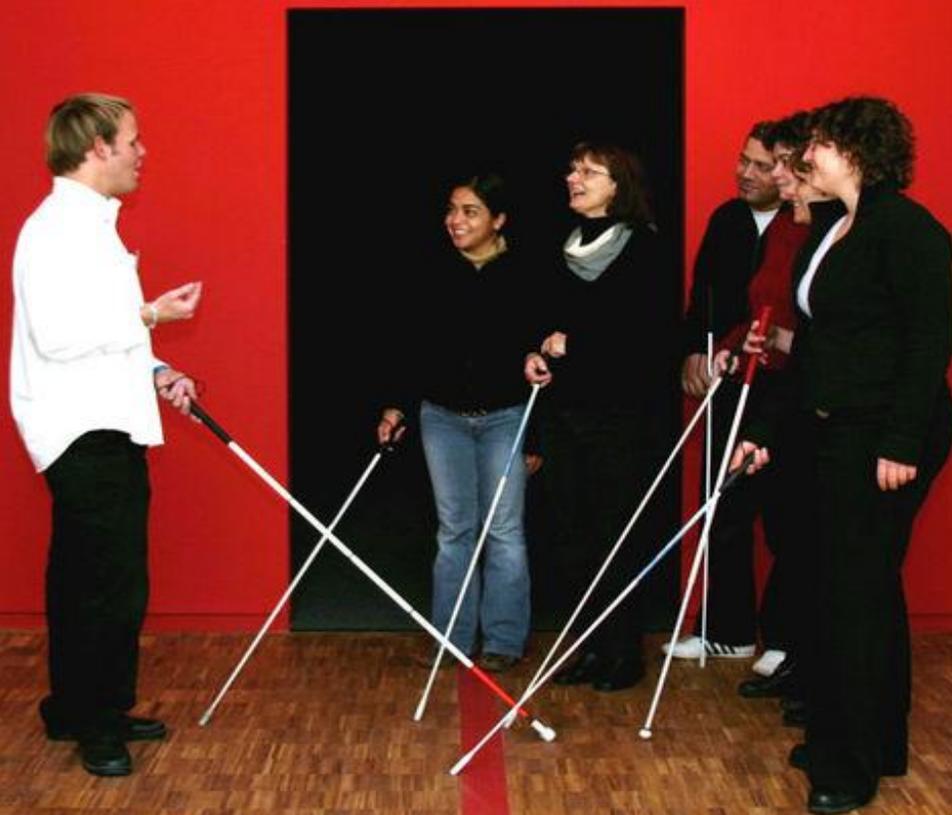


Design for All

DIALOG IM DUNKELN®
EINE AUSSTELLUNG ZUR ENTDECKUNG DES UNSICHTBAREN



Guest Editor: Astt Prof Sugandh Malhotra Ph.D,
IDC School of Design
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India

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Guest Editor:



Dr. Sugandh Malhotra has over sixteen years professional experience in industrial design and automotive styling industry. He has worked on design projects for marquee brands in the industry that include Honda R&D, Hero Global Design, Hi-Tech Robotic Systemz Ltd., SETI Labs Berkley, Aprilia Motors Italy, Bombardier Canada and most of the leading automotive and consumer brands of India. He has been instrumental in design of over 18 techno-commercially successful launched products at a pan India level. He has won many International and National level design awards. Dr. Malhotra takes keen interest in teaching design and has been mentoring students from many leading institutions such as IIT Delhi, IIT Roorkee, SPA Delhi, Lady Irving College, IILM, Pearl Academy among others. Currently, he is working as an Assistant Professor and the Coordinator of MVD program in IDC School of Design at IIT Bombay. His research interest areas include design research methods, future design possibilities, trend research and design forecasting and intelligent mobility systems.

Dear friends,

'Design is what designers do', I was made aware about this epiphany when I became the design student myself more than two decades back. It seemed simplistic and obvious at the first but with time I have realized design as a more complex, responsible, sensitive and sensible profession that is rich with both 'passion' to create and 'compassion' for the user.

The world of design has oscillated between design of objects to design of services and back to special objects that relate to specific needs. However the pertinent questions of 'what we are proposing' and 'why we are proposing' have come in the fore front and started a new wave of 'sharing' the used products or utilize the services rather than buying a product itself.

Design has traveled a long journey from being exclusive to being inclusive in its approach. Design has evolved from being a crafts centric profession to supporting industry in the last few centuries. It took many decades to come to the point where the 'user' was considered the centre of new design development in all spheres. In the new century, rapid production techniques, better marketing and overt consumerism compelled us to look at the 'environment' as another important factor that should drive design. Addition of multiple design considerations with time has led to the evolution of design as a complex process. Design of 21st century is now an integral part of teams that are multi-disciplinary, multi-dimensional and multi-talented. And these teams are creating objects for the future that are inclusive. Even the latest and most cutting edge marvels of technology are made really friendly for specially-abled. We are living in times where disruption is appreciated and new ideas

encouraged. The wheels of innovation that had barely started to move in the beginning of the century have begun to run at a fast pace.

Design for All is an interesting and a very important newsletter because it focusses and promotes the concept of universal design, the design for everyone. I have observed this newsletter and seen it grow for past one decade now. It is through persistent efforts of the newsletters such as 'Design for all' that the focus has shifted from the 'designer' to the 'designed for' and the appeal to be inclusive has come forth.

Significant work is happening in the area of design for disabled or elderly. The ambient conditions of an interior of a space (e.g. house) are more controlled. There are ample references that the visually impaired (blind) or movement impaired people (e.g. elderly) can maintain for their ease of movement. The exterior spaces pose rather difficult challenges. The ambient conditions in an exterior setting of a developed country (e.g. Germany) are controlled, regulated and organized as compared to exterior setting of a developing country (e.g. India) where the ambient conditions can be extremely chaotic. A simple simulation and observational study of a visually impaired person's way finding while trying to catch a bus from the bus stand in India revealed startling challenges in this otherwise simple process. His other senses swell to fill the gap of lost sense. An annoyance like smell from fish market or loud chats around a roadside hawker or subtle gush of wind coming from open street seem necessary references to help him orient himself and reach his destination. This phenomenon of dependence on other senses is already well documented in the literature but the experience of it first hand was an overwhelming experience. This

actually enabled the researchers to acknowledge the other perceptions and capabilities more actively. This project clearly demonstrated how the designers need to research with users, or learn through simulating real life situations and observe the context carefully while working on the higher levels of system design to be able to make a significant change. Understanding user context is imperative to design and it is even more relevant for the design for differently abled. Research techniques such as shadowing and body-storming enable researchers to record keen observations about how differently abled people perceive the world. These further help in gathering pertinent and meaningful insights and generate solutions.

It is widely discussed at various forums that the new century belongs to the developing world wherein India, China, Brazil and other developing countries are right in the centre of where the action is. These are the lands of opportunities. As the old adage goes, 'necessity is the mother of invention', India continues to struggle and grapple with challenges posed by rapidly increasing population density in urban areas or how to facilitate people living in rural areas. India has also seen an upsurge of indigenous developments and local innovations at grass root level that are practical and economical alternatives to the existing versions that are overtly expensive. These self-initiated projects are usually self-funded too and are popular alternatives in rural areas. This is in support to a new line of thought that encourages a more system level design thinking approach based on larger overview of 'context'. This also appraises the design researcher about other important areas such as demographics, social connections, cultural upbringing, economic realities and real life sustenance issues on an individual,

family, community, region and mega level. This approach may encourage minimum new interventions with minor improvements and promote longevity in existing solutions. This particularly works well for smaller communities in rural areas.

On the other hand, many a times the ideal solutions cannot be seen from within the system itself. It demands the researcher or the designer to take a step back, observe the context from outside and appreciate the systemic overview. To quote an example, hospitals, medical centres and first aid centres are rarer in rural settings in India. The approach to these *Praathmic Chikitsa Kendra* (also known as First Aid Centres) in rural India is perceived as challenging due to lack of rural road infrastructure. The small communities in the villages cannot afford to purchase expensive ambulance while hospital establishment also struggles to reach out due to lack of funds and infrastructure. Thus the villagers often depend on their own conveyance in case of medical emergencies. In an ideal world, adding a new fleet of ambulances or improving the road infrastructure would address most of these problems but this dream is far from realization in real world. However, once we observe the entire problem more critically, we acknowledge that every village (or group of villages) are largely self-sufficient in themselves and has its own operational mechanism. Many families within the communities run *Tum-Tums* (small privately held public transport systems) that provide primary means to approach these villages and act as last mile connectivity. The project proposed a solution that worked on the principle of modifying existing public transport solution with clever design interventions so that it can be transformed into a response vehicle for medical emergencies within minutes while on regular days, it can continue to work as public

transport vehicle. This would need a fraction of investment and can thus be supported and maintained by *Gram Sabhas* or *Gram Panchayats*, i.e. within community itself. The solution proposed through this project showcases another example of understanding context in a larger perspective and how it aided in finding an ideal solution to the pertinent problem.

Zooming out of the given context to see the big picture has several advantages. This can be particularly useful for envisaging bold visions for the future. These visions may not be limited by the present day technological capabilities or cater to demand/supply. When we zoom out of the current context where we use/consume the objects of desire or function, we are able to see the entire life cycle of the products. We are able to acknowledge the relationship between our objects, our society and the environment also. It is this appreciation towards lowering our carbon footprint that has led to the advent of electric mobility, shared mobility and other environmentally conscious innovative concepts of the new age. However the mountains of waste still continue to grow. Very often the user is compelled to discard the products because of small things that could have been added in the existing one itself if it had an ability to 'upgrade'. One of our student projects looked at this situation and proposed a system that took inspiration from 'Modularity'. The industry has embraced this system in a very limited way and it has been particularly helpful to make the products live longer by replacing the faulty parts or the ones that have lived its life. But can this concept of modularity be used on a much larger scale that truly enhances the life span of existing automobile. We will have the capability to upgrade, replace, install or remove to enhance (or downgrade) the existing product thereby increasing the

life span of the product. The design researcher studied various types of modular systems such as Lego blocks and assembled computer systems. His proposed system is a new direction to look at architecture of future mobility systems.

I have tried to explain the impact of context sensitive research and its ability to foster new creative thinking through the three examples quoted above. From studying the user-context in its immediate context to zooming out and seeing the systemic perspective, the study of context gives us a much needed perspective. You will notice that the definition of context expands to include the object, its user, its stakeholders, its usage, usage environment, social structure, cultural context, environmental impact and many others. As a design educationist, I would advocate that the designers of the future should be made aware about the significance and importance of these dimensions of the context.

This discourse of the context sensitive user centric design can clearly be observed in the design education also. A closer and comparative look at design curriculums followed by design institutions across the world indicate how the focus of the design program has embodied the ethos and value system of the current generation. It addresses the needs, wants and aspirations of the target audience but through a local or a regional perspective thus remaining oblivious to the global challenges. However, the objects are no longer restricted to a specific area of the world and very often launched to a worldwide audience. The design education that focuses on problem solving does not have to be a prime ingredient for developing countries only because they are grappling with real life issues.

As a design educationist, I often wonder and debate with myself to decide, what is the right thing to teach the next generation of designers? Is it the blue sky thinking, creative, fascinating, sci-fi type of projects that is creative at best but very distant from the reality and the user-context? Or teach the design student to be sensitive, grounded and logical to propose workable solutions that are valid in the context? Over the years, I have observed more students choosing for the first option than the second way which to me is more difficult and pragmatic.

I believe that an ideal path lies in the middle of both paradigms, a well-designed and elegant solution. There is much to learn from both worlds. The individual strengths of both worlds should be leveraged and that is possible through collaborative learning. It can also help solve the context-sensitive challenges that may occur while creating a global design curriculum. It is quite optimistic to see the world opening up and students from multi-ethnicities and backgrounds working jointly on collaborative projects. This is a great bridge between the design education in developed and the developing countries. The design schools of newer generations should focus not only to teach to make things pretty but also focus on making the right products and for larger good.

I think we are living in interesting times and am excited to see what the future has to offer. Any institution that takes care of the present while planning for the future, is more resilient to meet the needs of the society, both in the present and the future.

In the end, I thank Design of All team for granting me an opportunity to share my views with you all and also for a wonderful

opportunity to wish you all on the auspicious occasion of *Diwali*, the festival of lights.

Warm regards,

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Since 2016, Dr. Sugandh Malhotra is working as an Assistant Professor and the Coordinator of MVD program in IDC School of Design at IIT Bombay.

His research interest areas include design research methods, future design possibilities, trend research and design forecasting and intelligent mobility systems.



Faizan Zahid

Ar. Faizan Zahid studied in Masters of Design (Industrial Design) programme at IDC School of Design, IIT Bombay from 2015-17. He graduated as an architect from School of Planning and Architecture, New Delhi. He is currently working as a UX Designer in Bangalore and has been involved in freelance and volunteer work in various designs fields like Architecture, Tangible Interaction Design, Interface and Experience Design. His interests lie in solving social design issues since he started his journey as a student. He is a strong believer of user centric design process in problem solving and aspires to be a design educator in future.

Over the years, he has won many design awards namely Transparence 2015, Archumen 1415, INSDAG Student Competition, NASA ADI Product Design Trophy among others, has excelled throughout his academics and has won merit awards like Kajaria Student Award, Vandana Goyal Award, ICON Student Excellence Award etc. He was awarded the best student in overall proficiency award in graduation at SPA Delhi and was selected for carrying out his thesis in TU, Darmstadt, Germany during his post graduation at IDC, IIT Bombay based on his merit.



Professor Gaur G. Ray

Professor Gaur G Ray is attached with the IDC School of Design, IIT Bombay since last 38 years. At present he working as Emeritus Fellow of the Institute. He served as the Head of the Department for four years. Prof. Ray is also attached with the Department of Bio-Sciences and Bio-Technology as Associated Faculty. He has published more than 35 papers in different National and International Journals, Presented more than 150 papers in different International and National conferences. He has guided 7 PhDs and numerous number of M. Des, M. Tech and M.Sc. thesis/dissertations.

Prof. Ray was member of the Scientific Expert committee for DST, MHRD, AICTE, Member of the Board of Governor, Indian Institute of Packaging Mumbai. He served the Bureau of Indian Standard as the chairperson of the PG 15 Division for more than 6 years. He is the founder member of the Indian Society of Ergonomics and served the Society for consecutive 9 years as the president of the Society.

Prof. Ray was advisor to Godrej & Boyce furniture division for three years and also worked with different major Industries like, Tata Motors, Mahindra & Mahindra, Eureka Forbes, etc as Ergonomics expert.

He has published several books/guidelines in the area of Ergonomics design and bagged 3 patents and 6 design registrations to his credit.

Professor Gaur G Ray has recently been recognised for his contribution in Ergonomics in the Industrially Developing countries by the International Ergonomics Association (IEA). He is also the founder member of the BRICS committee of the IEA.

STUDY OF BLIND PEOPLE ACCESSING PUBLIC TRANSPORT

Faizan Zahid, M.Des (2015-17), IDC school of design, IIT Bombay

Dr. Sugandh Malhotra, Asst. Professor, IDC school of design, IIT Bombay

Dr. G. G. Ray, Professor (Retd.), IDC school of design, IIT Bombay

Abstract:

Public transportation is the basic amenity to travel within and outside the city. That being the case, this amenity must be available to the residents irrespective of their social status, gender, physical condition, etc. It is also a basic right for every citizen to be able to navigate comfortably to places of work and so forth in the city of their residence. People with visually disability need special care and attention while designing. Unlike all other, the designs especially which are directed towards public use must take care of this group. However, this critical user group is most of the times not paid attention to and it makes difficult for them to survive through even the smallest of the daily tasks. This project is an attempt to find issues related to the access of public transport for visually impaired commuters. These insights were then used to propose concepts to help the visually impaired people access public transportation and navigate to places of their requirement more efficiently.

1. Introduction

Buses and trains are used by a great number of people daily. “Bus and rail networks are the lifeblood of Indian society and prime movers of the local economies” says Jamie Osborne, a Transit Planner and Accessibility Specialist with the San Francisco Municipal Transportation Agency after a travel through India (Osborne, 2007). A lot of work keeps happening in the domain of transportation to give this comfortable commute to the citizens in a country like India with such a large population. Year after year more people move to cities for opportunities and the cities must battle with infrastructural maintenance nonetheless, but we still need to buckle up to make public transportation accessible.

Visual impairment, also known as vision impairment or vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Some also include those who have a decreased ability to see because they do not have access to glasses or contact lenses. Visual impairment is often defined as a best corrected visual acuity of worse than either 20/40 or 20/60. The term blindness is used for complete or nearly complete vision loss. Visual impairment may cause people difficulties with normal daily activities such as driving, reading, socializing, and walking.

India has the largest blind population in the world of nearly 20 million. Around 1.5% of the population is blind. But the impairment does not restrict them from studying, having ambitions and raising a

family. Sadly, many portions of the world have still not been completely made accessible. Their basic requirement is affected when the navigation is curbed. Many people prefer staying indoors than to get out there and battle everyday with transportation and infrastructure.

2. Methodology

The initial part of the project was conducted in Darmstadt, Germany. A study was done to understand the cultural differences, infrastructural advancements, the attempts to provide solution and design a guiding system which would act as an assistant to the person using it whether visually impaired. After initial study, public bus was chosen as the mode of transportation as the bus system is pretty much the same in both Germany and India. Both countries have visions to make the countries barrier free by 2020 (Johari, 2017). Though one is a developed country and one is developing fast, the visually impaired citizens did have their concerns about not being able to travel like their counterparts.

The initial study was done to understand the issues in real life scenario and come up with areas of interventions. A brief timeline and general methodology is shown in figure 1

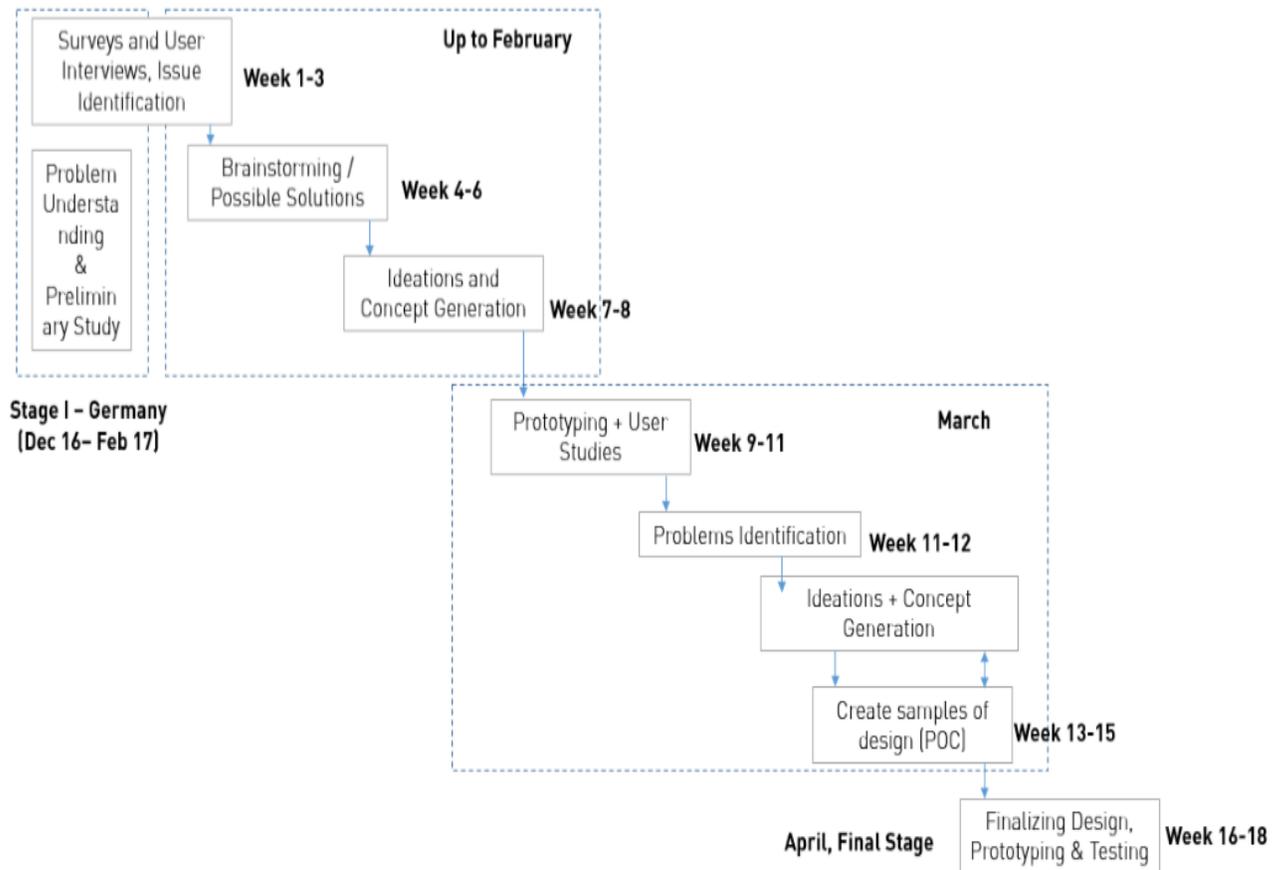


Figure 1: Timeline of the project (source: author)

2.1. Initial study

The visit to IAD, TU Darmstadt, Germany was of a total duration of 8 weeks from December 10th 2016 to February 10th, 2017. The main objectives of the visit were:

- Understand the issues faced by blind people while accessing public transportation,
- Looking at the solutions available in Germany.

- **Find areas of work common to both the context of India and Germany.**

It was observed that most transportation systems in Germany are claimed to be barrier free. In the vehicle, specific seats close to the doors are reserved for disabled or elderly people. Also, busses normally have a ramp for wheelchair access. The bus, tram and train stations provide an easy access to the vehicle by being on the same level as the door of the vehicle. At the stop orientation systems for blind on the ground are implemented. There are orientation systems for blind on the ground, dynamic passenger information screens with voice output at several bus and tram stops and most buses and trams are low floor and therefore barrier free. Nevertheless, it was observed that these circumstances don't occur at all bus and tram stops.

Initially, relevant points of interventions and critical issues while using public transportation through brainstorming. Then, a visit to blind museum at Frankfurt (figure 2) was conducted to experience simulated blindness along with field observations. This visit along with observations during field study led to multiple insights.



Figure 2: Dialog museum in Frankfurt (source: <https://www.frankfurt-tourismus.de/en/Media/Attractions/Museums/Dialog-Museum>)

2.2. Insights

These experiences gave the following insights:

- ***Vibrations from environment is a very important feedback for the visually impaired***
- ***The blind stick acts as a third limb providing an additional sensory feedback***
- ***to compensate lack of vision the sense of hearing takes over with time***

- ***Sense of orientation and reference points are very important for navigation***
- ***Physical cues in the environment are required for effective orientation***
- ***Haptic feedback can be explored to improve communication with the environment***

The problem of identifying the correct bus and correct direction to bus door was noted as a major issue which is common to both Germany and India. A lack of affordable and user validated system was noted which can provide the right cues from the bus, to help identify the bus of interest before it's arrival at the bus stop. Identifying the entry door of the bus was another issue that was observed.

Based on these observations, this area of work (of guiding blind people to correct bus and bus door) was selected for a collaborative project and a design brief was generated.

2.3. Design brief

"To design a system/product for helping blind people find their desired bus correctly and guide them to the bus door, when the user is already at a bus stop."

Based on the brief, 3 key areas were identified as focus points for the scope of this project, i.e.

locating origin bus stop/ platform, locating the right bus and accessing the bus. Further, user persona and scenarios were explored. Then using the insights from field study and initial ideations, user context was created, to understand the parameters required for system and hardware with respect to targets and work task, system environment and equipment.

2.4. Ideation

Using the parameters, the requirement was understood and tabulated for development of product. System behavior, user hardware, interaction requirement, offered information, system architecture, cost effectiveness, legal conformity, data security, affordance and impairment on health of the user were included as evaluation factors.

