Human-Computer Interaction COMS21301

Public Interfaces

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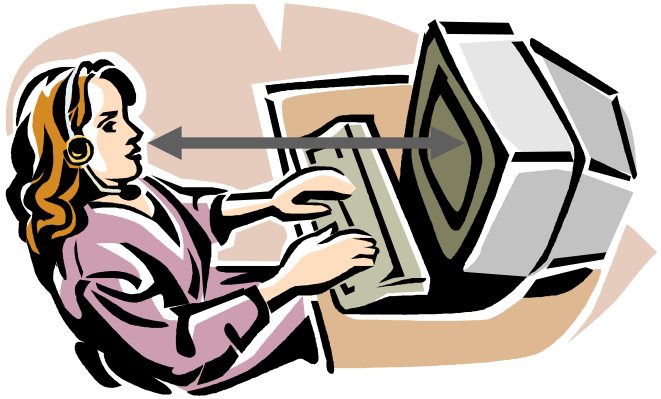
Literature

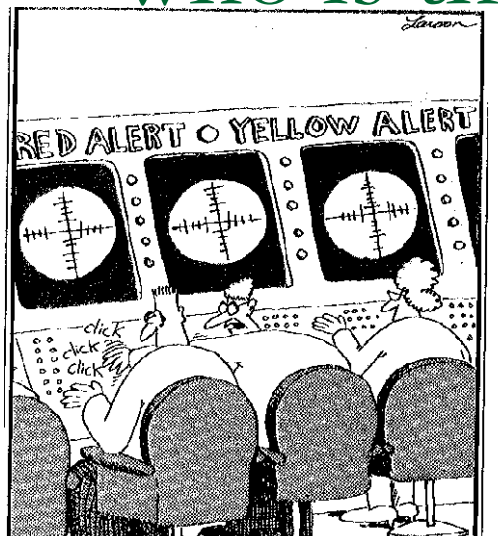
- Laurel, B., Computers as Theatre, Addison-Wesley, 1993.
- Reeves, S., Benford, S., O'Malley, C. and Fraser, M., Designing the Spectator Experience, in Proc. CHI 2005, ACM Press.
- Benford, S. and Gianucci, G., Performing Mixed Reality, MIT Press, 2011.

Traditional model of human-computer interaction

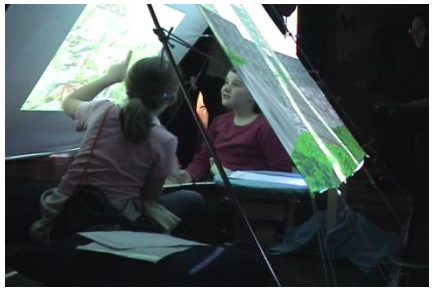


- User produces input
- Machine produces output
- Appropriate design involves making input easy to produce for the user and output easy to understand for the user
- Metaphor: I/O resembles a human-computer window

The reality of the public situation – who is the ‘user’ here?



" OK, Baxter, if that's your game, I'll just reach over and push a few of your buttons."



A recent study found frequent use of cell phones can present a serious health risk to the incredibly inconsiderate.

- Perhaps it would be more appropriate to ask “how are interfaces used?”

One possible axis: Private/Public

- Interfaces may be used in a variety of situations, ranging from private to public
- The exact location of a particular interface on the axis is a function of properties and ‘the context’
- Traditional interface design considered private
- Metaphor: I/O ranges from a window to a whiteboard
- Problem: what aspects of interaction are made available to bystanders and how this is achieved?

Input vs. Manipulation

- Consider the primary ‘user’ as a performer
- Manipulation serves two roles in varying proportion: input; and allowing others to perceive that input
- Includes anything sensed by the interface **plus anything not sensed by the interface**
- Manipulations are sometimes functional and sometimes artistic (c.f. piano playing)

Output vs. Effect

- Effect also serves two roles in varying proportion: output; and allowing others to perceive that output
- Includes results of manipulations, serving performer and serving audience (‘content’), as well as reactions (deliberate or involuntary) and effects on the performer themselves

