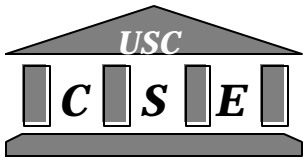


# Course Overview

**CS 510**

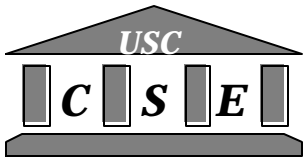
**Software Management and  
Economics**

**Barry Boehm, USC**

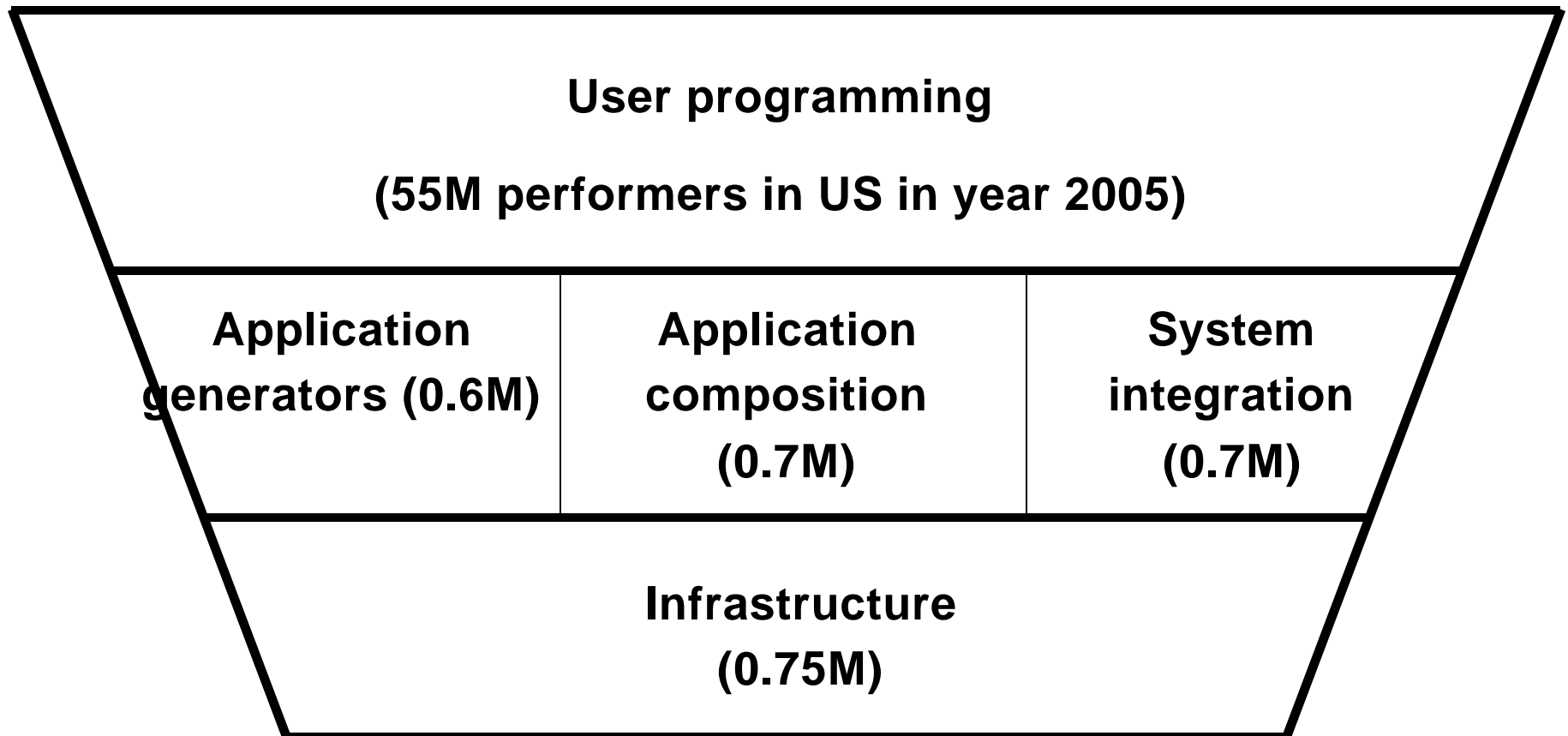


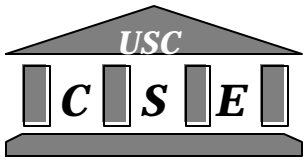
# Outline

- **The future of software practices**
  - **And career paths**
  - **And things you need to know**
- **Major software technology trends**
- **Traditional vs. emerging software engineering**
- **Comparison of CS 510 and CS577a**
- **Class Procedures**
- **UniWord Case Study**



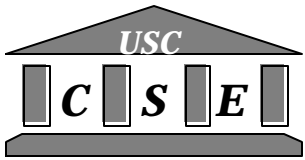
# The future of the software practices marketplace





# The future of Software Careers

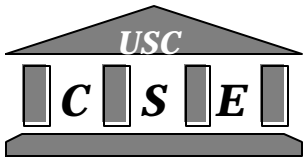
<b>User programming</b>			<b>Applications majors</b>
<b>Application generators</b>	<b>Application composition</b>	<b>System integration</b>	<b>Gap</b>
<b>Infrastructure</b>			<b>Computer science majors</b>



**“ Software Engineering:”** The disciplines which distinguish the coding of a computer program from the development of a software product.

Issues \ Stages	Requirements, Architecture	Design, Code	Implement, Maintain
Computer Science		CS Focus	
User Applications			
Economics			
People			

- Accommodate new tools and techniques
  - Web browsers, GUI prototypers, WinWin, Spiral processes
- Integrate all these considerations