Based on the system overview, an initial idea was to create a wearable as the system that the user has on him or her. For the ideation many factors were considered and compared. The place to wear and the feedback that the device must give to the person wearing were also considered and a prototype was developed. The theoretical framework of device (fig. 3) was also conceptualized before working on the hardware (figure 4)

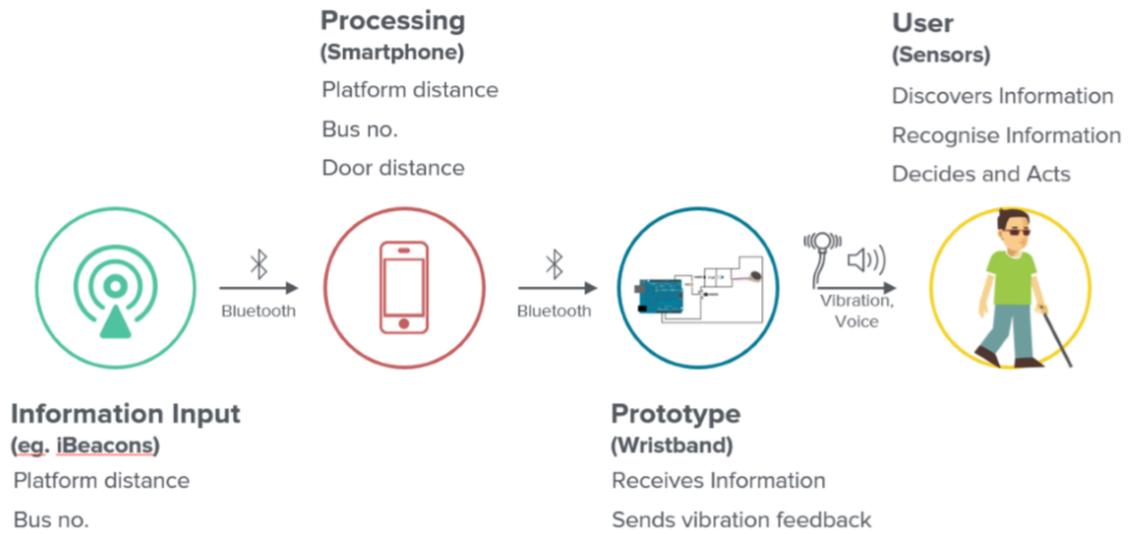


Figure 3: Theoretical framework of the device (source: author)

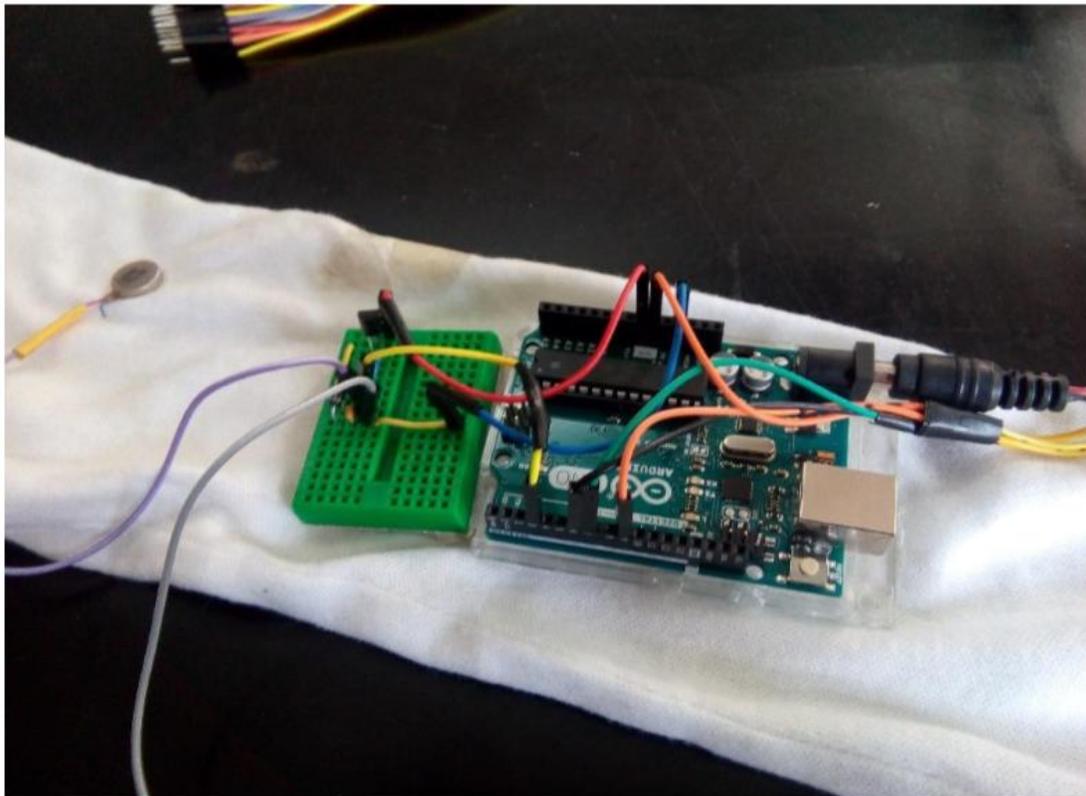


Figure 4: Arduino prototype glow used as proof of concept (source: author)

Further ideation sketches (figure 5) were done to refine the product and then product evaluation was conducted at IDC school of design, IIT Bombay.

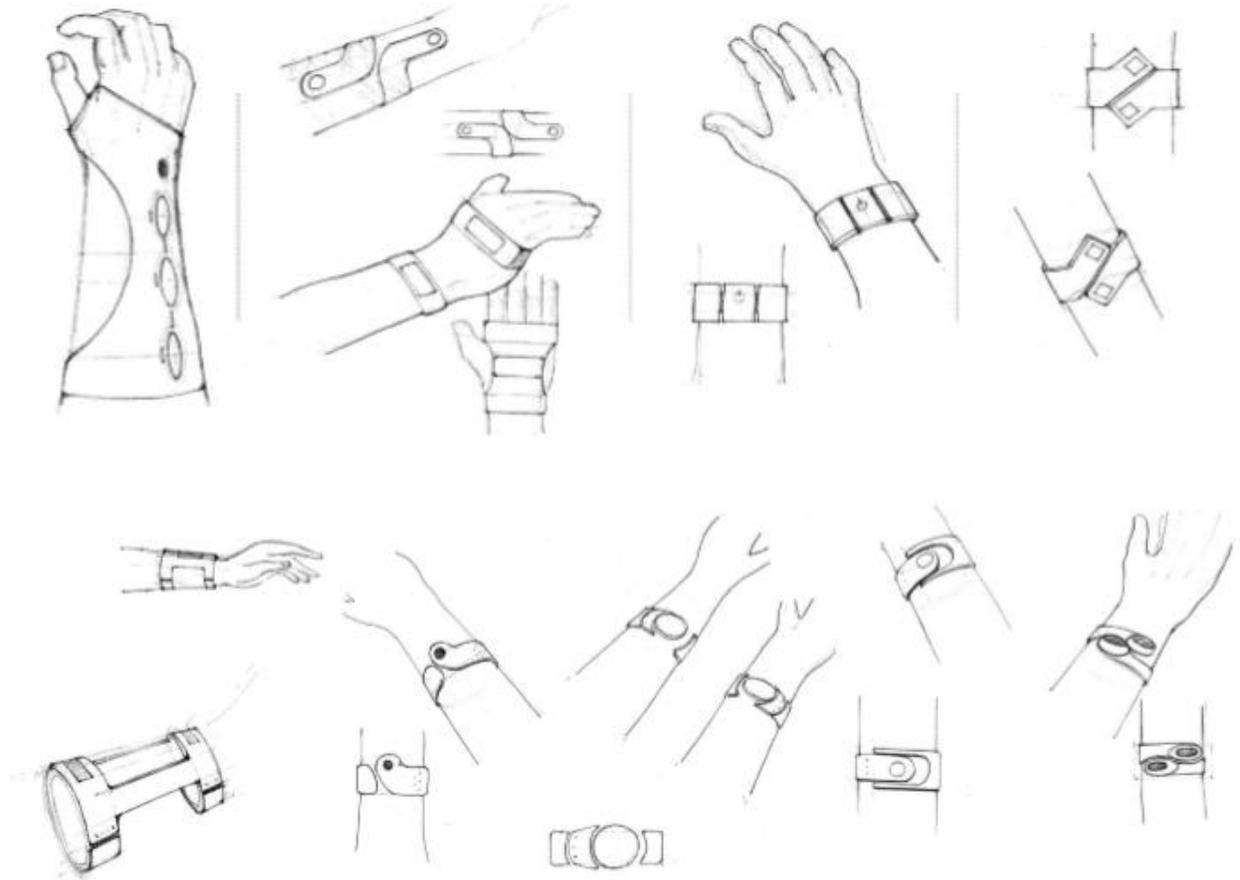


Figure 5: Ideation sketches (source: author)

2.5. Study in India

Further study was carried out to understand users in context of public transportation in city of Mumbai, India. The aims of the study were as follows:

- **Understand the current system of public transportation in Mumbai.**
- **Find out issues faced by blind users accessing public local buses.**
- **Find out the areas which need to be improved in the current infrastructure.**
- **Find out the areas which could be developed for future.**
- **Finalize the problem statement and design brief.**
- **Create design solutions and test with actual users**

Observation of blind users and interaction with experts who have worked in this field, along with simulation through role playing exercises were conducted. The insights were used to draft the scope of the project to consider sighted users, while keeping blind users as primary users. Test simulations through soft prototyping and 'Wizard of Oz' was planned as a primary method of testing the system due to anticipated shortage of time to create and test through working prototypes.

2.6. Revised Design brief

The final design brief and deliverables for the second phase of the project were as follows:

"To design an information system to be deployed at bus stops of Mumbai for passengers (primarily blind) to aid users to choose appropriate bus to reach his/her desired destination"

The major aims/deliverables of the information system would be:

- ***To inform user about the current upcoming bus.***

- To suggest user which bus to take for his/her desired destination.
- To inform the user about scheduled arrival & ETA of the desired bus.

Along with that, the system needs to be

- Designed for public too (i.e. sighted people)
- Requiring less maintenance
- Easy to deploy
- Unobtrusive

2.7. Concept development

The existing examples of information systems, implementable technology and ergonomics were then studied, and iterative ideations were created on the basis of scenarios. The following concepts were then developed for interface as well as kiosk

2.7.1. Concept 1: interface (figure 6 and 7)

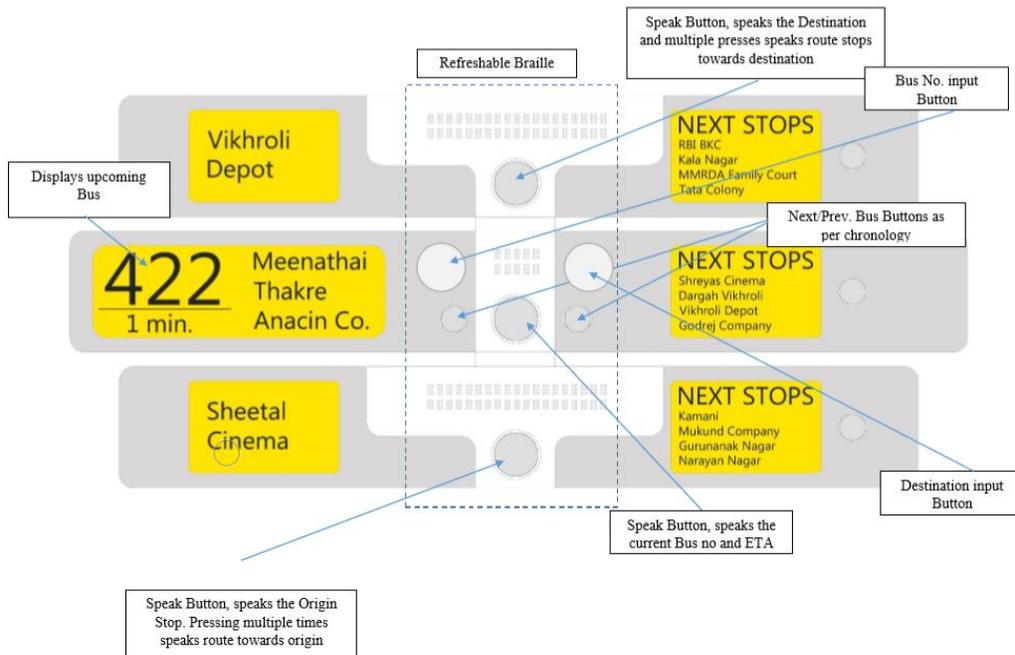


Figure 6: concept 1 interface (source: author)

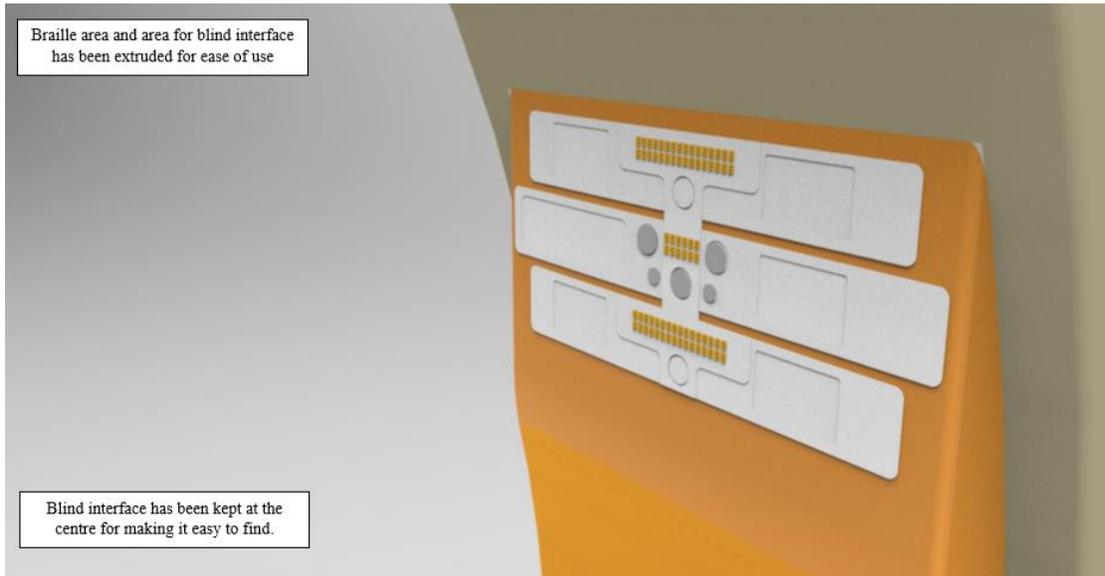


Figure 7: Concept 1 interface module (source: author)

2.7 Concept 2: Interface.2. (figure 8 and 9)

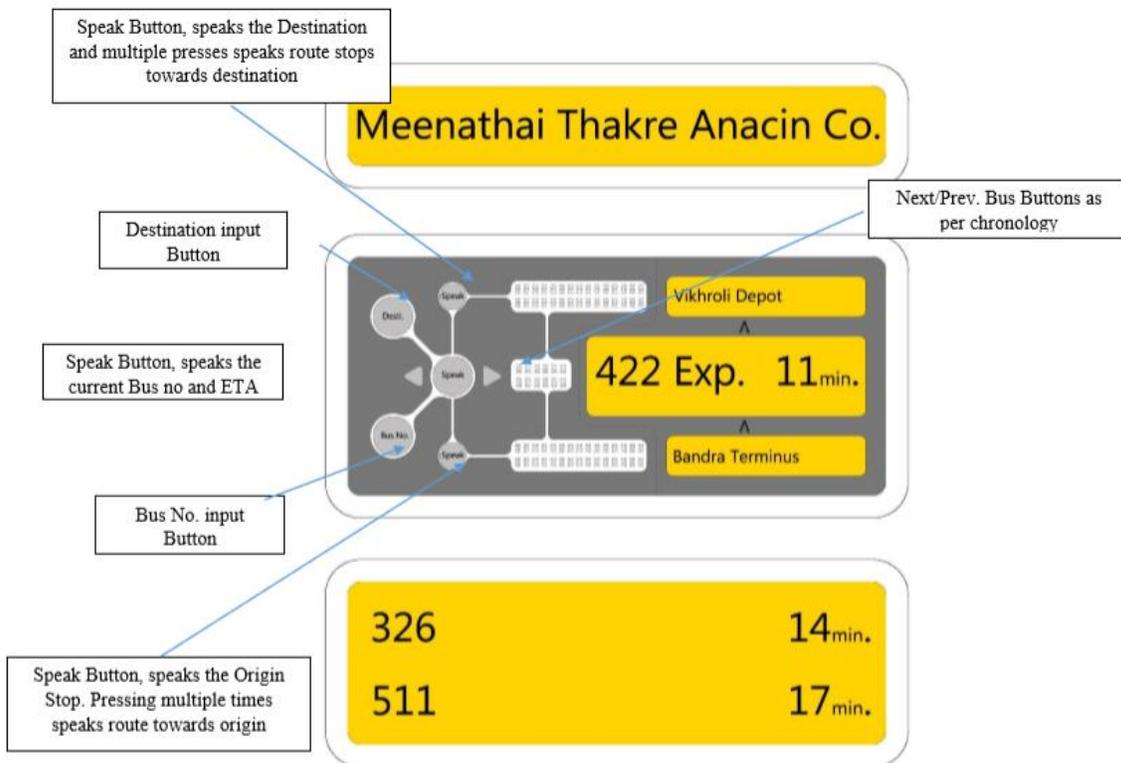


Figure 8: concept 2 interface (source: author)

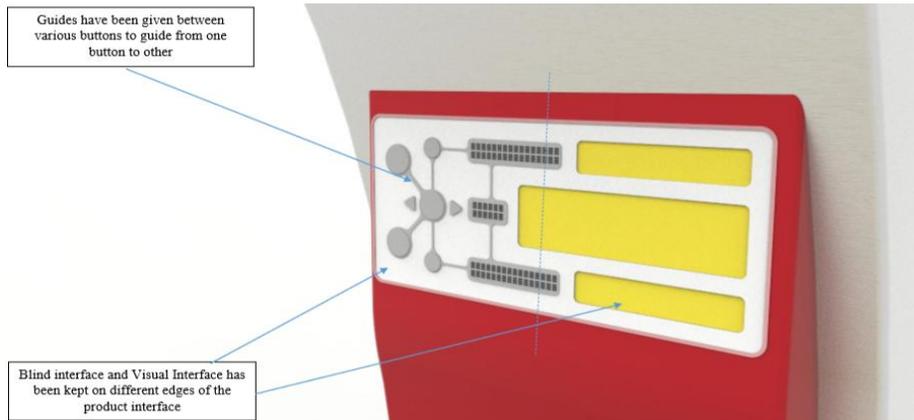


Figure 9: concept 2 interface module (source: author)

2.7.3 Kiosk concepts

Information Kiosks concepts were designed to match with the existing designs of the bus stops. In the next phase, they will be placed near each bus stop and hence should be responding to its design. Stainless steel has been used as primary outer casing material in order cater to the harsh weather of Mumbai and to respond to the bus stop design.

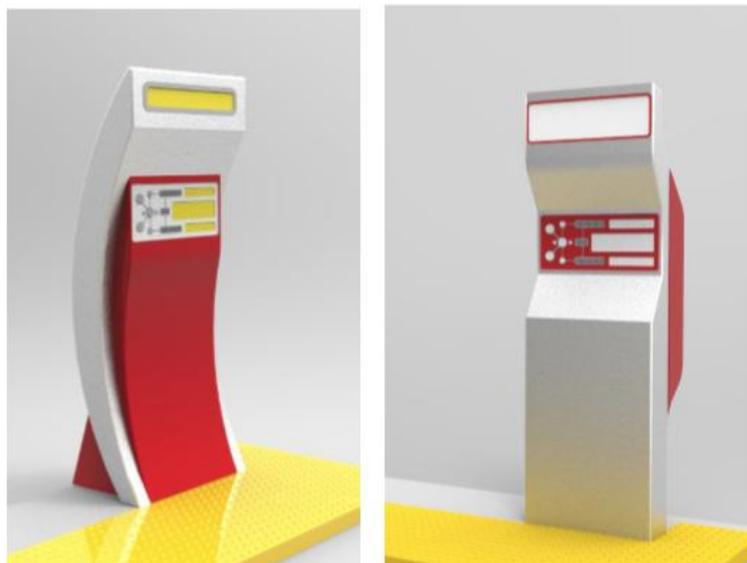


Figure 10: Kiosk concepts (source: author)

2.8. Product positioning

Another important task other than designing such information system is to designate a place for such kiosk which could be universal and would be known to the frequent blind users. Hence, as suggested by the CPWD guidelines, there is a need to incorporate tactile tiles for mobility at any bus stop for guiding blind users to towards the bus, figure 11 shows a proposal for the positioning the kiosk at every bus stop. As the space behind the bus stops is generally unused and left blank, this place should be provided with tactile mobility tiles as per standards. These tiles will guide them towards the entry of the bus stop and to the information kiosk.

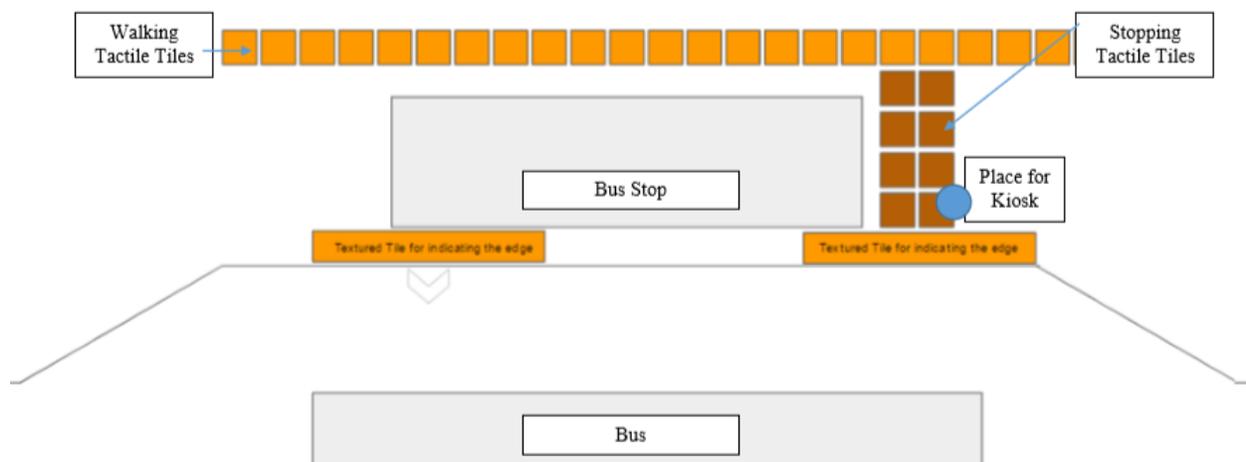


Figure 11: Positioning of the kiosk and proposed stop layout (source: author)

The project is currently in testing phase. The concepts will be fabricated and tested. And then based on the results and parameters decided while finalizing the design brief, these concepts would be evaluated to generate the final product for validation.

3. Limitations of the study:

- *Exhaustive testing needs to be done with a wider spectrum of users with different needs and backgrounds.*
- *Opinions generated were subjective and may not be used for forming an opinion for general case.*
- *There was a limitation of time and resources for this project.*
- *The process followed needs to be augmented with more extensive research and user interviews along with more robust experiment design to test the concepts as well as to validate insights.*

4. Future scope of work

- *The concepts need to be tested for usability and interactions*
- *The kiosk form needs to be further refined and detailed for manufacture on the basis of feedback and specifications. Thereafter it can be used for field testing.*

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Figure 11: Positioning of the kiosk and proposed stop layout (source: author)

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Professor Sugandh Malhotra, Ph.D.

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His research interest areas include design research methods, future design possibilities, trend research and design forecasting and intelligent mobility systems.



Prabal Namdeo

Mr. Prabal Namdeo studied in Masters of Design (Mobility & Vehicle Design) at IDC School of Design, IIT Bombay from 2016-18. He graduated in B.E. (Mechanical Engineering) from LNCT, Indore (2010). He is an automotive designer with experience of handling varied kind of projects during his academics, from having experience of building an ATV Buggy for college-level SAE Baja competition to the thesis project on "Micro Mobility Vehicle for Elderly". He holds good strength and interests in Design research and digital sculpting. He is currently working as a Designer at Abhikalp Design Studio, where he is responsible for building new concepts and also to convert them into 3d models.

His research interests include working in the areas of automotive styling design, digital sculpting and design research methods.

FIRST RESPONSE VEHICLE FOR RURAL INDIA

Mr. Prabal Namdeo, M.Des student (2015-17), IDC school of design, IIT Bombay

Prof. Sugandh Malhotra, Asst. Professor, IDC school of design, IIT Bombay

Abstract:

This project was an attempt to find out the problems and difficulties related to transportation faced by people in rural India during any medical emergency and to address the issue using mobility solution. Impact and scope of this project was analyzed through a field study and research and it was found that in maximum number of the cases people will use any public transport vehicle to reach the nearest health care centre. On one hand, the proposed concept must ensure its function as a public transport vehicle more efficiently through wider access and better seating layout. On the other hand, the same vehicle's interior gets reorganized and transformed quickly so that it can now accommodate a patient in a safe and comfortable way. Thus this concept ensures ready availability and less response time.

1. Introduction

There is an acute shortage of ambulances in India. Conditions get worse in the rural area due to unavailability of amenities and infrastructure leading to a higher response time. A lot of casualties happen in rural area just because of the unavailability of any proper mode of transportation in any kind of medical emergency. The bad

terrains in rural India also makes the places inaccessible by the ambulances. Apart from inaccessibility, the distance that a person must travel to reach to the nearest health care centre is usually large. To reduce the response time of the ambulance, number of ambulances needs to be increased substantially. These ambulances should be readily available at different locations instead of being parked at the hospital. But, this will take a hefty amount of capital investment which is a big constraint. However, if a vehicle which is easily accessible to the people (i.e. vehicles used for intermediate public transport) is used and made capable enough to accommodate a patient safely and comfortably, then it can have a very large impact on the ground level. Following this conclusion interior of appropriate intermediate public transport vehicle has been modified in such a way that it can either accommodate a patient with stretcher or can be used as a usual public transport vehicle.

