Improve a Product's User Experience with Model-Based UI Design

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Peter Abowd, Altia

- Global Operational and Business Development at Altia
- Twenty-five years of Embedded Product Leadership
  - Tech-Transition startup with Georgia Tech
  - Leadership positions in automotive OEM and Tier1
    - Ford Motor Company and Visteon Corporation
  - Director of Embedded Software Development at Visteon
    - Oversaw software development for all Audio/Infotainment, Driver Information and Climate Control products in North America and Europe
- B.S. in Electrical Engineering with a Concentration in Computer Engineering from the University of Notre Dame.
- M.S. in Software Engineering with a Real Time Specialization from Carnegie Mellon University
Renesas Technology & Solution Portfolio

Microcontrollers
No.1 Market Share Worldwide

Advanced and Proven Technologies
System LSIs

Extensive, High-quality Portfolio
Analog & Power

Enabling the Smart Society
Agenda

- Introduction
- Who is Altia?
- Why Graphical User Interfaces?
- The Challenges
- Five Keys to Success
- Summary
Introduction

- Information and Computing Technology to IMPROVE
  - Work and life
  - In both cases the user experience can determine the value

- Smarter doesn’t just mean that user is able to do more
  - Technology has to be able to help them do better
  - This is User Experience
  - GUI is a critical part of that UX
Altia and Graphical User Interfaces (GUIs)

- Altia provides tools and services for User Interface (UI) Engineering
- 20 years of experience in user interface development
- Our focus is GUIs for embedded devices
Why Graphical User Interfaces (GUI)?

- The user interface **is** the product
- Exciting displays
  - Differentiate products
  - Sell products
- A great user experience
  - Market Leadership
- User interfaces redefine
  - Your brand
  - Your company
The Challenge...

Your GUI must...

- Look good
- Run fast
- Be affordable
- Be timely

Keys to Success...
Key 1:
Be Uncompromising at the PRODUCT Level
Be Uncompromising at the PRODUCT Level

- Focus product development upon the users’ perspective
- Equally temper design, hardware and software
  - Unbalanced solution parts can destroy the user experience
Demand the Best Whole Product Experience
Outstanding User Experience (UX) = Market Leadership

“No Android Tablet has more Than 5% Share vs. iPad….”

“Despite high expectations for companies like Amazon, Samsung, Acer and Asus, the Android community has yet to make a serious dent in Apple’s dominance of the tablet market.”

2- http://techcrunch.com/2012/03/05/forrester-no-android-tablet-has-more-than-5-share-vs-ipad-how-does-amazons-kindler-fire-compare/  TechCrunch March 5, 2012

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Demand the Best Whole Product Experience
Outstanding User Experience (UX) = Market Leadership

“Some carrier retail stores haven’t sold a single BlackBerry in over a month.”

Demand the Best Whole Product Experience
Outstanding User Experience (UX) = Market Leadership

No Obvious Winners or Losers in Auto Industry

BMW iDrive
Audi MMI
Ford Sync
GM CUE

Many challenges with launches.

All suffer from customer experience criticism.
Understand Market Needs (Features)

- How is YOUR GUI going to redefine the product and UX?
  - Market research – needed early
  - Customer focus groups – multiple cycles

- Define return on investment
  - How will this impact your sales?

- Collect this data early – before significant expenses
Key 2:
Build a Multi-Disciplined Team for User-Centered Design
Essential Expertise for User-Centered Team

- Industrial Design
- Human Factors
- Systems Engineering
- Software Engineering
Essential Expertise: Market Research

- Market Research
- Customer Clinics
- Graphic Design
- Interactive Design
Essential Expertise: Human Factors

Human Factors

- Physical Aspects
- Cognitive Aspects
- Goal/Task Analysis
Essential Expertise: Systems Engineering

- Peripherals
- Network Constraint
- System Simulation
Essential Expertise: Software Engineering

- Product Simulation
- Embedded Arch.
- Code Generation
Essential Expertise

- Market Research
- Customer Clinics
- Graphic Design
- Interactive Design

- Physical Aspects
- Cognitive Aspects
- Goal/Task Analysis

Industrial Design

Systems Engineering

Software Engineering

- Peripherals
- Network Constraint
- System Simulation

- Product Simulation
- Embedded Arch.
- Code Generation
Key 3: Actively Manage Cross-Discipline Design Trade-offs
Creating a Design that Cannot Be Built

- Market Research
- Customer Clinics
- Graphic Design
- Interactive Design

Industrial Design

- Physical Aspects
- Cognitive Aspects
- Goal/Task Analysis

Human Factors

Systems Engineering

- Peripherals
- Network Constraint
- System Simulation

Software Engineering

- Product Simulation
- Embedded Arch.
- Code Generation
Creating a Design that Cannot Be Built

Focus too heavily on Human Factors and Industrial Design

- GUI cannot fit or run on the hardware
- GUI that will:
  - Look great
  - Run poorly
Building a Design Not Easily Used

- Market Research
- Customer Clinics
- Graphic Design
- Interactive Design

Industrial Design

- Physical Aspects
- Cognitive Aspects
- Goal/Task Analysis

Human Factors

- System Simulation
- Physical Aspects
- Cognitive Aspects
- Goal/Task Analysis

Software Engineering

- Product Simulation
- Embedded Arch.
- Code Generation

Systems Engineering

- Peripherals
- Network Constraint
- System Simulation

Industrial Design
Building a Design Not Easily Used

Systems and Software Engineering have fooled management
- Promise “cool” technologies – sweeps, spins, 3D
- Product will:
  - Look great
  - Will not be easy to use
Key 4:
Great Touch-Based GUI is More Than an LCD and Software
The Hardware/Software Considerations

- Touch Screen Technology & Drivers
- LCD Resolution Dimension Color Depth
- Application Interfaces
- Color Formats, Raster-Vector Image Compression, Animation
- Font Management Sizes, Types, Runtime/Pre-Render
- Graphics Accelerator Memory Bandwidth for FLASH and VRAM
  Amount of FLASH and VRAM
  Bill of Material Management
Interactive Design Considerations

- Usability
  - Layout, Information Processing
  - Goal Achievement

- Text and Font Consistency
  - Legibility, Animation

- Screen Area Management for Performance

- Information Chunking

- Z-Order Precedence and Management

- Demand on Embedded Resources
Product Lines Provide Additional Challenges

Range

**SMALL FOOTPRINT**
- Limited or No External RAM
- Limited or No External FLASH
- No Graphical Acceleration
- qVGA, limited WVGA
- Small screen size

**FULL FEATURED**
- External System RAM, VRAM
- External FLASH
- Graphics Acceleration
- Small or Large HD Displays
- Large screen size
Tools Must Cover the Range Successfully

Altia’s Range

**SMALL FOOTPRINT**
- Limited or No External RAM
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**FULL FEATURED**
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Key 5: UI Simulation Throughout the Development Lifecycle from Desktop to Product Hardware
The Process

Market Research
Develop Concept
  Market Studies
  User Studies
  Build GUI
  User Studies
Generate Code
  User Studies

Altia Design

Altia PhotoProto

Altia FlowProto

Renesas
Summary

- Be uncompromising at the PRODUCT level
- Build a multi-disciplined team for user-centered design
- Actively manage cross-discipline design trade-offs
- Great touch-based GUI is more than an LCD and software
- UI simulation throughout the development lifecycle from desktop to product hardware
Questions?
Please Provide Your Feedback

- Please utilize the ‘Guidebook’ application to leave feedback

- Or, ask for the paper feedback form