Best Practices for App Development: A Case Study of User Centered Design

James Killick, Brenda Wolfe, Sooria Jeyaraman, David Dodge, Garry Burgess
Intro to Business Analyst Online (BAO)

User Centered Design

How User Centered Design Was Used to Design & Build BAO
James Killick

Education:
BS Computer Science

Experience:
20 Years Product Management
Mostly Consumer Products
Etak → MapQuest → AOL → Esri

Role:
Product Management
Intro to BAO
The Problem in 2008

- Hard to Use
- Lots of Support Calls
- Older Technology Platform
“The new BAO looks fantastic! You guys did a wonderful job and have made my job much easier!”

--Ruth Parish
City of San Bernardino
“… thank you for the stunning overhaul of Business Analyst Online! The system has functionality for all of the things we always dreamed about – and more.”

--Jamey DeOrio
Masterplans.com
Brenda Wolfe

Education:
M.S. Economics & Statistics

Experience:
11 Years Product Management
SAS and Esri
6 Products (Online, Desktop)

Role:
Requirements & User Definition
Demo
So, how did we put it together?
User Centered Design
User Centered Design Flowchart

1. Innovate
2. User Research
3. Analyze
4. Prototype
5. UI Design
6. Evaluate
7. Usability Testing
8. Develop

Looping Process:
- Innovate to User Research
- User Research to Analyze
- Analyze to Prototype
- Prototype to UI Design
- UI Design to Evaluate
- Evaluate to Usability Testing
- Usability Testing to Develop
- Develop back to Innovate
It’s about Research
Understand Your Users

It’s about Evaluation
Does it work for Your Users?

It’s a Cycle
Iterative, Collaborative, Works Well with Scrum

It Embraces Innovation
While still focusing on user problems
Sooria Jeyaraman

Education:
MS Human Factors Engineering

Experience:
6 years in the field
Lexmark and Esri

Role:
User Experience Architect
Usability
What is Usability?

- Easy to Learn
- Efficient to Use
- Easy to Memorize
- Fewer User Errors
- High User Satisfaction

Usability is the ease of use...

User Centered Design is the means to achieve usability
User Centered Design

It is a philosophy and a process.

It is a philosophy that places the person (as opposed to the 'thing') at the center.

It is a process that focuses on cognitive factors (such as perception, memory, learning, problem-solving, etc.) as they come into play during user’s interactions with applications to achieve high-quality user experiences.
• Interviews
• Focus Groups
• Ethnographic Research
• Task Analysis
• Surveys
• Contextual Interviews
• Shadowing
• Personas
• Story Boards
• Paper Prototypes
• Wireframes
• Information Architecture
• Card Sorting
• Contextual Inquiry
• Low fidelity Prototypes
• Mock-ups
• Heuristic Evaluation
• Scenarios
• User/Usability Testing
Innovate

User Research

User Centered Design

Analyze Users

Prototype

UI Design

Develop

Usability Testing

Evaluate
User Centered Design helps to improve the usability and usefulness of everything from software to information systems to processes... anything with which people interact.
Quick Examples
What do I need to enter in the text boxes?
Where do I start?
Simplify
UI is also about words...
How User Centered Design Was Used to Build BAO
Innovate

User Research

User Centered Design

Analyze Users

Prototype

UI Design

Evaluate

Usability Testing

Develop
Rule #1: Know your user.*
“Perfect companion for my USB toaster. I'll wait for the knife sharpener/external hard drive, the tomato slicer keyboard, and the Mr. Coffee GPS”
iPhone 4: Antennagate
BAO Initial Interviews

Did 20 interviews before any design or development started
Probe for…

Background
Goals
Workflows
Data & software used
Final products
Environment
Frustrations and pain
The Persona
Persona Example

- Graphic Designers
- Mac and Adobe Users
- Generally younger
- They are all about visual presentation.
- Want small icons/tools.
Persona Example

- Always busy, often interrupted
- Money-motivated—don’t learn for the fun of it
- *Slightly* older 😊
- Not computer savvy
- See themselves as very individual
- Strive to be seen as knowledgeable, credible
BAO Personas

BAO Persona (co-Primary)

Larry Landhawk
CCIM, Real Estate Professional

Larry has a bachelor’s degree in Business Management. He has been in the real estate profession for more than 25 years. He has his own small business with ten other brokers. He is active on several community boards and organizations. For Larry, real estate is all about who you know, so being involved in many organizations helps him network with others. Larry is not at all shy—you can’t be shy in his business. And he’s not big on political correctness for that matter.

According to Larry, you have to have connections, but you also need to prove yourself. Software tools such as BAO and Google help make him look good and help him to make his case to his clients and to finance professionals. Sometimes Larry will actually run analysis reports in front of the customer. When the software throws an error in front of the customer, Larry loses credibility.