2. Initial study

2.1 Pre-research

Initial background study included a thorough study to understand the context and determine the scope of the project. The pre-research consisted of understanding parameters like the population and city divisions (figure 1), causes of deaths (figure 2), accessibility (figure 3), road connectivity and availability of ambulance (figure 4).



Figure 1: population and city divisions in the country (data source: data.worldbank.org¹)

The population division between urban and rural area was studied to gain insights regarding the ratio of amenities and infrastructure required to serve the people in urban and rural area. The rural population in India is double of the urban population i.e. 67% of population lives in rural area compared as of 2016.

Though the rural population is apparently decreasing compared to the urban population, the actual population is increasing in rural area at a rate of 0.57% if we consider the growth ratio. If the population of an area is categorised using tiers, In India there are 8 Tier 1 cities, 26 Tier 2 cities and 33 Tier 3 cities. These 67 cities fall under the urban area and encapsulates the 33% population of India.¹ Rest of the cities are divided in four parts namely, Districts, Tehsils, Towns and villages. There are 696 Districts in India under which there are 5,767 Tehsils, these tehsils encompass 7,933 towns under which there are 640,867 villages. All the 640,867 villages,

7,933 and most of the tehsils comes under rural area. This shows that we have a most of our population divided across a larger number of settlements which really signifies need for better connectivity.

Currently, more facilities are available in urban areas as compared to the rural areas, whereas need is exactly opposite of it. On the other hand, facilities available at present are not enough to suffice the need of the growing population of India.

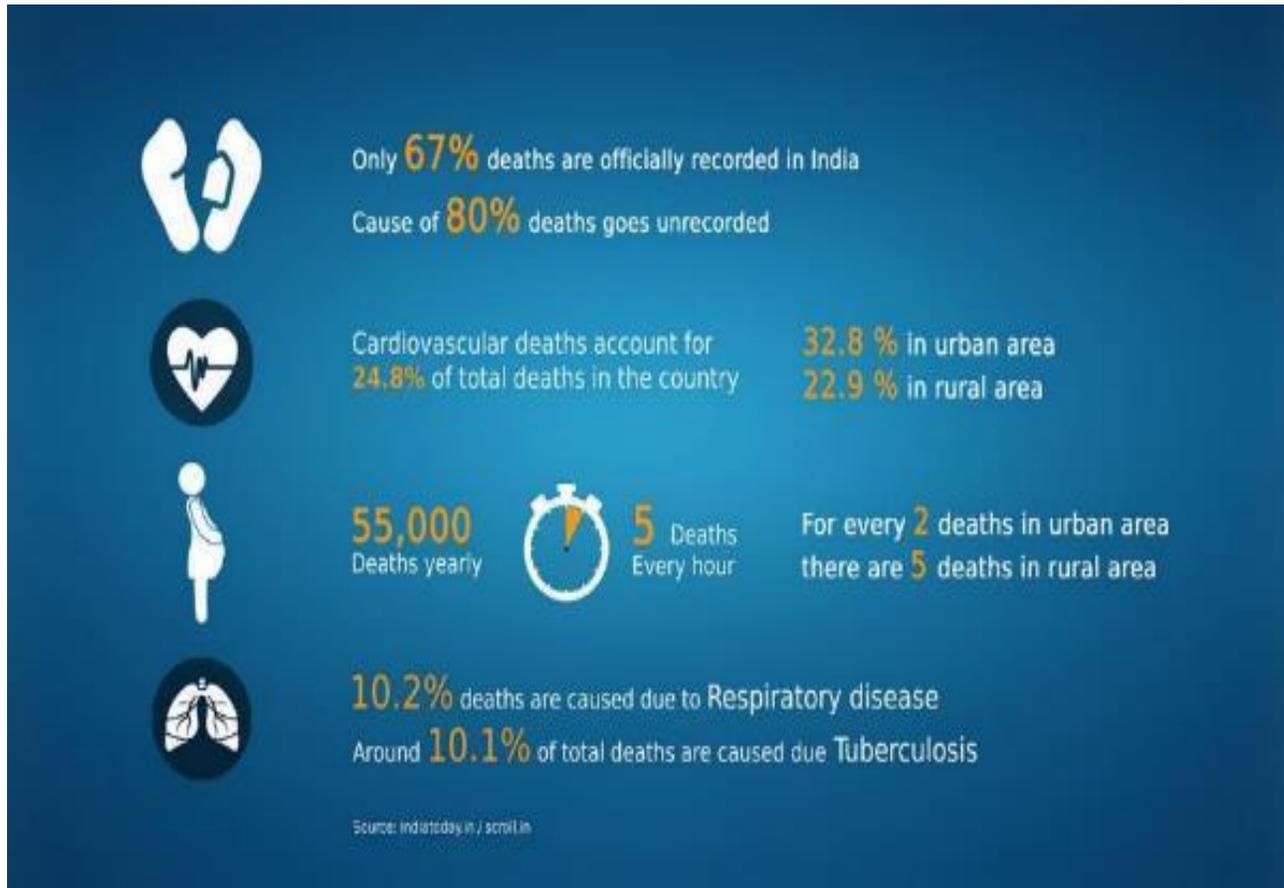


Figure 2: causes of deaths (data source: www.worldatlas.com²)

Statistics about mortality were studied. It was noted that most of the deaths are registered in urban areas. Only 67% of deaths in India are officially registered and out of those 67% deaths, reasons of 80% deaths are not recorded. Cardiovascular deaths accounts for the overall 24,8% deaths in India. Out of which, 32.8% deaths in urban area and 22.9% deaths in rural area is due to the cardiovascular disease However as the rural population is twice as much as urban population, number of deaths are also much higher in rural area but most of these death goes unregistered. ²

Maternal Mortality Rate (MMR) is also a big cause of death in India (55,000 deaths/year which is 5 deaths/hour). Even though the MMR index for India is in decline still it constitutes 20% of the MMR in the world. Comparing deaths related to maternity in rural and urban area gives a very shocking result, MMR in rural area is two and half times more as compared to the urban area i.e. for every 2 deaths in urban area there are 5 deaths registered in rural areas. Other main causes of deaths in India are the respiratory diseases and Tuberculosis which constitutes the 10.2% and 10.1% of deaths respectively. ²

One of the major cause of higher numbers of deaths in rural areas can be speculated to be the inaccessibility of health care centres and also the inability of the people to reach to the nearest hospital before the person demise.

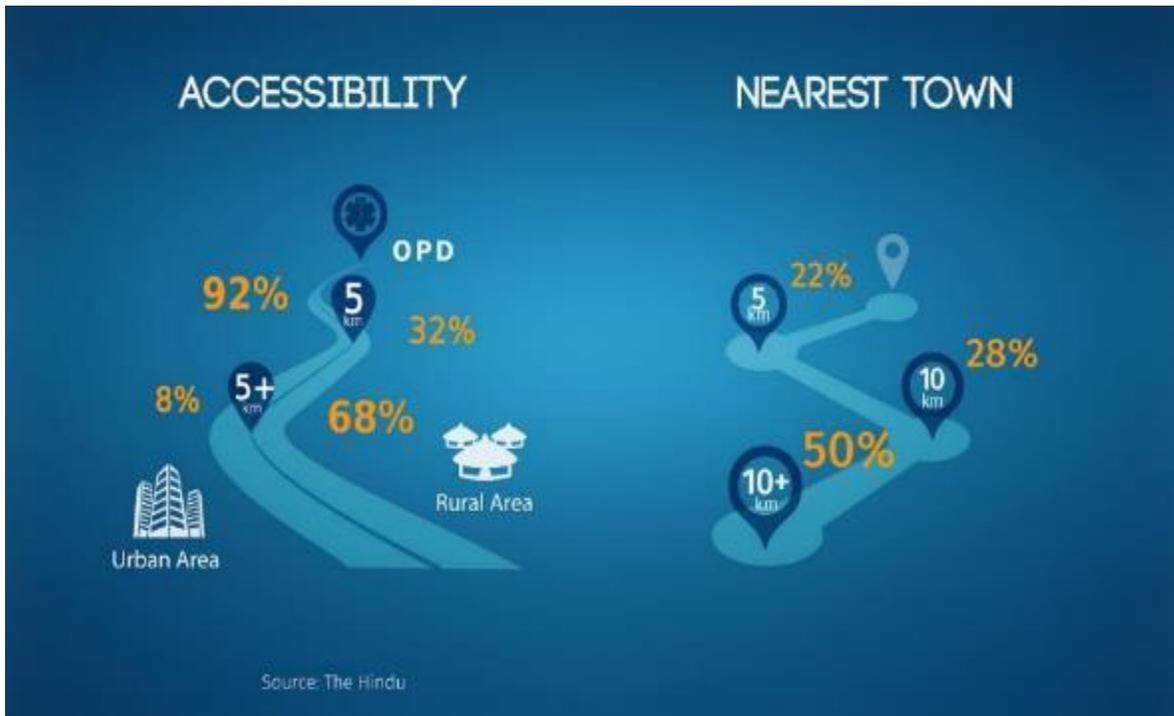


Figure 3: accessibility and nearest town (data source: www.downtoearth.org.in³)

Accessibility of the health care centre in rural area was studied. In urban area, for 92% of people OPD is available within 5km, whereas in rural area only 32% people live within the distance of 5km from the nearest OPD. The conditions of OPD's in rural area are not good enough to handle fatal conditions. Hence people try to reach to the nearest town to get any kind of satisfactory treatment. The distance that people must travel to reach to the nearest town becomes an issue. More than 50% of rural population live more than 10 km from the nearest town, 28% of rural population live within the range of 5km to 10km to from the nearest town and only 22% of population lives within the distance of 5km of the nearest town.³

Issues regarding poor road connectivity and conditions in rural area were studied. Though the towns and villages are connected to highway, but condition deteriorate in the rural hinterland. According to the government data, rural area contains 60% of roads. This 60% includes both surfaced and unsurfaced roads, and condition of unsurfaced is not suitable for commuting during bad weather, especially monsoons. On the other hand, there are no roads available in 40% rural area.⁴

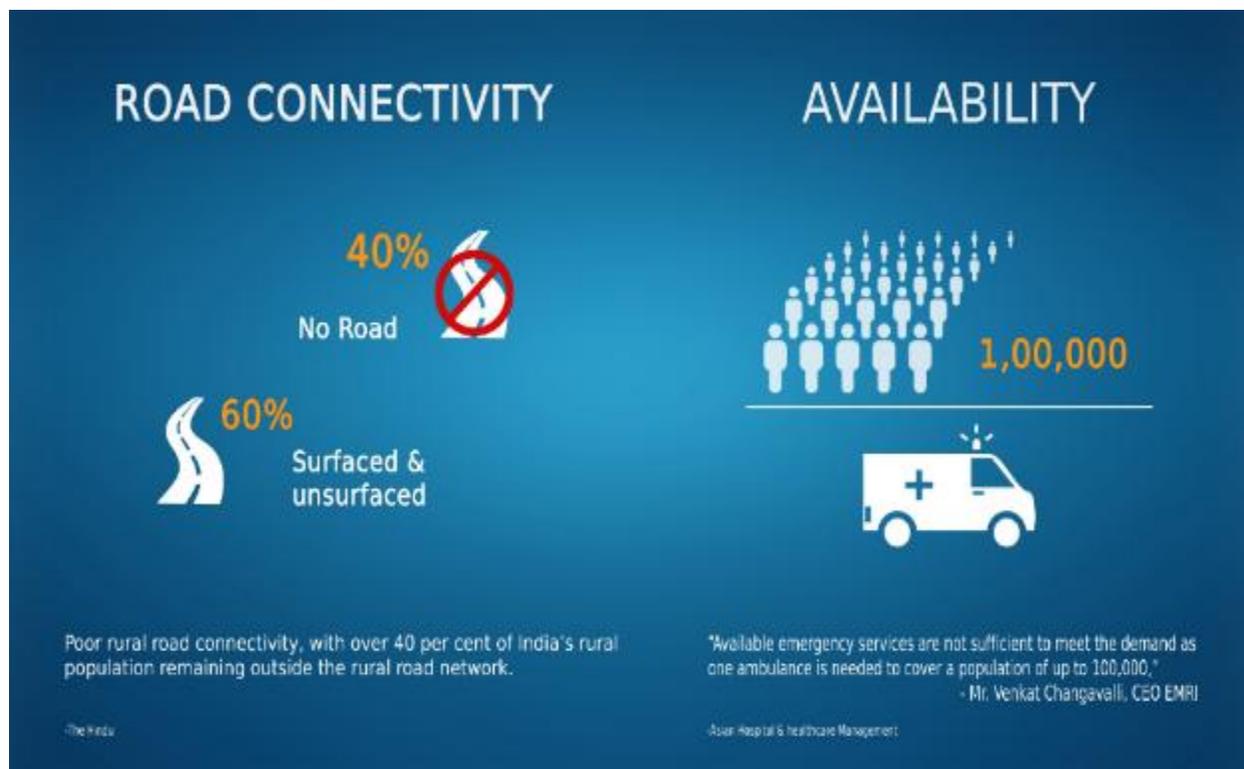


Figure 4: road connectivity and availability of the ambulance (data source: www.thehindu.com⁴)

2.2 Field research

Along with pre-research, field research was conducted to understand the ground conditions in the rural area and the problems faced by the people and how do they tackle them at present. To do the field

research two different areas were chosen, Karjat nearby to the metropolitan city Mumbai and the towns adjacent to a 3-tier city Chhindwara, Madhya Pradesh. Both the places being diverse in nature gave insights to different situations and bit of similarities too. As part of the observational study, terrain, alternate vehicles used for ambulance in India (figure 5) and abroad (figure 6), condition ambulances, crew of the ambulance were observed to gain sufficient understanding and insights.



Figure 5: alternate vehicles used as ambulance in India (source: author)



Figure 6: alternate vehicles used as ambulance across the world (source: author)

The following insights were gained from pre-research as well as field study:

- **People are restrained to use intermediate public transport during medical emergency.**
- **Required number of ambulances are not enough to meet the needs.**
- **Higher preventable death rate in rural area as compared to urban India.**
- **Limited accessibility to health care for below tier 3 cities.**
- **People are trying frugal innovation to fulfil their needs.**

- ***People are unaware of criticality related to transporting a serious patient and hence they end up using dangerous and unsafe mode of transportation most of the times.***

Also based on observational study, the following priority list was developed which helped in setting a clear aim for designing.

- ***Capable of handling rough terrains***
- ***Multi-utility***
- ***Comfortable for the patient***
- ***Modular***
- ***Weather protection***
- ***Affordable***
- ***Space to accommodate medical personnel***

3. Ideation

3.1 Choosing appropriate vehicle

There were five vehicle options that suited the requirements namely, Motorcycle with sidecar, Motorcycle with trailer, a three-wheeler, vehicle used as intermediate public transport and a completely new vehicle. The options were rated on factor like availability of the vehicle, modularity that can be achieved, maintenance needed by the vehicle, ingress-egress for the patient, weather protection, comfort for the patient, capability of handling different terrains etc. (figure7).



Figure 7: comparing various vehicle options (source: author)

After comparing all the considered options based on different operational aspects, option of modifying a vehicle used for intermediate public transport was selected. This was to address the primary issue of confined reach of ambulance by providing a vehicle that could be owned and maintained by public. An existing well-established vehicle was chosen to avoid higher costs and the lead time of manufacturing and trust building. After comparing intermediate public transport vehicles used in India and benchmarking suitable and appropriate options, Tata magic was selected due to its popularity in rural area and as it matched all the prerequisites. This led to creation of the design brief

3.2 Design Brief

“To design interior of a multi-utility public transport vehicle that can also be used as referral transport in case of any medical emergency.”

Considerations:

Capable of shifting a patient in a safe and comfortable manner to the nearest health facility. Can be used as intermediate mode of public transport or any other commute purpose.

Required functions of the vehicle

Emergency medical response

Intermediate public transport

Capable of handling rough terrains

Considerations for the interior

- **Ingress-egress for the patient (on or off the stretcher)**
- **IV holder and oxygen cylinder storage**
- **Sitting area for at least two attendants of patient**
- **Place to keep first aid kit**

The dimensions of the selected vehicle and stretcher as well as using appropriate anthropometric data were understood to generate multiple layouts (figure 8).

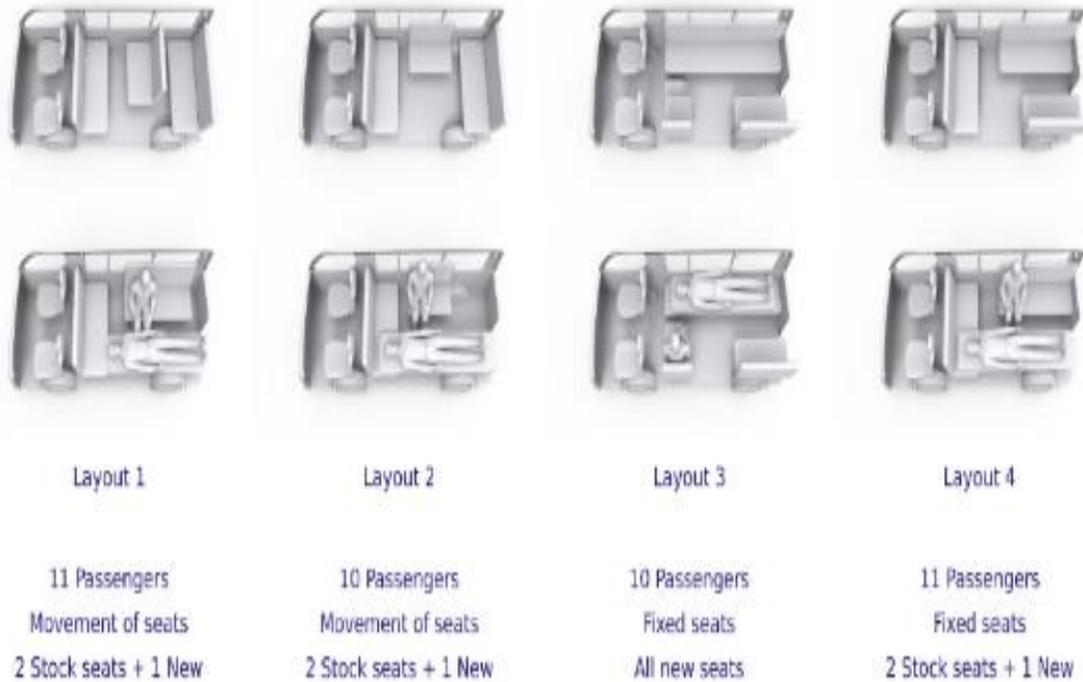


Figure 8: ideation for vehicle layouts (source: author)

Different options of interior layouts were explored with the possibility of accommodating a stretcher, layouts were also judged from the point of view of number of people it can easily accommodate while being used as intermediate public transport vehicle and based on ingress-egress of stretcher and people including many other aspects. After every layout were critically judged over different aspects, they were compared with each other and the best suited layout was selected (figure 9). This was then converted to a full scale mock up to simulate conditions close to the real scenario.



Figure 9: selected layout and full scale mock up (source: author)

Further iterations and simulations of this mock up led to multiple insights and findings which were the used to refine the mock up. Following decisions were made based on findings:

Initial idea of backrest cum stretcher was modified to seat cum stretcher to facilitate complexities of collapsibility, handling, manufacturing and to save space while providing a cleaner look.

Interior was rearranged, and grooves were provided to guide the stretcher to facilitate safe ingress and egress for the patient. Placement of IV hangar and oxygen cylinder was provided considering minimum intrusion to maximize the usable space.

3.3 Final concept generation

Based on the findings and observation during testing of the mock up, the final concept was generated (figure 10 and 11), and the stretcher frame details were finalized (figure 12).



Figure 10: final concept (source: author)



Figure 11: interior considerations (source: author)

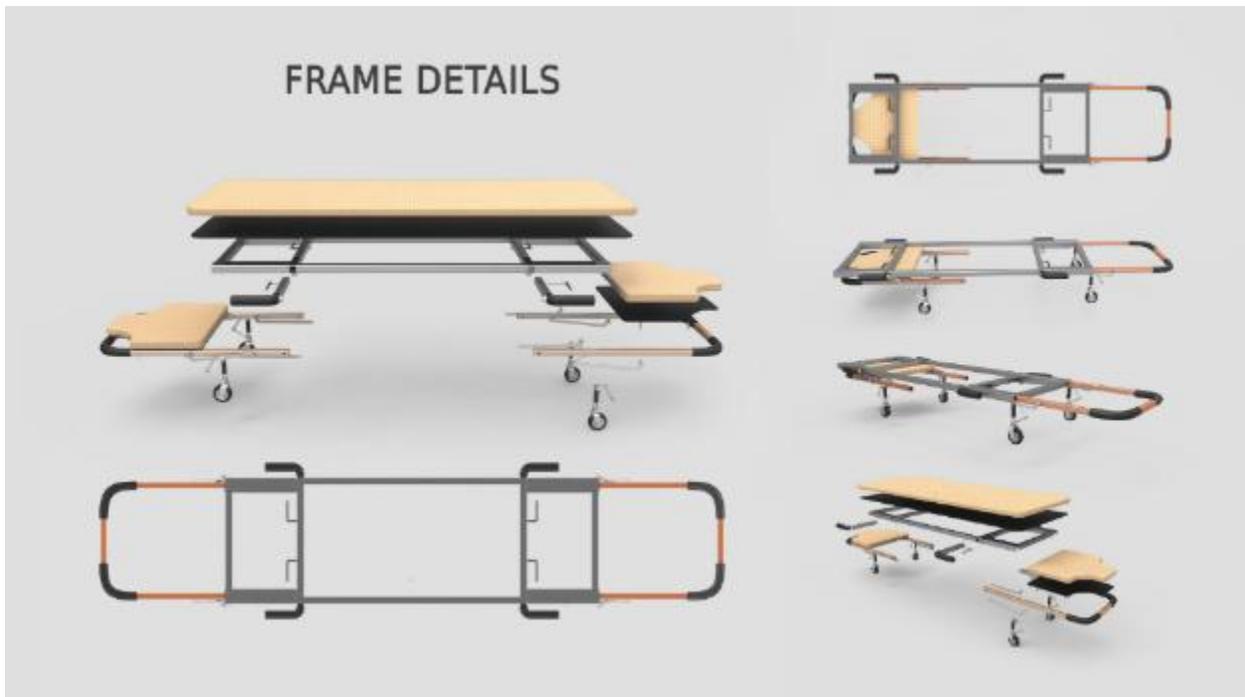


Figure 12: stretcher frame details (source: author)

4. Future scope

The project was limited to self-study and observation from the field studies. The proposed solution needs to be prototyped in full scale and tested in the actual conditions. Further, more in-depth studies and feedbacks collected through contextual enquiry sessions will help in gathering more insights.

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Figure 9: selected layout and full-scale mock up (source: author)

Figure 10: final concept (source: author)

Figure 11: interior considerations (source: author)

Figure 12: stretcher frame details (source: author)

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Professor Sugandh Malhotra, Ph.D.

Dr. Sugandh Malhotra has over sixteen years of professional experience in industrial design and automotive design industry. He has worked on design projects for marquee brands in the industry that include Honda R&D, Hero Global Design, Hi-Tech Robotic Systemz Ltd., SETI Labs Berkley, Aprilia Motors Italy, Bombardier Canada and most of the leading automotive and consumer brands of India. He has been instrumental in design of over 23 techno-commercially successful launched products at a pan India level. He has won many International and National level design awards. Dr. Malhotra takes keen interest in teaching design and had been mentoring students from many leading institutions such as IIT Delhi, IIT Roorkee, SPA Delhi, Lady Irving College, IILM, Pearl Academy among others.

Since 2016, Dr. Sugandh Malhotra is working as an Assistant Professor and the Coordinator of MVD program in IDC School of Design at IIT Bombay.

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His research interest areas include concept design and development, experience design and automotive design.

MODULAR MOBILITY FOR FUTURE

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Umesh Dinde, M.Des student, IDC school of design, IIT Bombay

Abstract

Automobiles that are a large part of mobility remained crafted and tailor-made solutions for a long time in history since its inception until the time when Henry Ford introduced the concept of production line with Model-T. This revolutionized the automobile industry dramatically and the economical vehicle for the masses was born. The vehicles have evolved in all aspects to be more sophisticated and increasingly complex with every generation since then. However it has not undergone major paradigm shift in terms of its structure and being. The user uses the vehicle for long period of time and develops a relationship with his vehicle. Changing or upgrading anything in existing vehicle requires skill, long time, lots of efforts and huge cost. This is why the current users tend to replace the vehicle instead of modifying it. The concept of modularity proposes an alternate approach to tackle this scenario. Working with a modular system would help in maintenance and up gradation of vehicle from time to time. This would also eliminate the need to buy new vehicle as every current vehicle would have potential to upgrade itself into modern vehicle and become in line with future generation of vehicles. This project proposes modular mobility as an alternate way of building future vehicles that is also sustainable.

