LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

Abschlussvortrag der Diplomarbeit

Design and Evaluation of User-Interfaces for Mobile Applications Development

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Structure of the Presentation

- **Introduction**
  - Mobile Applications Development
  - Related Work and Literature
  - Thesis Problem Statement
  - Goals
- Realization
  - Implementation
  - Design Ideas
  - Prototypes
- Evaluation
  - User study, Objective
  - Results and Conclusions
- Alternative Designs
  - Widgets
  - GUI presentation

Mobile Application Development:

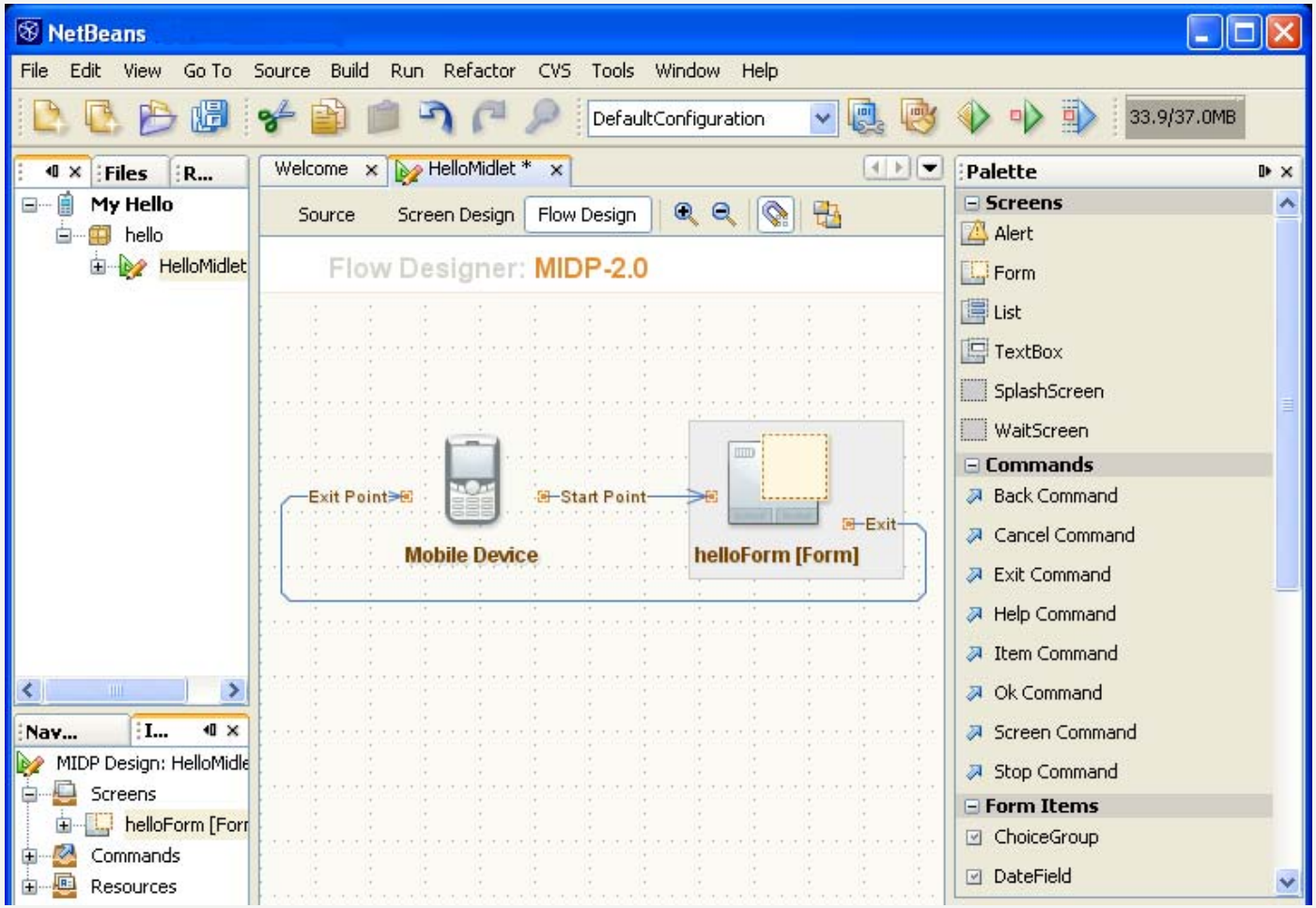
- Definition: Development of software for mobile devices
- Motivation
  - Opened Application Development Interfaces (API) of mobile devices
  - Creation of own, novel software for mobile devices
  - Discovery of new ideas generated by end-users (iTunes)
- Problems
  - No support for non-programmers
  - Specific constraints of mobile devices (screen size, CPU power, connectivity etc.)

    → MDD

Brief Overview of Related Work and Literature

- Integrated Development Environments (IDE) Supporting Mobile Application Development
  - NetBeans → Mobility Pack
  - XCode → GUI-Framework Cocoa
  - Android → DroidDraw
- Modeling Tools
  - MetaEdit+
  - Mobile application modeler from SAP
- Guidelines for Designing User Interfaces

