

▶ POLITECNICO DI MILANO

Dipartimento di
Elettronica e Informazione

Session 8

Development Management

Emanuele Della Valle

<http://home.dei.polimi.it/dellavalle>

- This slides are largely based on Prof. John Musser class notes on “Principles of Software Project Management”
- Original slides are available at <http://www.projectreference.com/>
- Reuse and republish permission was granted

Today

3

- People dimension
- Capability Maturity Model
- Requirements (most critical activity)
- Other notes

Session 7 Review

4

- Risk Management
- Feature Set Control
- Change Control

- Risk Management
 - Types of risk: schedule, cost, requirements
- Risk Identification
- Risk Analysis
 - Risk Exposure ($RE = Prob. * Size$)
- Risk Prioritization
- Risk Control
- Risk Resolution
 - Avoidance, assumption, transfer, gain knowledge
- Top 10 Risk List

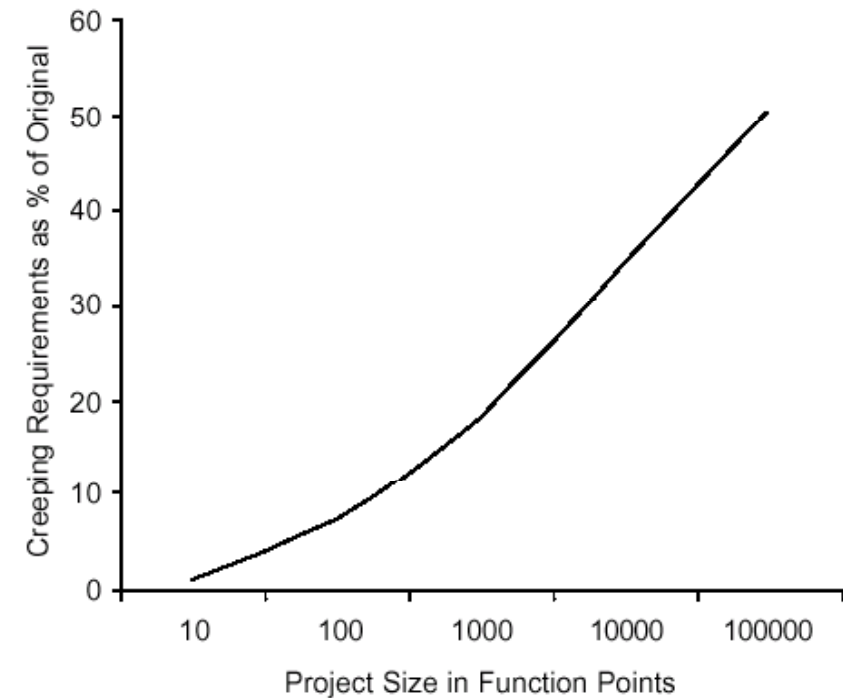
- Early Stages
 1. Minimal Specification
 2. Requirements Scrubbing
 3. Versioned Development
- Mid-Project
 - Effective change control
- Late-Project
 - Feature cuts

Session 7 Review

Change Control

7

- Average project has 25% requirements change
- Sources of change
- Change control is a process
- Overly detailed specs. or prolonged requirements phase are not the answer
- Change Control Board (CCB)
 - Structure
 - Process
 - **Triage !!!**



- Items: code, documents
- Change & Version control
- SCM
- Configuration Management Plan