This would also ensure that the vehicles can keep pace with ever-changing technology at a fraction of the cost.

1.Introduction

Monolithic or homogeneous vehicles give very limited options of customization. At the moment only limited graphical changes along with interior and exterior colour are allowed. Current generation vehicle has a limited time span. They have lots of independent systems and sub systems without any natural buffer leading to costly repairs. Also, vehicle buying process by nature involves compromised choice. The customer must choose between readymade models which may not take their individual need and requirement into account. Modular mobility is one way of solving these issues.

Modular design, or "modularity in design", is a design approach that subdivides a system into smaller parts called modules or skids that can be independently created and then used in different systems. A modular system can be characterized by functional partitioning into discrete scalable, reusable modules; rigorous use of well-defined modular interfaces; and making use of industry standards for interfaces. (wikipedia.org, 2017)¹

Modular mobility would provide aesthetic and component level customization, greater life span by allowing easier replacement of faulty systems and reduces repair costs by providing a natural buffer zone between components.

2. Methodology

The main objective of the project was to understand modularity through modular products and then implementation of modular philosophy appropriately to solve identified issues. The project was done in following stages.

- *Identification and categorization of existing modular products*
- *Analysis and probable applications of modularity in vehicle design*
- *Volume study of current vehicles and its subsystems*
- *Reconfiguration of vehicle interiors using volume blocks to create concepts*
- *Final concept selection and refinement*

2.1 Identification of modular products

Literature study was done to understand modules and modularity. Modularity can be categorized into 3 levels i.e. component level (ex. Lego), product level (ex. modular furniture) and system level (airline transportation system). Then a case study approach was taken to understand how modularity can be achieved.

2.2 Study of modular products

After initial study of modularity and modular product, Personal computers and Lego blocks were taken up as case studies.

2.2.1 Personal computers

Personal computers are ideal example of modularity where one can assemble, upgrade or modify own computer with minimum effort.

Personal computer is divided into various sub-systems. These sub-systems are interchangeable and upgradable. Hence personal

computer phases out only when major technological revolution occurs.

Intension of this study is to understand how modular interface work in the personal computer and how variation is achieved. Components were classified into three sections i.e. basic structure, basic components and add-ons (figure 1).



Figure 1: Categorisation of components (source: www.wikipedia.org²)

The observation of connections and ports of components and add-ons led to following inferences:

- **Standardized chip structure helps accessories fit into mother board.**
- **Port placement on Motherboard prevent fouling of accessories.**
- **Maximum up-gradation solely depend on capacity of motherboard.**

2.2.2. Study of Lego blocks

Lego is a very successful and popular modular product. They allow creatively using the joinery to create new structures. Also, if one Lego block gets damaged it can be easy replaced with another Lego block. The objective of this study was to understand the possibilities, challenges and limitations inherent in this system.

It was observed that that the design of Lego blocks allows shape generation, modular growth, repeatability to generate volumes but hinders side profile generation, requires special purpose blocks and creates only low polygonal structures (figure2).

Possibilities



- Any shape can be generate
- It's almost instant repairable
- It repeat itself to generate volumes
- Easy vertical volumes
- Basic blocks are useful for construction

Challenges



- Side profile generation is difficult
- Profile limitations with basic blocks
- Always need of special purpose blocks
- Less control over final shape
- Final structure looks like low polygonal structure

Opportunities



- With Die cast pieces desired shapes can be generated
- One special purpose block can be used for multiple product (eg: Wheels, lights)

Figure 2: observations from Lego blocks study (source: author)

2.2.3. Inferences from case studies

- **Basic blocks are generally used as structural member. (like *standard Lego block & Mother board in personal computer*)**
- ***Larger mandatory systems will be primary modules. They could be interchangeable with similar functioning modules of other brand or capacity. (like chips and cards in personal computer)***
- ***Additional accessories would be like add-ons to enhance experience or to fulfill specific need of owner***
- ***To build final product special purpose blocks are needed. But these blocks limit the multi-functional usage.***

2.3 Vehicle volume study

Vehicles have various systems and sub-systems in them. These systems occupy spaces in vehicle.

In this study various systems and sub systems of three vehicles were identified and converted into volume modules. The three vehicles chosen for the study were BMD X6, Toyota Prius and Tesla Model X. Then these vehicles were compared based on usable space (Figure 3). It was found that Tesla Model X had the largest space due to its flat-bed platform and less number of components as it is an electric platform.

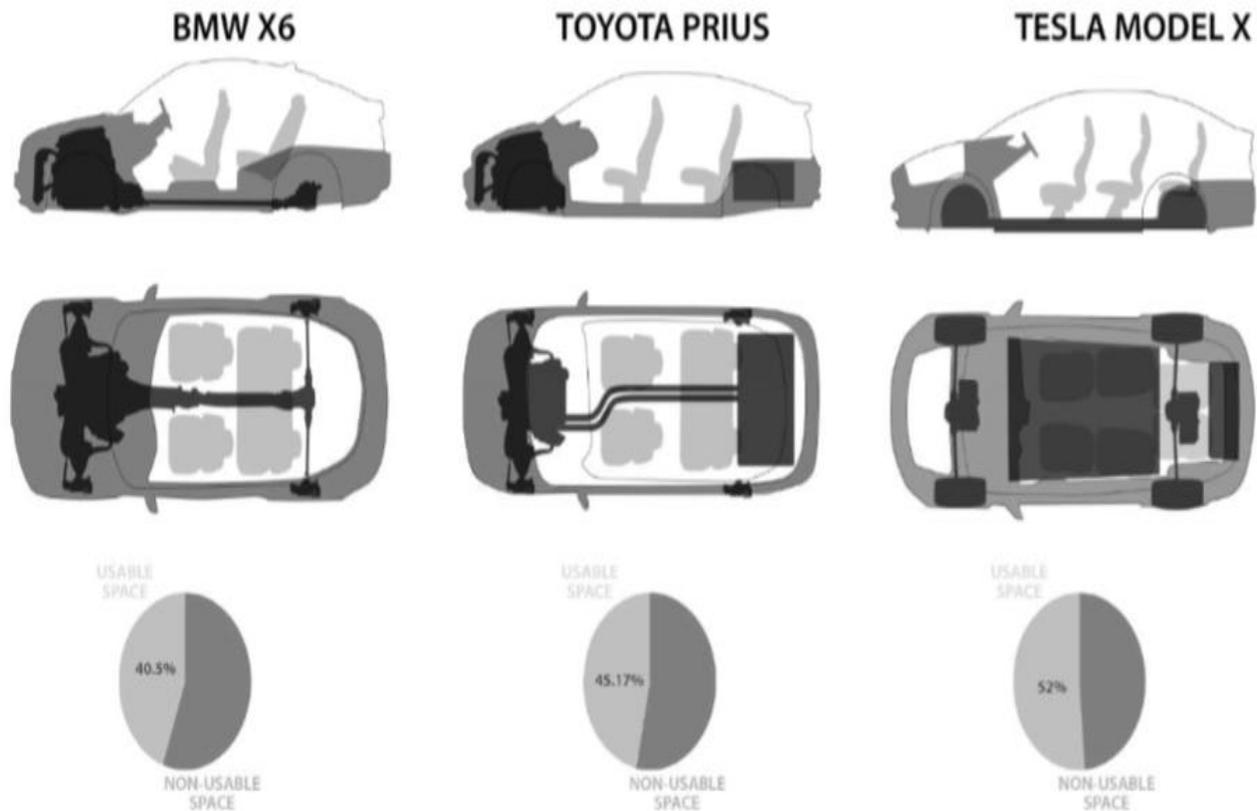


Figure 3: volume study (data source: carbuyer.co.uk³, www.toyota.com⁴, en.wikipedia.org⁵)

2.4. Vehicle configuration

Various configurations of systems and sub systems were explored by rearranging the volume modules. Since reconfigurable interiors was one of the key points for the project, thermocol mock ups of volume modules were made to showcase multiple possibilities of the modular approach (figure 4).

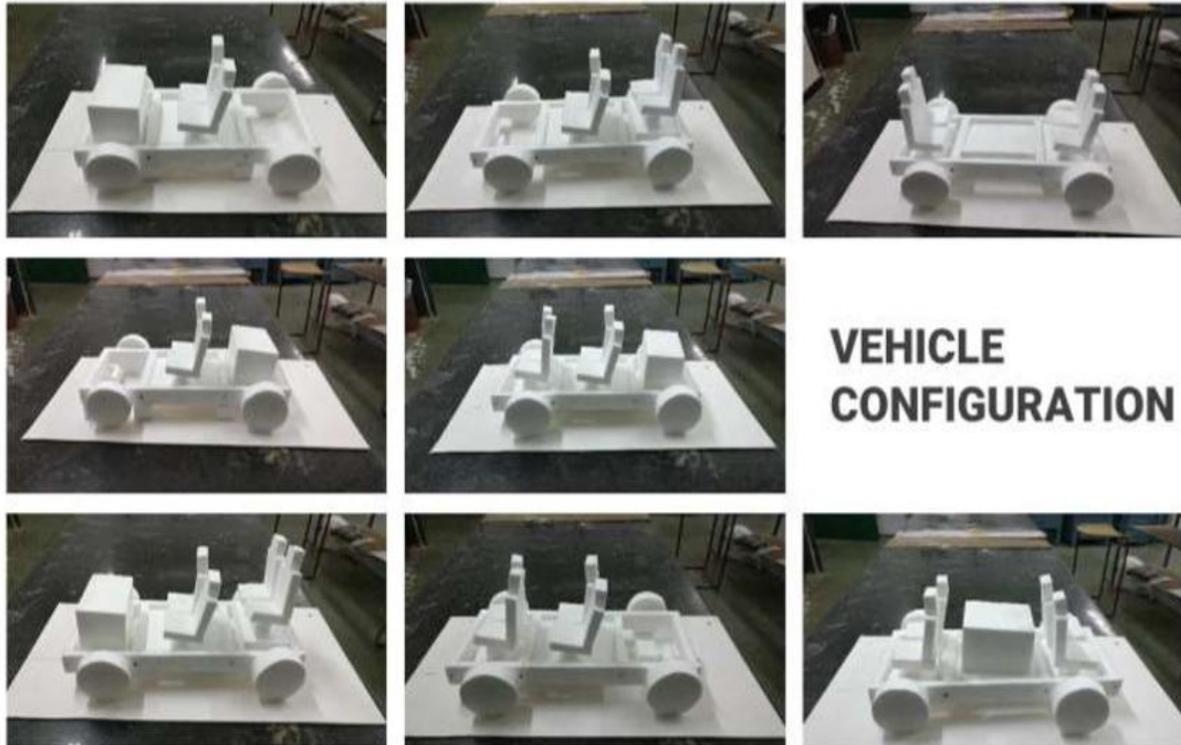


Figure 4: Exploration of vehicle configuration using volume modules (source: author)

2.5. Design Brief

On the basis of initial studies and research, the project design brief was narrowed down to 'conceptualize modular mobility for the year 2030' by building an urban commuter vehicle with a minimum seating capacity of two passengers including the driver.

2.6 Scenarios

Various scenarios were developed, considering a 35 to 49 year old consumer (current generation Y). Generation Y were selected as the preferred consumer profile as ideally they would have more purchasing power compared to younger age groups in 2030. The scenarios were developed considering increase in population and traffic density, and the need for the vehicle to evolve according to

consumer's changing needs. The quick solutions arising out of these scenarios (i.e. social mobility, transition of vehicle from product to service, quick adaptation of interior and exterior space as per the need etc) lead to creation of multiple concepts.

2.7 Concept generation and refinement

Multiple concepts were made using the insights gained during the study of modularity. The basic idea of separating systems and sub-systems into modules based on functionality to allow greater flexibility in internal space arrangement as well as swappable modules was explored.

To refine the concept, ideas of having swappable modules (figure 5) and a Lego inspired floor with magnetic connections (figure 6) were developed further.

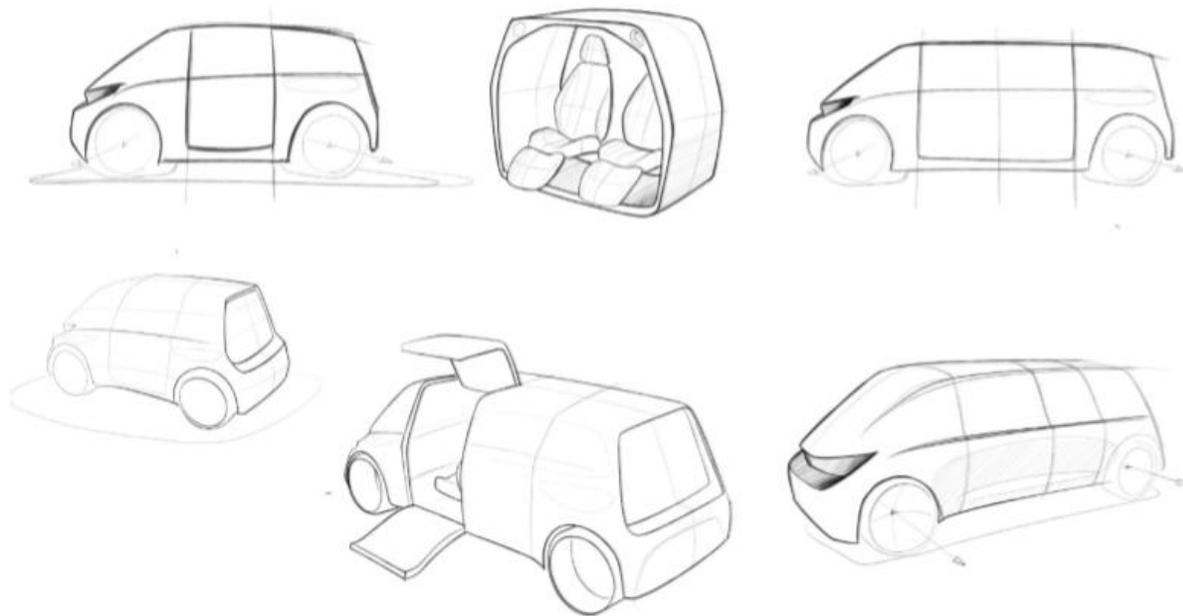


Figure 5: swappable control, passenger and storage modules (source: author)

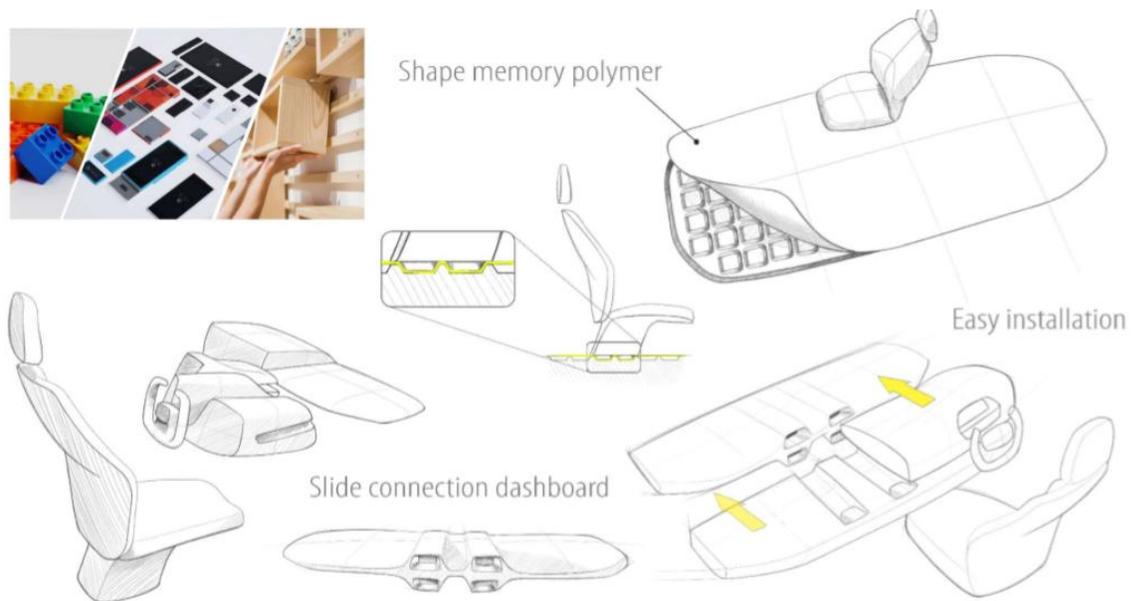


Figure 6: Lego inspired floor with magnetic joinery detail (source: author)

Along with the functional details derived from concepts, the form of the vehicle was also explored using ideas from concept generation stage (figure 7). The final selected form and modular details led to the creation of final concept.

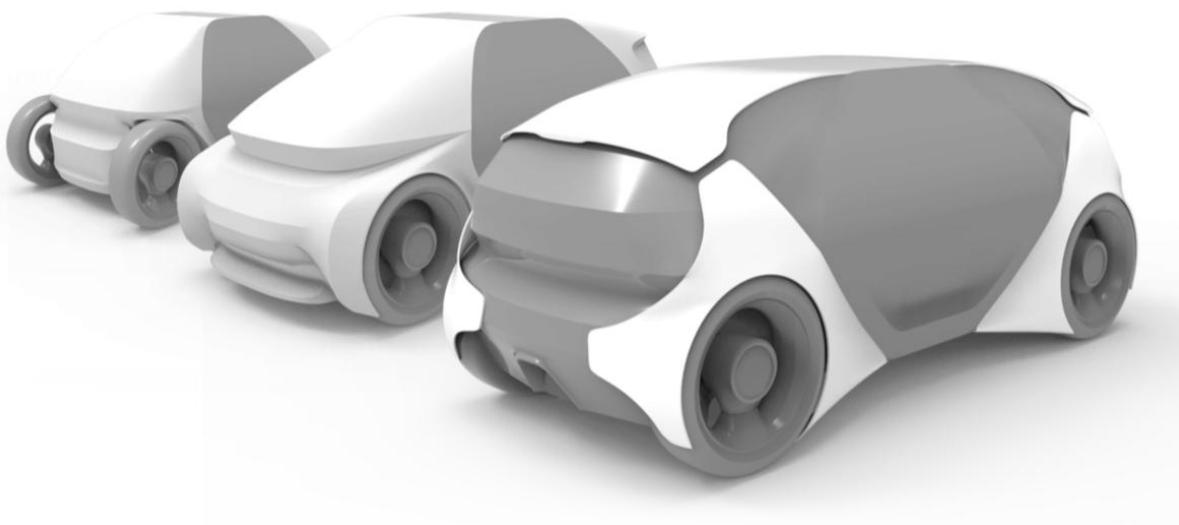


Figure 7: forms developed during concept refinement stage (source: author)

2.8 Final concept

The salient features of final concept are as follows:

- **Multiple modules which allow greater customisation and need based functionality (figure 8)**
- **Lego block like interface floor on which seats and all sorts of interior modules can be mounted allowing easier reconfiguration and upgradation (figure 9)**
- **Shape memory fabric which smoothens the floor once appropriate connections are established (figure 10)**
- **Modular frame and exterior components which allow length extension and flexibility (figure 11)**

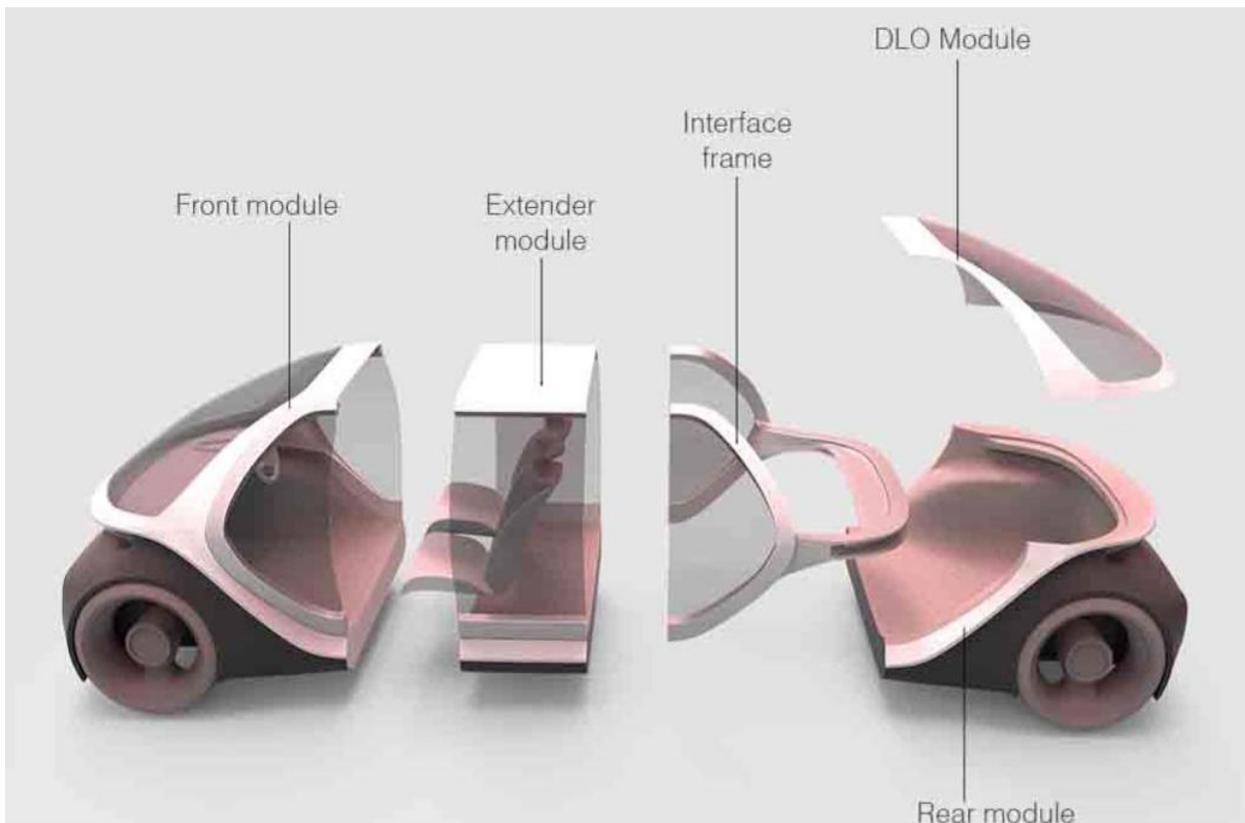


Figure 8: Functional modules (source: author)

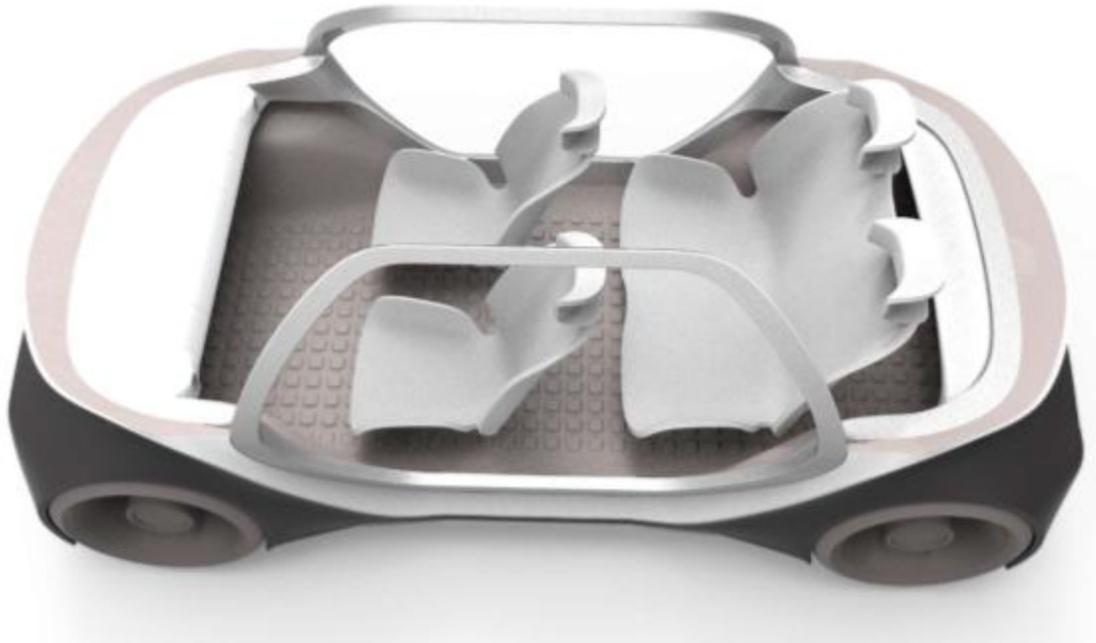


Figure 9: Lego inspired floor connections (source: author)

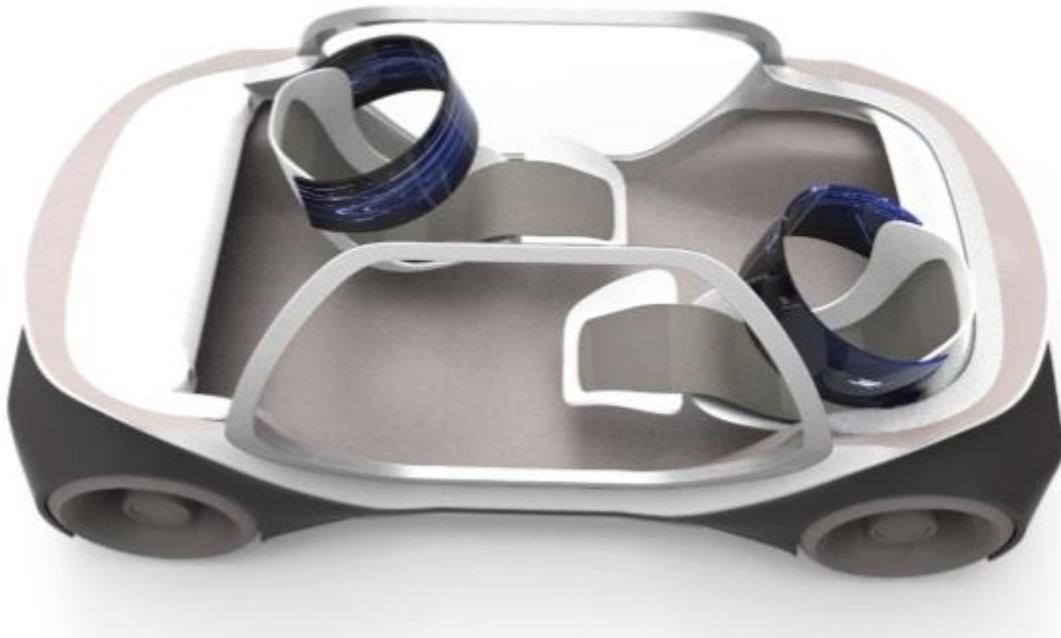


Figure 10: shape memory fabric to smoothen the floor after reconfiguration of interior modules (source: author)



Figure 11: frame and exterior modules to allow extension in length (source: author)

3. Future scope

The next phase of the project would be to-

- ***design framework of using modular philosophy to develop products and vehicles***
- ***develop a toolkit to conceptualize through modular design philosophy***
- ***refine the concept and make it design-for-manufacture***
- ***develop a proof of concept prototype and test it further***

List of figures

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Professor Sugandh Malhotra, Ph.D.

