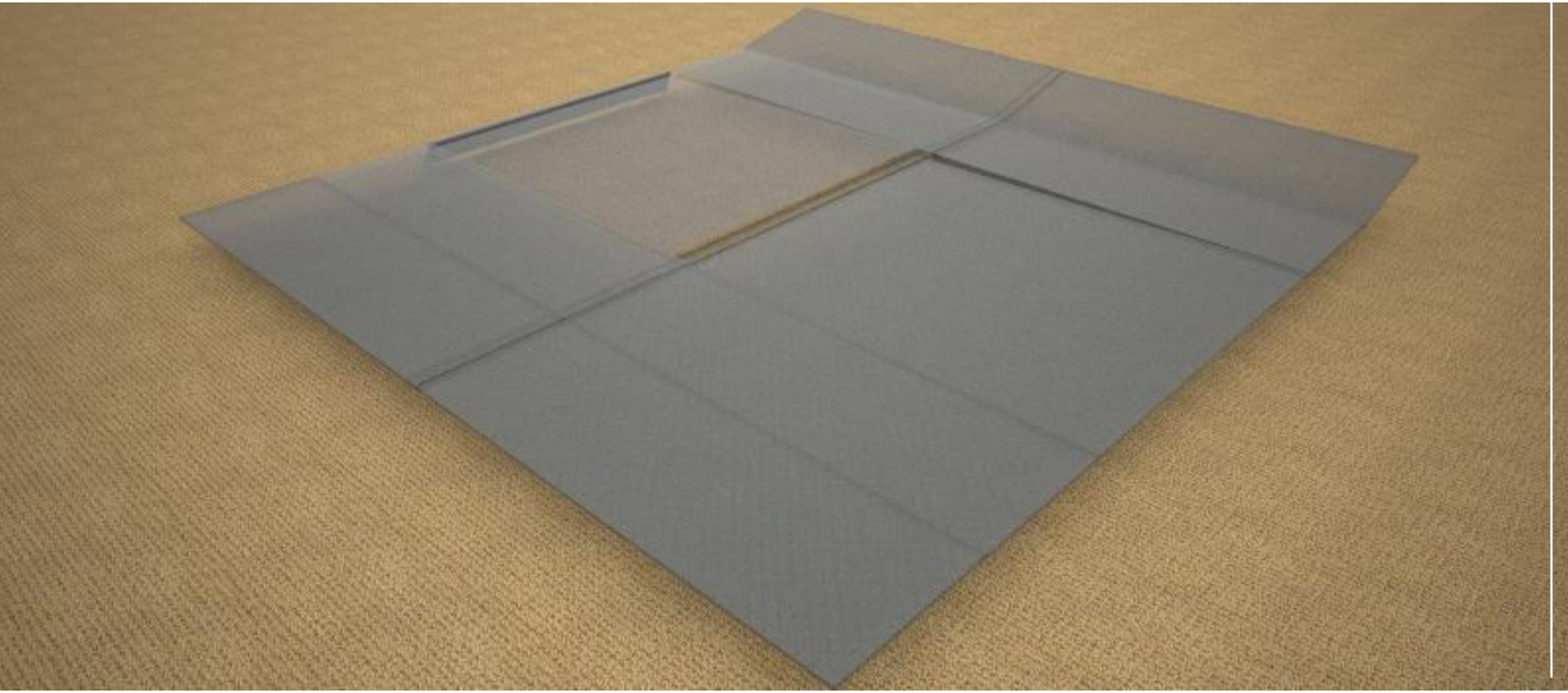


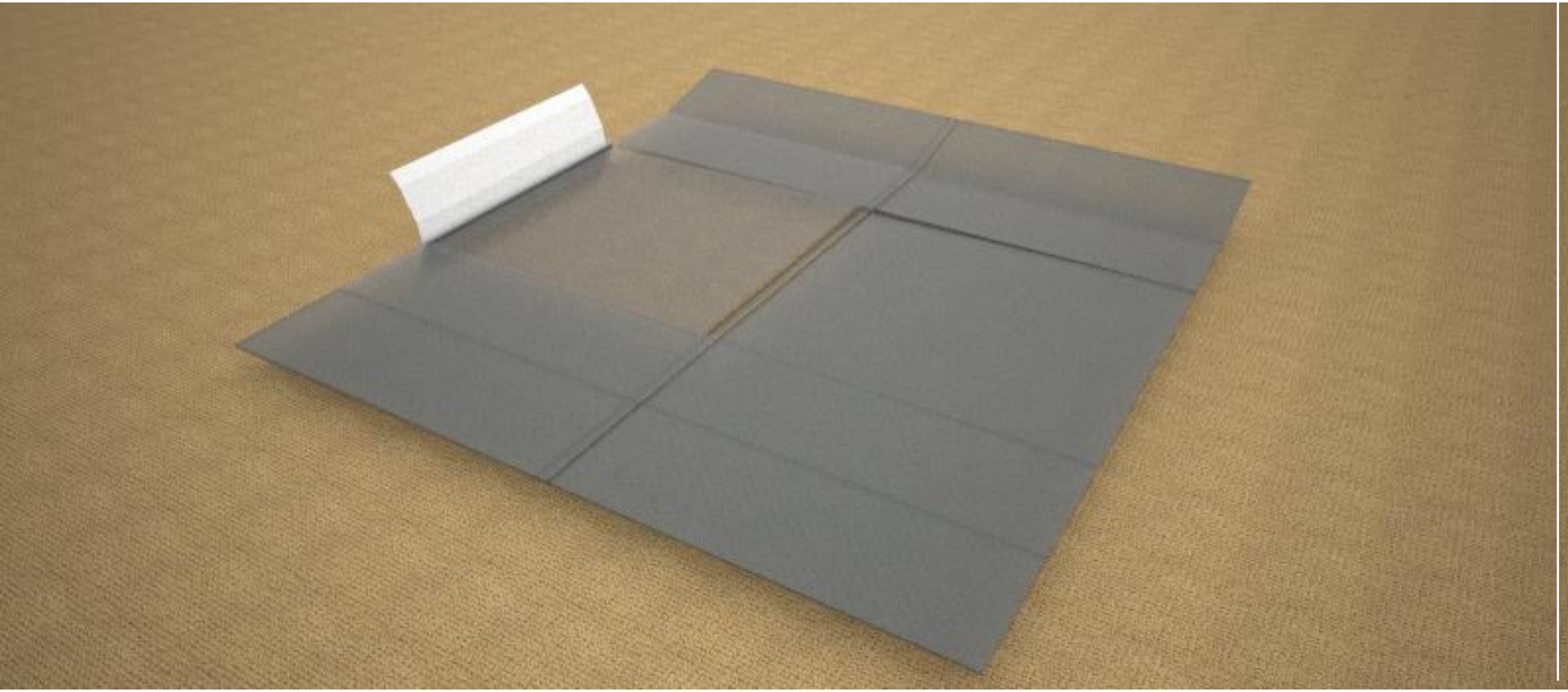


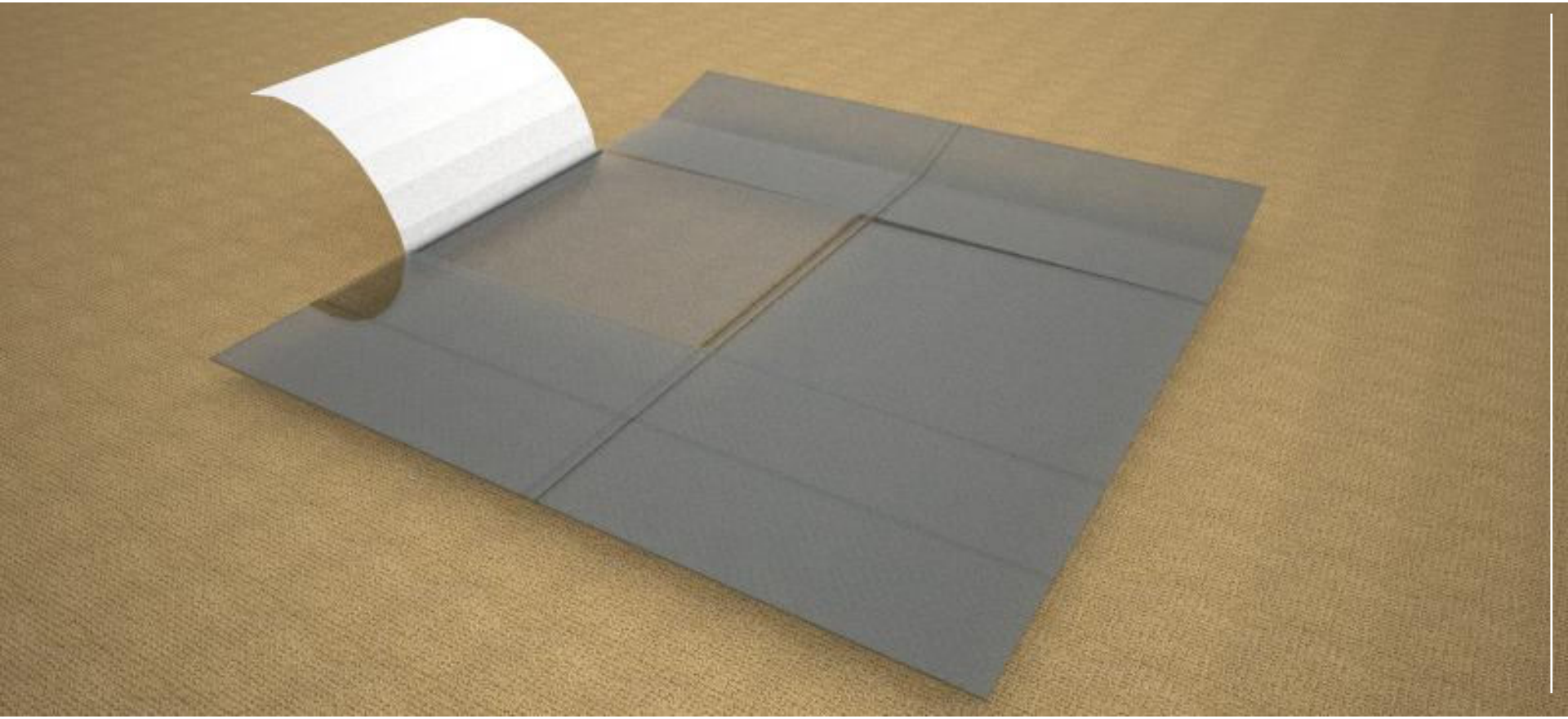




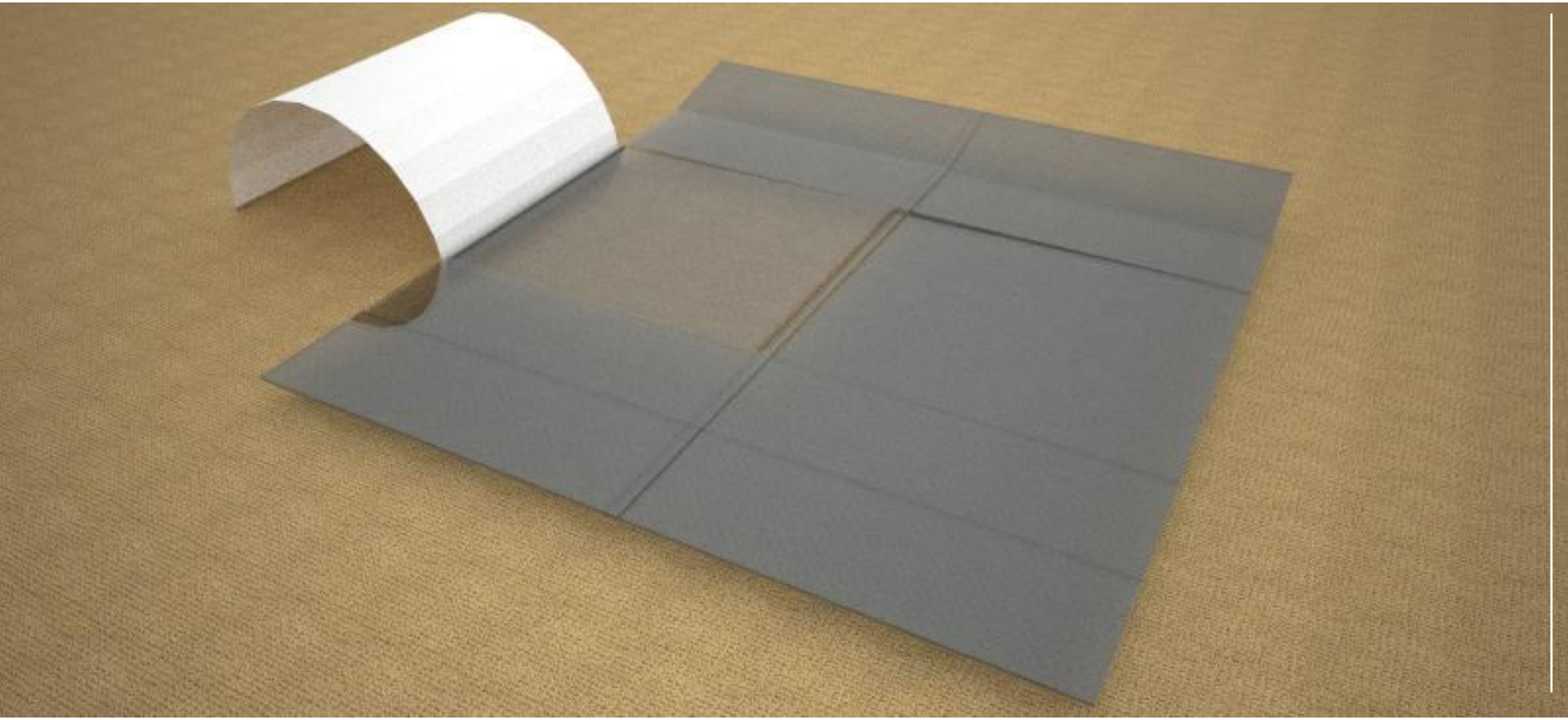


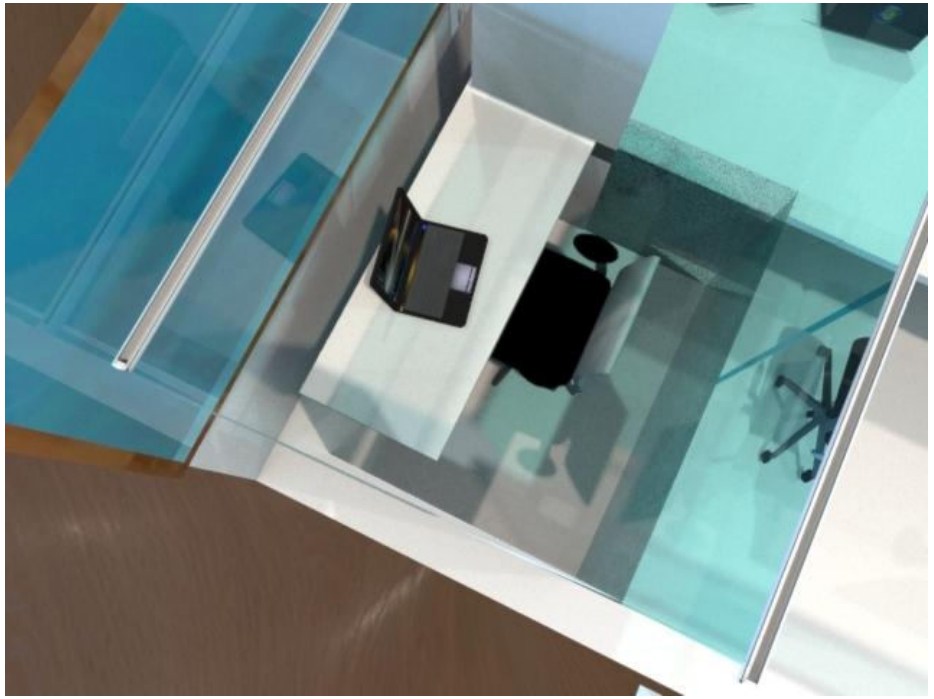


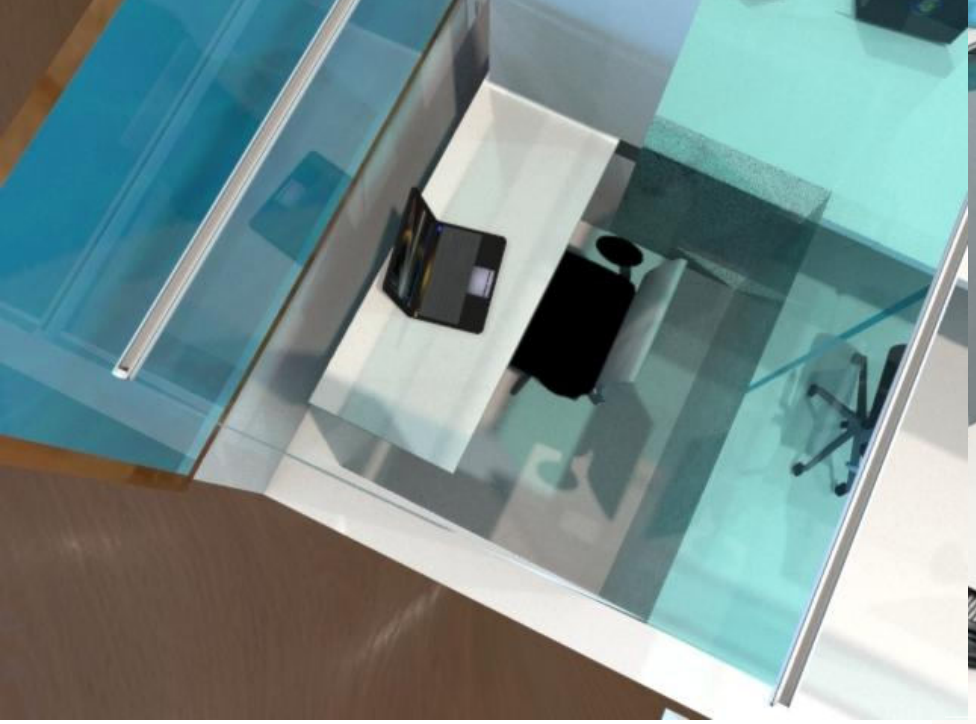


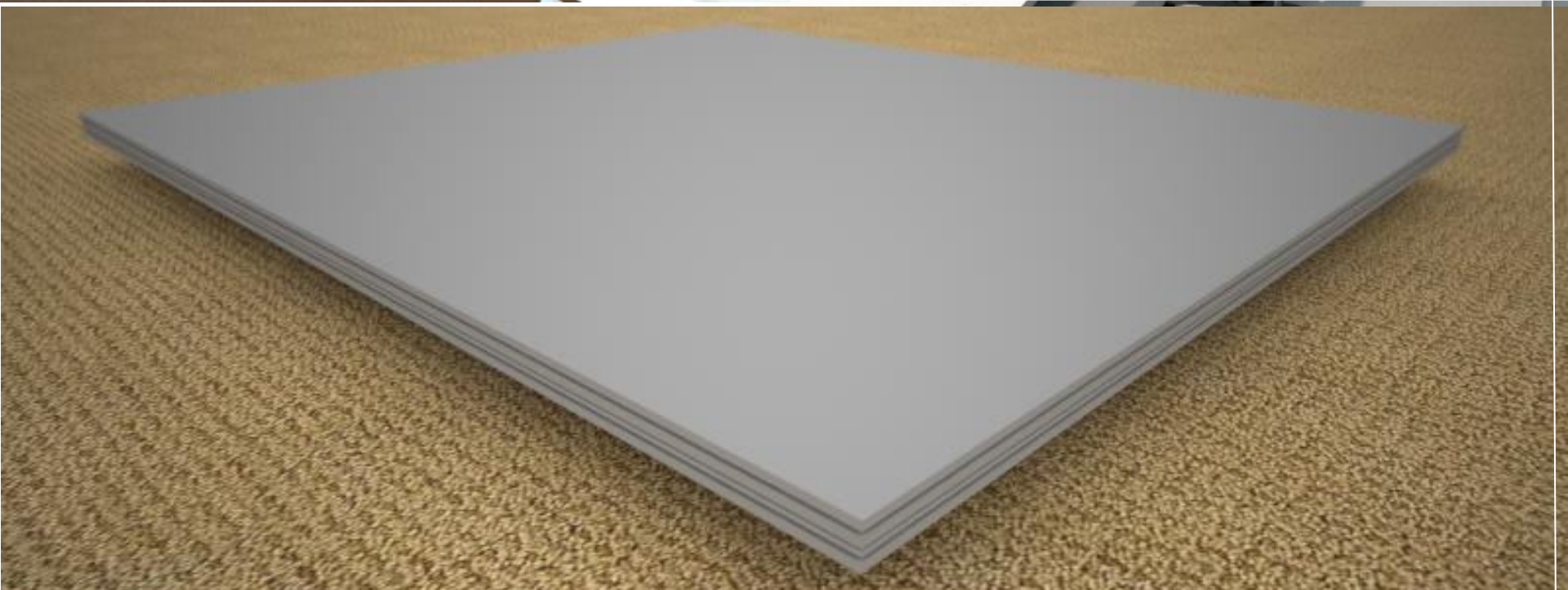


- Sound absorbing Material
- Canopy to absorb noise happening inside
- Unfolding it will make your own workspace



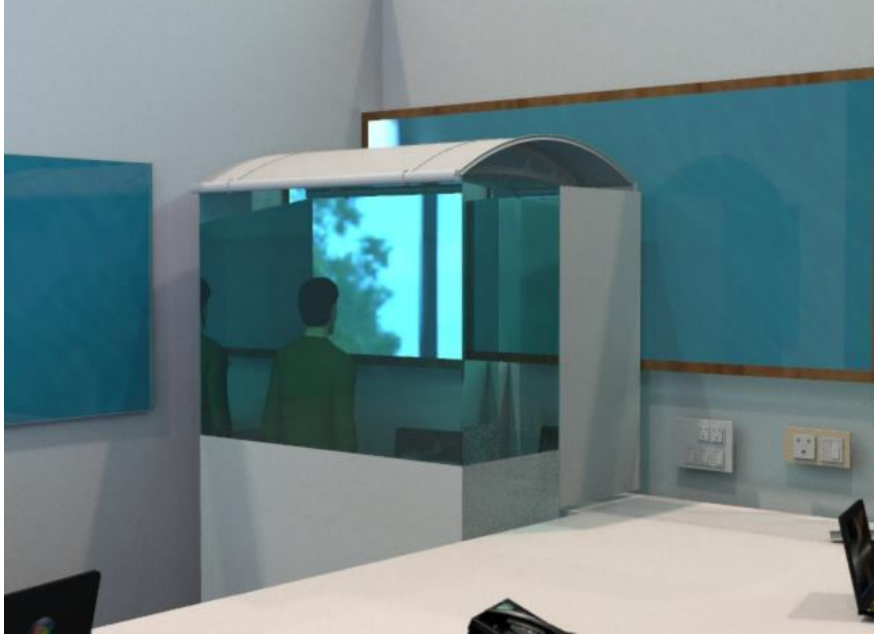


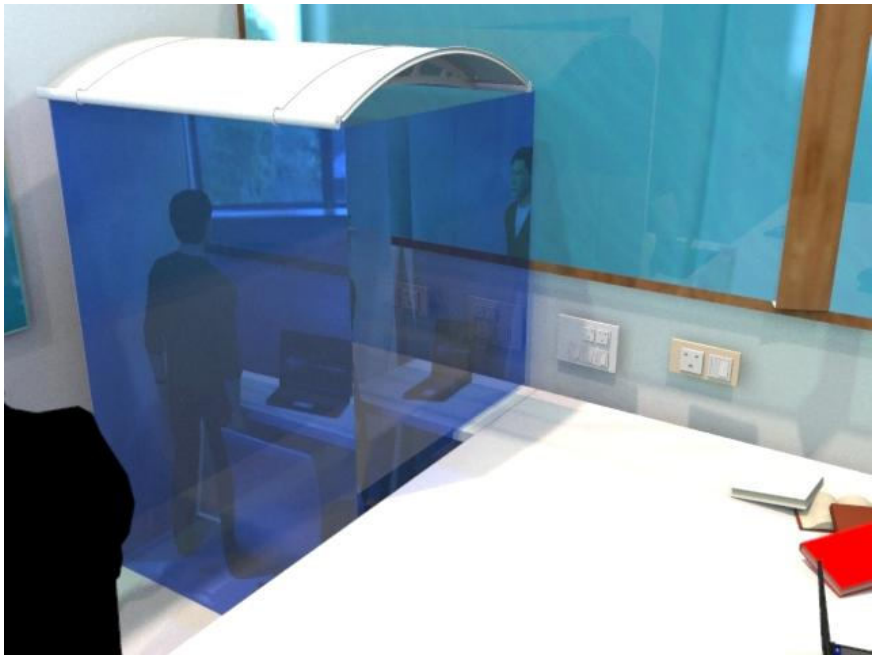




Types of ich-tandie

- Completely Opaque
- Half Transparent
- Completely Transparent





Materials

- Hinges can be done with Polypropylene
- Overall material HDPE, composite of gypsum boards
- Cloth can be used if cost is really an issue
- Armstrong soundsoak panel made of sound absorbing resilient material

Approximate Cost

- Extended table : ₹ 2000
- Ich-Tandie : ₹3000- 4000
- Auto DND Circuitry : ₹ 400 (with light)

- Total : ₹5000 to ₹ 6500
- Total : € 70 to € 80

Assumptions

- The need for silence/private time (SPT) is part of their normal schedule
- Employees need SPT for short duration in a day
- Employees need SPT days only once in a few months
- There is no need for a permanent solution

