

Design and Research Seminar 2019

Promoting the Use of Helmets through User Centric Design

IDC School of Design
अभिकल्प विद्यालय



IIT Bombay

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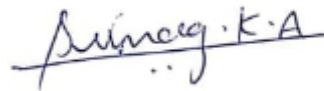
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Declaration

I declare that this written report represents my own idea in my own words, and where others, ideas or words have been included, I have mentioned the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or source in my submission.

I understood that any violation of the above will be cause for disciplinary action by the Institute and can also penal action from the source from which proper permission has not been taken, or improperly cited.

A handwritten signature in blue ink that reads "Srinag K A". The signature is written in a cursive style with a horizontal line underneath the name.

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Approval Sheet

This Mobility & Vehicle Design project report entitled "Promoting the use of helmets through user centric design", by Srinag K A is approved in partial fulfillment of the requirement for Master of Design degree in Mobility and Vehicle Design.

Project Guide- Dr. B K Chakravarthy



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1.0 Introduction

India has among the most unsafe roads in the world. In 2015, over 400 people were killed in road accidents every day. In the same year, two-wheeler accidents claimed 36,800 victims and left around 93,400 injured. Numbers that could have been significantly lower, if riders had proper helmets.

Between the years 2008 and 2020, almost 34 lakh people might die of motorcycle crashes. A figure that can be halved with appropriate measures. "As many as 14 lakh of those fatalities can be avoided with the proper use of safety helmets," the study says.

Since wearing of helmets have been made compulsory for both the riders and pillions in most of the Indian cities, user centric design approach to understand the consumer needs when it comes to the use of helmets and hence promote the use of helmets not only for two wheeler riders but also for pillions.

In order to promote the use of helmets among the Indian two wheeler commuters, user centric design approach is required.

2.0 Traditional Industrial Design Process

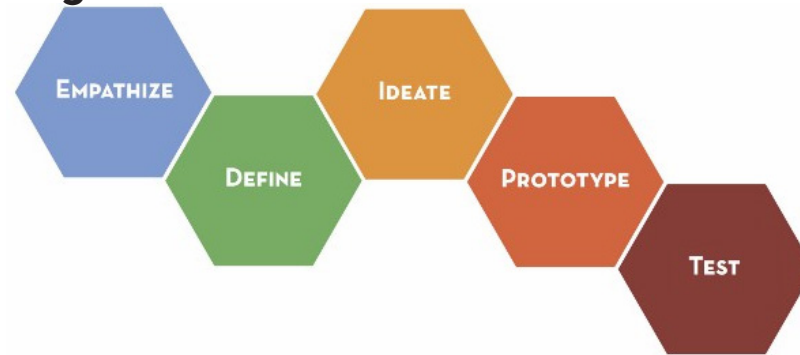


Fig: Design thinking model

Steps Followed in traditional industrial design process

1. The first step involved is user research. A needs and functionality analysis is carried out, involving examinations of the general conditions (such as quantitative and qualitative studies) and a series of talks and tests with the users concerned. It is also advisable to make contact with the networks involved and the media. All this information is to be analyzed ahead of the work yet to be done.
2. During the define stage, the problem statement is defined. This involves the type of product to be designed, the various constraints such as cost etc, the target market. The data obtained during the Emphatise stage or user research stage helps in understanding various parameters to be considered while designing the product.
3. The main aim of the Ideation stage is to use creativity and innovation in order to develop solutions. By expanding the solution space, the design team will be able to look beyond the usual methods of solving problems in order to find better, more elegant, and satisfying solutions to problems that affect a user's experience of a product.
- 4 Prototype development adds value to a project as it prove that the concept works. In this instance, a basic Proof-of-Concept Prototype would be adequate to demonstrate the basic fundamentals of the idea. A more refined prototype to strengthen their presentation, but the associated cost of this needs to be weighed up against other factors.
5. Testing is ongoing as the construction progresses, but a final test of the entire system or model proves if the project does the job for which it is designed. Look back at the specifications and check the requirements carefully.. various such questions as: How well does the design function? Does the design look good? Is the product safe to use? Were suitable materials used? etc are asked. These questions help in improving the design of the product before it goes to mass manufacturing.

3.0 User Centric Design Process

User-centered design (UCD) is a framework of processes in which the needs, wants, and limitations of end users of a product, service or process are given attention at each stage of the design process.

User-centered design is a multi-stage problem solving process that not only requires designers to analyze and understand how users are likely to use a product, but also to test the validity of their assumptions with regard to user behavior in real world tests with actual users at each stage of the process from requirements, concepts, per-production models, mid production and post production creating a circle of proof back to and confirming or modifying the original requirements. Such testing is necessary as it is often very difficult for the designers of a product to understand intuitively what a first-time user of their design experiences and what each user desires in terms of experiences.