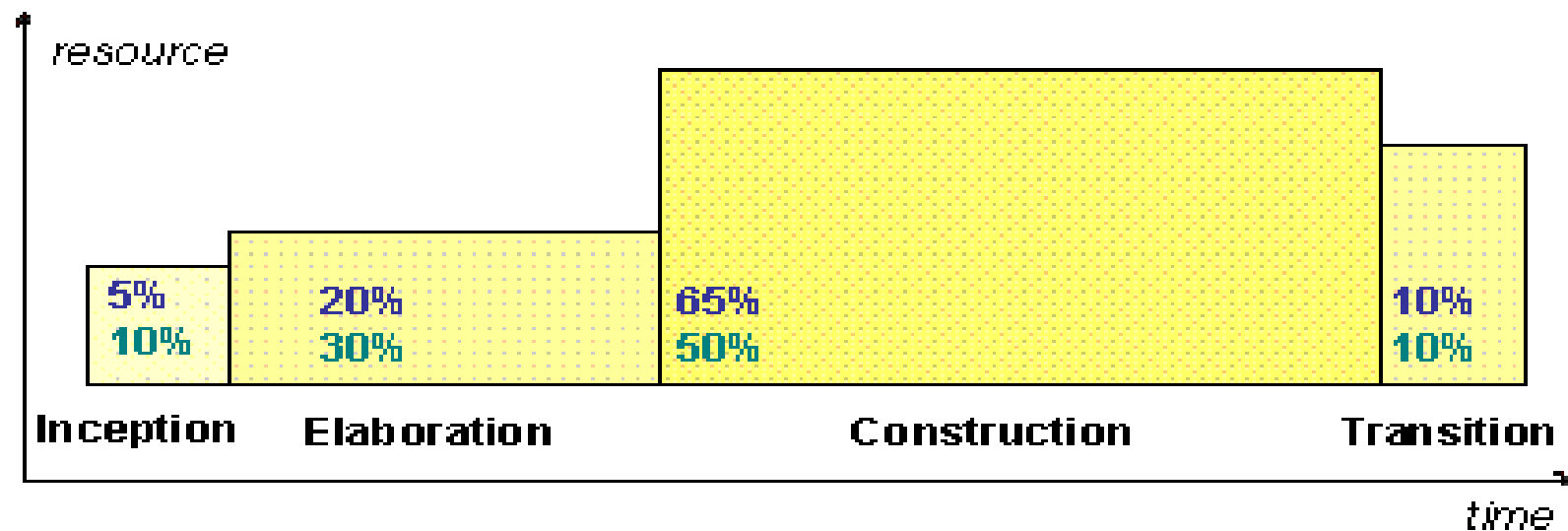
- Programmers (system engineers)
 - Technical lead, architect, programmer, Sr. programmer
- Quality Assurance (QA) engineers (testers)
 - QA Manager, QA Lead, QA staff
- DBAs
 - DB Administrator, DB Programmer, DB Modeler
- CM engineers (build engineers)
- Network engineers, System Administrators
- Analysts (business analysts)
- UI Designers
- Information Architects
- Documentation writers (editors, documentation specialist)
- Project manager
- Other
 - Security specialist, consultants, trainer

- You need to decide which of these are necessary for your class project
- Depends on what you're building
 - How big is it?
 - Is it UI intensive? Data intensive?
 - Are you installing/managing hardware?
 - Do you need to run an operations center?
 - Is it in-house, contract, Commercial off-the-shelf (COTS), etc?
- Depends on your budget

People Dimension Staffing Profile

11

- Projects do not typically have a 'static team size'
- Who and how many varies as needed



Legend:
Actual Effort (% of project total)
Schedule (% of project total)

Copyright: Rational Software 2002

- PM must have a plan as to how & when
- Roll-on
 - Hiring or 'reserving' resources
 - Ramp-up time
 - Learning project or company
- Roll-off
 - Knowledge transfer
 - Documentation
 - Cleanup

- Part of Software Development Plan
- Includes
 - What roles needed, how many, when, who
 - Resource assignments
 - Timing: start/stop dates
 - Cost/salary targets (if hiring)
- Project Directory
 - Simply a list of those involved with contact info.
- Team size: often dictated by budget as often as any other factor

- 1st: What's the team's objective?
 - Problem resolution
 - Complex, poorly-defined problem
 - Focuses on 1-3 specific issues
 - Ex: fixing a showstopper defect
 - Sense of urgency
 - Creativity
 - New product development
 - Tactical execution
 - Carrying-out well-defined plan
 - Focused tasks and clear roles



"We're the right team to win this game."