*These assumptions are based on the user research

Contraints and requirements

- The solution should have quick adaptability to the current environment
- Should not make the user completely isolated
- Should not hinder the current way of working
- Cost must be as minimal as possible

Initial Ideas

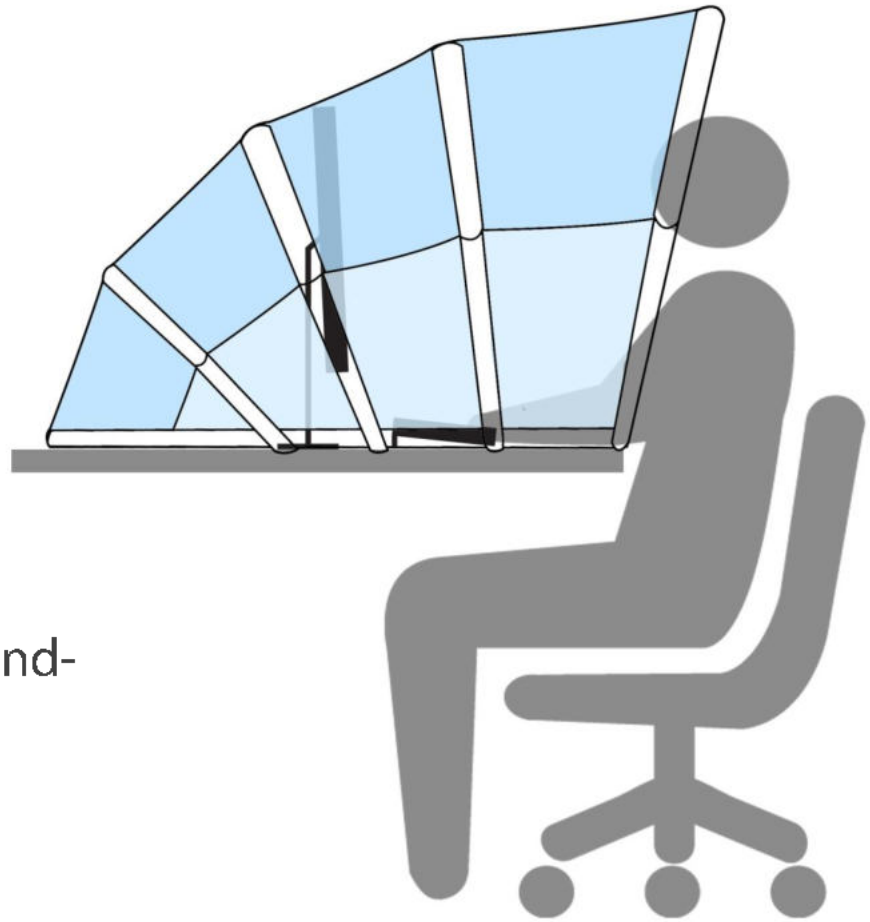
- Sound Dome
- Pink noise system
- Redesign IAD Floor

- Rejected these ideas due to feasibility and cost factors

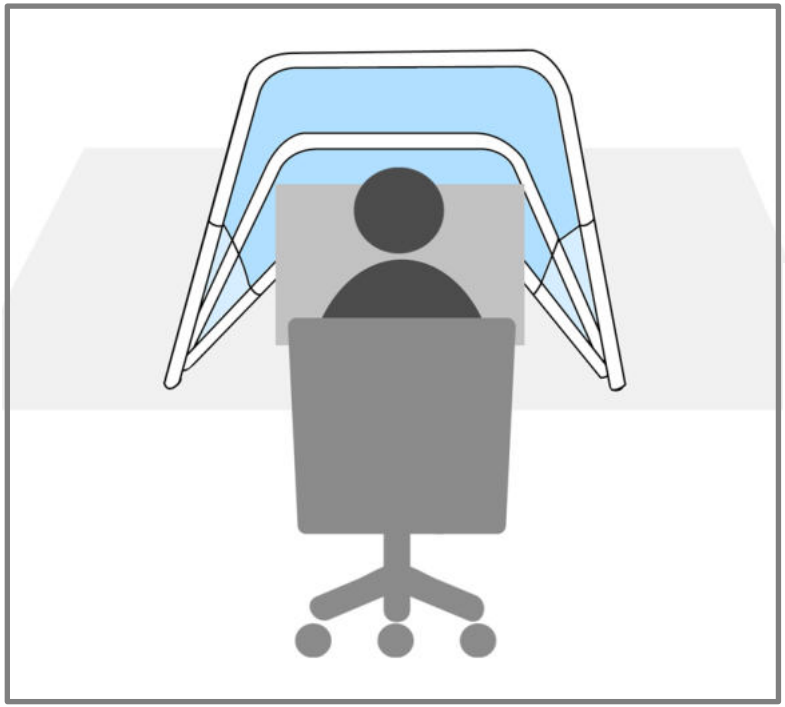
Final Solution: Isolation Hood

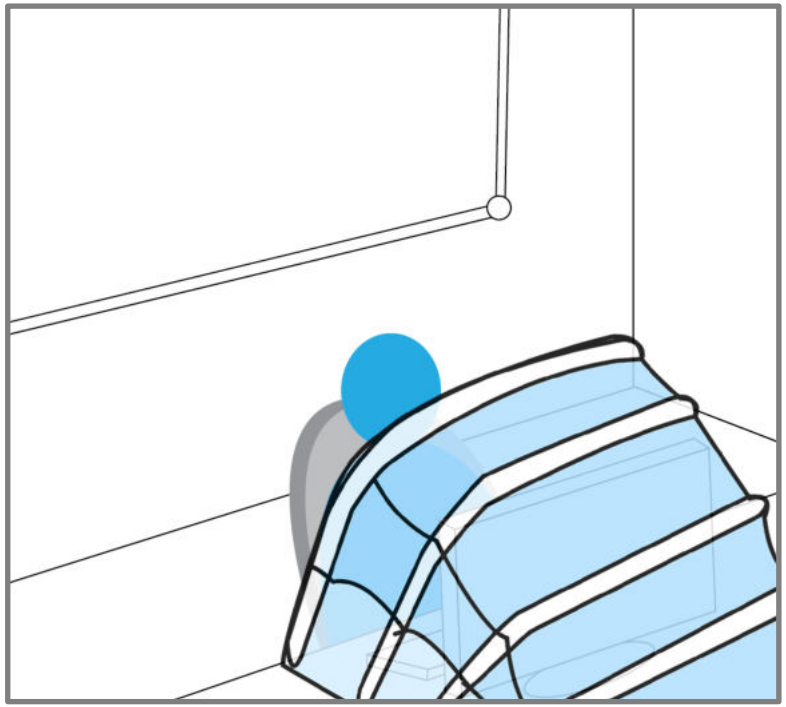
- Provides noise isolation
- Private space
- User can seamlessly transition between environments

- Collapsible Isolation Hood
- Light-weight
- Made of translucent material
- Transparent material would be sound-absorbing materila



Isolation Hood





Working and operations

- To avoid total isolation of the employee, it will not be available to all the employees
- The Institute will own a few of the hoods and will be issued to the employee whenever required

SWITCH

Workspace environment inside IAD

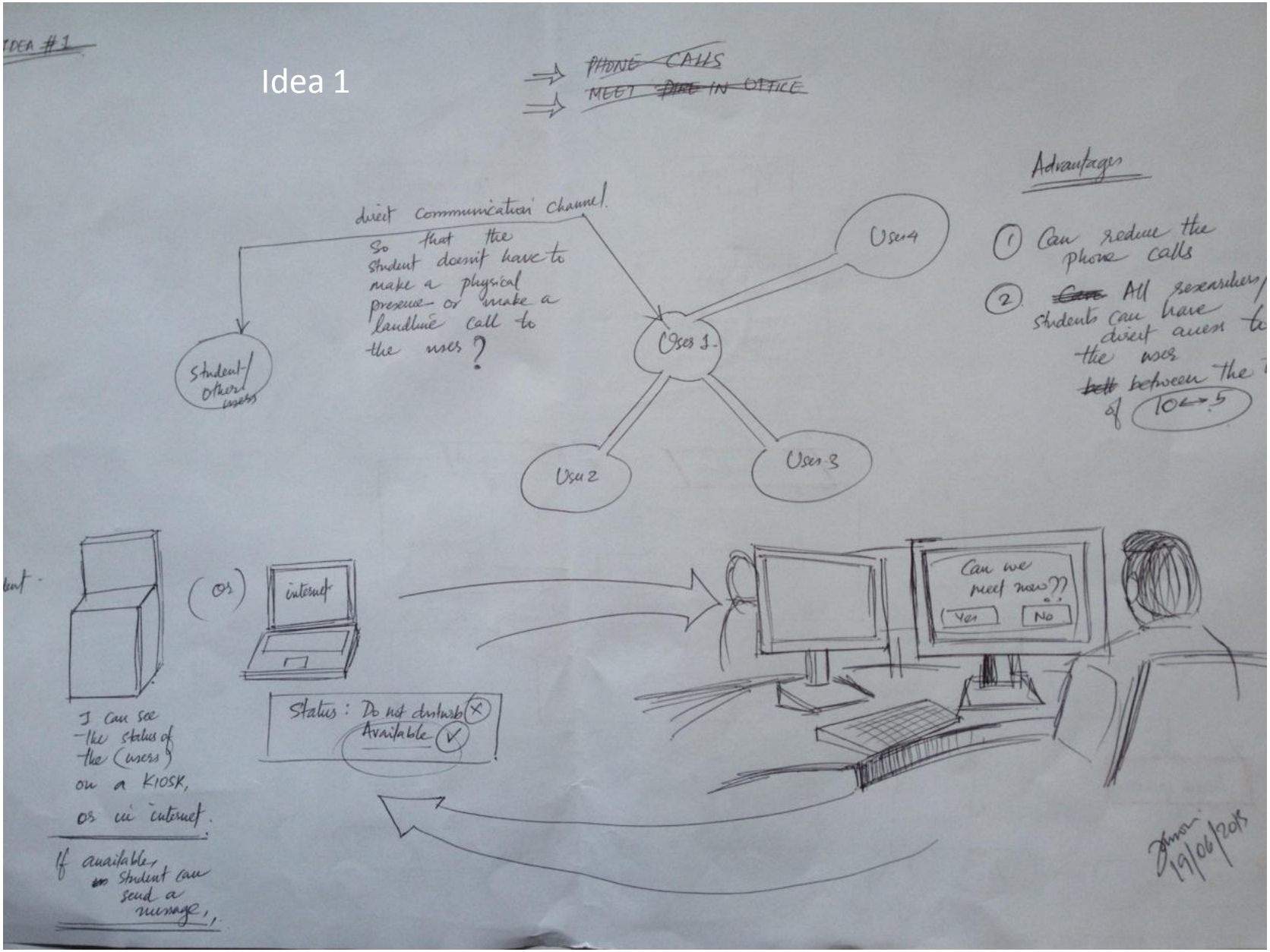
- A room is normally shared by 4 researchers.
- They share a common telephone that makes “class three noise” when it rings.
- In case of phone calls, one person has answer the call to figure out to whom the caller wants to talk to.
- If a visitor comes to meet one user, his presence inside the room effects the other users even if they are in their “Do not disturb” mode.

Assumptions

- All users inside the workspace would use the new system.
- Communicating inside the workspace and talking over phone does not go beyond the class 3 noise.
- It should be an established practice that the user should go out of the workspace in case of a visitor.
- As user is "available only for his colleagues", It should be another established practice that the students should not disturb the user.