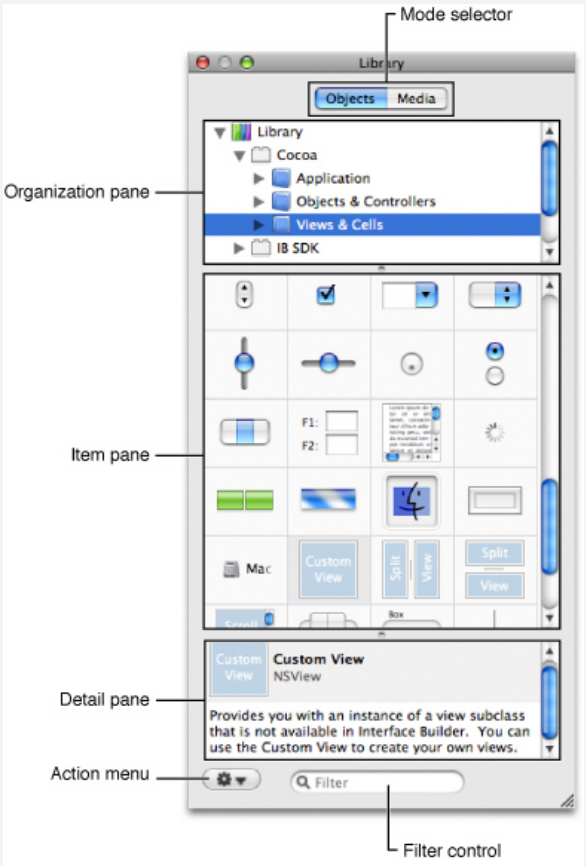
Netbeans Mobility Pack 5.5

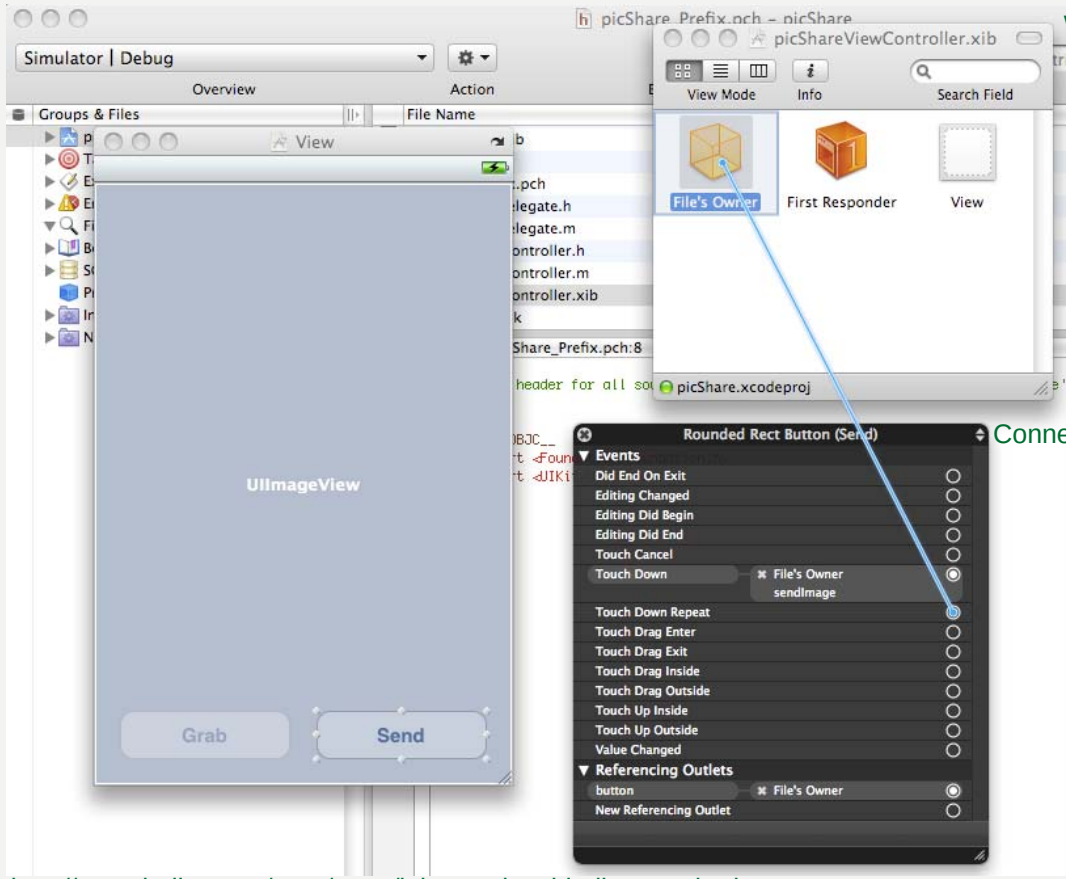


http://www.netbeans.org/kb/55/quickstart-mobility.html

XCode - InterfaceBuilder with GUI-Framework Cocoa

Library





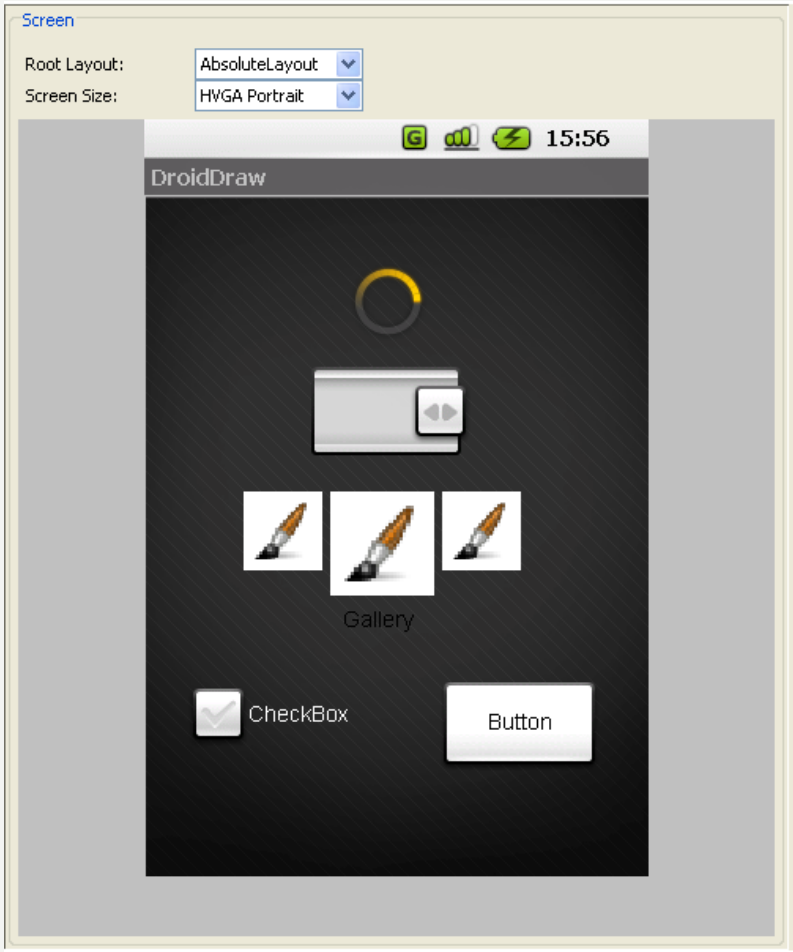
