Designing Interactive Systems I

Prototyping

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RWTH Aachen University

Winter Semester ’20/’21

https://hci.rwth-aachen.de/dis

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Review

- DIA cycle?
- Double-Diamond Model?
- First Three Questions?
- Personas?
- Brainstorming?
  - How to structure brainstorms?
- Storyboards?

Paper Prototypes

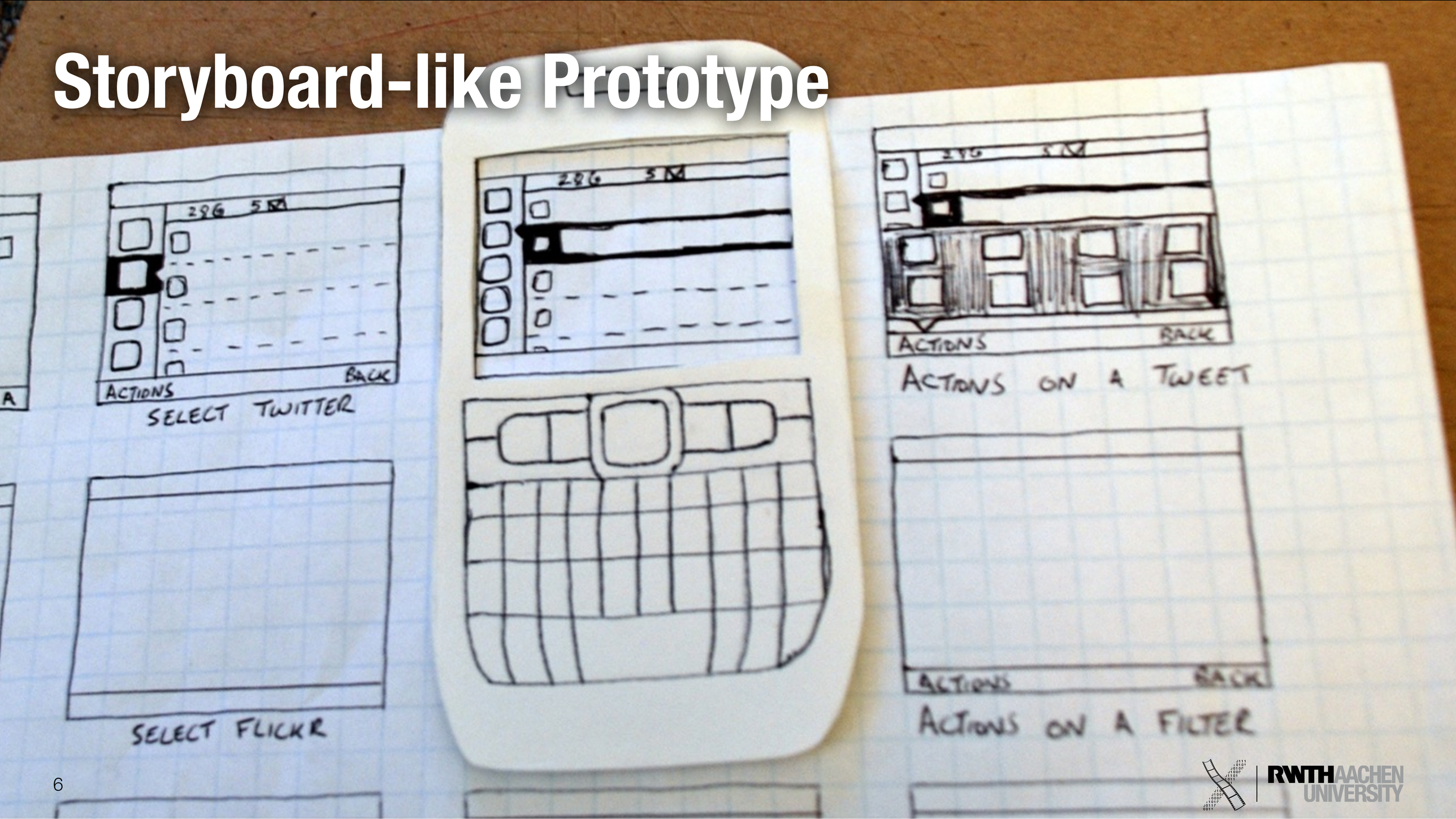
Paper Prototypes

- First prototypes, quick and cheap
- Rough paper & pencil sketches of interface or central UI dialogs
- Hand-drawn, no ruler, no computer!
- Pro: Not detailed, so designer and user focus on important **high-level** UI design
- Con:
  - Dialog sequence hard to convey unless you drive it yourself
  - Drawing many screens is a lot of work
- A storyboard can be your first paper prototype

Paper Prototypes

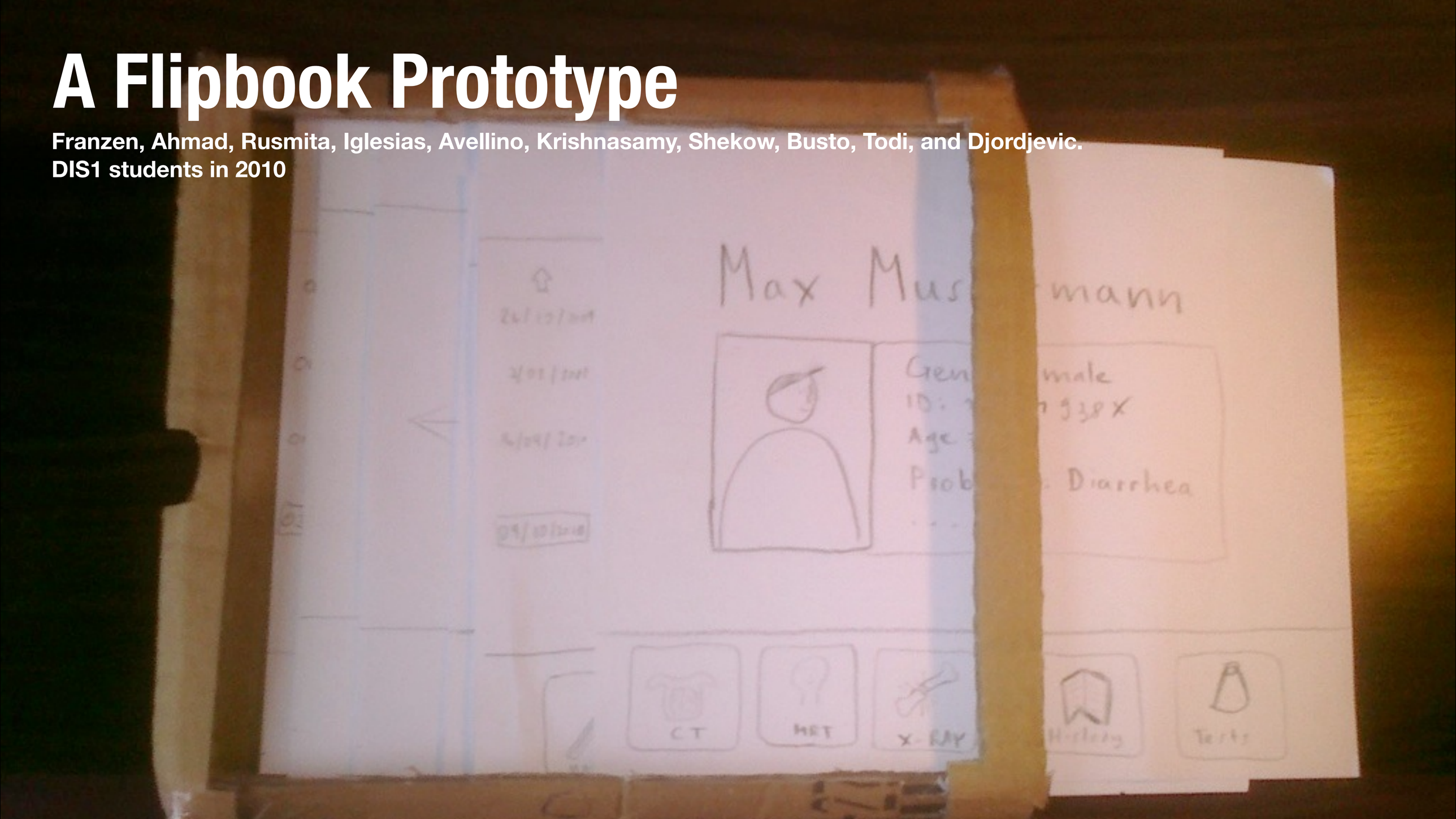
- Type A: Storyboard-like
  - Put several frames with sketched snapshots of the UI on one page
  - Label each frame and each connection
  - Only allows you to show one fixed interaction sequence (scenario)
  - Like a storyboard, but only shows the UI (and maybe the user's hand), not the entire environment of the task
- Type B: Flipbook
  - Sketch each UI snapshot frame on separate page
  - Collect in a loosely bound flipbook that flips over easily
  - Usage: Show start screen page to user—he selects an action—turn to the resulting page from your flipbook, etc.
  - Allows you to simulate the UI for a user

