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Our Strategic Design Process

Designing systems for a user group is an exercise that is very satisfying. As creators, it gives us an ultimate high in providing something of use to a particular group. While financial wellbeing is important, I would dare say most of us work for contributing to society in a meaningful manner and then getting compensation in line with our contributions value.

Creation is an important part of any enterprise. We have to create and innovate new solutions that are relevant to the society. This process requires us to be smart with our design. It requires us to ensure that we don't waste any time on making things that aren't relevant. It requires us to be innovative in using minimum resources for maximum impact. It also needs to include our strategy on how we will communicate about our product right from the get-go. This is the basic concept of strategic design and in our meetings we have been discussing how to develop relevant solutions for a particular user group we are interested in.

Let me briefly outline the strategic design process my team in US and India has used with lots of success.

We made this process after reading several sources of text. We have followed this process in quite some details and it has always given me important insights into the required system design. It is an amalgamation of techniques from sociology, human computer interaction, system design, software engineering, design and marketing. My team has been an ardent user of it and it has allowed us to be comprehensive in our approach. Based on validated principles and scientific data, this approach if followed correctly can produce systems that are usable, persuasive and have a better than average chance of scaling up.

There are similar approaches out there and we should learn from them. Examples are biodesign approach from Stanford (characterised by identify, invent and implement stages), strategic design approach, persuasive design approach by BJ Fogg and even the waterfall model of software engineering. Our approach here would be to follow our approach, study it, find its limitations and then review it to iterate its design learning from other competent frameworks for building interactive systems.

Figure 1 shows the basic steps of the design. We first begin by observations and shadowing. The idea here is to hold interviews and observations sessions with a

particular user group. This is a technique that has been developed in sociology and the most famous account here is that of Jane Goodall who used observations and shadowing technique to study chimpanzees (see <http://www.theguardian.com/science/2010/jun/27/jane-goodall-chimps-africa-interview>). Observations and shadowing help us study our users in their actual environment. They help us identify their work condition, how they live, what motivates them, what makes them come to work every day, what are the barriers to them achieving their goals and how we can enable them. This is a very positive process in which we focus on humans being enabled through our support.

