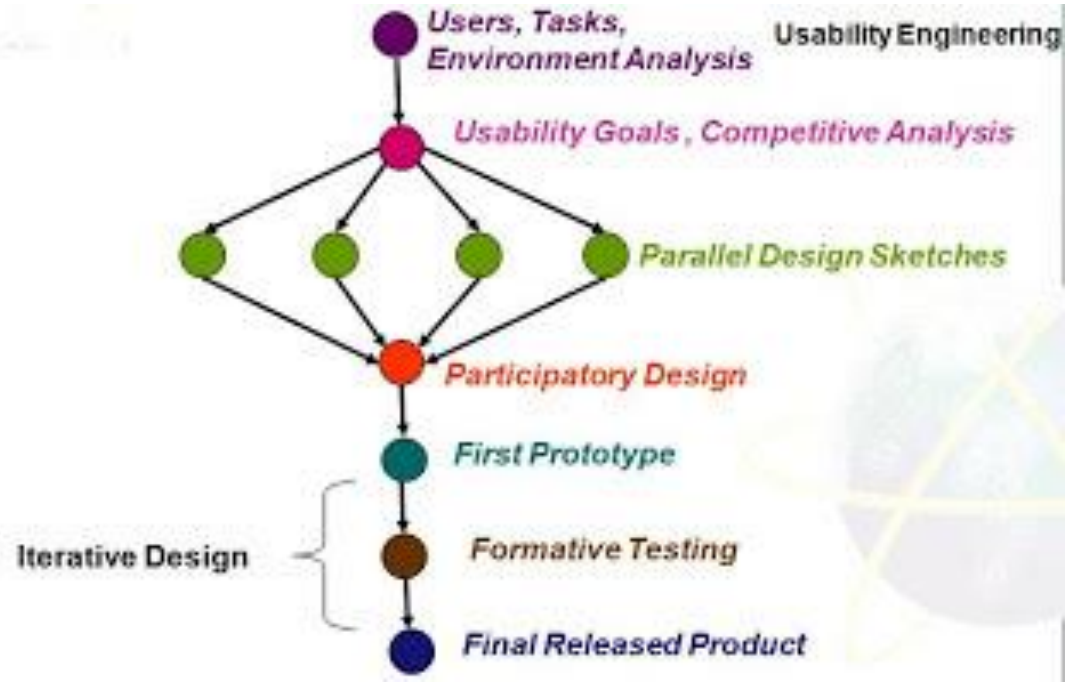
PR(E/O)TOTYPING

Lecture 6

Outline

- Usability engineering & UCD
- Prototyping
- Pretotyping

Usability Engineering



Prototyping

- A limited representation of a design that allows users to interact with it and to explore its suitability
- Allows stakeholders to interact with the envisioned product, gain some experience of using and explore imagined uses
- E.g. paper-based storyboards of a system, cardboard mockup for a desktop laser printer, hyperlinked screens

Prototyping

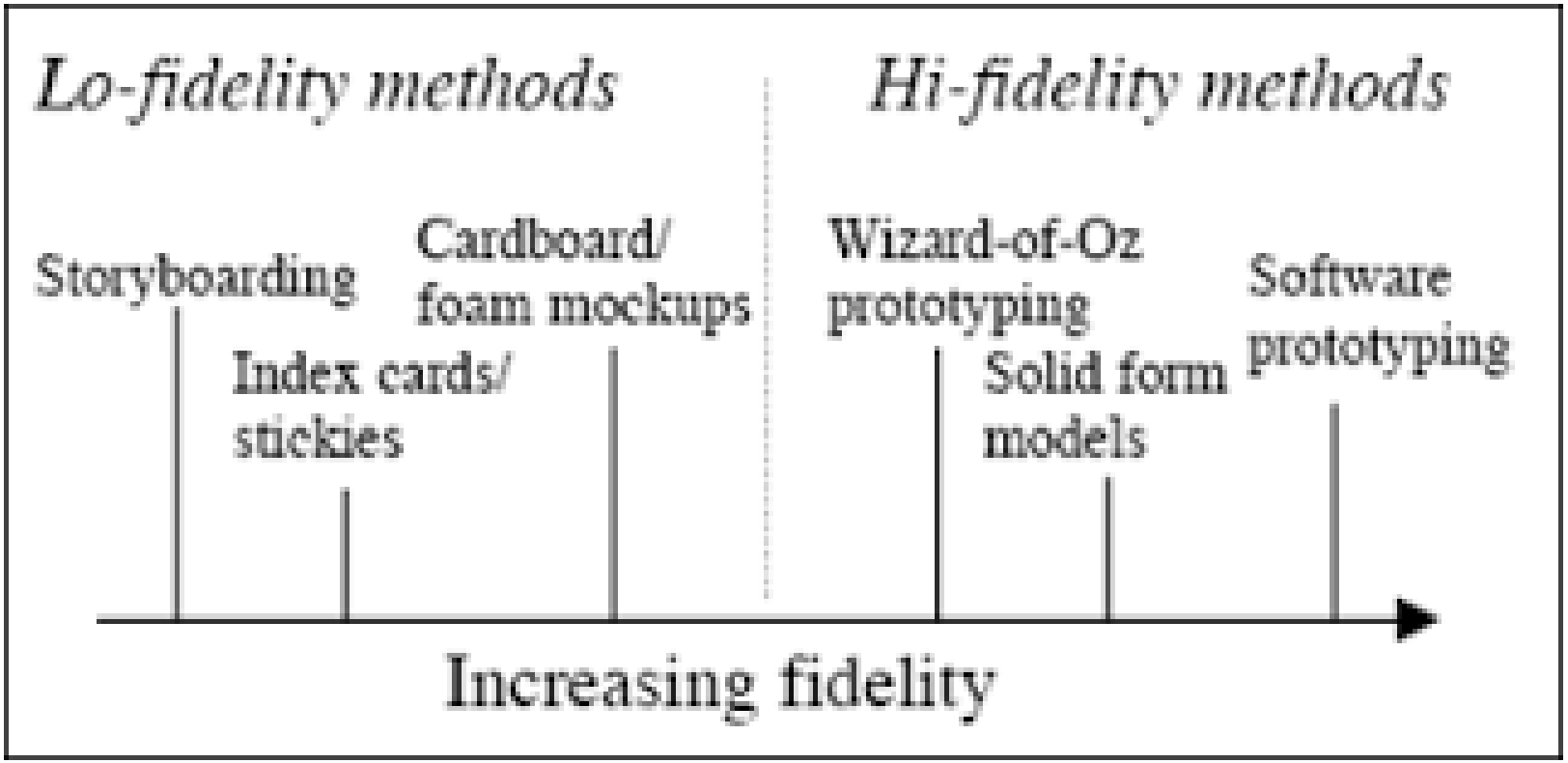
- Reid Hoffman, founder of LinkedIn once said:

- “If you are not embarrassed by the first version of your product, you’ve launched too late.”

Why use prototypes

- Communication device among team members
- Test out technical feasibility of an idea
- Effective way for user testing/evaluation
- Clarifying vague requirements
- Check if the design direction is compatible with the rest of the system development
- Recommended in software design, to come before any writing of code

Prototypes Types



LOW FIDELITY PROTOTYPING

- The prototype only retains **limited characteristics** of the final product

- They are cheap and quick to produce - therefore, they support the exploration of alternative designs (multiple iterations)

- They are particularly good for:

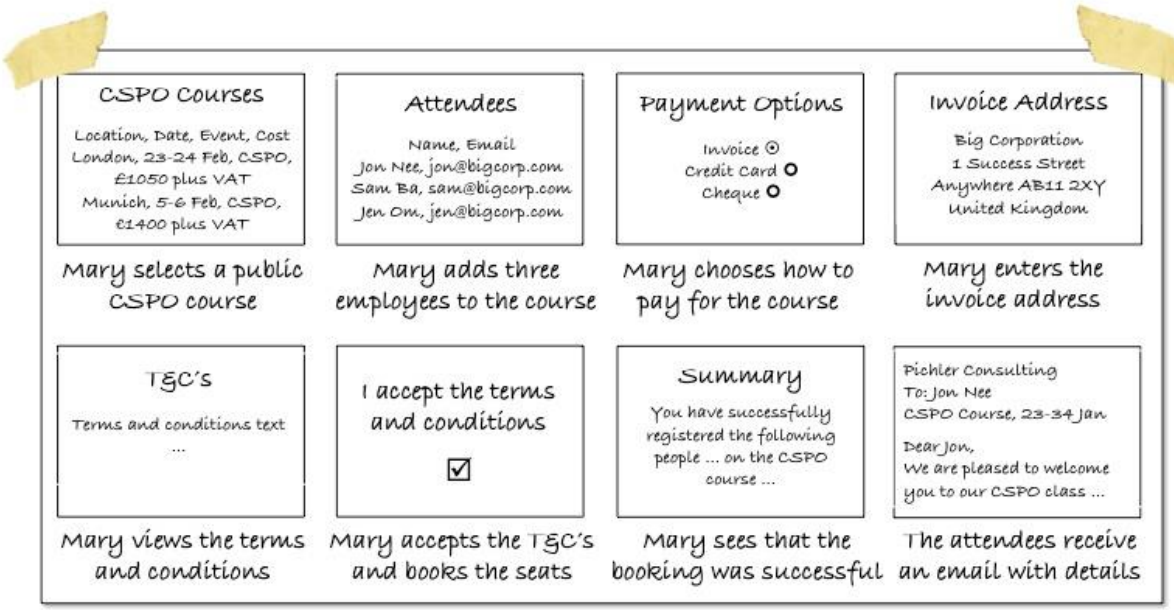
  - Considering early design issues, e.g. layout of controls and display items, sequencing, etc.