"No, we're the right team to win this game."

- Two early philosophies
 - Decentralized/democratic
 - Centralized/autocratic
- Variation
 - Controlled Decentralized

- Most common model
- Technical lead + team (rest team at equal status)
- Hierarchical with one principal contact
- Adaptable and general
- Variation: Democratic Team
 - All decisions made by whole team
 - See Weinberg's "egoless programming" model [1]

[1] Gerald M. Weinberg, "Egoless Programming," IEEE Software, vol. 16, no. 1, pp. 118-120, Jan./Feb. 1999, doi: 10.1109/MS.1999.744582
<http://www2.computer.org/portal/web/csdl/doi/10.1109/MS.1999.744582>

Chief-Programmer Team

- From IBM in 70's
 - See Brooks and Mythical Man-Month
- a.k.a. 'surgical team'
- Puts a superstar at the top
 - Others then specialize around him/her
 - Backup Programmer
 - Co-pilot or alter-ego
 - Administrator
 - Toolsmith
 - "Language lawyer"
- Issues
 - Difficult to achieve
 - Ego issues: superstar and/or team
- Can be appropriate for creative projects or tactical execution

“Skunkworks” Team [1]

- Put a bunch of talented, creative developers away from the mother ship
 - Off-site literally or figuratively
- Pro: Creates high ownership & buy-in
- Con: Little visibility into team progress
- Applicable: exploratory projects needing creativity
 - Not on well-defined or narrow problem

[1] http://searchcio.techtarget.com/sDefinition/0,,sid182_gci214112,00.html

SWAT Team [1]

- Highly skilled team
- Skills tightly match goal
- Members often work together
- Ex: security swat team

[1] <http://en.wikipedia.org/wiki/SWAT>

- Communication increases multiplicatively
 - Square of the number of people
 - 50 programmers = 1200 possible paths
 - Communication must be formalized
- Always use a hierarchy
- Reduce units to optimal team sizes
 - Always less than 10

- What is the optimal team size?
 - 4-6 developers
 - Tech lead + developers
 - Small projects inspire stronger identification
 - Increases cohesiveness
 - QA, operations, and design on top of this

- “Hire for Attitude, Train for Skill”
- Look for: “Smart, Gets Things Done”
 - For programmers, see joelonsoftware’s “Guerilla Guide to Interviewing”
 - <http://www.joelonsoftware.com/articles/fog0000000073.html>
 - <http://www.joelonsoftware.com/articles/GuerrillaInterviewing3.html>
- Balance the team

- A resource planning tool
- Who does What
- Can be for both planning and tracking
- Identify authority, accountability, responsibility
- Who: can be individual, team or department
- Can have totals/summary at end of row or column (ex: total Contributors on a task)

Item	WBS	Description		Sponsor	Developer	Developer	QA	Customer
1	1	Initiate Project		A				
2	1.1	PMP Signoff		A				R
3	1.2	Initial UI			L	C		R
4	1.3	DB Model			C	L		
5	1.4	Start Test					L	
	Legend							
	A	Approval						
	L	Lead						
	S	Secondary						
	C	Contributor						
	R	Reviewer						

Item		Development	Customer A	Customer B	Mgmt	QA	
Unit Test		A	S	S	R	A	
Systems Test		P	R	R	R	R	
Beta Test		P	R	R	P	R	
User Acceptance Test		A	S	S	S	S	
Accountable	A						
Participant	P						
Reviewer	R						
Sign-off Required	S						

- Another resource planning tool
- Resources on one axis, skills on other
- Skills can high level or very specific
- Cells can be X's or numeric (ex: level, # yrs.)