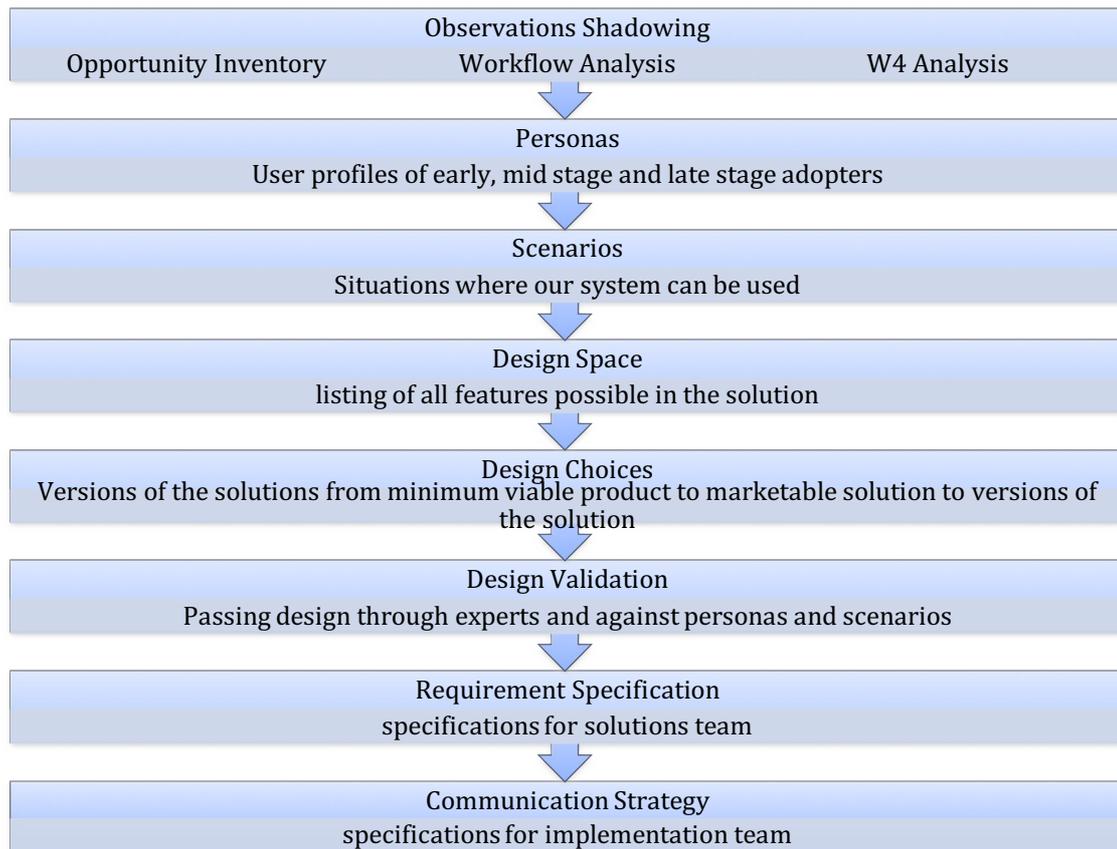


Figure 1. Overview of our socio-technical design strategy

I have designed three methods to make observations and shadowing a useful exercise. The first is an opportunity analysis document. (See Appendix I). The purpose of this document is to list all issues that a particular user group identifies as an opportunity for us to help them. Every user group and every user has several tasks to do. Our job is to observe them and engage in a conversation that helps us identify opportunities where we can help them. This is done through a controlled process that is structured as an informal conversation. **Appendix A** gives guidelines on how to do an opportunity analysis. The idea is to listen and document possible opportunities for a solution. We do so to find explicit problems which are relevant to a user group. Explicit here means these are problems and opportunity that are relevant to a user group. However there are also opportunities hidden that a user may not be aware of. These are not revealed directly by the user and it requires us to walk in observe users. Here we use observing

the user in their environment strategy aka Jane Goodall style. In order to aid and assist this process, we have designed an A4 system. A4 here refers to Action, Atmosphere, Artefacts, Actors. When observing a user in environment, first we have to record all their actions. We have to record the time they started the action and the time they stopped the action. We need to record the atmosphere in which the action is taken. Like was it tense, was it organised or disorganized. We need to take a note of all actions and the surrounding atmosphere. We also need to record all artefacts or tools used during the exercise. This could range from a pen to a notebook to a computer, a refrigerator everything. Finally we should record all actors involved in an action. We can take notes like whether the action was completed or not and what happened during it. Appendix II has the A4 inventory attached.

Once our observations and shadowing is complete, we perform the **W4 analysis**. Shown in figure below.