Storyboard-like Prototype

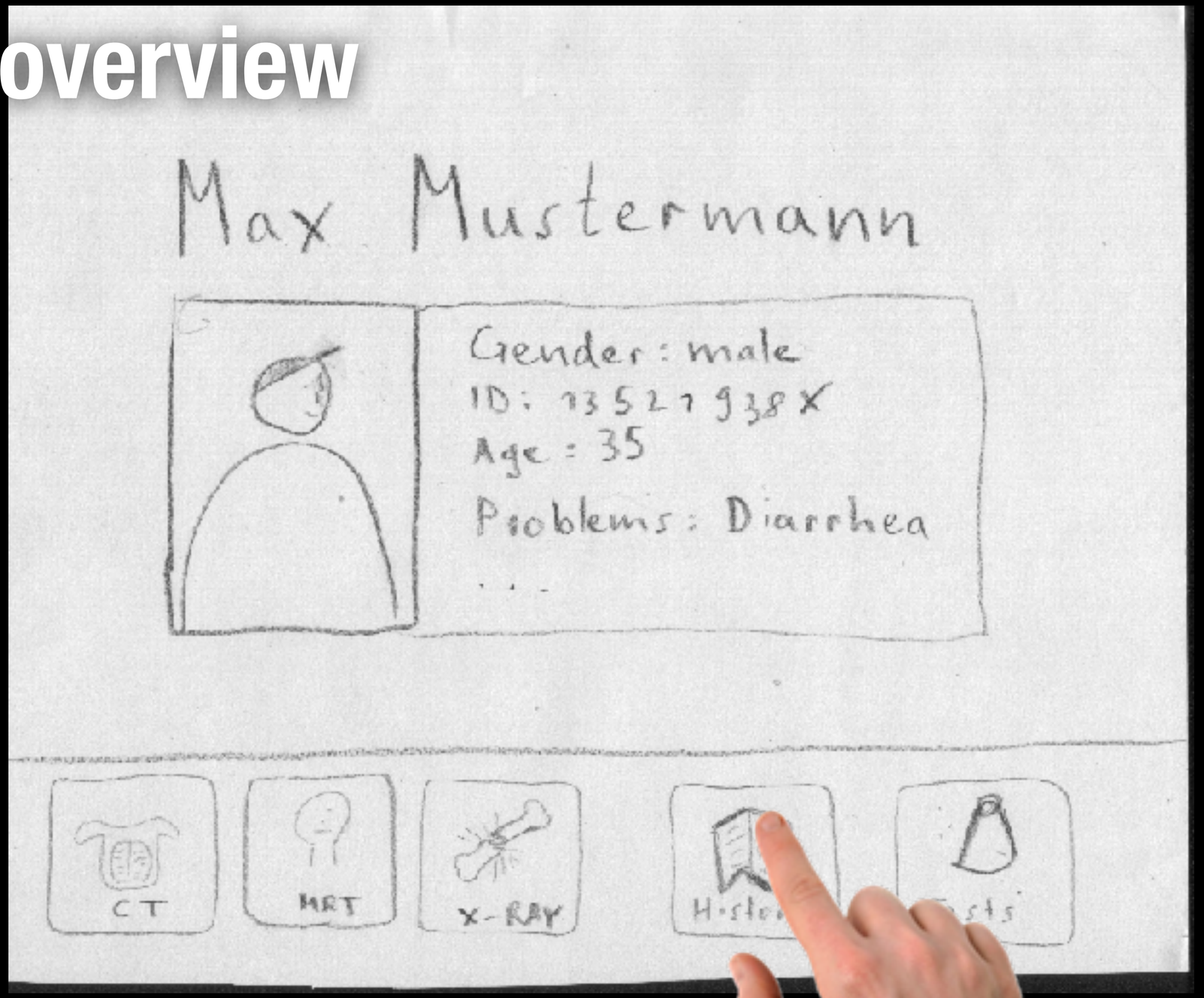


A Flipbook Prototype

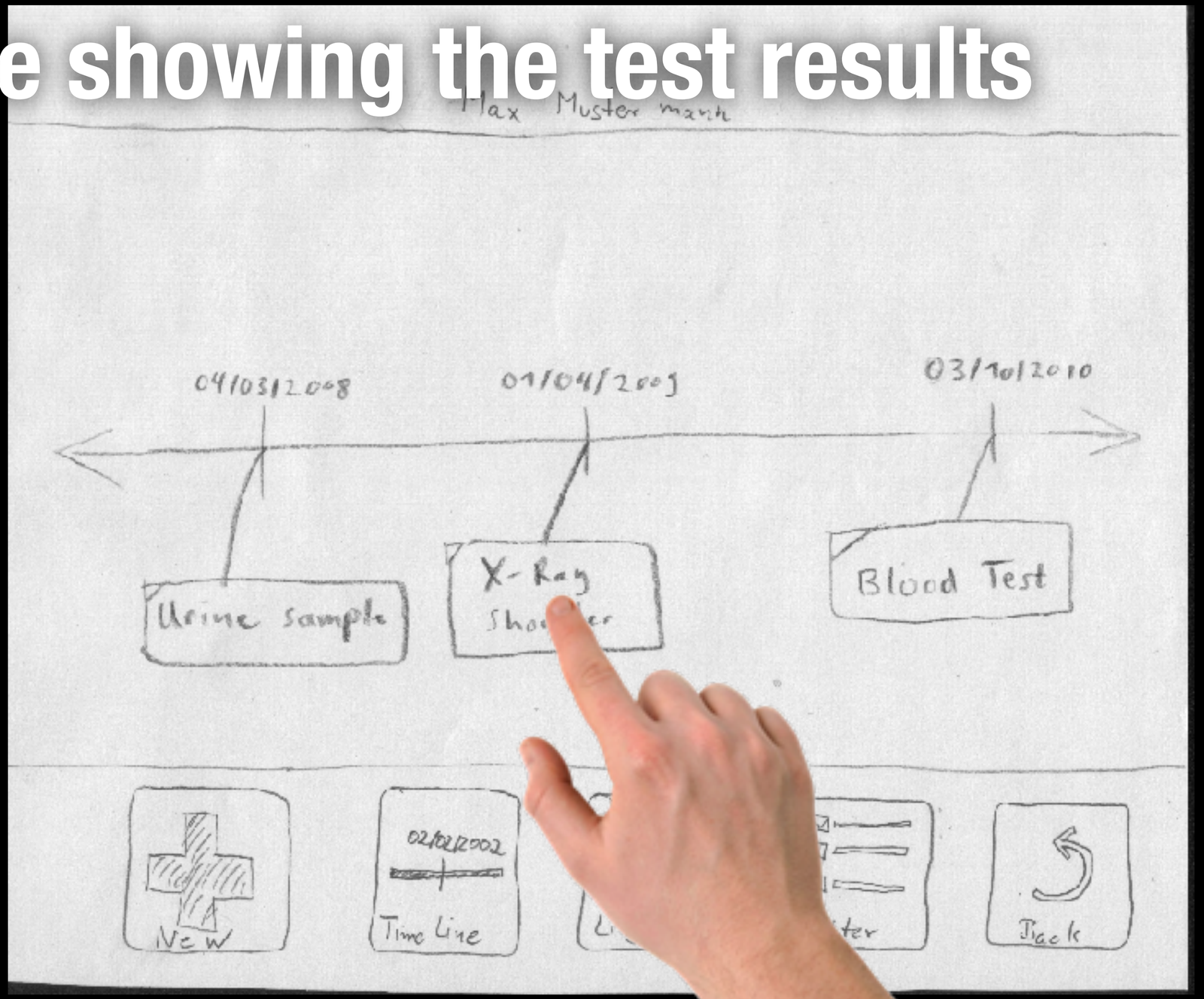
Franzen, Ahmad, Rusmita, Iglesias, Avellino, Krishnasamy, Shekow, Busto, Todi, and Djordjevic.
DIS1 students in 2010



