Mobile Applications, Function Points and Cost Estimating

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International Cost Estimation & Analysis Association Conference
June 11, 2013
Agenda

• Mobile Applications – Fun Facts
• Function Points
• Sizing models to consider for Cost Estimation
• The Terrific Tuner – A mobile application
### What is meant by Mobile and Connected?

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Network Protocols</th>
<th>Radio Frequencies in the United States</th>
<th>Distance</th>
<th>Primary use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensed</td>
<td>Cell towers (GSM and CDMA standards)</td>
<td>Various frequencies between 700 - 2100 Megahertz</td>
<td>Up to 10 square miles</td>
<td>Cellular coverage</td>
</tr>
<tr>
<td>Licensed</td>
<td>Femtocell (GSM and CDMA standards)</td>
<td>Various frequencies between 700 - 2100 Megahertz</td>
<td>5000 square feet</td>
<td>Provide cellular coverage in little to no-coverage areas and residences</td>
</tr>
<tr>
<td>Licensed and Unlicensed</td>
<td>Wi-MAX (GSM and CDMA standards)</td>
<td>2.5 Gigahertz</td>
<td>30 miles</td>
<td>Cellular coverage</td>
</tr>
<tr>
<td>Unlicensed</td>
<td>Wi-Fi</td>
<td>2.4 or 5 Gigahertz</td>
<td>300 feet</td>
<td>Connect 2 or more devices</td>
</tr>
<tr>
<td>Unlicensed</td>
<td>Bluetooth</td>
<td>2.4-2.485 Gigahertz</td>
<td>33 feet</td>
<td>Connect 2 or more devices. Very close range</td>
</tr>
<tr>
<td>Unlicensed</td>
<td>Near Field Communications</td>
<td>13.85 Gigahertz</td>
<td>4 cm</td>
<td>Connect 2 devices. Extremely close range</td>
</tr>
</tbody>
</table>
Classification of Mobile Applications

• Connect to a Network
  • Connect tablet to the network

• Use the wireless network for short, bursty data from the originating device or service to another device
  • Find a pet with tracking collars

• Applications that are self-contained on the device
  • The Terrific Tuner

• Social Networking Applications
  • Facebook, Instagram

• Live Streaming, Netflix, various Music services
  • World Cup Games

• Cloud Applications/Storage
  • Salesforce.com

• Combinations of the above
• Popular: Apple’s App Store & Google Play
• Corporate App Stores

Mobile Application Stores

Number of apps in the store (free and paid)
Mobile Apps – Other characteristics

- Usually Development teams use Agile
- Native Operating Systems vs. HTML 5
- Companies with small numbers of employees command large market capitalization
  - Rovio – Angry Birds (650 employees in 2013)
  - Facebook – Instagram (13 employees in 2012) when acquired by Facebook - $1 billion
  - Facebook – What’s App (55 employees in 2014) when acquired by Facebook) – 19 billion
Function Points (FP)

- Brief Background/History
- What they are?
- How are they used?
- Why are they important to software measurement?
Function Points (FP)
Brief History

1979
- Developed by Allan Albrecht at IBM for better software estimation
- *A New Way of Looking at Tools*

1980’s
- First Formal Function Point Guidelines
- IFPUG elects first Board of Directors

1990’s
- Publication of Function Points as Assets
- Certified Function Point Specialist Certification

2000’s
- **IFPUG FSM Method: ISO/IEC 20926:2009 Software and systems engineering - Software measurement - IFPUG is first ISO approved functional size measurement method**
- CFPS certification test is automated
- Publication of IFPUG Guide to IT & Software Measurements (2012)

2014
- Counting Practices Manual (CPM) v4.3.1
- International Software Measurements & Analysis Conference ISMA 9 Madrid Spain
- Special interest groups in Agile methodology & Cloud
- Working relationships with industry groups including TM Forum, CCC, ICEAA, OMG, NIST, ISBSG
Function Points (FP) Counting Process

1. Gather Available Documentation and Identify Subject Matter Experts (SME)
2. Determine counting scope & boundaries. Identify functional user requirement
3. Measure Data Functions
4. Measure Transactional Functions
5. Calculate Functional Size
6. Document & Report
Function Points (FP)  
Let’s Get Started

- Gather documentation & identify the Subject Matter Experts
- Determine counting scope and boundary
- Identify functional user requirements
Function Points (FP) Measure Data