  - Identifying fundamental problems, i.e. those which lead to errors, confusions, major dislikes

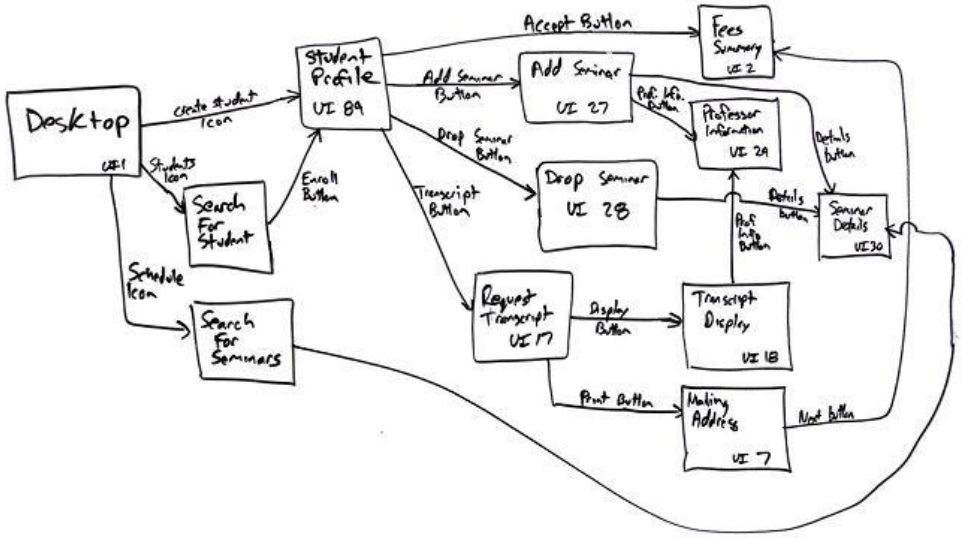
Storyboarding

- Series of sketches showing how a user might progress through a task using the device being developed

- Often based on scenarios - typical activities involving the product/system in a story form, e.g. “a patron wants to purchase Harry Potter movie ticket from the cinema, he uses his mobile phone to make the booking while he is on the bus”



UI storyboarding



- used to model the interactions that users have with your software, as defined in a single use

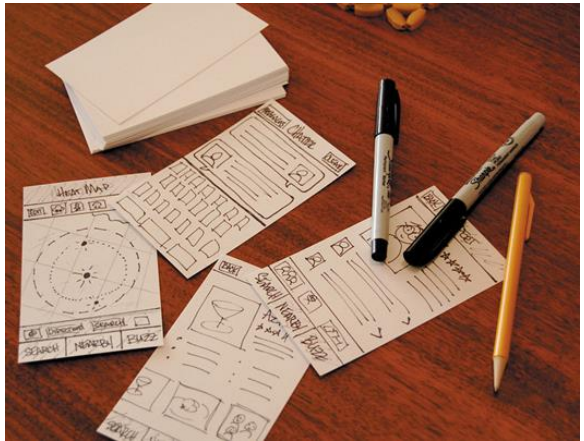
- enable the designer to gain a high-level overview of the user interface. This overview is effectively the combination of all the behavioral views derived from your use cases, the result being called the architectural view of your user interface

Storyboarding benefits

- They help us gather and share information about users, tasks, and goals
- They can spark new design concepts and encourage collaboration and innovation.
- They are a way to share ideas and create a sense of shared history and purpose.
- They help us understand the world by giving us insight into people who are not just like us.
- They can even persuade others of the value of our contribution.

Index Card/Stickies

- Each card/sticky represents an element of a task, one screen or a screen element
- Used in user evaluations where a member of the design team “plays the computer”
- Difficulties encountered are observed and/or recorded



Low fidelity prototypes

- Advantages
  - Evaluate multiple design concepts
  - Useful communication device
  - Easy and cheap to change, many times
  - Lack of polish does not affect user opinion of prototype (obviously isn't finished product)

- Disadvantages:
  - Limited error/usability checking
  - Facilitator driven
  - Navigational and flow limitations
  - Don't simulate computer response time accurately
  - Need to set up and explain conventions for user

HIGH FIDELITY PROTOTYPING

- Retains many of the characteristics of the final product
- Time consuming and expensive to develop, however:
  - Enable a wider range of usability issues/ problems to be considered/uncovered
  - Enable other quality attributes such as aesthetics to be evaluated
  - Impress management, serve as a good marketing and sales tool
  - 3D form with some limited interaction possible
  - A range of materials may be employed
  - Very useful when the physical fit/feel of the product is critical, e.g. a handheld device, a wearable device

Software Prototyping

- Computer-based mock-ups of interface enabling sophisticated user-system interactions

- Variety of prototyping tools exist to support developers with differing levels of fidelity:
  - MS PowerPoint
  - Authorware
  - Macromedia Flash
  - Macromedia Director

HIGH FIDELITY PROTOTYPING

- Advantages:
  - Complete functionality, look and feel of final product
  - Fully interactive
  - User-driven
  - Marketing/sales tools
- Disadvantages:
  - Expensive to develop
  - Time-consuming to create
  - Not effective for requirements gathering

COMPARING PROTOTYPING

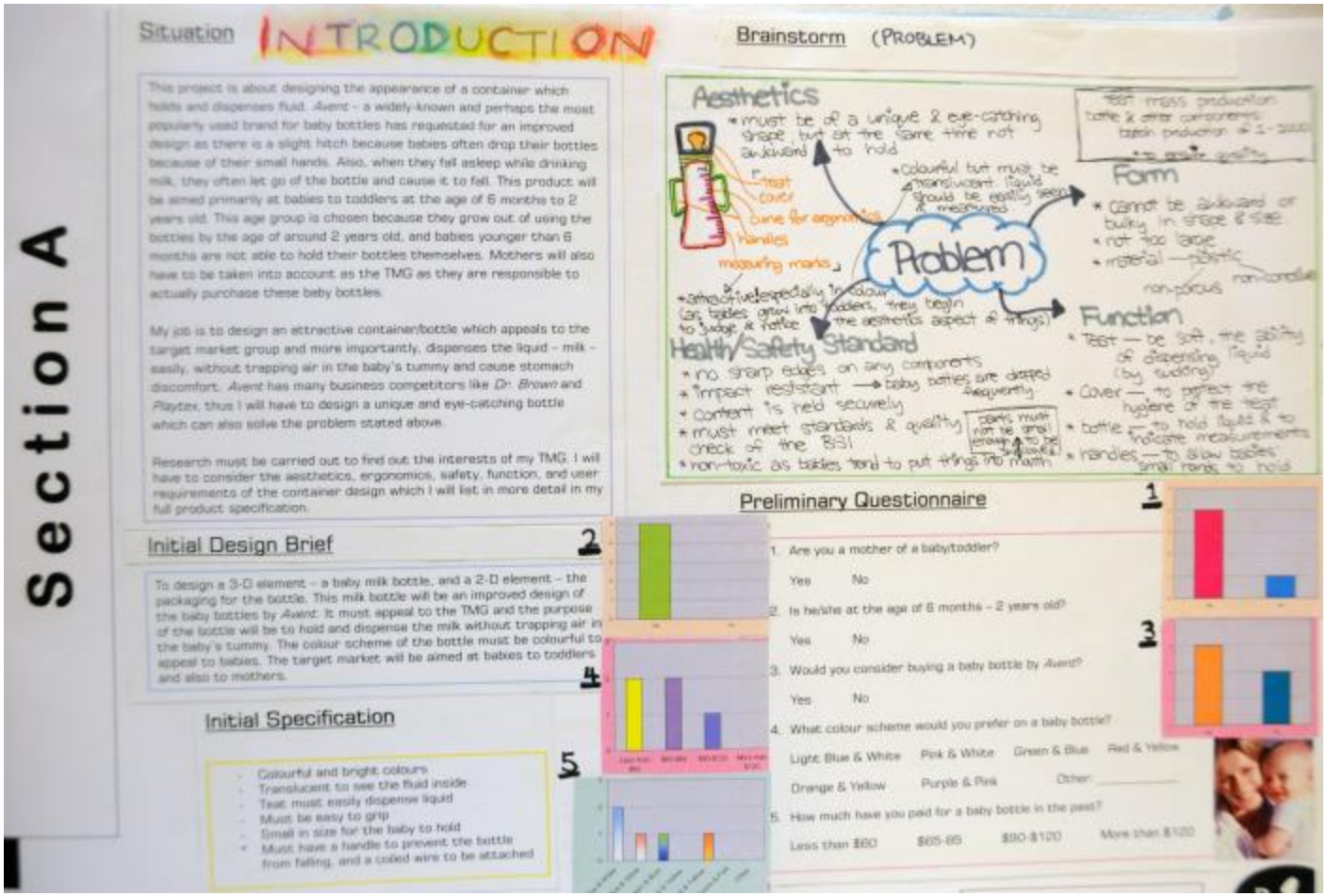
	Time to construct and evaluate	Number (and %) of major problems revealed	Average number of problems revealed/user
Lo-fi – cardboard	Approx. 3 days	14 (67%)	8.5
Hi-fi – touch screen	Approx. 3 weeks	19 (90%)	13.5