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Anirban Maiti

Mr. Anirban Maiti studied in Masters of Design (Industrial Design) programme at IDC School of Design, IIT Bombay from 2015-17. He has been working in industrial design of consumer products especially in white goods since past two years. As a sensitive designer, he always searches for design opportunities in every inventive problem and believes that Innovation is a structured outcome of Critical Design Thinking. He works as an Assistant Lead Industrial Designer at Future Factory LLP, an international award-winning design consultancy firm based in Mumbai. He also works for several start-up companies as Design Freelancer. Before coming into the domain of Industrial Product Design he worked for several architectural firms that include Urban Design, Infrastructural Development, Heritage Conservation and Real Estate Projects. He won several national level architectural design competition awards and scholarships.

His research interest areas include user and context sensitive design, innovation in design thinking, product form exploration for future, innovation management, design for society and cost effective design.

Study of relationship between socio-cultural context and design education through comparative study of design institutes' course curriculums of Germany and India

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Abstract

Design must always be studied in the context. The context that includes the societal conditions, cultural connections, technological capabilities and the very environment that we live in. Socio cultural factors are important drivers of design. This study tries to interrogate nature of this relationship from design education perspective through comparative content analysis of the course curriculums of prominent design institutes from two diverse countries- Germany and India. Relevant data that highlighted the focus of the respective institutes such as introduction, course curriculum etc. was collected through data gathering techniques and web crawler. The detailed content analysis (frequency mapping of words, visual representations of word co-occurrence networks and multi-dimensional scatter plots)highlighted distinctions and diversity in the focus areas of these design institutes' course curriculums. On one end of the spectrum, Indian design institutes tilted heavily towards problem solving, system design and user centric design alongside creativity. On the other end, content from German design institutes indicated a clear focus towards artistic expression, new technology, materials and processes. We can draw

connections to socio-cultural, economical and development related framework and infer that the focus of design education in a country is largely influenced by the country's socio cultural background. This study holds merit and vitality in the larger context where boundaries are merging especially from education perspective. Such studies also enables visionaries of the future to identify, acknowledge and accept uniqueness that comes through socio-cultural variation while creating globally valid design curriculums.

Keywords: Design Education, Course Curriculum, Content Analysis, Co-occurrence Network.

1. Introduction

Traditional design gave a lot of importance to socio-cultural factors. Key researchers such as Day (2000) establish the importance of culture when he stated "The key aspects of culture, such as cultural group history and life experiences, assets, beliefs and values, care giving practices, activities and preferences, are considered while designing for people". The design of kitchen utensils that match perfectly with the food we eat present a clear evidence of this relationship between culture and products. Similar examples are clothes or accessories. However, as design shifts from a local to a global platform, designers face the challenge of identifying common thread and propose homogeneity while designing for millions of people from diverse cultures. On the other hand, researchers such as Norman (2012) establishes importance of technology in design when he stated that "In most modern products, technology dictates the activity and in turn the activity dictates the design". Hence, technology plays an important role in design and act as a common

unifying factor across different cultures. This is how companies are able to sell the same product such as cell phones, laptops and cars across different countries. Although, Norman (2012) also acknowledged the importance of culture and its differentiating role while interacting with these products. This further consolidates the role of socio-cultural factors.

If socio - cultural factors impact design, do they also influence design education? By studying the design curriculum of prominent design schools from two different countries, this study explores the relation between a country's socio cultural background and its design education.

2. Relevance

By studying the course curriculum of design institutes, researchers can identify the latent focal areas that students are being trained towards. This will help academicians to consciously develop their course curriculum and be more innovative in their course content.

The increasing globalization of products requires designers to be well trained for both local and international markets. The comparison of design education between countries will help encourage international knowledge exchange and enable institutes to address both national and global focus areas. It will also help establish national and global benchmarks that will constantly push the realm of design and promote better teaching, critiquing and evaluating methods.

3. Objective

3.1 Study the course curriculum and derive the latent focus areas of design institutes based on a) Design Principles and b) Work concentration Areas

3.2 Compare the focus areas of design institutes in India and Germany to understand the factors that influence it.

4. Methodology

4.1 International Selection of Design institutes

In order to understand how the focus of education may vary in design institutes across different countries, two diverse countries were selected to be studied. Namely, Germany (*developed country*) and India (*developing country*). These countries also have a very different socio cultural background. Each country was represented by three of its most established and prominent design institutes. These institutes were also known to offer a variety of design streams.

Table 1: Design institutes selected from India and Germany

Indian Institutes	German Institutes
National Institute of Design (1961), Ahmedabad	Bauhaus Universitat (1860) , Weimer
IDC School of Design (1969), Mumbai	University of Art and Design (1915), Halle
MIT Institute of Design (2006), Pune	Koln International School of Design (1991), Cologne

4.2 Identification of factors to analyze Design education

According to U-Multirank (*Design and Testing the Feasibility of a Multidimensional Global University Ranking by Consortium for Higher Education and Research Performance Assessment, CHERPA-Network, US*), the major areas that can be considered for the analysis of design education in both the countries are:

- 1. Design Course Curriculum and activities,*
- 2. Perspective and basic principle of Design Education,*
- 3. Concentration Area.*

4.3 Method adopted to study course curriculum

The study adopted a content analysis - word frequency approach to understand the latent focus areas of course curriculums. Content analysis is a popular research tool used to determine the frequency of words within a given text body. Words with a higher frequency are then observed for their meanings, inter relations and broader level categorizations to understand prevalent themes and concepts. As it is able to combine both quantitative and qualitative methods of analysis it is a popular tool used by academicians to study large bodies of text.

This method is also useful when taking interviews of actual users is inappropriate or difficult. In such cases, researchers can extract information from online websites, blogs and other verified public sources. This method also enables researchers to get a non-biased and non-manipulated, scientific overview of the focused areas.

4.4 Process

During the process of analysis, one text document file was created for each country. Each file comprised of all the course curriculums

offered by the design institutes of that country and other relevant information mentioned on their websites. The relevant software that was chosen to conduct the Content Analysis was KH Coder. The document file of each country was run through KH Coder and the following experiments were conducted:

4.4.1 Frequency of Words - This process gave rise to a generic list of the most frequently used words with respect to different parts-of-speech. Frequently used *Nouns*, *Pronouns* and *Adjectives* helped understand the focus area of design principles and drivers whereas, frequently used *Verbs* and *Adverbs* helped identify activity areas.

4.4.2 Co-Occurrence Network of Words - This experiment resulted in the graphic representation of potential relationships between words based on their co - occurrence in the given text file. The size of the bubbles and the bold connection lines communicated how frequent the words occurred with each other. This helped add context to the most frequent words.

4.4.3 Multi-Dimension Scatter Plot of Words - This process generated a graphic representation of word associations with clusters. Each cluster was represented with a different color and comprised of different sized bubbles to give an idea of the most used words. The formation of clusters helped create narratives that in turn helped generate inferences. Furthermore, when filters like noun-adjective or verb-adverbs were applied, even more detailed information could be obtained.

5. Results and Analysis

5.1 Frequency of Words

On a first look the analysis of frequency of words for Indian and German design schools' curriculum appears similar to each other. However, on a closer look one can notice many differences. Words appearing in nouns are similar to each other. Specific differentiating words such as *need* start to appear fairly low though. On the other hand, there was a noticeable difference in specific words in adjectives category of both countries. In the data that was prepared from Indian design schools' curriculum list, words such as *creative, social, cultural, human, diverse, holistic*, etc. ranked fairly high. On the other hand, the list of adjectives for German design schools' curriculum had higher frequency of words such as *professional, artistic, practical, creative, theoretical, visual*, etc. Words like *social* appeared fairly low in frequency in comparison to Indian list while *user, need, human* were not noticed.

Table 2: Frequency list of words for design schools in India

Noun	ProperNoun	Foreign	PRP	Adj	Adv	Verb	W	
design	255 Design	133 etc	15 they	91 creative	38 also	27 be	254 that	36
program	117 Des	46 vis	6 it	29 social	31 well	24 have	73 which	21
student	98 India	32 pro	3 you	27 visual	24 as	19 develop	43 who	19
course	76 M	27 2d	1 its	23 professional	21 not	14 create	28 where	12
industry	59 MIT	22 3	1 we	18 new	18 only	11 design	28 what	5
skill	50	21 e.g.	1 he	1 various	18	11 include	25 how	4
project	48 B	18 hi	1 I	1 cultural	17 more	9 make	25 when	1
communication	43 IDC	18 imitating	1 itself	1 human	17 highly	7 use	20	
product	43 Graphic	17 tech	1 themseive	1 diverse	16 thus	6 offer	19	
designer	35 Film	16		indian	15 increasingly	5 build	18	
system	35 ID	16		other	15 just	5 work	18	
technology	35 NID	16		digital	14 rapidly	5 provide	17	
experience	34 Communicator	13		innovative	14 so	5 require	16	
animation	33 Fashion	12		such	14 eventually	4 encourage	15	
fashion	33 Product	12		holistic	13 ever	4 understand	15	
study	33 Video	12		strong	13 further	4 explore	14	
knowledge	31 Management	11		many	12 here	4 change	13	
process	30 Retail	11		relevant	12 very	4 learn	13	
research	30 Industrial	10		global	11 abroad	3 base	12	
need	28 Institute	10		conceptual	10 always	3 lead	12	
ability	26 Furniture	9		critical	10 closely	3 equip	11	
approach	26 Animation	8		interactive	10 contextually	3 find	11	
area	26 MBA	8		international	10 currently	3 look	11	
business	26 MITID	8		own	10 especially	3 address	10	

Table 3: Frequency list of words for design schools in Germany

Noun	ProperNoun	Foreign	PRP	Adj	Adv	Verb	W	
design	250 Design	134 e.g.	4 they	97 new	40 also	47 be	428 which	49
course	123 Art	88 le	3 we	60 academic	35 not	36 have	47 that	34
student	92 Prof	57 etc	2 it	54 other	35 as	32 develop	34 who	19
study	92 Master	47 i.e.	2 you	54 professional	30 well	28 offer	32 how	17
degree	87 Media	47 n.n.	2 its	31 artistic	29 more	13 work	31 what	17
program	83 Weimar	45 vs	2 he	9 practical	25 here	12 provide	23 when	8
art	57 Architecture	38	itself	8 creative	22 only	11 do	20 where	8
faculty	55 Bachelor	26	s	4 own	22 abroad	10 play	19 whereby	1
product	53 Bauhaus-Universitat	20	my	3 complex	19 even	10 take	18 whoever	1
project	51 Telephone	19	themselves	3 theoretical	19 just	9 follow	16	
area	50 Fine	18	one	2 visual	19 most	8 apply	15	
process	43 M.A.	18	yourself	2 able	17 thus	7 include	15	
work	43 Industrial	17	I	1 social	17 generally	6 make	15	
media	39 Product	16	ourselves	1 conceptual	16 then	6 require	15	
designer	37 Communication	15		individual	16 very	6 teach	15	
research	37 Interior	15		interdisciplinary	16 already	5 cover	14	
semester	37 Germany	14		relevant	15 closely	5 focus	14	
skill	37 Bauhaus	13		digital	14 later	5 create	13	
development	36 Studies	12		first	14 often	5 become	12	
master	34 Education	11		important	14 so	5 lead	12	
discipline	30 Multimedia	10		scientific	14 too	5 prepare	12	
university	29 University	10		such	14 accordingly	4 complete	11	
architecture	28 Arts	9		urban	14 environmentally	4 design	11	
concept	28 Burg	9		experimental	13 indeed	4 learn	11	

5.2 Multi-dimensional scaling plot

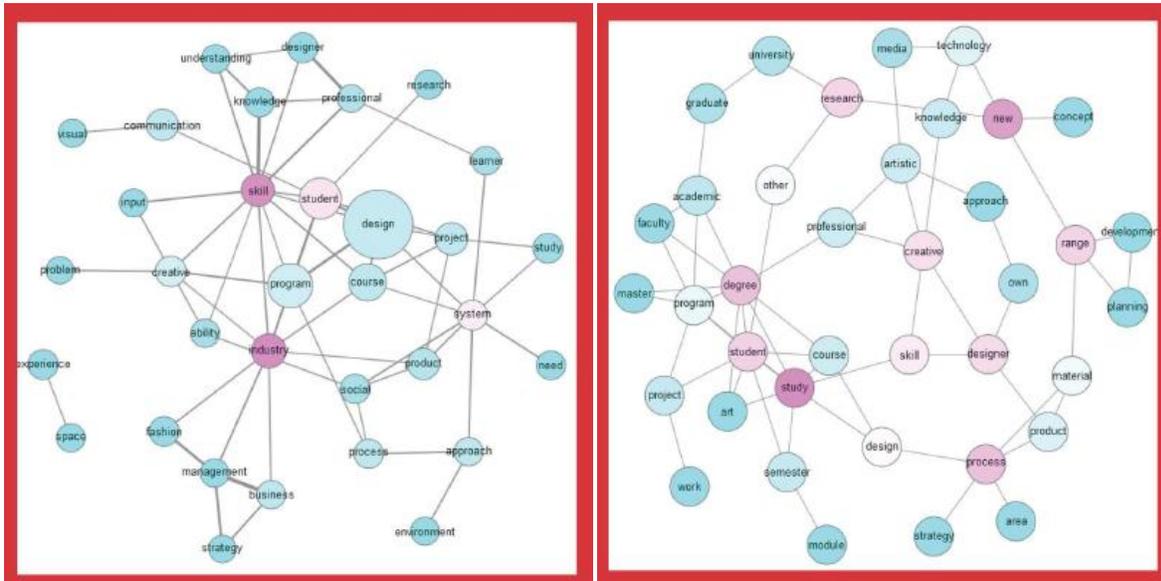


Image 1: (Left) (a) Multi-dimensional scaling plot (India), (Right) (b) Multi-dimensional scaling plot (Germany)

Images 1 (a) and (b) represent multi-dimensional scaling plot results from the experiment. Image 1 (a) represents test results from Indian design schools' curriculum. Many word phrases appear

together frequently. 'Design' is associated closely to problem solving activity that needs to be addressed to by a rigorous process. The design projects are associated with studying the context, address the user need, find the problem and propose a solution. Study of social, cultural, economic and other diverse viewpoints lay ample stress on formulating strategies to efficiently manage the resources. Many of the projects run at systems level and focus on social issues and sustainable approaches. Also, the industry is highly dependent on good business management and sustainable strategic skills for successful project implementation and survival in the competitive market. In other words, a design student in India has to learn to be creative, skillful, sensitive, organized, competitive and sustainable. It orients students towards skill based industries with an attitude that is sensitive to social and environmental factors.

On the other hand, Image 1(b) that highlights German design schools emphasizes on similar words and phrases but with different co-occurrence. Words such as creative is connected with artistic and skill that emphasizes the role of creative freedom and focus on artistic expression. The scaling plot is more evenly spread and well-structured like technical or engineering courses and had little focus on real-life problem solving and need based design. Development, range, planning are considered to be sequential steps towards continuous improvement. Co-occurrence of technology, knowledge and research highlight a clear focus on generation of new knowledge through research. Interestingly, many words do not seem to co-occur with design including social, user needs, problem solving, etc. German design curriculum reflect importance of exploration, new technologies, materials and processes.

5.3 Co-occurrence network of words

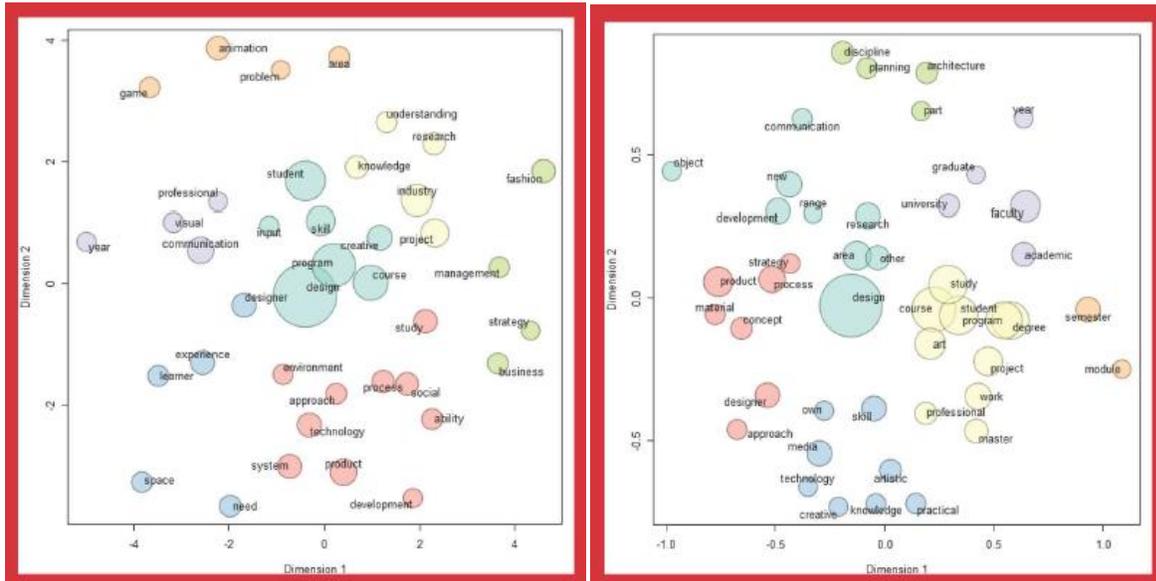


Image 2: (Left) (a) Co - Occurrence Network of Words (Germany), (Right) (b) Co - Occurrence Network of Words (Germany)

Co-occurrence network of words plot arranged the top cited words into several clusters. These clusters indicated the broad focus of design education in the two targeted countries.

Table 4: Country based cluster formations of words: India

India	Cluster-1 Design, Program, Course, Student, Designer, Input, Skill, Creative
	Cluster-2 Environment, Approach, Technology, System, Product, Development, Process, Social, Ability
	Cluster-3 Understanding, Research, Knowledge, Industry, Project
	Cluster-4 Year, Professional, Visual, Communication
	Cluster-5 Experience, Lerner, Space, Need
	Cluster-6 Game, Animation, Problem, area
	Cluster-7 Fashion, Management, Strategy, Business

Table 5: Country based cluster formations of words: Germany

Germany	Cluster-1 Design, area, research, development, range, object, communication
	Cluster-2 Study, course, student, program, degree, art, project, work, professional, master
	Cluster-3 Product, Strategy, process, material, concept, designer, approach
	Cluster-4 Own, skill, media, technology, artistic, creative, knowledge, practical
	Cluster-5 University, Faculty, Academic, year, graduate, semester, module
	Cluster-6 Discipline, Planning, Architecture

6. Inferences

This study highlights the difference between design course curriculum that can be linked to the difference in context that is governed by society, socio-cultural, economic, political environment and other factors. These factors greatly influences the focus of education offered by its design institutes. Both the countries started their nation building in the similar time zone. On one hand, post WWII, Germany focused on development and technology that reflected in its design focus on development of faster processes, quick prototyping and overall excellence in manufacturing. Slowly, as the country's social structure and literacy level improved, its focus shifted to technology. Hence, its design education focuses on technology based solutions rather than creative methods of solving users' needs. This also gave them the liberty to lean towards artistic qualities.

In contrast, India being world's largest democracy worked towards social upliftment. Challenges such as fastest growing populations and diverse demography have enabled India to focus on design of systems that cater to wider audience and have more social impact. The country has multiple users from different sectors and economic backgrounds. Hence, Indian design curriculums leaned more towards systems design, scalability strategies, rigorous user study methods and explorations to support its heterogeneous culture.

It was seen that both countries invested in innovation but majorly targeted different stages of innovation due to their socio cultural standpoints. If one looks at Roger's Innovation bell curve then Germany usually targets the first half which involves innovation due to technology and material and invests in early adopters while India usually targets the second half which involves simplifying and demystifying innovation for easy adoption by a large mass by late early adopters.

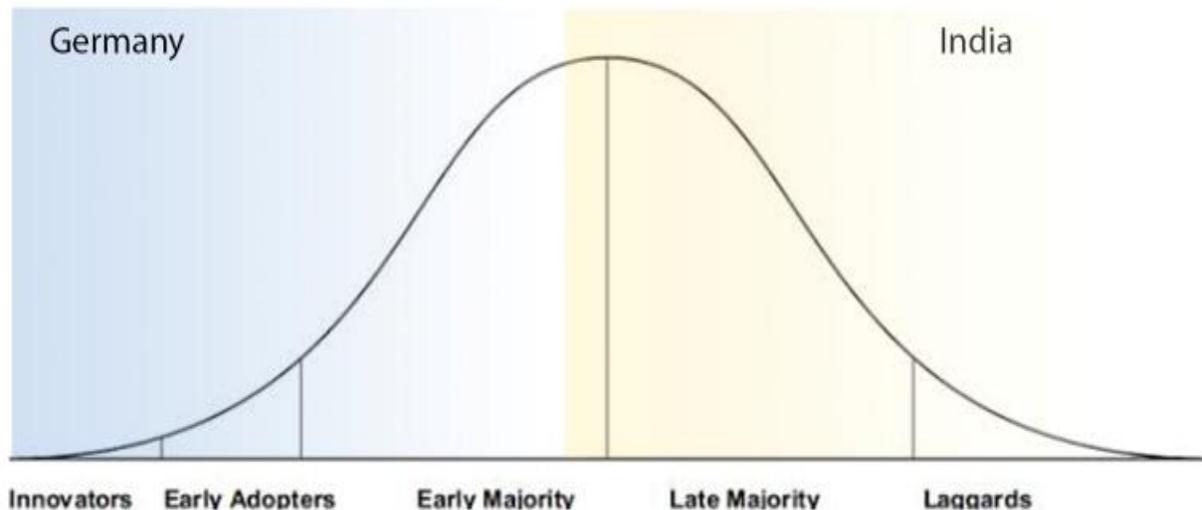


Image 5: Innovation Focus areas of Germany and India

Table 8 highlights detailed contextual commentary about the differences cited in the literature and data found during text-mining with reference to many standard standpoints. These standpoints were manually identified through rigorous comparative reading. Some text was modified to fit into the table syntax with an objective to keep the meaning as much same as possible.