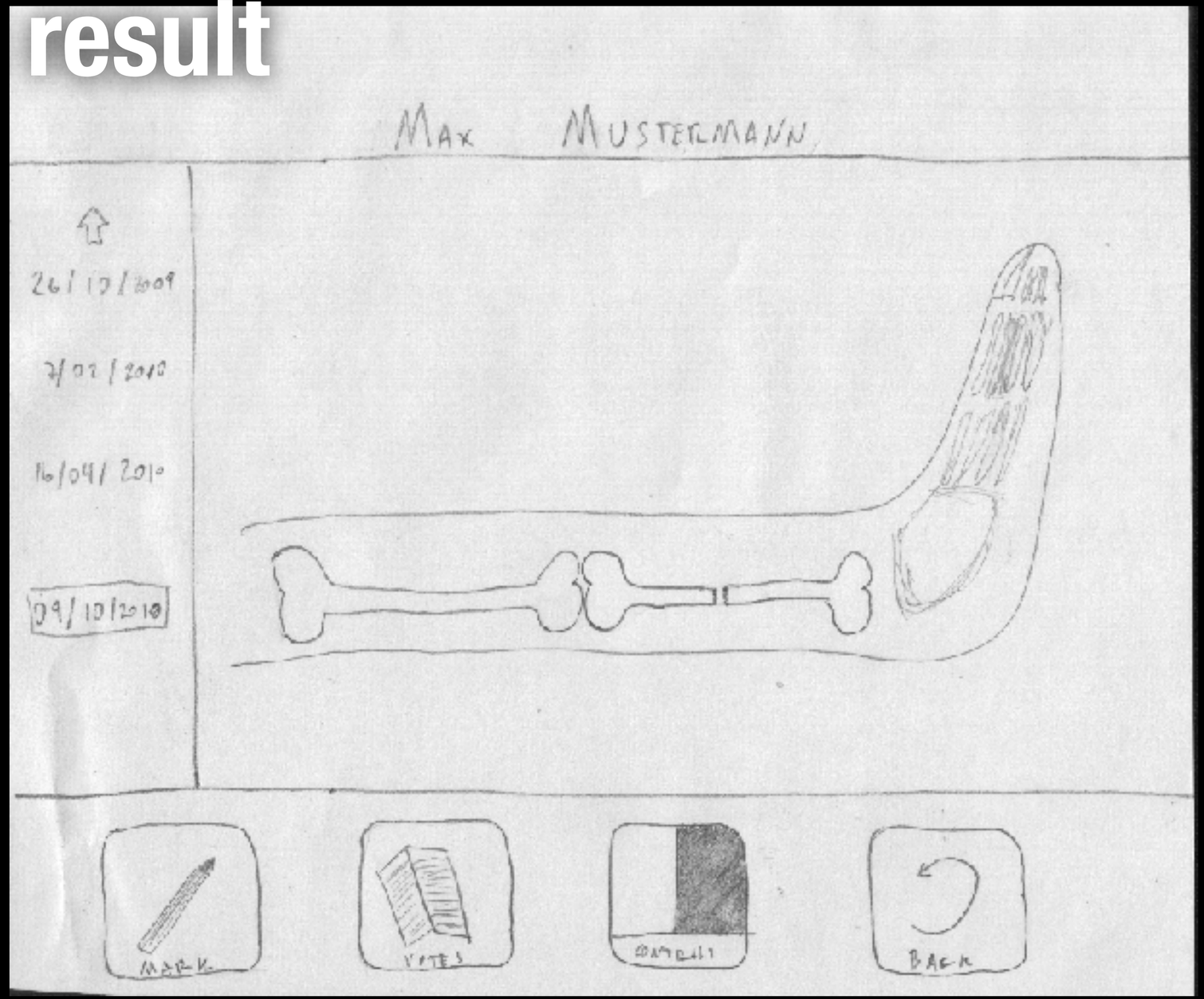
Patient overview



Timeline showing the test results



Detailed result



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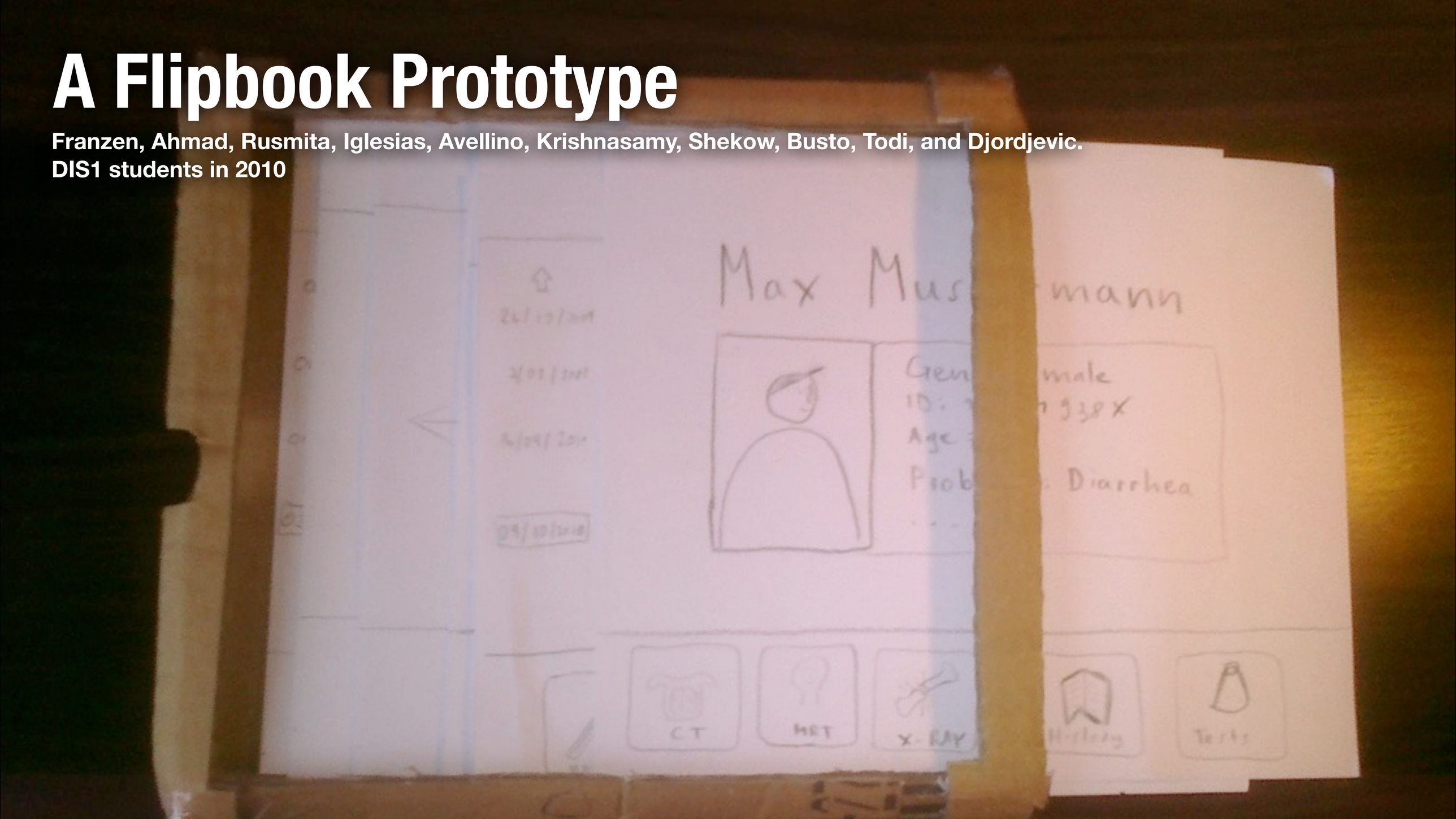
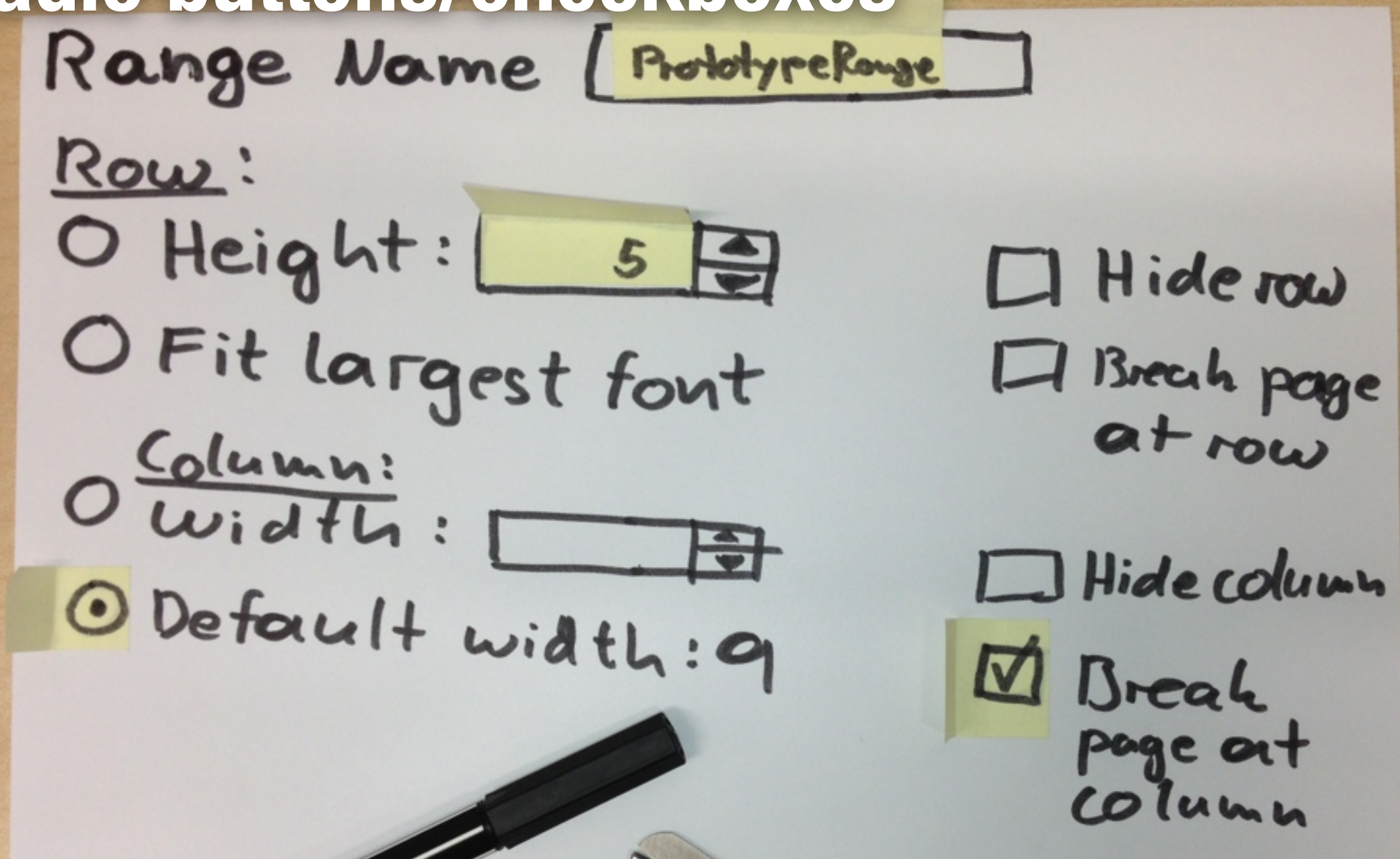
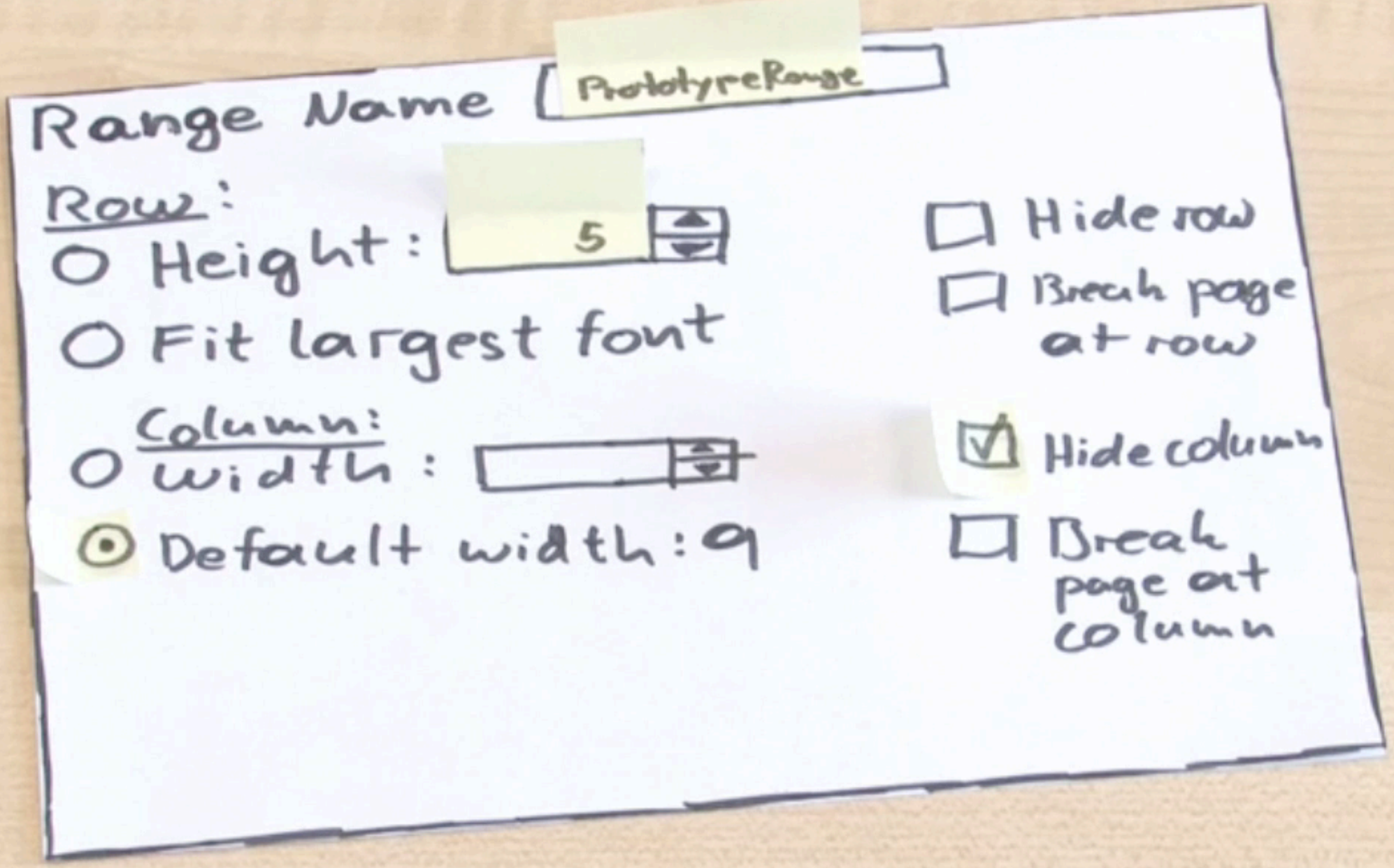


