

Summer Internship Report

May-June 2013

Submitted on July 8, 2013

Jaison Jacob, Naveed Ahmed & Sourabh Pateriya

Interaction Design, 2012-14

Master of Design

Industrial Design Centre,

Indian Institute of Technology Bombay,

Mumbai, India

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Pratap KS, our guide, facilitator and supervisor during the project, for his constant guidance and help - both professional and otherwise - throughout our trip to Germany.

Sajan Pillai for the assistance during the selection process and for keeping up with our pre-departure nagging.

Last, but not the least, we thank our family and friends for their love and co-operation at every step.

Jaison Jacob, Naveed Ahmed & Sourabh Pateriya

July 8, 2013

Internship Certificates - Jaison Jacob & Sourabh Pateriya



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Certificate of Internship

This is to certify that **Mr. Jaison Jacob**, Master of Design student from Industrial Design Centre (IDC), Indian Institute of Technology Bombay (IIT Bombay) has successfully completed his Internship from **17th May 2013 to 28th June 2013** (six weeks) at the Institute for Ergonomics (IAD), Darmstadt University of Technology, Germany.

He has successfully participated and contributed in a Design Project for the German Office Environment. The project was to conceptualise and design flexible workspaces to improve productivity in the office environment. The project specially looked into the aspects of providing the worker with need - mood specific environment within his workspace.

Additionally, he also participated in workshops for creativity methods, interaction design and usability of supervisor and worker interfaces in the railway trackside work environment and interaction design concepts for Advanced Driver Assistance systems

During the internship, he demonstrated good design skills with a self-motivated attitude to learn new things. His performance exceeded expectations and was able to complete the assignments successfully on time.

We wish him all the best for his future endeavours.


Prof. Dr.-Ing. Ralph Bruder
Head of the Institute

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This is to certify that **Mr. Sourabh Pateriya**, Master of Design student from Industrial Design Centre (IDC), Indian Institute of Technology Bombay (IIT Bombay) has successfully completed his Internship from **17th May 2013 to 28th June 2013** (six weeks) at the Institute for Ergonomics (IAD), Darmstadt University of Technology, Germany.

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Internship Certificate - Naveed Ahmed

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Certificate of Internship

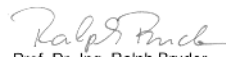
This is to certify that **Mr. Naveed Ahmed**, Master of Design student from Industrial Design Centre (IDC), Indian Institute of Technology Bombay (IIT Bombay) has successfully completed his Internship from **17th May 2013 to 28th June 2013** (six weeks) at the Institute for Ergonomics (IAD), Darmstadt University of Technology, Germany.

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Head of the Institute

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28.06.2013



Introduction

The team from Industrial Design Centre, IIT Bombay comprising of Edu Mohan, Jaison Jacob, Naveed Ahmed and Sourabh Pateriya visited Institute of Ergonomics (IAD), Technical University of Darmstadt, Germany, on a Student Exchange Program during May-June 2013.

IAD specializes and carries out continuous research in the field of ergonomics with focus on vehicle ergonomics, work organization and production ergonomics.

During the 6-week exchange programme, the team worked on a project and various workshops. While the project was three weeks long, the workshops usually were as short as two or three days. The workshops were randomly distributed over the 6-week period. Students from Interaction Design – Jaison, Naveed & Sourabh – worked on the project, the details of which are mentioned below.

The project, Creating flexible workspaces in the IAD context, was completed by the team from Interaction Design over a period of three weeks. The workshops included learning new methods of decision making, design explorations, designing games, attending talks and providing design recommendations to a variety of project modules.

The content in this report has been structured and divided based on the projects and workshops done. They have been ordered according to the duration and amount of work done during each assignment.

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Participated by Edu Mohan, Jaison Jacob, Naveed Ahmed & Sourabh Pateriya

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Creating Flexible Workspaces

ABSTRACT

The project on Work Life Balance (WLB) was carried out at the Institut für Arbeitswissenschaft (IAD), Technische Universität Darmstadt, Germany. WLB is a concept of including proper prioritizing between work and lifestyle [1] and striking a perfect-enough balance between the two, without adversely affecting each other.

Germans, by culture, are very structured individuals and keep their professional and personal lives independent of each other. Due to an increase in demands of the workplace and personal lives, there is always a spillover, which affects relationships and work satisfaction.

The project concentrated on the area of flexible work spaces, which is about enabling employees with a greater control of their work-life balance to deliver better results.

By employing various methods of primary research, the team worked on identifying the issues and needs in the current context (IAD) and find areas where design can intervene to make life better for the employees. The goal of the project was to reduce the impact of various factors on the employees' life, thereby increasing their productivity and efficiency.

INTRODUCTION

The current project was done at IAD, TU Darmstadt in Germany. During the three-week project, the team did an extensive study to understand a topic that is very nascent in its research and implementation. Further, the challenge was to know the German culture that the team was alien to, so that we can create more empathic designs.

IAD specializes and carries out continuous research in the field of ergonomics with focus on vehicle ergonomics, work organization and production ergonomics.

Work-life Balance is about striking a balance between personal and professional lives. The flexibility of working conditions is increasing due to mobile internet as well as the shift from production to knowledge worker. In the same time, the boundaries between work and leisure time are blurring, which can affect the employee's recreation time and long-time well-being.

Organizations need to be supported in the application of working conditions that support employees' well-being. This includes a flexible room concept as well as healthy and aesthetic workplaces.

This project was undertaken by the design team from Industrial Design Centre (IDC), IIT Bombay, Mumbai, India. The team included Jaison Jacob, Naveed Ahmed and Sourabh Pateriya, students pursuing their Masters in Interaction Design at IDC.

GLOSSARY & TERMS

Employees Refers to the employees at IAD. The term is used interchangeably with the term 'users.'

FWS Flexible Workspaces

IAD Institut für Arbeitswissenschaft (IAD), Technische Universität Darmstadt, Germany or Institute of Ergonomics, Technical University of Darmstadt, Germany

IDC Industrial Design Center, IIT Bombay, Mumbai

IIT Indian Institute of Technology

Institute Refers to IAD

Team The student team comprising of Jaison Jacob, Naveed Ahmed and Sourabh Pateriya, guided by Pratap KS

Users The users of the system. Here, the employees of IAD. The term is used interchangeably with the term 'employees'

WLB Work-life balance

PROJECT BRIEF

The brief given by the Institute at the beginning of the project defined the problem space and scope of work.

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*

Based on the primary research during the design process, the project brief was redefined to align it to the identified problem area.

PROCESS FOLLOWED

From the initial stages of the project, the team followed User Centred Design(UCD) Process. We tried to understand the needs, wants and limitations of the user and their environment through various research techniques. The results from research were then analysed to create the final solution.

The various steps followed during the process are mentioned below.



Research

The research was a two-step process involving secondary and primary research. Primary research involved contextual inquiry and observing user environment, while secondary research was mainly literature study to understand the state of art.

Insights

The data obtained from the research was used to generate insights using the techniques of affinity mapping, which were later validated by comparison to secondary data.

Identifying Problems

By keeping the user and their environment under consideration, critical problem areas were identified where design could intervene to make things better.

Concept Generation

The team members individually worked on various possible solutions addressing the problems identified.

Solution

The final solution was in the form of concept ideas and recommendations.

SECONDARY RESEARCH

The team did an extensive research on existing literature and reports to understand Work Life Balance, a topic that is very nascent in its research and implementation.

Work Life Balance

Work life balance is a concept which talks about prioritization of 'work' and 'lifestyle.' When there is proper functioning at work and home with minimum conflict and there is satisfaction, it is called work-life balance. Here, 'work' includes career and ambition. Lifestyle includes health, pleasure, leisure, family and spiritual development. [2]

Work life balance is a bi-directional mechanism, where work and non-work activities are inter-related and affect each other. [3] It should be flexible for the user to switch physically to meet the responsibilities from both sides. [4]

Basic goal of work-life balance is to create a good balance in everyday life, so that it immediately and consistently creates more value. One of the goals of work life balance is to drive productivity and personal commitment and accountability to the organization. [5]

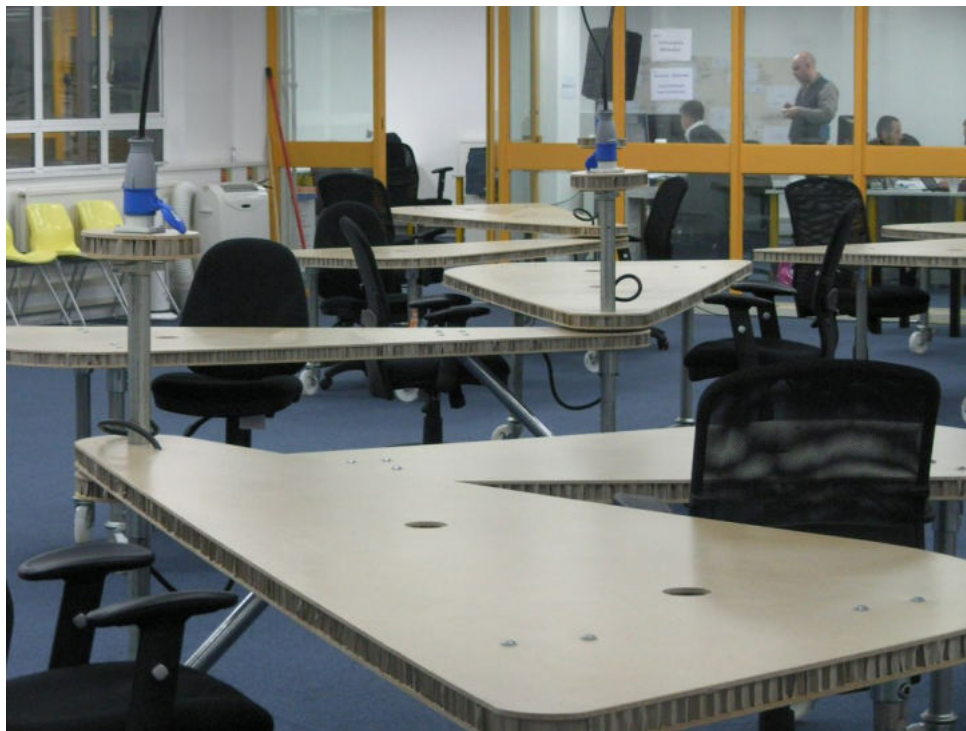
According to the Centre for American Progress, 90 percent of working mothers and 95 percent of working fathers report work-family conflict [6]. To have a proper balance between work and lifestyle, employers give lots of benefits to their employees including flex time, child care, elder care, leave (including paternity), job sharing, assistance programs, gym subsidies, vacations, concierge services, in-house services, limited number of working hours, etc. [2]



Source: Polka Dot Creations / Flickr.com



Source: Dan Halutz / Flickr.com



Source: TechHub / Flickr.com

Flexible Workspaces

Flexible Workspace is about when, where and how people work. It is becoming an essential part of the organization to support the balance between work, relationships, health, spiritual and personal interests. [7]

Flexible workspaces promote collaboration and innovation and have economical, strategic and infrastructural advantages. [6]

The quality and quantity of work generated by employees is influenced by the office environment, while poor environmental conditions can cause inefficient work productivity as well as reduced job satisfaction. Four factors of the office environment which have impact on employee productivity are lighting, noise, colour and air quality. [8]

Aim of flexible work spaces is to :

- Balance work and personal interests
- Maximise the productivity at work
- Enhance the quality of work done
- Encourage stress-free productivity
- Work from anywhere, anytime
- Allow reconfiguration of space [7] [9] [10]

Employers have adopted different methods to provide flexible workspaces to their employees. IAD too has many methods in place to allow researchers to work with minimum disturbance. Some of them include

- Each room is provided with a status board outside, where the researcher can post his status and the visitors can know of their availability
- IAD provides additional rooms which are quieter and researchers can use them whenever required

PRIMARY RESEARCH

The team collected primary data through the methods of contextual inquiry and by directly observing the user environment.

