

Prototyping

Jörg Cassens

SoSe 2019

Contextual Design of Interactive Systems

Introduction

Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

Introduction

- Ein Design zu kommunizieren ist schwierig
- Demos und Spezifikationen können keine Arbeitspraxis abbilden
 - Der Kunde muß verstehen, wie das Produkt funktioniert und strukturiert ist
 - wie es in die eigene (nicht-artikulierte) Praxis paßt
 - und wie es besser sein könnte
- Herausforderung: die “Experience”, die ein neues System anbietet, zu kommunizieren
- Modelle sind eine neue Sprache, die der Kunde erlernen muß
- Ansätze:
 - Szenarien
 - Use-Cases

Prototyping

- Problem:
 - We can't evaluate a design until it's built
- But...
 - After building, changes to the design are difficult
- Solution
 - Prototype!
- Simulate the design in low-cost manner
- Make it fast. Make it cheap.
- Facilitate iterative design and evaluation
 - Your first idea is rarely your best!
- Promote feedback
- Allow lots of flexibility for radically different designs
 - Don't kill crazy ideas!

How to Prototype

Introduction

Fidelity
Completeness

Paper
Prototyping

Digital
Prototyping

References



Dell (2018)

Prototyp-Types

- Storyboard
 - Sketches or screen shots illustrating key points in a usage narrative
- Paper Prototype
 - Fabricated devices with simulated controls or display elements
- Wizard of Oz
 - Workstation connected to invisible human assistant who simulates input, output, and processing functionality not yet available
- Video Prototype
 - Video recording of persons enacting one or more envisioned tasks
- Computer Animation
 - Screen transitions that illustrate a series of input and output events
- Scenario Machine
 - Interactive system implementing a specific scenario's event stream
- Rapid prototype
 - Interactive system created with special purpose prototyping tools
- Partial Working System
 - Executable version of a system with a subset of intended functionality

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Introduction

Fidelity
Completeness

Paper
Prototyping

Digital
Prototyping

References



(Hix and Hartson, 1993)

Prototyping

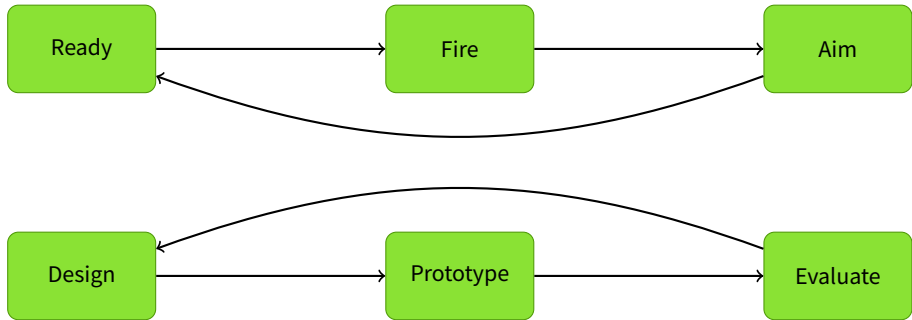
Introduction

Fidelity
Completeness

Paper
Prototyping

Digital
Prototyping

References



(Hix and Hartson, 1993)

Throw-Away vs. Evolution

Introduction

Fidelity
Completeness

Paper
Prototyping

Digital
Prototyping

References

- **Throw-away** prototyping means that a series of prototypes are constructed and then discarded
 - Typically higher and higher fidelity versions are developed
- **Evolutionary** prototype means that the same prototype evolves into higher and higher fidelity and eventually becomes the system
- Throw-away prototyping can be difficult for design teams or management to accept because it seems as if the time spent developing the prototype is a waste
- Evolutionary prototyping is possible with software development, but there is a danger
- An early high-fidelity prototype might have been built to illustrate a design idea, but not designed to be extended
- Nevertheless evolutionary prototyping can be useful for eliciting more and more subtle design aspects