Window callout

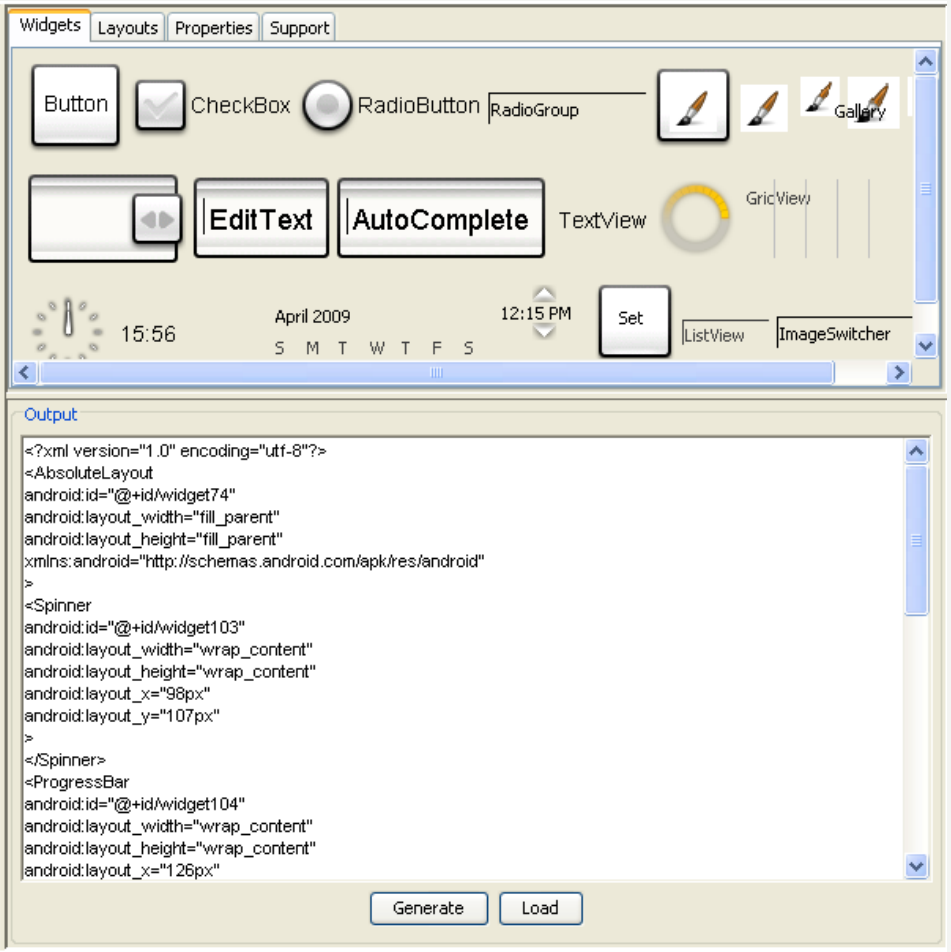
Connections panel

http://www.jroller.com/mert/entry/iphone_dev_binding_methods_to

http://developer.apple.com/documentation/developertools/conceptual/IB_UserGuide/ApplicationBasics/ApplicationBasics.html