- Identify Functional User Requirements
  - Internal Logical Files
  - External Interface Files

Application Being Considered

Other Applications
EI = Maintains ILF or passes control data into the application
EO = data sent out of application with added value (e.g., calculated totals)
EQ = External Inquiry (e.g. queries)

Complexity determined by number of Data Element Types (DETs) and number of File Types Reference (FTRs)
Key is that data is passed into or out of the boundary
<table>
<thead>
<tr>
<th>Function Type</th>
<th>Low</th>
<th>Average</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>x 3</td>
<td>x 4</td>
<td>x 6</td>
</tr>
<tr>
<td>EO</td>
<td>x 4</td>
<td>x 5</td>
<td>x 7</td>
</tr>
<tr>
<td>EQ</td>
<td>x 3</td>
<td>x 4</td>
<td>x 6</td>
</tr>
<tr>
<td>ILF</td>
<td>x 7</td>
<td>x 10</td>
<td>x 15</td>
</tr>
<tr>
<td>EIF</td>
<td>x 5</td>
<td>x 7</td>
<td>x 10</td>
</tr>
</tbody>
</table>
Function Points (FP)  
Where are they used?

- Estimating
  - (What is the estimated effort? Estimated cost per function point)

- Contracting
  - (How much will you charge me per FP?)

- Outsourcing
  - (How much will you charge me per FP?)

- Software Quality
  - (What is my defect ratio? Defects/FP)

- Productivity
  - (What is my productivity? FP/time unit)

- Benchmarking
  - (How do I compare against my company, other companies, international standards?)
Sizing Models to Consider for Estimating Cost

Function Points

Source Lines of Code

User Stories
### Cost Estimation & Mobile Applications

Where are sizing measures used?

<table>
<thead>
<tr>
<th>Stage</th>
<th>FP</th>
<th>SLOC</th>
<th>User Story Pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Coding</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Testing</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Production</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Cost Estimation & Mobile Applications

- Determine how long it will take to develop the user’s requirements for an app
  - Effort months

- Determine how much labor will cost to develop an app
  - Cost per unit of sizing
The Terrific Tuner
• **Target Market**
  • High School & College Students

• **What Problem am I solving?**
  • An inexpensive tool used to tune an instrument wherever the student is.
  • Allows the student to have some fun with a boring but important part of performing by customizing the tuning screen with pictures of drinks or friends

• **What are competitors doing?**
  • Cleartune
Marketing and Pricing

- High School & College Band & Orchestra Directors
- High School & College students
- Professional Musicians
- Where do customers congregate?
  - Social media
  - School
  - Rehearsals
- Pricing – Free to customers
  - Later – Product Placement dollars, click-thru revenue and a percentage of food & beverage sales in many cities
Release 1.0 – The Terrific Tuner

Application Store

New releases

Downloads

Sales reports

Customer usage reports

Boundary of the Application
## Measure the Data

### Logical data Data Type

<table>
<thead>
<tr>
<th>Logical data</th>
<th>Data Elements</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td>Name of instrument</td>
<td>ILF</td>
</tr>
<tr>
<td>Instruments</td>
<td>Picture of Instrument</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Strings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common note names</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common tunings (in hertz)</td>
<td></td>
</tr>
<tr>
<td>Favorite</td>
<td>Name of drink</td>
<td>ILF</td>
</tr>
<tr>
<td>Drinks</td>
<td>Picture of drink</td>
<td></td>
</tr>
<tr>
<td>Customer Data</td>
<td>Number of times customer opens application</td>
<td>ILF</td>
</tr>
<tr>
<td></td>
<td>Customer’s favorite drink</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer location when using application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length of time application is open</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>GPS longitude and latitude</td>
<td>EIF</td>
</tr>
<tr>
<td></td>
<td>Wi-Fi registered name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wi-Fi longitude and latitude</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cellular Tower identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cellular Tower longitude and latitude</td>
<td></td>
</tr>
</tbody>
</table>
## Release 1.0 – The Terrific Tuner