Fidelity

Low-Fidelity Prototypen

Introduction

Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

■ Designskizze

- Frühe Skizzen auf Papier oder Tafel
- Vermitteln Eindruck von Designideen
- Diskussion der Skizzen kann gegenseitiges Verständnis von Gestalter und Anwender fördern
- Fehler können frühzeitig erkannt werden
- Beispiele wären ein Storyboard oder Comic

■ Papierprototypen

- Bildschirminhalte werden durch Papierstreifen und Post-Its simuliert
- Austauschen und Manipulation dieser lassen das Verhalten der Benutzungsschnittstelle erkennen
- Diese Low-Fidelity-Prototypen können mit minimalen Kosten erstellt werden
- Der offensichtlich unfertige Charakter lädt zur Kritik und Manipulation ein
- Man kann grundlegende Beurteilungen konzeptioneller Modelle erhalten

Medium-Fidelity Prototypen

Introduction

Fidelity
Completeness

Paper
Prototyping

Digital
Prototyping

References

■ Wizard of Oz

- Sollen Nutzer einen realistischen Eindruck eines Systems bekommen, das noch nicht implementiert ist, bieten sich Simulationen an
- Dem Benutzer wird die Benutzungsschnittstelle präsentiert
- Ein menschlicher Operator (Wizard) beobachtet den Benutzer und seine Umgebung und steuert die Funktionen des Systems
- Besonders nützlich, wenn vor der Implementierung Interaktionsdaten benötigt werden
 - Ambiente System
 - Sprachsteuerung

■ Mock-Up

- Typischerweise mit Rapid Prototyping Werkzeugen erstellt
 - Webseiten mit Screenshots
- Simuliert immer noch die funktionalen Teile des Systems
- Erlaubt typische Interaktionssequenzen

High-Fidelity Prototypes

Introduction

Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

■ Simulation

- In particular object-oriented simulations
- Agents with particular goals, believes, intentions interact via simulated sensors with the real software
- Data and/or modelling necessary

■ Proof-of-concepts

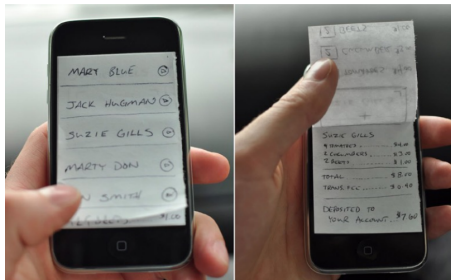
- Later versions of throw-away prototype
- Rudimentary and/or incomplete

■ Implemented Application

- Later versions of evolutionary prototypes
- Large-scale implementations
- Long running systems
- Suitable for a field-study

“Mixed”-Fidelity

- Easy access to cameras makes it easy to blur the lines between lo-fi and hi-fi prototypes
- Photos of hand-drawn prototypes can easily be captured and displayed on real screens
- Sequences of photos can also be animated to simulate interaction



Dell (2018)

Completeness

Breadth or Depth?

Introduction

Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

■ Partially working systems

■ Horizontal prototype

- all the intended functionality, but only at the top level
- Example: initiate a shopping spree, but cannot actually order
- Good for testing high level goals and action plans

■ Vertical prototype

- only one or two tasks are implemented in detail
- Example: shop til you drop, but cannot see shipping information
- Good when only few tasks are seen as particularly complex or important

Horizontal vs. Vertical Prototype

Introduction

Fidelity

Completeness

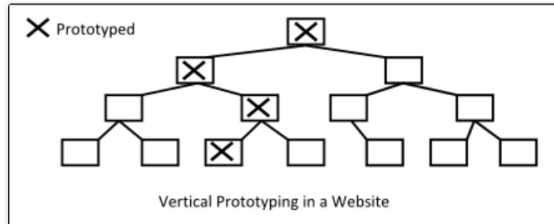
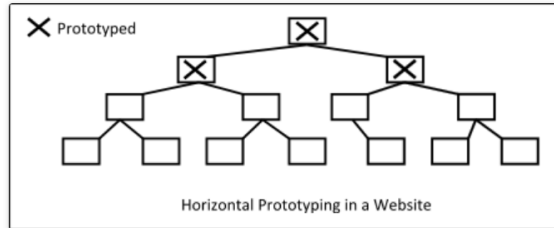
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Prototyping