Table 8: Summary: Comparison of focus areas of design institutes in India and Germany

Factors	Indian Design Schools	German Design Schools
Structure of Design Curriculum	Promotes creative skill and is industry oriented	Promotes technology and art
Diversity of Design Course	Versatile, addresses social and environmental issues with respect to user needs of a large population	Less diversified, concentrates on product level, not social and environmental issues
Design Approach	Systems Level - holistic approach taking care of many factors other than the actual problem	Problem Level - system level interventions are not practiced

Major Focus	Creativity based - balance user needs and problem solving	Research based - new technology concepts and artistic media intervention.
Creativity & Innovation	Focuses on usability functions and formal aspects	Incremental & large focus on Technology
User Study	Extensively done for the validation of the project and for mass implementation among huge population	Comparatively less, taken forward from previous studies
Design Strategies	considers current trends to manage different system level approach at industrial scale	considers product planning, new technology and development of a wide range of products
Industry Orientation	Flexible and diverse curriculum highlighting skills, user needs identification, creative thinking and development with no clear mastery of any.	Well-structured design curriculum with no focus towards user needs

Social Issues	Design courses focus on training for social issues industrial perspectives	less oriented to socio-economic issues and more focus on the individual design style
Environmental Issues	Plays a key role to keep a balance between system level approach and product development in the industry	Not a major issue as population density is low
Skill development	Make designer skilled enough to solve problems according to user needs accordingly with newer technologies	Courses are designed to make students skilled enough to approach problem creatively, artistically and develop products
Creativity Development	Develop creative ability to solve problems from holistic point of view	Artistic styling is preferred over usability
Problem finding ability	Holistic approach to understand overall system and classify different problem sectors	Not found to be a focus area

Artistic Approach	Although having rich heritage and cultural value, function and affordability are given priority over artistic intervention	Greatly appreciated to come up with new innovative product design
Materials and Innovation	Highly contextual, not so widely practiced	Widely practiced and appreciated
Research Projects	Ample of existing problems to explore	New Technology based innovative concepts
Practical Knowledge	Practical knowledge is emphasized and taken care of by industry oriented professional design courses	courses are not well oriented to Industries and emphasis is given to research projects
Social Issues	Appropriate user experience according to different social backgrounds, as India is a country of diversity	not a major area of concentration
Environmental Issues	Rising population led to more consumption created lot of pressure on limited resources and led to pollution	Is already under control and hence is not seen as a major concern

Business Strategy	Briefly addressed through preliminary courses on design management and product planning	Focuses on educational design courses and research projects
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7. Conclusion

As the socio cultural background of every country is unique it would imply that each country would have its own focus areas in design education. Hence, it would benefit design institutes to collaborate with multiple international design institutes in the future to adopt a more holistic approach to course development. This would also ensure that design students get sufficient exposure to both local and global focus areas. Emphasis of knowledge sharing and opportunity identification would be the primary learnings of this study.

8. Future Scope of Work

Further detailed studies can formulate a basis to (i) compare course curriculums of design institutes from other countries to explore global design trends and identify synergies; (ii) contribute towards development of holistic knowledge sharing strategy on a global level for local design schools.

9. References

9.1. Verified Websites of the six institutes used for content analysis

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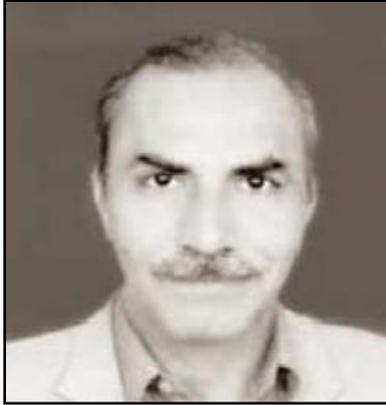
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Letter from the Chairman's Desk

By Sunil Bhatia
PhD

I was lecturing about systems and explaining about open and close system. Open system is continuously interacting with its environment and best example any system operated by man turns to open, and close system does not interact with its environment and the best part is there is no absolute close system exists in this universe so 'every system sooner or later is bound to die.'

Why do we die? What is mortality and recent incidence of death of mother shock and disturbed my inner. She was talking and sitting on sofa so close even her touch was felt by me and I could not sense her death and there was no reason to die but she slipped out of my hand and I could not do anything for saving her. I can understand reason of death of a person either sick or organs are failing or crushed under heavy items or due to some reason of bleeding or hunger or suffocation, in her case she was absolutely fine and suddenly her body ceased to functions and what went out of her body within fraction of second that slipped her to death. I remember as a child cried for her absence or when she was not within my sight but as she came back after few moments as nothing happened, this incidence turned to my knowledge and experienced anything goes away return back. It is human nature of keep testing his beliefs over the time and as a young man threw ball for striking on wall it rebounds or in case missed the target I located ball was

lying nearby. My beliefs, knowledge and experience completely shattered with her death when I could not find lost mother and my struggle is continuing in search of her but I am measurably failing. The more extensively I struggle for finding her more helpless feeling is disturbing. People around me are consoling by saying 'no one can win against the wish of God, she is mortal.'

Whosoever is born will turn to mortal and even we predicate one day our solar or galaxies will die out. Our human civilization is million years old and how come we talk about greatest messengers of god lived in few thousand years. Is it not those who wished to be immortal, nature never spare and washes there any form of existence to dust and leave no traces? Where are traces of those people who existed, contributed a lot for betterment and lost in oblivion? Is it not we are ungrateful creatures that helping in forgetting or our limited memory only remember recent history and earlier great people are wiped out from our minds even we fail in connecting if at all there is slightest mark of their existence present around us. What we call immortality has inbuilt character of mortality.

There are simple people with simple minds of true believer and accept what is happening around and do not struggle for understanding or searching for reasons, simply accept gracefully as destiny or appear wiser than those struggle hard for reasoning out of incidence and ultimately die with no solution in sight. I divide people in two category, one who are struggling in search of solution are called scientists and nature of probing has element of challenge and confrontation and it somewhere terminates with tinge of destruction, rest lives in ignorance appear in class where majority surrenders to destiny and accept whatever happens where other

group believes confrontation is no way to search but consider death is part of life and move along with it with love that is the path where nature gradually unfolds her mystery for inclusive growth. The real contributions came from those who moved along death as part of life and never denied its existence and worked in defying but not with sense of pride of overpowering. This path of thinking till date proves better and appears with wisdom. Wisdom allows design to techniques for achieving immortality through mortal items that has longer life compared to humans. Carving stone as statue is one kind of achieving immortality by living by refreshing memory in coming generations or accumulate such huge wealth that few generations keep remembering by enjoying it. Those who could not earn simply produce as many as children for believing their survived generations will carry forward their genes and they believe 'soul is immortal and body is mortal'. Why do writers write the books, it is one kind of feeling people will enjoy his presence after death? It is the modern technologies that help us in achieving longer life even after death of performing artists or musicians or singers records their performance in digital or voice in disc or other recording mediums. What is photography it is tool for freeze that specific moments in camera for future. Similarly rolling camera records the incidence as it is and can play in future. These attempts of achieving longevity by products were surveillance by camera and helped in maintaining the social fabric for nabbing the culprits.

Nature has own way to turn so called immortal into mortal by havoc of floods or tornado or earthquakes or natural calamities wipe out entire populations and coming generations rehabilitate those are useful and rest buried under debris. Seeds lose their identity for new life of plants .In social life we blessed by saying 'long live' or any

ideology that is good for society we shout 'long live'. Fruits are spoiled easily and in reaction to make longer life use of lamination with wax or store in control environment of cold storage or refrigeration were designed. We found some preservatives or learnt the art of preserving as we do in design of pickles for enhancing shelf life. Our life is nothing but actions and responding with reactions as other person no more exist for reactions we call it death.

All the archive techniques for preserving our milestones products for narrating the history are nothing but covering for immortality or longer life through design of museum. Design of photo frames is nothing but giving cover of immortality. Books are kept under hard bound for enhancing their life and protection from damage. Design of exercise or fitness or yoga is nothing to live longer in best possible way.

In industry, machinery has designed life and to achieve longevity designed lubricants, paints and devised the techniques of lowering the wear and tears. Even our house has expiry and to give longevity we properly maintain by painting or controlling seepage or by introducing seepage control chemicals not to damage the buildings and its load bearing iron bar not to rust and lower the life. Forts are generally built with big stones not to be easily destroyed by enemies. Death of fort is sign of victory of war by enemies. Design of tiles was not introduced for aesthetic sense but for longevity by protecting from vagaries of weather. Termites helps in shorter the life of woods and we designed anti termites chemicals for helping in immortality.

Common person has strong and confirmed belief that immortality cannot achieve and who so ever has come into any form is to die sooner or later and only way is to increase the longevity or design that has association for keeping the things remind its presence or preserve in memory for passing from one generation to another. They understood the art of keeping the things alive and realized simplest design that could be adopted by common people where there is no much scope of improvements helps in longevity as we witness in design of comb or knife. I think it is the same design from the day of inception and in modern days witness minor changes because of commercial angle that helps in ease of use but earlier objective remains the same. Design of statue is complex and specialize art limited to a few , where design of cross of crucified is the simplest design leaves everlasting marks in minds of masses and when it expressed in behaviour by moving hands upward and sidewise it is impossible to die . In this attempt of keeping alive the presence of such persons from one generation to another designed folk music or paintings or performing arts and in some places design pyramids in hope the king required staffs after death and will resurrect one day in future. Polishing the shoe is attempt in direction of enhancing life of shoes. Man also learnt side by side for avoiding death by designing dos and don'ts as advisory. 'Don't go near fire it will harm or burnt alive.' Necessity of working with fire forced for designing fire resistance as well protection products just to avoid harm or fatal accidents leads to death. They designed warning sign not to attract death by accidents. Proper safety for sewer worker for not to die with sudden release of blocked methane gas of drainage or electricians wear gloves, helmets and insulated tools are method of avoiding death. This attempt led to standardization for lowering

any possibility of eventualities that may prove fatal and it is clearly visible in modern transportation where vehicles, roads and drivers are designed for follow standard design. Haphazard growth or life style disturbs others and invite early death where standard format helps in organize inclusive growth.

A journey of protection of dying person or saving life or invents all possible ways for avoiding death has changed the human life. Compassion ,love and affection are off shoots providing sense of security at family to community and state level and fear of attack of enemies should be neutralize not to make our citizens mortal is the reason of designing various form of governments who has own thought of designing armies for meeting the external challenges as well for internal safety designed police ,laws and punishment and never compromise with basic crux of governing of respect the feelings of masses that allows for new experiment prove reason of death of current systems. Every dying system has inbuilt character of evolving new system for meeting new challenges in better way and provides new lease of life. Entire medical sciences are design for fulfilling the social concept of caring and respecting one another at the time of crisis .It is visible in design of ambulance or surgery or medications for patients not to achieve mortality. Design of antiseptic and bandage believing open wounds can harm severely in longer time and applying it over wound kills the foreign elements not to grow. Antibiotics resistance drugs forces for research for better drugs for curing. Drugs have expiry date or caution of use before two months from the date of packaging is nothing but one way of informing the mortality in advance.

I was using wiper for cleaning the floor and it was designed in such a way its handle will wear out after some uses and left with no other

options but should be replaced with new one. Commercial world works on other parameters of gaining optimum profits and deliberately design the products in such a manner its design life should not be more than what they think. There is rumour that electric bulbs was initially designed for years and could bear the shock of electric current at tungsten wire but manufacturers were worried for profitability and deliberately designed the bulbs not to last more than 1000 hours. Similarly automobile manufacturers designed the parts that should be less than the designed life of automobiles for promoting spare parts. It is mortality through design. A woman wears apron for protection from accidental damage of her dress and it is nothing but avoiding possibility of death of dress. I remember an incidence of social embarrassment when someone pointed my mother of wearing of slight damaged shawl with an odd small hole. She was annoyed and thinking for discarding but my father advised to visit professional craft person who worked with stitches for mending the hole in such a beautiful way it would be difficult in locating where it was. That simple art made it new shawl with extended life. Entire service sectors have come to existence for longevity of the products for avoiding death as long it is possible. As death strikes, new form of sectors surface for extending life after death.

Nature protects the life and this philosophy was well understood by our ancestors and they wished to hold that mystery for controlling modifying and win over death. They realized when they ate fruits with the help of teeth and found seed that was carrier of life was protected under pulps. They further added their knowledge as and when seeds do not get proper conducive environment of soil or water or foods for growth it does not turn to life and live in

hibernation for preserving life. They found various type of fruits some has hard shell like almonds or walnuts needs special tools for breaking , a few are soft required peeling tools and some with light fibre as in cotton seed and designed knife or thrashing and other agriculture techniques for protecting without damaging life of seeds . They also learnt the art of protection and designed various containers not to damage by environment as well rodents or insects for foods. It was the idea of immortality of seeds forced for designing better tools from sowing to thrashing to preservations.

The striking similarity of seeds with woman functioning of conceiving and delivering of child and realized something is inside her body that is reason of carrying life. Miscarriage can strike to any woman who is pregnant is natural phenomena and abortion is artificially induced techniques of termination of pregnancy and in both case life ends. Why ancient people designed the techniques of terminating the pregnancy artificially by inducing tools for puncturing for uterus liquid or allow giving natural or chemical medicines? They designed surgery for opening of body but found nothing that could be pin point for reason of life. That mystery got deepens and various ideas came into their minds but failed miserably. The best part of these attempts by products was biological sciences and other areas for solving mystery of death.

Biggest exploiter was religion and still continues to do so in the name of peaceful death and control the anxiety by saying heaven is a place where best of best for you is kept. Good deeds are rewarded and concept of reincarnation and rebirth was introduced. Various position of sex was thought thinking it might solve the mystery of beginning of life but it turned to enjoyment and led to lust , perversion and later on status symbols of claiming having sex with

as many as women. No one was discussing what goes out of the body takes away life but understood what goes inside the fertile woman turns to life. Their frustration was reflected when life is coming out of female body as child after certain activities of sex and does not reveal reason of life by saying 'woman is biggest mystery, no one can understand her'. This philosophy created two school of thought one understanding of woman is real search of mortality and another shunning the woman by living life of celibacy saying 'man does not produce child but dies as woman dies, it means problem is not with woman but mystery lies somewhere else '

Scientists are focussing on origin of life and that might help in solving riddle of death. That community is sure that amoeba is responsible for life and humans are extension of it. They designed microscope and associated technologies for further probe and found it is the nucleus that is managing life but creations and destruction is still mystery at quantum level .A section of group believes 'life and sex is everywhere enjoy living and forget about what will happen after death', it is bound to strike and safe way is to focus on how to minimize its effects and started working on reason of pre mature death or untimely death and found flood can be control by dams, design of boats not to face the fury of current of river, earthquakes resistance house etc. Biggest surprise is humans have learnt the art of forgetting death that helps a lot in progress. As knowledge improved so their design and as someone designed comb or mirror or make up products so it was natural progress to design where every items could place in organized manner for ease and comforts for users led to dressing table and as realized it is time taking process so designed stool for sitting . Improvements was need base and treated as progress of extending life. Kitchen, living or

bathroom witnessed improvements and as someone noticed users are facing problem in operating it was obvious where user is at the centre and should not feel tax physically or mentally so natural step was introduce the concept of universal design. Other side a group believes life and death is control by some unknown external forces and their firm beliefs 'life is existing in other planets and will help us in understanding in unfolding the mystery as well conquering death'. That led to design of telescope and space technologies in search of life in other planets. All are grouping in dark in search of reason of life and death.

Death has left an everlasting mark in our minds as and when someone dodges the death it thrills us. In a sequence in a motion picture ,actor is left with no option but to handle situation where death can strike any moment, somehow he manages escape and his actions enthrals the audiences and in return clap. Similarly in circus 'well of death', a motorcycle driver performs where any small mistake can invite accidents and death but keep avoiding death. A magician performs the act of illusion of cutting the human body with sharp edge that appears real but end of the act join the body that entertains the audience. 'Is it not our psychology of defying or dodging or act of killing the villain who is symbolizing death represent our real struggle for life and provide relief I am still alive ? The same is reflected in Bull fighting where matador keep dodging the attack and succeed in killing the violent bull. Mortality is the basis of wining war. History celebrates with praises of death of heroes of war and unkind to the losers. Death of transgender is celebration believing liberated from lifelong social curse.

What does appear unjust of nature for living beings prove reason of progress in humans? In early stages of life primitive people

understood our body was fragile and slightest damage could be reason of death and unknowingly or in ignorance that concept turned to the driving force for experimenting that later laid the foundation of modern man by attempt of avoiding any possible eventualities of environments that has elements of destroying and other side looking for elements where nature was helping in achieving longevity. They learnt the art of saving the fragile body as well how to keep away the elements that has potential of destroying. Combination of protection and keeping away enemies led to longevity. At what point of journey of progress there was gradual shift of thought of controlling the nature surfaced and ultimately led to thought of not living with mercy of nature but busy acquiring power of knowledge for destroying nature by designing small tools of dynamite to nuclear bombs.

Our ancestors were wise and accepted this incidence a part of life as platform for transferring culture, heritage; maintain the social fabric in the form of rituals of last rites and those people performed in returns turns to livelihood. Earlier every transaction was verbal and there was no written agreement, as person dies his legal heirs were morally bound to honour his unfulfilled commitments in front of assembled clans for not to disturbed social fabrics.

Death is the best leveller where king's crown and beggar's bowl tumbles. Death is the solution for non curable patients and never ending sufferings.

I am grateful to Astd Prof Dr Sugandh Malhotra of Bombay IIT for honouring us by accepting our invitation of Guest Editor. He has invited authors from student community for showcasing their works. After reading the contribution of Indian students, it gives me the

feeling that they are in safe hand of good teachers who are passing values to students with social responsibility .

LAMBERT Academic Publishing has published book "Design For All, Drivers of Design" author Dr. Sunil Bhatia of Design For All Institute of India and it is available on www.morebooks.de one of the largest online bookstores. Here's the link to it:

<https://www.morebooks.de/store/gb/book/design-for-all/isbn/978-613-9-83306-1>

This book is dedicated to our esteem readers, contributors and well wishers.

With Regards

Dr. Sunil Bhatia

Design For All Institute of India

www.designforall.in

dr_subha@yahoo.com

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Forthcoming Issues

November 2018 Vol-13 No-11

Gaurab Das Mahapatra

**M.Plan (M U R P Gold Medallist, SPA Bhopal);
B. Arch Assistant Professor, Gitam (Deemed to
be University)**

**Gaurab Das Mahapatra is an Architect-Planner
presently working as Assistant Professor in
Gitam School of Architecture, GITAM (Deemed
to be University), Visakhapatnam Campus.**

**Architect Mahapatra had received the prestigious DIC (Design
Innovation Centre) scholarship for research in Universal Design from
Centre for Human Centric Research in SPA, Bhopal under the
guidance of Prof. Dr. Rachna Khare, who herself is a pioneer in the
Indian Universal Design scenario.**



December 2018 Vol-13 No-12

Robert Nichols , an Owner of Nichols Design Associates, Inc., Washington, DC has been extensive experience in Architectural Design and Universal Design for over 35 years. His expertise within this area of specialty includes building surveys and ADA Accessibility checklist for the public and private clients. He is President and Chairman of the Board of World Deaf Architecture, Inc. (WDA), a new knowledge group of American Institute of Architects (AIA), since a non-profit organization was established in 2016. Received B.Arch. & M. Arch. degrees in Urban Design under the leadership of Prof. Colin Rowe from Cornell University will be our Guest Editor.



January 2019 Vol-14 No-1

Mugendi K. M'Rithaa , Transdisciplinary Industrial Designer/Educator/Researcher with a passion for Afrika, Design and Innovation.



A widely traveled transdisciplinary designer experienced in design education and research. Skilled in various socially conscious fields including: Industrial Design, Human Factors Engineering/Ergonomics, Advertising and Marketing, Building Research, Design Research, Universal Design, Design Thinking, Communication Design, as well as Design Strategy and Management.

February 2019 Vol-14 No-2

Architect Kavita Murugkar, an associate professor at the Dr B N college of Architecture in Pune, graduated in 1998 from the Pune University, and completed her Masters in Archaeology from the Deccan College Deemed University, Pune in 2006.



With over a decade of teaching experience, Kavita is recognized as a passionate educator and an active researcher and has handled various academic and administrative responsibilities as a faculty and course coordinator successfully ever since she joined BNCA as full time faculty in 2006. Her academic interests and expertise lie in research and constant innovation in subjects like basic design, architectural design, history of architecture and architectural project. Her professional work experience majorly consists of residential and corporate interior architecture projects. She also has heritage related projects to her credit including the listing and documentation of all heritage buildings in Pune for

the PMC and INTACH. Kavita has emerged as a strong proponent of Universal Design formerly identified as Barrier free architecture and has set up a Research and Training Centre for Universal Design at BNCA for promoting people centric and inclusive design education and practice. Her work on the subject of Universal Design has been recognized at State and National level. She is empanelled as an Accessibility Expert and Access Auditor by the Ministry of Social Justice and Empowerment and the Department for Empowerment of People with Disabilities. She is the first architect recipient of the AVISHKAR AWARD for best research project at the State level Inter-university research competition in 2012. She has also received the NCPEDP-MPHASIS UNIVERSAL DESIGN AWARD 2014, for the work done to promote accessibility and Universal Design in the built environment. She has been felicitated by the Indian Institute of Architects, Pune Centre and the Maharashtra association of Schools of Architecture with the Best Teacher's Award 2014 for her outstanding contribution to architectural education. She has also received the A3 Foundation Teachers Award 2016 at Chandigarh for her work in the field of architectural education. She has been invited by prestigious institutions like National Institute of Design (NID), School of Planning and Architecture (SPA, Bhopal) as expert jury and for conducting courses on Universal Design Thinking.

New Books



ISBN 978-613-9-83306-1



Sunil Bhatia

Design for All

Drivers of Design

Expression of gratitude to unknown, unsung, unacknowledged, unmineralized and selfless millions of heroes who have contributed immensely in making our society worth living. Their design of comb, kite, fireworks, glass, mirror even thread concept have revolutionized the thought process of human minds and prepared blueprint of future. Modern people may take for granted but its beyond imagination the hardships and how these innovative ideas could strike their minds. Discovery of fire was possible because of its presence in nature but management of fire through man made designs was a significant attempt of thinking beyond survival and no

doubt this contributed in establishing our supremacy over other living beings. Somewhere in journey of progress we lost the legacy of ancestors in shaping minds of future generations and completely ignored their philosophy and established a society that was beyond their imagination. I picked up such drivers that have contributed in our progress and continue guiding but we failed to recognize its role and functions. Even tears, confusion in designing products was marvelous attempt and design of ladder and many more helped in sustainable, inclusive growth.

www.lap-publishing.com

it is available on www.morebooks.de one of the largest online bookstores. Here's the link to it: <https://www.morebooks.de/store/gb/book/design-for-all/isbn/978-613-9-83306-1>



The Ultimate Resource for Aging in Place With Dignity and Grace!

Are you looking for housing options that are safer and more accommodating for independently aging in place? Do you want to enjoy comfort, accessibility, safety and peace of mind – despite your disabilities, limitations and health challenges? The help you need is available in the Universal Design Toolkit: Time-saving ideas, resources, solutions, and guidance for making homes accessible.

This is the ultimate resource for individuals and professionals who want to save time, money and energy when designing, building, remodeling or downsizing a home. The Universal Design Toolkit will help you take the steps to design homes for your clients or yourself while eliminating the costly trial and error challenges you'd inevitably encounter if faced with this learning curve on your own.

Rosemarie Rossetti, Ph.D., teamed with her husband Mark Leder in creating this unique Toolkit. They bring ten years of research, design and building expertise by serving as the general contractors for their home, the Universal Design Living Laboratory– which is the highest rated universal design home in North America.

Within the Toolkit's 200 richly illustrated pages, you'll find:

Insights that distinguish *essential* products, services and resources from the *unnecessary*.

Proven, realistic tips for finding the right home.

Home features you need to look for. Nothing is assumed or left out.

Handy home checklists and assessments.

Interview questions to help you hire industry professionals with knowledge and experience.

Photographs that provide a frame of reference to inspire, clarify and illuminate features and benefits.

Valuable resources to save you time, money and energy.

Helpful sources of funding.

Space planning dimensions for access using assistive devices such as wheelchairs and walkers.

And so much more!

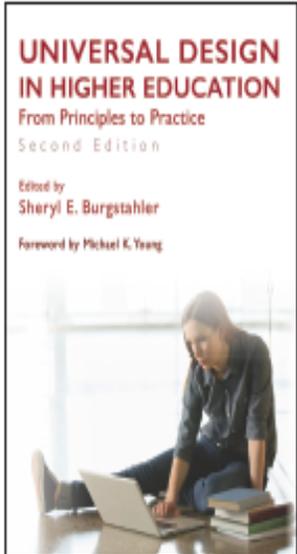
If you want useful, dependable advice and easy to implement ideas from respected experts who know the ropes, you'll love Rossetti and Leder's perspective. As a speaker, author and consultant who uses a wheelchair, Rossetti has helped hundreds of people design their ideal homes. Now her comprehensive Toolkit is available to help and support you!

Get the Universal Design Toolkit now to start your project!

“Fresh, comprehensive, and engaging, *Universal Design in Higher Education* is expertly written, thoughtfully crafted, and a ‘must-add’ to your resource collection.”