Contextual Inquiry

Contextual interviews of the employees were conducted to understand the work culture and, in general, the work habits and culture of Germany. In all, the team conducted five interviews which lasted an average of 37 minutes. The interviews yielded about 400 individual user statements, which were later analyzed.

User Criteria

The criteria to select users for interview

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

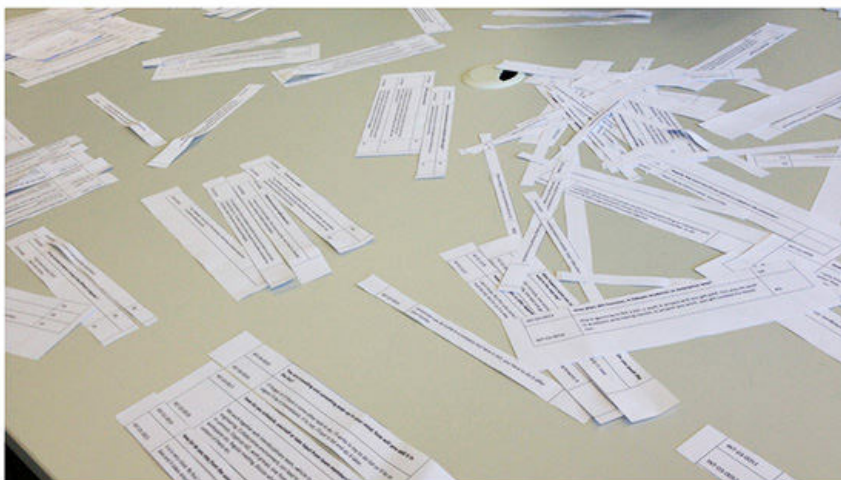
Observing User Environment

As part of the research, the team followed the technique of fly-on-the-wall [11], where the users were silently observed in the environment they worked in, without any intervention from the observers.

The observations yielded information that was later used to create the final solution. The findings from the user environment are mentioned below.

- Depending on the location of the workspace with respect to the kitchen, and the number of people in the room, the levels of noise in the workspace environment vary
- The workspace near the kitchen had more noise, due to regular movement of other employees and conversations.
- Some employees used earphones to listen to music, while others played music at a





low volume

- Employees took a break and left the room after continuous disturbance from a co-worker in the same room.

Insight Categories

Affinity mapping of the data obtained during the research process was followed by a detailed scrutiny to generate insights. In all, about 27 individual insights were obtained of which some addressed critical problem areas. These insights were classified into the following categories.

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

Of all the insights, major insights that affected the users' WLB were identified and were directly related to the problem statement. The major insights included

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

Following are the list of all the insights from the primary research, accordingly to the classification.

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
- 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; but they also feel more structured and organized when someone plans the schedules for them
- People are fine with the rule of being at the office between 10am-3pm every day, but prefer it to be slightly flexible when required

- 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 scheduling and appointments
- People use tools like to-do lists to keep track of things to be done – both personal and official
- People use their mobile phones for work email and personal tasks like social networking. 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 far less priority than the function it provides

Weekend/Vacation Preferences

- People reserve their weekends/vacations only for personal work with no intervention from their professional lives
 - People work on weekends only if they have an important engagement on Mondays
 - In case people are called-upon to do an important official work while they are on vacation, they time-box their work and decide if it can be done. They communicate their decision to their colleagues and work accordingly
-

- They prefer not to do official work at home unless it demands a quiet environment to work – like working on a paper

Group Dynamics

- People in the same team/project have closer bonds and more regular interactions (outside office, informal) than with the people in other teams
 - People non-formally happen to meet at locations like the IAD kitchen and Mensa (the Institute Mess); and sometimes have casual discussions
-

CRITICAL PROBLEM AREAS

Based on the data collected from the primary research and observations from user environment, the team focussed on the following problem spaces that we believed to have a cascading effect on a many aspects of work-life. These were basically the needs of the users the team wanted to address to.

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

Need for creating quiet environments

Our research showed that employees needed quiet environments for performing crucial tasks and when they did not get such an environment they took their work home. The professional work spilled over into personal time and affected their personal lives too. This problem was indirectly affecting productivity, goal accomplishment and personal time of the employees. Hence, creating a solution in this problem space had a scope for larger and indirect impact on various factors of work-life.

From the observations of user environment, the scenarios/instances which usually had noisy environments that could hinder productivity and efficiency of the employee.

- 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

Further on, for the ease of research and problem solving the sound and noises that were observed in the (above mentioned) user environment were categorized into the following classes, based on their severity.

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

At a broader level, the sounds were also classified as intrinsic – sounds under the direct control of the user – and extrinsic – sounds which are beyond the direct control of the user. The detailed description of the identified noises can be found in the Appendix 1.

REVISED PROJECT BRIEF

After the research, the team redefined the earlier brief to align it to the problem space and the research.

*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.*

What the solution would do

The project would aim to create a workplace where employees can work collaboratively or in isolation, whenever required, without affecting their efficiency. The workspace will be more adaptable to the users' needs so that they make better use of their productive time. The solution may not completely resolve the currently identified issues, but will bring them to a more acceptable level.

Goals of the project

- Irrespective of work profiles, an employees who needs a silent environment to work can work with other employees in the same room
- The user can adapt his environment to his needs or vice-versa with minimum physical effort
- The co-workers and visitors will be mindful of an employee's need for silence and act accordingly

Critical Problem Areas

The project shall address the following disturbances and try to minimize them

- Loud conversations by co-workers
- Uninformed/ignorant visitors
- Issues with office furnishing and equipment

Experiential aspects of the project

The project tried to achieve the following intangible aspects of the project

- The feeling of being in control of environment
- Seamless transition between states of work and the mind
- Freedom to work with concentration any time

PERSONAS & SCENARIO

Persona

Albert, is a 34-year old PhD student from IAD, TUD who is working on a project funded by Ford. He has been working here for the past 2 years and his research is in the area of driverless vehicles.

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

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

A 'responsible worker,' Albert has good relations with his colleagues and people around him, and is involved in voluntary activities like managing internal events at IAD. He also teaches school students on weekends.

In the evenings, he usually works on his personal venture.



Albert (Source: Victor1558 / Flickr.com)



Scenario

Whenever Albert has some important work, he puts 'Do Not Disturb' (DND) as his status on the status board outside the room. But as he shares his room with two other colleagues, their team mates keep coming to the room to interact with them, ignoring his DND status.

Sometimes, they keep moving and re-adjusting themselves inside the room, which disturbs the room.

Phone calls in the room are again an issue, as a desk phone is shared between three people. As a result, Albert loses his concentration while doing serious work.



INITIAL CONCEPTS BY JAISON JACOB

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.

Idea 2

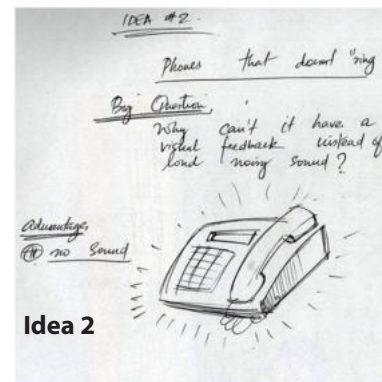
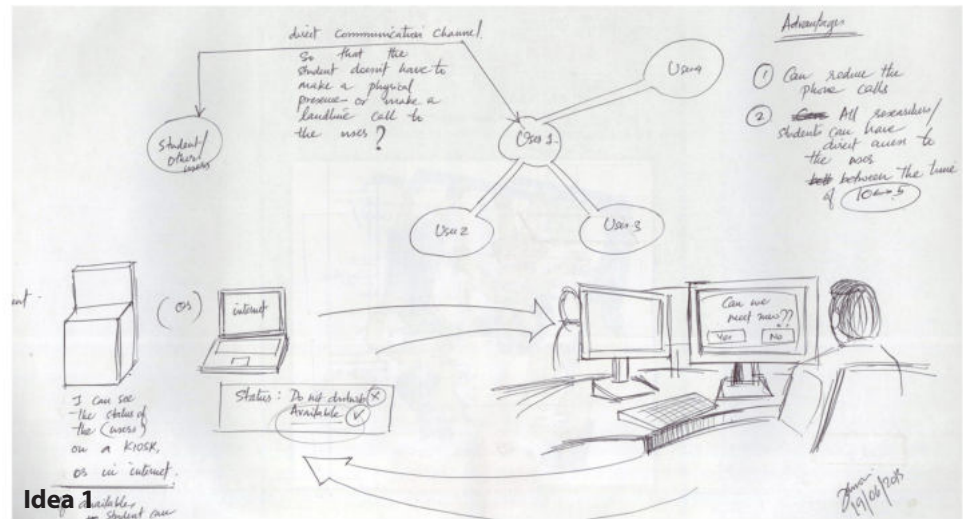
- The second idea was to make a noise-less telephone.
- The noise was substituted with lighted LEDs to grab the attention of users.
- Discarded the idea since it didn't meet the needs of the user.

Idea 3

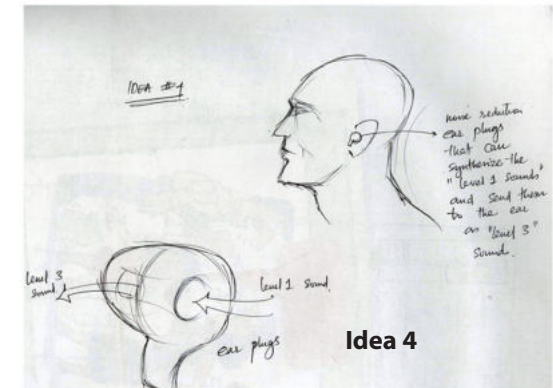
- Having a status board that can be operated from inside the workspace.
- It has a knob to switch status, as it was really important that a knob should be used to perform this task as it should be intuitive and easier to use for less tech savvy users.
- The user doesn't have to go out of the workspace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

Idea 4

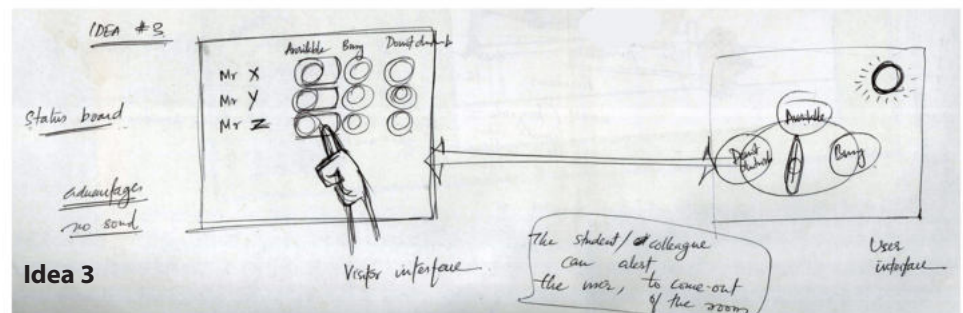
- Using an ear-bud to reduce the noise around.
- The ear-bud converts class 3 noise to class 1 noise.
- Discarded as it wasn't a low cost product and there wasn't any existing literature.



Idea 2



Idea 4



Idea 3



A user sitting under a sound dome that produces anti-noise

INITIAL CONCEPTS BY NAVEED AHMED

Before working on the concepts, the following assumptions were made about the environment based on the user research.

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

Further, the following constraint and requirements were set so that the final solution can be confined within these parameters.

- 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

Sound Dome

As seen in the image on the left, the idea was to have a sound dome which would produce an anti-noise to nullify the existing ambient noise. The dome would be directly above the seat of the user or would be in a special corner in the room

Pink noise system

A pink-noise system is a system that would generate an inaudible sound at the frequency equal to that of human voice so that any noise created by co-workers is immediately cancelled out.