Post-It Prototype

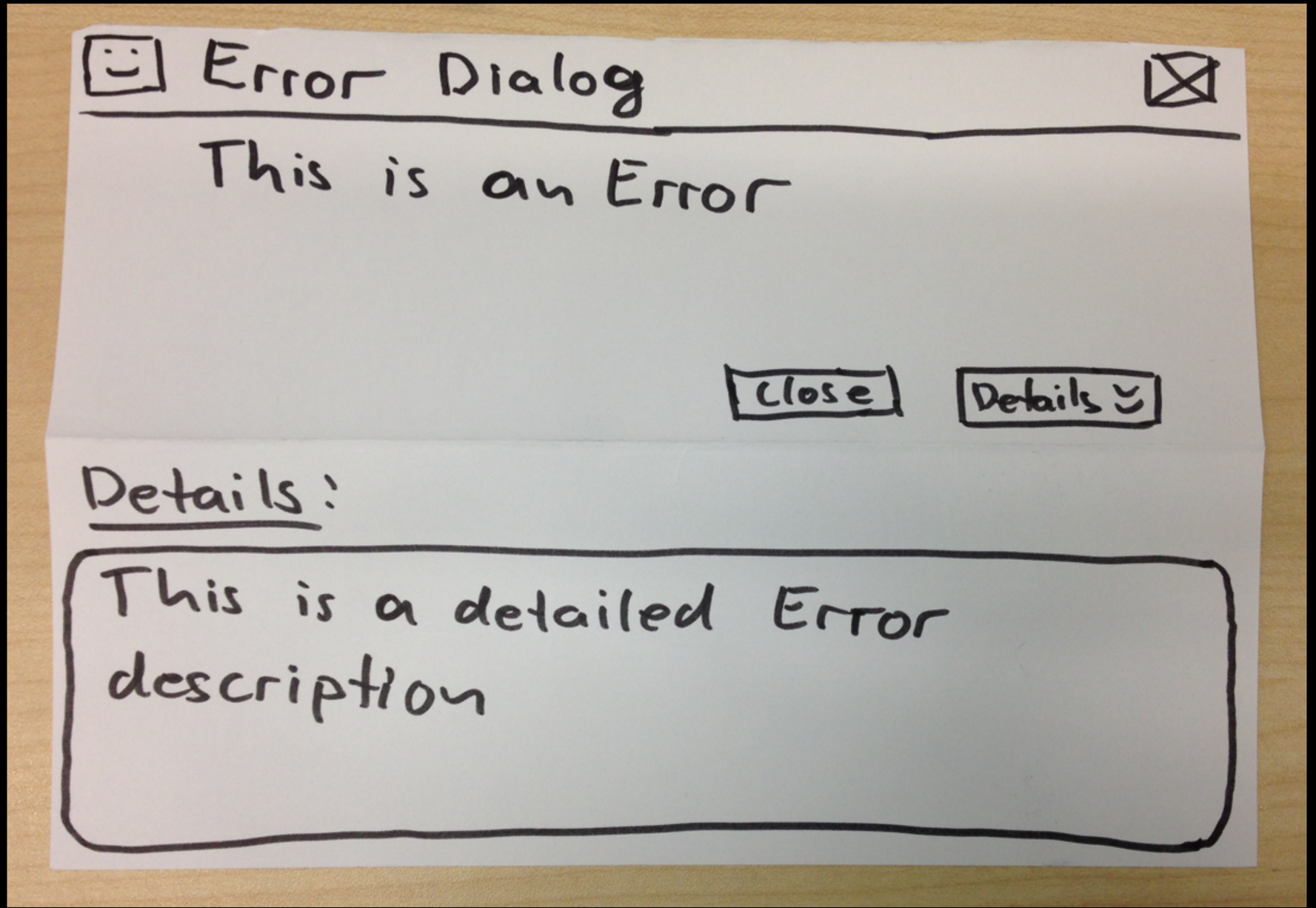
- More interactive paper prototype
- Dialogs, menus, windows on post-it notes in multiple layers
- Allows simulating opening dialogs, etc., by manipulating notes
- Quick to change by making new notes
- Tip: Create empty templates for dialog objects, then fill in
- Tip: Videotape user session for later analysis