—STEPHAN J. SMITH, EXECUTIVE DIRECTOR, ASSOCIATION ON HIGHER EDUCATION AND DISABILITY

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UNIVERSAL DESIGN IN HIGHER EDUCATION

From Principles to Practice, Second Edition
EDITED BY SHERYL E. BURGSTAHLER • FOREWORD BY MICHAEL K. YOUNG

This second edition of the classic *Universal Design in Higher Education* is a comprehensive, up-to-the-minute guide for creating fully accessible college and university programs. The second edition has been thoroughly revised and expanded, and it addresses major recent changes in universities and colleges, the law, and technology.

As larger numbers of people with disabilities attend postsecondary educational institutions, there have been increased efforts to make the full array of classes, services, and programs accessible to all students. This revised edition provides both a full survey of those measures and practical guidance for schools as they work to turn the goal of universal accessibility into a reality. As such, it makes an indispensable contribution to the growing body of literature on special education and universal design. This book will be of particular value to university and college administrators, and to special education researchers, teachers, and activists.

SHERYL E. BURGSTAHLER is an affiliate professor in the College of Education at the University of Washington in Seattle, and founder and director of the university's Disabilities, Opportunities, Intermediating, and Technology (DO-IT) and Access Technology Centers.

“Sheryl Burgstahler has assembled a great set of chapters and authors on universal design in higher education. It’s a must-have book for all universities, as it covers universal design of instruction, physical spaces, student services, technology, and provides examples of best practices.”

—JONATHAN LAZAR, PROFESSOR OF COMPUTER AND INFORMATION SCIENCES, TOWSON UNIVERSITY, AND CO-AUTHOR OF *EN SURE TO DIGITAL ACCESSIBILITY THROUGH PROCESS AND POLICY*

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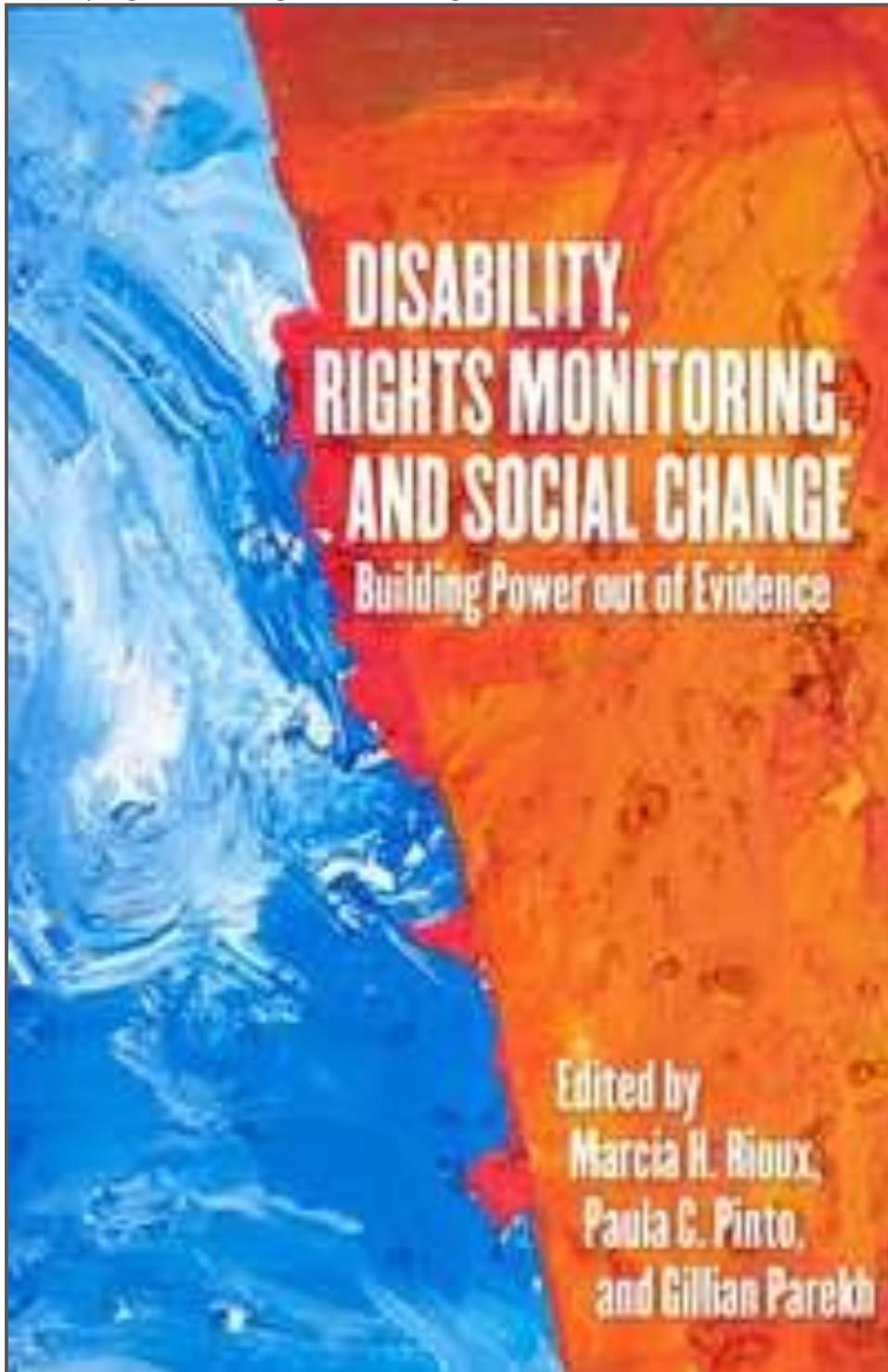
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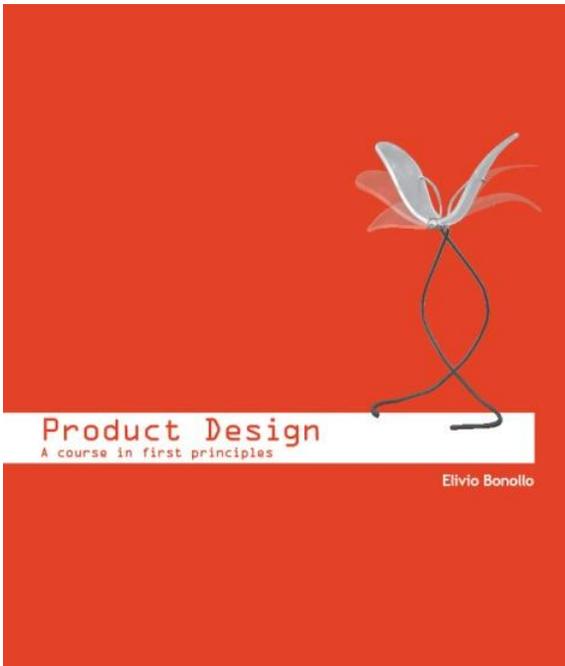
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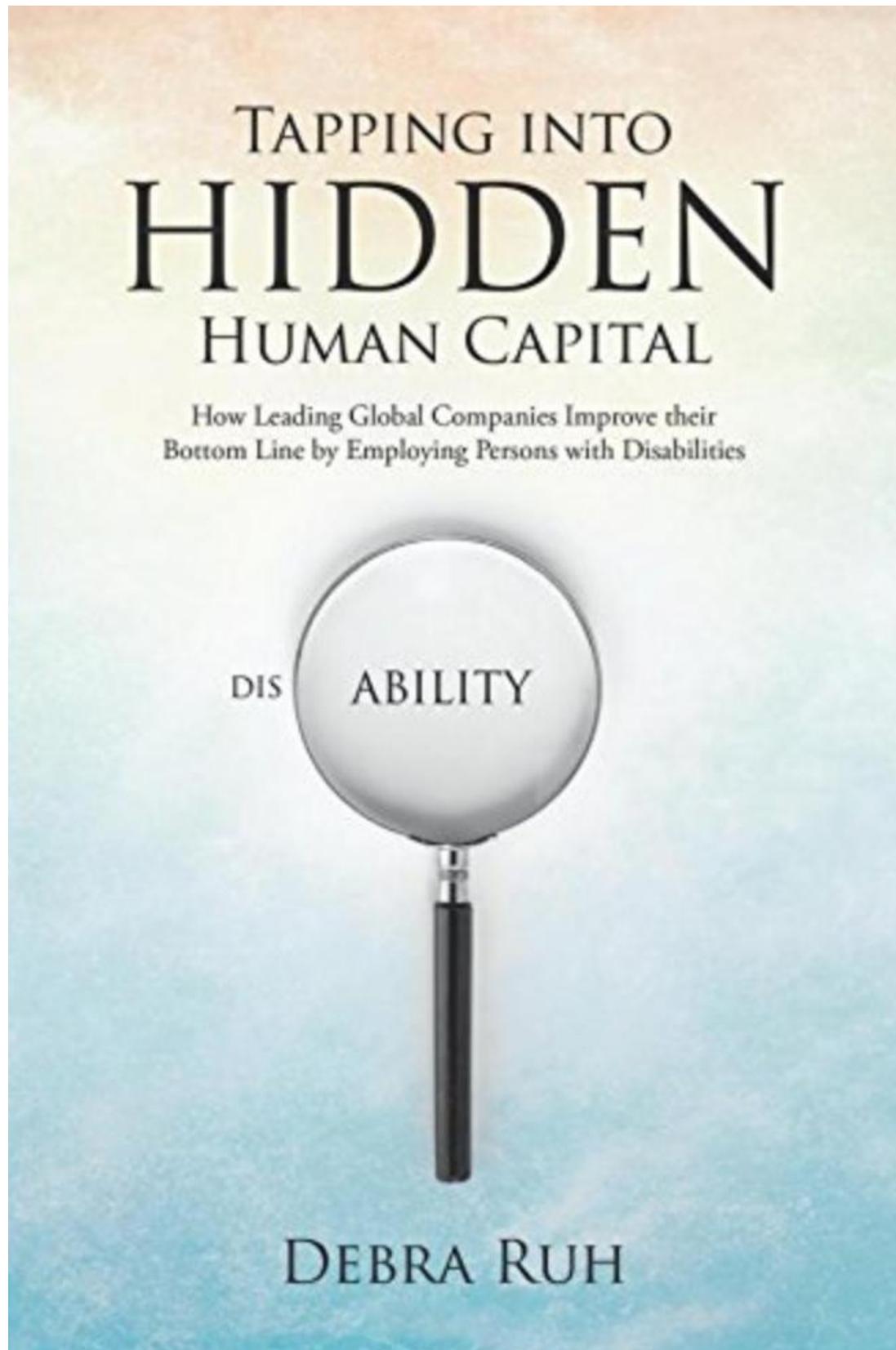
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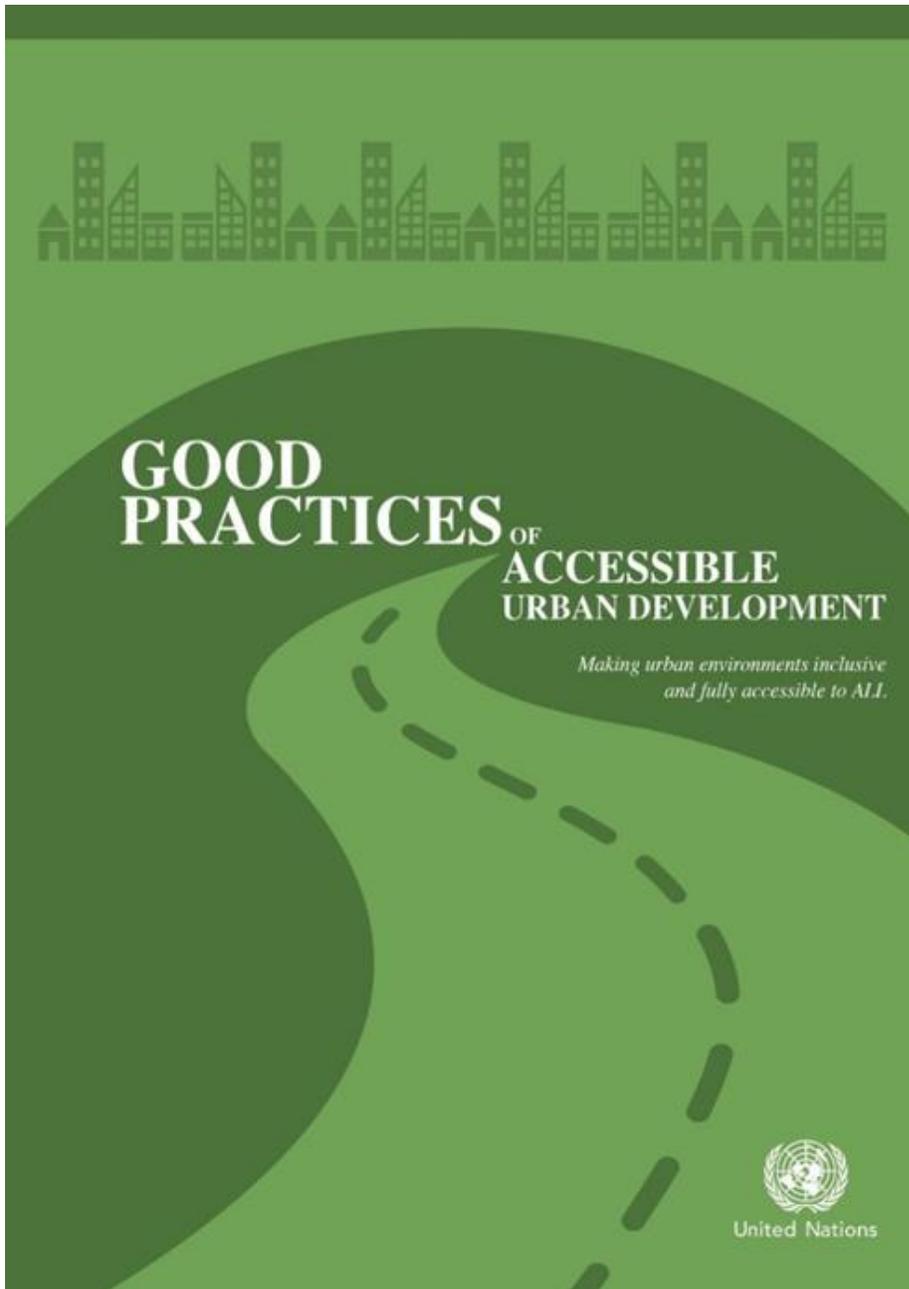
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READING HINTS: ePub files can be read with the iBook app on Apple MacBook/iPad devices; ePub files can also be read on Desktops PCs, Laptops and Surface devices using readers such as the Microsoft *freda* ePub reader. The Kindle (mobi file) reader is flexible and suitable for reading the eBook on PCs; Kobo readers can also be used to read ePub files on MacBook and iPad. All formats are very interactive with very good navigation.



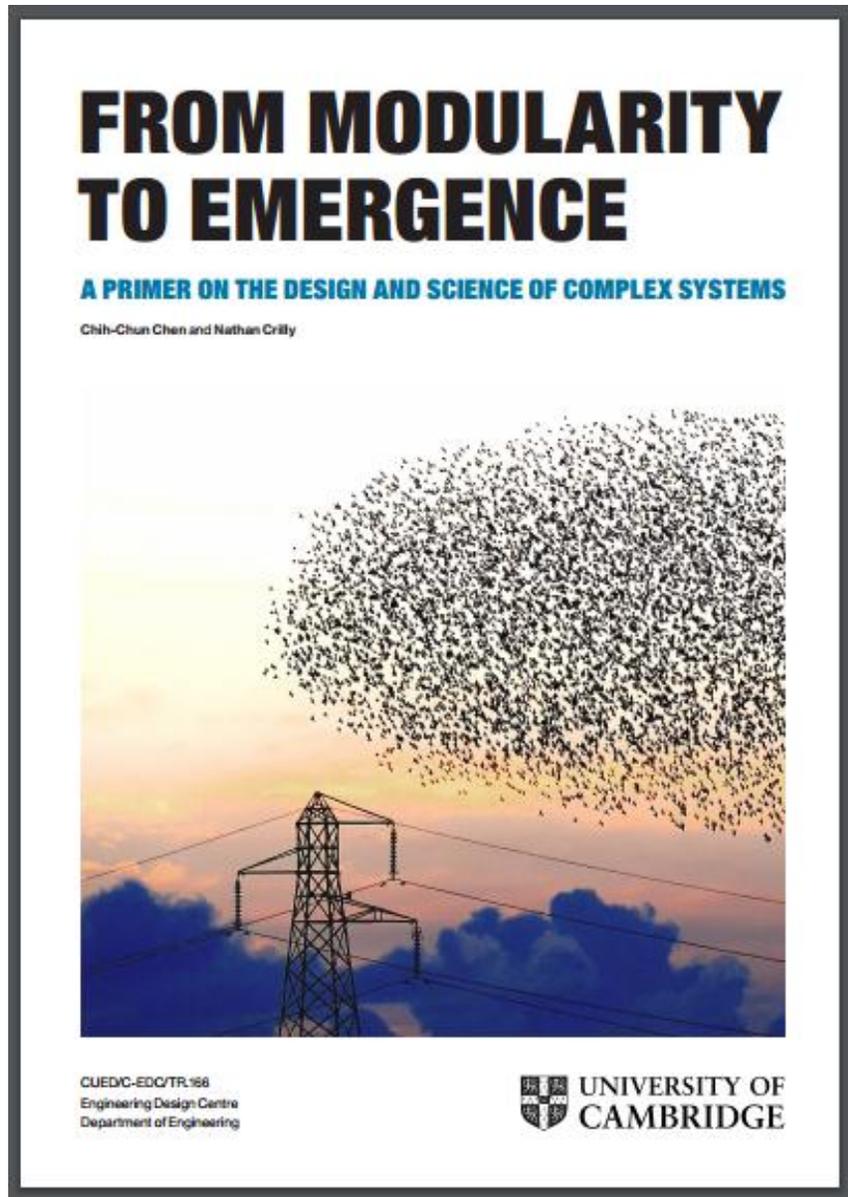


In light of the forthcoming United Nations Conference on Housing and Sustainable Urban Development (HABITAT III) and the imminent launch of the New Urban Agenda, DESA in collaboration with the Essl Foundation (Zero Project) and others have prepared a new publication entitled: “Good practices of accessible urban development”. The publication provides case studies of innovative practices and policies in housing and built environments, as well as transportation, public spaces and public services, including information and communication technology (ICT) based services.

The publication concludes with strategies and innovations for promoting accessible urban development.

The advance unedited text is available

at: http://www.un.org/disabilities/documents/desa/good_practices_urban_dev.pdf



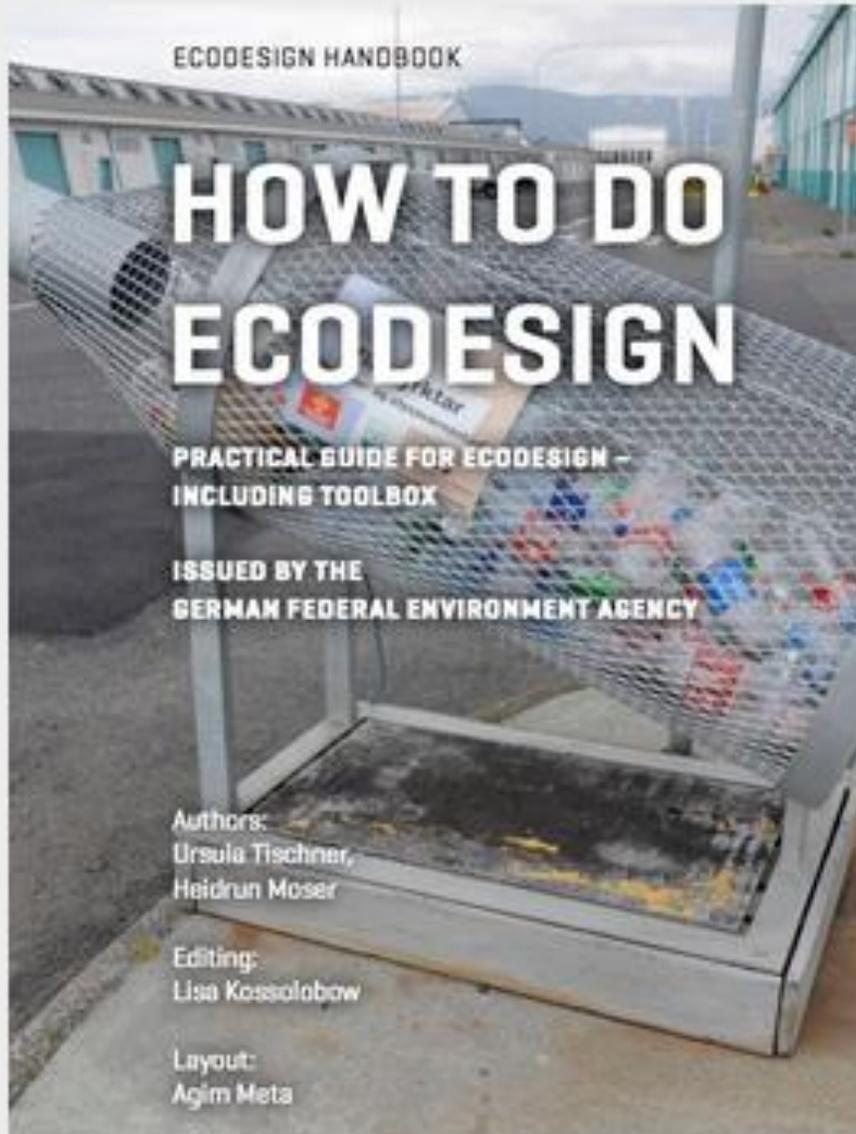
Dr Chih-Chun Chen and Dr Nathan Crilly of the Cambridge University Engineering Design Centre Design Practice Group have released a free, downloadable book, *_A Primer on the Design and Science of Complex Systems_*. This project is funded by the UK Engineering and Physical Sciences Research Council (EP/K008196/1). The book is available at URL:

<http://complexityprimer.eng.cam.ac.uk>

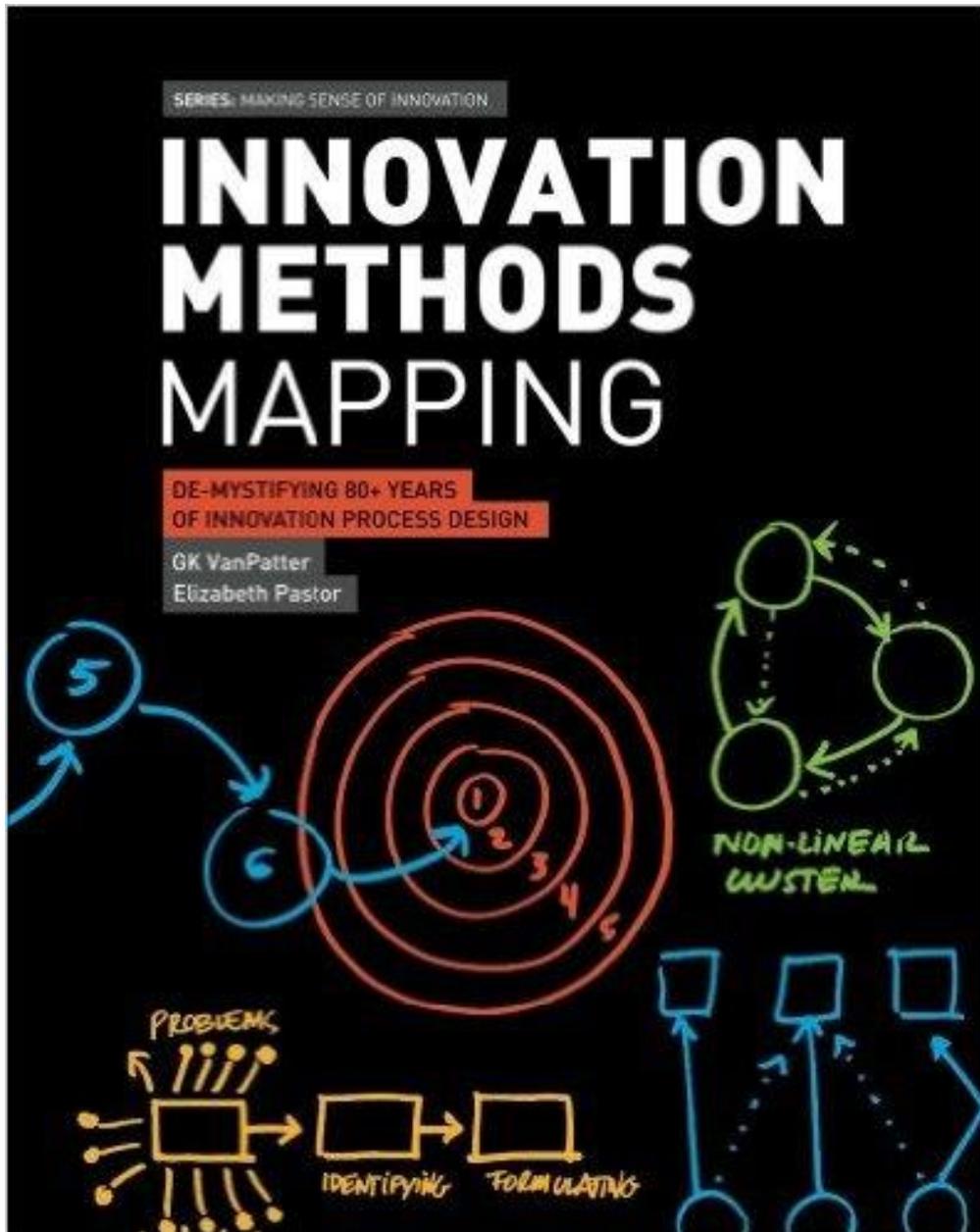
Changing Paradigms: Designing for a Sustainable Future