	Analyst	Developer (Java)	Developer (HTML)	QA Tester	Database Design
Dilbert	7	2			
Larry			8		4
Sarah	4	4			
Boss				4	
Fred					5

- A software process framework
- “Process determines capability”
- 5 ‘maturity’ levels
 - ‘Evolutionary plateaus’ to a mature software process
- Each level has its own goals
- Organizations can be ‘certified’
 - Later to be used as a marketing or validation tool
 - <http://www.itil-officialsite.com/home/home.asp>
- Links:
 - SEI - <http://www.sei.cmu.edu/>
 - Diagram - <http://www.sei.cmu.edu/cmm/>

1. Initial

- 'Ad hoc' process, chaotic even
- Few defined processes
- Heroics often required here

2. Repeatable

- Basic PM processes
 - For cost, schedule, functionality
- Earlier successes can be repeated

3. Defined

- Software & Mgmt. process documented
- All projects use a version of org. standard

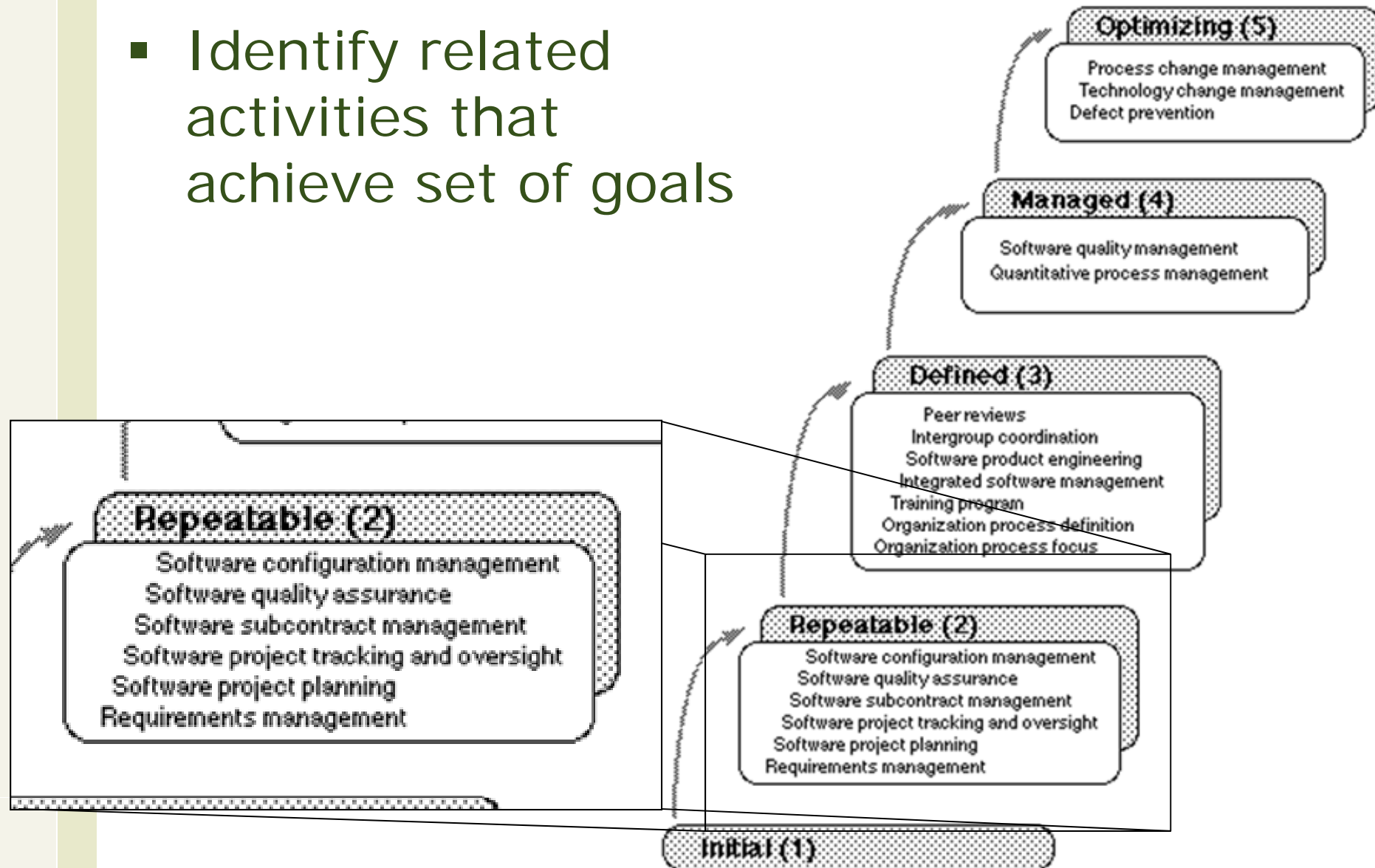
4. Managed

- Detailed metrics of process & quality
- Quantitative control

5. Optimizing

- Continuous process improvement
- Using quantitative feedback

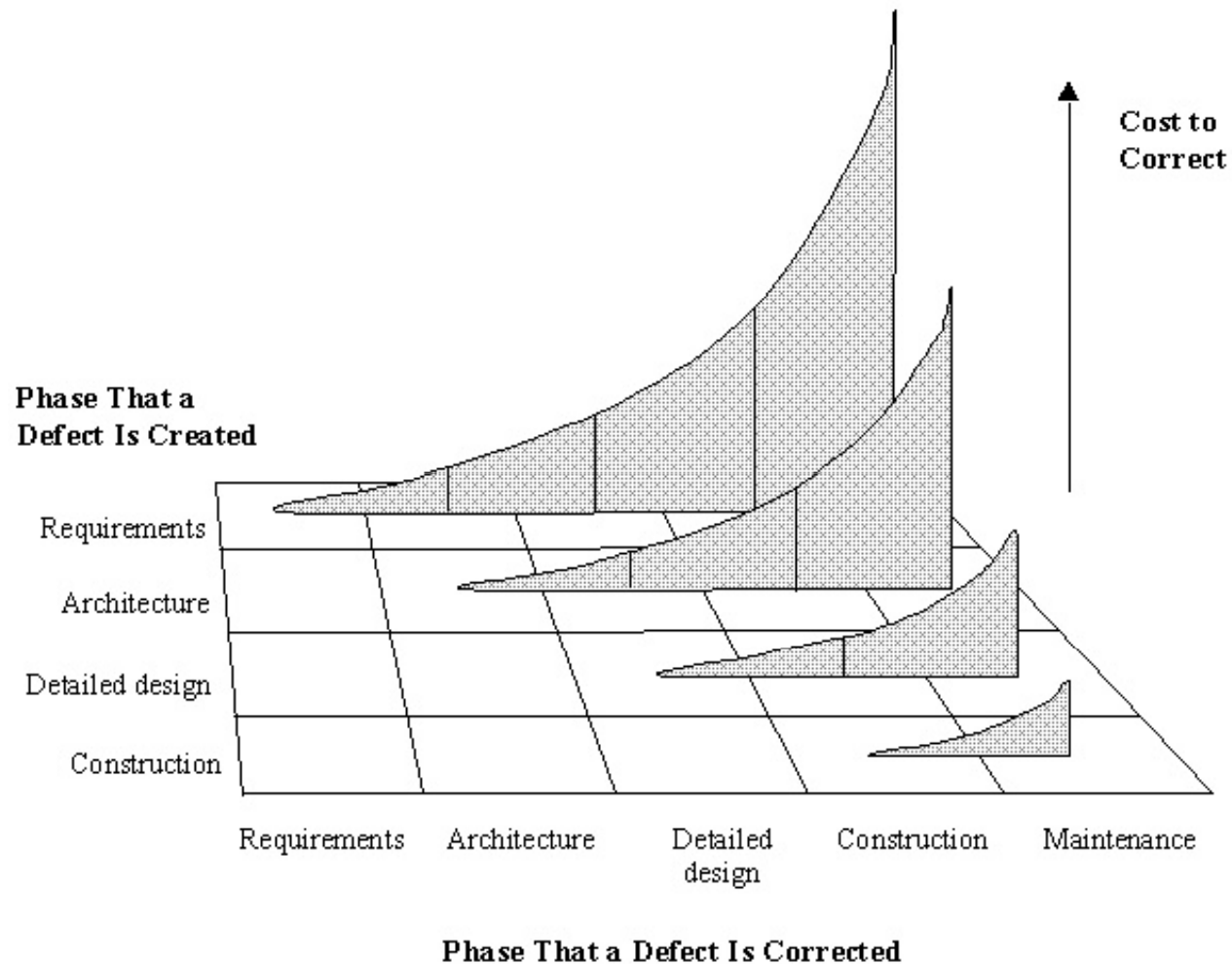
- Identify related activities that achieve set of goals