Larry is in the business of helping retail chains find branch locations and/or investment properties. He likes himself and is a big dog and so on. He...
BAO Personas

BAO Persona (Co-Primary)

Peggy Printsalot
Executive Administrative Assistant

Peggy has an associate’s degree in an unrelated field from a regional Community College. She came to work for Larry Landhawk’s company 12 years ago. She has some background in sales and customer service, which is why Larry thought she was a good person to hire for the office all those years ago. She has an outgoing bubbly personality and doesn’t mind fielding all of the phone calls the company gets. She works with one other administrative assistant in the office, and together they support a staff of eleven agents.

Peggy is not a software expert. She uses Microsoft Office products to keep the office running, but otherwise is not interested in software for fun. In her down time, Peggy is more interested in her two kids—both are in college, and she is quite proud of that. She will readily confess she wouldn’t mind becoming a grandmother, but is trying hard not to pressure her kids about it.

Peggy works 40 hours per week. At the end of the day she is “off the clock.” She goes home and works on some of her personal hobbies in the evening. She has more time now that both kids are out of the house.
Pragmatic Marketing Call Report

Ken Spillberg
RSG
http://www.webrsg.com/
9/9/09

**Background**

RSG advises local governments on development issues.

When researching neighborhoods, they actually go out into the neighborhoods and do a field survey. They look at the buildings and interview people on the street. Many of the neighborhoods they go to are not the best and they always go in pairs.

They examine both commercial and residential properties. They look at trends in the community. They look developers’ plans on behalf of local governments to assess if the plan would be successful. They are a neutral expert on behalf of the city.
Problem Statements

![Problem Frequency Chart]

- Problem A
- Problem B
- Problem C
- Problem D
- Problem E
- Problem F
- Problem J
“Show me areas near public train stations where educated people are employed and have housing over $300,000.”

“I like this location, find me something demographically like it.”

“I want to enter demographics that are key, and for the application to find high concentrations of those demographics.”
“The system shall…”

“The user shall…”

Does not get into “How”
“Larry shall be able to select multiple criteria by which he can filter the map”

Does not get into “How”
Product Requirements Document
Bringing it all together

Context

Requirements

REQUIREMENT GROUP # B- SELECT AREA BY CRITERIA ("SMART MAP")

Market evidence: $ = times impact $ = equals priority $ =

Persona/Goal: Save time and provide superior service relative to other real estate consultants/brokers.

B. PROBLEM: Larry can’t display multiple site criteria on the map in order to whittle down areas for site evaluation.

B.1 USE SCENARIO: Larry is looking to purchase some retail malls that he will later lease out to tenants. He wishes to filter the map to show which areas meet his criteria and to show which locations are located in areas with characteristics that will also make the malls appealing to tenants.

B.1.3 REQUIREMENT: Larry shall be able to select multiple criteria (variables) by which he wishes to filter the map.

B.1.2 REQUIREMENT: Larry shall be able to specify the desired value ranges of each variable.

B.1.5 REQUIREMENT: The system shall display and highlight areas of the map that meet multiple selection criteria.

B.1.4 REQUIREMENT: Larry shall be able to probe the map to see the exact values of the variables he is interested in.
Requirement Group Name

REQUIREMENT GROUP #8—SELECT AREA BY CRITERIA (“SMART MAP”)

Market evidence 5  Times impact 5  Equals priority 25

Persona Goal: Save time and provide superior service relative to other real estate consultants/brokers.

8. PROBLEM: Larry can’t display multiple site criteria on the map in order to whittle down areas for site evaluation.

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Product Requirements Document
Bringing it all together

Problem
Frequency & Impact

REQUIREMENT GROUP # 8 - SELECT AREA BY CRITERIA ("SMART MAP")

Market evidence  5  Times impact  5  Equals priority  25

Persona Goal: Save time and provide superior service relative to other real estate consultants/brokers.

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Use Scenario

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PRODUCT REQUIREMENTS DOCUMENT
Bringing it all together

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Market evidence 5 Times impact 5 Equals priority 25

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Product Requirements Document
Bringing it all together