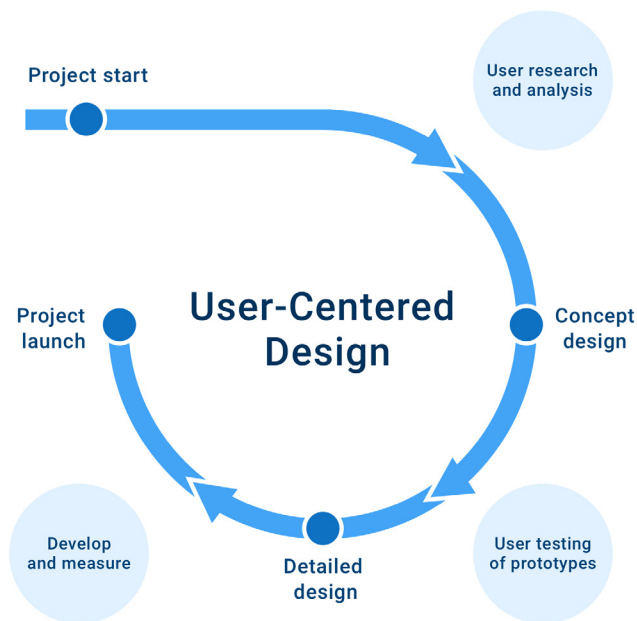


Fig 1. User Centered Design Process

The main aspect of user centric design is that it tries to optimize the product around how users can, want or need to use the product, rather than forcing the users to change their behavior to accommodate the product.

Therefore in order to promote the use of helmets among the motorcyclists and the pillion riders through design, user centric design is followed as this process would give enable the designer to design the helmet satisfying the user’s requirements.

Unlike traditional design process, user centric design approach would involve the participation of user hence influencing the product takes shape and matches the users’ requirements.

The principles of user centric design is discussed in the upcoming section.

1 The design is based upon the understanding of the environment and activities of the user- During the design process, the product is considered to be a part of the user's lifestyle rather than focusing on the product itself. The product is based on how the product fits seamlessly in the life of the user

2. Involvement of user throughout the design process- User is not only involved during the user research but also is involved during the concept selection, concept development and testing stages. This helps in designing the product which satisfies most of the user's expectations.

3. The design is driven and refined based on the users' evaluation- During the refinements of the product during development stage is based on the evaluation of the user. The user is exposed to various concepts developed by the designer. This helps in developing the product based on users' preferences.

4. The process is iterative- User centric design process is iterative as the product is tested thoroughly to improve its form, usability, the use of materials etc. The iteration process is carried out by consulting users and it continues till it fulfills the users' requirements

5. The design involves the whole user experience- The design must address the entire user experience. The focus must be beyond just the use of the product. It must also involve various ways the user interacts with the product.

Ex- Criteria must be given to how the user would hold the helmet when he doesn't wear it, the way the user stores the helmet in the vehicle's storage compartment, the way he carries around the helmet when not in use etc

6. Make things visible, including the conceptual model of the system, the alternative actions, and the results of actions- Every action has an outcome. Hence during the user centric design process, the output obtained for each decision taken- be it in development stage or implementation stage is early visible for both the designer and the user thus enabling the user to make right decisions thus helping the designer in the process of design

8. Make it easy to evaluate the current state of the system- Evaluating the current system would help in iterating it as it would help in determining the flaws in current process. This would be helpful in iterating the current design process.

These are some methods which designer can practice to impart UCD in their designs

Technique	Purpose	Stage of design process
Interviews and questionnaires	Collecting data related to the needs and expectations of users evaluation of design alternatives, prototypes and the final artifact	At the beginning of the design project
Sequence of work interviews and questionnaires	Collecting data related to the and questionnaires sequence of work to be performed with the artifact	At the beginning of the design project
Focus groups	Include a wide range of stakeholders to discuss issues and requirements	Early in the design cycle
On-site observation	Collecting information concerning the environment in which the artifact will be used	Early in the design cycle
Role Playing breakthroughs, and simulations	Evaluation of alternative simulations designs and gaining additional information about user needs and expectations, prototype	Early and mid-point in the design cycle