Describing Manipulation-Effect space 1. Partially Revealing

- Effects and manipulations may be partially revealed
  - either as a result of the scale of the interface or distance of the spectators (e.g., PDAs, mobile phones)
  - or perhaps through more explicit means (e.g., we could redesign presentation tools so that background user interactions were prevented from being projected along with the primary content)

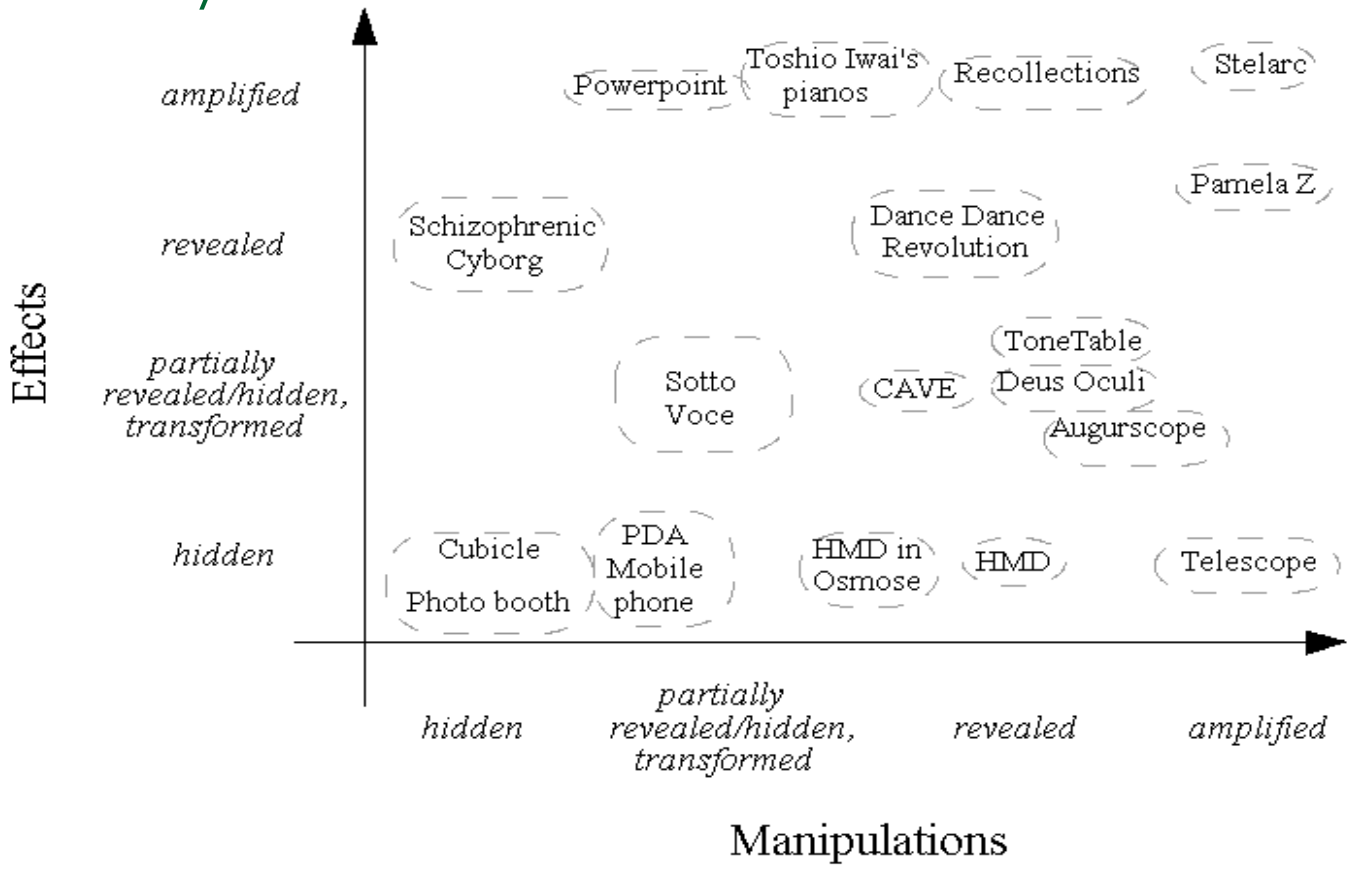
Describing Manipulation-Effect space 2. Transforming