Summary Table

Easy to View and Rank

<table>
<thead>
<tr>
<th>REQ Group</th>
<th>Requirement</th>
<th>Source</th>
<th>Weight</th>
<th>Product Initiative</th>
<th>Tentative Target Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG_1</td>
<td>Rename application to “ESRI Business Analyst Online”</td>
<td>Internal</td>
<td>999</td>
<td>Improved User Efficiency</td>
<td>November</td>
</tr>
<tr>
<td>RG_2</td>
<td>Two levels of variable tree in Color-Coded Maps and Create Comparison Reports</td>
<td>Internal</td>
<td>999</td>
<td>Improved User Efficiency</td>
<td>November</td>
</tr>
<tr>
<td>RG_3</td>
<td>Incorporate New End User License Agreement (EULA)</td>
<td>Internal</td>
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<td>Improved User Efficiency</td>
<td>November</td>
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<td>RG_4</td>
<td>Quick on-screen comparison reporting</td>
<td>Customers</td>
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<td>Improved User Efficiency</td>
<td>November</td>
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<tr>
<td>RG_5</td>
<td>Display sites over thematic maps</td>
<td>Customers</td>
<td>50</td>
<td>Improved User Efficiency</td>
<td>November</td>
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<tr>
<td>RG_6</td>
<td>Display thematic and point layers when creating sites</td>
<td>Customers</td>
<td>30</td>
<td>Improved User Efficiency</td>
<td>November</td>
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<tr>
<td>RG_7</td>
<td>Control the order of reports with all-in</td>
<td>Customers</td>
<td>28</td>
<td>Improved User Efficiency</td>
<td>November</td>
</tr>
</tbody>
</table>
Deliverables from the Process

- Call reports
- Problem statements
- Requirements
- Use scenarios
- Personas
Rule #2:
If it’s not usable, it doesn’t exist.
Innovate

User Research

User Centered Design

Analyze

Prototype

UI Design

Develop

Usability Testing

Evaluate
Two Components to UI Design

Interaction Design

Visual & Motion Design
• Knowledge in the head
• Knowledge in the world
• Affordances
• Progressive Disclosure
Information Architecture

- Shows task flow in the app
- Helpful to do this before designing screens
Paper Prototypes
Wireframes
Visual and Motion Design
David Dodge

Education:
B.A. Dartmouth

Experience:
15+ Years Design
Rapideye Media
Saatchi and Saatchi / Toyota

Role:
Visual & Motion Design
Not just pretty pictures
Have you tried...?

New Data for Comparison Reports and Smart Map Search
Market Potential, Consumer Spending, and Retail Marketplace Data are now available in Comparison Reports and Smart Map Search.

Learn more...
Create an emotional connection
Engage the user
Our User is Business
Gray and blue say business
Visual design answers our persona’s expectations
Visual design creates a Business experience
**Desired BAO Experience**

<table>
<thead>
<tr>
<th>Advanced</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accurate</td>
<td>Good Value</td>
</tr>
<tr>
<td>Benchmark</td>
<td>Insightful</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>Modern</td>
</tr>
<tr>
<td>Easy</td>
<td>Powerful</td>
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<tr>
<td>Enjoyable</td>
<td>Reliable</td>
</tr>
<tr>
<td>Efficient</td>
<td>Trustworthy</td>
</tr>
<tr>
<td>Empowering</td>
<td>Up-to-date</td>
</tr>
</tbody>
</table>
Desired feelings when you Use BAO …

You are Agile
You are Adept
You are Expert
You are Confident
You are Decisive
You are Efficient
You are Empowered
You are Intelligent
You are Knowledgeable
You are Self-assured
You are Superior
How does this work in BAO?
Preserve negative space
Have you tried...?

New Data for Comparison Reports and Smart Map Search

Market Potential, Consumer Spending, and Retail Marketplace Data are now available in Comparison Reports and Smart Map Search.

Learn more...
So the map and results remain primary
Blue Leads You

- Defines workflow menu
- Highlights the next step in the workflow
- Is the color of results... Smart Map Search
Motion not just about “flashiness”
Keep it subtle

Don’t overwhelm
Communicates what will happen and what just happened
Orients the user in the UI
<table>
<thead>
<tr>
<th>Add</th>
<th>Report Name</th>
<th>Price</th>
<th>Format</th>
<th>PDF</th>
<th>Sample</th>
<th>Favorites</th>
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</thead>
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<tr>
<td></td>
<td>1990-2000 Comparison Profile</td>
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<tr>
<td></td>
<td>Age 50+ Profile</td>
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<td></td>
<td>Age by Income Profile</td>
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<td></td>
<td>Age by Race by Age Profile</td>
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<td></td>
<td>Age by Sex Profile</td>
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<td></td>
<td>Automotive Aftermarket Expenditures</td>
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<tr>
<td></td>
<td>Business Locator</td>
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<tr>
<td></td>
<td>Business Summary</td>
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<tr>
<td></td>
<td>Census 2000 Detailed Race Profile</td>
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<tr>
<td></td>
<td>Census 2000 Summary Profile</td>
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<tr>
<td></td>
<td>Demographic and Income Comparison Profile</td>
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<tr>
<td></td>
<td>Demographic and Income Profile</td>
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<tr>
<td></td>
<td>Demographic and Income Profile (New Style)</td>
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<tr>
<td></td>
<td>Detailed Age Profile</td>
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</tr>
</tbody>
</table>
Video
Full UI Specification