Digital

Prototyping

References



McCracken et al. (2004)

Global vs. Local

Introduction

Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

■ Partially working systems

■ Global prototype

- model the complete system
- can address issues of completeness and consistency

■ Local prototype

- only model a small portion of the system
- can be used to resolve differences in opinion over design
- make a local prototype of the alternatives and evaluate them

■ Partially working systems

■ Chauffered prototype

- Considerable functionality, but little or no error detection
- How: A well trained assistant accepts and executes requests on behalf of the actual test user
- Orthogonal to other dimensions

Einbeziehen von Benutzern

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Fidelity

Completeness

Paper

Prototyping

Digital

Prototyping

References

- Szenarien testen die Reaktion der Benutzer zu einer Geschichte
- Vorher: Lehrmeister
- Jetzt: Co-Designer
- Dazu suchen wir uns neue Benutzer, die nicht Teil des Design-Teams waren
- Startpunkt: Initiales Systemdesign
- Designer und User verbessern dieses iterativ
- Iterationen sind schlecht für revolutionäre Änderungen, der initiale Prototyp sollte deshalb schon sehr gut sein, die richtigen Probleme anpacken

Paper Prototyping

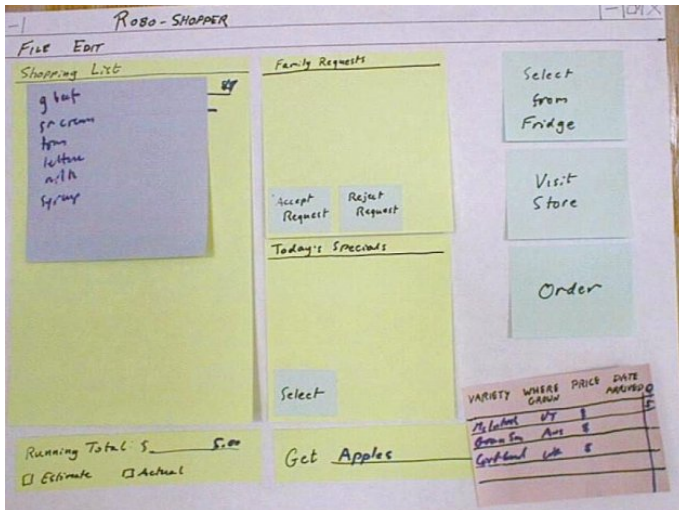
Beispiel

Introduction

Paper
Prototyping

Digital
Prototyping

References



🖼 Bilder aus einem Video der Nielsen Norman Group

- Low-fidelity Prototyp
 - Wenn eine UI von Hand gezeichnet ist wird klar, daß das genaue Design, die Icons oder Fensterstruktur, nicht der zentrale Punkt sind
 - Wenn Benutzer mit Papier arbeiten werden sie nicht abgelenkt von den zentralen Strukturelementen, um die es uns hier geht
 - Weg, um “bikeshedding” zu umgehen
 - Papierprototypen laden zu direkten Veränderungen ein
 - “Wenn ich hier klicke, so sollte das passieren”
- Lauffähige, partielle Prototypen sind weniger einfach zu ändern und gaukeln vor, daß viele Entscheidungen schon gefallen seien
- Prototypen machen es möglich, Arbeitsabläufe zu testen, die es derzeit noch nicht gibt

- mit einer Papierattrappe der Benutzerschnittstelle versuchen die Benutzer “echte” Arbeitsaufgaben mit “echten” Daten zu erfüllen
- Testen und Verändern der Benutzerschnittstelle
 - Benutzer als Co-Designer
- Struktur und Funktion testen, nicht Layout und Icons
- Interview nach den Richtlinien des Contextual Inquiry Interviews
- (mindestens) 2 Personen, einer “spielt” das System, der andere macht Notizen
 - Das System erklärt sich nicht

