Library Multimedia Project Experience

by Alexander Egyed
Outline

- WinWin System
- Project Organization
- Real-World Characteristics
- Project Results to Date
- Lessons Learned
- Summary
WinWin Artifact Relationships

Win Conditions

Issues

Options

Agreements

Taxonomy
Box-and-Arrow Representation

WIN CONDITIONS

- Aerospace-WINC-2
- Aerospace-WINC-5
- AirForce-WINC-1
- AirForce-WINC-2

ISSUES

- TRH-ISSU-1

OPTIONS

- Aerospace-OPTN-1
- AirForce-OPTN-1
- TRH-OPTN-1
- TRH-OPTN-2
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Project Organization

- WinWin Stakeholder Roles
- Milestones
- WinWin Domain Taxonomy mapping to Requirements Description Outline
- Specified Product Views
Each of the six team members will develop one of the following project artifacts concurrently, using the WinWin Spiral approach:

- An Operational Concept Definition
- A System Requirements Definition
- A System and Software Architecture Definition
- A Prototype of Key System Features
- A Life Cycle Plan
- A Feasibility Rationale, assuring the consistency and feasibility of above items.
WinWin Stakeholder Roles

- **User** (Operational Concept and Requirements team members): multimedia access features, fast response time, friendly user interface, high reliability, and flexibility of requirements.

- **Developer** (Architecture and Prototype team members): use of familiar packages, stability of requirements, availability of support tools, and technically challenging approaches.

- **Customer** (Plan and Rationale team members): IOC in one semester, limited (or no) budgets for support tools, and low-risk technical approaches.
Milestones

- WinWin Requirements Negotiation on October 21
- Life Cycle Objectives (LCO) on November 4
- Life Cycle Architecture (LCA) on December 4

- Revised Requirements, Plan, etc. on Feb 11
- Design Plan, Test Plan, Inspection Plan until March 18
- Test Report, Inspection Report until April 8
- Initial Operational Capabilities (IOC), etc. on April 11

- Possibly further increments throughout the summer
WinWin Taxonomy Mapping to Requirements Description Outline

**DOMAIN TAXONOMY**

1 Interfaces
   1.1 Infrastructure (SIRSI, UCS, etc.)
   1.2 Media providers

2 Operational Modes
   2.1 Classes of Service (research, public)
   2.2 Training
   2.3 Graceful Degradation and Recovery

3 Capabilities
   3.1 Media Handled
   3.2 Media Operations
   3.3 Help
   3.4 Administration

**REQUIREMENTS**

5 Interface Requirements

3 Required States and Modes

4 Capability Requirements
WinWin Taxonomy Mapping to Requirements Description Outline

Center for Software Engineering

**DOMAIN TAXONOMY**

4 Evolution
   4.1 Capability Evolution
   4.2 Interface and Technology Evolution
   4.3 Environment and Workload Evolution

5 Quality Attributes

6 Environment and Data

**REQUIREMENTS**

8 Evolution Requirements

6 Quality Attributes Rqmts.

7 Environment & Data Requirements
Some Guidelines Given

- WinWin Spiral Process Model for software development.
- They have to produce a number of items such as the LCA and IOC.
- WinWin tool must be used for software requirements negotiation.
- Prototype should be preferably WWW-based and it should be used as a proof-of-concept and for risk-resolution.
- Final product should be built on top of SIRSI.
Specified Product Views

- System Block Diagrams
- Requirements Templates
- Usage Scenarios
- Physical Architecture
- Objects and Classes
- Object Interaction Diagrams
- Dataflow Diagrams
- State Transition Diagrams
- Event Sequence Diagrams
- Data Descriptions
- Requirements Traceability

Synthesized from Booch, Rumbaugh, Sommerville, J-STD-016
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Real-World Characteristics

- Availability of Equipment, Tools, and COTS packages: Librarians wanted to build products on top of their SIRSI software package which handles most of their tasks. However, neither equipment (server) nor COTS (motif clients for development) were available on time.

- Alternative option of developing products on Web was initially problematic as well because no suitable web server could be found.
Real-World Characteristics

- Fuzzy Requirements: Librarians (the customers and/or users) had little or no software development knowledge. Initial proposals were not more than a paragraph of text.

- Unstable Requirements: Above problem had additionally the effect of making it hard to stabilize the requirements. Even until recently, some teams experienced major requirements changes.
Real-World Characteristics

- Librarians were not available all the time. This made negotiation and collaboration more challenging. Requirements assumptions were made which caused painful changes later on.
Real-World Characteristics

- Personnel turnover: The spring non-core-CS course is always much smaller. Only 30 students (out of 90) from almost all projects continued the class. Limited personnel resulted in merging students with sometimes different project backgrounds.

- Personnel conflicts: In the fall, any collection of 15 teams will experience conflicts. In the spring, merging of different teams with similar project background resulted in conflicts of interest (e.g. what approach should be taken?).
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Six 5-member-teams are continuing some of the projects.

The main tasks are Detailed-Design, Documentation, Coding, Testing, and Implementation - but some requirements are still volatile.