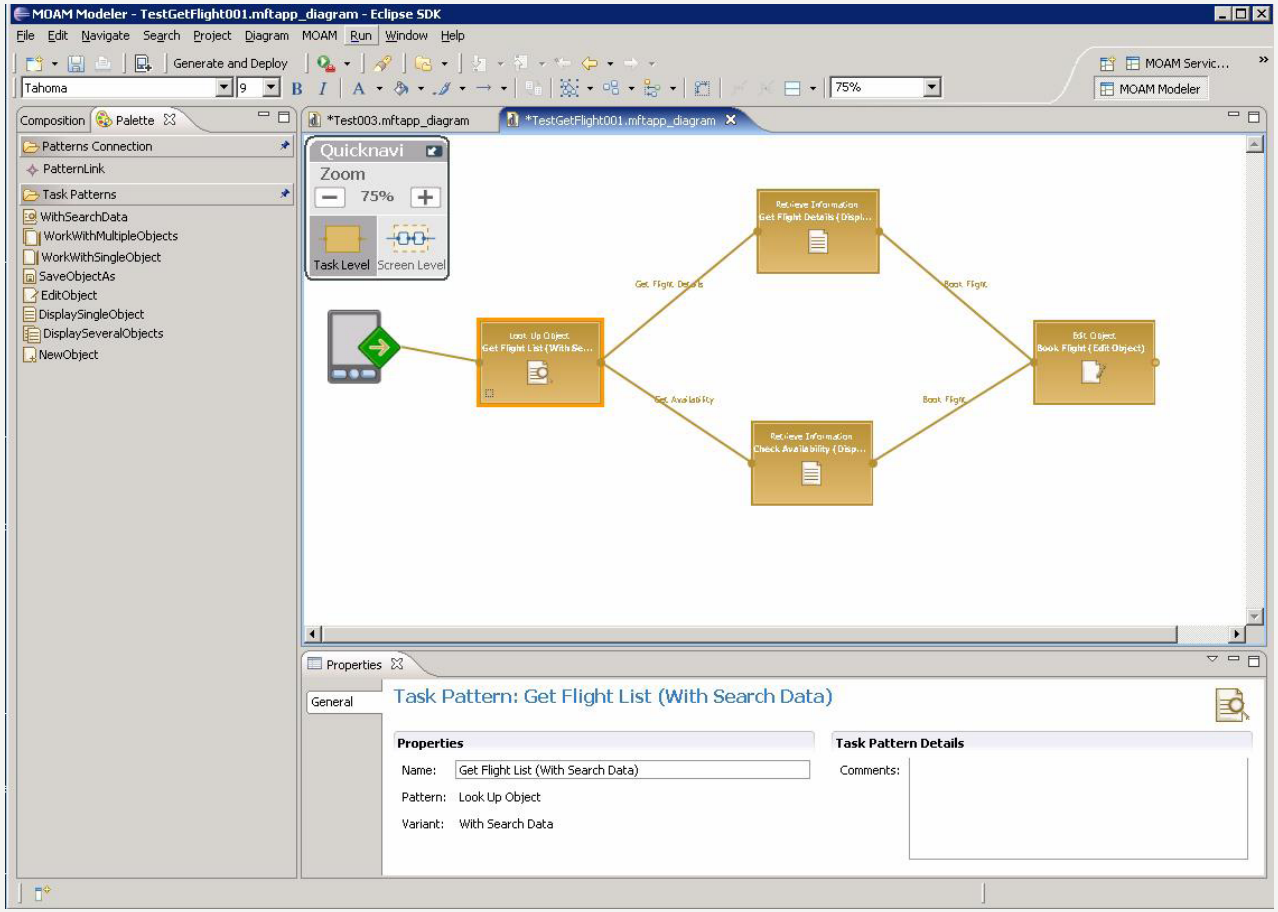
Android with DroidDraw Beta





http://droiddraw.org

SAP Mobile Application Modeler



https://www.sdn.sap.com/irj/sdn/go/portal/prtroot/docs/library/uuid/5045b3cc-acbe-2910-2bab-8d930cb31a33

Problem Statement

- Design and evaluation of high-fidelity user interfaces for the Mobile Applications Modeler (Mobia)
- Mobia: Model Driven Development of mobile software
  - Project at LFE Medieninformatik
  - Focuses on mobile health
  - Platform independent
- Generation of domain specific mobile applications
- Evaluation through user studies and observation

Goals

- Creation of user interfaces which support novice users
  - Simple usage / good usability
  - Modeling of software by visual means, without needing to code
  - Delivering good support by hints
  - Directing users towards right actions and preventing erroneous ones

- Evaluation
  - Can novice users model simple applications in WYSIWYG manners?
    → Like applied to web applications
  - Results and the observations will deliver facts to improve and modify GUIs for better support of novices

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Implementation

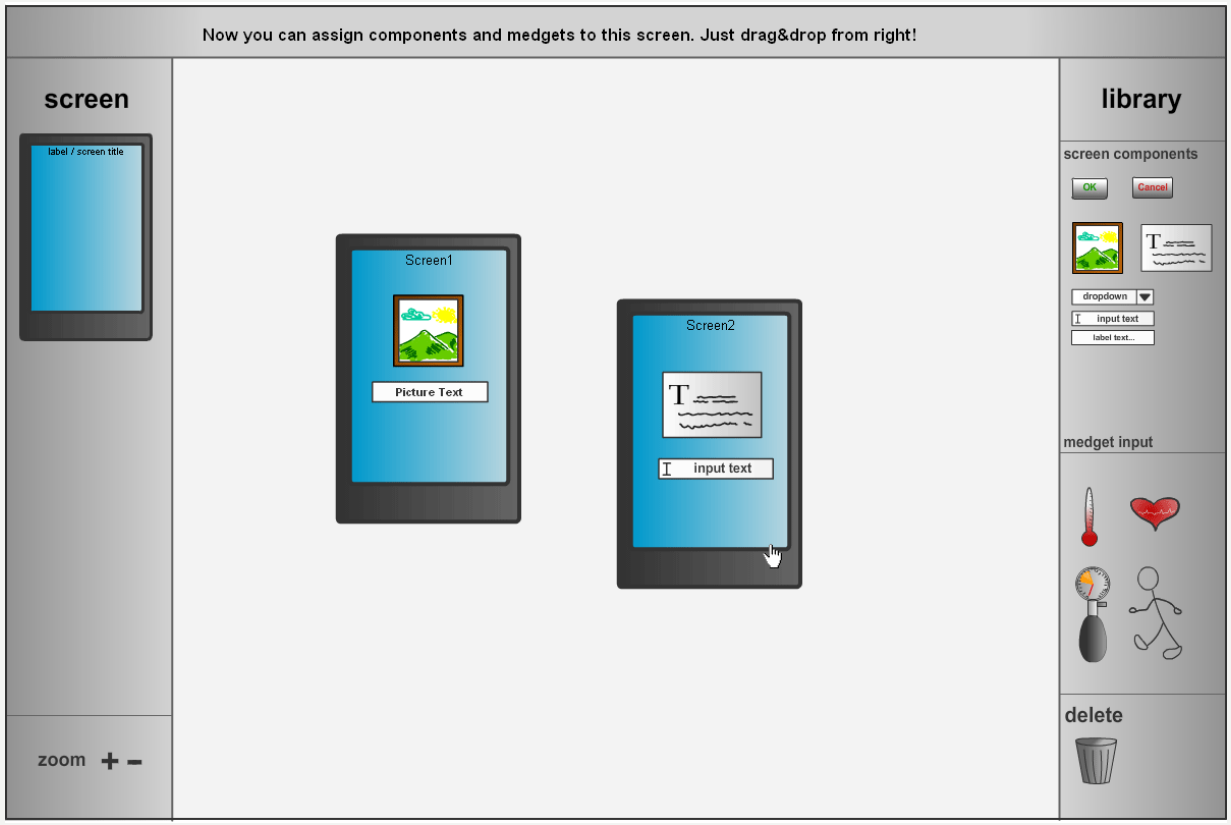
- Flash CS3 with ActionScript 3.0
- Each interaction element as an object
- MVC Approach
- View included in the Flash environment
- Model implemented in the objects, making use of inheritance
- Controller in main class
- Outsourced classes for drawing and tooltips