- We may transform manipulations
  - E.g. by using non-linear algorithms or by aggregating multiple inputs when mapping them onto effects, as employed by artists to introduce an element of unpredictability or ambiguity to an interface in order to provoke curiosity and reflection
  - Or alternatively, manipulations may be transformed into unrelated actions by a performer in order to mislead spectators, such as a magician's intentionally misleading bodily conduct that hides the methods employed to produce a trick

Describing Manipulation-Effect space 3. Amplifying

- Performers may deliberately amplify their manipulations and effects rather than merely reveal them
  - As with partial revelation, this may be as a result of physical scale (manipulations of a large device are inherently more visible), through technical augmentations such as using expressive sensing based interfaces, or by introducing additional visualisations or sonifications of manipulations alongside the primary effects

Two possible axes: extent to which Manipulations and Effects are Private/Public



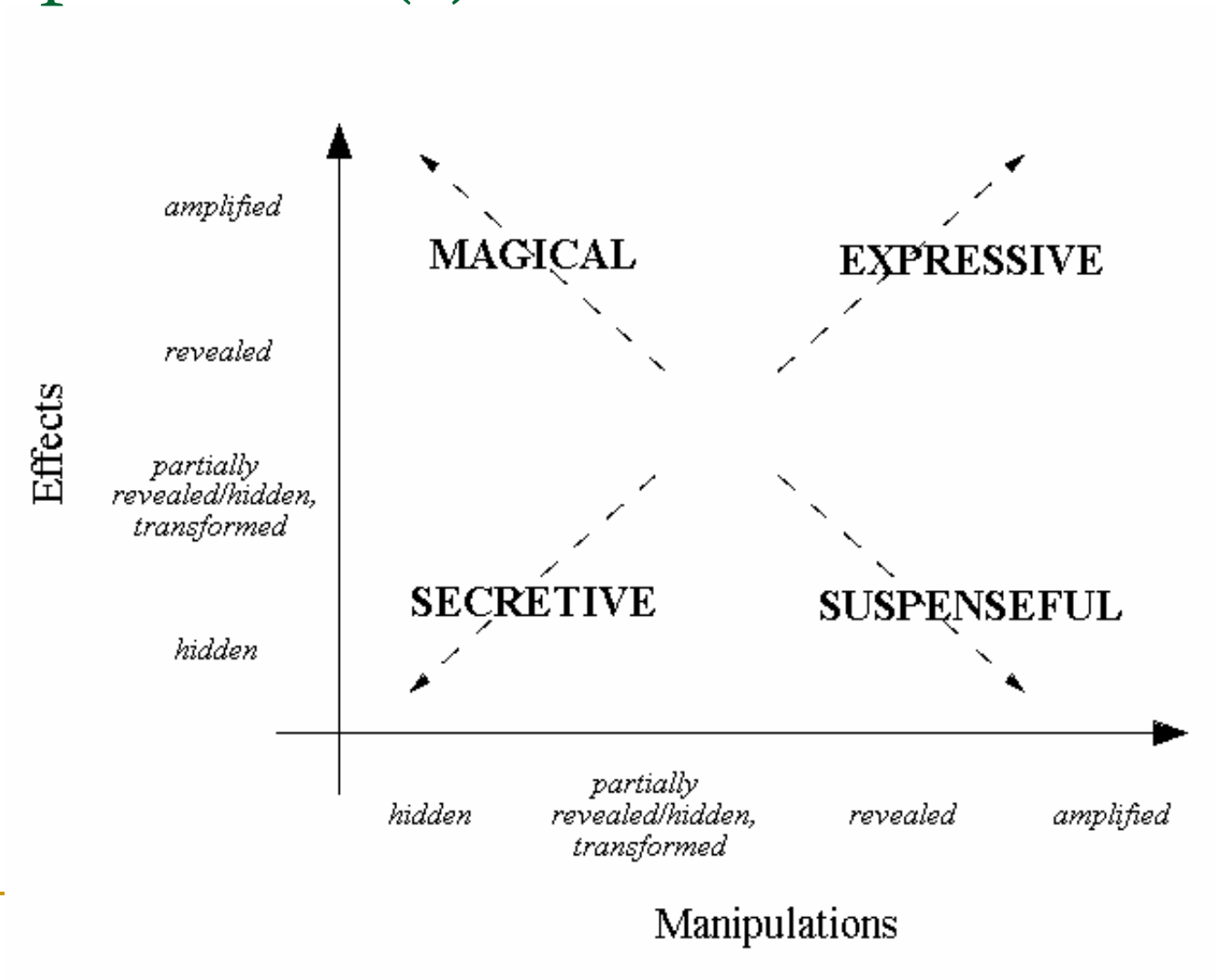
Manipulation-Effect space
1. Conventional Interfaces