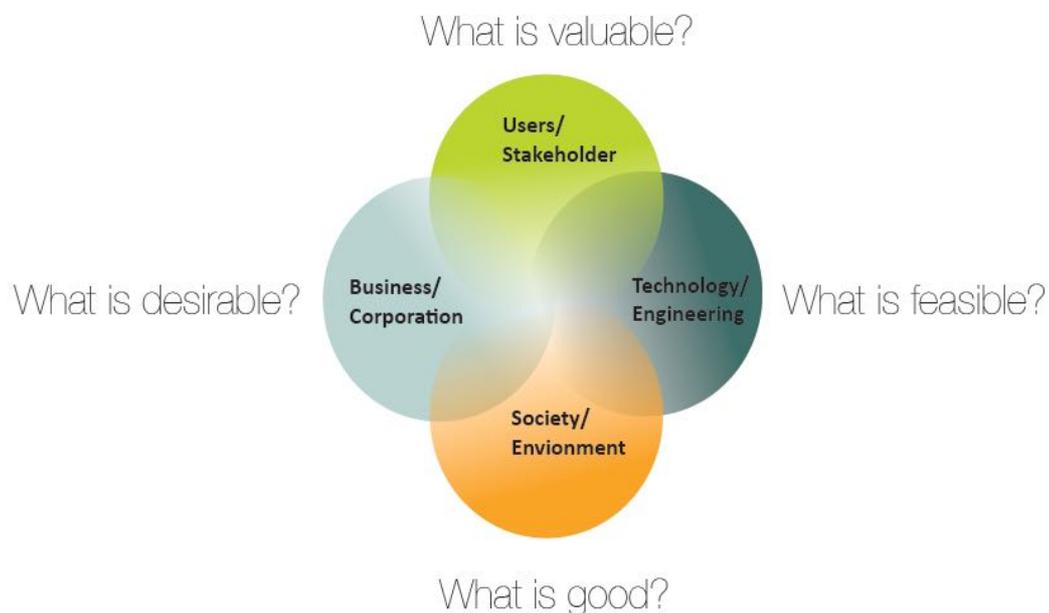


Figure 2. W4 Analysis

We then create a list of what is valuable for users/stakeholders. These users stakeholders find certain things in their daily lives useful as pertaining to their work. We need to document what they see as explicit value generators and implicit value generators. For example a pharmacist may see an explicit value in number of people who visit his shop or number of doctors who say they will send their patients to the pharmacists. An implicit value may be in a pharmacist being able to hold a health camp. He doesn't see this immediately but if we discuss with him then he may see the value. Value generators are important to bind your users. A student needs to be engaged. A patient needs to be engaged. If, for example, a patient sees a value in being reminded of her/his medication, then this needs to be documented. If a doctor sees a value in developing a follow-up service, then it needs to be documented. In Education, value can come from different sources like providing a gaming interface or enabling formative and summative feedback. What is valuable for the user is an important aid

in defining the scope of project and often is critical to identify features that can encourage adoption of the system.

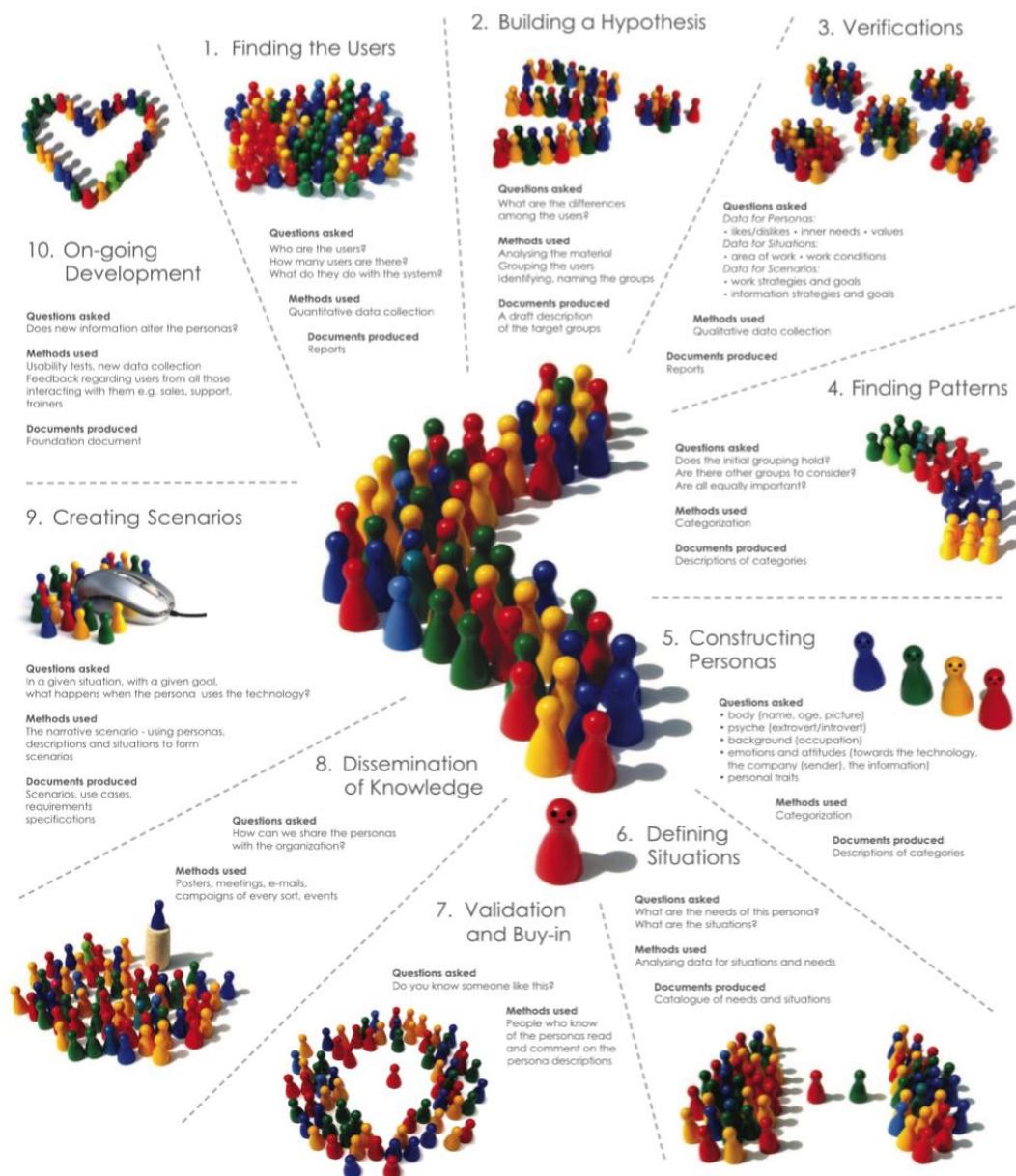
An analysis is performed on what is desirable from a business/financial/sustainability perspective. Any intervention whether meant for charitable purposes or for business purpose requires a detailed analysis of what is the basis of making this system financially sustainable. Often development is done of products without considering their financial aspects. This leads to wasteful expenditure and developing models that cannot scale. There is a need to consider at the very initial stages, the aspects of what will make the system attractive from a financial perspective. If for example, a device is being designed for the healthcare system, we need to look at how different stakeholders will be able to benefit from the service. When creating technologies, we need to add features to the technology that make them sustainable. In some cases, it is addition of an advertising platform, in some cases it is charging the users, in other cases it is crowd funding. We need to allow a system to have the best chance of surviving and thriving which is only possible when we consider the financial aspect.