Radio buttons/checkboxes

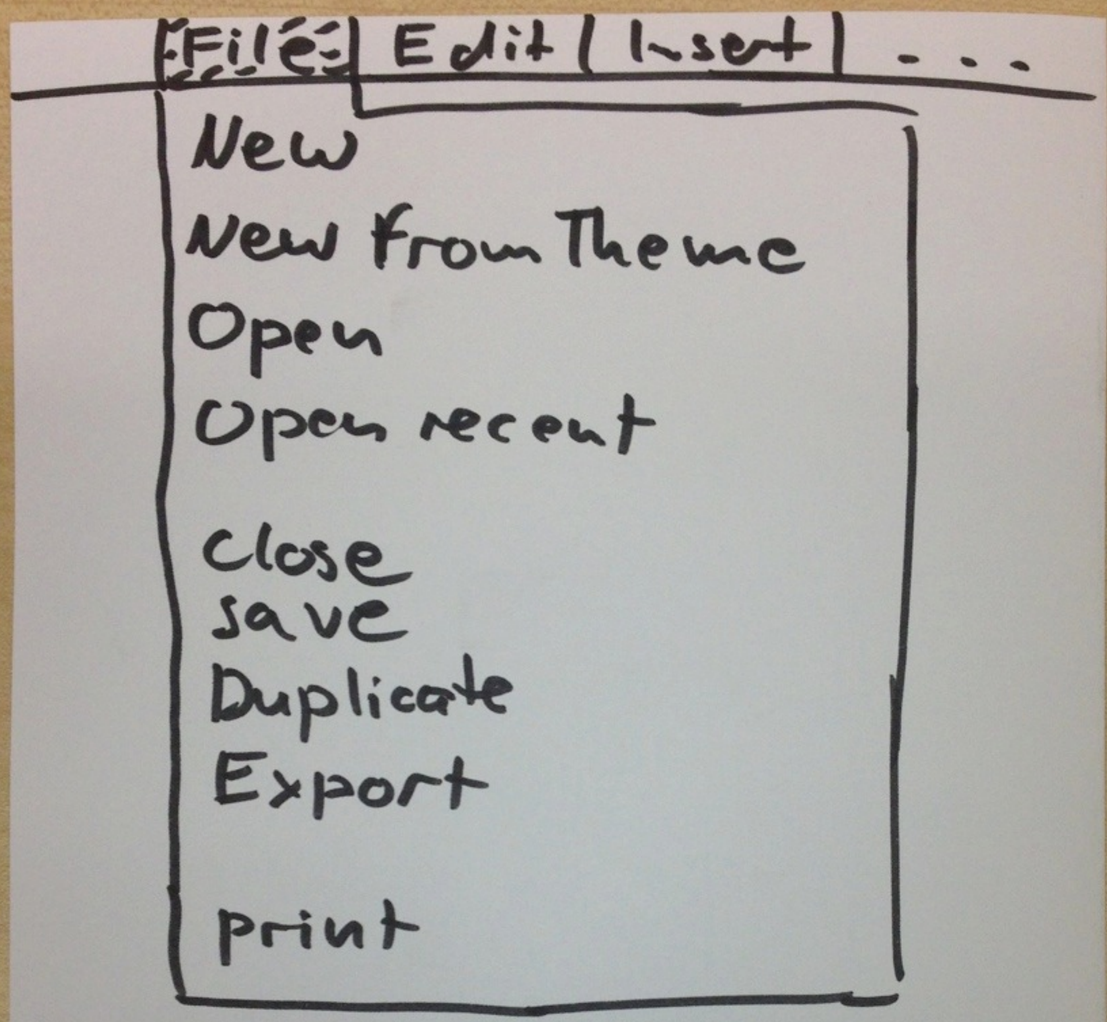


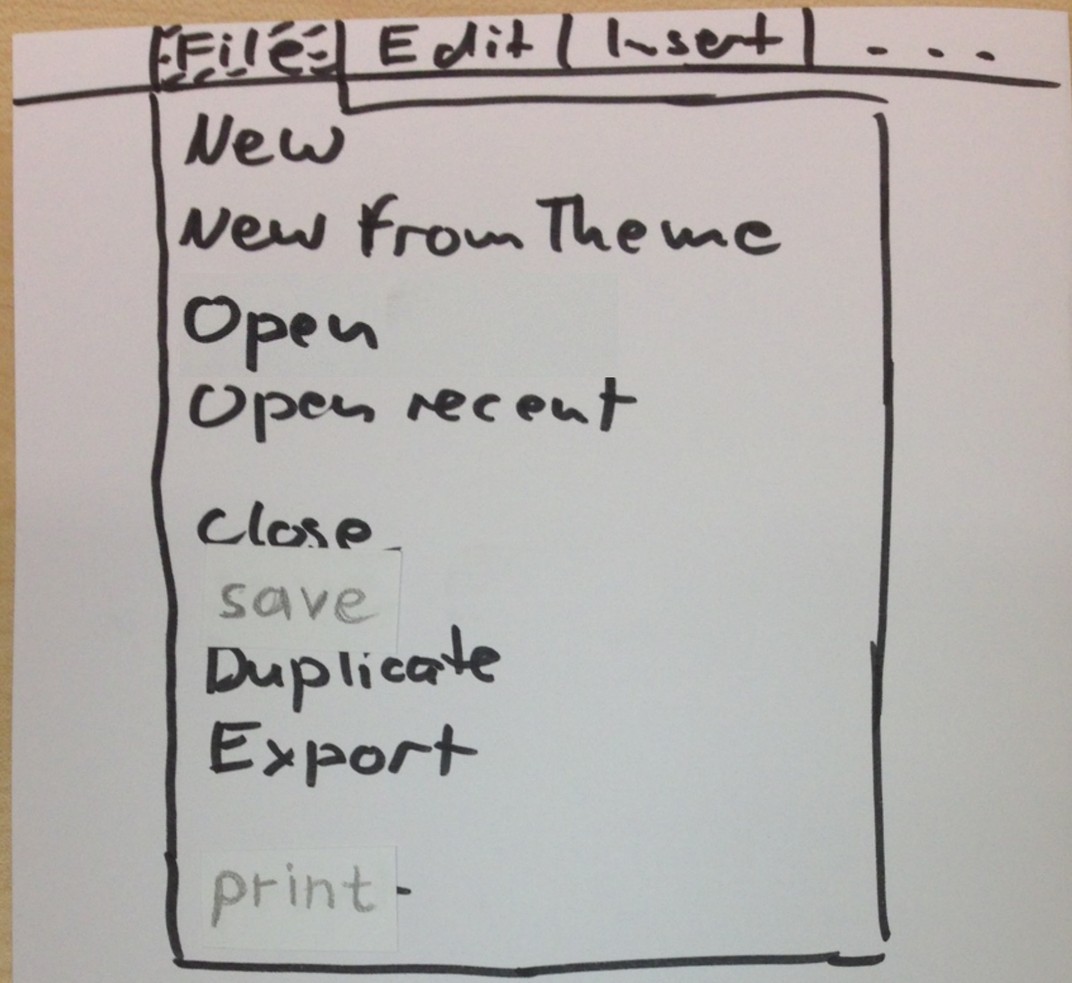

Range Name
PrototyreRange
Row:
Height:
5
Fit largest font
Hide row
Break page at row
Column:
Width:
Default width: 9
Hide column
Break page at column

Expandable dialog boxes



Expandable lists



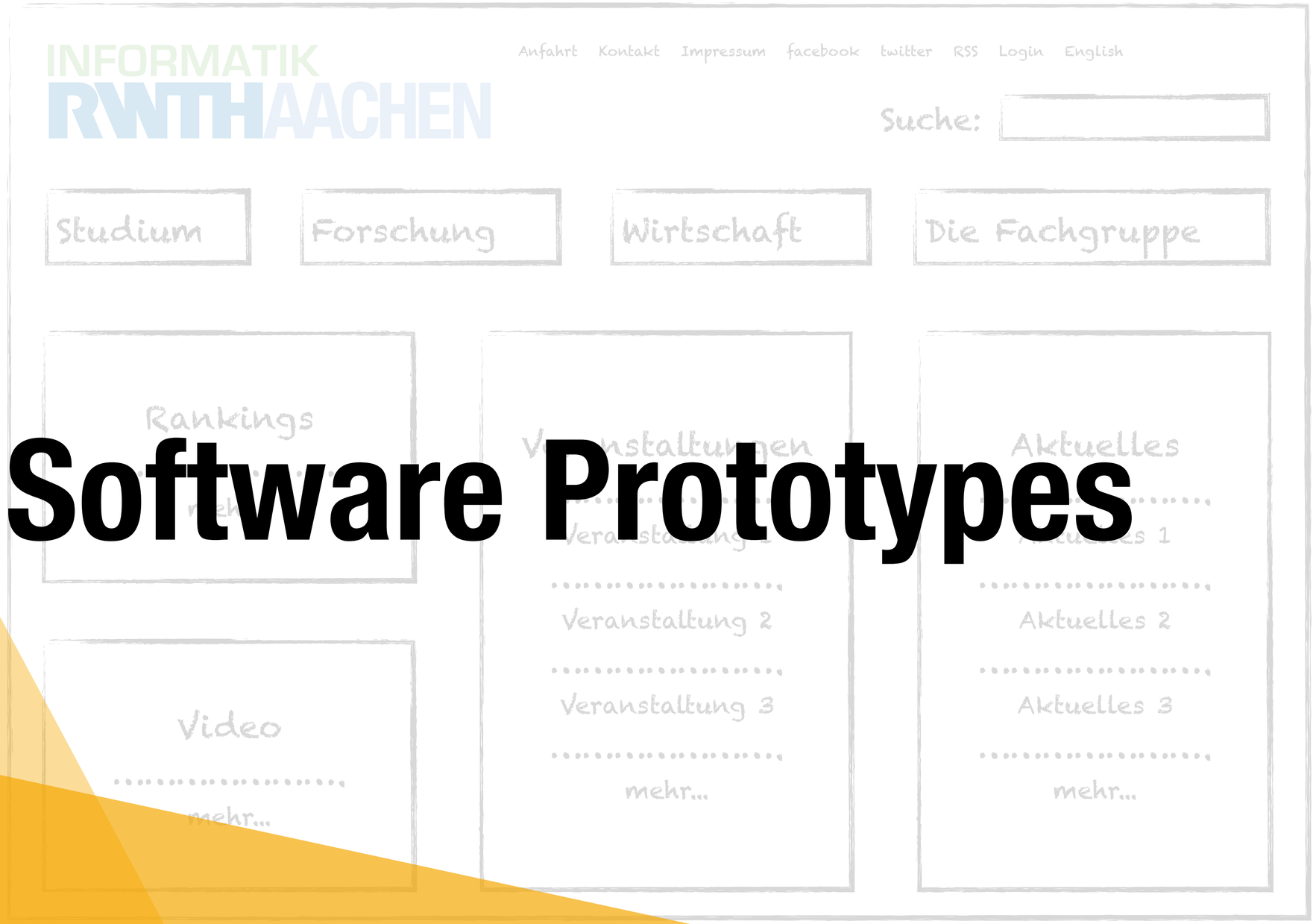


Disabled (“grayed-out

Images: Paper Prototyping by Carolyn Snyder, 2003

Simulating touchscreen UI with paper prototype

Kaiser, Dieckert. DIS1 students in 2010



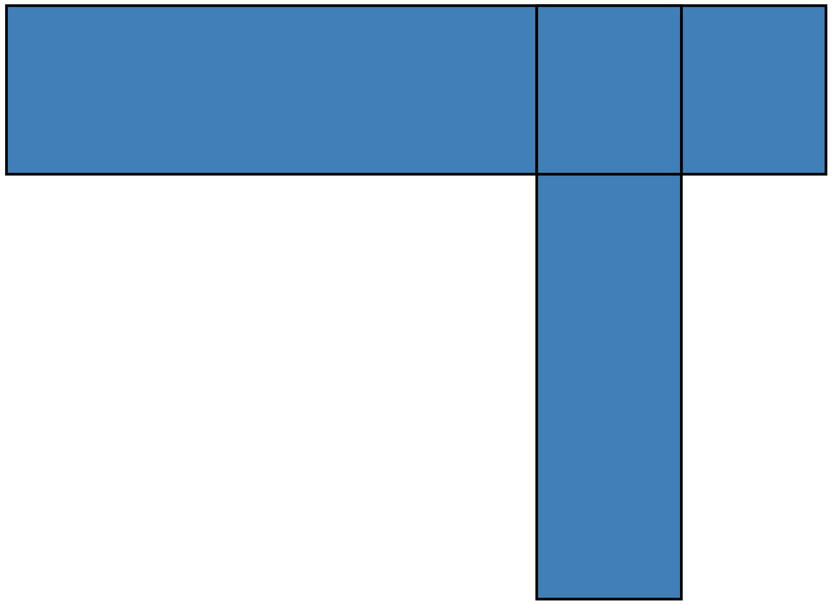
Software Prototypes

Software Prototype

- Medium fidelity prototype
  - More detailed, more precise, interactive
  - Create only after initial, simpler (paper) prototypes!
- Mock-up (model, illusion) of some (but not all) aspects of the final UI
- Example: Powerpoint prototype
- Important: UI, not functionality, is key!
- Pro: More engaging for user to try, user can play with it without designer around

How to Limit Prototypes

- Horizontal prototype
  - Entire UI visible, but no functionality
  - Simulate each interaction step (nothing “works”)
- Vertical prototype
  - Few functions, but those implemented in detail
  - Allows testing general design ideas by example
- Scenario
  - Combination of horizontal and vertical prototype
  - Script simulates only fixed interaction paths



What to do

Find the item you want in the catalog and scan the bar code next to it.