Paper Prototype Screen

Introduction

Paper
Prototyping

Digital
Prototyping

References

File Edit Sort

Item	Count	Ordered By	Price

Cancel Order

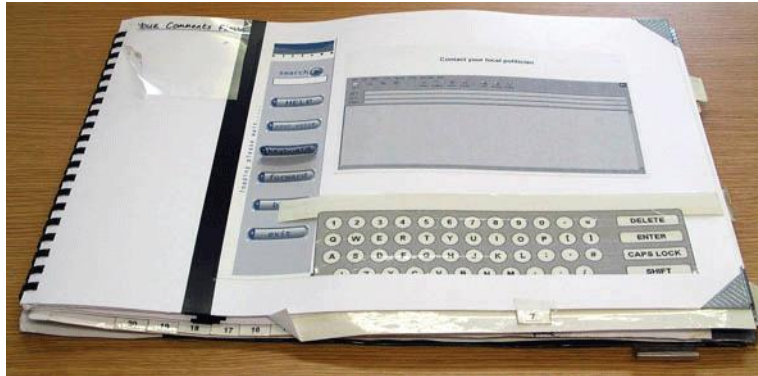
Paper Prototype Book

Introduction

Paper
Prototyping

Digital
Prototyping

References



Benyon et al. (2005)

Why do it?

Introduction

Paper
Prototyping

Digital
Prototyping

References

- Low cost
- Fast to implement
 - Typical hi-fi prototype takes a few weeks as opposed to a paper prototype that takes a few hours
- Allows you to merge the design and prototyping phase together
- It gets everyone involved!
 - Builds teamwork in groups with diverse skill sets
 - So simple, no one gets left out
- Feedback on the BIG things
 - Lo-fi nature forces users to consider usability issues related to layout and control
 - Nit picking over choice of colors, buttons sizes, font choice ignored
 - Focus on Content as opposed to Appearance

Why not to do it?

- May seem unprofessional to some users
 - Maybe not the right prototype for the VCs
- Can't represent some effects with paper
- Typically, you would start with several rounds of paper prototyping, and move towards high-fidelity prototyping as the design becomes more finalized
 - So, you do both

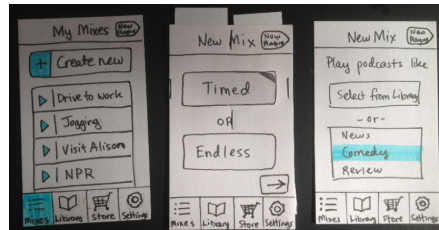
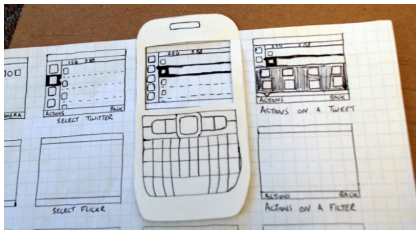


Dell (2018)

- Paper:
 - heavy stock unlined
 - light stock unlined
 - sticky notes, different colors
 - Acetate sheets
- Markers:
 - color pens
 - color board markers
 - color pencils
- Adhesives:
 - scotch tape
 - glue sticks
 - soft adhesive (like what is found on sticky notes)
- Scissors:
 - Scissors
 - eXacto knives
- Everything else you can think of

Building

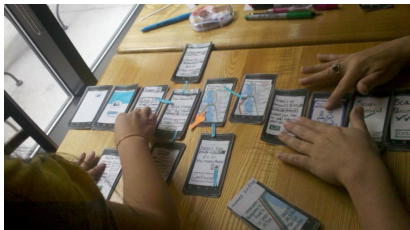
- Don't get carried away with design!
 - Goal is to get as much user feedback as possible
 - Set a deadline – forget minor details
- Draw generic frames
- Make everything needed to simulate effects
- Photocopier/camera is your friend!