  - Via integrated models (MBASE)



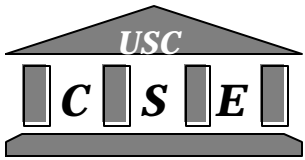
# Major Software Technology Trends

- **Application generators based on domain architectures**
  - VHLL's, class libraries
- **Applications composition based on tailorable middleware**
  - GUI, object/data management, distributed processing, document processing, mail, etc.
- **Networked hypermedia**
  - WWW, Java, voice, video, virtual reality
  - Intelligent agents
- **Flexible but disciplined software/system processes**
  - Collaborative win-win vs. adversarial win-lose
  - Beyond current CMM: integrated teams, risk, reuse, technology
- **Software-based competitive advantage**



# Traditional vs. Emerging SW Engineering

- **Traditional: Focused on**
  - Construction of
  - Individual
  - Batch or fully-automated applications
- **Emerging: Needed for**
  - Reuse-based integration of
  - Multiple
  - User-interactive, distributed applications



## Traditional vs. Emerging SW Products

### Traditional

- Requirements-driven
- Quality as conformance to specifications
- Function or object oriented
- Individual “stovepipe” applications

### Emerging

- Everything is negotiable
- Quality as multi-stakeholder satisfaction
- People oriented
- Product line families of applications



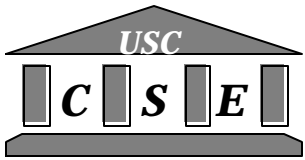
## Traditional vs. Emerging SW Processes