- Two areas of the Manipulation-Effect space translate back to our original argument
- Bottom left: hidden manipulations, hidden effects
  - Traditional private interaction, both manipulations and their effects are hidden from spectators
- Top right: amplified manipulations, amplified effects
  - Very public interaction, both effects and manipulations that cause them are revealed to spectators

Manipulation-Effect space
2. Less traditional Interfaces

- Top left and Bottom right are somewhat less conventional
- Top left: Hidden manipulations, amplified effects
  - Magic-like effects, including ‘wizard of oz’ interfaces such as a performer speaking through a real-time animated character from off-stage
- Bottom right: Amplified manipulations, hidden effects
  - Spectators can watch a performer but cannot share in the content of their experience

Secretive, Expressive, Magical, Suspenseful (1)



Secretive, Expressive, Magical, Suspenseful (2)

- **Secretive** interfaces protect spectators from knowing about the experience until it is their turn, or protect performers from interference
- **Magical** interfaces support magician's skill in ensuring the spectator is only aware of the effect
  - May reveal the performer, making clear that they are causing the effects whilst not revealing the manipulations
  - may completely hide the performer, in order to impress spectators with the implied capabilities of the interface alone

Secretive, Expressive, Magical, Suspenseful (3)

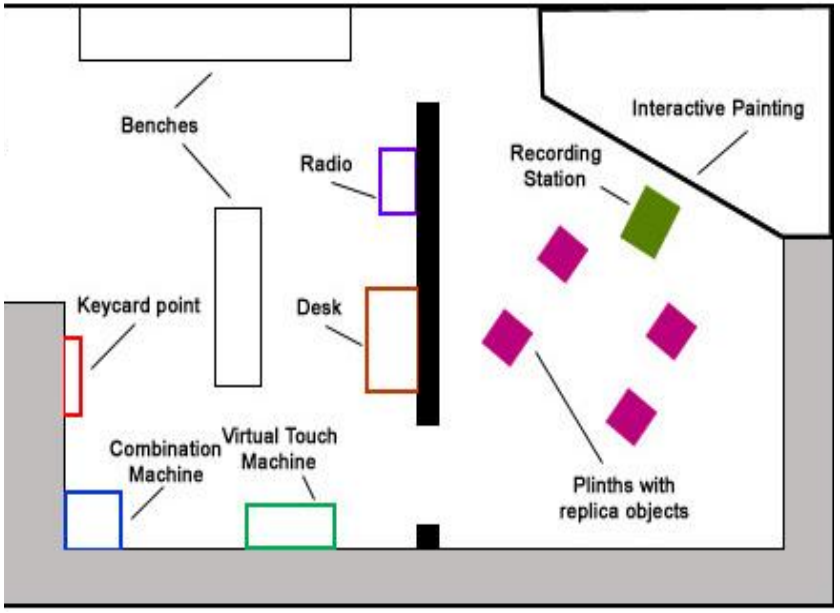
- **Expressive** interfaces entertain spectators by enabling them to appreciate how well a performer is interacting with the system
  - E.g. admiring the skill of a virtuoso user or being entertained by a new user's attempts
  - Attract spectators and then enable them to learn by watching so that they can prepare themselves for their own turn

Secretive, Expressive, Magical, Suspenseful (4)

- **Suspenseful** interfaces may attract spectators by seeing the interaction and may be able to learn something of what to do by observing
  - However, spectators will not experience output until it is their turn
  - Watching others manipulate and react to the interface may serve to build suspense, heightening the ‘payoff’ delivered when it is finally their turn
  - Particularly appropriate in situations where visitors have to pay for each individual experience, for example interactive rides in theme-parks, in which case only those who pay experience the actual content, while people who are in line waiting their turn experience a heightening of suspense.