Baby-bottle design

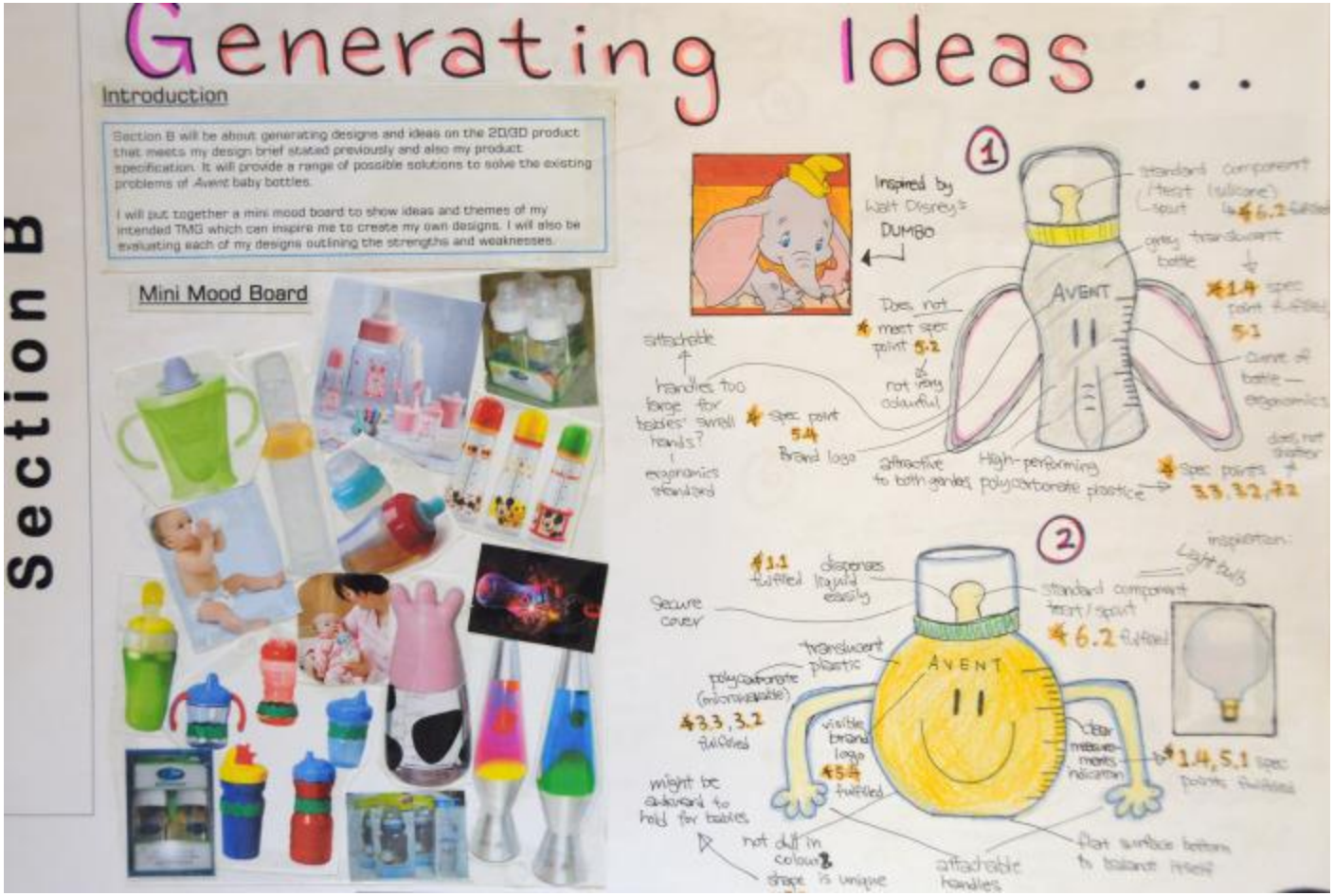
- http://jesschowdesign.com/portfolio/product-design/baby-bottle-design/

