Design patterns in products

Special project report

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The special project

'Design patterns in products'

by

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Is approved for the partial fulfillment of the requirements for the post graduate degree of

Master of Design in
Industrial Design

at

Industrial Design Center,
Indian Institute of
technology, Bombay.

…… Guide

……. Internal Examiner

Acknowledgement

I am grateful to my project guide

Prof. A. Joshi for his guidance and encouragement throughout the project. His able guidance gave me an insight in to this field.

I am thankful to the faculty members for their suggestions and inputs given at every stage of the project.

I am thankful to all the people who have directly and indirectly contributed to complete this project.

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1. About patterns :

About 20 years ago, Christopher Alexander an architect established the concepts of patterns through his breakthrough books ‘Timeless way of building’ and ‘A pattern language’.

He found out that though the quality of a well-designed building is sublime and hard to put into words, the patterns themselves that make up that building are remarkably simple and easy to understand.

Patterns are not abstract principles that require you to rediscover how to apply them successfully, nor are they overly specific to one particular situation or culture. A pattern describes possible good solutions to a common design problem within a certain context, by describing the invariant qualities of all those solutions.

Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem in such a way that it can be used millions times without ever doing it the same way twice.

In each pattern, solution is stated in such a way that it gives essential field of relationships needed to solve the problem, but in very general and abstract way.

So that you can solve the problem by yourself in your own way by adapting it to your preferences and the local conditions as the place where you are making it.

He and his colleagues came up with some 253 pattern's set which involved a work of around 8 years.the patterns lie in the area of architecture. They differ in scale, from city planning, structure of towns to community centers, shopping complexes and up to doors,walls,alcoves etc. The 253 patterns were neatly stated and categorized with examples and contexts.

The patterns can be used as a guide to improve the town or neighborhood. They can be referred to design a house, they can be used to make good public buildings,workshops, or offices.

The patterns are further ordered beginning with larger scales to smaller to help form a 'language' of the patterns. The patterns make connections or interlink to some others,thus forming networks of them. Each pattern is supported by other patterns of same size, same time it is embedded in larger patterns and has few patterns embedded in itself.

The large level patterns are embellished by smaller ones and the embellishments are further embellished by lower levels.

At the end Christopher states that similar languages can be developed for any field and can be further evolved.

An example of pattern can be given as

Patterns 112 - Entrance Transition pattern :

While explaining about the entrance to a house he came up with this pattern-

"Make a transition space between the street and the front door. Bring the path which connects street and entrance through this transition space, and mark it with a change of light, a change of sound, a change of direction, a change of surface, a change of level, perhaps by gateways which make a change of enclosure, and above all with a change of view."

This pattern describes what one must do to a doorway so that someone entering it feels as though they are coming into a private, safe space(a house).
There can be different ways to make the transition, and it can be created by your own method,but what the pattern states is, transition should exist in some form. The pattern points out the importance of the core idea behind the entrance space.

In simple words a pattern is providing a common good solution to the set of similar problems confined to one specific area.
The problems are not solved directly but the core principle behind all similar problems is identified and resolved in such a way that each specific problem in the set can be solved in different way using the same principle.

2. Extensions of pattern language:

The pattern languages are evolved in software field in recent years.

In object oriented programming the patterns are quite well defined similar to Alexandrian patterns by few software engineers. The patterns are concrete enough to immediately put into practice, with good results and yet sufficiently abstract to apply to countless situations.

The work of Jennifer Tidwell and others in the field of HCI have made a lot of difference in solving and simplifying the user interaction methods in software industry.

Though the pattern language development in HCI field is not fully evolved into a complete refined pattern language like Christopher Alexander's work, The additions and attempts are made by large group of people working in this domain.

The connection of pattern languages can be shown across the different fields.

The concepts used in software user interface like wizards, menu items, popup menus,combo boxes have some patterns behind them which were in existence and in use from long time before their use in soft wares.

Many principles which hold true in the field of control panels(of cars, power plants), consumer electronics, book design etc are directly applicable to software field and so as the patterns behind them.

the patterns in interaction area are quite easily extendable to the upcoming fields like virtual reality, sound based interfaces,new generation websites like 3-d websites (which will work on the patterns based on 2-d sites).