Design Ideas

- Usage of familiar widgets (buttons, text fields, dropdown lists etc.)
- Usage of familiar and “friendly” symbols for the provided domain
- Interaction and modeling by drag and drop
- Combination of UI design and UML like modeling
  - Arrows indicating transitions
  - Overview of hierarchy and relations of different states
- Visual and textual cues directing users to accomplish their ideas

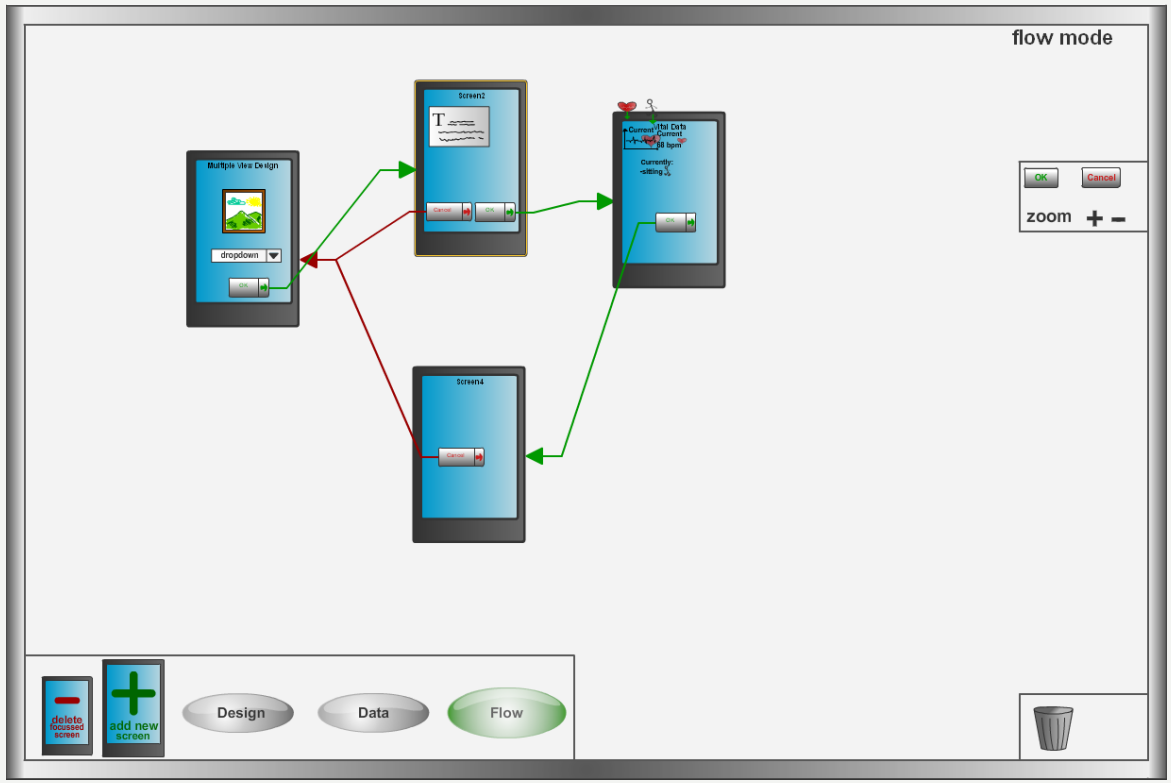
Short Presentation of the Prototypes

- Prototype 1: ***Mobia with an Integrated View*** (MobiaOneView)
  - Add design and application flow in one view

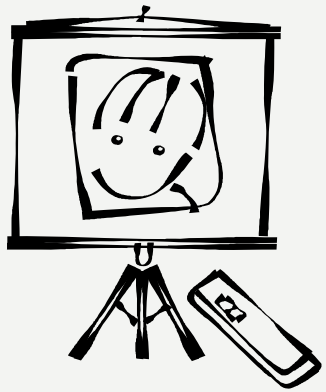


Short Presentation of the Prototypes

- Prototype 2: ***Mobia with multiple Views*** (MobiaMultiViews)
  - Separation of tasks in different views:
    - Design, Data and Flow View



Brief demonstration of the Look and Feel of the Prototypes



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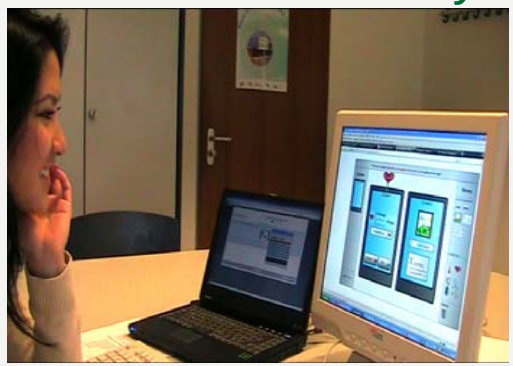
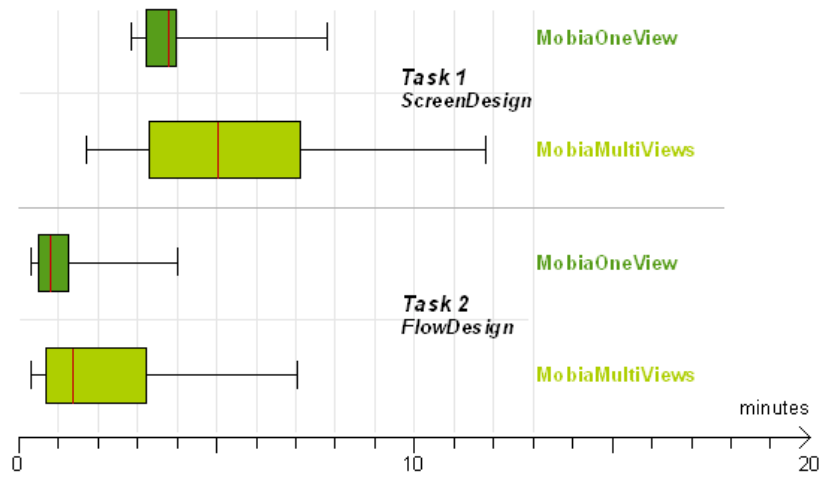
On-Site User Study