- User centered design

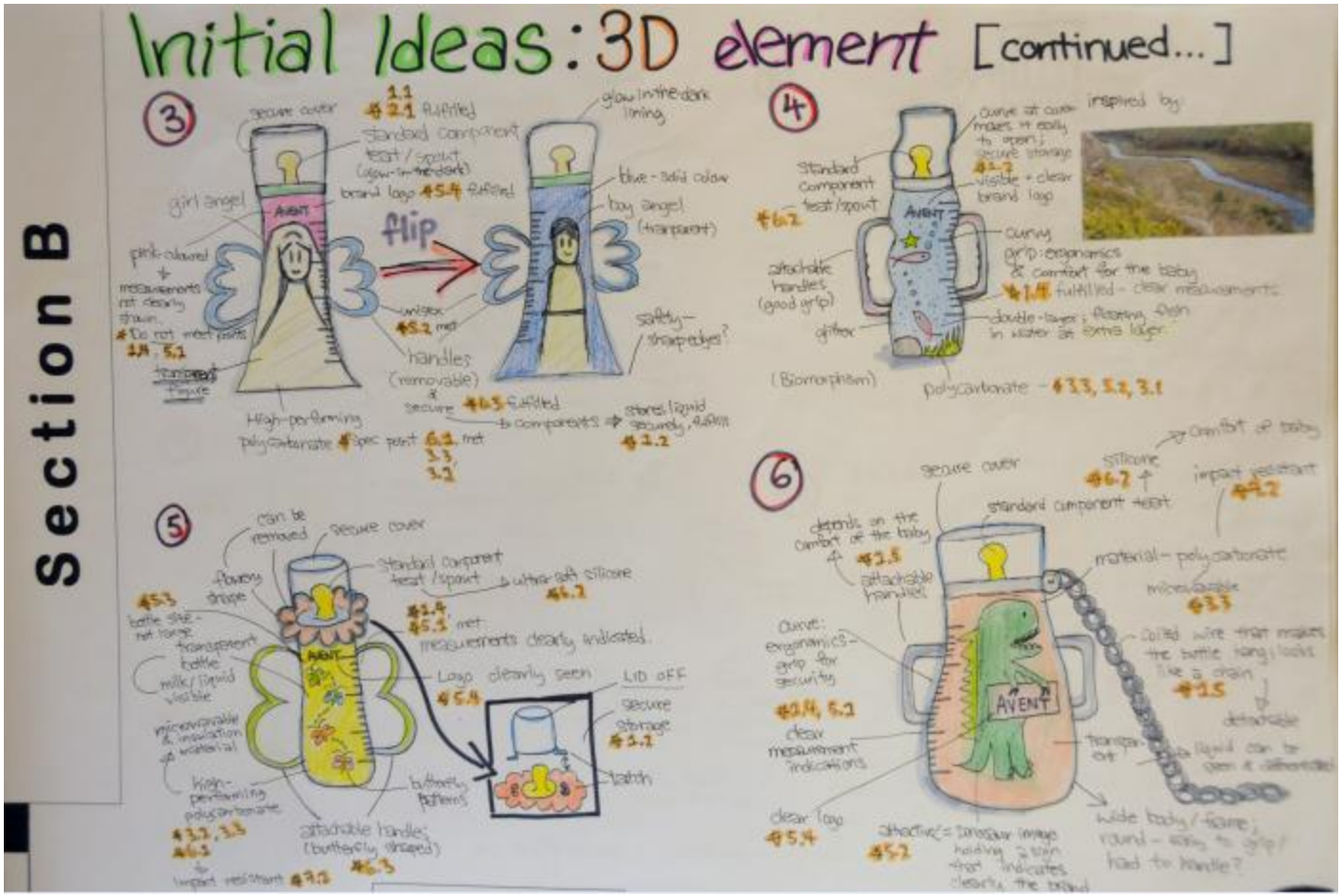
Avent Baby Bottle Design



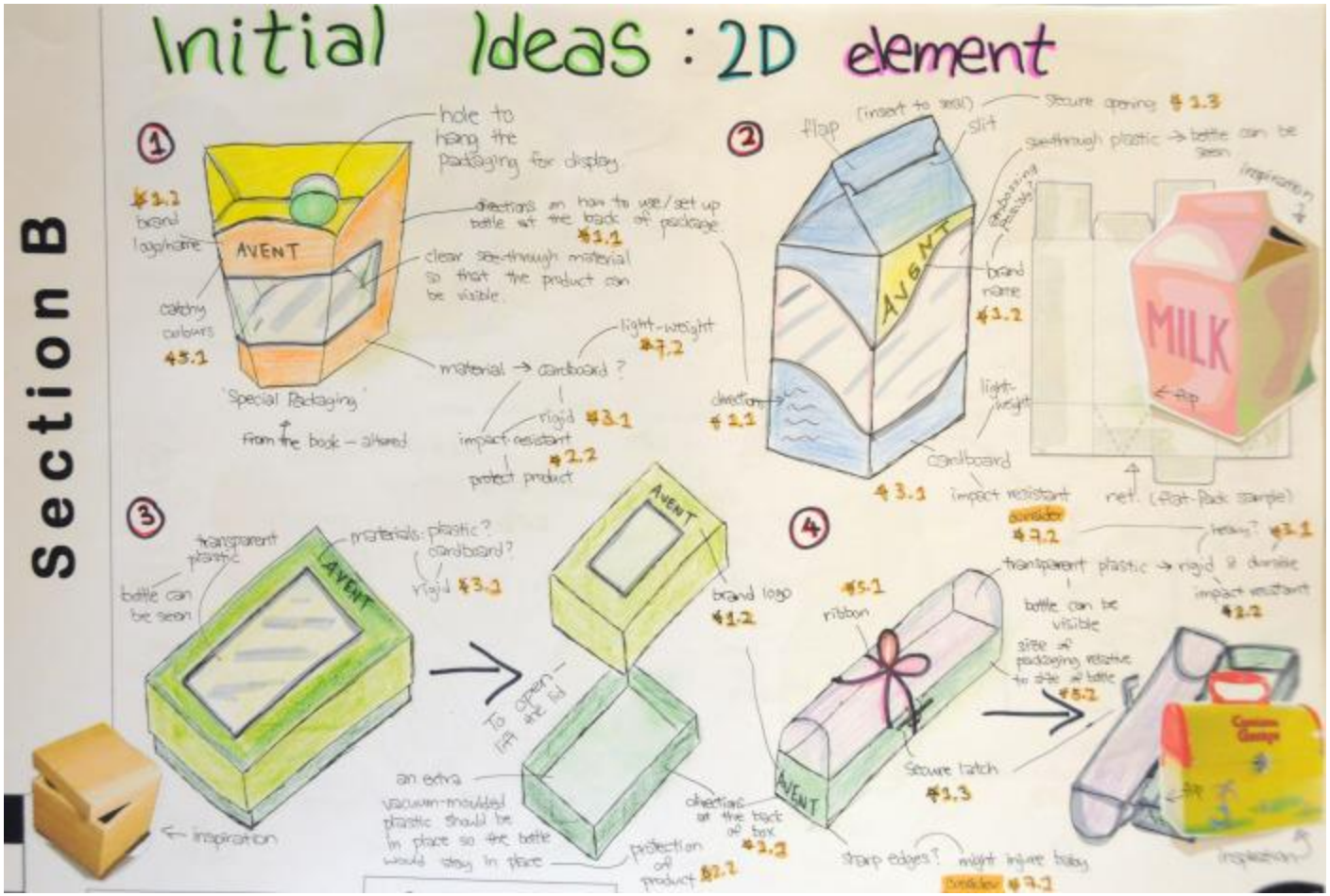
Ideas


Section B
Generating Ideas . . .
Introduction
Section B will be about generating designs and ideas on the 2D/3D product that meets my design brief stated previously and also my product specification. It will provide a range of possible solutions to solve the existing problems of Avent baby bottles.
I will put together a mini mood board to show ideas and themes of my intended TMG which can inspire me to create my own designs. I will also be evaluating each of my designs outlining the strengths and weaknesses.
Mini Mood Board
Inspired by Walt Disney's DUMBO
AVENT
AVENT

Ideas

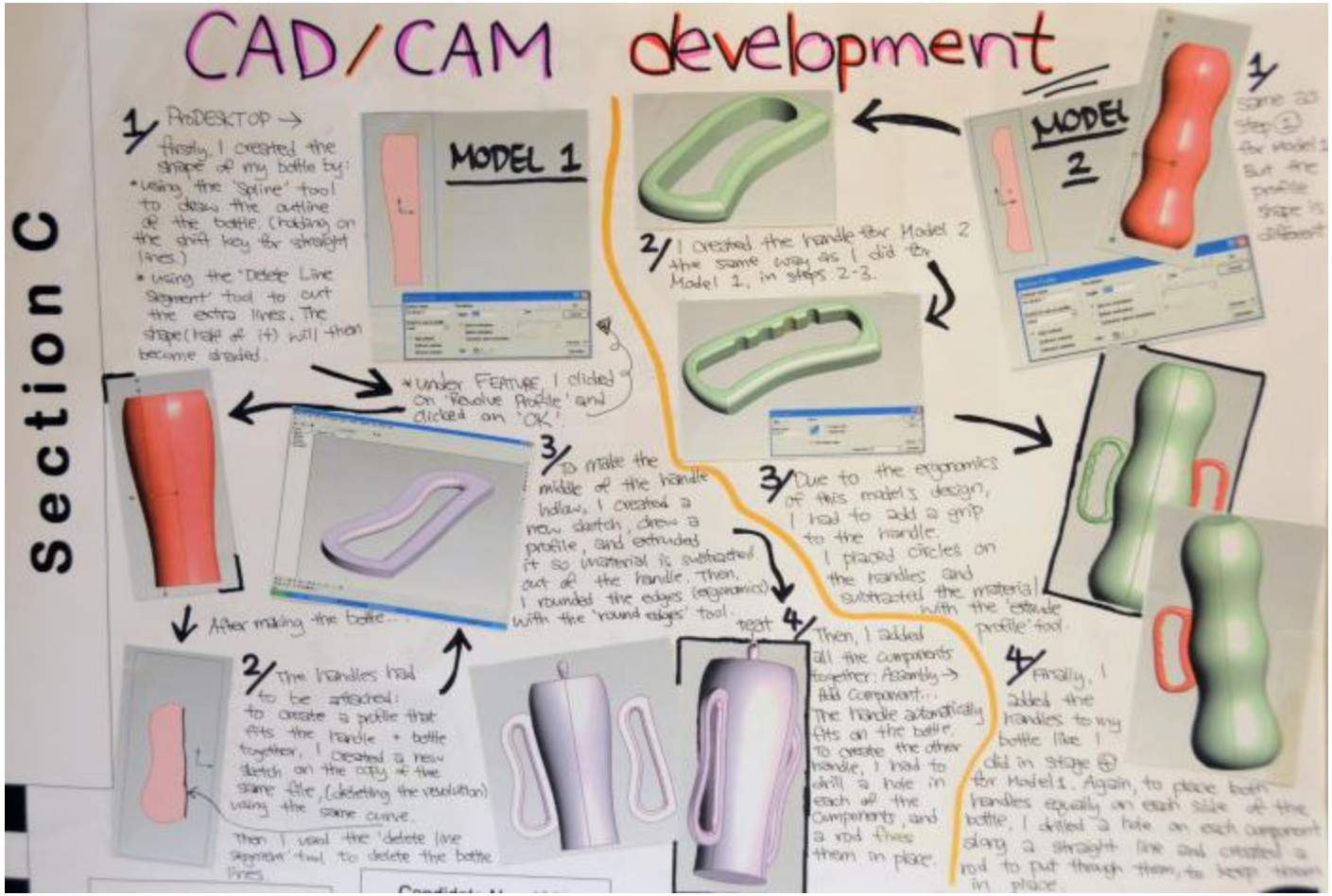

Initial Ideas: 3D element [continued...]
Section B
3
flip
4
5
6
AVENT

Ideas

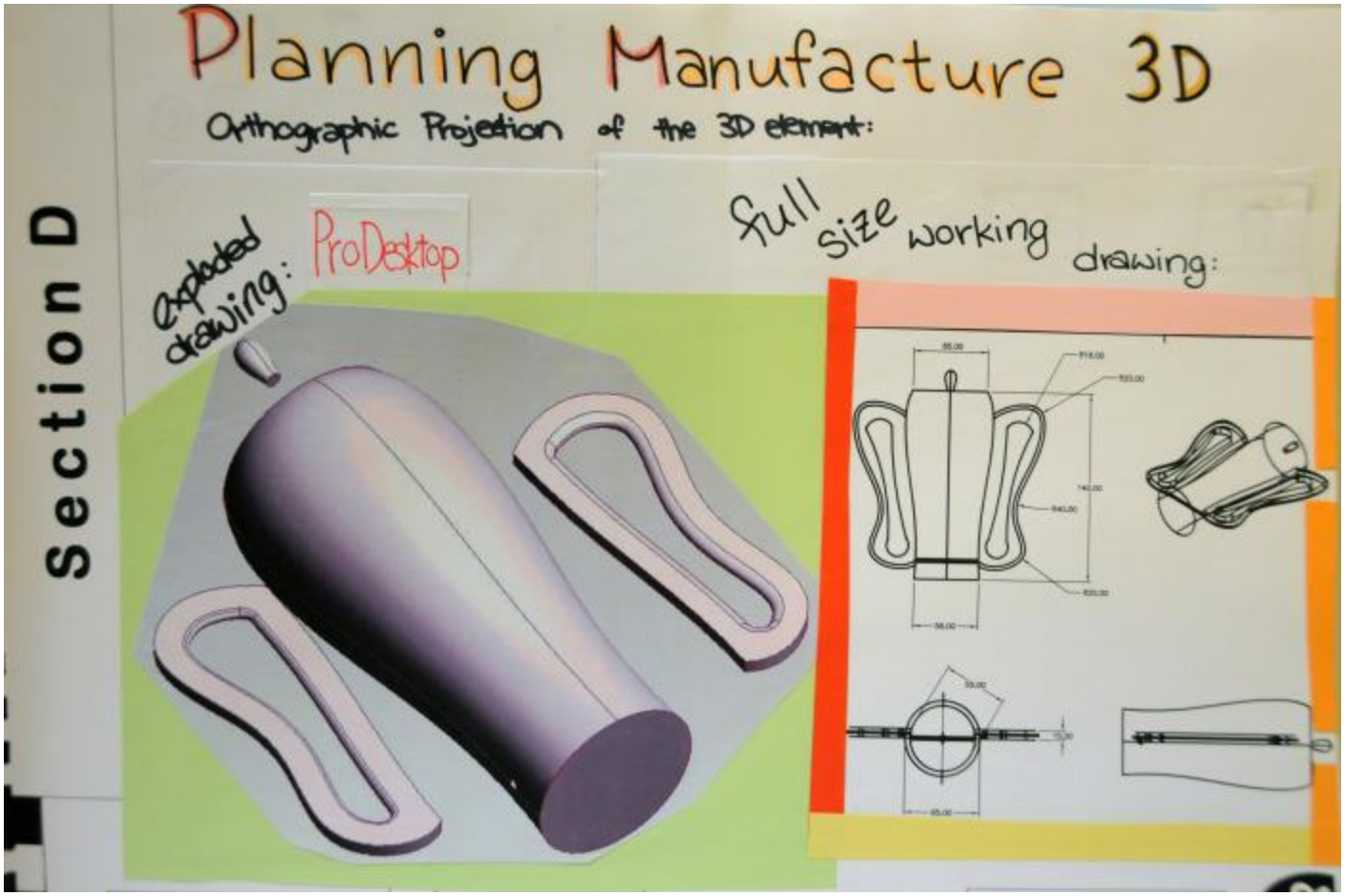

Initial Ideas : 2D element
Section B
1
hole to hang the packaging for display
AVENT
Special Packaging
From the book – altered
2
flap
slit
AVENT
MILK
3
AVENT
AVENT
4
AVENT
ribbon
Secure latch
Sharp edges?