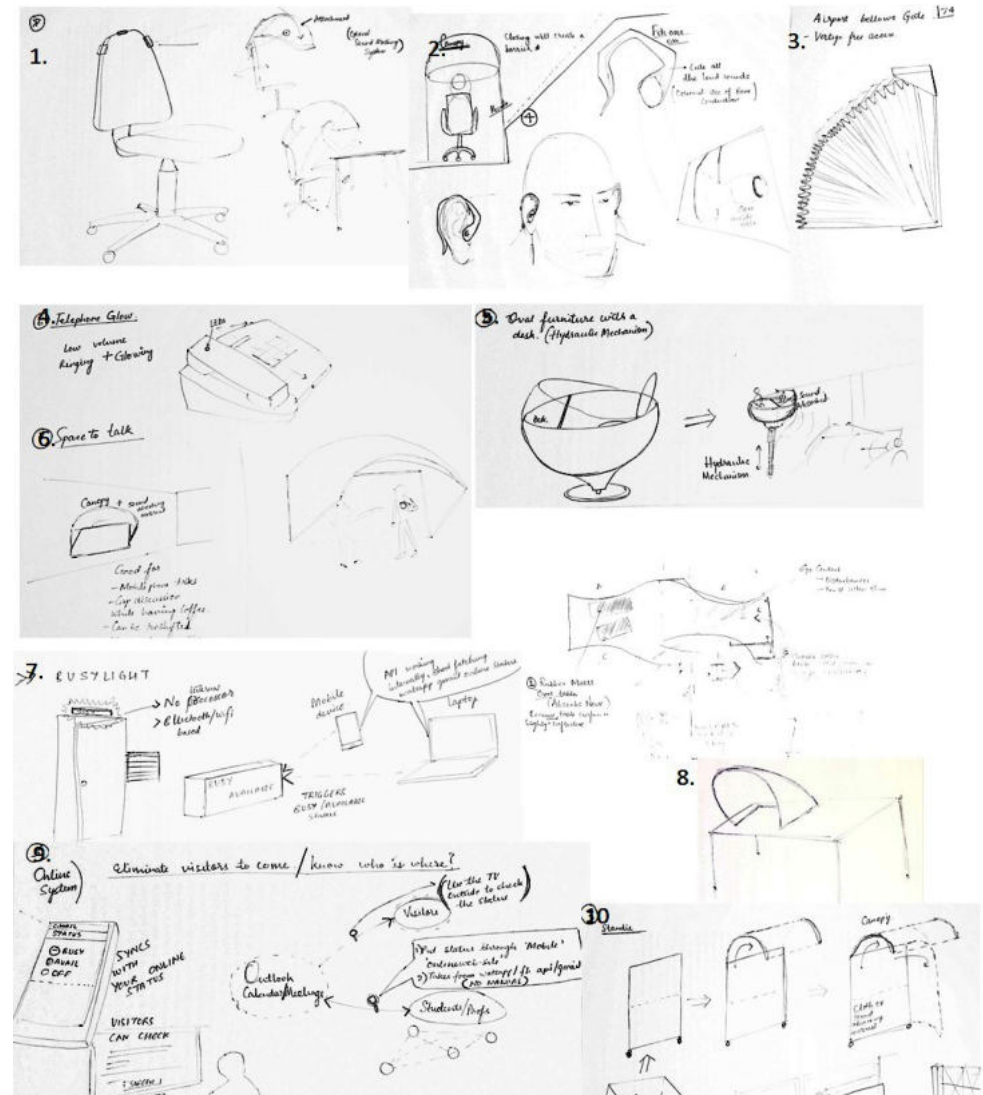
Redesign IAD Floor

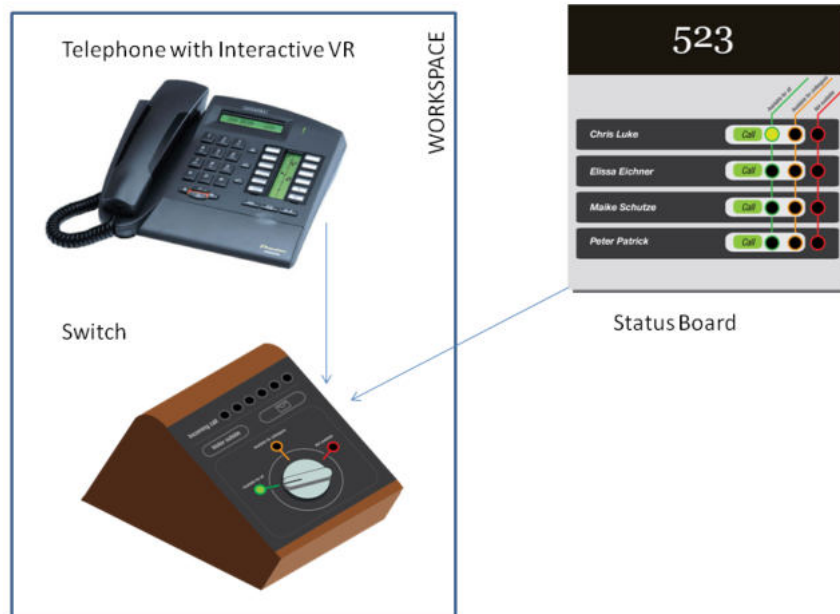
A further idea was to redesign the complete floor of the institute into a bullpen arrangement.

The above ideas were later rejected due to factors such as feasibility, cost factors and appropriateness. Some solutions might have caused more harm than good.

INITIAL CONCEPTS BY SOURABH PATERIYA

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





SWITCH

Final Concept by Jaison Jacob

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.

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 four parts

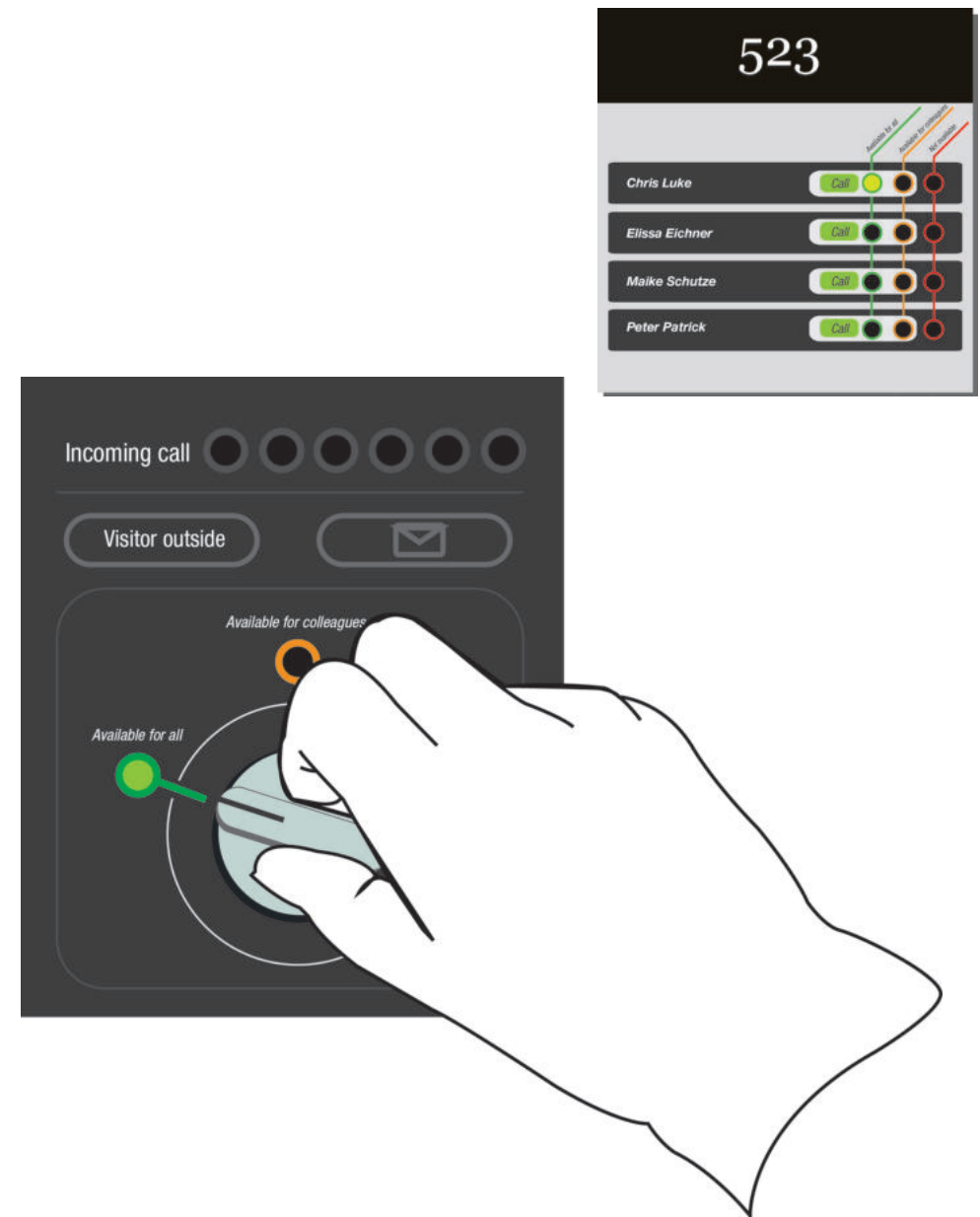
1. Incoming call alert,
2. Visitor alert,
3. Voice message alert and
4. The knob to switch between the modes.

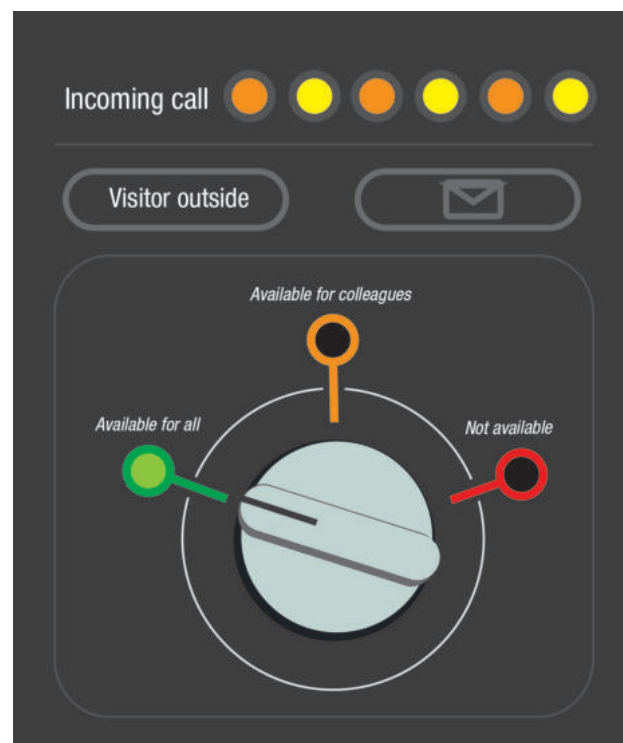
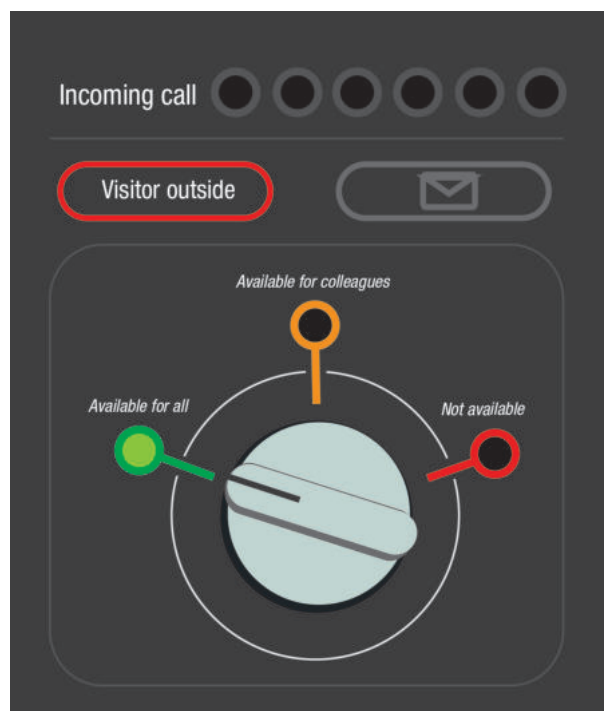
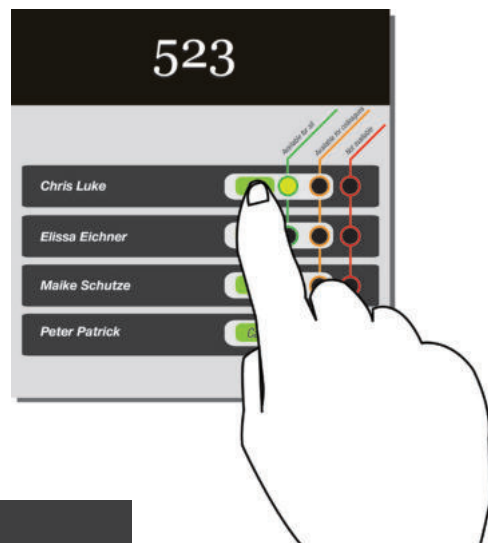
Based on the mode of work the user is indulged in, His availability is classified broadly into 3 modes:

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

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.