Dell (2018)

Preparing

- Select users
 - Perform user and task analysis
 - Find out educational background, knowledge of computers, typical tasks required
 - Get testers who fit the final user profile
- Prepare test scenarios
- Practice
 - Sort out bugs/hitches before the real testing
 - Get everyone comfortable with their role



Dell (2018)

■ Facilitator

- Encourage user to express thoughts
- (don't influence decisions!!!!)
- Giving instructions
- Making sure timing is met

■ “Computer” person

- Arranges the paper prototype according to user input
- Needs to be organized
- Knows the prototype well
- Make changes quickly

■ Observers

- Take notes
- Write possible solutions to problems faced
- Cannot react to user's actions

- Summarize problems (e.g., make a list)
 - Usability issues
 - Missing (or mis-specified) functional requirements
 - Preferences for different alternatives
 - User priorities
 - Issues outside the user interfaces (e.g., high-level understanding)
- Prioritize problems
- Construct revised prototype
- Iterate, iterate, iterate!

Summary: Paper Prototyping

Introduction

Paper
Prototyping

Digital
Prototyping

References

- An important prototyping tool (but not the only tool!)
- Quick to build/refine, thus enabling rapid design interactions. Useful tool for speeding up the process of iterative design
- Requires minimal resources and materials (cheap!)
- Detects usability problems at a very early stage before implementation.
- Focus on the “right” things early on
- Promotes communication between stakeholders. Team members gain understanding of user needs and priorities
- Consider that you always do a few rounds of paper prototyping for every new design/app/system/solution that you create!

Assignment 9.1: Paper Prototype

Group Work

Introduction

Paper
Prototyping

Digital
Prototyping

References

- Your task is to design a privacy controller app.
 - An app that magically helps you control and keep track of the privacy settings of all other apps on your device. You should be able to have custom privacy settings for different apps, but it should still be easy to use.
- Form groups of 4-6 people
 - Pick a couple of concrete tasks to focus on (your choice)
 - Create a paper prototype for those tasks
 - Work quickly! Set a deadline.
 - Evaluate your paper prototype with another team
 - Take turns in using each other's prototypes
 - Write down the results from testing your prototype
 - Iterate!
- Present your findings in the course

Digital Prototyping

Mockups & Wireframes

Introduction

Paper
Prototyping

Digital
Prototyping

References

- You can also make higher fidelity prototypes using are also mockup or wireframe software
- Expensive prototyping tools can demonstrate interactivity and make story boards
- Some are web based so that you can share demonstrate the story boards with the team or client

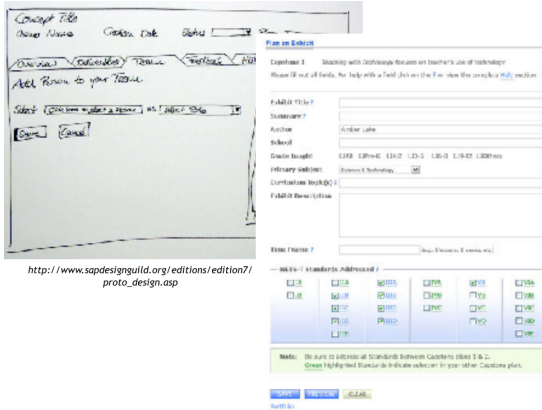
Dimensions of Fidelity

Introduction

Paper
Prototyping

Digital
Prototyping

References



■ Fidelity can be broken down into four basic dimensions:

- Breadth
- Depth
- Look
- Interaction

Dell (2018)

Definition

The “breadth” of a prototype refers to how much of the product’s functionality is represented in the prototype

- A very narrow prototype only represents a single feature
- A broad prototype represents all intended functionality
- Prototypes should generally be as broad as needed to cover basic or most important tasks, but not much more

Definition

The “depth” of a prototype refers to how much of the prototype is functional, and how robust it is

- A very shallow prototype has no backend at all and is hard-coded to respond as though the user had provided ideal input
- A deep prototype has some logic and error-handling capabilities
- At first glance, depth may seem unimportant, but it affects the amount of exploration a user can do
- Thus depth can actually have a profound influence on user testing!