What you selected

Item	Style	Cost

tax:

Total: $ 0.00

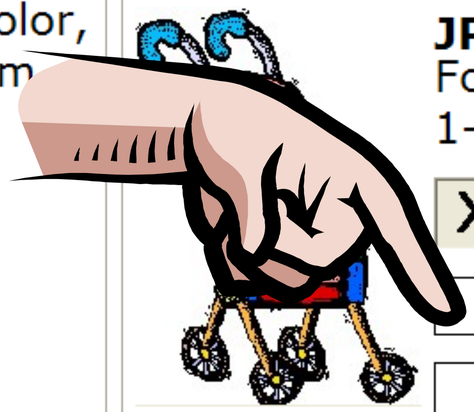
All done?

Place your order | Print this list | Throw this list away

What to do

Touch a different color, or scan another item

What you selected



JPG Stroller
For children between 1-3 years old **...$98.**

- [X] Green
- [ ] Blue
- [ ] Red (out of stock)

Item	Style	Cost	
JPG Stroller	Green	98.00	Delete

tax: 6.98

Total: $104.98

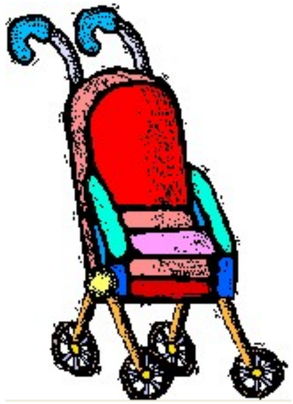
All done?

Place your order | Print this list | Throw this list away

What to do

Touch a different color, or scan another item.

What you selected



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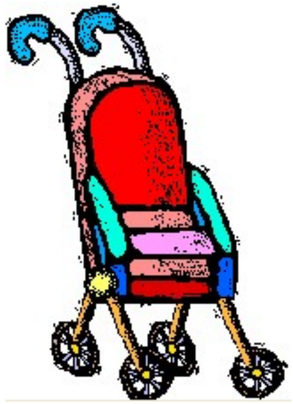

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Item	Style	Cost	
JPG Stroller	Green	98.00	Delete

tax: 6.98

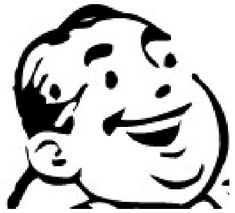
Total: $104.98

e?

Place your order | Print this list | Throw this list away

What to do

To get your items, bring your printout to the front counter.

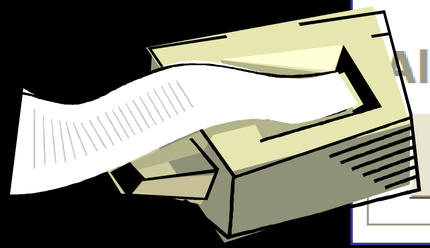


What you selected

Item	Style	Cost
JPG Stroller	Green	98.00

tax: 6.98

Total: $104.98



All done?

Place your order | Print this list | Throw this list away

Software Prototyping: Screenshots

- Photoshop, PowerPoint, etc.
- Draw screens / UI storyboards
- Thin horizontal prototype
- Easier to change than hand drawings
- Allows for visual detail and quality
- Designs can become part of actual UI
  - Useful for non-standard GUIs
- Easy to distribute electronically

Screenshot Prototype: Adding Effects

- Scripted simulations
- Using media tools such as PowerPoint or Photoshop layers
- More potential for interactivity:
  - Scene transition by simple input, timing, animation
- Prototype with slightly more vertical depth
- Use as click-through prototype or for pitching
- Pro: looks real, good for non-standard UIs, no programming
- Con: still linear—simulation fails when script is not followed

Demonstration: Personal Orchestra Prototype

- Alternative to sequential interaction scripts
- Using Photoshop layers to simulate
  - Highlighting menu options
  - Moving to different screens
- Photoshop layers can do some magic
- Normally your Screenshot Prototype will look less polished
  - This example turned out to also become our final graphical layout

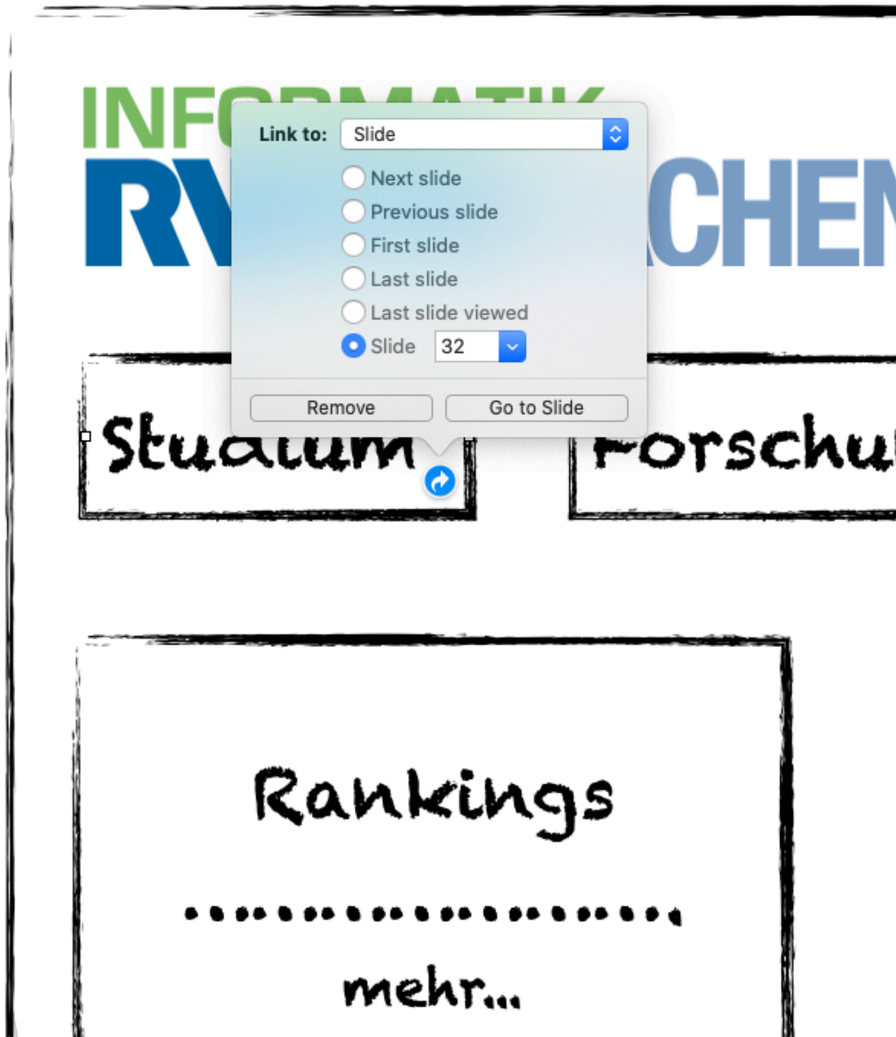
Using Layer Comps for Prototyping

Screenshots: Problems

- No interaction, does not capture any dynamic behavior or “feel” of the UI
- Danger of looking too polished, limits feedback, suggests the interface is “done”
- Missing physical aspects of devices

Non-Linear Software Prototypes

- Connect UI elements to a specific screenshot
- Prototypes with more horizontal and vertical depth
- No predefined sequence of actions
  - Users can decide what to do next

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nn.nn.2011 Abend der Offenen Tür

nn.nn.2011 Girls' Day

nn.nn.2011 Tag Der Informatik

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- Helle Köpfe 2011 für Grundschüler
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Studienberatung Master Software Systems Engineering
Studienberatung Master Media Informatics
Studienberatung Lehramt Informatik
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Prüfungsausschüsse...

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Prüfungsordnungen
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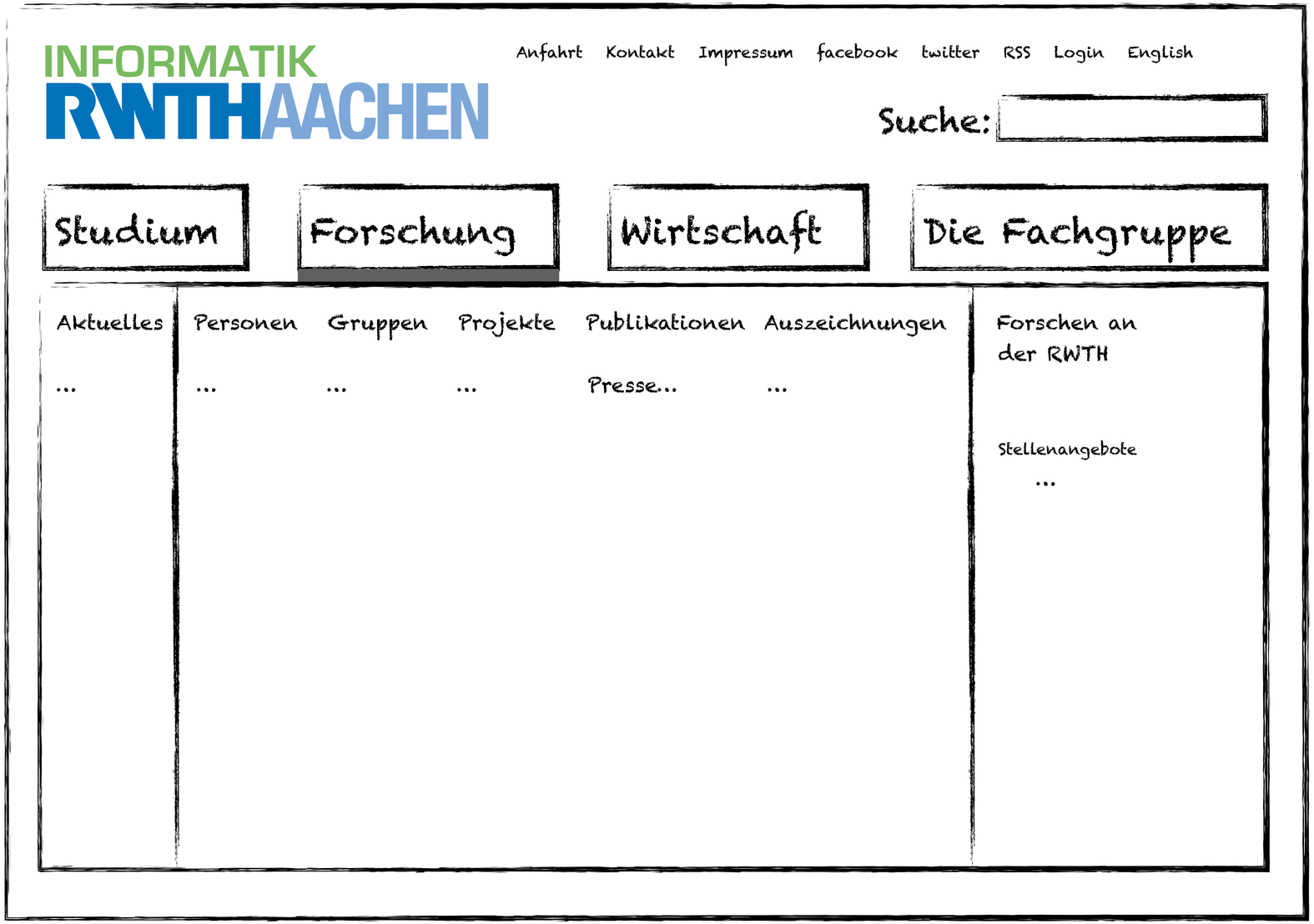
- Berufseinstieg
- Career Center
- Alumni Office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Aktuelles