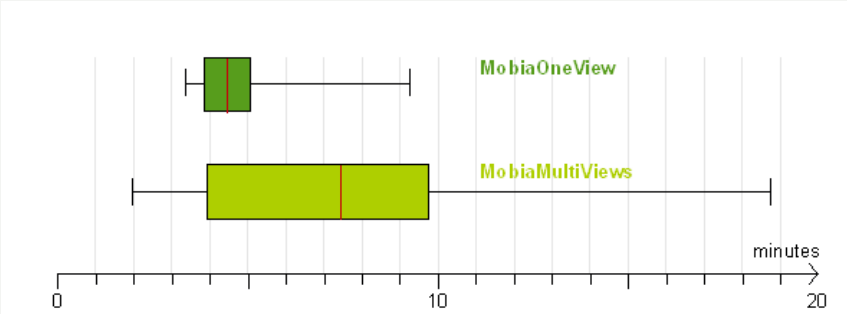
- 10 participants.
- Began counterbalanced with one of the GUI prototypes
- 2 Tasks:
  - Screen Design
  - App. Flow Design witch each prototypes
- Quantitative Data: Measurement of the time needed for the tasks
- Qualitative Data / Subjective analysis through the included survey.



Evaluation

	MobiaOneView	MobiaMultiViews
ScreenDesign Task	4.036 min	5.833 min
FlowDesign Task	1.126 min	2.223 min

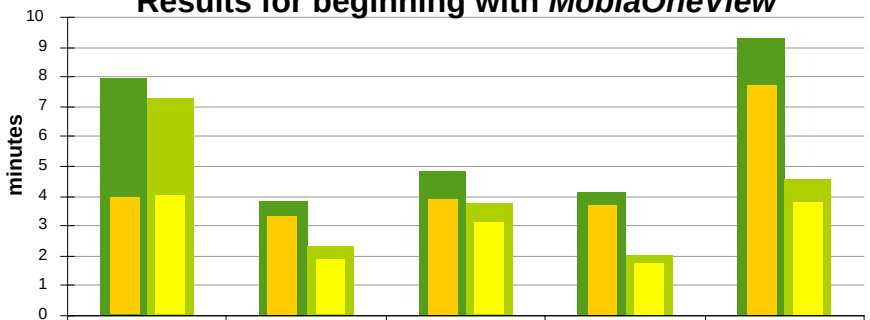




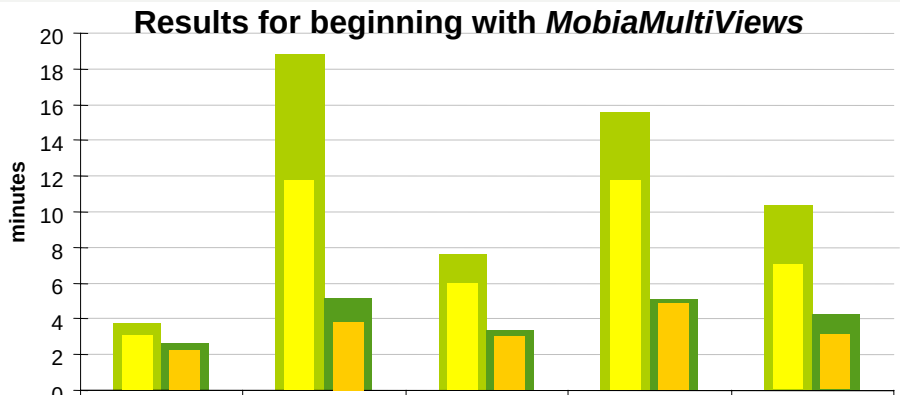
Objective Results

- Better performance of MobiaOneView
- But not significant in the paired t-test

Evaluation



	1	2	3	4	5
MoV - Total time	7.984	3.826	4.843	4.115	9.306
MmV - Total time	7.297	2.324	3.77	2.025	4.615
MoV - ScreenDesign	3.952	3.333	3.965	3.798	7.798
MmV - ScreenDesign	4.087	1.823	3.148	1.715	3.775



	1	2	3	4	5
MmV - Total time	3.718	18.795	7.665	15.578	10.334
MoV - Total time	2.666	5.153	3.416	5.05	4.204
MmV - Screen Design	3.016	11.765	5.99	11.785	7.122
MoV - Screen Design	2.25	3.806	2.833	4.69	3.167

MobiaOneView easier to learn and to start with

Subjective and Qualitative Results

	"Easier to Use"	"More fun to Use"
MobiaOneView	60%	50%
MobiaMultiViews	40%	40%
None	0%	10%

MobiaOneView is preferred by the users, corresponding to the performance

Reason:
- Simple View
- Simpler handling

	Preferred medgets palette	
	Summarized	Detailed
Started with MoV	20%	100%
Started with MmV	80%	0%
Overall	40%	60%

The detailed medgets palette of MobiaMultiViews was preferred

Reason:
- Draggable data representation
- Easier to change and arrange

Conclusions

- Novices are able to model simple mobile applications using the GUI prototypes of Mobia
- They benefit from clear and simple interfaces, and
- Consistent interaction mechanisms

Points for Improvement

- One screen should be in the canvas from beginning
- Deleting operation
- Support for mnemonics
- No redundant widgets (e.g. two pre-labeled buttons)
- Better separation of views (e.g. only two views for design and flow)