Foam mockup

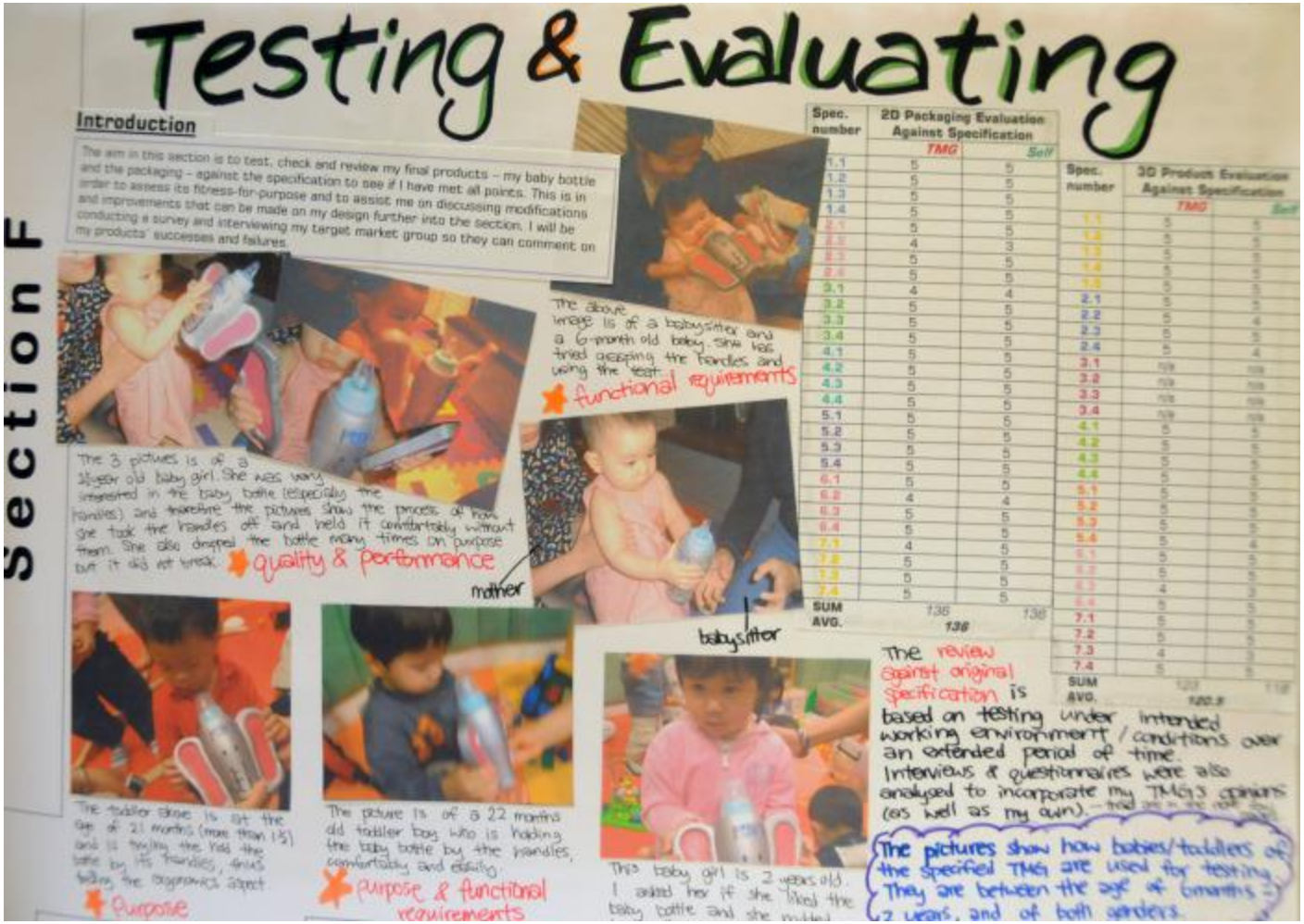
CAD/CAM


CAD/CAM development
Section C
MODEL 1
MODEL 2
1/ ProDESKTOP →
Firstly, I created the shape of my bottle by:
• using the 'Spline' tool to draw the outline of the bottle. (holding on the shift key for straight lines.)
• using the 'Delete Line Segment' tool to cut the extra lines. The shape (half of it) will then become shaded.
• Under FEATURE, I clicked on 'Revolve Profile' and clicked on 'OK'.
After making the bottle...
2/ The handles had to be attached: to create a profile that fits the handle + bottle together, I created a new sketch on the copy of the same file, (deleting the revolution) using the same curve.
Then I used the 'delete line segment' tool to delete the bottle lines.
3/ To make the middle of the handle hollow, I created a new sketch, drew a profile, and extruded it so material is subtracted out of the handle. Then, I rounded the edges (ergonomics) with the 'round edges' tool.
repeat
4/ Then, I added all the components together: Assembly → Add Component...
The handle automatically fits on the bottle.
To create the other handle, I had to drill a hole in each of the components, and a rod fixes them in place.
2/ I created the handle for Model 2 the same way as I did for Model 1, in steps 2-3.
3/ Due to the ergonomics of this model's design, I had to add a grip to the handle.
I placed circles on the handles and subtracted the material with the 'extrude profile' tool.
4/ Finally, I added the handles to my bottle like I did in step ④ for Model 1. Again, to place both handles equally on each side of the bottle, I drilled a hole on each component along a straight line and created a rod to put through them, to keep them in place.
1/ same as step ① for model 1 but the profile shape is different

Ortographic projection



Testing& evaluating



Redesign


Modifications
based on previous testing to ensure fitness-for-purpose
Section F
Project Name: Fluid
P.50

Prototype

Prototype

Prototype

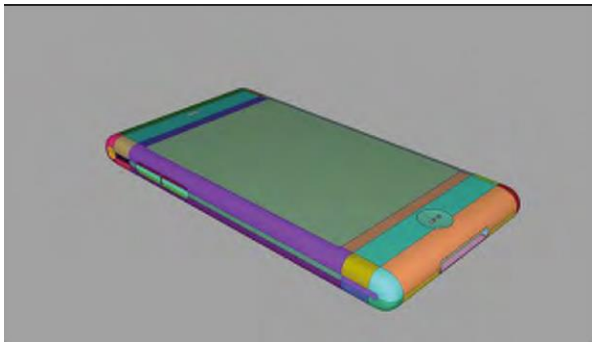
Packaging

Marketing


new DUMBO style!
Clinically proven to reduce colic.*
Features of AVENT Nursers:
-LID
keeps nipple/teat clean.
-TEAT
*ultra-soft silicone material with excellent elasticity & prevents the entry of air into baby's mouth.
-CAP
holds the teat in place & prevents teat from collapsing.
-BOTTLE
easy to clean; high clarity and smooth surface.
WARNING*
>Infants must not be bottle fed without adult supervision.
>Prolonged bottle-sucking may cause tooth decay.
NURSER
complete with ultra-soft silicone teat
8OZ/240ML
-Clear and smooth finish ensures no hidden dirt.
-Sterilizable by steam or boiling water.
AVENT CORPORATION ENGLAND
Cleaning and Sterilizing:
1) Before use clean all parts with AVENT Safety Bottle Cleanser. Be sure to clear the teat hole with nipple brush.
2) After rinsing with water, sterilize the nursers along with the tongs by boiling water or steam for 5 mins. Prolonged boiling is unnecessary and may shorten the durability of the plastic parts.
3) In case of using steel made sterilizer, be sure to adjust the flame to "Medium" so the flame hits only the bottom area, not the sides. It is recommended to use bottle rack to keep plastic parts from direct contact with the pot. Be careful not to boil dry.
4) Use tongs to remove bottles and parts after sterilization. Keep the sterilized items in a dry, covered container.