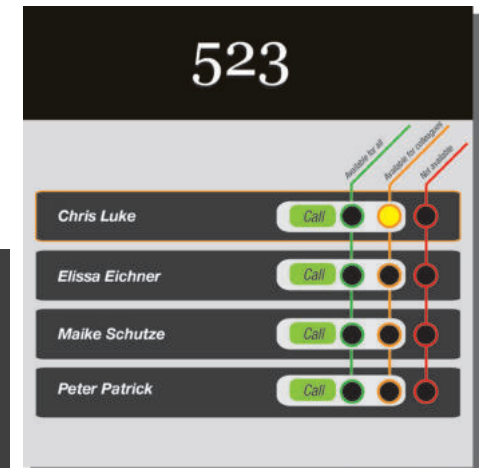
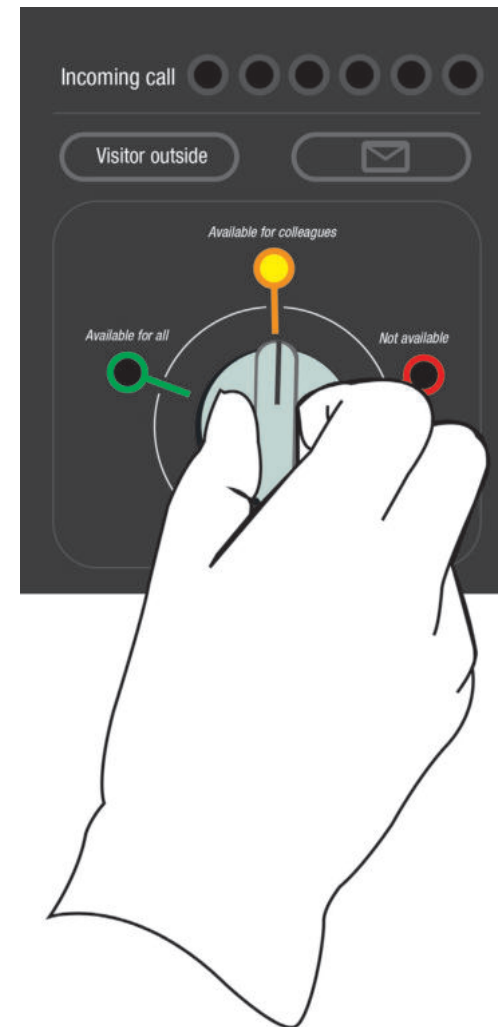


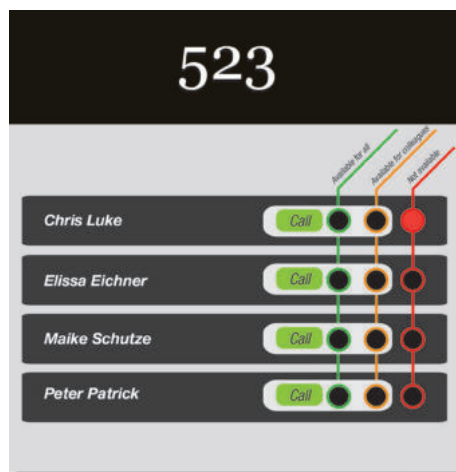
2. Available for Colleagues

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.



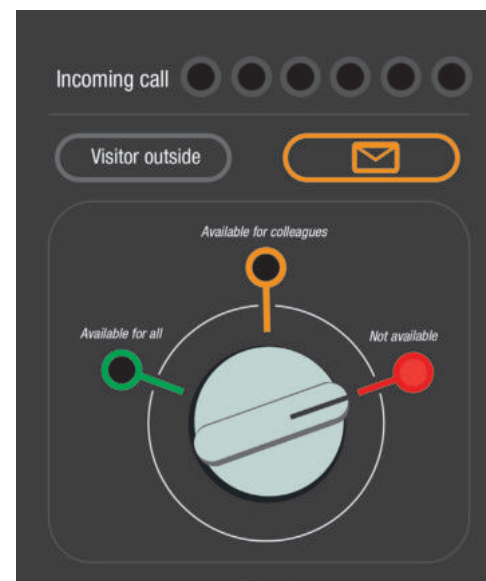
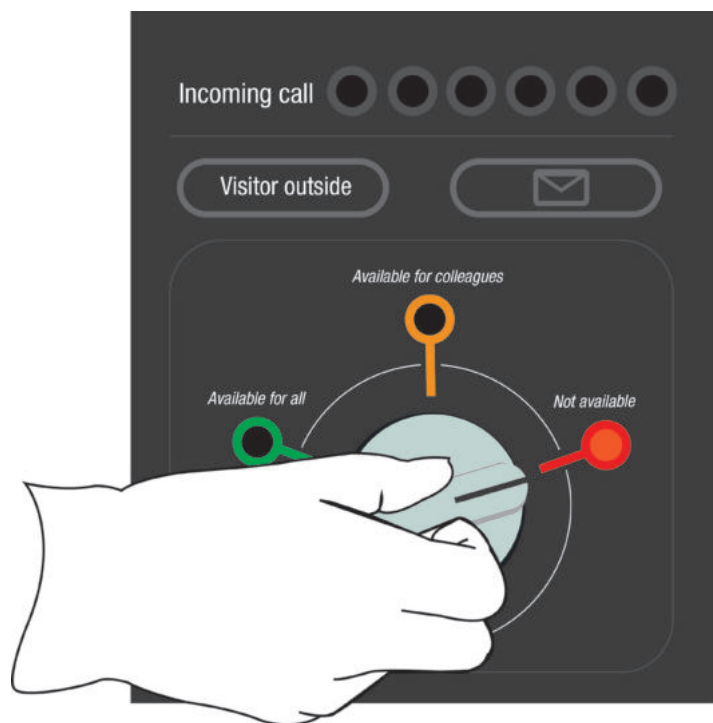


3. Not available

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



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.

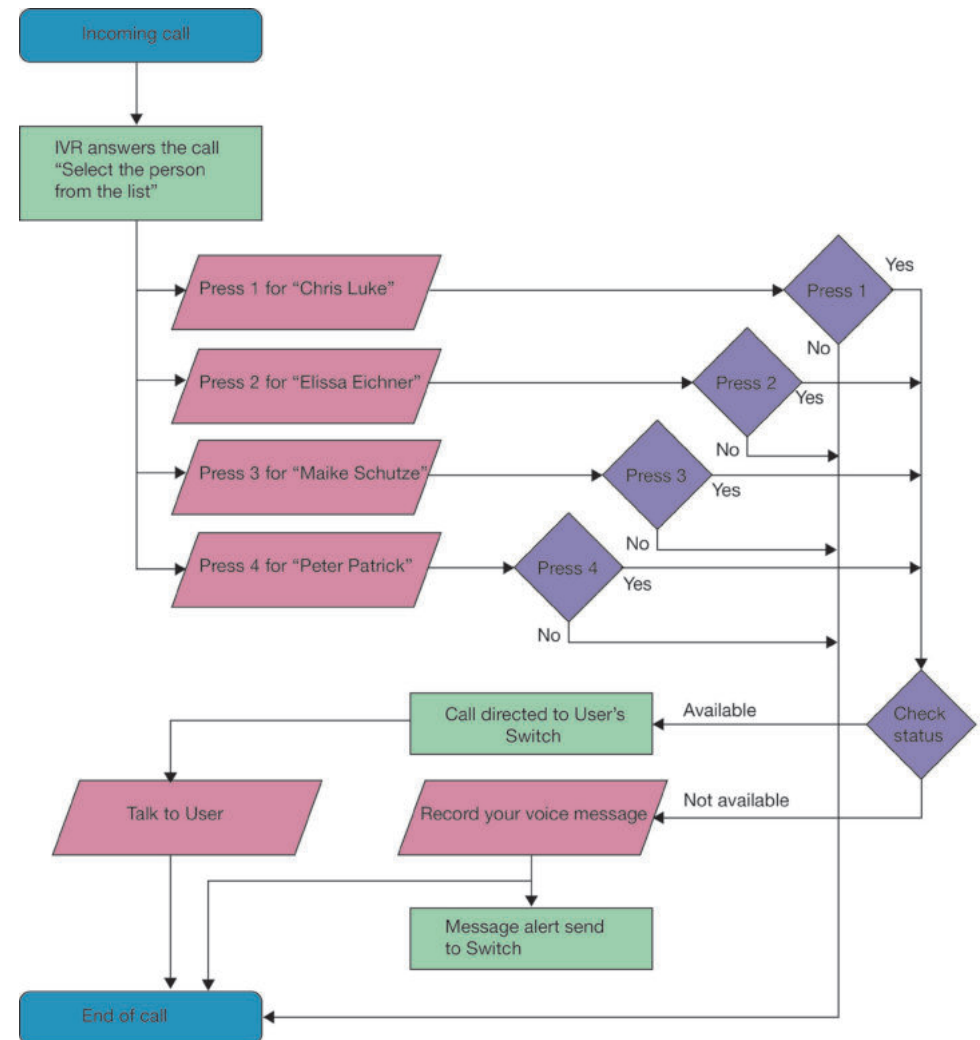
Interface of switch : 5 X 5 inches.

Acrylic board + LEDs and wires + switches.

Interface of status board: 8.3 x 11.7 inches.

Total cost: Rs.5000 (approx)

Euro 50 (approx)





ISOLATION HOOD

Final Concept by Naveed Ahmed

Based on the assumptions I had made earlier, the aim was to come up with a cost-effective and personalized solution for the employees.

With this in mind, an isolation hood was designed that would be a contraption that can be used whenever needed by the employee. The hood made of light-weight, transparent sound-absorbing material, would be completely open on one side to allow enough ventilation during the use. The user can also carry it easily and move it to a different location without help from anyone.

The device while providing privacy whenever required would also provide a seamless transition from isolation to collaboration with minimum physical effort.