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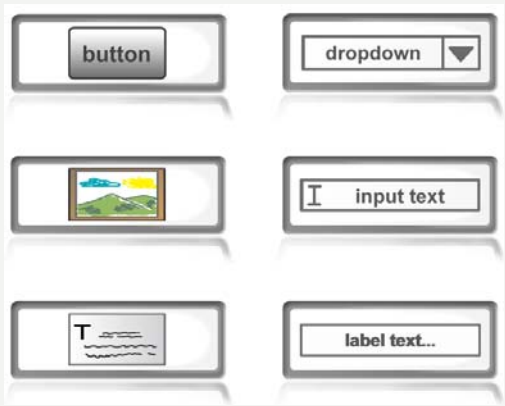
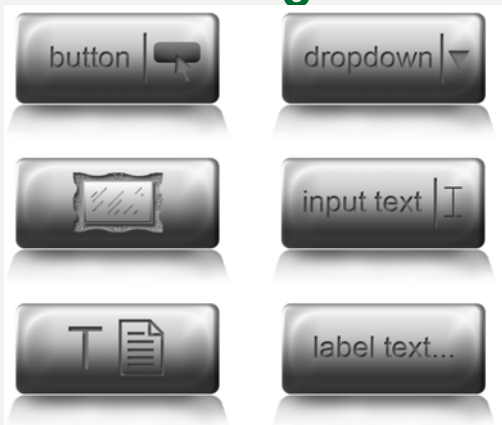
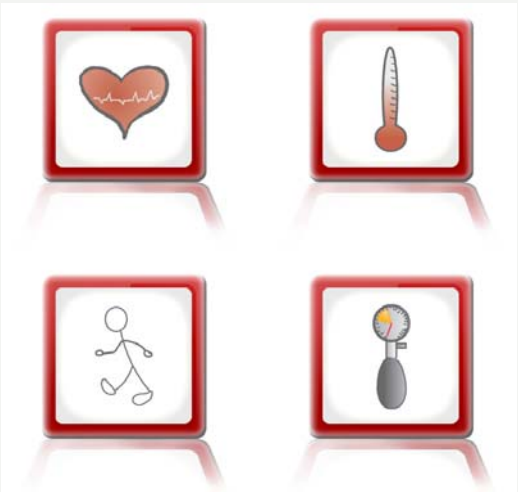
Alternative Widgets, using pictograms for medgets

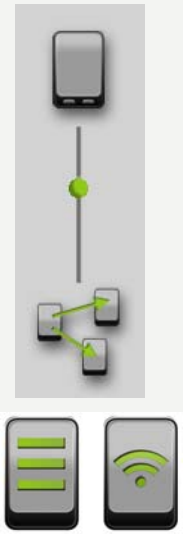


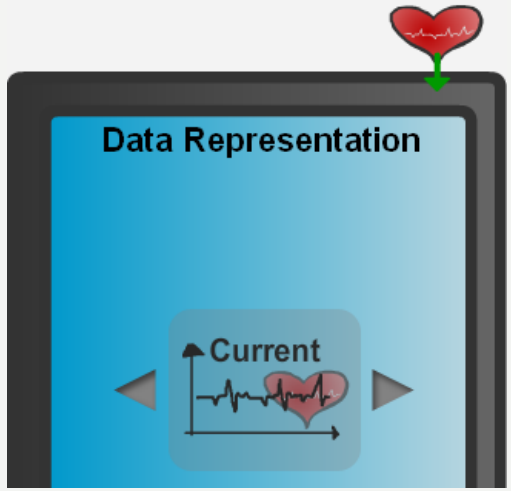


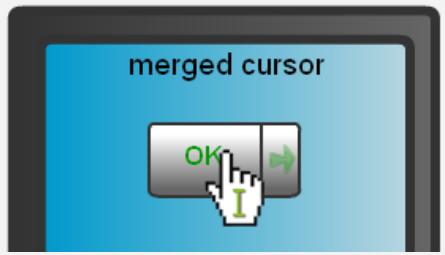


Alternative Designs

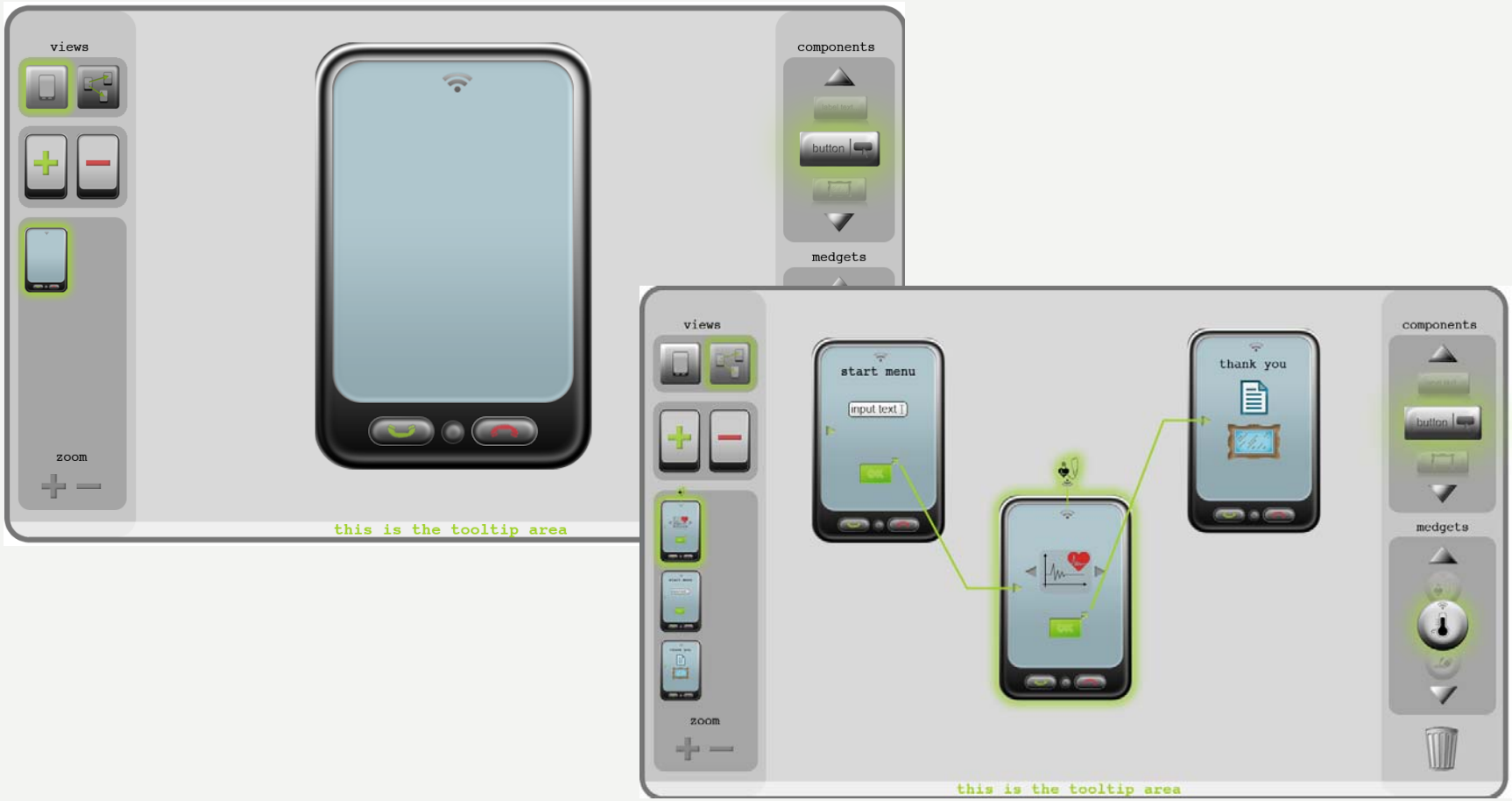
Alternatives for Widget Palettes, UI buttons, Data Representation and Cursors



