Model-Driven Development of Mobile Applications

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The Mobile Age

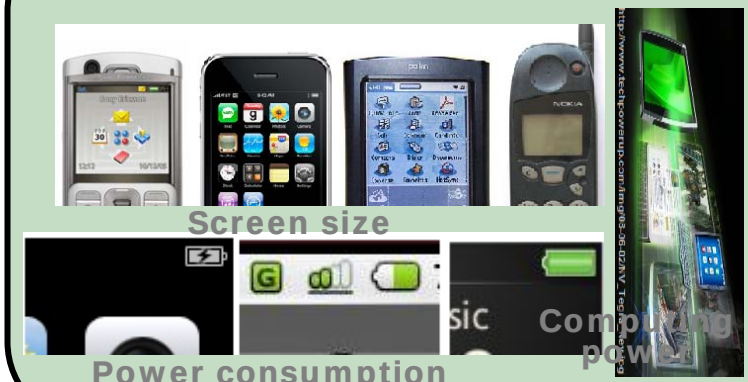
Images from http://www.sonyericsson.com/

Mobile Applications Development

Factors to Consider during Development

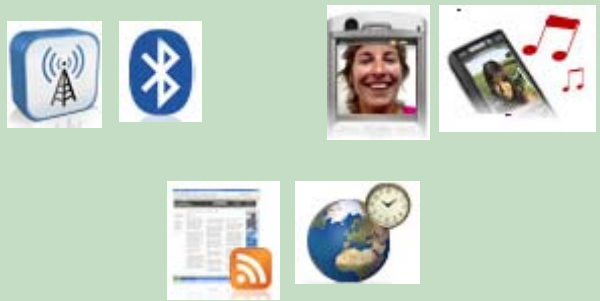
Operating Systems & APIS

Device Limitations



Input Methods

Additional Capabilities

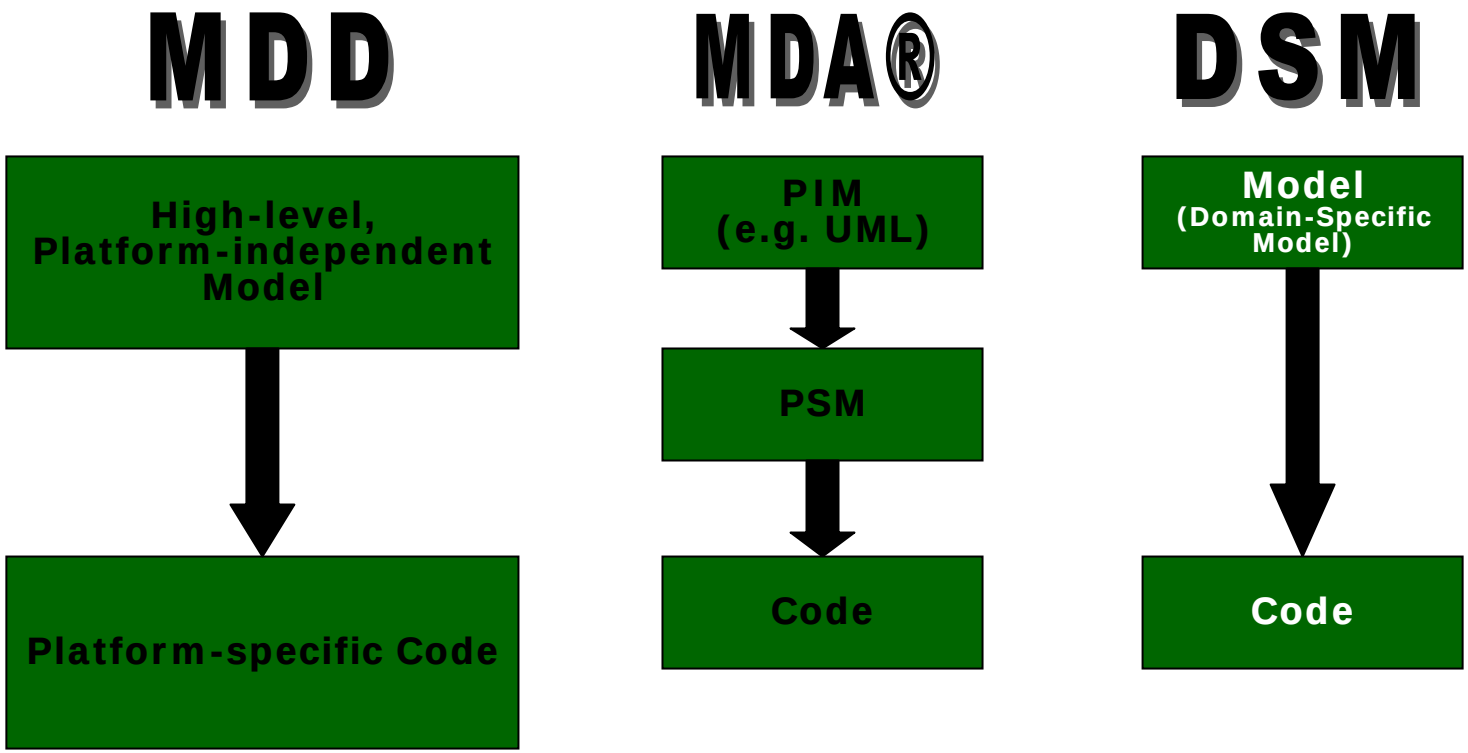


Mobile Applications Development

Challenges, Solutions and More Challenges

Challenge	Current Solutions	More Challenges
Complex process of developing software applications	Provide Integrated Development Environment (IDE) and Emulator	Complicated to use; Some have no support for drag-and-drop GUI development; Development view of the application does not reflect actual application; Device Limitations/ Capabilities are not known during application development; Different IDEs for different operating systems
	Application Wizards	Too basic
	Tutorials	Too basic
	Discussion Groups	Too difficult to find specific solution to specific problem
Interoperability of applications	Web-based applications	Limited access to device; Limited functionality; Needs device to be online
Multiplatform development	Creating applications separately (same design and application logic)	Tedious and redundant
	Virtual Machine running on device	Interpretation overhead

Model-Driven Development



Example Researches:
SMS Project [3],
Model-driven development for pervasive systems [14],
MML [15], Multi-platform UI development [7][9]

- *PIM (Platform Independent Model)*
- *PSM (Platform Specific Model)*

Problem Statement

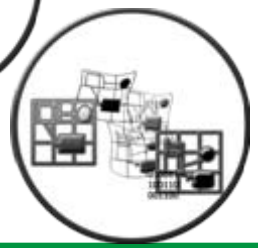
Model-driven Development of Mobile Applications

"To **simplify** the creation of applications for **mobile platforms** by developing a **high-level** and **platform independent model** of an application, and automatically transforming this high-level model to platform specific code."