Definition

The “look” refers to how accurately a prototype represents the product’s intended appearance, including fonts, colors, and graphics

- “Look” is probably what most people think of when they think of prototype fidelity
- It’s generally a good idea to hold off on something that has a high fidelity look until later in the design process
- People are less likely to point out flaws and mistakes
- People can easily fixate on the “little” things
- You are less likely to throw it out and start again

Definition

“Interaction” refers to how the prototype handles input and output

- Interaction can often be simulated
- For example, you might create a digital prototype for an iPad application which runs on your desktop and responds to traditional a traditional mouse and keyboard
- You might use hyperlinks or animation to simulate clicking interaction (e.g., in Powerpoint)

Hi-Fi Prototyping

Introduction

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Prototyping

Digital
Prototyping

References

- Once you have developed a lo-fi prototype and solicited feedback on it through peer critique and user testing:
 - You may wish to create another lo-fi prototype
 - (isn't iterative design fun?)
 - Or you may be ready to move on to a hi-fi prototype
- Remember, a high fidelity prototype is a substantial time investment!
- It is good for evaluating a working design that has been derived from a few rounds paper prototyping

Things to Consider

- Choice of tool
- Typography / font
- Color palette
- Device
- Interaction
- Implementation

- Start by creating a digital version of your paper prototype
- Then iterate through user testing and feedback
- Don't design a beautiful prototype that can't be implemented!

Digital Prototyping Tools

- There are literally hundreds...
- And more released every day.
- I don't know them all!
- What you choose will depend on a variety of factors...
 - Learning Curve
 - How long will it take me to learn this tool?
 - Usage
 - Which device will it be used on?
 - Fidelity
 - Will it showcase layout structure or complex interactions?
 - Sharing
 - Can I collaborate with others on the prototype?
 - Cost
 - How much am I prepared to pay for this tool?