Ideation Process

Idea 1


IDEA #1
PHONE CALLS
MEET DIRECT IN OFFICE
Advantages
direct communication channel.
So that the student doesn't have to make a physical presence or make a landline call to the users?
User4
User 1
User 2
User 3
Student/ Others users
1. Can reduce the phone calls
2. All researchers/ students can have direct access to the user between the
of 10 to 5
(OR)
internet
Can we meet now??
Yes
No
Status: Do not disturb
Available
I can see the status of the (users) on a KIOSK, or in internet.
If available, student can send a message,
19/06/2015

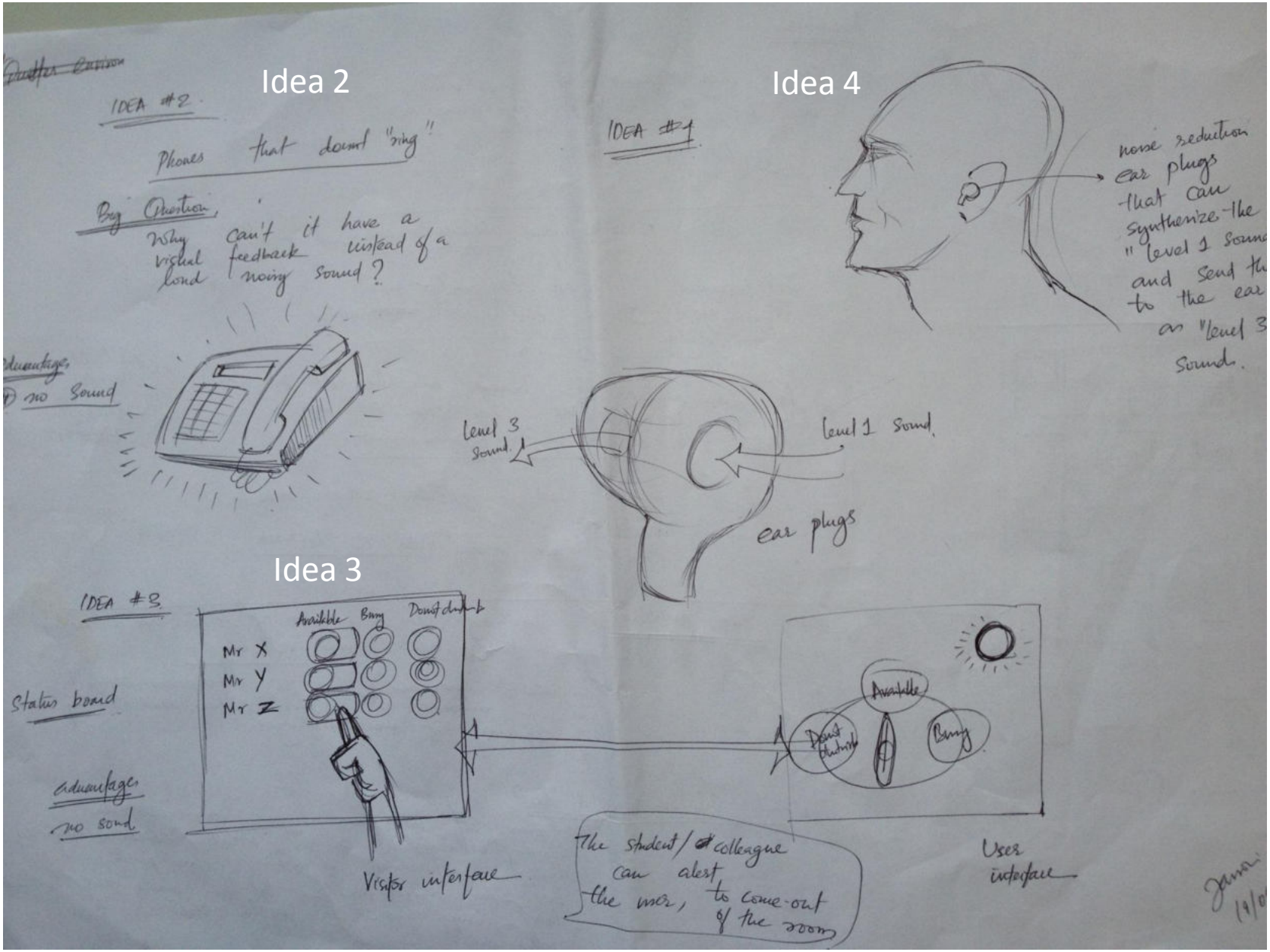
Idea 1

- The idea was to make a peer to peer communication channel between the user and his visitors (Students/Colleagues) so that the status of the user will be available online and a chat application can be enabled to communicate with the user.

- The product can be a web app or a Kiosk that can be placed on the main hallway.

- The idea was discarded because the user had to login the system and connect to the internet everyday to update his status.

- What if user doesn't want to switch on the system at all to perform his tasks?


Idea 2
IDEA #2
Phones that doesn't "ring"
Big Question
Why can't it have a visual feedback instead of a loud noisy sound?
Idea 4
IDEA #1
noise reduction ear plugs that can synthenize the "level 1 sound" and send the to the ear as "level 3 sound.
level 3 Sound.
level 1 Sound.
ear plugs
Idea 3
IDEA #3
Available
Busy
Don't disturb
Mr X
Mr Y
Mr Z
Status board
advantage: no sound
Visitor interface
The student / colleague can alert the user, to come out of the room
User interface

Idea 2

- The second idea was to make a noise-less telephone.
- The noise was substituted with lighted LEDs to grab the attention of users.
- Discarded the idea since it didn’t meet the needs of the user.

Idea 3

- Having a status board that can be operated from inside the workspace.
- It has a knob to switch status, as It was really important that a knob should be used to perform this task as it should be intuitive and easier to use for less tech savvy users .
- The user doesn’t have to go out of the workspace to change his status.

Idea 4

- Using an ear-bud to reduce the noise around.
- The ear-bud converts class 3 noise to class 1 noise.
- Discarded as it wasn’t a low cost product and there wasn’t any existing literature.

Switch

Switch is a device that can be used by a user to adapt his environment to his needs or vice-versa with minimum physical effort.

In IAD, where multiple researchers share a common workspace, the noise (Intrinsic & Extrinsic) due to certain activities of co-workers tends to have an immediate effect on the productivity and efficiency of the employee.

How Switch solves the problem

Switch solves this problem by reducing the rates by which a visitor or a call can potentially effect your productivity and efficiency during the work hours.

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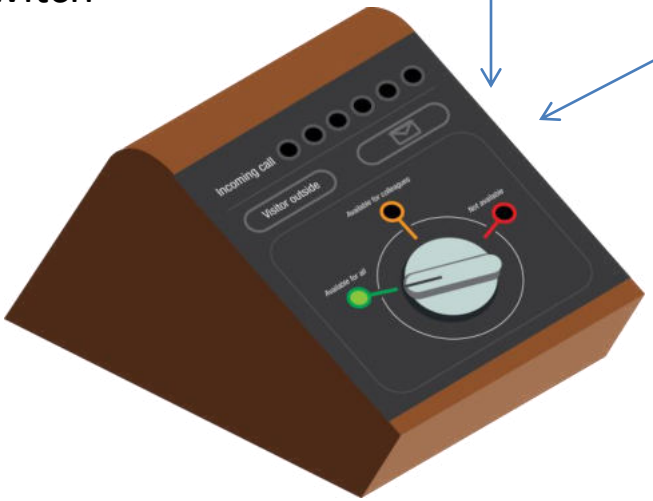
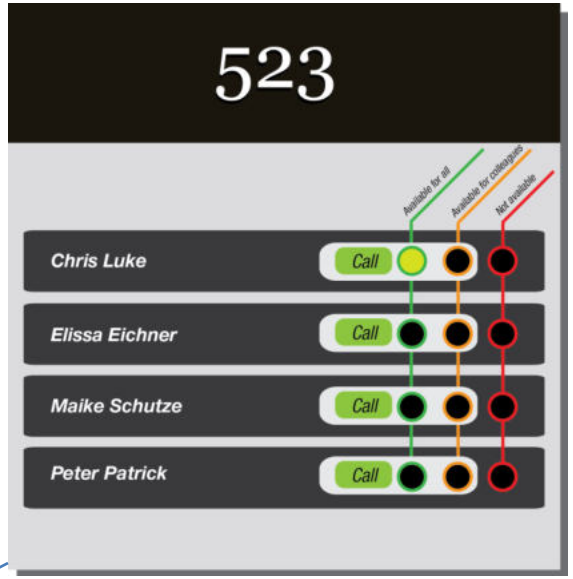
WORKSPACE

Telephone with Interactive VR

Switch





Status Board

The Switch system consists of three parts, A telephone with IVR system , Switch and a Status board outside the room.

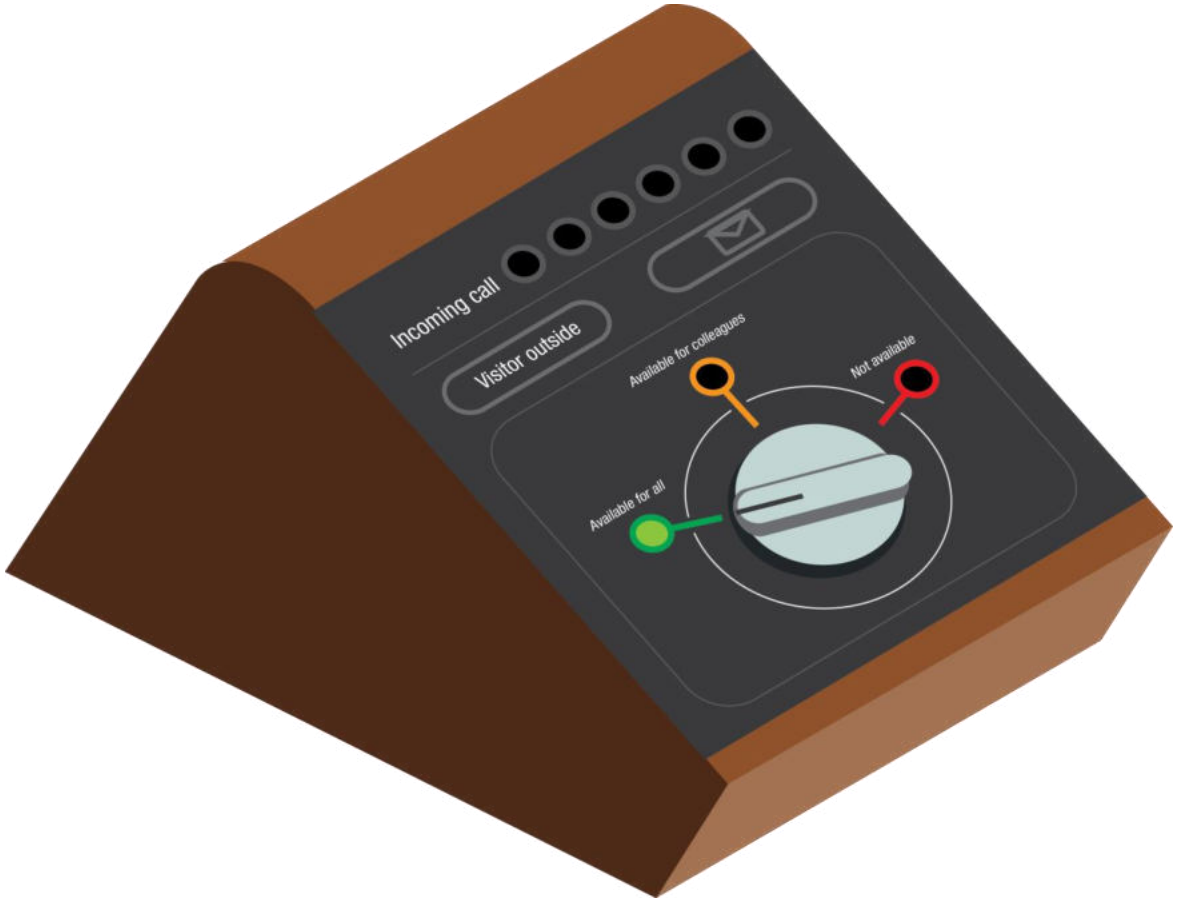
The two devices are connected to the switch, through which the user will be able to control the noise in workspace environment from inside the room, i.e, the people coming inside the room and the phone calls when the user is busy working.

The switch consists of mainly 4 parts namely,

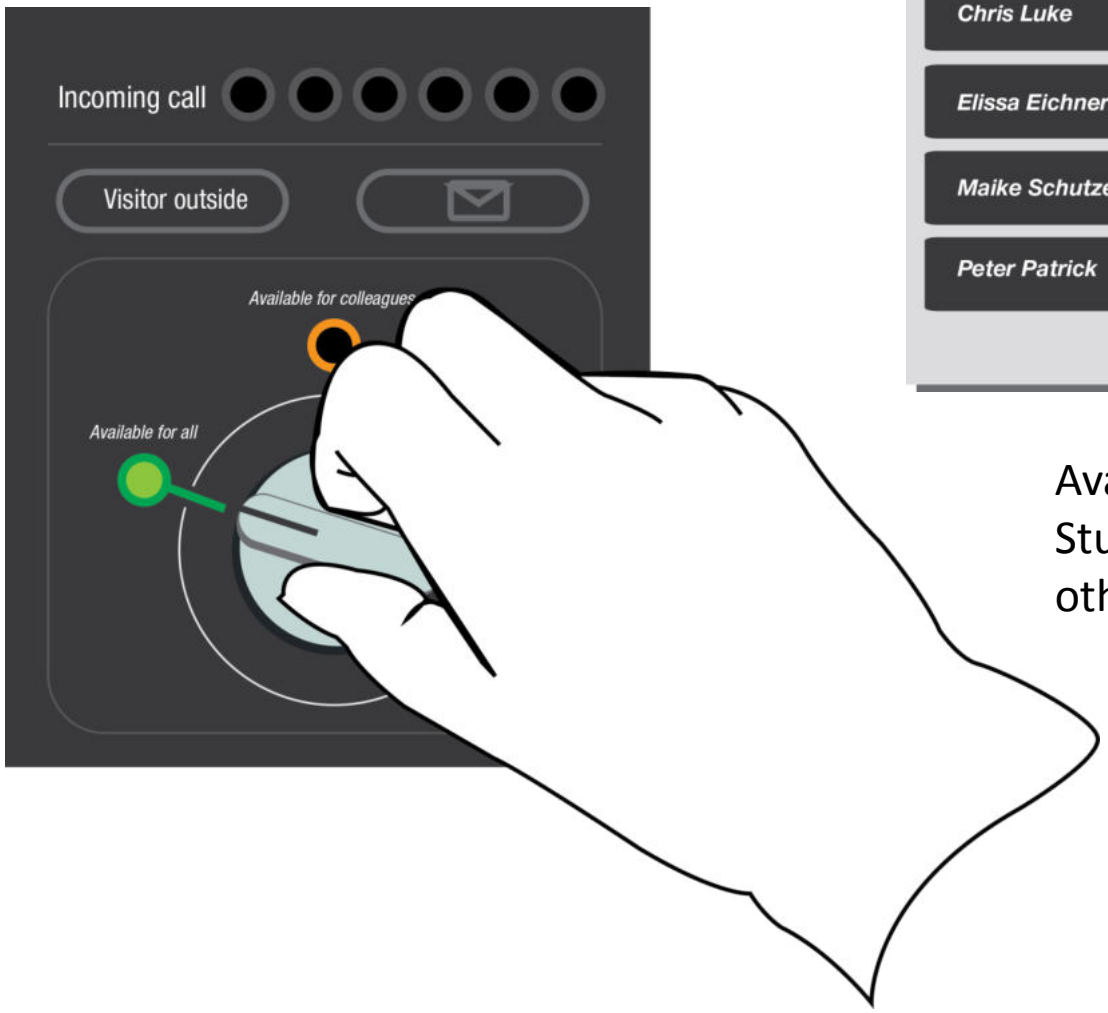
1. Incoming call alert,
2. Visitor alert,
3. Voice message alert and
4. The knob to switch between the modes.