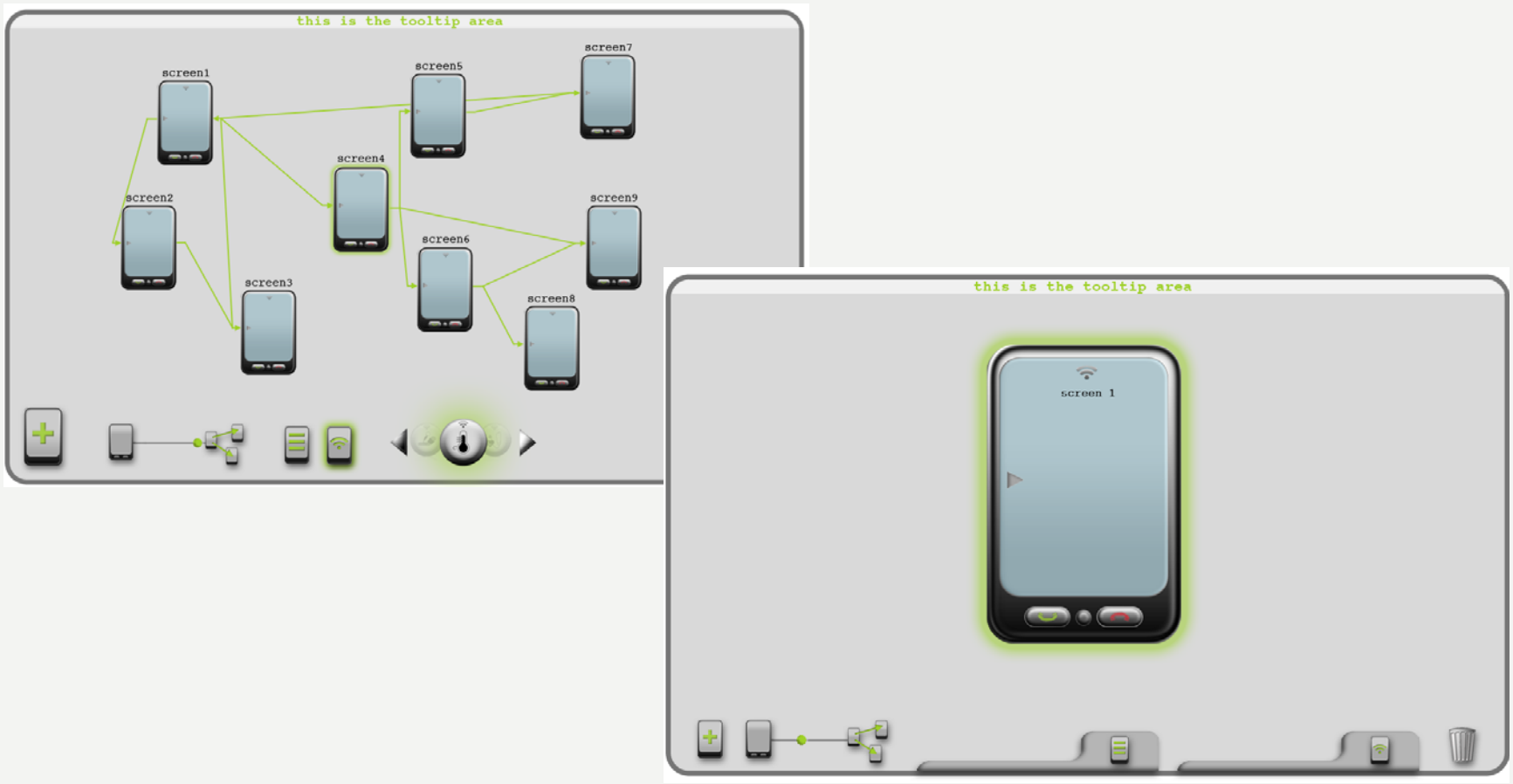




Alternative GUI with two Views



Minimalistic GUI with one Integrated View and Different Zooming



Questions?

Thank you for your attention

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Questions are welcome…