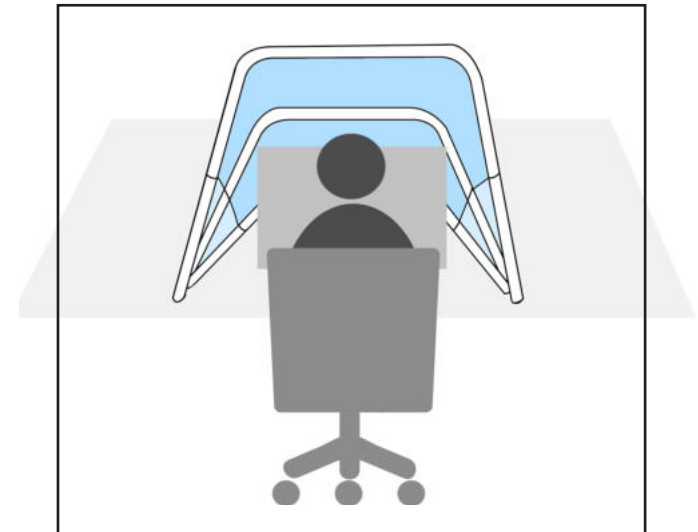
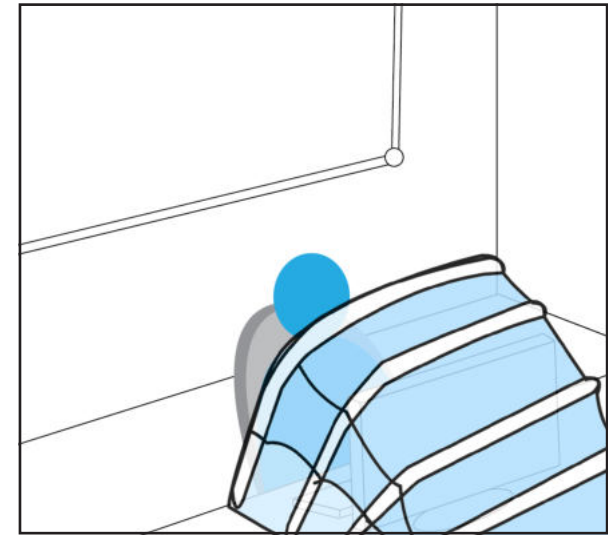
Though the solution would not completely remove the noise, it would reduce it to a more acceptable level.

The final form and design of the isolation hood can be seen in the further pages.

Final Design Idea

Below you can see an user working with a hood over his workstation.

The other views of the hood can be seen in the adjacent images



Working and operations

Due to the transparency of the material of the hood, there would be enough light inside the work area to work comfortably without any additional light, other than the ambient light in the room.

To avoid isolation of the employee, it would be recommended that the institute not procure these hoods for all the employees. The Institute would have only a few of these, that would be issued to the employees whenever required, to be returned later for the use of other employees.

ICH-TANDIE

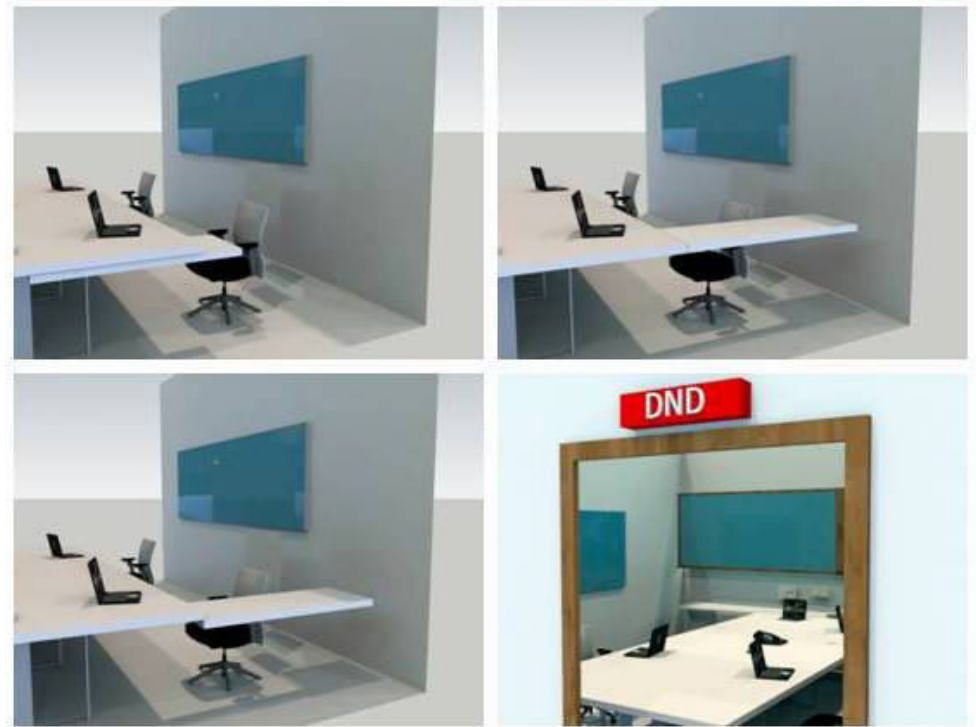
Final Concept by Sourabh Pateriya



Room consists of a table, big window, separate 3 to 4 chairs and one entrance as can be seen in above diagrams.

Solution consists of 3 things

1. Consists of a little addition in existing furniture
2. A new furniture
3. Small circuitry addition to deliver better UX



A slidable table which can be fixed anywhere in the existing table, and is detachable too. The moment you slide out this table, DND status outside the main gate gets ON. This saves extra effort to put DND status outside that too manually. As it can be noticed that DND status is set for whole room, not for an individual. This can solve out the problem of people visiting their co-workers in a room when they don't have information whether others are busy or not.

DND status is set to OFF once user slides back the table or detach it.

Another solution implemented along with previous solution is Ich-tandie :

Ich is a german word and standie means something which can stand on its own, combination of these two makes Ich-tandie.

Features of ich-tandie

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

It can be folded and easily carried to different places as can be seen in the image next to this section.

Materials used

- 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

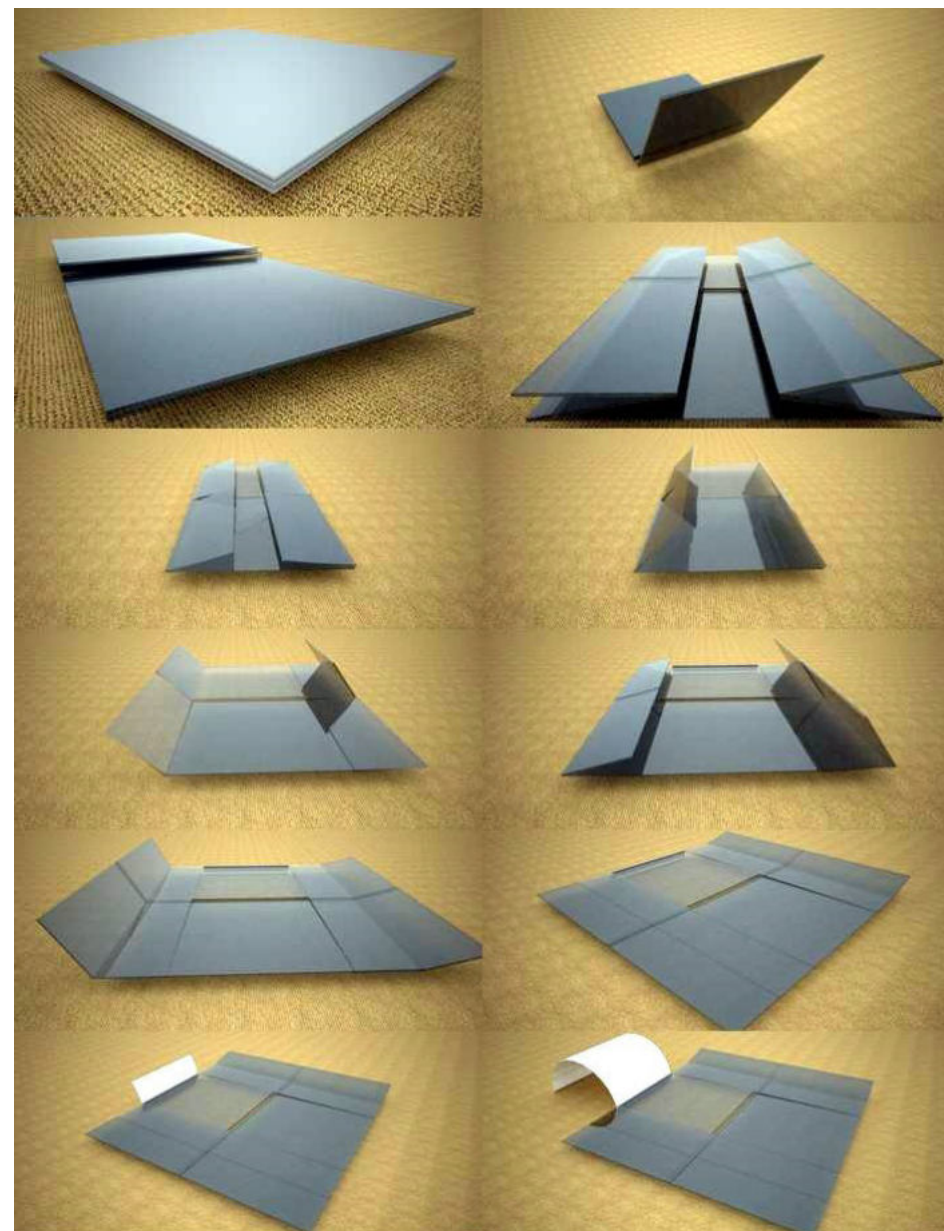
Extended table : ₹ 2000

Ich-Tandie : ₹3000- 4000

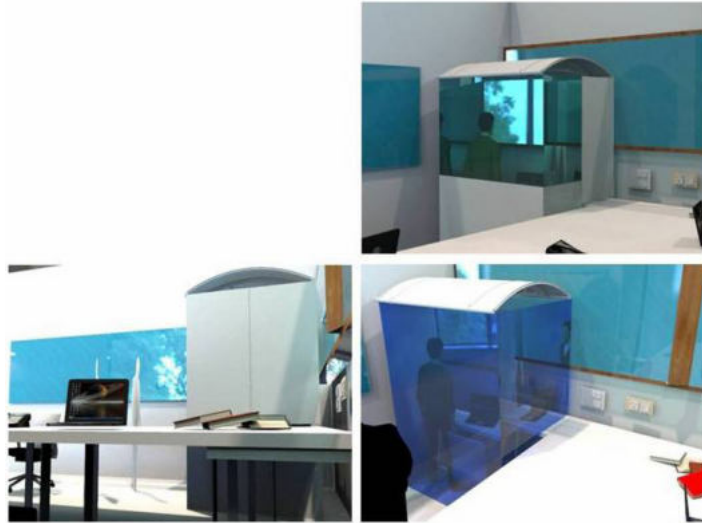
Auto DND Circuitry : ₹ 400 (with light)