Not only for baby-bottles ☺

- iPhone prototypes

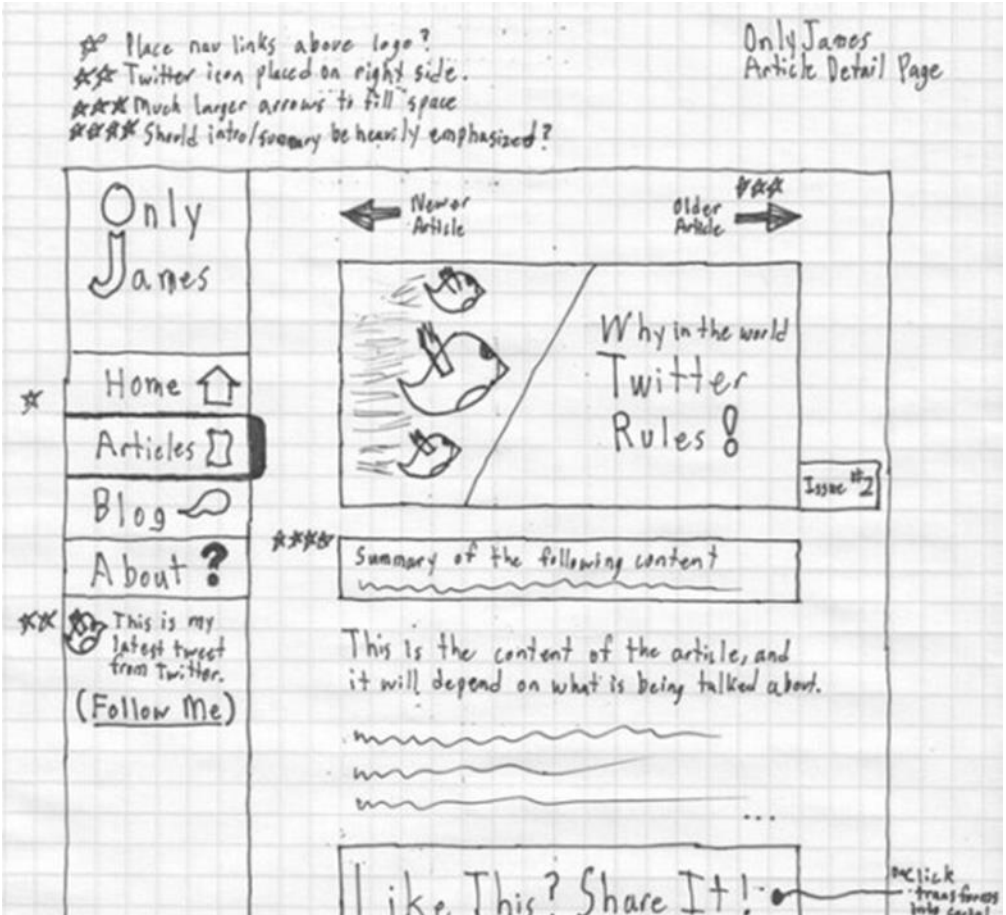


Even cars…

One Thing Isn't New in Car Design: Clay Prototypes

Car clay prototype

User Interface Prototyping



Wireframes

- a page schematic or screen blueprint, is a visual guide that represents the skeletal framework of a website
- created for the purpose of arranging elements to best accomplish a particular purpose.
- depicts the page layout of the website’s content, including interface elements and navigational systems, and how they work together
- usually lacks typographic style, color, or graphics, since the main focus lies in functionality, behavior, and priority of content
- focuses on what a screen does, not what it looks like

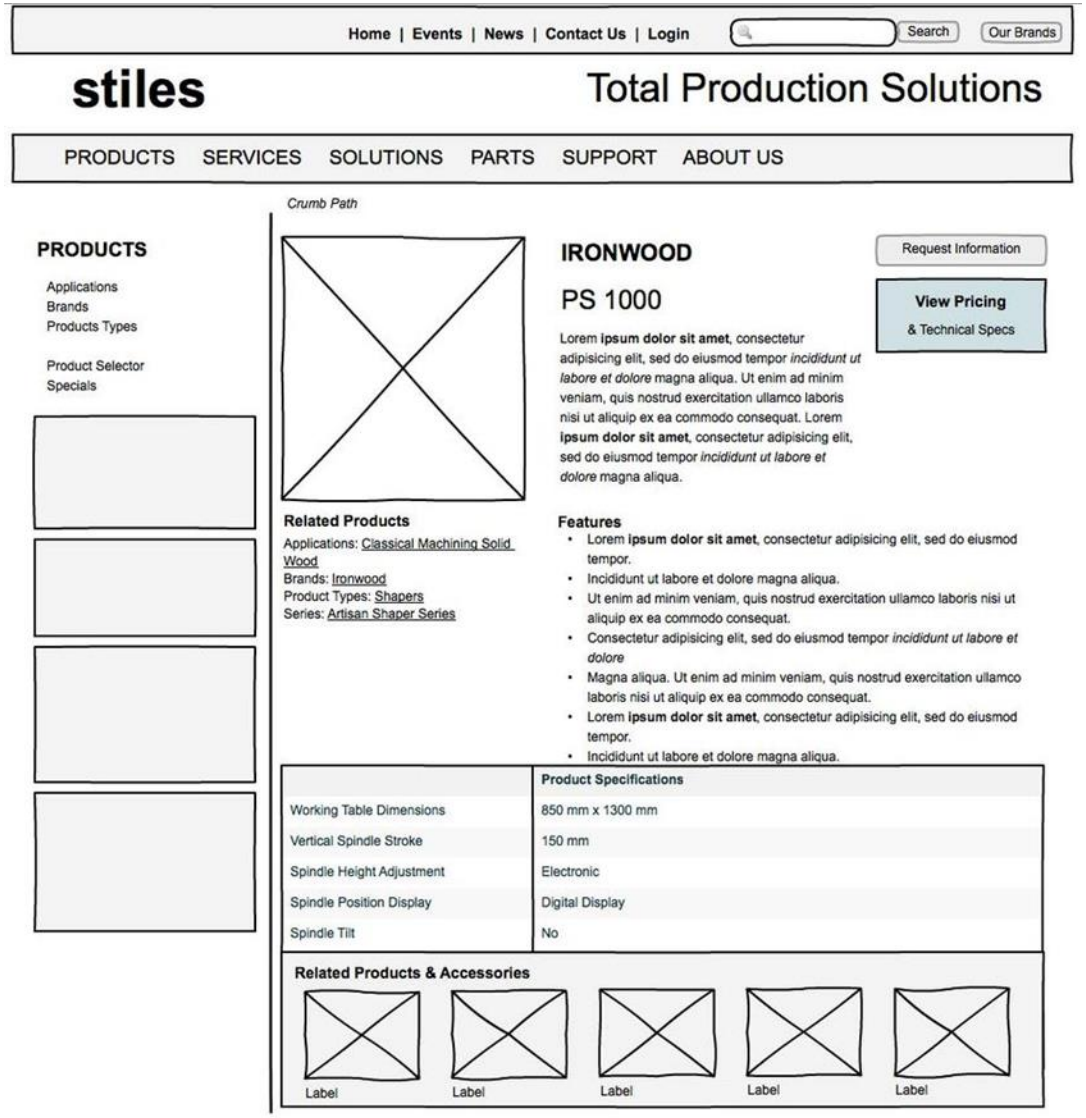
Wireframes

- focus on:
  - The range of functions available
  - The relative priorities of the information and functions
  - The rules for displaying certain kinds of information
  - The effect of different scenarios on the display

- connects the underlying conceptual structure, or information architecture, to the surface, or visual design of the website

- An iterative process, creating wireframes is an effective way to make rapid prototypes of pages, while measuring the practicality of a design concept

Wireframes


Home | Events | News | Contact Us | Login
Search
Our Brands
stiles
Total Production Solutions
PRODUCTS SERVICES SOLUTIONS PARTS SUPPORT ABOUT US
Crumb Path
PRODUCTS
Applications
Brands
Products Types
Product Selector
Specials
IRONWOOD
PS 1000
Request Information
View Pricing
& Technical Specs
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Related Products
Applications: Classical Machining Solid Wood
Brands: Ironwood
Product Types: Shapers
Series: Artisan Shaper Series
Features
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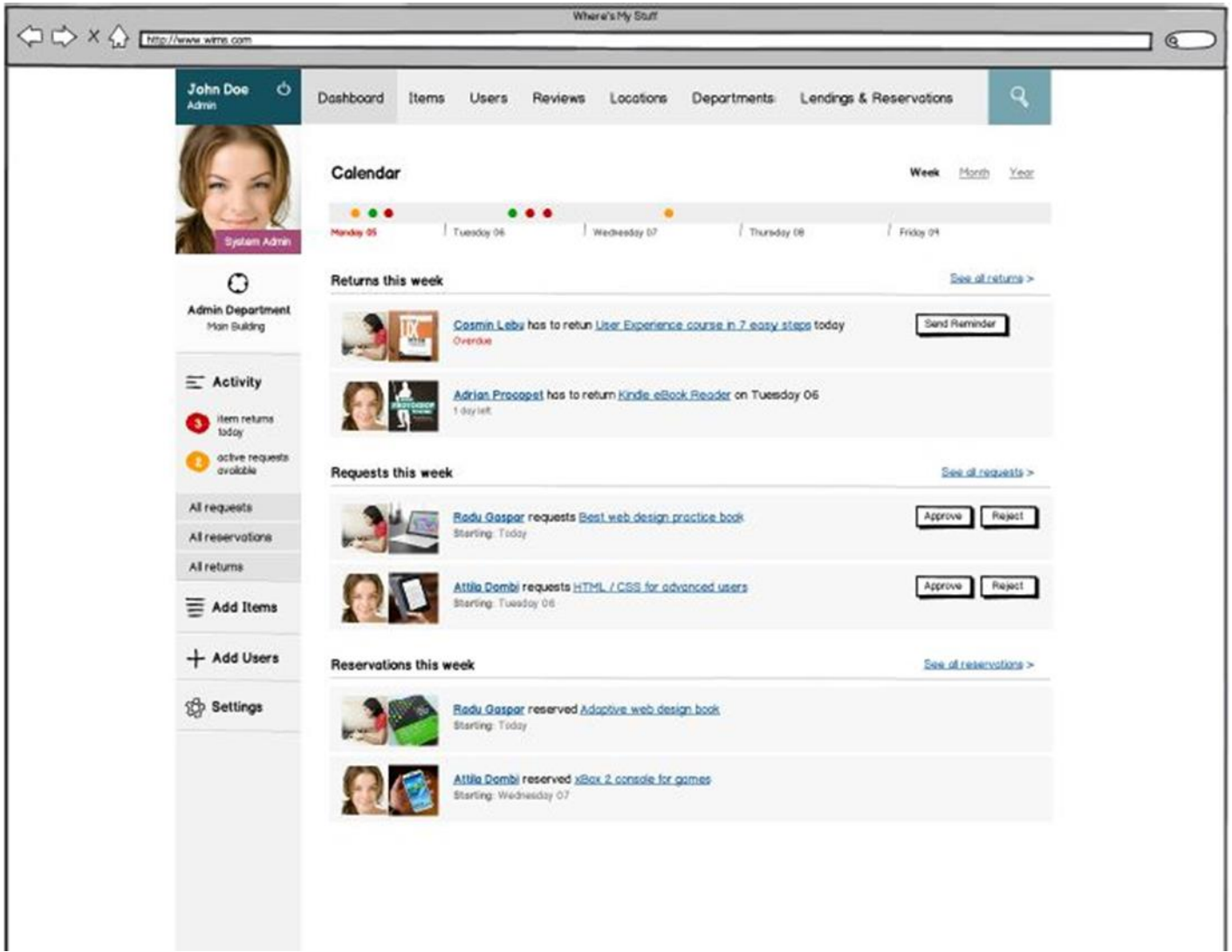
Incididunt ut labore et dolore magna aliqua.
Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.
Consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore
Magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.
Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor.
Incididunt ut labore et dolore magna aliqua.
Product Specifications
Working Table Dimensions 850 mm x 1300 mm
Vertical Spindle Stroke 150 mm
Spindle Height Adjustment Electronic
Spindle Position Display Digital Display
Spindle Tilt No
Related Products & Accessories
Label
Label
Label
Label
Label