### Traditional

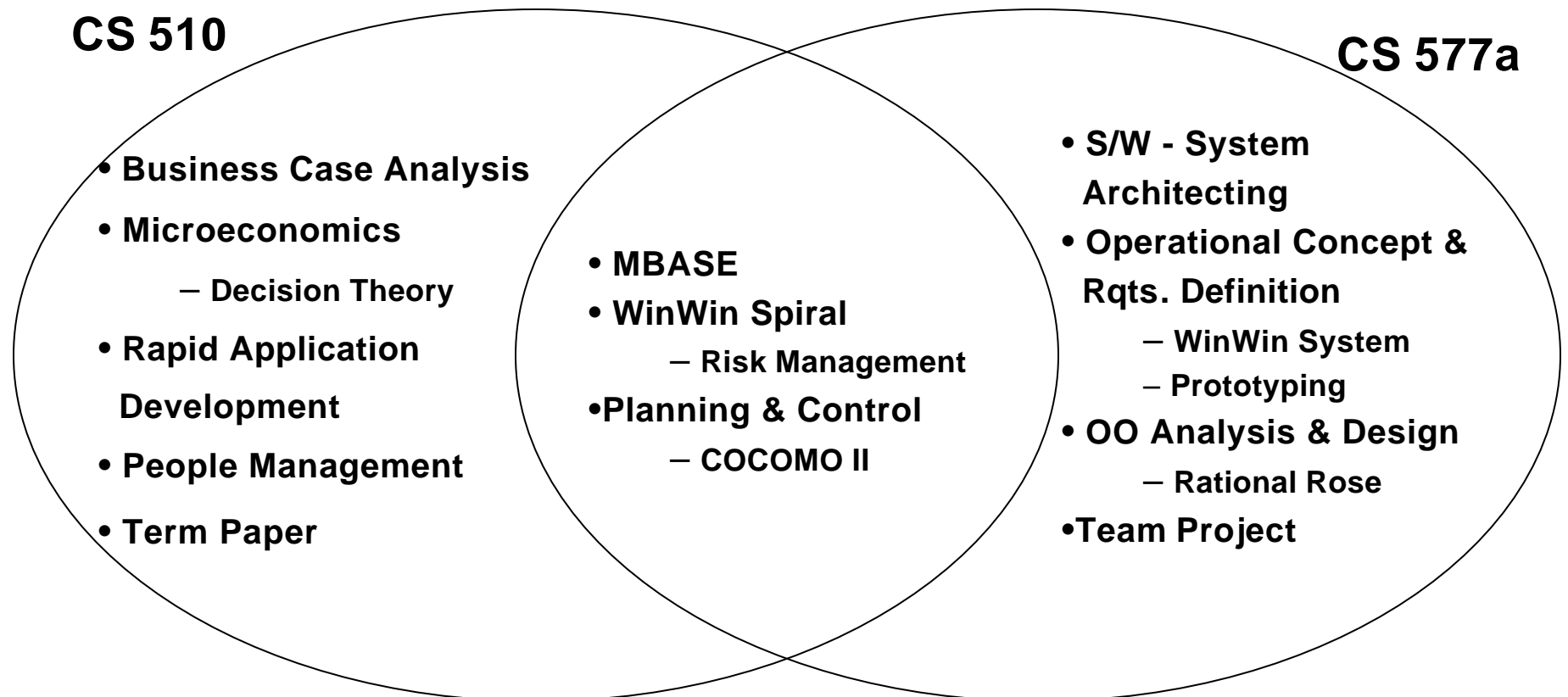
- **Contract-oriented**
  - Your problem; win-lose
- **Sequential**
- **Procedure-driven**
- **Programming-driven**
- **Many interlocking milestones**
- **Focus on discipline & control**

### Emerging

- **Collaboration-oriented**
  - Our problem; win-win
- **Cyclic, concurrent**
- **Risk-driven**
- **Reuse-driven**
- **Critical anchor points with subsidiary milestones**
- **Mix of flexibility & discipline**



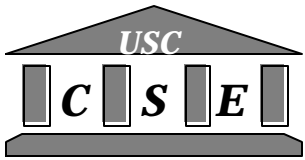
## Comparison of CS 510 and CS 577a





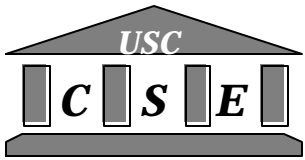
# UniWord Case Study

- **Background**
- **The Competition (7-9/83)**
- **Project Startup (9-10/83)**
- **Early Problems 10/83-2/84)**
- **Problem Interactions (2-4/84)**
- **The Rescue Attempt (4-5/84)**
- **The Assessment (5-6/84)**