Total : ₹5000 to ₹ 6500

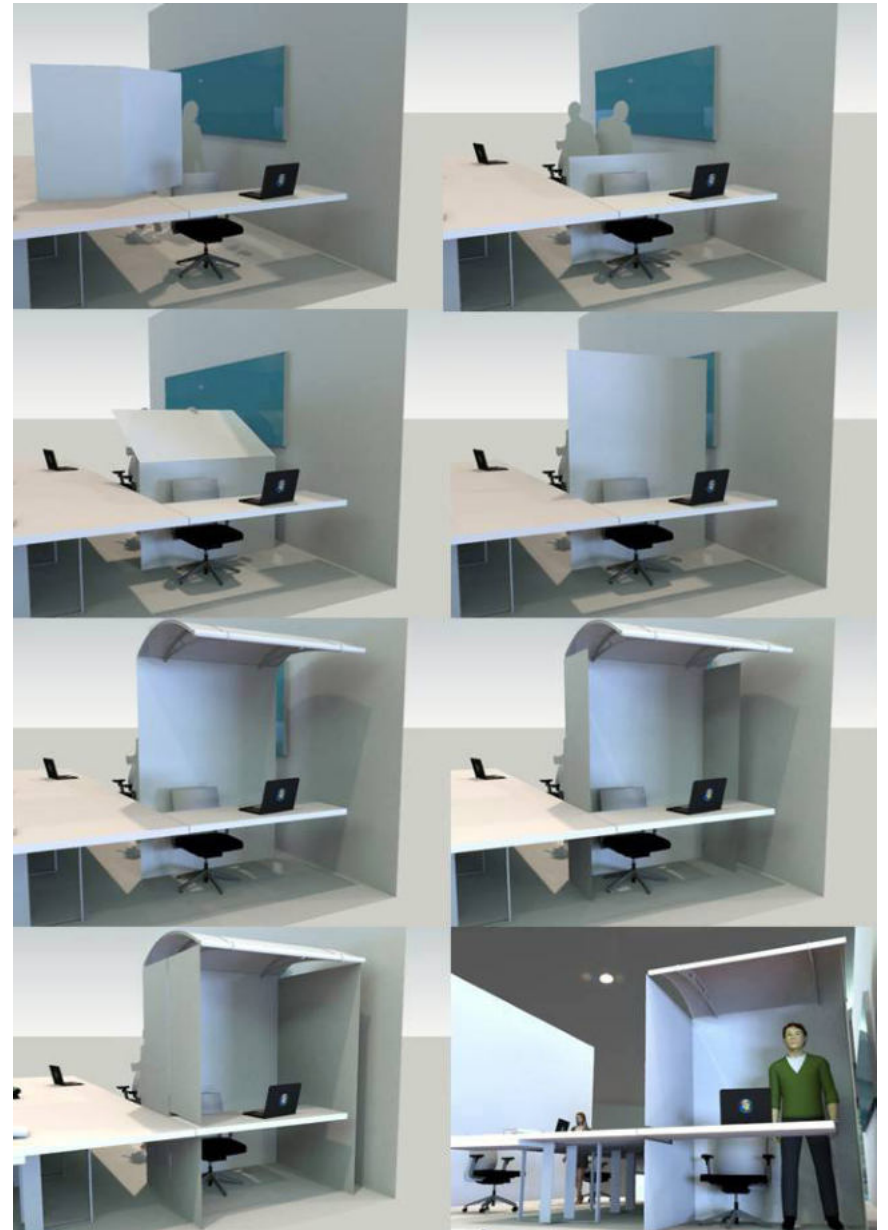
Total : € 70 to € 80



Types of ich-tandie: Completely Opaque, Half Transparent and Completely Transparent



Workspace after ich-tandie is installed, you can also check how it is unfolded in the workspace at the next section



PRODUCT EVALUATION

Though the solutions were not evaluated by formal processes after the project, the users who were interviewed were asked to evaluate the product based on its use and their understanding of the environment.

Below are the points that were obtained from the feedback session.

Switch

For the user this appeared to be a more implementable solution as it easily isolated people from the environment and was an improvement over the existing solution of the physical status board.

Isolation Hood

The users felt that this solution is applicable for short-time use but they may not be comfortable using it for longer durations. There are still some improvements to be done, in terms of environments factors like lighting and temperature.

Ich-standie

The solution though easily implementable, seems to occupy more space in the current rooms. There were certain issues with the lighting which had to be taken care of.



Design Recommendations for 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 system, the driver has an additional option for steering the car using Proreta, other than the steering wheel.

As part of the assignment, the team worked on ideating various input methods and feedback mechanisms for steering the car. The team consisted of interaction and product designers who worked with the existing Proreta team to come up with recommendations.

Below are the various options that were discussed during the ideation process. In the current context, a 'turn' would primarily mean a lane change.

Proreta is a project currently in progress at the Institut für Arbeitswissenschaft (IAD), Technische Universität Darmstadt, Germany. The project is owned by Dipl.-Ing. Matthias Pfromm.



INPUT METHODS

Hand Gestures

Touch gesture tracking pads behind the steering wheel on the periphery and relatively smaller ones in the front can be used as input mechanisms. The track pad at the back would be used for 90 degree turns while the ones in the front would be for lane change.

A counter-clock-wise movement of the hand on the larger track pad would indicate a left turn and vice-versa. The smaller track pad would mainly be used by the thumb and for lane changes.

Indicator Lever

The indicator lever is a default control that is used by the drivers while taking any

kind of turn. In the driver-assistance mode, the indicator lever can act as an input mechanism to imply lane change or a turn. The car would then make a turn depending upon its location and environment.

Using this method, the car retains standard controls and the driver need not necessarily learn new ways of providing input.

Buttons

Exploiting the current trend of alternative controls, buttons can be provided on the steering wheel that can be used indicate a turn. These would be simple push buttons that would require only a single press to give input to the system. As these will be at the nearest accessible region on the steering wheel, the driver can comfortably and easily provide input with minimum physical effort.

The buttons can be designed to be intuitive and can also contain feedback.

Audio/visual feedback for the user



The LED strip shows the lights running in the direction of the turn



Vibrating steering wheel



FEEDBACK MECHANISMS

Audio/Visual

Audio-based feedback can be given to the driver about the direction of turn. It can be a direct voice communication or a tone depicting the direction. Information can be shown visually in the main visual unit on the dashboard too. The instrument panel in-front of the steering wheel can display the direction of turn through visual cues and graphic elements.

Audio feedback is a common feature in cars and using it in current scenario would make Proreta a more integrated system.

Using the LED strip

The LED strip on the dashboard which is currently used for proximity warning can also be used for showing the direction of turn. Controlled and moving patterns can be created through the LED strip to show the direction, intensity and degree of turn that would be made.

Other than this, the colour of the LED can be used for ambient lighting inside the car to control the mood of the driver. The driver can hence be made more alert and vigilant depending upon the current driving conditions.

Haptic Feedback

Vibration in the steering wheel is a very powerful method for feedback. Other than alerting the driver about the turn, this is more direct in case of an accidental or unintentional input. Similar feedback can also be given through the seat of the driver. Unlike other suggestions, the feedback from this method would be restricted to the driver and other passengers would not know the next move.

This system can be coupled with other feedback mechanisms as a critical alerting method or a fail-safe.



Workshop: Mechanisms for safety of railway linemen

The team took part in a two-day workshop to create interaction concepts for the security of railway linemen. The assignment was part of a larger project - the Automatic Track Warning System (ATWS) - to improve the safety of railway trackside workers across Europe.

The system being developed contains a track-side train presence alert device (TPAD), which is able to sense an approaching train without interfering with the signalling system. It consists of wireless mobile terminals (MTs) to inform the workers about possible approaching trains and/or other events that could put them at risk.

The team worked on two modules - creating alarm concepts for the workers and improving the interface of the software to test the alarm sequences.

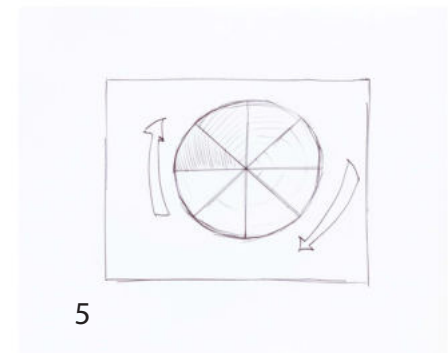
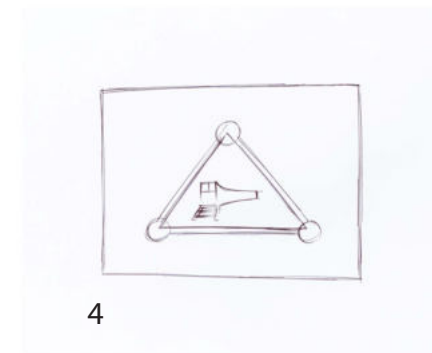
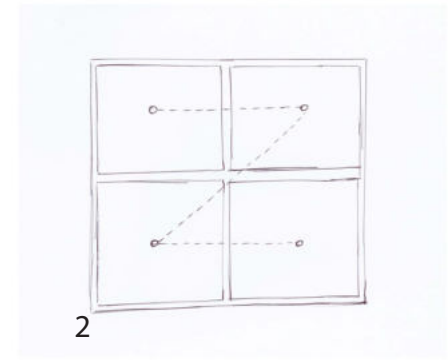
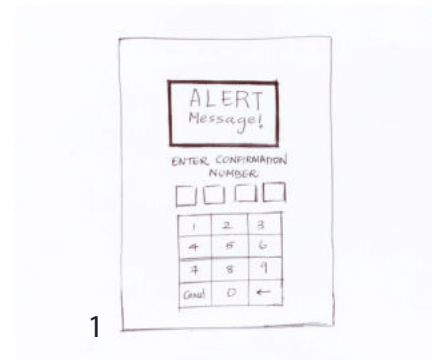
The team worked in collaboration with Kathrin Ballweg, a Masters student at TU Darmstadt.



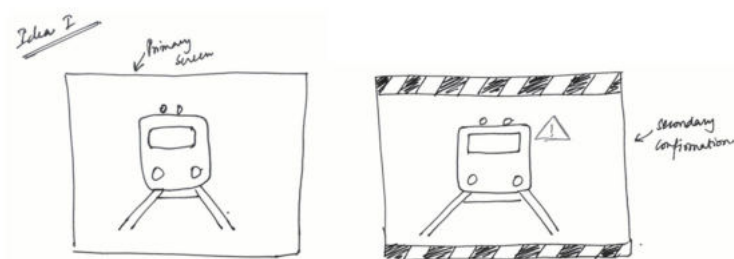
ALARM SYSTEM FOR ALERTING RAILWAY WORKERS

Concepts by Jaison Jacob

1. After receiving the signal, the rail worker has to enter his password to confirm that he has read and understood the message
2. For confirmation, user has to perform a small gesture on the touchscreen like following a random path over blue that makes sure that the user is on his senses and didn't perform the confirmation by mistake.
3. Confirmation by using a button on one side of the mobile device.
4. Different alerts have different shapes, so providing points around the alert icons and connecting them can also be one form of confirmation as the user will be knowing which shape he has drawn.
5. Circular paths, both clockwise and anticlockwise gestures can also be another form of confirmation. It doesn't need much effort and at the same time it can be effective in making sure that the user confirmed the message intentionally and not by mistake.



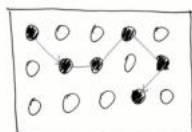
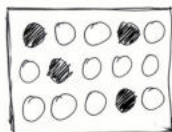
- Worker needs to confirm intentionally
- Avoid accidental confirmation
- Avoid recognition, prefer recall (physically)
- Must be quick and not time consuming



Yellow warning lights
blink on device every 500ms



Red alert lights
blink on device every 250ms
as it would be used in critical
situations



Concepts by Naveed Ahmed

There were several ideas that were generated during the ideation process.

Console Display

These were ideas for the display on the console that would be carried by the railway workers. The console would have two levels of alert, the second one of which would be sent if the first one is not acknowledged.

In my idea, I ensured that the first alert message is comparatively subtler to the second one.

Further, there are two types of alerts - Warning and Alert. The warning would be sent when there is a train passing on the neighbouring track while an alert would be sent when there would pass the track where the worker is working. By standard, these would be yellow and red respectively. In my idea, the screen would blink when the alert is sent. This can also be coupled with the goggles worn by the worker. The blink rate of the yellow screen would be lesser than the red screen. (as seen in the picture)

Also, the graphics on the screen were reduced to a much simpler AIGA train symbol for easy and quick identification.

Confirmation System

The confirmation screen is used by the worker to acknowledge the receipt of a message. This is for assurance to the control station that the worker has been alerted and the message has been read by the intended personnel.