Major Milestone is the Initial Operational Capability at the end of this semester.
Stereoscopic Slides
- Hancock Photo Archive
Latin American Pamphlets
EDGAR Corporate Data
Medieval Manuscripts
Technical Reports Archive
CNTV Moving Image Archive

John Ahouse
Jean Crampon
Barbara Robinson
Caroline Cisneros
Ruth Wallach
Charles Phelps
Sandra Joy Lee
Stereoscopic Slides

- Collection of stereoscopic slides from the early years of this century. When viewed through the stereoscope an illusion of depth is provided owing to the fact that the two adjacent photographs have been taken from slightly different angels. Photos have research value even without three dimensional effect.
- Make this material available through the WWW. Make use of second picture, e.g. merge it with the first one to improve the quality of the picture.
  » Made use of low-resolution pictures (thumbnails)
  » Database (future administrative functions)
Collection of Latin American pamphlets from the 19th and 20th century numbering 5,000 items. An item has typically less than 50 pages. They are fragile and in need for preservation. These pamphlets have substantial historic value. There is also a language issue to deal with (English and Spanish).

Preserve both contents and images through storing in electronic form and provide full-text searchability (in two languages)

» Image processing (e.g. zoom)
» Pamphlet database + administrative functions
EDGAR Corporate Data

- The government uses WWW as a tool for dissemination of information (e.g. EDGAR Database of Corporate Information). These sites provide a valuable source of information especially to business people and library researcher. However, the data is poorly formatted.
- Automate tiresome formatting of material and provide a more convenient way of accessing the material.
  » Redefined librarian proposal
  » Limited access to USC scholars or paying customer
  » Combining relevant data from several Web sites
Medieval Manuscripts

Collection of Medieval Manuscripts of historic value. Important are not only the contents but also the handwritings, markings, drawings, etc.

Provide a way of preserving these artifacts as well as viewing them over the Internet.

- Initially limited access to USC scholars
- Database + administrative functions
Technical Reports Archive

- Virtually all applied science departments (mostly from the School of Engineering) provide technical reports. These reports are usually submitted for publication to peer reviewed journals later on.
- Provide a central database of technical reports as well as full-text retrieval capabilities and links to the journal counterparts.
  » Centralized search but de-centralized storage
  » Reports can be stored centralized as well
  » Database + administrative functions
The USC Moving Image Archive houses USC student film and video productions dating from the 1930s to current productions in the School of Cinema-Television. Moving image material exist in multiple forms.

- Provide a way of making these movie clips and still available to students who wish to explore them. Observe copyright issues.
  - User functions built on existing database
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Lessons learned (from student critiques)

- **WinWin Utility:** WinWin helped with team building and prioritization, but more pre-WinWin homework is needed.

- **Better Time Management:** Delays in providing facilities on time caused additional strains on the workload towards the end of the semester. Team building and negotiation should have started earlier.

- **Training:** Tools like SIRSI, WinWin, and others more training.
Lessons learned
(from student critiques)

- **Team Members:** Staffing and role selection should have stronger risk management emphasis.
- **Team Size:** Should be more adapted to members and projects. Smaller teams would have worked more efficiently, especially because only very few had 'real' team working experience.
- **Roles:** Some felt roles were too strict, which affected their freedom in working on different parts of their project.
Lessons learned
(from student critiques)

- **Inconsistency**: Quite opposite to the roles, the documentation guidelines were felt to be too ambiguous. The same information was reflected (sometimes) in slightly different from in different documents. This affected consistency considerably.

- **Information Overload**: Ample handouts, class notes, etc. were provided. Important information should be better distinguished from useless material.

- **Documentation Templates**: More detailed support (e.g. examples) in writing mandatory documentation was needed.
Lessons learned
(from student critiques)

- **Prototype Infrastructure:** All prototypes were developed from scratch and most teams developed similar components (e.g. search engine) independently.

- **Prototypes:** Early prototypes helped a lot in stabilizing requirements. Librarians' wishes became more concrete. The prototype also satisfied their desire to get a 'tool' at the end of the semester.

  » **Software development problems** rarely come alone - they usually invite their friends.
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WinWin Spiral Process well matched to multimedia applications:

- Risk driven process prioritized teams' activities
- WinWin negotiation prioritized product features
- Rationale section stimulated solution feasibility and consistency
- Prototypes often expanded user expectations
Summary

Process accommodated real-world complications well:

- WinWin approach built trust; cooperative vs. adversarial spirit
- Flexible specs, two-cycle process facilitated adaptation to change
- Risk-driven reprioritization focused adaptation on critical issues
Summary

Approach had too many people, too few tools:

- Redundant documents caused update challenges
- Some people were seeing trees vs. forest
- Need view integration support
More Information

- CS 577a Software Engineering I Home Page
  http://sunset.usc.edu/classes/cs577a/index.html

- CS 577b Software Engineering II Home Page
  http://sunset.usc.edu/classes/cs577b/index.html
  (contains links to current project teams’ home pages)

- USC Chronicle Article ‘Library Gives Real-World Challenges to Student Software Designers’
  by Eric Mankin