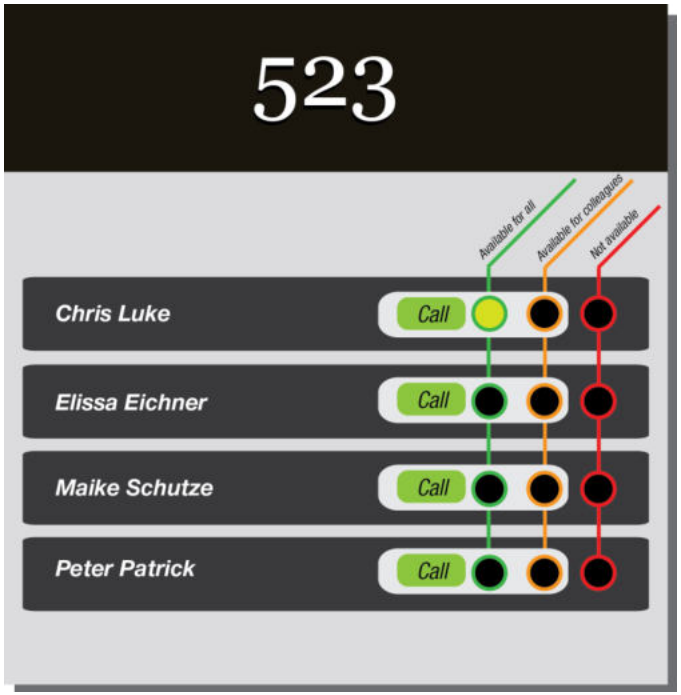
Based on the mode of work the user is indulged in, His availability is classified broadly into 3 modes:

1. Available for all
2. Available for colleagues
3. Not available


Incoming call
Visitor outside
Available for colleagues
Not available
Available for all

#1 Available for all





Available for both the Students , colleagues and other visitors.

#1 Available for all

In this mode, The user is free (not overloaded with work).

- He is free enough to attend his bachelor thesis-students(students who work under him and does part of his master thesis, who normally come to meet him for updates and guidance), his colleagues and other visitors.
- The status of the user is updated in the status board and the telephone IVR,
- If there is a visitor outside the room, he could alert the user about his presence outside the room by pressing a button attached to the “Available to all” and “Available for colleagues” on the status board. The user gets alert in his Switch.
- In case of phone call, the user gets a visual feed(Running LEDs) on his Switch as the IVR redirects the call to the specific user.

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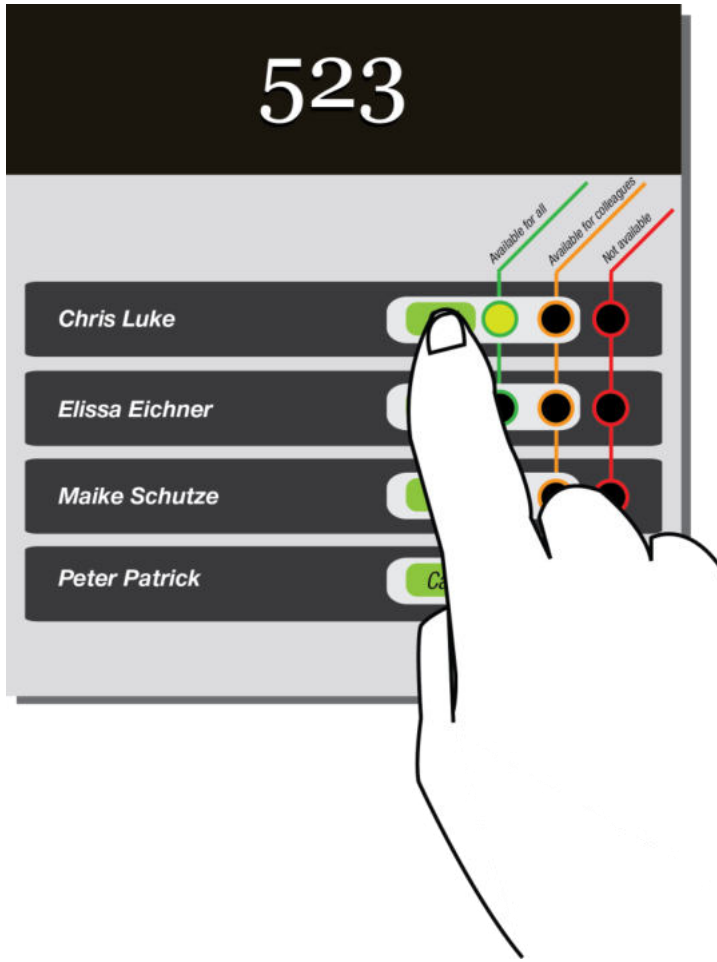
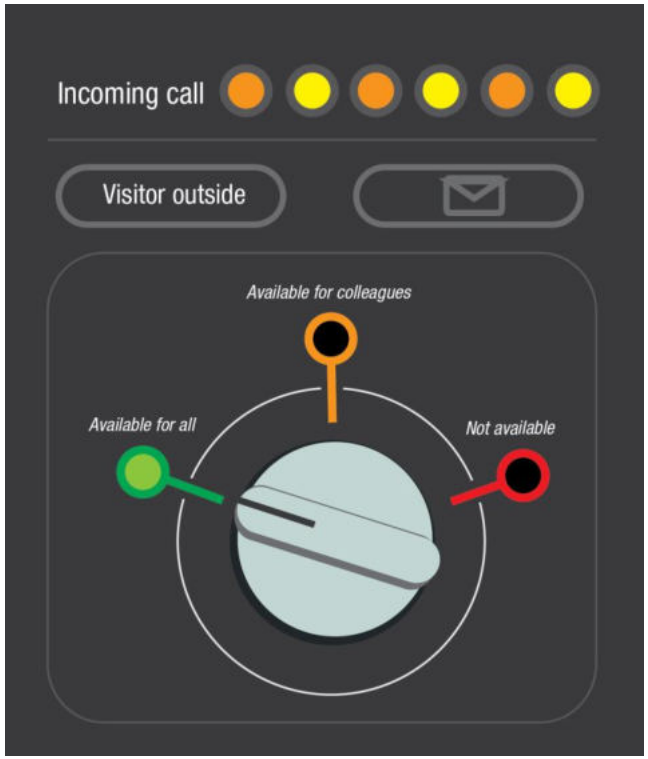
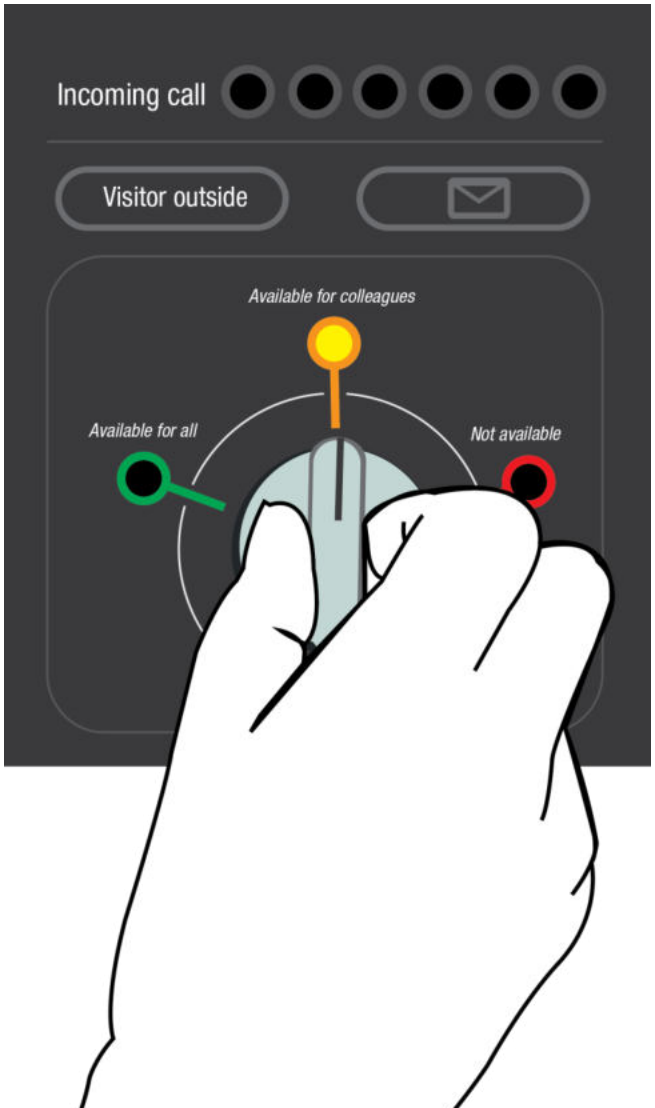


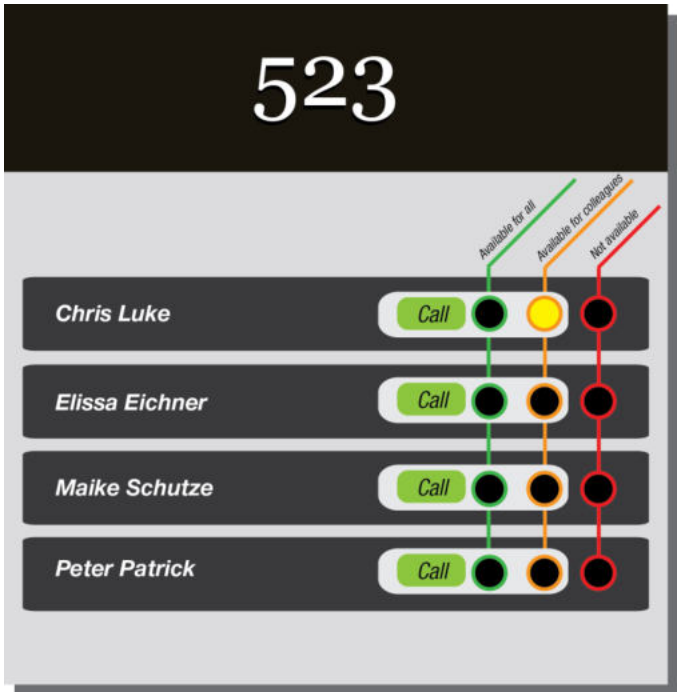
Visitors can call user from the status bar but only when user is available.



- IVR system
- Phone doesn't ring
- Ring substituted by visual feedback (LED lights)

#2 Available for Colleagues





Available only for colleagues as user is busy working and contact only if it's a matter of urgency .