Über die Fachgruppe Fachgruppen-Sprecher Kooperationen

Struktur
Jahresberichte
Geschichte

Mitgliedschaften

Prototyping Tools: Animation Apps

- Timeline metaphor
- Good for intricate animations
- Powerful when extended with scripts
  - But: Scripting languages are clumsy by CS standards
- May allow for integration of non-standard hardware and other OS features
- E.g. Adobe Animate
- Can even become final product
- But: Large designs become hard to manage

Image adopted from tutorial video: https://creativecloud.adobe.com/cc/discover/learn/animate/beginner/graphic-design/animate-basics/vector-pattern-brush-animation

Prototyping Tools: Web

- HTML + JavaScript, etc.
- Natural choice for web interface design
  - Can become final product
- Ubiquitous
  - Many tools (Electron, Cappuccino, ...)
  - Cleartext format
  - Viewable in any browser (in theory…), over the net
  - But: No precise look & feel (nature of the web)

Demo: Prototyping Interaction with HTML5 + Javascript

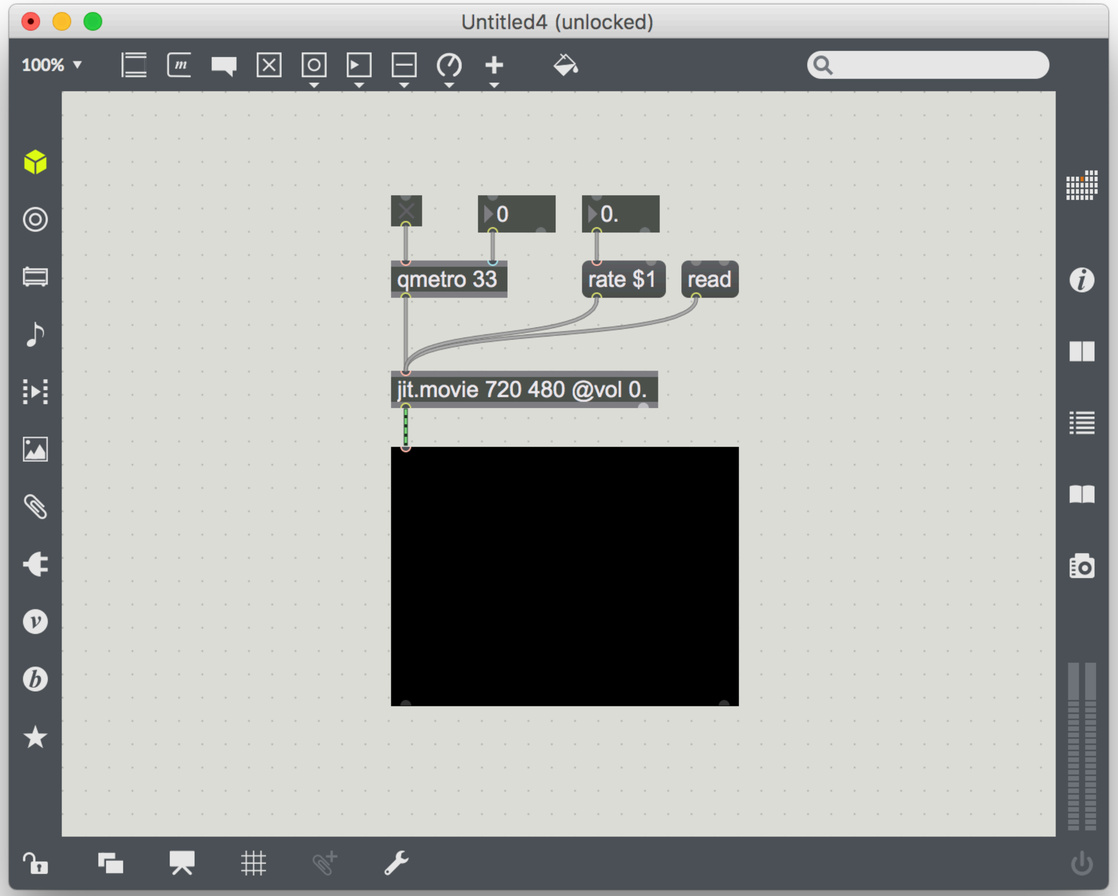
- HTML5 and many Javascript libraries support prototyping user interactions
  - Example: With HTML5 + Javascript you can create simple Drag&Drop operations
- Use your web browser as the IDE

Prototyping Tools: Rapid Development Environments

- Visual Basic .NET, Tcl/Tk, etc.
- Good for standard GUIs (create standard look & feel)
- Often become final product
- Partly interpreted
  - Quick development cycle, but potential performance issues
- Distribution: OK
  - Not always cross-platform
  - May require specific runtime environment

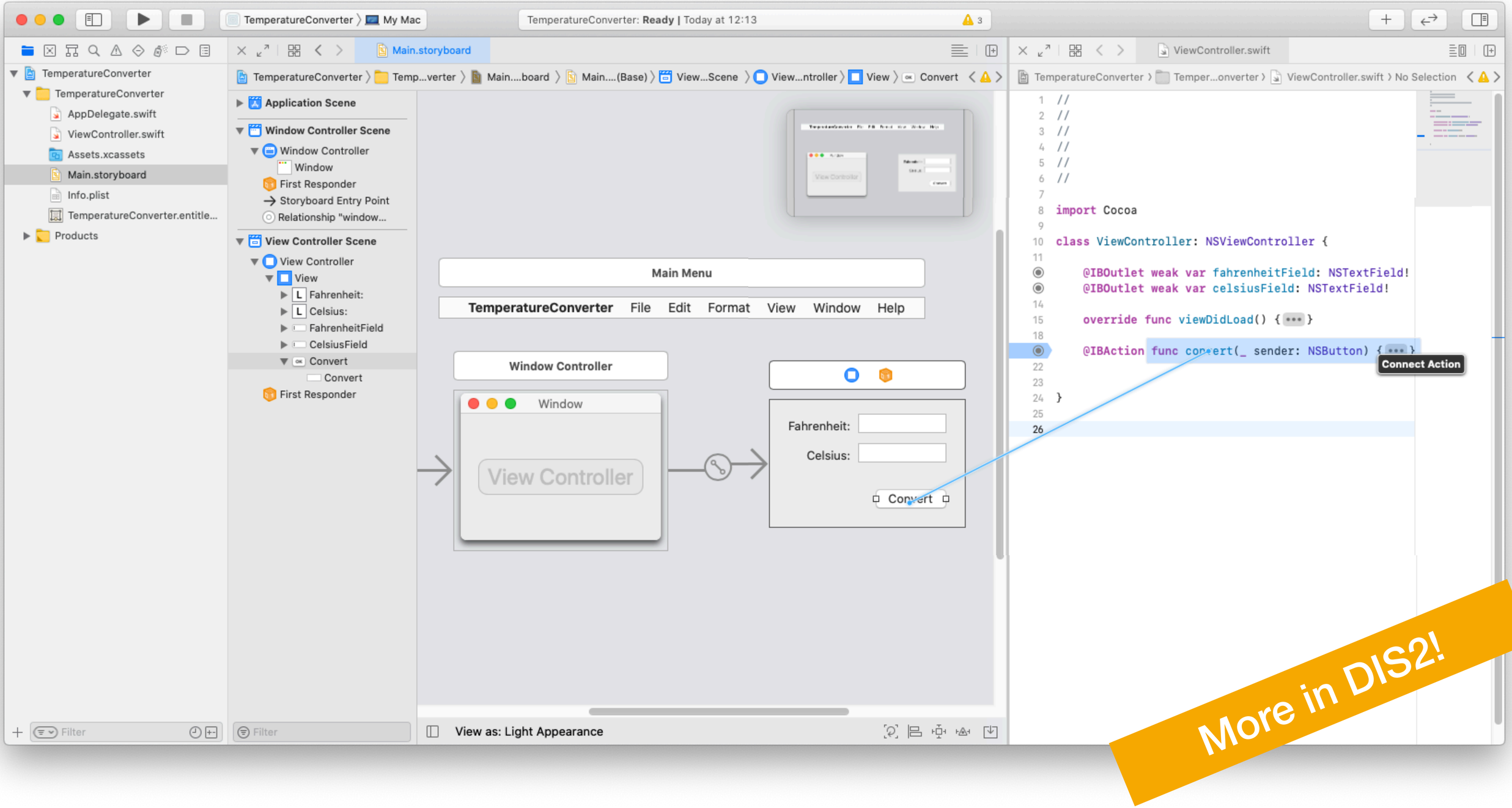
Prototyping Tools: Special-Purpose

- Example: MAX/MSP
  - Multimedia development environment
  - Originally for MIDI applications
  - Extended to handle graphics, audio, and video
  - Build applications by connecting “patches” that process incoming data
  - Very helpful for specific type of applications
    - MIDI/audio/video processing, interactive music systems
  - Can be used for end products (WorldBeat)
  - Distribution: Mac and Windows, free player
    - pd for Linux