Next, like financial sustainability environmental sustainability and societal sustainability is very important for a system. We need to do an analysis on what is good for the society and environment. No system can simply be about delivering a service. The service has to be good for the society and environment. This gives a natural impetus to the product. Let us take Uber. Uber a service to order taxis and rides to individuals is not only financially sustainable, but also allows for the society to benefit by lower cars on the road, car pooling services and thereby lower pollution. In healthcare too, technologies and systems that are good for environment (like allowing effective waste management or making temperature neutral vaccines thereby reducing need for refrigeration) and good for society (like making affordable drugs that reduce morbidity and mortality or promoting gender balance by health promotion apps) are the ones that are successful. It is hence important that this question is considered as an explicit step in the design methodology.

Finally, we consider what is feasible from a technology and engineering perspective. When considering technology required to make a system, we need to have the elements of value, desirability and good documented. This helps in ensuring that as different technologies are considered for realising the vision of the project, we know what makes it sustainable financially, environmentally and from a societal perspective. Having a W4 process brings discipline to the process of documenting the needs of a system (a pre-requisite for requirement specifications).

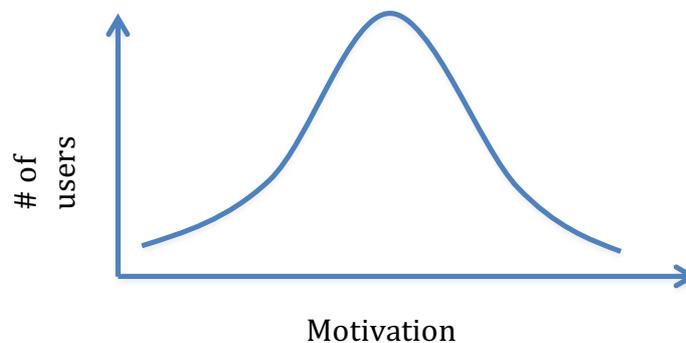
After the stage of observations and shadowing and organizing the material, we develop personas. The persona method has developed from being a method for IT system development to being used in many other contexts, including development of products, marketing, planning of communication, and service design. Despite the fact that the method has existed since the late 1990s, there is still no clear definition of what the method encompasses. In our understanding, the persona is a description of a fictitious person within the context of using the system and environment we are interested in. The benefits are seen as ranging from increasing the focus on users and

their needs, to being an effective communication tool; having direct design influence, such as leading to better design decisions and defining the product's feature set (Cooper, 1999; Cooper et al, 2007; Grudin & Pruitt, 2002; Long, 2009; Ma & LeRouge, 2007; Miaskiewicz & Kozar, 2011; Pruitt & Adlin, 2006). Often for a given system, multiple personas are created to represent different types of stakeholders. For example for a diagnostic system, we need to develop a persona of doctor, patient and person administering the tests (nurse or helper). We may in some cases need to add a persona of care giver too. In education systems for say a rural class, one needs a persona of teacher, children, supervisors etc. Personas help provide a personal yet distant way of imagining a user. Nielsen made 10 steps to developing a good persona and subsequently the scenarios.