- India has more CMM level 4 & 5 companies than any other country
 - Why is that?

- Requirements are capabilities and condition to which the system – more broadly, the project – must conform

- Perhaps the most important & difficult phase to control
- Shortchanging it is a 'classic mistake'
- Can begin with a Project Kickoff Meeting
- Can end with a Software Requirements Review (SRR)
 - For Sponsor and/or customer(s) approval



Copyright 1998 Steven C. McConnell. Reprinted with permission from *Software Project Survival Guide* (Microsoft Press, 1998).

- Conflict of interest: developer vs. customer
- Potential tug-of-war:
 - Disagreement on Features & Estimates
 - Especially in fixed-price contracts
- Frequent requirements changes
- Achieving sign-off
- Project planning occurs in parallel

2 Types of Requirements (see lesson 3)

- Functional (behavioral)
 - Features and capabilities
- Non-functional (a.k.a. “technical”) (everything else)
 - Usability
 - Human factors, help, documentation
 - Reliability
 - Failure rates, recoverability, availability
 - Performance
 - Response times, throughput, resource usage
 - Supportability
 - Maintainability, internationalization
 - Operations: systems management, installation
 - Interface: integration with other systems
 - Other: legal, packaging, hardware

- Must be prioritized
 - Must-have
 - Should-have
 - Could-have (Nice-to-have: NTH)
- Must be approved

- Management: Yes, that's what I funded
- Users: Yeah, that's what I need
- Developers: Yes, that's what I will build

- The “What” phase
- Inputs: SOW, Proposal
- Outputs:
 - Requirements Document (RD)
 - a.k.a. Requirements Specification Document (RSD)
 - Software Requirements Specification (SRS)
 - 1st Project Baseline
 - Software Project Management Plan (SPMP)
 - Requirements Approval & Sign-Off
 - Your most difficult task in this phase

- “There’s no sense being exact about something if you don’t even know what you’re talking about”
-- John von Neumann
- “When the map and the territory don’t agree, always believe the territory”
-- taught to all Swedish army recruits

- Interviews
- Document Analysis
- Brainstorming
- Requirements Workshops
- Prototyping
- Use Cases
- Storyboards
- There are more...

- Best practice: use 'context free' questions
 - A question that does not suggest a response
 - High-level, early questions to obtain 'global' properties of the problem and solution
 - Applicable to any project/product
 - Get the ball rolling

Context-free Questions

- Process, product and meta questions
- Process
 - “Who is the client for project X”?
 - “What is a very successful solution really worth to the client”?
 - “What is the reason for this project”?
- Product
 - “What problems does this system solve”?
 - “What problems could this system create”?
- Meta-questions
 - “Are these questions relevant”?
 - “Is there anyone else who can give useful answers”?
 - “Is there anything you want to ask me”?