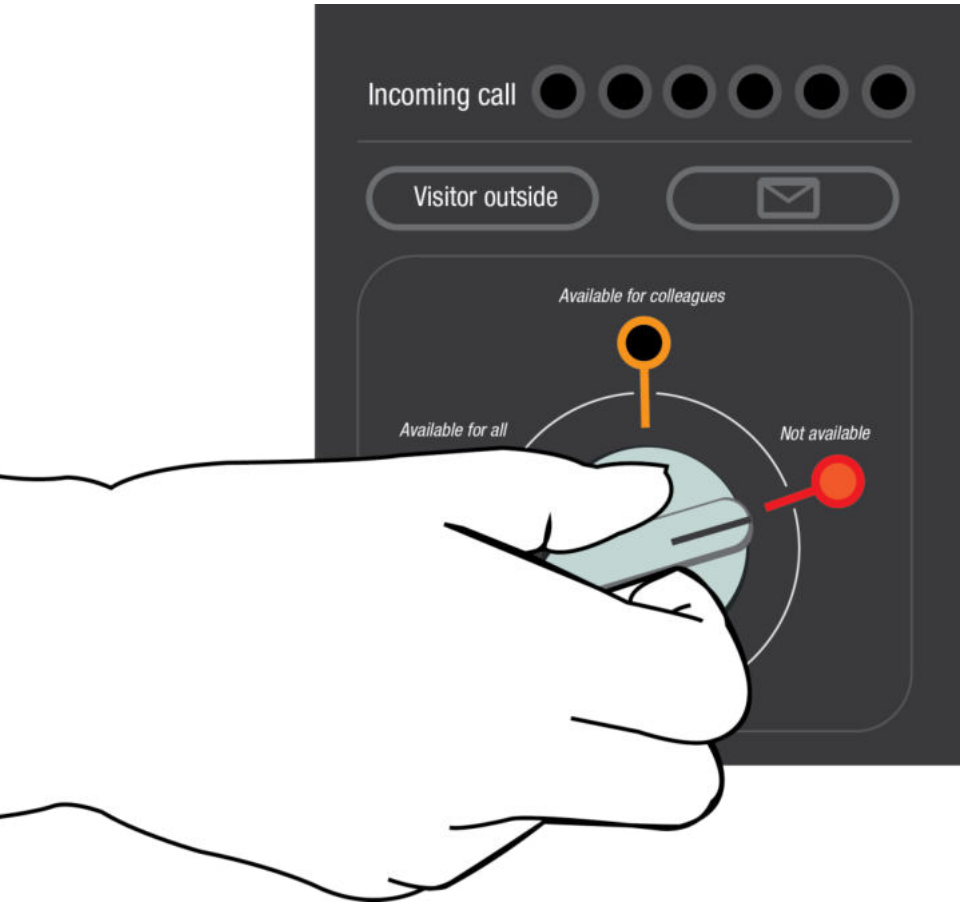
#2 Available for Colleagues

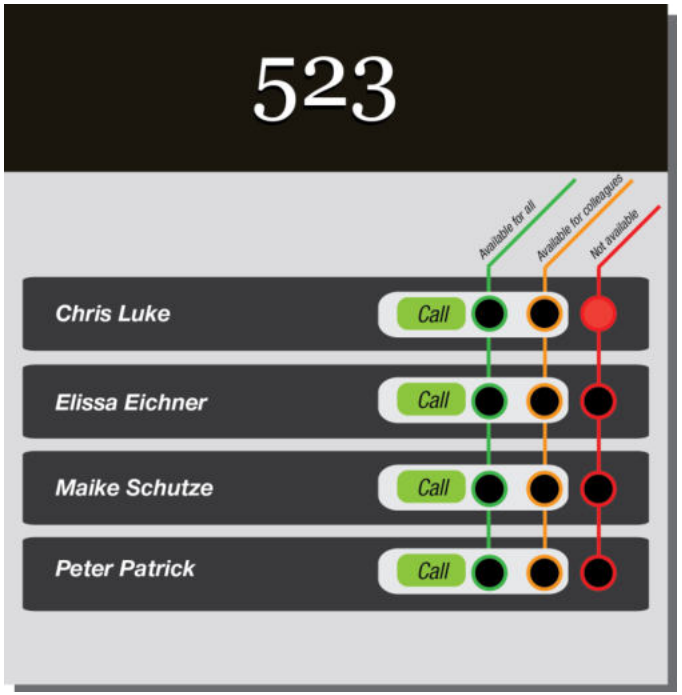
In this mode, The user is working on his daily routine and he is available only for the colleagues in critical situations.
Eg: Regarding the stimulator user is undertaking or urgent office works.

- The status of the user is updated in the status board and the telephone IVR,
- As user is available only for his colleagues, Its an established practice that the students should not disturb the user.(Assumption)
- In case of phone call, IVR redirects the call to the specific user after warning the caller about user's current mode.

.

#3 Not available





User not available. He is working on a serious issue like writing a paper. He Doesn't want any visitors or phone calls.

#3 Not available

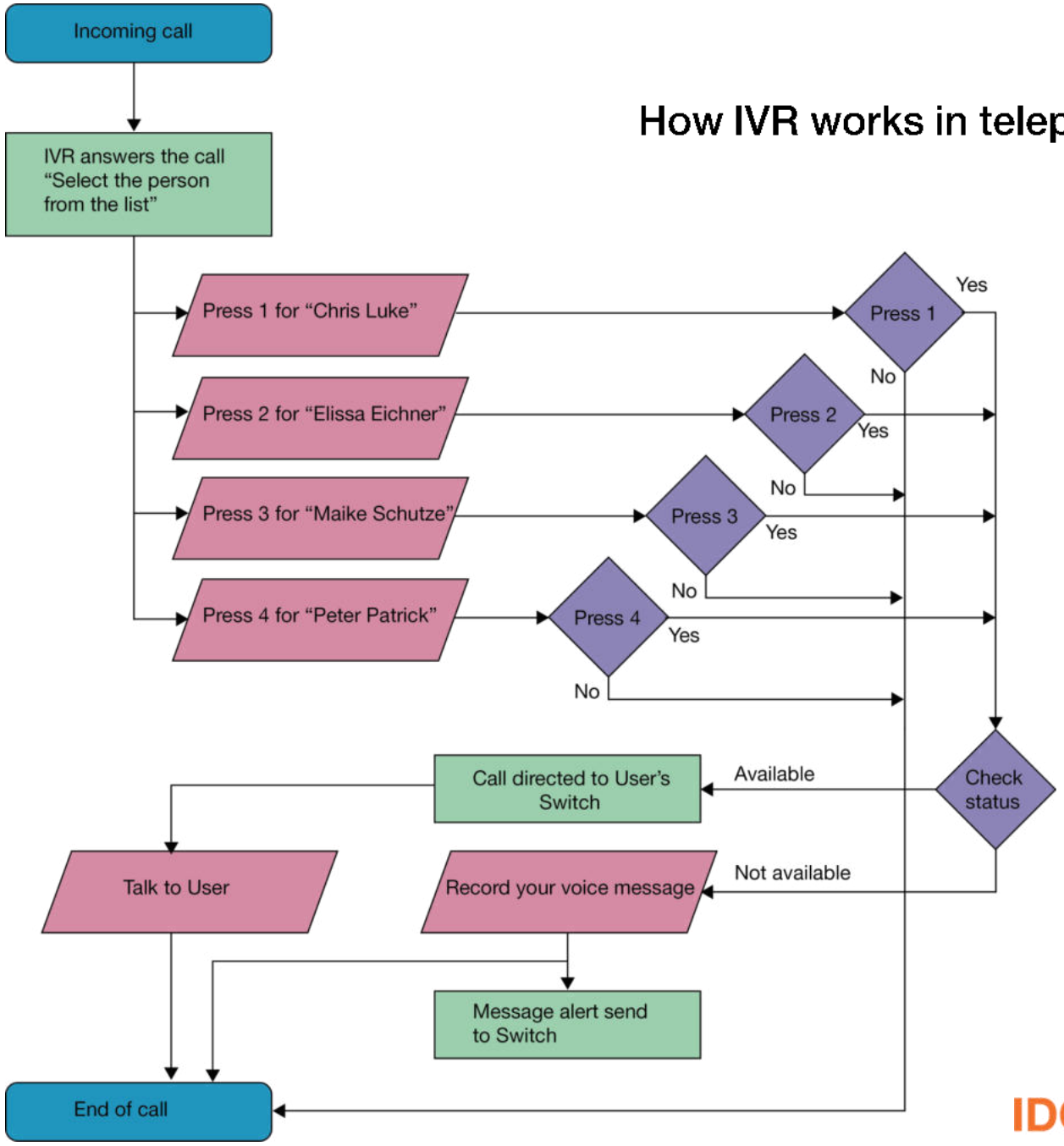
In this mode, The user needs complete silence and is not in a position to entertain anybody at all
Eg: Writing a research paper.

- The status of the user is updated in the status board and the telephone IVR,
- The “call button” on the status bar is inactive.
- In case of phone call, IVR asks the caller to send a Voice message after informing the caller that the user is busy.
- The voice message alert is displayed on the switch

.

- If “Not available”, IVR asks to send a voice message.
- No incoming calls during “Not available” mode.

How IVR works in telephone?



How IVR works in telephone?

In case of an incoming call, the IVR system responds to the caller, gives him a menu to choose the specified user from.

Based on the response of the user, the call will be redirected to the specific switch of the user.

If the user is not available, The IVR system asks the caller to send a Voice message. The feed will be sent to the user's switch.

Technological Specifications

IVR software + telephone (existing)

Micro controller + LEDs + wires + 9 volt battery
Wooden box with the interface pasted over it.
Interface of switch : 5 X 5 inches.

Acrylic board + LEDs and wires + switches.
Interface of status board: 8.3 x 11.7 inches.

Total cost: **4000 Rs. (approx)**
50 euros. (approx)

Recommendations for Proreta

Taken by Dipl.-Ing. Matthias Pfromm

What is Proreta

- Proreta is a driver-assistance system for cars that aims at reducing road accidents by minimizing driver errors during high-speed travel.
- As part of the assignment, the team worked on ideating various input methods and feedback mechanisms for steering the car
- Proreta is project currently in progress at the Institut für Arbeitswissenschaft (IAD), Technische Universität Darmstadt, Germany.

Input Methods

- Hand Gestures
- Indicator Lever
- Buttons

Feedback Mechanisms

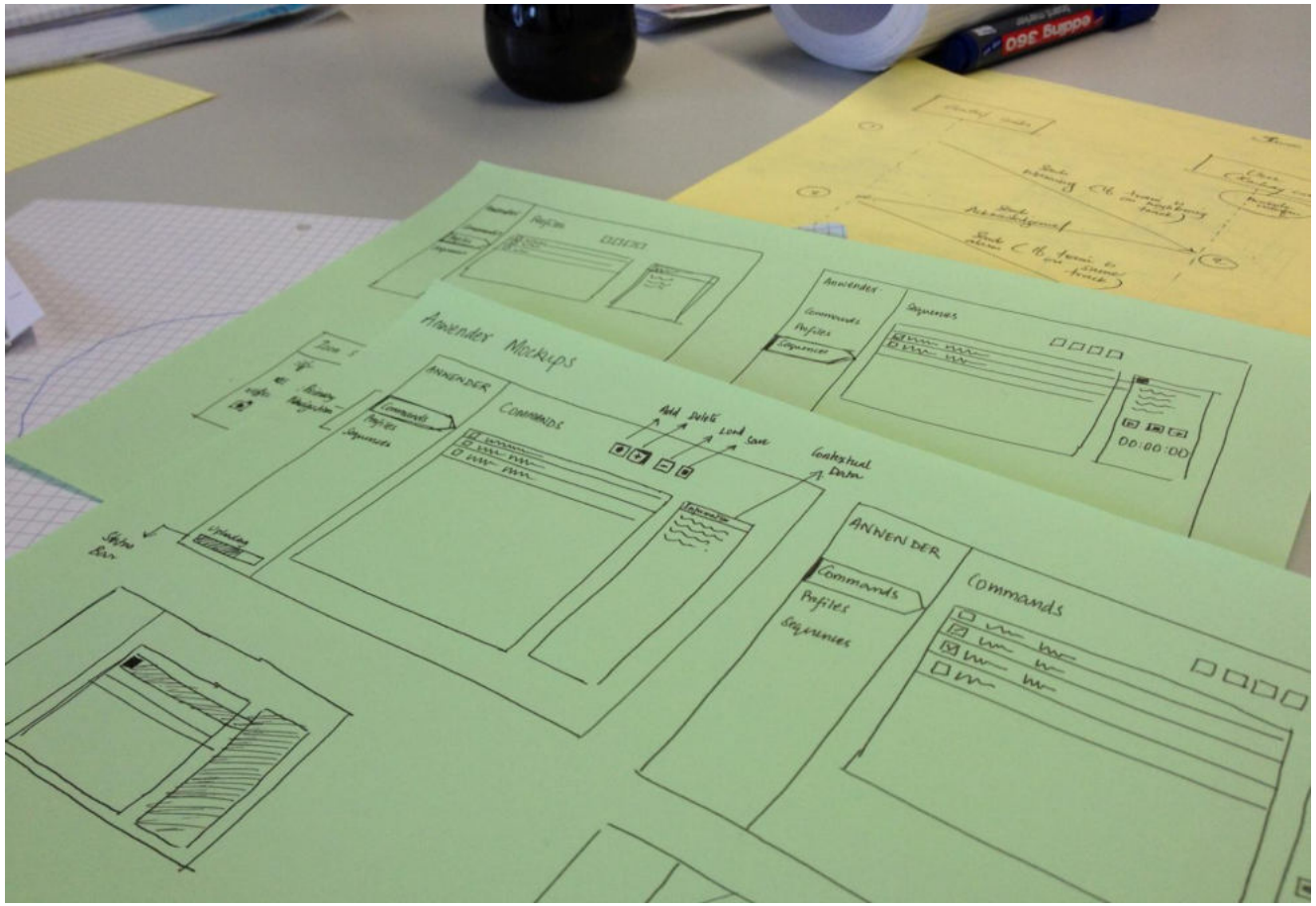
- Audio/Visual
- Using the LED strip
- Haptic Feedback