3. Focus of project:

The focus of the project was to find out the possibility of developing a pattern language in products.

The products with which we interact all the time throughout the day, may have identifiable principles in common behind them. The patterns if found can be converted into a language and can prove helpful for designing the products to be more usable and convenient.

For the initial stage, only a category of products is taken into considerations for this effort. I tried to find some of the possible patterns underlying in a specific area of products i.e. products in public domain. The public domain products are selected as these products are more specifically governed by function compared to the category of personal products which may be more subjective and are ruled by personal choices, market stimuli and manufacturer's efforts/convenience.

sitting communication time


Personal products



group products



Public products

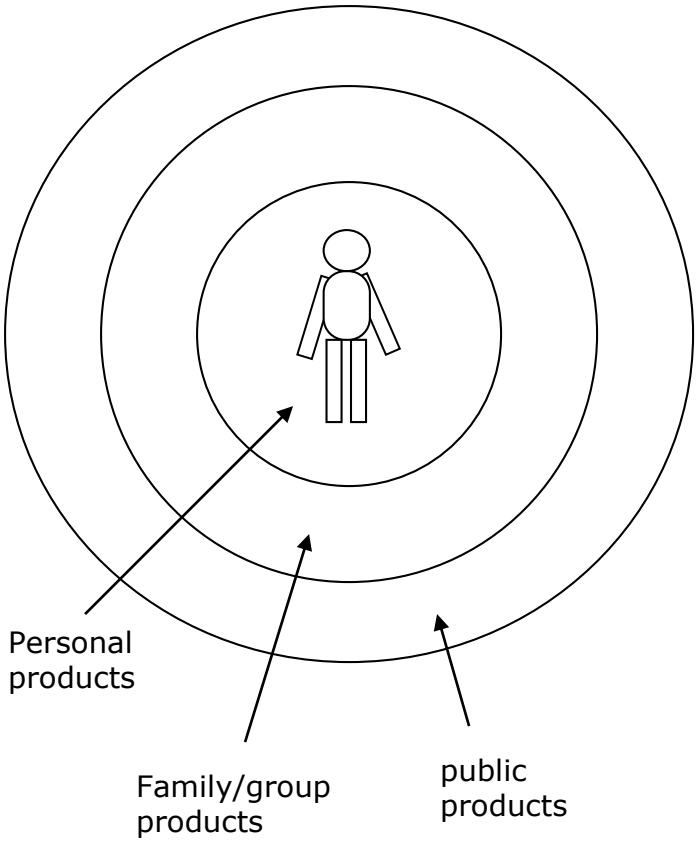
4. Categorization of products:

The products used in public domain are called public products.
There can be three categories of products

The personal products : which are meant for personal use by a single person. The products like toothbrush, mobile phone, wristwatch fall into this category.

The family or group products : the products which are used by more than one person like a car, a sofa set, a refrigerator which are used by a group of people come under this category.

Public products : the products which serve a large category of people with no one having authority on them will fall in public products category.
The local trains, stadiums ,theaters , pay phones etc products fall in this category.



The model of these products can be further built on the way these products are purchased or owned.

In personal products the decision of purchasing the product does not depend on any other person. The choice is done by the person without any reasoning.and the decision is taken solely by himself or his concerned.

In family products the decision of purchasing is done by the head and/or collectively by the family.They are generally purchased by more than one's opinion. And the control on buying process is distributed among a small family(group).

The products for which the person using it are not involved can be taken as public products.
There is possibly no involvement of the user in purchasing decision.The budget etc decisions are not taken by the user directly.

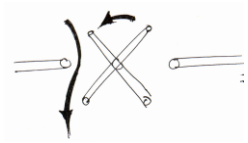
There are some products which lie in the boundary regions according the involvement of the user in decision process.like few office products.