- Clicking on "Standard Reports" will open up a list of predefined reports.
- If no sites are created, the "Select Sites" and "Select Location tab" will be grayed out.
- Clicking on the "Select Sites" will pop up a dialog box with options.
- Each site name to select the site in the list.
- On clicking on "Add More sites...", the user can add more sites from a different location.
- If the user makes the choice to select only 19th and 20th, the site will be added to the map.
- Now within a session, if the user has another site on the map, the selected site will be displayed.
- The "More Points" will open up a list of different business points domains.
- When the user clicks on the "Select Location tab" from the "Thematic Maps" tab, the thematic layer will be turned off, but the map view will remain at the same place and zoom level.
- The user can choose to open the thematic layer by clicking on the radio button and clicking on the "Apply" button to deselect a thematic layer.
- Opening a thematic layer will populate the layer along with a read only legend. The user will not be shown the other options like variable, color, transparency, etc.
Neal Dinoff

Education:
BFA, University of the Arts

Experience:
15+ yrs cartographic & UX design: Eureka Cartography, Rand McNally, marchFIRST, 9 years @ Esri

Role:
Usability Lab Manager
Usability Testing as an Evaluation Tool

- **Functional:** Does it work?

- **Holistic:** Does it work the way users need it to work?

- **Usability:** Can they figure out how it works?
Usability Testing

• Participant studies
  - Watch typical users perform common tasks
  - 5-8 participants
  - One-on-one 90-minute sessions
  - Team and key stakeholders observe
BAO Tests

• Nine rounds of participant testing since 2008
• 50+ participants
  - Customers and staff proxies
  - In-house and in-the-field
Rule #3:
Fail Fast!
Rule 3: Fail Fast!

- The earlier you identify a problem the cheaper and easier it is to fix.

- Waiting until functional testing is waiting too long.
Design Validation Can Happen at Any Phase

- Wireframes
- Design comps
- Working prototypes
- Partially completed apps
- Completed apps
Test Scenarios

- Written scenarios of typical tasks
  - Unbiased language
  - Independent tasks
Example Scenario

- You are considering locating a business at 14528 Ventura Blvd in Sherman Oaks, California.
  - Show this location on the map.

- The target market for your business is young professionals.
  - Create a map of Sherman Oaks showing the number of people age 25-29 with household incomes of $50,000-75,000.
Example Scenarios

• You want to map a combination of factors that identify your target market. Begin by looking at per capita income, median age, and 5-year projected population growth. You want to see a combination of
  - Areas projected to grow in population by 0.5-1.0 percent
  - Have a median age below 45
  - And have per capita income above $50,000
What We Observed: Smart Map Search

• Initial test
  - Users didn’t understand the feature’s core concept
  - They were baffled by pre-selected variables

• We made changes
  - Added a wizard and video
  - Allowed users to select variables

• Were the changes improvements?
Smart Map Search
Before and After
Usability Report

• Identifies the nature and severity of usability issues

• Provides the development team with guidance on what and where to tweak
Garry Burgess

Education:
B.A.A – Geography + Computer Science
M.S. – GIS / Remote Sensing

Experience:
15+ Years Development
Built lots of cool stuff

Role:
Development
Modify slide so only Innovate & Develop is highlighted.
No clear spec, unrealistic deadlines...
"Cut me Mic" I'll release this dam thing
“Adrian, we released on time!”
Collaborative Design

Nothing just gets handed over the fence

TEAMWORK!
“What” vs. “How”

I think we should build an SQL database.

Uh-oh.

Does he understand what he said or is it something he saw in a trade magazine ad?

What color do you want that database?

I think mauve has the most RAM.
Clear Specifications

Led to better development estimates

Better at meeting deadlines

Focused on users

Reduced stress
Does not Stifle Innovation

Designs can start with developer prototype

The first iPod – circa 1895
Ok, we lied. A couple of lines of code:

If (users = happy)
{
    devTeam = happy;
}
else
{
    devTeam <> happy;
}
Professional end result = Happiness
Challenges

“A lot of cooks in the kitchen”

Slows down development, but improves quality

Focus on iteration

Requires more planning for test, fix and stabilization
A User Centered design is a collaborative effort

Encourages developer input and innovation

Results in higher user satisfaction
“When a person calls in and we point them to BAO and get them started, we instruct them to call back if they get stuck at all. They never do.

On the previous version, 9 times out of 10 they got stuck and had to call us for assistance.”

- Paula Laborce, Esri Tele-Business
Rule #1: Know your user.

Rule #2: If it’s not usable, it doesn’t exist.

Rule #3: Fail fast!
Questions?
Please Fill Out Your Surveys!
esri.com/sessionevals
Thanks for Coming!