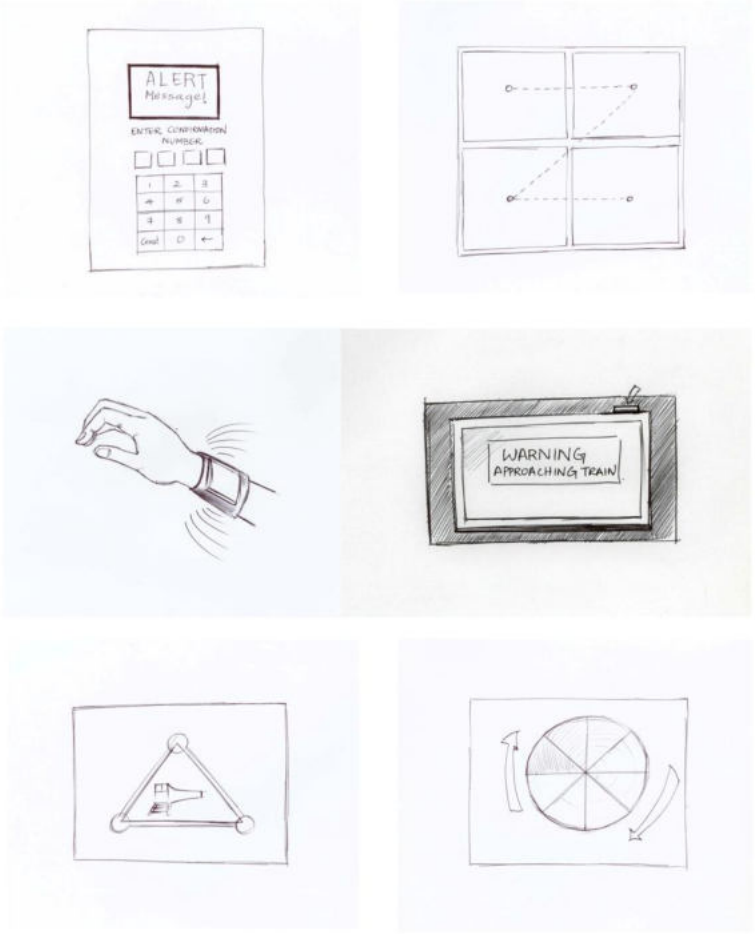
Workshop

Mechanisms for safety of railway linemen (ALARP)

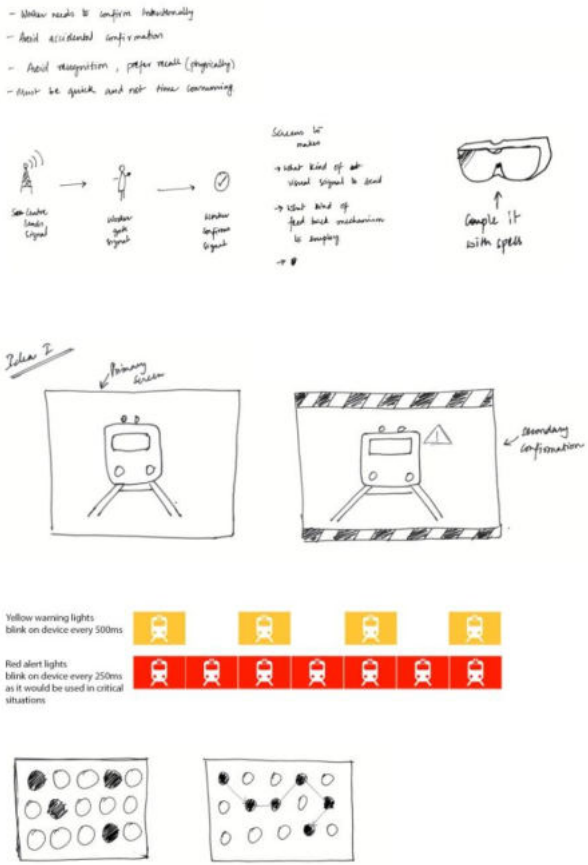
Taken by Kathrin Ballweg

Workshop : Mechanisms for safety of railway linemen



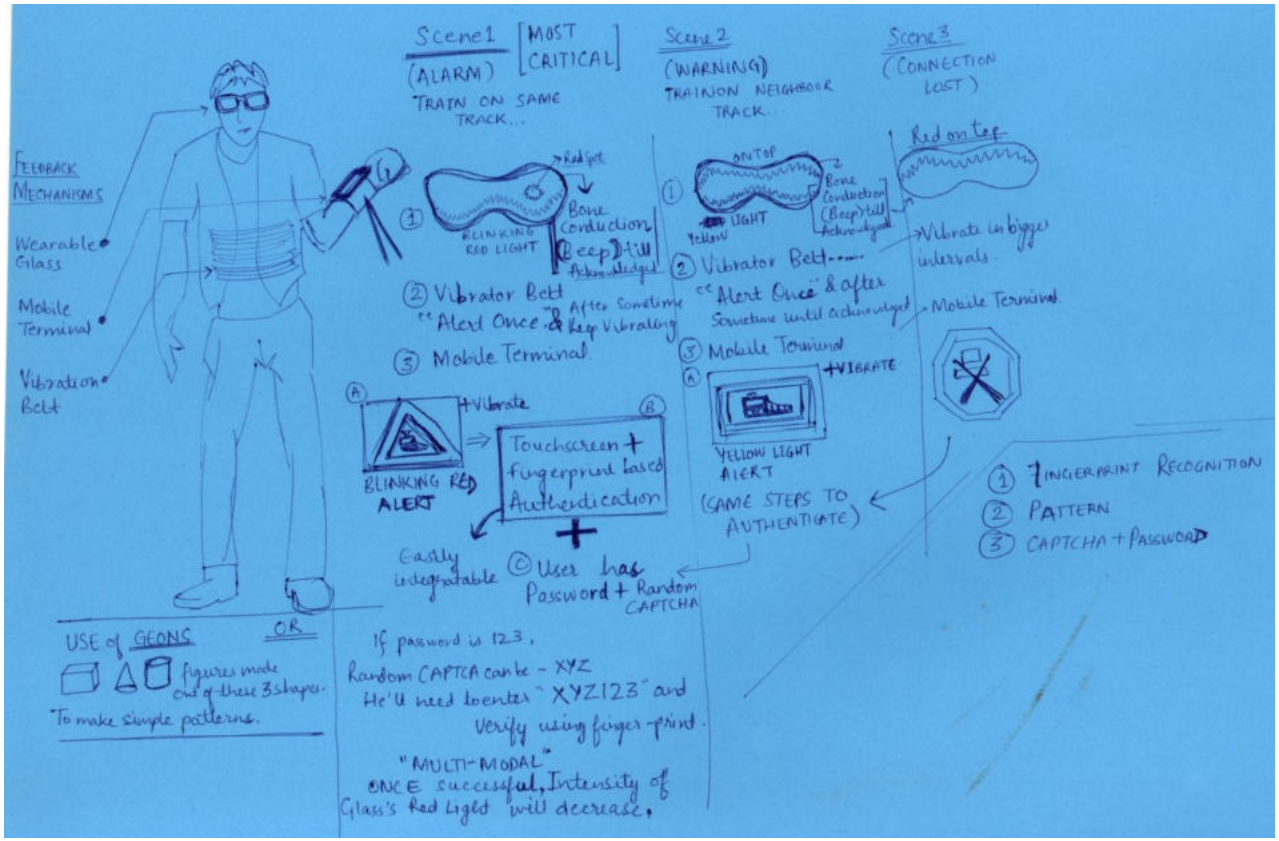


Jaison Jacob



Naveed Ahmed

Concepts



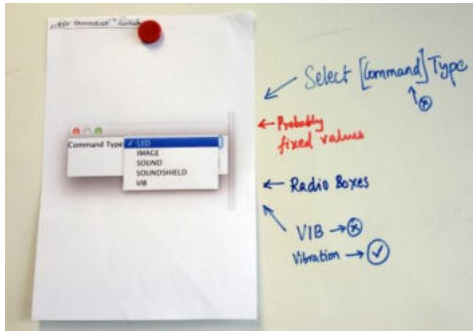
3 Available Feedback Mechanisms :

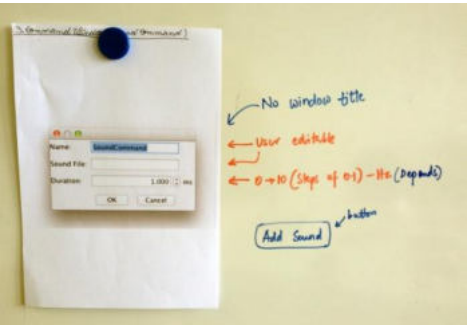
1. Wearable Glass
2. Mobile Terminal
3. Vibration Belt

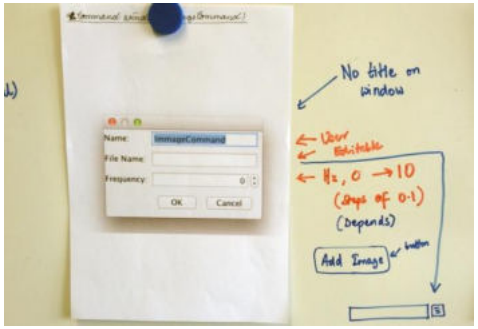
Possible ways for authentications,

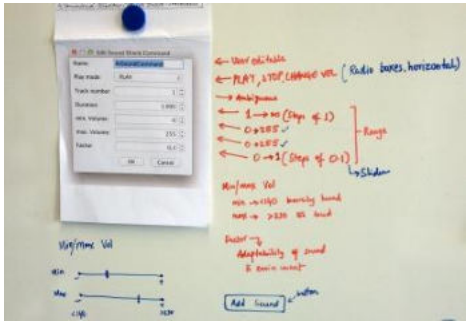
- Fingerprint Recognition
- CAPTCHA + Password

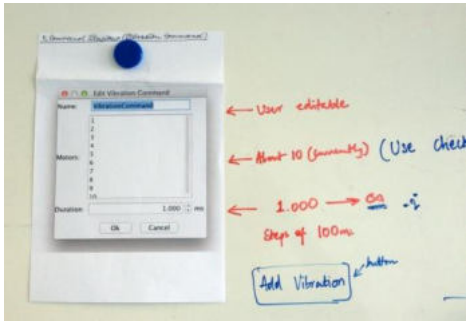
Analysis and redesign of the software component