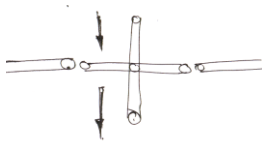
5. Patterns in public products:

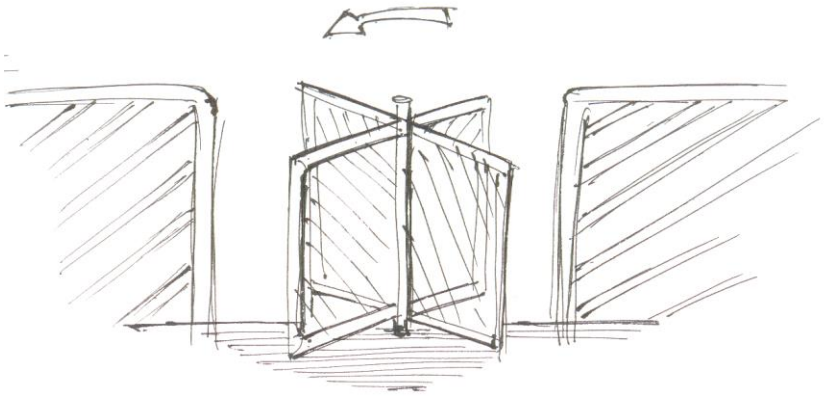
Here I have tried to come up with few patterns observed in public products.

The patterns are not very refined and doesn't form a group or networks like Alexandrian patterns at this stage.

But certainly they exhibit the possibility of developing a pattern language for products on similar lines.







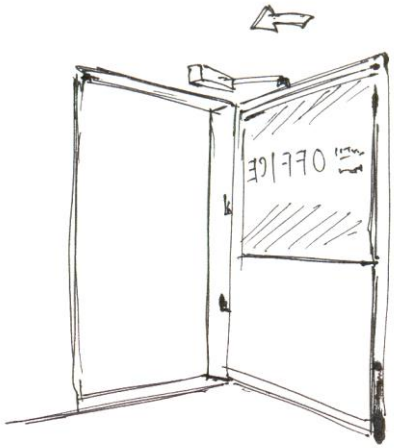
Pattern 1 : Off by default products

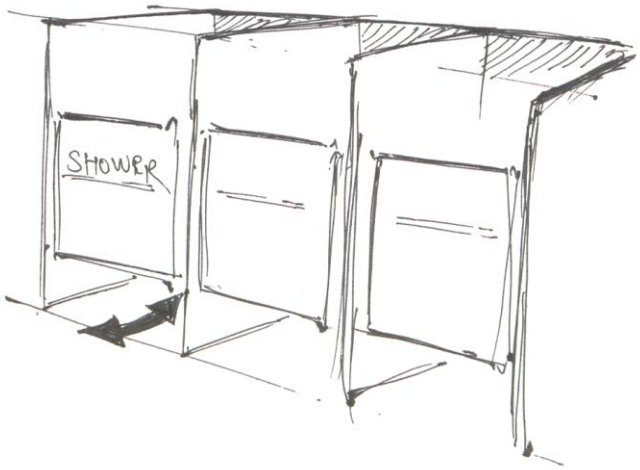
Public products which are not attended by anyone should made to be OFF as their default stage.

Explanation :

- Publicly used products which are not taken care by anyone can be non functional or less efficient because of careless handling.
- People at times can forget or be irresponsible to take care of the products which are used in common places.
- Sometimes the products can be wasteful if proper attention is not given towards them.

1) The circular gates which are used against a small entry. After using it for once, the gate becomes close at its default position.Thus nobody is required to close the gate after using it.This gives an efficient solution to publicly used unattended small entry spaces.



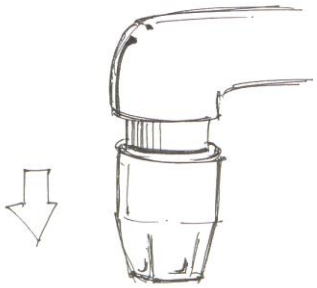


2) The doors of public places like banks, offices, theaters etc are more efficient if they are supplemented with auto close feature.the places which are not attended by guards are often seen to have this feature.Air conditioned places are often observed with auto close doors.