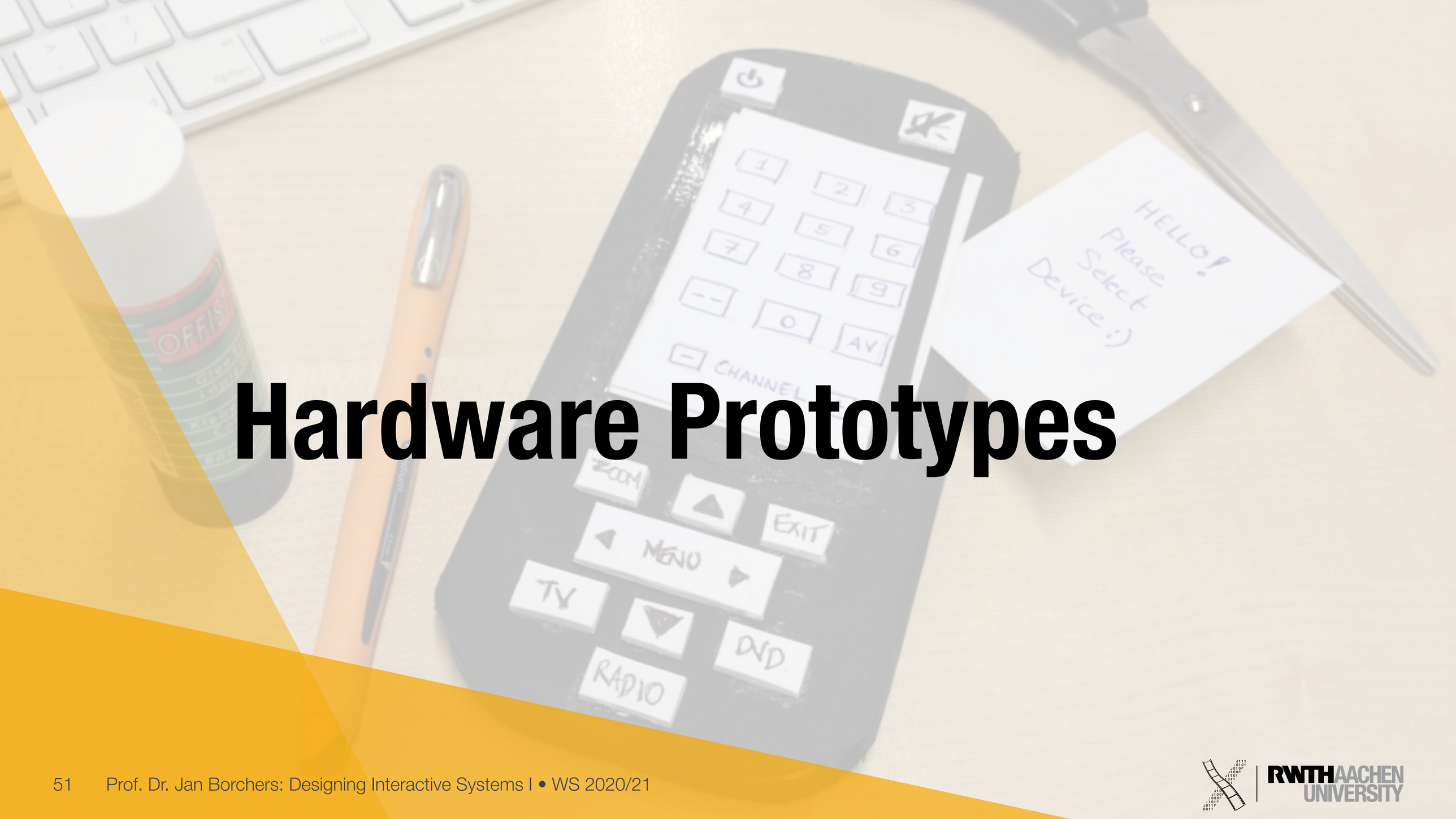
User Interface Builders

- Graphical/textual tools to define UI of real software application
- Usually part of integrated development environment (IDE)
- Pro:
  - Finished design can be used for final implementation
  - Real look & feel
  - Vertical functionality can be added easily
- Con:
  - Limited to 1 window system and its toolkit (windows, buttons, …)


TemperatureConverter
My Mac
TemperatureConverter: Ready | Today at 12:13
Main.storyboard
ViewController.swift
Application Scene
Window Controller Scene
Window Controller
Window
First Responder
Storyboard Entry Point
Relationship "window...
View Controller Scene
View Controller
View
Fahrenheit:
Celsius:
FahrenheitField
CelsiusField
Convert
Convert
First Responder
Main Menu
TemperatureConverter File Edit Format View Window Help
Window Controller
Window
View Controller
Fahrenheit:
Celsius:
Convert
View as: Light Appearance
import Cocoa
class ViewController: NSViewController {
@IBOutlet weak var fahrenheitField: NSTextField!
@IBOutlet weak var celsiusField: NSTextField!
override func viewDidLoad() {...}
@IBAction func convert(_ sender: NSButton) {...}
Connect Action
}
More in DIS2!

Software Prototype: Dangers

- Users focus on design details and overlook larger problems
- Users afraid to criticize or suggest changes to “nice” UI design
  - Looks like it was so much work…
- Management may think it’s real ☺
  - Looks like the software is almost done
  - Reason: Users think the interface is the system! (“Conceptual models”)



Hardware Prototypes

Hardware Prototype

- For systems that are hard to imagine by software alone
  - Example: Palm's wooden blocks
- Physical interaction is important
  - E.g., new 3-D mouse
- Design in wood, foam core, plastics, styrofoam, cardboard, …
- Problem: high effort to build and change

Prototypes of Microsoft Touch Mouse, Cut From Foam

Image (CC) wired.com

3D Printed Prototype of Pebble Watch

Image (C) Sarah Kessler (mashable.com)


HELLO!
Please
Select
Device :)
1
2
3
4
5
6
7
8
9
--
0
AV
CHANNEL
ZOOM
EXIT
MENU
TV
DVD
RADIO


For more freedom of play use the
Virtual Airguitar Simulator™

Wizard of Oz

- Human ‘wizard’ simulates system response
  - Interprets user input according to an algorithm
  - Controls computer to simulate appropriate output
  - Uses real or mock interface
  - Wizard sometimes visible, sometimes hidden
  - “Pay no attention to the man behind the curtain!”
- Good for:
  - Adding simulated and complex vertical functionality
  - Testing futuristic ideas
  - Example: 1984 IBM voice recognition editor

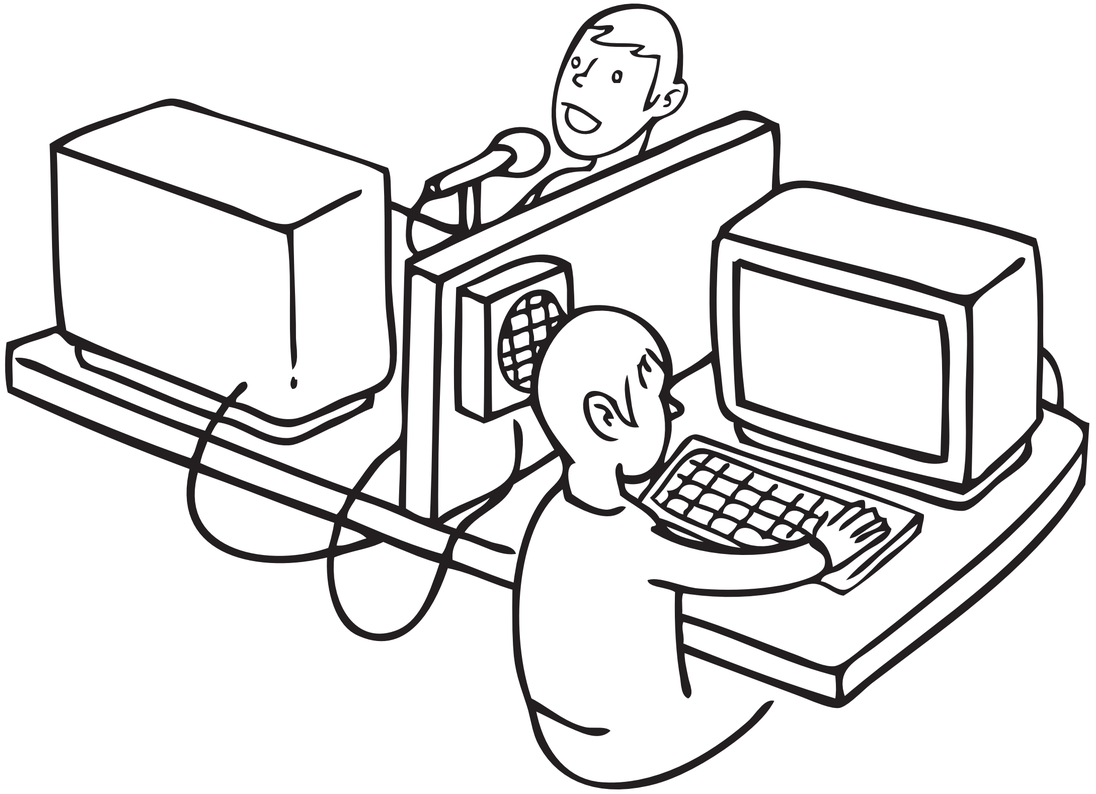


Image: Buxton 2007, *Sketching User Interfaces*

What to Do with a Prototype?

- Throw away
  - If creation was quick and cheap
- Continue to develop
  - Prototype improved incrementally
  - Becomes final product
  - Problem: Has to use production-strength technology