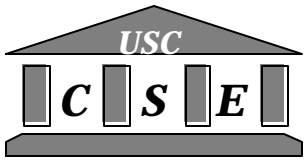
# Background

- **Universal Micros, Inc. Developing UniWindow Workstation**
  - Two 32-Bit, 15-MHz Micros
  - 1 Mbyte main Memory
  - 20 Mbyte Winchester Disk Drive
  - High-Resolution, Bit-Map, Color Display
  - UniWindow Operating System(based on Unix)
- **Target: Demo at NCC, July 1984**
- **Contracting for UniWord Word Processing System**
  - High-Level Functional Specs Developed
  - 9-Month Period of Performance



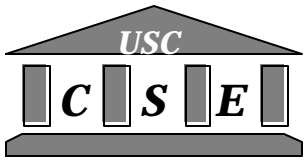
# The Competition

- **5 Responses to RFP**
  - 2 Unqualified
  - 1 Too Expensive
  - Soft Wizards, Inc.
  - Text Products, Inc.
- **Final 2 Asked for Best and Final Offer**
- **Soft Wizards Added Functions, Cut Price \$100K**
  - Get Leading position in Word Processing Software For Advanced Workstations
  - Needed Income
  - Make up Deficit With License Fees
- **Job Awarded to Soft Wizards 15 Sept 1983**



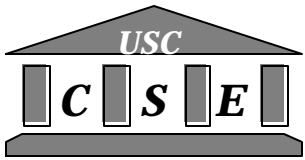
# Project Startup (Month 1)

- **Project Manager: Bill Brown**
  - CP/M-Based Text Editor
- **Deputy PM: Karen Gray**
  - UNIX, VI Expert
- **Major Differences on Text Editor**
  - Brown: Simple, Menu Oriented
  - Gray: Complex, Command Oriented
- **1 Month to Resolve This Issue**
  - Gray Develop Text Editor
  - Brown Lead Development of Other Components



# Early Problems (Months 2-5)

- **Integration Started January 1984**
  - No Test Drivers, Test Data
  - 3 Components: Text Editor, File Manager, Format/Runoff
- **Interface Incompatibilities**
  - File Structures, Buffers, Window Controls
- **Attempts to Compromise Fail**
  - Karen Gray Leaves Company
- **File Manager Progress Slow**
  - Sam Silver, DBMS Expert, Put On Job



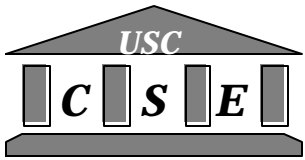
# Problem Interactions (Months 6-7)

- **Hard to modify Text Editor**
  - Lave It Alone, Build Layer Around It
- **Silver Begins Building Relational DBMS**
  - Suggested by Universal Micros Marketer
  - No Formal Customer Request
- **Integration Problems Deepen**
  - Proliferation of Program Versions
  - No Interface Specs
  - Major Drain on Developers' Time
- **Brown Requests Four Additional people to Help With Integration for 6 Weeks**
  - Request Granted



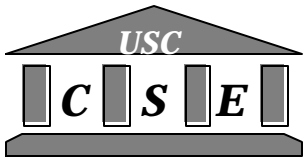
# **The Rescue Attempt (Month 8)**

- **New People Experienced, But not With UniWord**
- **Documentation Scarce, Out of Date**
- **Developers Required to Explain System to New People**
  - **Progress Slows Down Further**
- **Conclusion: Delivery Date Can't Be Achieved**



# Project Assessment (Month 9)

- **Soft Wizard/Universal Micro Meeting**
  - **Text Editor Demo: Unsatisfactory**
    - **Poor match to UniWindow Strengths**
  - **Summary of U.M. Change Requests**
  - **Could Deliver Legally Acceptable Product, But Nobody would Like It**
  - **Requested Another \$100K, 3 Months to Complete**
- **Universal Micros' Response**
  - **Drop UniWord from July NCC Demo**
  - **Hire Consultant to Audit Project**



# Homework Assignment #1

**Due Wednesday, Sept. 8, 25 points**

- **Read the UniWord case study (Introduction and Overview, pp. 10-14, Electronic Paper EP-2).**
- **Identify project risk items that could have been better addressed by either Universal Micros or Soft Wizards.**
- **Bulleted list OK.**