-bank/office doors

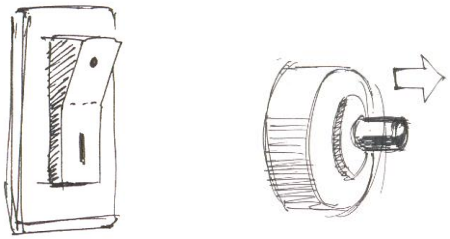
-Public toilet doors

-doors at theaters, airport



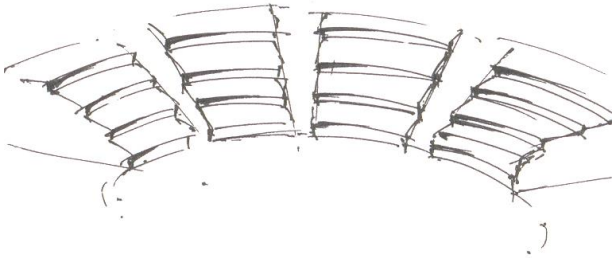
3) The taps which are made to be off by default are more efficient and avoid wastage in public usage compared to normal ON-OFF taps. The ON-OFF taps are often left unclosed,half open in public places.

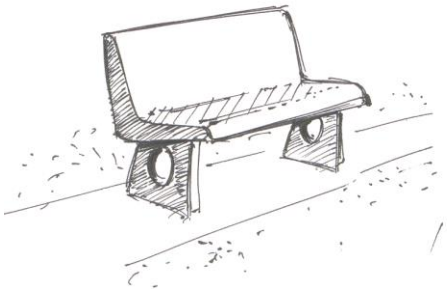
These by default OFF taps are adopted at different places like railway platforms, theaters, and schools where people are in hurry and/or can forget/be irresponsible to close the tap after using it.these taps may be little uncomfortable for using but still it's a good solution to avoid wastage due to irresponsible behavior.

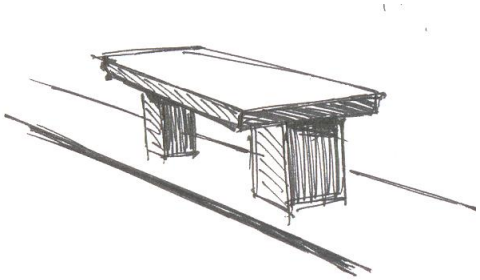


4) The switches, or on off devices(controls) accessible to public are made to be OFF by default.

Cigarette lighter in pan shops,canteens.



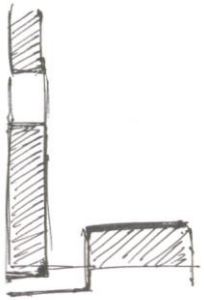




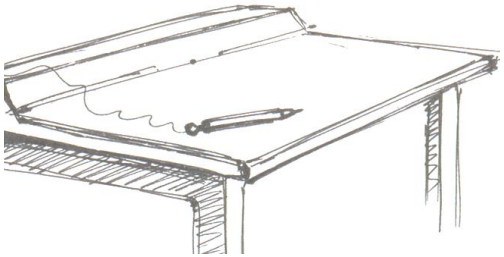
Pattern 2: One state products
Products which can be used in their default stage without any change are more suitable and feasible in public domain. Whenever possible public products should be made to be used in default stage.

Explanation :
Some products are designed in such a way that they will be used by people without any change in their state. These products perform well in public context.
The interaction with the user is minimum with minimum complexity of interaction. The products which are not supposed to interact are both, more convenient for use and easy to maintain.

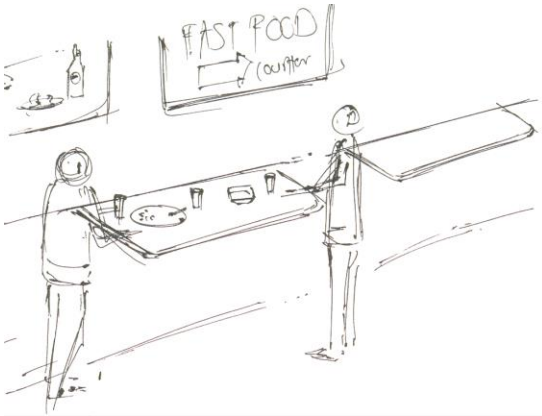
1) Sitting in public places like park benches, stadium seating etc are fixed and rigid. They don’t change or cannot be changed in any way throughout the use of the product. Their positions, place, direction can not be changed. And they may not be much comfortable.but they provide a good and feasible option for public sitting.
The sitting arrangements in local trains is another example.