Knowing the Target Users

Design & Development of the modeling tool

Iterative User Testing and design modification



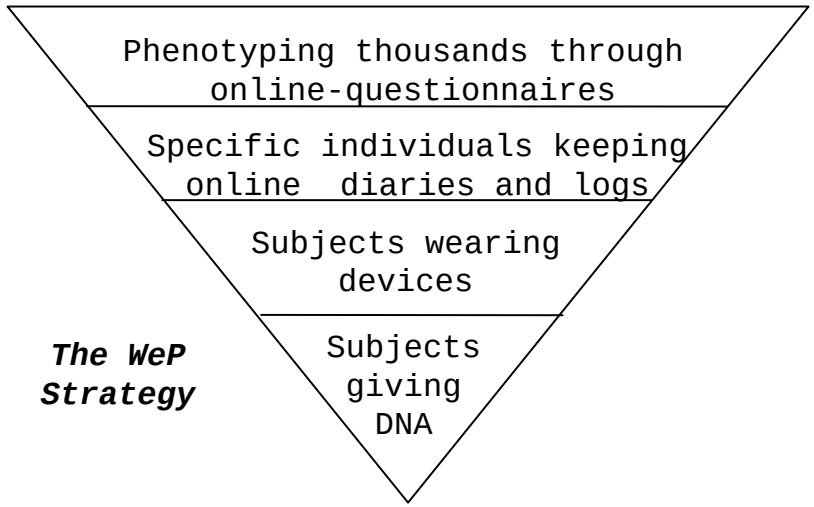
Coming up with algorithms for conversion from Model to Code

Knowing the Target Users

- Non-Expert Users
  - No experience in mobile applications development
- Sample Users
  - WeP Investigators
    - Group of scientists and psychologists from the LMU Institute of Medical Psychology involved in the Worldwide Experimental Platform (WeP) project

The Worldwide Experimental Platform Project (WeP)

A project from the LMU Institute of Medical Psychology which aims to "create a platform for large-scale use of the Internet for medical, epidemiological and genetic studies."



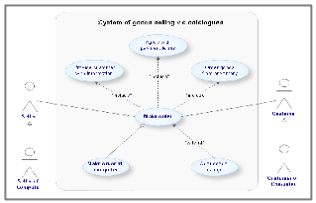
Knowing the Target Users

User Survey	Results
Assessment of users' technical knowledge (Computer Applications used, Operating Systems used, Background in programming)	Most of them do programming (MATLAB, C, Fortran, etc)
Current projects involving the use of mobile devices and problems encountered during development	Only one of them has a project: psychophysical tests and psychomotor vigilance tests running on a PDA (field work)
Application design: Features wanted on graphical tools	• drag-and-drop environment • icons and other visualizations • flowcharts: create flows and relationships • math and programming are taken care of by the tool • allows simulation of actual application • provide features of current IDEs (versioning, reverse engineering) • independent from operating system • accessible for both young and old: font size adjustment, acoustic signals, ease of errors • few clicks as possible • joy to use the tool without fears of any kind

Design & Development of the Modeling Tool

- Mobile Applications (MobiA) Modeler
  - Allows non-experts users to easily create mobile applications by allowing them to create the application through graphical means.