Both the ideas that were recommended had an interface similar to the mobile phone number-based lockscreen. The first one would contain a 5x3 grid of dots, where 4 random dots would lit up which the user has to click to confirm. Another idea was to have a similar grid where the user has to drag and connect the dots to send an acknowledgement.

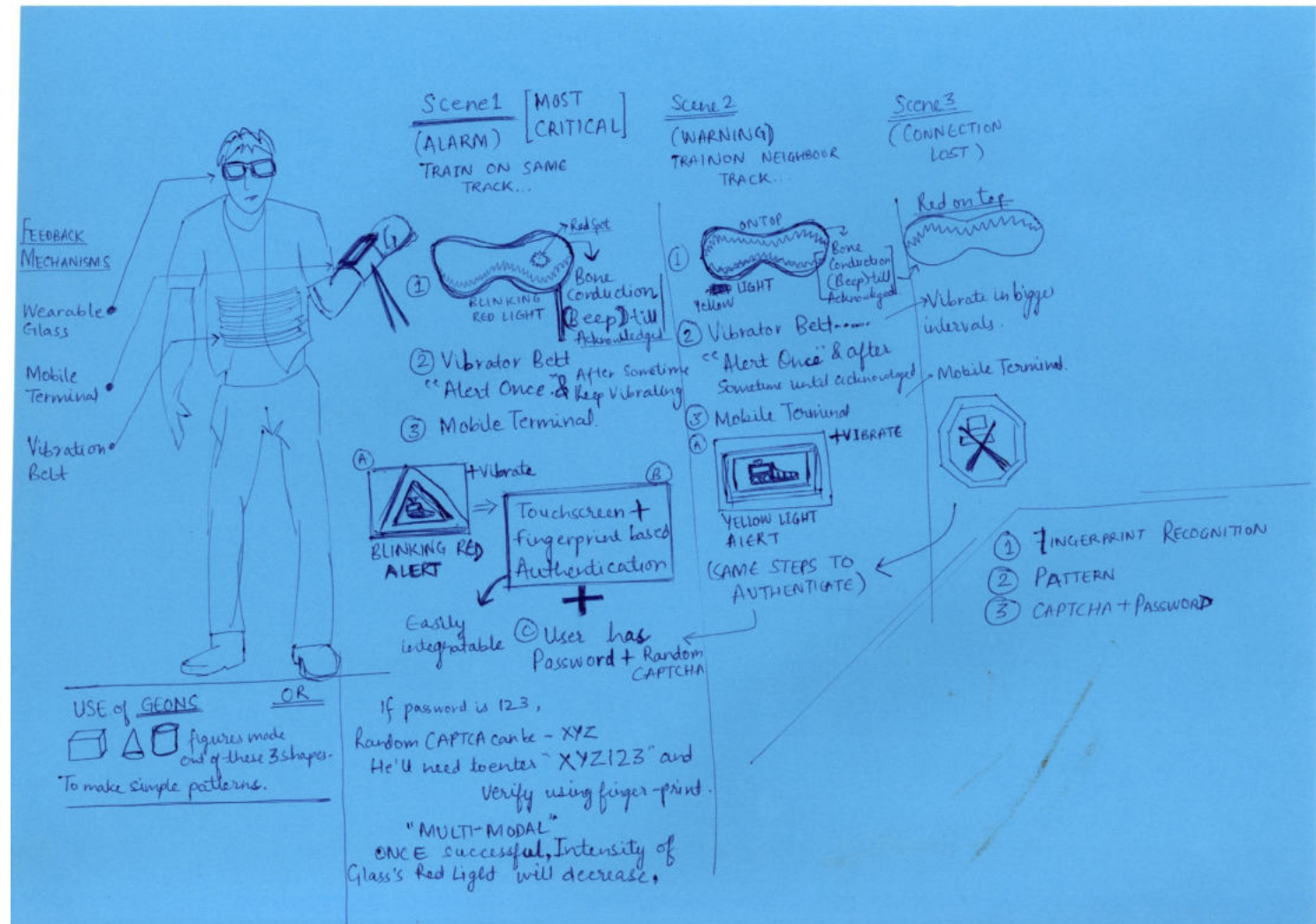
Concepts by Sourabh Pateriya

Available Feedback Mechanisms :

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

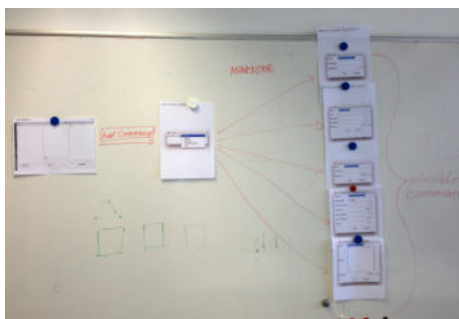
Possible ways for authentications,

- Fingerprint Recognition
- CAPTCHA + Password

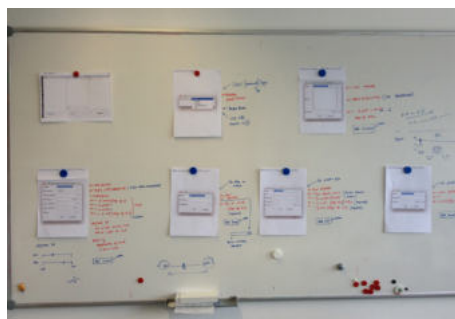


ANALYSIS AND REDESIGN OF THE SOFTWARE COMPONENT

Following are the design recommendations given by the team for the redesign of the forms in the software



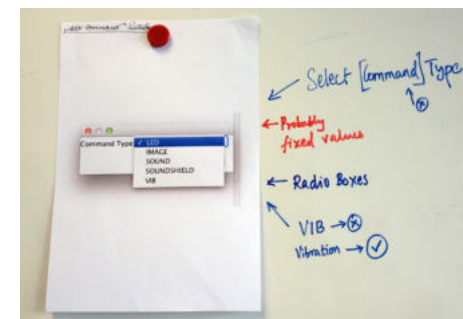
Task flow of the application



Individual stages after analysis



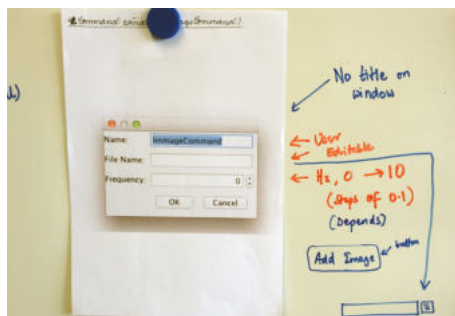
Interface of the application, later redesigned



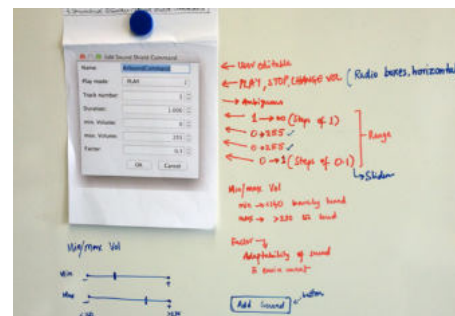
Recommendations by team



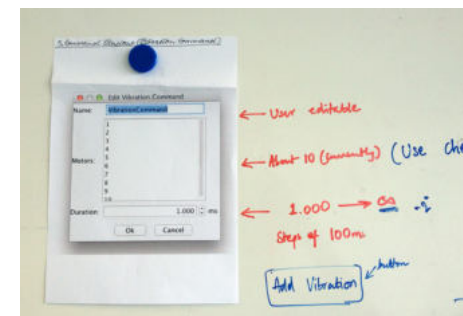
Usability aspects were taken care of



Analysis based on technical data



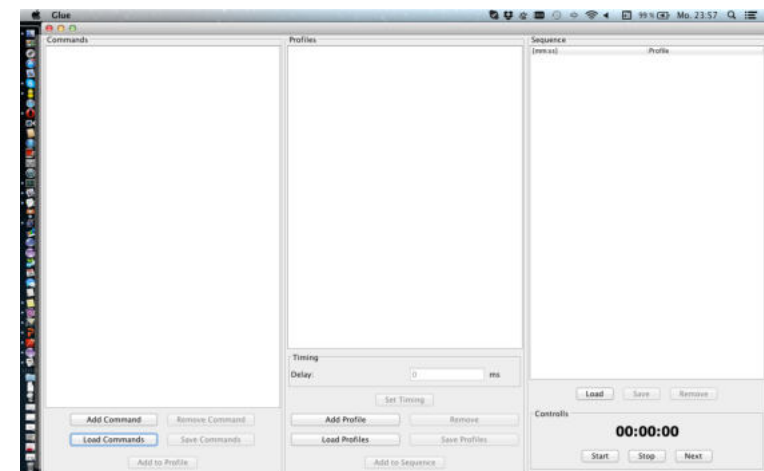
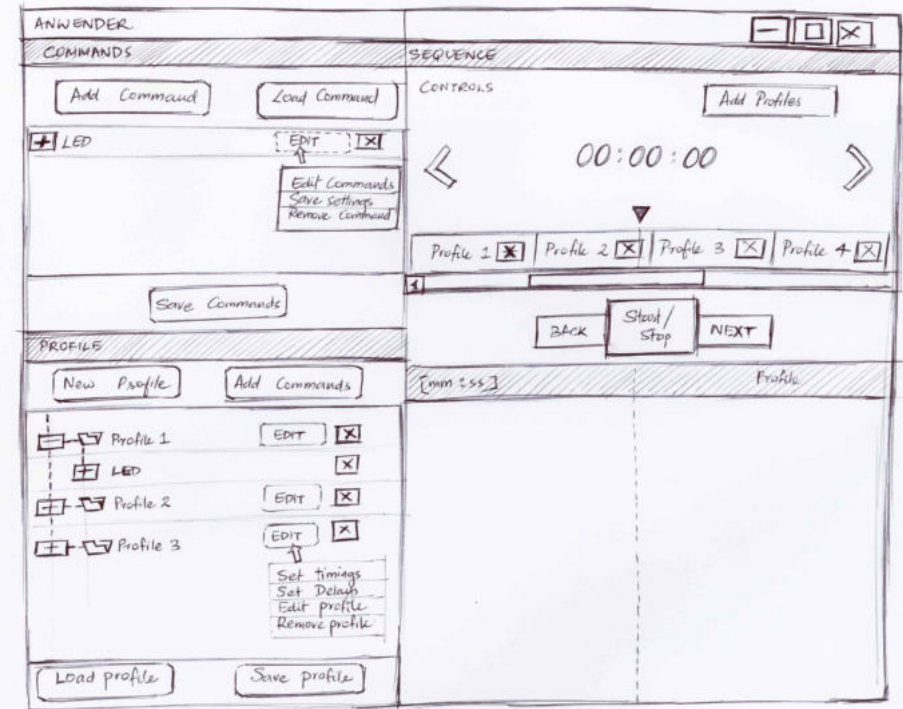
Ideas based on detailed form analysis