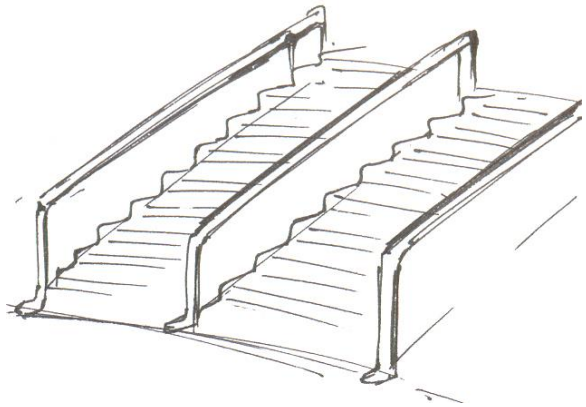
2) The public urinals which are made to be used without water don't require any interaction by the user for using it.



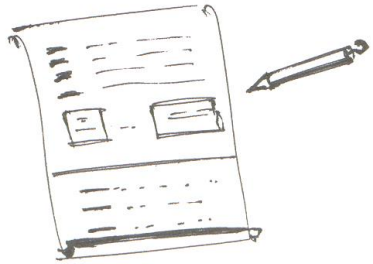
3) The writing pens tied with thread in banks,post offices are without any cap and can be used without interaction, opening etc.

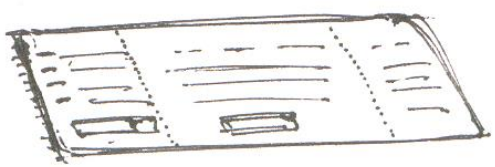


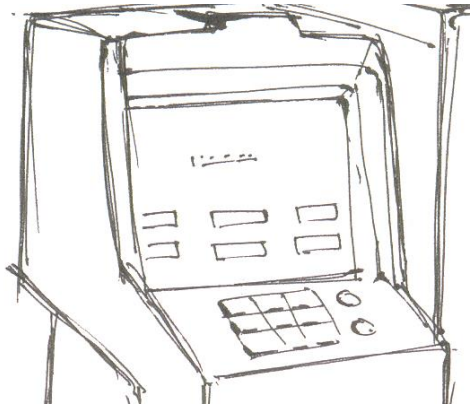
4) The eating platforms (stand and eat) in fast food centers at station are convenient compared to pulling a chair at table.



4) The elevators used at crowded places compared to conventional lifts.





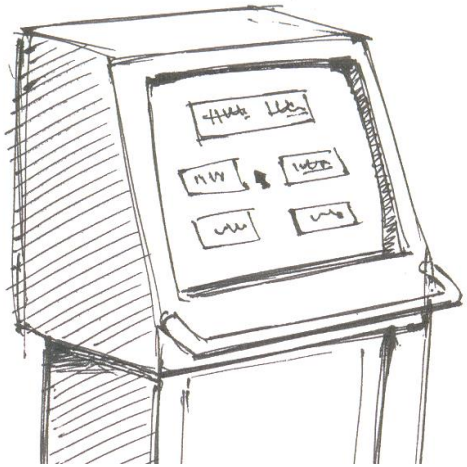


Pattern 3: Constraint controlled interaction
The constraint control approach for interactive products in public domain is better to reduce errors and avoid confusions. Only necessary options should be given to the users as and when required.

Explanation :
-The more freedom can lead to more mistakes and errors in system.
-Users may be new or novice to the systems.
-User needs to know the options from which he will be able to decide and select best suitable option.but at the same time user can get bewildered by the huge no of options.
-By providing less freedom the number of possible mistakes can be reduced.

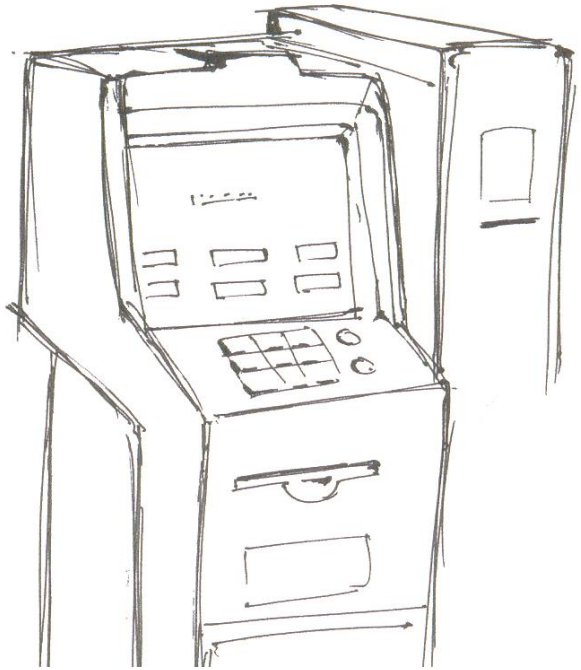
1) -In railway reservation forms the user has to input info with pen and he is free to write anything. Thus the chances of mistakes are more and it may create confusion in the user.