### Measure the Transactions

<table>
<thead>
<tr>
<th>Transactions using the data</th>
<th>Logical Data used</th>
<th>Transaction Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select string instrument to tune</td>
<td>Strings</td>
<td>EQ</td>
</tr>
<tr>
<td>For tuning by ear (aural tuning), present screen to select pitch. Sound pitch.</td>
<td>Strings</td>
<td>EQ</td>
</tr>
<tr>
<td>Select Favorite Drink</td>
<td>Favorite Drinks</td>
<td>EQ</td>
</tr>
<tr>
<td>For visual tuning, present screen to match pitch. Use pictures of favorite drinks on a string to indicate closeness to pitch. Drinks steam when exact pitch is attained.</td>
<td>Strings, Favorite Drinks</td>
<td>EO</td>
</tr>
<tr>
<td>Add new string instrument</td>
<td>Strings</td>
<td>EI</td>
</tr>
<tr>
<td>Delete string instrument</td>
<td>Strings</td>
<td>EI</td>
</tr>
<tr>
<td>Add new favorite drink</td>
<td>Favorite Drinks</td>
<td>EI</td>
</tr>
<tr>
<td>Get Customer Location GPS</td>
<td>Customer, Location</td>
<td>EI</td>
</tr>
<tr>
<td>Get Customer Location Wi-Fi</td>
<td>Customer, Location</td>
<td>EI</td>
</tr>
<tr>
<td>Get Customer Location Cellular</td>
<td>Customer, Location</td>
<td>EI</td>
</tr>
<tr>
<td>Report: Most popular drink</td>
<td>Favorite Drinks</td>
<td>EO</td>
</tr>
<tr>
<td>Report: Most popular location</td>
<td>Customer, Location</td>
<td>EO</td>
</tr>
<tr>
<td>Report: Average length of use by customer</td>
<td>Customer</td>
<td>EO</td>
</tr>
<tr>
<td>Report: Number of times customer opens application in a day</td>
<td>Customer</td>
<td>EO</td>
</tr>
</tbody>
</table>


## Summary of Functional Analysis

<table>
<thead>
<tr>
<th>Number</th>
<th>Quantity</th>
<th>Data or Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Logical Files</td>
<td>3</td>
<td>Strings, Favorite Drinks, Customer</td>
</tr>
<tr>
<td>External Interface Files</td>
<td>1</td>
<td>Location</td>
</tr>
<tr>
<td>External Inputs</td>
<td>6</td>
<td>Add &amp; Delete strings, Add drinks,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Get Customer Location GPS, Get</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer Location Wi-Fi, Get</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer Location Cellular</td>
</tr>
<tr>
<td>External Inquiries</td>
<td>3</td>
<td>Select string instrument, Aural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tuning, Select Favorite Drink</td>
</tr>
<tr>
<td>External Outputs</td>
<td>5</td>
<td>Visual tuning with drinks, All reports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4)</td>
</tr>
</tbody>
</table>

**Quick Tip!**

Use “Average” Sizes for these functions to get a quick estimate.

- **ILF** = 3 * 10 = 30 FP
- **EIF** = 1 * 7 = 7 FP
- **EI** = 6 * 4 = 24 FP
- **EQ** = 3 * 4 = 12 FP
- **EO** = 5 * 5 = 25 FP

**Total** = 98 FP
Release 1.0 – The Terrific Tuner
Estimated Costs

- Current development labor cost is $100 per function point.
- Current output is 20 function points in a month.

- How long will it take to develop the Terrific Tuner?
- How much will it cost to develop it?
Current development labor cost is $100 per function point.
Current output is 20 function points in a month.

How much will it cost to develop it?
- Answer: $98,000

How long will it take to develop the Terrific Tuner?
- Answer: 5 months
Conclusion

• Function Points are not only a good analytic tool but also can be used to estimate the cost of mobile applications.

• Functional Sizing (Function Points) is an ISO standard.

• International Benchmarking data is available.
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When Tammy isn’t playing her clarinet or working for a major telecommunications company, she is mom to a teenager and a long distance bike rider.
Appendix - About IFPUG

- International Function Point Users Group
  - Volunteers who maintain the standards, publish materials to assist counters, and software measurement programs
  - [www.ifpug.org](http://www.ifpug.org)
  - Established in 1982
  - Headquarters in Princeton, New Jersey, USA
  - Currently 1,200 members in 30 Countries
  - Members are in AT&T, Steria, IBM, HP, Accenture, Booz Allen Hamilton, Northwestern Mutual, LG CNS, USMC, Banco Bradesco, Banco Central do Brasil, US Department of Defense, Semantys
  - Internatio


International Function Point Users Group. IT Measurement Practical Advice from the Experts, Indianapolis, Addison-Wesley, 2002