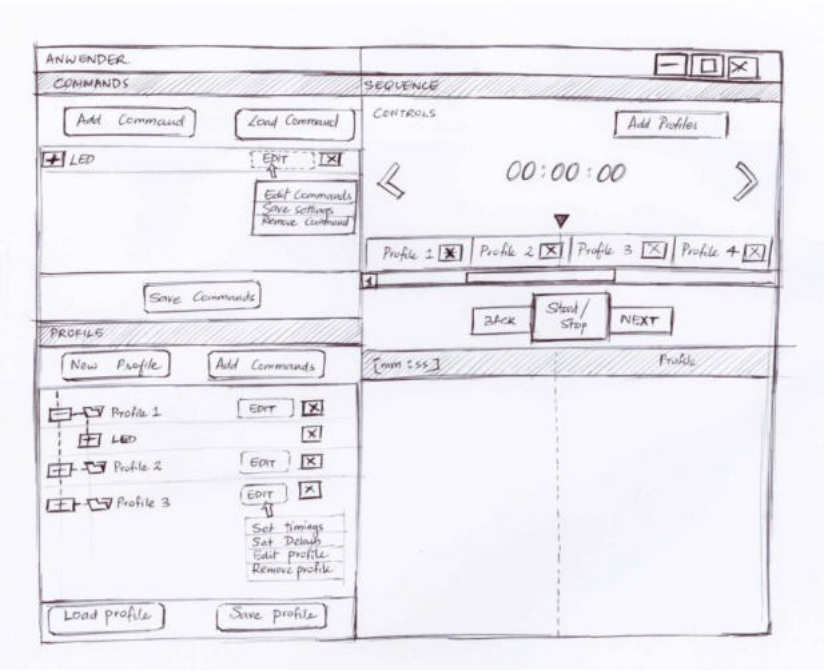


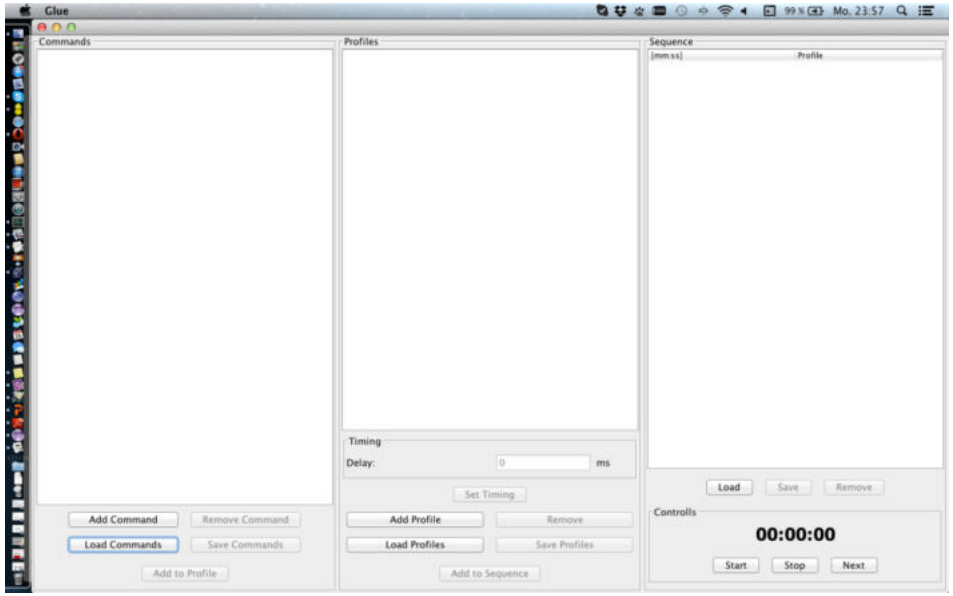




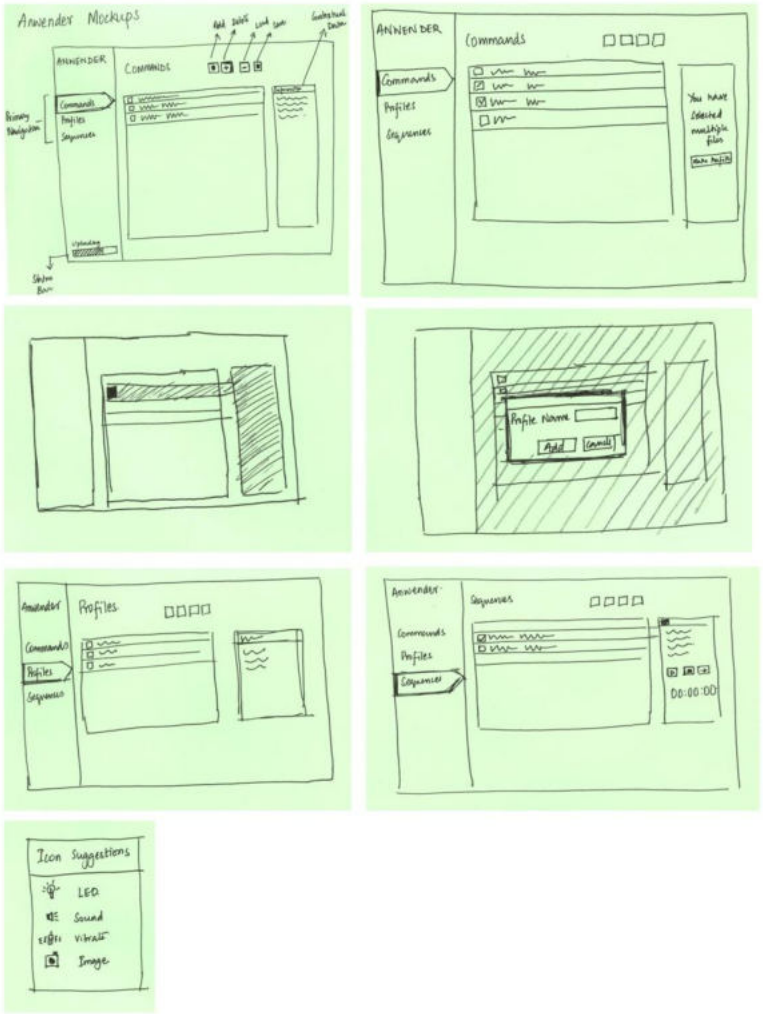


Redesign by Jaison Jacob





Redesign by Naveed Ahmed



Workshop

Understanding the Design Process

Taken by Pratap Kalenahalli Sudarshan

The Convaco-Convex Method for Design Feature Explorations

- Main aim of this method is to generate more and more forms because it is a constant demand for the design students. When your creativity stop responding, how to generate more forms.

- This whole activity workshop had two phases. One generating forms before this method, similarly generating after explaining this method..

- Usually when students are asked to generate forms for a product, the possible approaches for students are,
  - Google for inspiration
  - Keep sketching until one line leads to something new
  - Brainstorm in groups
  - Get inspired from colleague's design

The Convaco-Convex Method for Design Feature Explorations

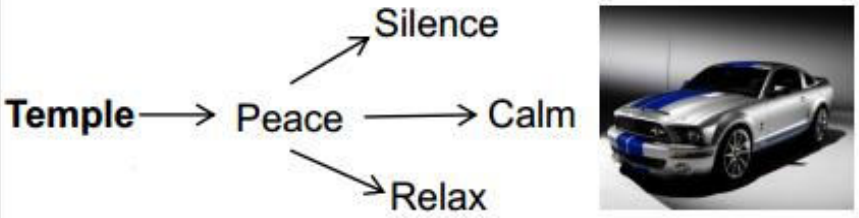
Four Steps in Concavo Convex Method are,

1. Have a collection of images of your favourite products
2. Know and understand your design brief, theme and space
3. Free association / mind map around the theme of the design
4. Forced connection of random portions of the mind map with one or more random images from the collection (step one) keeping the design brief in mind to generate ideas

The Convaco-Convex Method for Design Feature Explorations

Object: Pen **Theme:** Temple

Design before using the method

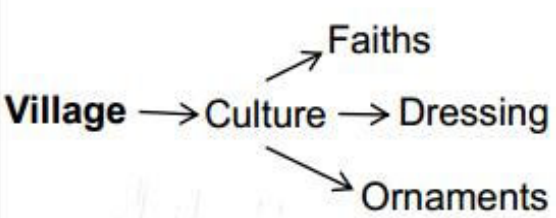


Designs After Using Method

Designer: Naveen R

Object: Spoon **Theme:** Village

Design before using the method



Designs After Using Method

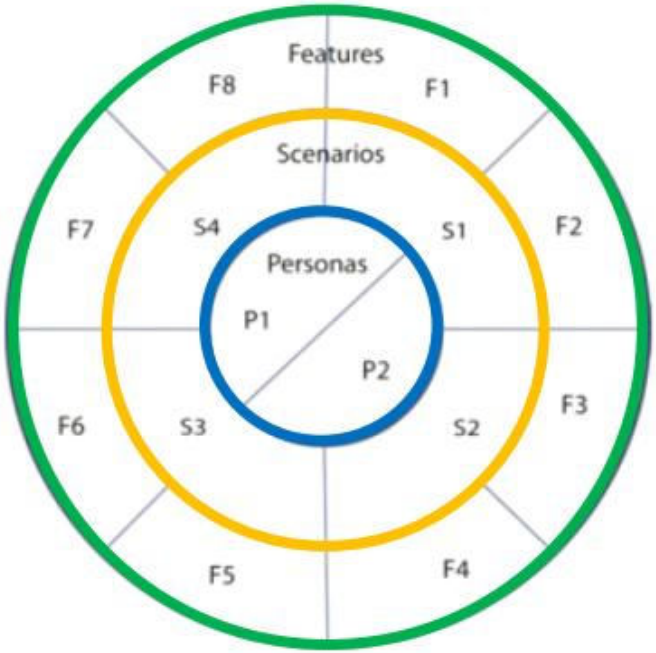
Designer: Amey S

References
Seventh International Conference on Design Principles and Practices
6 -8 March, 2013
Chiba University, Chiba, Japan
Pratap Kalenahalli Sudarshan, Michaela Kauer and Ralph Bruder

Persona-Scenario-Feature Wheel

- PSF Wheel is a tangible freely moving wheel which has rotating concentric circles to enrich product feature discussions. This helps in deciding the facilities and services in consultation with the stakeholders.

- These concentric discs has the information of Persona, Scenarios and Features. For every persona, corresponding scenarios and features can be evaluated.



Persona-Scenario-Feature Wheel

- For every feature, evaluation is done and seen whether it fits a particular persona or not.

Features ↓ P/S →	Adrenalin	Solitude		
Indoor Games				
Fishing	x	x		
Plantation Harvest	x			
Spiritual Area				
Driver Quarters				
Adventure Sports (Tree climbing, rock climbing, etc)	x			
Reading Area		x		
Host Family Interaction				
Tree House	x	x		
TV / Home Theatre				
Mini Bar	x			
....				

References
A complimentary tool to aid product feature discussions by Pratap Kalenahalli Sudarshan and Michaela Kauer, User Experience Day 2012 at Telekom AG, Darmstadt.

Other Activities

- ## Talk by Prof. Chris Johnson

  Prof. Chris Johnson from Glasgow University gave talk on 'Usability in Critical Systems.' He works in the field of design of complex systems, accident analysis, military risk assessments and usability in critical systems like aircrafts, air traffic management, space research, et. al.

- ## Visit to Design School

  The team visited the Faculty of Design, University of Applied Sciences, Darmstadt where we got an overview of the projects done by the department. This was followed by a short presentation about IDC to the Professors .

- ## Designing a 'cool' game

  The team was briefed to create a 'cool' game that would be organic and self-sustaining in the way it would survive in the market. We worked on various aspects of what makes a game successful and cool' and try to incorporate those ideas into the features of the game. The initial concepts and ideas were then conveyed to the owners of the idea. This is still a work in progress.

The End

Jaison Jacob, Naveed Ahmed & Sourabh Pateriya
Industrial Design Center, IIT Bombay

Under Ms. Des. Pratap KS

Presented at
IDC, IIT Bombay
July 08, 2013

Insights (contd.)

General Observations

- Germans plan things much in advance and are very organized
- Germans are structured in their approach
- People keep their personal and professional lives completely distinct
- People are planned and have perfectly set timings even for regular activities, so that they can concentrate on their official work. For example, they check their email only at specific times of the day or only on a particular day in a week
- People have separate computers/devices for personal and official work, unless necessary.
- PhD is considered as a personal goal (by the students) and they don't look forward to a push from anyone
- People voluntarily take up a lot of self-initiated activities other than their PhD work. If they take up such work, they do it responsibly and with dedication

Insights (contd.)

- Most of the PhD students work in inter-disciplinary teams involving students from various departments

People Behaviour

- People want to see immediate effect of the work they do and the impact it makes
- People are happy to know that their work at IAD, though it has no immediate effects, has bigger and long-term impact on a large number of people

Time Management & Environment

- People want to be in total control of their time and schedules; they also feel more structured and organized when someone does the schedules for them
- People are fine with the rule of being 10am-3pm in the office every day, but prefer it to be slightly flexible when required

Insights (contd.)

- People prefer working in quiet environments especially while doing critical work or work that needs thinking. *"Sometimes when I am on DND and other colleagues in the room are not, it is a disturbance."*
- People try to create a distraction-free environment if the elements that cause it are under their control. They usually do that by switching off their cell phones, moving to quieter rooms for work, having strict times for activities, etc.
- People move to a quieter room if they want to work efficiently or on a serious issue

Technology and Tools

- MS Outlook is a major tool of communication within IAD, like any enterprise. It is used by everyone for schedules and appointments
- People use tools like to-do lists to keep track of things to be done – both personal and official

Insights (contd.)

- People use their mobile phones for work email and personal tasks like connecting socially with friends. They use applications like Whatsapp, Skype, Facebook, etc. to connect to people.
- People use technologies like Dropbox to share and sync data across devices and with other stakeholders
- People are open to adapting new technology if it facilitates their work, is not very expensive and if they hear good reviews from others. They are not early-adopters.
- For one user, design of a product had less priority than the function it provides

Weekend/Vacation Preferences

- People want to reserve their weekends/vacations only for personal work with no intervention from their professional lives

References

- Designing Ubiquitous computing environments to support work life balance by Karlene C. Cousins and Upkar Varshney, Communications of ACM, Vol. 52, No:5, May 2009
- Workplace flexibility survey report: Workplace flexibility in the 21st Century by Socitey for human resource management. August 2009
- Five spheres of success /Off Balance On Purpose: The Future of Engagement and Work-Life Balance by Dan Thurmon at TEDxPSU http://www.youtube.com/watch?v=8OkzozrUEHY
  - "Flexible Workspaces: Employee Perk Or Business Tool To Recruit Top Talent?" Forbes. Accessed June 3, 2013. http://www.forbes.com/sites/jeannemeister/2013/04/01/flexible-workspaces-another-workplace-perk-or-a-must-have-to-attract-top-talent/.

Image References

- Slide 3: Microsoft Clipart
- Slide 4: Office of We Like Small, http://www.officedesigngallery.com/