-Compared to that in screen and buttons type of interaction (like pay phone)the user has limited freedom and has less possibilities of errors (not null).



-The touch screen kind of interaction allows only limited option (whenever required) and has even less possibilities of error situation or confusion.

- The dynamic menus and drop boxes at websites changes the contains according to previous information given by users to reduce the possibility of errors.



Pattern 4 A: Authenticating users
Interactive products offering services in public domain should first authenticate the user for eligibility and then interact to avoid unnecessary actions and confusion to user.

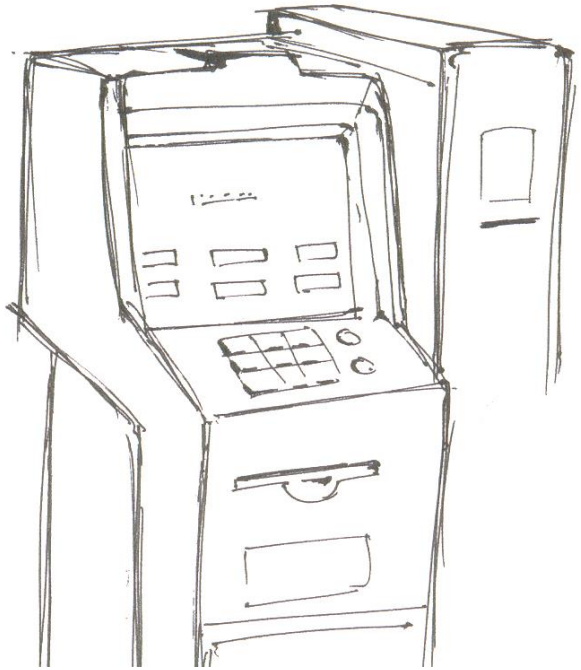
Explanation:
To avoid unnecessary interaction and misuse of the products it is better to verify the user at first place. User may not be having the data to use the system. Thus asking for this data at first place will make the user aware of it at the starting of process only. Unknown users may not be sure about the interaction cause and method.
(in the change vending machine the user may not be interested if he knows that the service is paid one)
-But at the same time this approach restricts people from exploring and experimenting with the products to know and get used to them.

1) In pay phones the tone will start only after the coin is put in the box.(Earlier it used to allow the phone to get dialed before paying.)

2) In some websites registration process the credit card no is asked at the end of feeding all the information(which makes the user to quit the process sometimes.)

3) In ATM’s the user has to first authenticate himself with card and password before asking any other question.

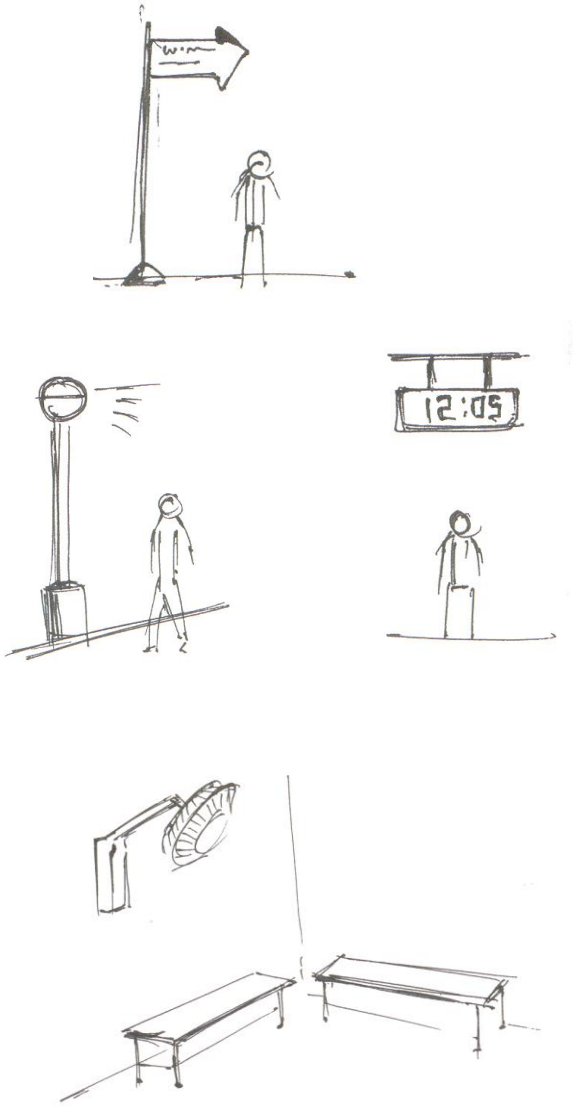
4) In railway enquiry system the ticket number is asked at first place.