- Review of existing documents
 - Business plans
 - Market studies
 - Contracts
 - Requests for proposals (RFP)
 - Statements of work (SOW)
 - Existing guidelines
 - Analyses of existing systems and procedures

- Idea generation & idea reduction
- Typically via group meetings
- Generation Best practices
 - Minimize criticism and debate
 - Editing occurs at end of meeting or later
 - Aim for quantity
 - Mutate or combine ideas
- Reduction best practices
 - Voting with a threshold (N votes/person)
 - Blending ideas
 - Applying criteria
 - Scoring with a weighting formula

- Typically 1-5 days
- Who? Varies. Users & stakeholders
- Pros
 - Good for consensus building
 - Builds participant commitment
 - Can cost less than numerous interviews
 - Provide structure to capture and analysis process
 - Can involve users across organizational boundaries
 - Can help identify priorities and contentious issues
- Joint Application Design (JAD)
 - A type of requirements workshop using a facilitator
 - See <http://www.carolla.com/wp-jad.htm>

- Quick and rough implementation
- Good communications mechanism
- Can be combined with other techniques such as JAD
- Issues: creating the mis-appearance that development is more complete than it actually is
 - See joelonsoftware's "The Iceberg Secret Revealed"
 - <http://www.joelonsoftware.com/articles/fog0000000356.html>

The Iceberg Secret

- You know how an iceberg is 90% underwater? Well, most software is like that too
 - 10% of the work goes into a *pretty* UI
 - 90% of the programming work is under the covers
- That's not the secret. The secret is that *People Who Aren't Programmers Do Not Understand This.*
- Corollaries:
 1. Bad interface → bad program
 2. Beautiful interface → program is complete
 3. When demanding nontechnical managers or customers "sign off" on a project, give them several versions of the graphic design to choose from.
 4. When you're showing off, the only thing that matters is the screen shot. Make it 100% beautiful.

[Source: See joelonsoftware's "The Iceberg Secret Revealed"
<http://www.joelonsoftware.com/articles/fog0000000356.html>]

- Picture plus description
- Often misunderstood: the text is more important
- Text structure
 - Use case name and number (ID)
 - Goal
 - Pre-conditions
 - Primary & secondary actors
 - Trigger
 - Description
 - Business rules
 - Open issues
- See also <http://alistair.cockburn.us/Use+cases>

Storyboards

- Set of drawings depicting user activities
- Paper prototyping
- Drawing screens or processes

- Customers and users (note: often not the same)
 - Customers can be users, but rarely opposite
 - Sometimes user constituencies need to be 'found'
- Subject matter experts
- Other stakeholders
 - Marketing, sales
 - Product managers

- Meetings
 - Treat them like a tool: design them
 - Boy scout motto: “Be Prepared”
 - As small as possible – but no smaller
 - Make it safe not to attend
 - Publish an agenda before
 - Publish a summary after
 - Generate a ‘related issues’ list
 - Can formal/informal, scheduled/ad-hoc

- Manage expectations
 - Don't forget to ask people theirs
 - Listen
 - Make explicit otherwise implicit decisions
 - PDA: Possibility, Deferred, Absolutely impossible
- Technical reviews
 - Requirements can be wrong by: inadequate or inaccurate
 - Quantity & quality
 - Reviews help with the latter

- Borland Caliber Analyst
 - Collaborative Software Requirements Engineering
 - <http://www.borland.com/us/products/caliber/index.html>

- IBM Telelogic DOORS
 - Requirements Management for Complex Systems and Software Development
 - <http://www.telelogic.com/Products/doors/doors/index.cfm>

- Both offer
 - Databases of requirements
 - Displayable in various formats
 - Requirements control metrics:
 - Requirements Stability Index
 - See http://sunset.usc.edu/classes/cs577b_2001/metricsguide/metrics.html#p36
 - To help manage feature creep and 'vibration'

There's a Tool for Every Need

- Requirements Tools
- Design Tools
- Construction Tools
- Test Tools
- Maintenance Tools
- CM Tools

- Tools could save 10-25% on some projects
 - But that's optimistic at best
- Choose tools to meet your needs
- No can guarantee you anything
 - They *may* help
 - Tools don't control people, especially customers

- Your projects: do you choose a language?
- Typically not the PM's choice, but does effect you
 - Staffing requirements
 - Methodology
 - Tools and infrastructure

- Schwalbe: 7 “Project Quality Management”
- URLs
 - “Introduction to Software Testing”
 - <http://www.iplbath.com/pdf/p0820.pdf>

Questions?

60