Flood Assessment and Warning System

Aaron Ciaghi
ICT4G - Fondazione Bruno Kessler, Italy
Outline

• Mozambique at a Glance
• Risk Management Process
• Case Study
• Class Activity
• Homework
Mozambique at a Glance

- Population: ~24m+
- HDI: 0.393 (178th)
- HIV/AIDS prevalence: 11.5%
- Literacy: 47.8%
- 77% of population living in rural areas
- 70% below poverty line
Infrastructure in Mozambique

- Very poor infrastructure
- Fixed telephony: 1 line/100 people
- Mobile telephony penetration: ~56%
- Broadband availability: ~7.6%
Natural Disasters in Mozambique

- Main risk to the achievement of poverty reduction together with HIV/AIDS
- 12 major floods, 9 droughts and 4 major cyclone disasters between 1965 and 1998
- 2 disastrous floods in 2000 and 2001
Focus on Floods

- Non-functioning monitoring infrastructure
- Succession of tropical storms in 2000-2001 affected 1/4 of the population
- Detailed analysis of flood after 2001 allowed for early warning and quick response in 2007
- Assessment and warning requires monitoring of rivers and dams in low-resource rural areas
Case Study

• We want to develop a risk assessment tool to be used in Mozambique by experts and volunteers

• Volunteers contribute with reports from remote rural areas

• Experts evaluate the impact and likelihood of each risk
Risk Management Process

Experts+Volunteers

Delphi method
Delphi Method

- Used to reach consensus among a panel of experts
- Organized in rounds as follows
  1. The experts respond to a questionnaire
  2. After each round, a facilitator provides an anonymous summary of previous round responses
  3. Experts revise their earlier answers in light of the replies of other members of their panel
Example: Risk Description

- The river floods: (Beira)
  - Nov-Dec
  - Jan-Oct

- Low precipitation: (Moamba Region)
  - Nov-Jul
  - Jan-Oct

- Massive traffic jam: (Maputo Area)
  - 6:00-8:00
  - 16:00-18:00
Risk Identification

- List all the possible risks which could affect a region
- Elicited, for instance, with
  - meetings
  - by looking at the history of a region
  - by analogy with plans defined in similar regions (or checklists)
Risk Classification

- Not all risks are *equally important* and not all of them *deserve the same attention*

- Risk classification assigns each risk a *probability* and an *impact*

- A common classification uses *five-scale values*

- The impact can be made more specific, e.g. distinguishing among
  - People
  - Infrastructure
Scope Statement

• **Context:** we are building an application to meet the Emergency Dept. needs

• **Goal:** the application will manage a risk register. A risk register is a list of risks (characterised by different information) and to which an expert assigns priority and impact

• **Why:**
  • The application will help the Emergency Dept. simplify the management of the risk register, possibly enabling forms of online collaboration
  • In the long term, integration with other systems will simplify monitoring and alerting
Approach

• We will use a simplified version of the SCRUM methodology

• **Product backlog**: starting point, it collects the requirements as user stories
  
  • User stories have a weight (programmer) and an importance (customer).

  • The user stories are developed in iterations

• **Sprint**: for each iteration we select the user stories we want to implement
Class Activity

• Form groups of 3-4 people
• Scope statement discussion
• Constraints and Sustainability
• Elicitation of User Stories
• Prioritisation of User Stories
# Product Backlog Template

<table>
<thead>
<tr>
<th>STORY</th>
<th>PRIORITY</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a user I want to .... in order to .....</td>
<td>H</td>
<td>n1</td>
</tr>
<tr>
<td>As a user I want to .... in order to .....</td>
<td>M</td>
<td>n2</td>
</tr>
<tr>
<td>....</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>....</td>
<td>...</td>
<td>n</td>
</tr>
</tbody>
</table>
Homework

• Starting from the product backlog, you should
  • Refine the estimation based on your skills
  • Select the user stories for the first sprint (consider 15 man-hours)
  • Implement a working prototype
Expected Output

• A specification (with diagrams) of the system, indicating your choices and how they address the particular deployment environment

• The first sprint backlog and burn-down chart

• A link to a public repository with your code

• A working demo