Wireframes


Where's My Stuff
http://www.wms.com
John Doe
Admin
Dashboard
Items
Users
Reviews
Locations
Departments
Lendings & Reservations
System Admin
Admin Department
Main Building
Activity
item returns today
active requests available
All requests
All reservations
All returns
Add Items
Add Users
Settings
Calendar
Week
Month
Year
Monday 05
Tuesday 06
Wednesday 07
Thursday 08
Friday 09
Returns this week
See all returns >
Cosmin Lebu has to return User Experience course in 7 easy steps today
Overdue
Send Reminder
Adrian Procopet has to return Kindle eBook Reader on Tuesday 06
1 day left
Requests this week
See all requests >
Radu Gaspar requests Best web design practice book
Starting: Today
Approve
Reject
Attila Dombi requests HTML / CSS for advanced users
Starting: Tuesday 06
Approve
Reject
Reservations this week
See all reservations >
Radu Gaspar reserved Adaptive web design book
Starting: Today
Attila Dombi reserved xBox 2 console for games
Starting: Wednesday 07

Evaluating prototypes

- *Formative* evaluation during development (cook tastes the soup)
- *Summative* evaluation at completion of project (guests taste the soup)
- Which kind is a paper prototype?
- When should you test with actual users?

Pretotyping

- **Make sure you are building the right *it* before you build *it* right**

The Pretotyping Manifesto

innovators beat ideas
pretotypes beat productypes
building beats talking
simplicity beats features
now beats later
commitment beats committees
data beats opinions

don't finish what you've started
failure is an option
scarcity bring clarity
the more the messier
reinvent the wheel
play with fire

Pretotyping

- Introduced by Alberto Savoia

- If all we have is an *idea* for some new product (or service, or book, etc.), the best thing we can do with that idea is *collect opinions* about its usefulness or market potential.

- Ideas are fuzzy and abstract; opinions are subjective and even more abstract; when you combine the two you get a big fuzzy ball of abstractions and opinions

Prototyping vs Pretotyping

- Traditional prototypes can help to test and validate the market potential of new ideas more concretely and objectively than ideas and opinions.

- In many cases the development of a “proper prototype” is too difficult, expensive and time consuming

- Protoypes are built to answer questions like
  - “**Can we** build it?”
  - “Will it work as expected?”

- Pretotyping answers the questions like
  - “**Should we** build it?”
  - “If we build it, will people buy it and use it?”

Protoypes vs Pretotypes

- Prototypes can help your idea fail faster, but not fast enough or cheap enough
- After investing in a product you are tempted to try to improve it hoping it will be better – you finally get a productype – “a prototype gone too far”
- Pretotypes are in between abstract ideas and prototypes
- Pr***e***totypes make it possible to collect valuable usage and market data to make a *go/no-go* decision on a new idea at a fraction of the cost of pr***o***totypes: hours or days instead of weeks or months, and pennies instead of dollars.

The right *it*

- Statistics:
  - 90% of all mobile apps don’t make any money
  - Four startups out of five lose money for the investors
  - 80% of new restaurants close within one year

- Most new ***it***s fail

- *it* =
  - **i**dea on the **t**able
  - **i**dea to **t**est
  - **i**nnovation to **t**ry

Real life examples

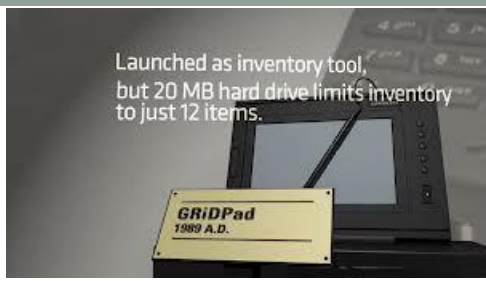
- IBM speech-to-text machine
  - Test the idea with potential users with a “fake” system (a typist typing what the people were saying)
  - It was not a prototype, they only ***pretended*** to have a text to speech machine
  - After a day of interaction – users were not anymore enthusiastic - noisy environment, not proper for confidential information
  - Conclusion: the keyboard is the right *it*

Real life examples

- PalmPilot

- the Palm Pilot was a palm-sized digital device with four basic functions:
  - a calendar,
  - an address book,
  - a to-do list and
  - a simple note taker.

PalmPilot



"*Hawkins, 40, Palm's chief technologist and Pilot's creator, designed one of the first handheld computers, the GRiDPad, a decade ago. It was* ***an engineering marvel but a market failure*** *because, he says, it was still too big.* ***Determined not to make the same mistake twice****, he had a ready answer when his colleagues asked him how small their new device should be: "****Let's try*** *the shirt pocket.*"

Retreating to his garage, he cut a block of wood to fit his shirt pocket.Then he carried it around for months, ***pretending*** *it was a computer. Was he free for lunch on Wednesday? Hawkins would haul out the block and tap on it as if he were checking his schedule. If he needed a phone number, he would* ***pretend*** *to look it up on the wood. Occasionally he would try out different design faces with various button configurations, using paper printouts glued to t block. (Time Magazine, 1998)*

Real life examples

- Conclusions:
  - Both teams had doubts about the usefulness and adoption of their innovation
  - Creating a prototype would have been very expensive
  - Their solution to the “proper prototype” problem was to *pretend* that they had such a prototype
  - “fake it before you make it”

Real life examples

- Wrong approach:
  - People have an innovative idea
  - They invest too much too soon to develop a first version of the product with too many features, too much functionality and too much “polish.”
  - They **presume** to know what people will want.
  - They **assume** that if they build it right, people will **want** it.

First proposed terms

- *Pretendotyping*
- *Preprototyping*
- *Pretotyping*
- Pretotypes – artifacts produced by pretotyping

Pretotyping definitions

- Pretotyping [pree-tow-tie-ping], verb: Testing the initial appeal and actual usage of a potential new product by simulating its core experience with the smallest possible investment of time and money

- *Pretotyping is a way to test an idea quickly and inexpensively by creating extremely simplified, mocked or virtual versions of that product to help validate the premise that* "If we build it, they will use it.“

- *Pretotyping: Fake it and test it before you make it!*

- *Make sure – as quickly and as cheaply as you can – that you are building the right **it** before you build **it** right.*

Pretotype vs Prototype

- Differences:
  - Functionality
  - Time-frame for development
  - Cost

IBM prototype?

Prototypes

- Can we build it?
- Will it work at all?
- Will it work as intended?
- How small/big can we make it?
- How much would it cost to produce?
- How long will the batteries last?
- How will people use it?
- What will people use it for?

Pretotypes

- **Is this the right thing to build?**

Pretotypes and Prototypes

- pretotyping can be viewed either as a specific subset of prototyping or a prelude to it (just like startups and companies)

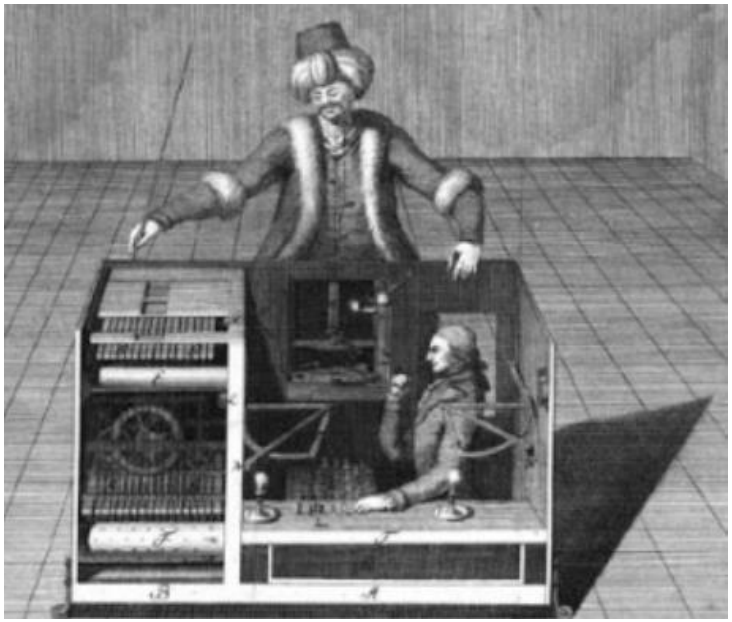
- It will not help you turn the wrong it into right it, but it will help you identify cheap and fast the wrong it

Pretotyping techniques

- **The Mechanical Turk** – Replace complex and expensive computers or machines with human beings.
- **The Pinocchio** – Build a non-functional, “lifeless”, version of the product.
- **The Minimum Viable Product (or Stripped Tease)** – Create a functional version of ***it***, but stripped down to its most basic functionality.
- **The Provincial** – Before launching *world-wide*, run a test on a very small sample.
- **The Fake Door** – Create a fake “entry” for a product that doesn’t yet exist in any form
- **The Pretend-to-Own** – Before investing in buying whatever you need for your ***it***, rent or borrow it first.
- **The Re-label** – Put a different label on an existing product that looks like the product you want to create.
- **The One Night Stand** - create “a complete service experience without the infrastructure required by a permanent solution

The Mechanical Turk

- Replace costly, complex or yet-to-be-developed technology with a hidden human being performing the functions of that technology



Meet the 18th Century chess machine

The Pinocchio

- Inspired by Jeff Hawkins' wood block Palm Pilot pretotype and has been named after the wood puppet who, after being visited by the Blue Fairy, becomes a real boy.