Design & Development of the Modeling Tool



Level of abstraction and modeling constructs

How to abstract technical details

How can device capabilities be shown

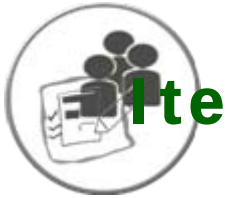
Design & Development of the Modeling Tool

How to visualize device interaction

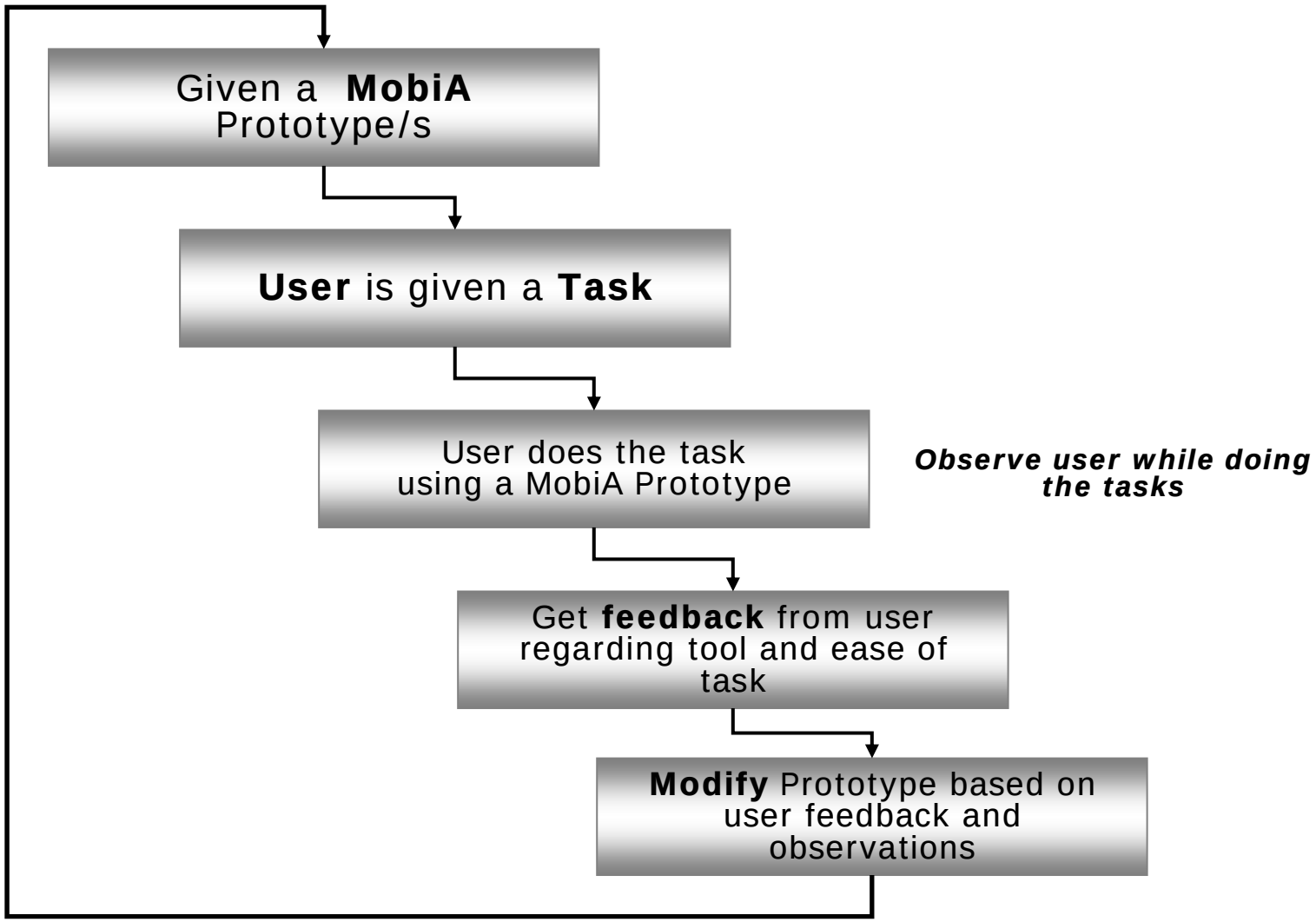
How should a modeller interface look like

High-level form?

Reflect actual interface?



Iterative User Testing & design modification






Thank you for your attention.

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