Pattern 4 B: Authenticating users
Public products should be kept safe and secure from unauthorized people by locking with different means.

Explanation:
-the protection from unauthorized people can be done in different ways.
- the physical lock and key is used in case of protection of letters in letterboxes.
-Passwords or non physical keys are used in case of websites.
-In case of ATM's there is combination of physical key (card) and non physical key (password).

the products which are protected with more than one methods are more secure. In the case of ATM's both the keys are required to break into the system,which makes it harder to breaking in.



Pattern 5: Out of reach products
Whenever possible the public products should be kept out of reach and inaccessible and still provide the services.

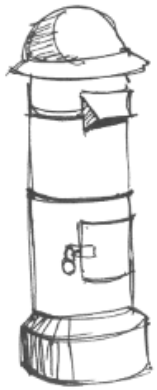
Explanation:
- Unnecessary interference with public active area is avoided by keeping the products as away as possible.
-Unnecessary interaction with the product can cause damage to the products.
-People has at times attitude to tamper and fool around with products (vandalism)which should be taken care of.
- products in which there is no need of physical contact with user should be kept as away as possible.

1) The lights in common places are placed on height in such a way that they wont be accessible normally and still provide ample lighting . e.g. office lighting, local trains ,parks.

2) The public displays, signboards, platform clocks,direction boards etc are placed at heights.

3) In waiting rooms etc. the wall fans are preferred rather than table fans.

4) The voltage meters etc are always kept away from public reach.



Pattern 6: Separation of interfaces
Wherever possible in public products the interaction area and service area should be kept separate from each other.

Explanation:
- the public products are normally required to get serviced quite frequently.(the cash feed to ATM, coins taken out from payphone, change feed to the change vending m/c, letters collected from letterboxes.)
- to avoid the confusion and unnecessary interference and in some sense adopting a black box approach, the user area should be kept as much away from the service area.
-The user interaction area should be kept as much simplistic and clean as possible.

1) the letterbox has two openings. One for putting letters inside the box and other for collecting the letters.

2) the payphones have the coin collection box at the bottom and behind.

3) in ATM's, vending machines, the interaction area is kept as subdued, unnoticeable and separate from the interface area.

Pattern 7: Modes of communication

In interaction with products, the products should communicate with the user in more than one means but the user should be able to interact with product by lesser means.

Explanation:
The lesser the modes of communication with the product, less is the possibility of user getting confused and more is the comfort.

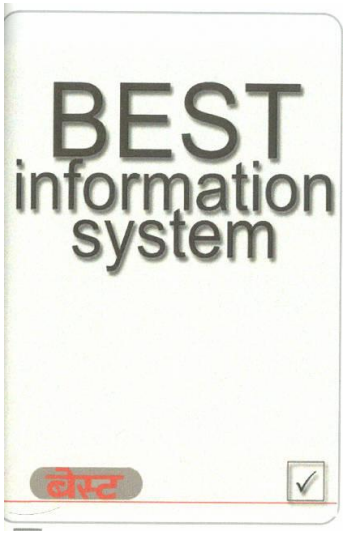
-In touch screen interaction, the user is interacting with the screen for both watching and selecting options. Compared to ATM kind of interaction, where user has to see the output on screen and press the buttons which are away from the screen.