Expressive: Re-tracing the past (Hunt Museum, Limerick)

- Attract and enable learning by watching
- Classification and description of objects sometimes difficult
  - Embed visitor opinion into interaction
  - technologies where same effect cannot be achieved by traditional means (e.g. docents, object handling sessions)
  - Allow traditional and novel components to co-exist


Benches
Radio
Recording Station
Interactive Painting
Keycard point
Desk
Combination Machine
Virtual Touch Machine
Plinths with replica objects

Will and his mum

M: Oh its dad
((Radio playing audio recording)): “I think the Oxford Disc is a pendant used for a necklace it has a hole in the top...”
W: ((pointing at radio and looking at M)) That’s what everyone says! (1.2)

((M hits his own leg with his fist))

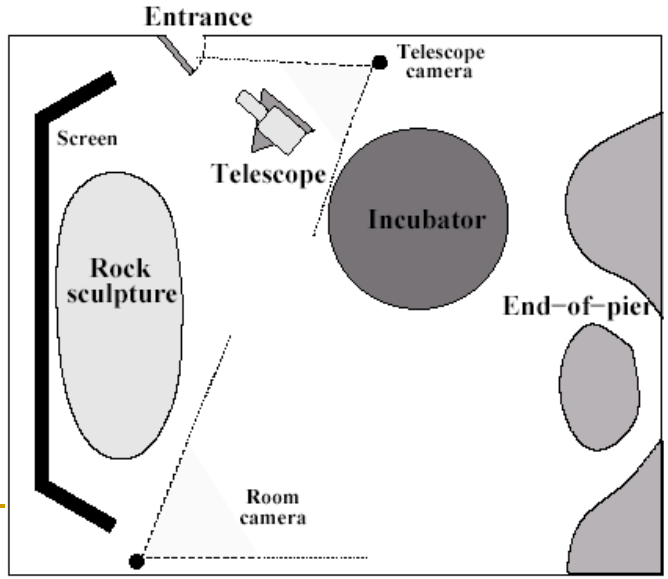
Expressive Interfaces

- Visitors will leave opinions if design of exhibition prioritises the importance of opinions
- Opinions are not just personal, but form an important part of the quality of the overall contribution
- Exhibit designs can succeed by emphasising the expressive manipulations of visitors just as well as the expression of designers and curators

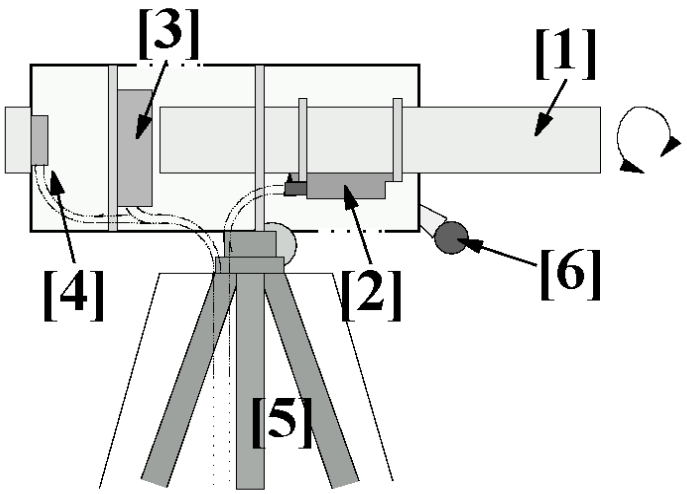
Suspenseful: One Rock (Lanternhouse, Ulverston, Cumbria)