- best suited for situation where things like **size, shape, weight, portability**, etc., are important and where one's imagination can be used to fill in the blanks – much the same way Hawkins' pretended that his wood block had the functionality required to schedule appointments, store phone numbers and keep notes.

The Minimum Viable Product (or The Stripped Tease)

- Minimum Viable Product (MVP) was introduced and popularized by Eric Ries, the creator of The Lean Startup movement

- involves creating a **working pretotype** – an actual product – but with features and functionality stripped down to the bare minimum in order to: "*… collect the maximum amount of validated learning about customers with the least effort.*"

- MVPs typically require more work than Mechanical Turk or Pinocchio pretotypes.

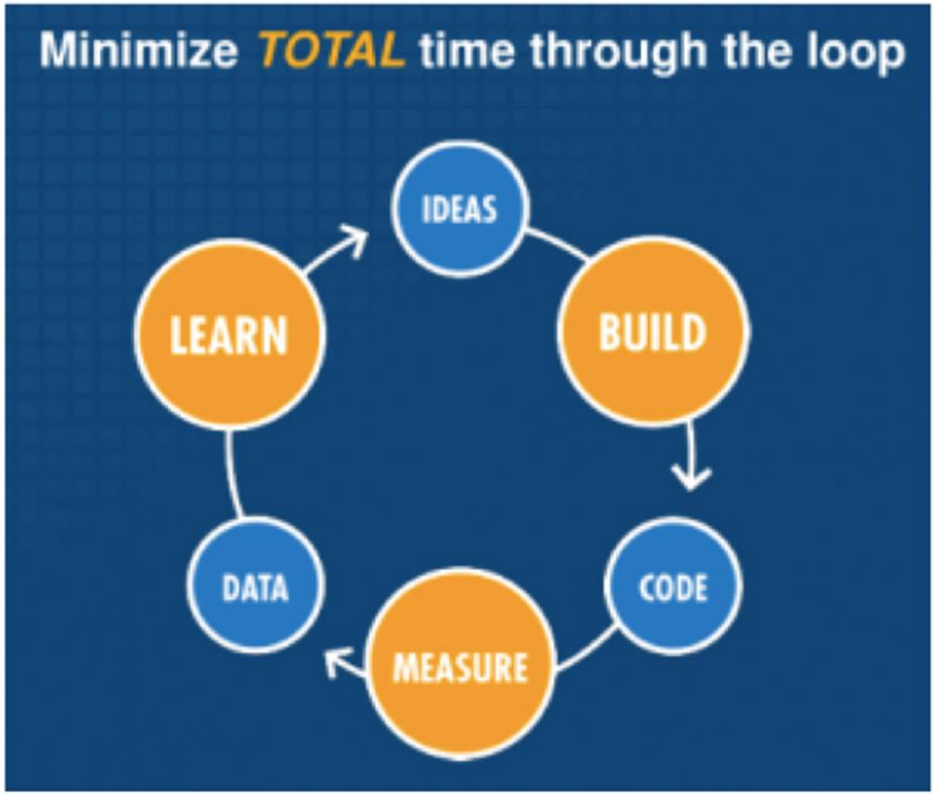
- an MVP can be developed much more quickly because it dispenses with all non-critical features.

MVP

- smallest possible product that has three critical characteristics:
  - people choose to use it or buy it;
  - people can figure out how to use it;
  - we can deliver it when we need it with the resources available –
- In other words: **valuable, usable and feasible**.

MVP


THE LEAN STARTUP
How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses
ERIC RIES


Minimize TOTAL time through the loop
IDEAS
BUILD
CODE
MEASURE
DATA
LEARN

MVP

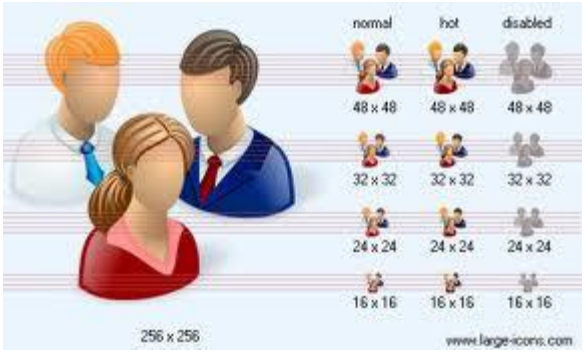
- An MVP for an online family diary application, for example, should only support text entries (and perhaps uploading of pictures), but it should not bother to provide support for different text fonts, uploading of videos or different types sharing

- Such features may be nice, and even required, for the success of the final product but should only be added once initial testing indicates that the online family diary is *the right **it***.

The Provincial

- In many cases, the major costs associated with a product are not in developing the basic functionality, but in scaling the product to support and make it useful for a large number of users

- A Provincial pretotype provides the core features of the intended final product, but limits its scope (and scale) to **support a small subset of the ultimate target market**



The Provincial example

- Let's assume that Sandra has an idea for a mobile application that helps people find restaurants that serve only organic food. Let's call Sandra's ***it*** the *Organic Eater Helper*.

- One of the most expensive and time consuming aspects of this app would be the creation and maintenance of a national database of restaurants that meet the requirements of serving only organic foods.

- There may be thousands of such restaurants across the country, and to include them all, and write the code to automatically keep the list up to date, Sandra would have to do a lot of work – unnecessary and wasted work if it turns out that the *Organic Eater Helper* app is not *the right* ***it***.

The Provincial example

- A Provincial pretotype : Sandra should start by focusing on a particular city or county – ideally this is where she already lives.

- Since there will probably be only a few organic restaurants in the area she selected, the development of the application is greatly simplified.

- Sandra can *hardwire* the names and location of the restaurant directly in the app instead of having to write code to poll a central database with thousands of restaurants and only return the ones closest to the user's location.

The Fake Door Pretotype

- The only requirement is to create an “entry” point for a potential product (or new feature).
- The product (or feature) does not have to exist at all.
- *“In a web product, what this means is that you **pretend** that a feature exists and you see if anybody clicks on it.”*
- Useful for determining the level of interest for an ***it***.
- On the Internet, a Fake Door can be implemented as a link, a button on a web page, or a web ad for your ***it.***

The Fake Door Example

- Sandy is thinking about writing a book on *squirrel watching*

- Before she invests months of precious time away from her actual squirrel watching pursuit to write *The Complete Squirrel Watcher*, Sandy can use a Fake Door pretotype to determine the level of interest in such a tome by creating a web ad – something like this:

  The Complete Squirrel Watcher.
  The only book for serious squirrelers.
  Only $9.98. Click here for more information.

- She can then pay for Google AdWords to serve her ad on squirrel-related websites or whenever people search online for “squirrel watching.”

The Pretend-To-Own Pretotype

- Some ***it***s may require a major upfront investments, in such cases, it's critical that you pretotype the idea by borrowing or renting those expensive items.

- A new business that requires a physical store, for example, should not commit to a 5-year lease until they are sure that the idea is viable - they could try to get a 3-month deal on some un-leased space or – even better – arrange to squeeze their display inside another store that may attract the same type of buyers

- The idea for a new *green* car rental company that only rents electric cars should be tested by either renting or borrowing a few electric cars for a few weeks – not buying a fleet of them upfront

The One-night Stand Pretotype

- Delivering target customers the real experience in an extremely narrow geo scope and time frame
- Avoid investments for large infrastructure and validating market interest and actual use
- Used in the same real life situation where the innovation will be used but with limited time and geo scope

Pretotypes testing

- 2 metrics:
  - ILI (Initial Level of Interest)
  - OLI (Ongoing Level of Interest)

- *ILI = number of actions taken / number of opportunities for action offered*

- Where:

  - *number of opportunities for action offered* represents the number of people who have been offered an opportunity to take some positive action associated with the pretotype

  - *number of action taken* represents the number of people who have actually taken you up on that opportunity

Pretotypes testing

- OLI
- best represented by a time-based graph (or table) rather than by a single number.
- each point/entry in the graph/table represents the level of interest at a particular date.
- you should be looking for a trend in the OLI graph/table.

Resources

- Alberto Savoia, Pretotype it, https://docs.google.com/file/d/0B0QztbuDlKs_ZTk2M2RhZWItYzk3YS00ZDZmLTgyZjItY2Y2ZWIyYjZkOTE3/edit?hl=en_US

- www.pretotyping.com