3.1 Interviews and questionnaires-

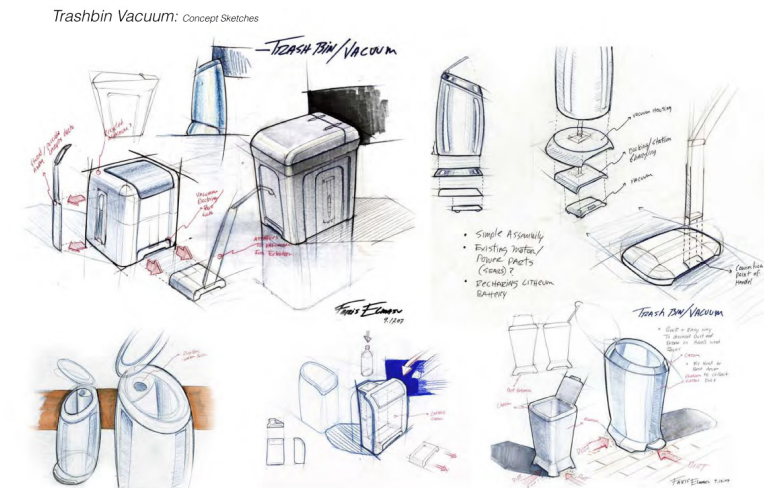
Interviews and questionnaires are few of the basic methods involved in user centric design. The users are asked questions or interviewed not only the way they react with the product but also the their lifestyle, their routine. The designer should understand the role the product plays a role in user's life. Ethnographic study, Online surveys, participatory research are a few ways through which user research is conducted. This helps in accessing the expectations of the user with respect to the product which helps in shaping the product in further design process.

3.2 Sequence of work interviews and questionnaires

Work interviews and questionnaires are a few methods involved in understanding the dynamism of the product in the life of the user- It gives information on the sequence in which the product is used.

In the case of designing a helmet, the sequence in which the way the helmet is worn, the way it is removed, the way the helmet is carried is noted. By breaking the steps and analyzing it closely helps in designing the helmet such that it suits this action. This process is carried out in initial stage as it helps in setting basis for designing the product. Storyboarding is one of the effective methods involved understanding the work sequence of the user.

In design of helmets, story boarding is involved in understanding the scenario in which the product is used. The focus here is on how the user uses the product on a day to day/ regular basis. The designer refers to the story board and generates the concepts such that it fits seamlessly into the user's lifestyle



Fig; The storyboard involves how the user interacts with a trashbin

3.3 Focus groups

User centric design involves focusing on certain groups of user so that the product is suited for their use. During the user centric design process, the focus is drawn to certain set of target market as their requirements are common- low differences in terms of requirements among the users helps in designing a helmet suitable for that particular market.

Since the focus is on a particular group of stakeholders, user persona is used in most of the cases. User persona gives information on the lifestyle of the user, user's aspirations/requirements, their demographics, their behaviors etc.

User persona represent that particular group of stakeholders. The designer is ideates or creates concepts based on these persona



Fig: The helmets are designed considering the focus groups

3.4 On-site testing

On-site testing would involve the observation of the way the user uses the product. The sequence of the use of product, the interaction between the product and the user is observed. This process is carried out in order to for all the prototypes generated. The feedback from the user using on-site testing is noted. The significance of on-site testing is that the product is tested in real circumstances. This helps in designing the product that suits well for the user's lifestyle.

Under helmet design, the focus not only lies on helmet as a head protection gear, various other aspects such as the way it is held, the way it is carries, the storage of helmet in storage unit in scooters etc is considered.

The feedback obtained during on-site testing is used to improvise the design of helmet.

4.0 Examples of helmets designed through User Centric Design approach



Fig; Helmet designed specially for the police

Alfred Boyadgis has won a prestigious Red Dot design award for his futuristic motor cycle cop helmet that has facial recognition technology and a fully integrated communications system. Currently, police officers on motorcycles have heavy helmets that are without any smart phone-style technology and communication devices available to other officers.

“Even though motorcycle police are often first on the scene, they rely on poor technology,” says Alfred, the 23-year-old industrial design student from UNSW. “They sometimes even have mobile phones tucked under their helmets.”

The new lightweight helmet, which has received interest locally and internationally, enables rapid communication between emergency services. Among its features is a GPS and the first semi-modular visor system to increase vision and improve safety by more than 65 percent



Fig: Fold-able Helmet

Twenty-five-year-old Australian Jessica Dunn spent five months riding a motorcycle in Indonesia as a foreign exchange student, and that meant hauling a helmet around all that time. Weary of that grind after just 150 days, Dunn developed the Proteus folding helmet and it is now shortlisted for the James Dyson Award.

An outer layer of polycarbonate covers polystyrene foam, and the innermost layer is a material that's pliable during normal use but instantly hardens when it registers an impact. The helmet itself collapses in a manner reminiscent of a hardtop convertibles, the visor slides back on top while the sides and back fold into the helmet's interior cavity. The Proteus helmet has been engineered to meet Australian safety standards, and when folded fits into a standard backpack.

5.0 Conclusion

With the increase on the emphasis on the use of helmets on two wheeler commuters spreading to most of the cities in the county, user centric design would help in designing the helmets such that it satisfies the needs of the user thus encouraging them to wear the helmet. By employing the user centric design process and involving the users in the design process, the user's requirements are understood clearly. The techniques such as background interviews, questionnaires, focus groups, on-site observations help in understanding the various aspect of the helmet in terms of usability, aesthetics, ergonomics and using these techniques, helmets effective to the users' requirements can be designed.

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Folding Motorcycle Helmet Nominated For Dyson Award

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