New iBook / ebook: HOW TO DO ECODESIGN



Practical Guide for Ecodesign – Including a
Toolbox
Author: Ursula Tischner

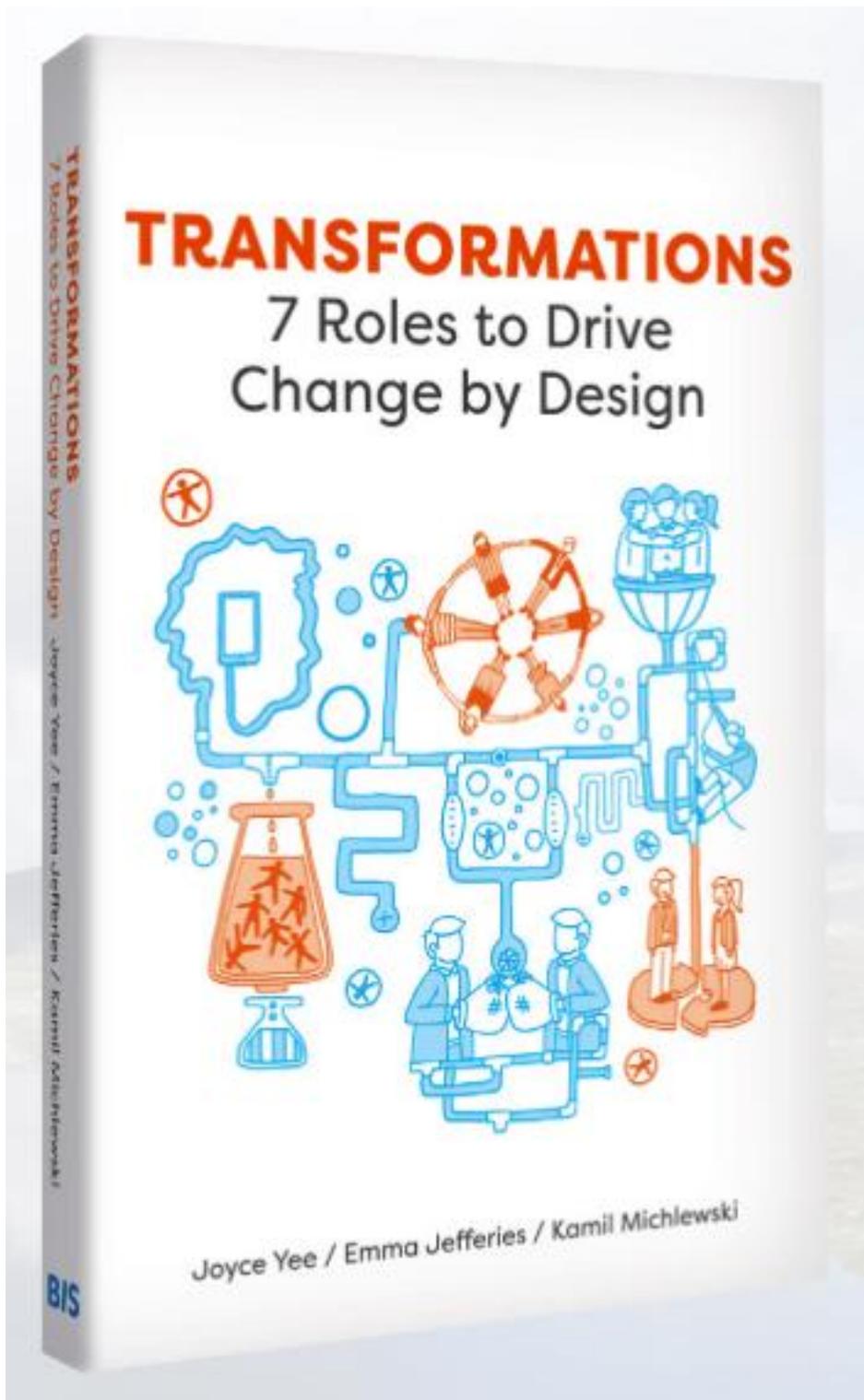


Humantific's new book: Innovation Methods Mapping has just been published and is now available on Amazon.

https://www.amazon.com/dp/1540788849/ref=sr_1_1?ie=UTF8&qid=1482329576&sr=8-1&keywords=Humantific

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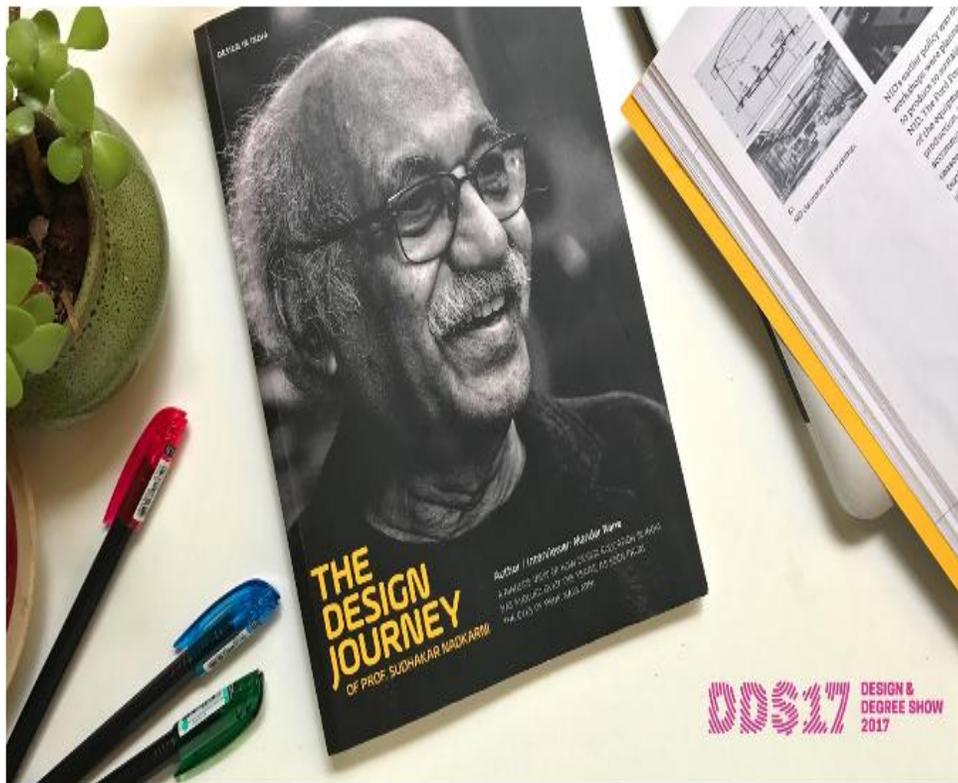
https://issuu.com/humantific/docs/innovation_methods_mapping_book_pre



Pre-book form

Thank you for your interest in the book, 'The Design Journey of Prof. Sudhakar Nadkarni'. Few limited copies will be available for purchase on the day of IDC Alumni Meet, on June 11th, Sunday, 5:30 to 6:30 pm. Rest of the book orders will start shipping June 25th, 2017 onward.

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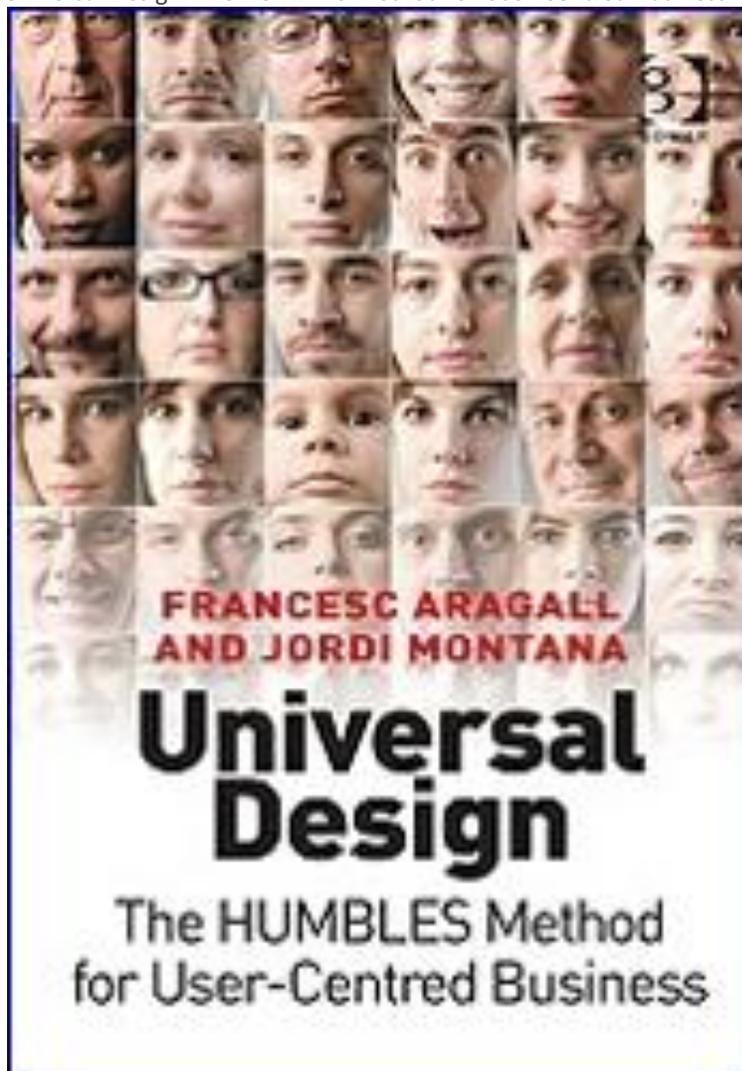
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Neo-liberalism, grief and the nation form

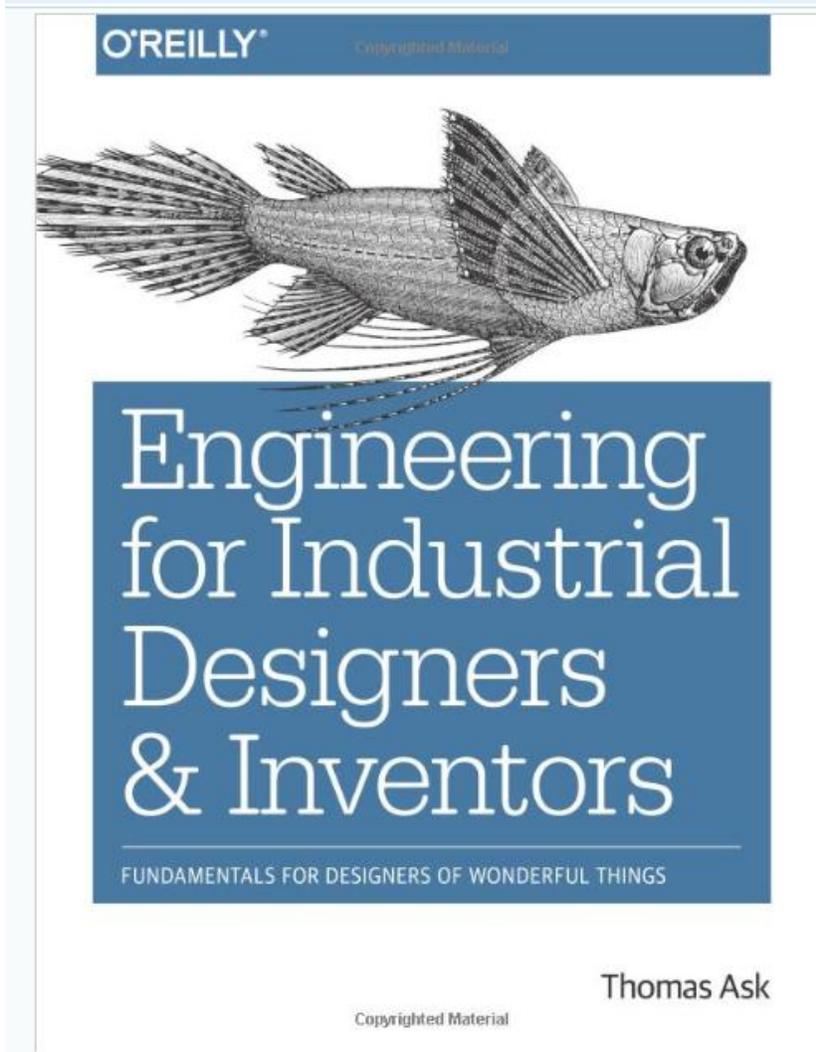


Universal Design: The HUMBLE Method for User-Centred Business



“Universal Design: The HUMBLE Method for User-Centred Business”, written by Francesc Aragall and Jordi Montaña and published by Gower, provides an innovative method to support businesses wishing to increase the number of satisfied users and clients and enhance their reputation by adapting their products and services to the diversity of their actual and potential customers, taking into account their needs, wishes and expectations. The HUMBLE method (© Aragall) consists of a progressive, seven-phase approach for implementing Design for All within a business. By incorporating the user’s point of view, it enables companies to evaluate their business strategies in order to improve provide an improved, more customer-oriented experience, and thereby gain a competitive advantage in the marketplace. As well as a comprehensive guide to the method, the book provides case studies of multinational business which have successfully incorporated Design for All into their working practices.

According to Sandro Rossell, President of FC Barcelona, who in company with other leading business professionals endorsed the publication, it is “required reading for those who wish to understand how universal design is the only way to connect a brand to the widest possible public, increasing client loyalty and enhancing company prestige”. To purchase the book, visit either the [Design for All Foundation website](#)



I have a new book that presents fundamental engineering concepts to industrial designers that might be of interest to you. This is the link:

https://www.amazon.com/Engineering-Industrial-Designers-Inventors-Fundamentals/dp/1491932619/ref=sr_1_1?ie=UTF8&qid=1506958137&sr=8-1&keywords=engineering+for+industrial+designers+and+inventrs

APPEAL:

Master of Design at NID; Apply by Nov 9

Read more at:

<https://english.mathrubhumi.com/education/news/admissions/master-of-design-at-nid-apply-by-nov-9-1.3192045>

Applications have been invited by the National Institute of Design (NID), Ahmedabad, for admission to the Master of Design (M.Des) programmes.



News

1.



Good for everybody, easy for you

International Design for All Foundation Awards 2018 Winners Announced



Congratulations to the winners!!!



Programme and Events

Access Israel's 6th Annual International Conference on
Innovation & The Future of Accessibility
29 April 2018 - Israel
Avenue Conference Center - Airport City

The DesignEuropa Awards celebrate excellence in design and design management among [Registered Community Design \(RCD\)](#) holders, whether they are individual right holders, small businesses or large enterprises. The Awards seek to recognise companies and designers that have brought outstanding design to the market with the support and protection of the RCD.

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Submit your application or nomination before 15 May 2018.



Join us for the **2018 EDRA49 Annual Conference** in the **Oklahoma City, Oklahoma!** Walk along the streets of Oklahoma City, home to an attractive variety of historic buildings. Eye-catching religious buildings, and magnificent structures of great architectural and historic significance. **Stay tuned for registration to open in late Fall.** Check out what OKC has to offer, [click here](#).

Human-Work Interaction Design (HWID'18) - Designing Engaging Automation
5th IFIP WG 13.6 Working Conference
August 20-21, 2018

Aalto University, Espoo, Finland

In continuation with the series of the Human Work Interaction Design working conferences, the fifth edition will take place in Espoo, Finland, on the 20th and 21st of August, 2018. The venue is the brand new building of School of Arts, Design and Architecture in Aalto University, Otaniemi campus.

Important dates:

Full paper submission deadline: April 2nd

Poster submission deadline: April 30th

Acceptance notifications: May 11th

Early bird registration deadline: May 31st

Conference: August 20-21, 2018

Theme, Scope and Focus:

This year's theme is Designing Engaging Automation. While we do not exclude other aspects of work analysis and designing interactions for work contexts, we encourage authors to share especially their research on human aspects in workplace automation in the 2018 edition of HWID conference.

Interaction design for work engagement has lately started to gather more attention, especially in designing tools for employees. Work engagement takes usability of interactive systems to the next level by providing employees pleasurable and meaningful experiences via the tools used at work. The theme of HWID'18 emphasizes the need for providing these experiences also when parts of the work are automated.

Examples of relevant questions include:

Is automation making work less interesting or more engaging?

How to improve work engagement by automation?

How to share work optimally between humans and automation?

How to maintain operator vigilance in highly automated environments?

How to support situation and/or automation awareness?

How to evaluate the impact of automation on work engagement?

This working conference aims to answer these questions to support professionals, academia, national labs, and industry engaged in human work analysis and interaction design for the workplace. We will discuss the tools, procedures, and professional competences needed for designing for and evaluating engaging automation in workplace contexts.

We invite two types of submissions:

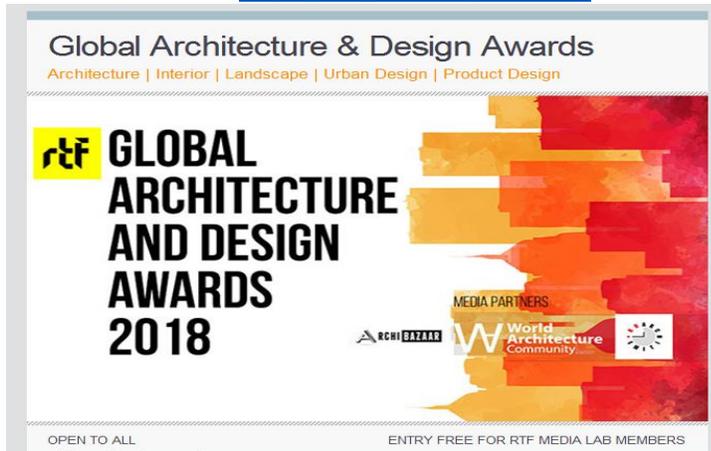
Full papers (max 15 pages, excluding references) and

Poster submissions (max 4 pages, excluding references).

For both types of submissions, the authors must use the LNCS templates available from [Springer](http://www.springer.com). Please submit your work in PDF format to [EasyChair](http://www.easychair.org).

All accepted papers will be published in the working conference proceedings in the form of an electronic copy with ISBN and made available to the participants. During the review process, the reviewers are asked to evaluate whether the paper is suitable for a HWID's Springer book (Springer-Verlag) that will be made available after the conference. We aim at most accepted full research papers to be included here, but also the possibility to have a very interesting perspective from industry or similar represented.

Conference web site: <https://blogs.aalto.fi/hwid2018>



**2nd World Summit
on Accessible Tourism**
Brussels
1-2 October 2018

**Destinations
for All**

**Build
Promote
Welcome**

The Accessible Tourism Chain

The second World Summit on Accessible Tourism will present latest innovations and best practices for the development of destinations for all. In parallel to the summit, an exhibition will allow you to discover accessible tourist destinations, products and services from all over the world.

www.destinationsforall2018.eu

Global Architecture & Design Awards



GLOBAL ARCHITECTURE AND DESIGN AWARDS 2018

A
Rethinking
The Future
Initiative

A call for
Professionals and
Students to submit
their work under
Mentioned Categories

Registration Free
for RTF Media Lab
Members

MEDIA PARTNERS



Global Architecture & Design Awards is one of the world's most prestigious Awards hosted by Rethinking The Future (RTF). RTF has been hosting Awards since 2012, and many esteemed Studios have been the winner of the Awards like Aecom, HOK, Aedas, Bjarke Ingels Group & Dialog, UNstudio, Perkins Eastman, etc. GADA is open to all the professionals and students across the world and offers more than 40 Categories divided into 'Concept' and 'Built'.

[Participate Now](#)

International Architecture Awards



One of the most famous Architecture Awards across the globe, International Architecture Awards hosted by Architecture Podium brings its winners to the top in the industry. Some of the previous winners include Aedas, TerreformOne, Rockwell Group, Pepe Gascon Arquitectura, Nadaaa etc. International Architecture Awards offer 30+ Categories under three groups' i.e.; Architecture, Interior Design and Product Design.

[Participate Now](#)

The Aga Khan Award for Architecture



The Aga Khan Award for Architecture

The Aga Khan Award for Architecture (AKAA), established by Aga Khan IV in 1977, is awarded every three years to an architectural project that meets the needs and preferences of Islamic societies. The Award seeks to identify and encourage architectural concepts in the fields of community development, area conservation, contemporary design, preservation of the environment and landscape design.

[Participate](#)

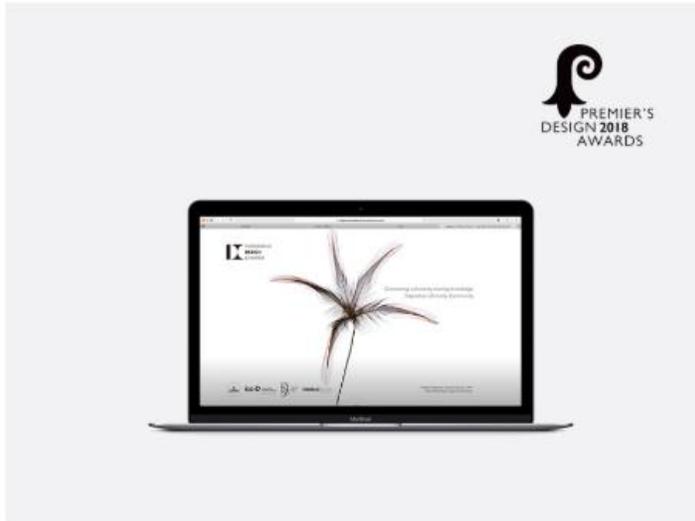


Schedule:
Registration Begins. 15 Mar, 2018



International Architecture Awards 2018

After the huge success of previous International Architecture Awards, Architecture Podium is announcing IAA 2018. Architecture Podium created one of the largest awards in architecture and design with some of the esteemed studios as winners like [Aedas](#), [TerreformOne](#), [Rockwell Group](#), [Pepe Gascon Arquitectura](#), [Morphogenesis](#), [Dada & Partners](#), [Nadaaa](#), [XTEN Architecture](#), [Mecanoo](#), [ABIBOO Architecture](#) and many more from across the globe making IAA one of the most successful awards.



2018 PREMIER'S DESIGN AWARDS ANNOUNCED

A ground-breaking International Indigenous Design Charter has taken out the highest design honour in Victoria receiving the 2018 Victorian Premier's Design Award of the Year. The annual awards celebrate the state's best and brightest designers and innovators across categories including architectural, product and industrial, communications, digital and service design. [MORE](#)

Typography Day 2019
IDC School of Design (IDC), IIT Bombay, Mumbai, India
2nd - 4th March 2019



The 7th International Conference for Universal Design in Bangkok 2019

First time in ASEAN, the International Conference for Universal Design in Bangkok.

Call for paper

IAUD, Japan collaborates with Faculty of Architecture, KMITL, Thailand, organise...

The 7th International Conference for Universal Design in Bangkok, Thailand on 4-6 March 2019

You are invited to submit full papers for the theme “Universal Design and Sustainable Development”

Sub-theme;

- Innovation for all
- Regional and urban development
- Sustainable inclusive city
- User-friendly product design and service
- Rapid global ageing

Submission full paper deadline: 20 November 2019

For more information please visit

<https://www.ud2019.net/index.html.en>

THE ANNUAL INTERNATIONAL BERKELEY UNDERGRADUATE PRIZE FOR ARCHITECTURAL DESIGN EXCELLENCE 2019

2019

berkeley
prize

Architecture and
Climate Resilience



[ABOUT THE PRIZE](#)

[ESSAY PRIZE COMPETITION](#)

[TRAVEL FELLOWSHIP](#)

[PREVIOUS FELLOWSHIPS](#)



Job Openings

Job Opening

1. At Gramener, we are looking for Information Designers/Data Visualization Designers with 3-5 years of experience in User Centered Design Process, Data Visualisation, UX Design, Information Design. hashtag

Check details of the job and apply from here:

- **Senior Information Designer**

2. Icarus Nova Pvt Ltd, a Bangalore based healthcare design innovation firm, is looking for a research intern to study two areas - Mental Health and Chronic Obstructive Pulmonary Disease among the underserved communities in Bangalore. We would like to extend this opportunity to students or recent graduates with a background in design/ anthropology/social sciences/ healthcare. It is an immediate requirement, for a duration of 2 months, at the end of which the intern is expected to create a detailed document. It is a paid internship.

Interested candidates can get in touch with aparna@icarus.co.in with their resume.



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