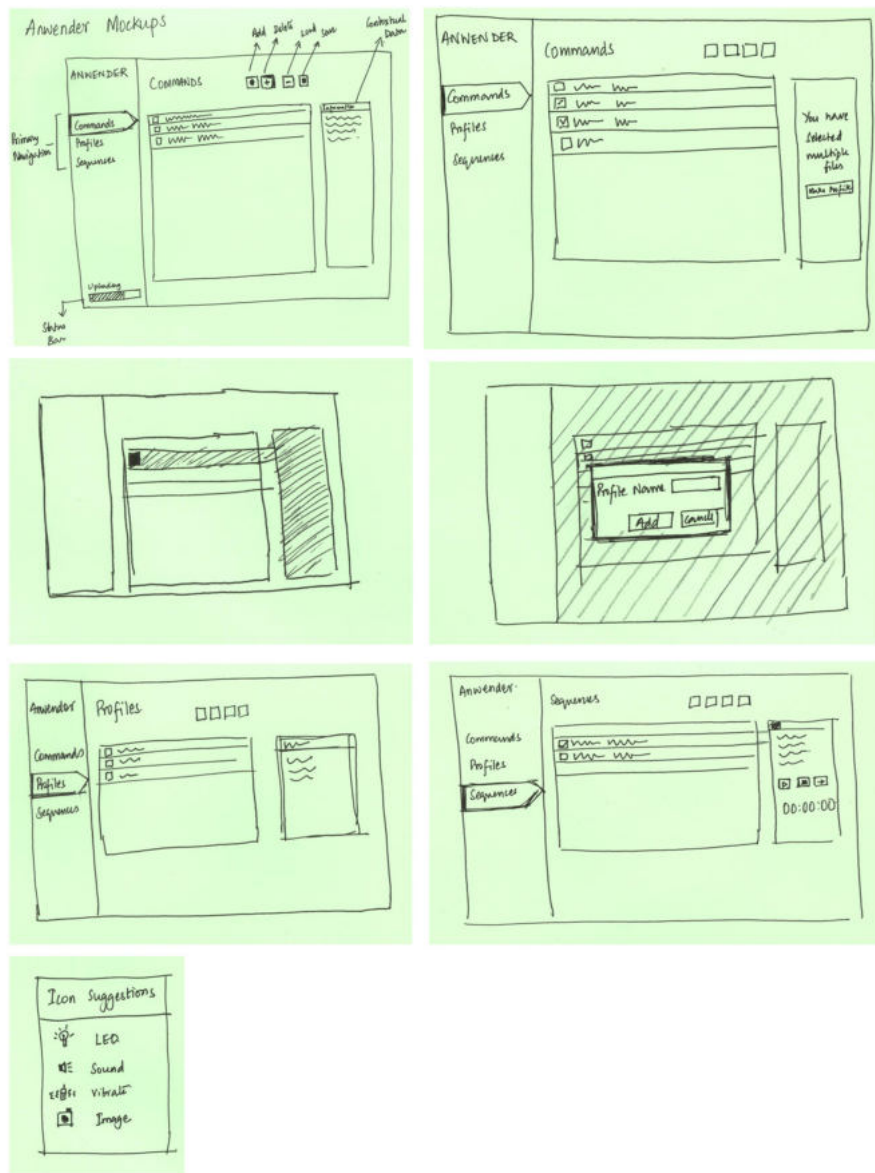


Team concentrated on minute details

INTERFACE AND INTERACTION DESIGN

Concepts by Jaison Jacob





Concepts by Naveed Ahmed

The earlier interface of the software application had a three-column layout with each column being dependent its left column for data.

I looked into the various design and usability aspects to come up with a single-window design with simpler navigation on the left of the window.

With the improved design of the forms and the newly suggested interactions in the software, the testing process is expected to be lot easier and faster than before.

The Concavo-Convex Method for Design Feature Explorations

The 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. We were asked to generate forms for objects like Pen and Spoon with different themes.

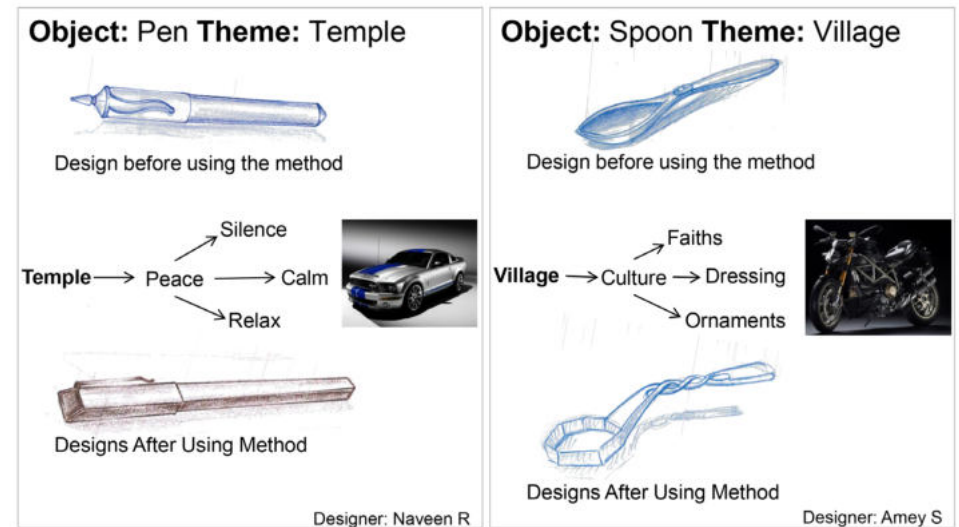
Usually when students are asked to generate forms for a product, the possible approaches for students are,

- Google for inspiration
- Keep sketching until one line leads to something new
- Brainstorm in groups
- Get inspired from colleague's design

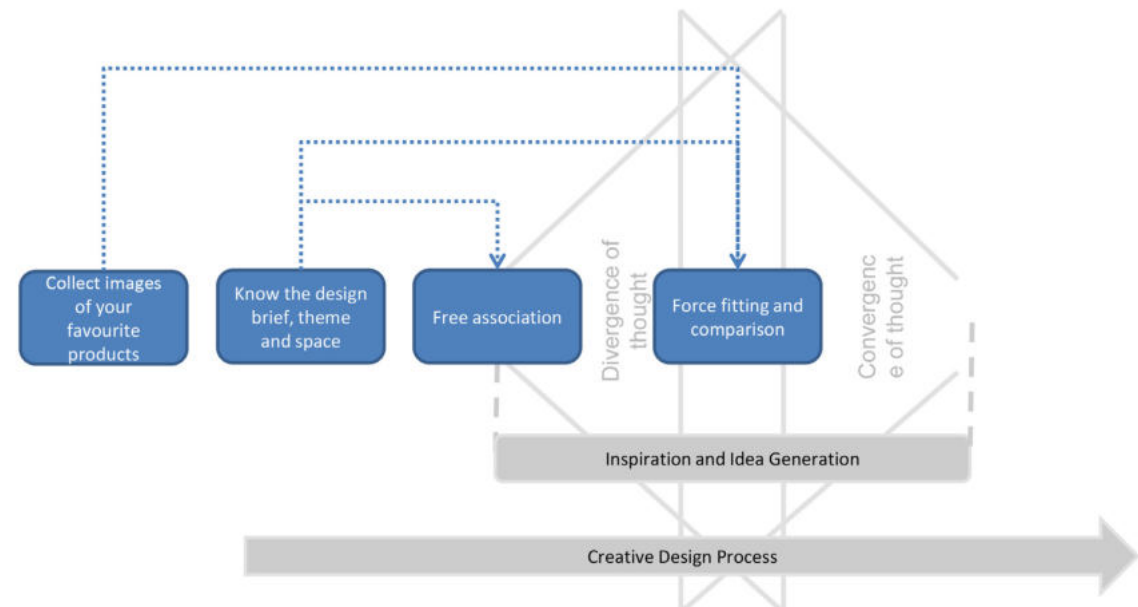
Using this method, students can come up with absolutely new forms and add value.

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



Visualizing the steps involved in Concavo Convex method.



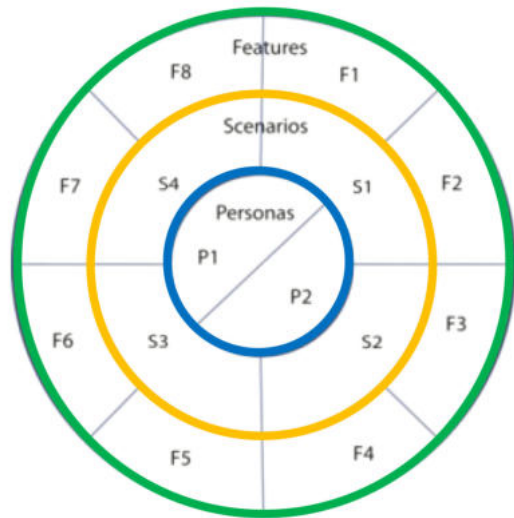
References

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.

Personas: Personas are not real people but represent them throughout the design process. They are hypothetical archetypes of actual users. Personas are defined by their goals.

Scenarios: A scenario is a concise description of a persona using a product / service to achieve a goal.

Features: A characteristic or prominent or conspicuous part of a product or service that help the Personas (users) achieve their goals.

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			
....				

These concentric discs have the information of Persona, Scenarios and Features. For every persona, corresponding scenarios and features can be evaluated. This can be done using PSF Wheel and matrix method. Innermost disc is for Personas, intermediate discs are for Scenarios and Outermost is for featureset. For every feature, evaluation is done and seen whether it fits a particular persona or not.

References

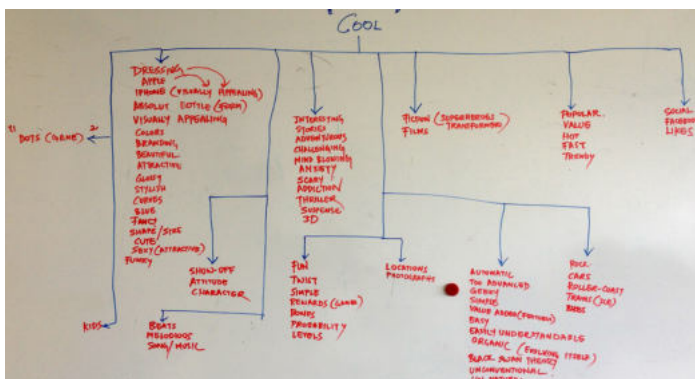
A complimentary tool to aid product feature discussions by Pratap Kalenahalli Sudarshan and Michaela Kauer, User Experience Day 2012 at Telekom AG, Darmstadt



Aeroplane Cockpit (Source: SWF Photography / Flickr.com)



Faculty of Design (Source: Thomas Eicken / <http://www.detail.de/>)



A categorized mindmap for a 'cool' game

Other Activities

This is a list of other minor activities done by the team during the internship.

Talk by Prof. Chris Johnson

Prof. Chris Johnson from Glasgow University gave talk on 'Usability in Critical Systems.' The Professor 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. The team was also briefed and shown the available infrastructure and facilities in 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.

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APPENDIX 1

Intrinsic Factors

Problem	Description	Severity
Fan	The noise produced by the fan was found to be loud in two out of three instances.	Class 1
Employees moving inside the room	Users tend to move within the work-space as a part of the work they do.	Class 2
Chairs	For an immediate use, users move their chairs or make noise by sudden movement, intentionally or otherwise	Class 2
Keyboards and mouse clicks	Mechanical sounds produced while using keyboards or mouse	Class 1
Sounds made by the body	Sudden actions like sneezing, coughing, etc.	Class 3
Sounds due to users' activities	Using plastic covers or wrappings that create noise	Class 2
Dialling or talking on the phone	Using and talking on phone for long duration	Class 3
Users talking to each other	Discussions between co-workers inside the room can be a source of noise, if all the users are not involved in the conversation.	Class 3

Extrinsic Factors

Problem	Description	Severity
Receiving a phone call	A telephone that is ringing inside a work-space creates noise, and it takes a few seconds to answer the call and figure out for whom the call is for.	Class 3
Noise from the kitchen	People talking inside the kitchen, noise produced by opening and closing the shelves, handling the cutlery, etc. This is a problem only for the employees who rooms are situated near the kitchen.	Class 2
People coming into the room and talking to the employees	Visitors come inside the room to interact the employees	Class 3
Footsteps across the doorway	Noise created by the people walking across the doorway	Class 1
Sound from the neighbouring rooms	Activities like opening, closing doors, shelves, locking the doors, keys, etc. makes noise that is unintentional, but sometimes disturbing	Class 1
Noise from outside the building	If the windows are open, the noise from the surroundings adds to noise Eg. These include cars, trucks and other vehicles as the building is situated next to a road.	Class 1