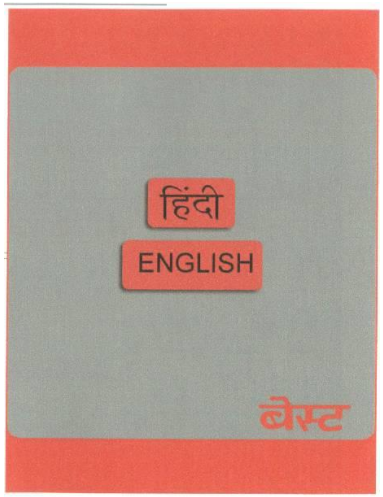
-Some functions in the TV sets are on remote and some are on the control panel. This is a little confusing for the user.

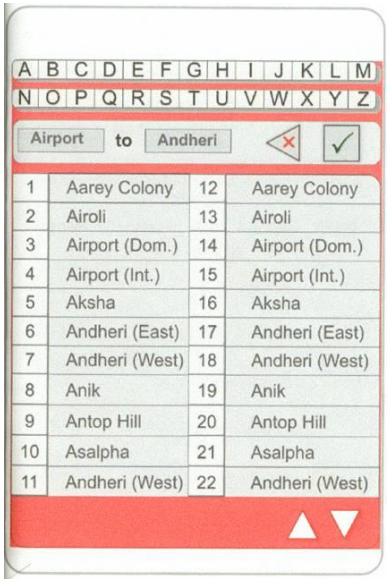
The more the modes of communication from the machine to the user, better are the chances of communication.

-Some phones interact with the user by giving light signals, sound signals in conjunction with tactile signals. This way the understanding of the happening is better for the user.

-The weighing machine on railway platforms uses sounds and light variations to communicate the result of action.







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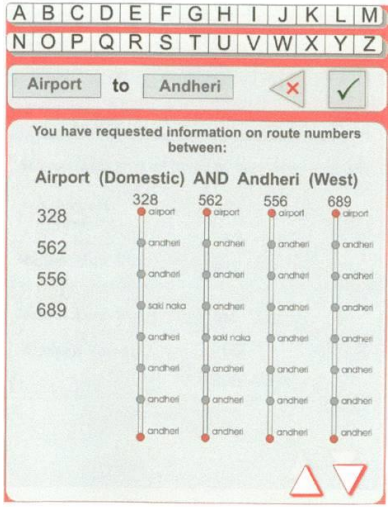

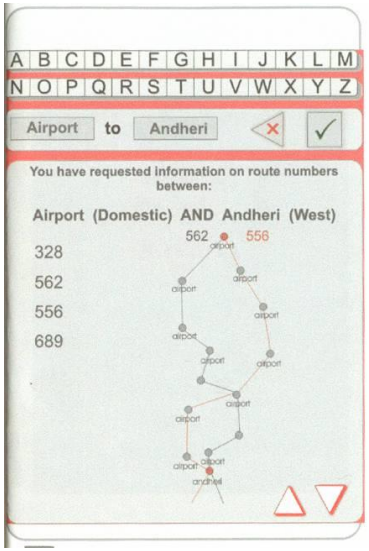

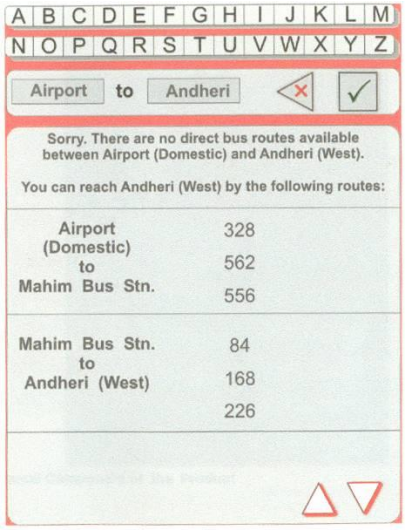

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Conclusion:

-The patterns found out in public domain can be used to make a particular product more public or more personal oriented.

-It is possible to evaluate some specific public products based on the patterns identified. Though the full fledge set of patterns is not developed and the interconnection does not exists, some suggestions can be definitely derived from the pattern set.

- It is possible to come up with a pattern language similar to Alexandrian patterns for products as a whole or for a category.

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