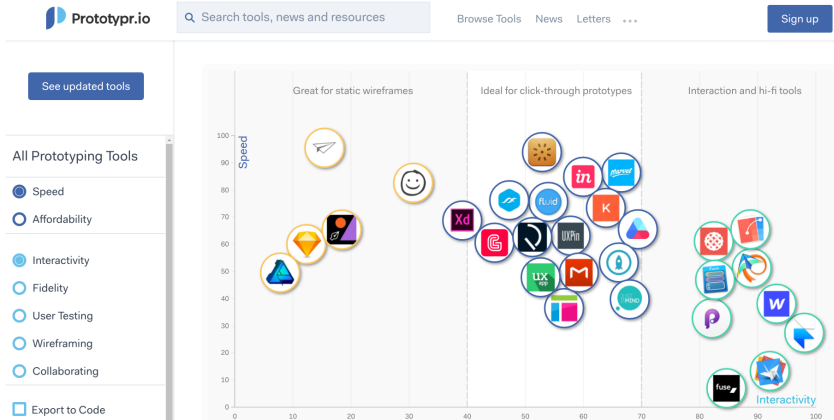
Comparing

Introduction

Paper
Prototyping

Digital
Prototyping

References



prototypr.io/prototyping-tools

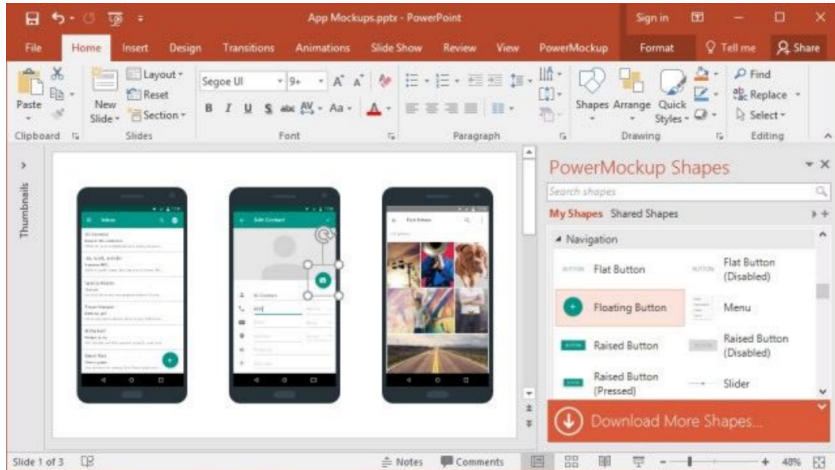
Presentation Software

Introduction

Paper
Prototyping

Digital
Prototyping

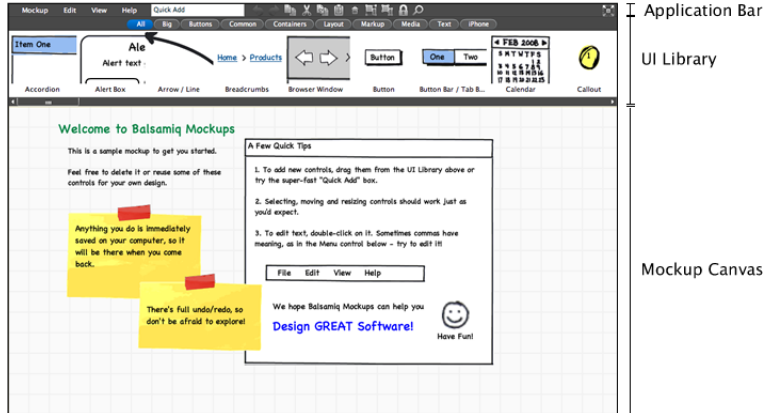
References



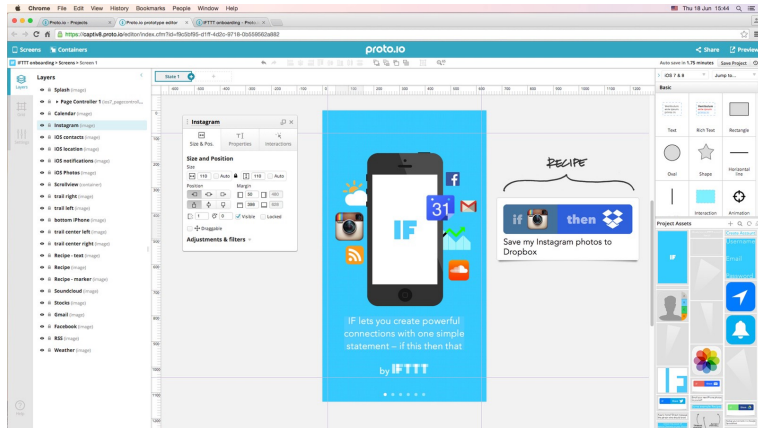
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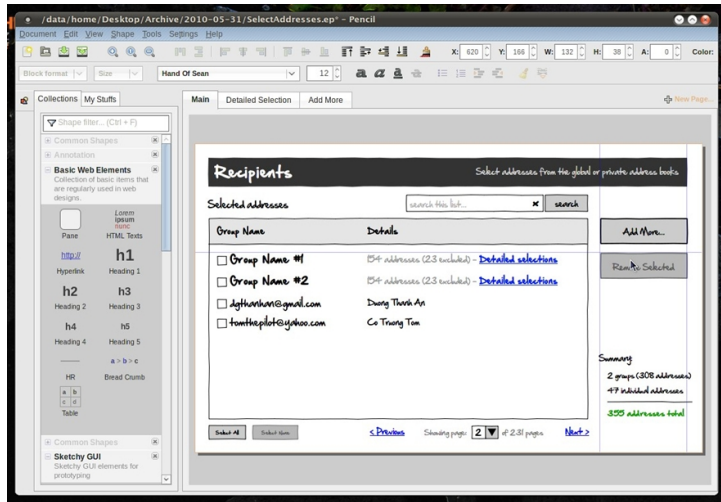
👉 Marvel



 balsamiq



proto.io



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Jörg Cassens

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