These 10 steps are explained in detail in the encyclopaedia of human computer interaction and are briefly summarised here. The first step is quantitative data collection which is supported by our first step of doing observations and shadowing. In the second step, we explore what are the differences among the users? We analyse

the material to group users and name the groups. One type of grouping is by the user type or what they would do with our system. The second type of grouping which I find very useful lies in grouping by motivation. In general every user can be highly motivated to use the system, have low motivations to use the system or have motivations that are medium and are guided by how good the system is. Often a system is designed for the high motivation group because they are the ones that lead the charge for making such a system. They are however not our representative sample. Similarly folks with low motivation to use the system because of external reasons are not a representative sample either. Often this group of users is cited to “kill” a project: to say never will that user ever use your system. Inherently motivated or demotivated users of a system definitely exist and we will always run into them but our focus should be on the large quantity of users that lie in the middle. Folks who would use the system when they see W4 being satisfied. They are not inherently biased against the system nor are they biased towards the system. They are reluctant adopters at the worst and cautiously optimistic users at the best. They give your system a chance to succeed and you and YOUR design has to convince them to use the system.



In the next step our team has to agree on the personas. We need to match personas against data we have seen in the field. We need to agree that personas we are designing as best for our given problem. In the fourth step we again look at our categories of users and ensure we have complete ownership of our domain before we go into design phase. We then design the personas considering each of their aspects. We then catalogue needs and design of the personas and match them against the w4 needs assessment we performed. This has a validation purpose as well as also ensuring that our needs from the field can be expanded if we see a gap. Mostly these will come in as intrinsic needs and gaps.

We then decide on how to disseminate personas. This is done in a variety of ways. In some organizations big large cut-outs are made of personas to ensure that designers of the system can have a conversation with the personas. They are living breathing users and not just some text in a design rationale book.

We then go about creating scenarios which are personalised accounts of a persona using our system. Scenarios are very helpful in enumerating the various features that need to be incorporated into a system. They provide narrative descriptions of what a user may expect from a system, what may disappoint or excite them. Once the scenarios are done, we go ahead and keep on repeating the process iteratively in the system development phase.

After the personas and scenarios, we move onto the design space. Design space is a documentation of the entire design decision and choices that are up for consideration in the system creation. Right from the colour to user experience to how the system dynamics would function to how data will be stored, all choices and all design points are stored in the design space. An example of design space is shown below.



Design spaces tend to be large in their scope and construction of the design space is an iterative process. It allows documentation of all possible design decisions of all possible choices. It reveals the overall scope of what all is needed to be achieved in designing the system. It provides a gestalt view of the overall achievement to be done and then details to ensure implementation. It reveals not only the current version of the system we want to achieve, but the next iterations too.

Design spaces are a bird's eye view of what all features need to be considered for admission into the system. It is important to note that we don't make any choices in the design space stage. We leave that for the design choices stage.

Design Choices and design validation happen iteratively. The design team makes the design choices from the design spaces for each of the design element. We validate this by using the personas and scenarios. We check whether our personas would like the choices. Would the high motivation folks find this attractive, would the medium motivation folks find value in the choice and would the low motivation folks be able to find any issues with this choice and maybe even try it.

At the end of this stage, we finally write down the requirement specifications. Requirement specifications help convert the design choices and elements into a language the software developers understand. Most software are written by an informal needs assessment followed by requirement specifications. These requirements specifications achieve the goals but because the goals are badly designed and do not take a holistic strategic design approach. With our approach, the requirement specifications are generated only after all design options and all elements of what the system would function within its socio-technical context is noted.

Finally along with requirement specifications, we move onto communication strategy. Here as we already know from design what the system is going to be able to achieve, we start creating communication material, training material and promotion material around it. We start assembling help resources and other documents at this stage.

In short this socio-technical design process offers a comprehensive method to study and design systems within their use context. It helps ensure that system is designed keeping in mind all aspects from design to financial to social. It helps in using tools from different sciences to provide designers with a means to capture system usage and its parameters in minute details. It allows non-programmers but domain experts to play a pivotal role in software design. Further it allows creation of a common vocabulary between system designers and users which can translate into effective design.

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