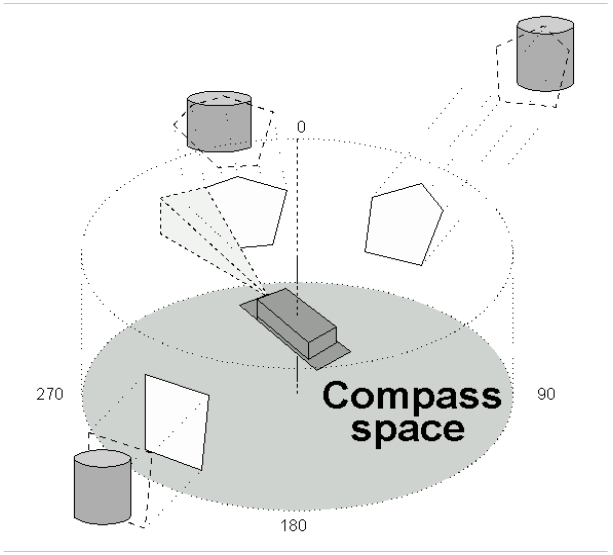
- Artistic aims

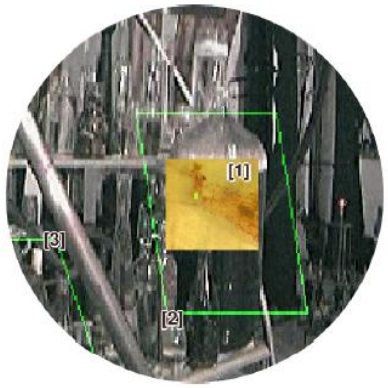
- Enable exploration of videos of the area
- Create fascination with the ‘mundane’
- Display microbiology of specific location

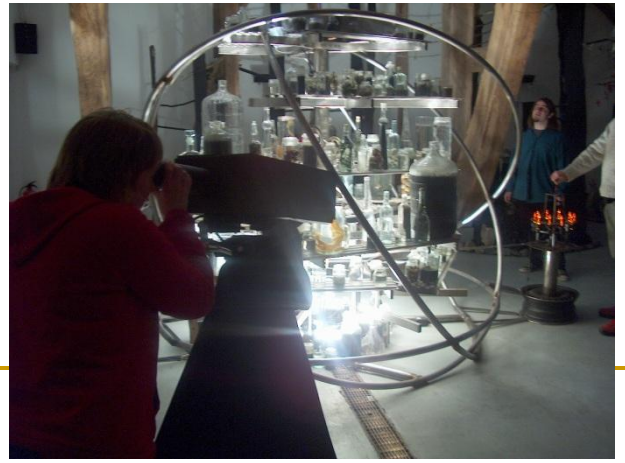

Entrance
Telescope camera
Screen
Telescope
Incubator
Rock sculpture
End−of−pier
Room camera

The Telescope: A Suspenseful Device









Tom and Sally





- **S**: What am I looking at? (4.0) Can't see what I'm looking at ((jogs Telescope as she moves up))
- **T:** Right oh there you go you've got something y- you've on screen ((points at eyepiece)) now you've act- you've picked something up you've picked a beastie up there you've picked a blob a live microbe
- ((moves up, some magnetic field jitter occurs))
- **S**: Have I?
- **T**: Yes can you see what it is?
- **S**: Nooooh!
- **T**: Oh it's gone now ummm
- **S**: What that blue there was a blue ((Tom pushes the Telescope's view to the right in order to get the focus inside the region))
- **T**: Try and line it up with the green squares ahh there you go yeah yeah those are living- ((Tom hands over the Telescope to Sally)) living microbes in the inside the jars
- **S**: Oooh my lord

Suspenseful Interfaces

- Designs need to exploit transitions
  - Consider how frequent and fluid such transitions will be, choosing technologies accordingly
  - Handing over a wearable display such as an HMD will be more difficult than walking up to and away from a stand-mounted display; but even stand-mounts provide some difficulties with stability and sensor jitter
- Techniques such as automated sensor-down time or explicit handover declaration retain the ability of performers to animate surprising features of suspenseful interfaces to spectators during handover

Conclusions

- Expressive interfaces can prioritise the sense of public ownership of a technical installation
- Suspenseful interfaces provide interesting public designs but require consideration of handover capability
- Moving away from user-machine design to consider transitions and broader effects of the situation of technology in museums and other public spaces
- Public design requires much more consideration of use rather than user