需求工程与系统建模

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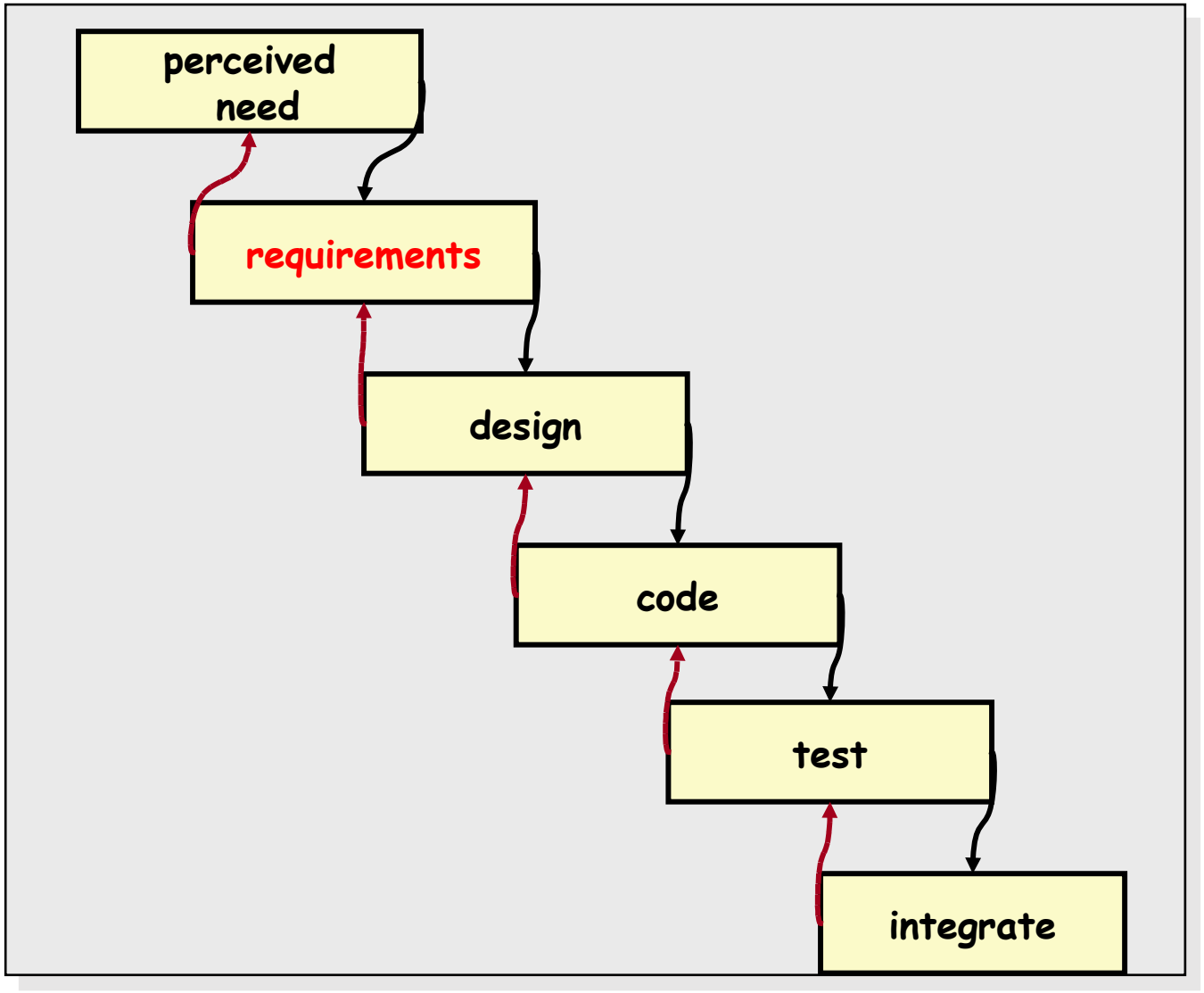
教学安排

开发管理（一）	需求建模（二）	设计实现（三）	测试维护（四）
■ 软件工程概述	■ 需求获取技术	■ 软件体系结构	■ 软件测试基础
■ 软件过程	■ 用户故事与估算	■ 面向对象设计	■ 软件系统测试
■ 软件项目管理	■ 需求原型化与文档	■ 代码重构与模式	■ 软件发布与部署
■ 软件配置管理	■ 软件建模方法	■ 编程规范与实践	■ 软件演化
□ 1-2 □	□ 3-6 □	□ 7-13 □	□ 14-16 □
	实验项目一	实验项目二	

需求工程活动

- 需求抽取（Elicitation）
- 需求分析（Analysis）
- 需求规约（Specification）
- 需求管理（Management）
- 需求验证（Validation）



需求抽取

目标： 主动与干系人协同工作，找出他们的需求，识别潜在的冲突，磋商解决矛盾，定义系统范围与边界

实质： 了解待解决的问题及其所属领域

关键： 确保该问题的解决是有商业价值的

注意以下问题：

- 产品设计目标不明确
- 干系人参与不足
- 干系人之间缺少共识
- 画蛇添足
- 需求快速变化
- 变更管理不足
- 需求分析不足

需求抽取

- 抽取技术
  - 协同工作（Collaborative sessions）
  - 面谈　　（Interviewing techniques）
  - 问卷调查（Questionnaires）
  - 观察法　（Ethnography）
  - 原型法　（Prototyping）
  - 文档分析（Documentation）
  - 建模　　（Modeling）
  - 角色扮演（Roleplaying）
  - 非功能性需求列表（Checklists of NFRs）
- 冲突识别与磋商　（Conflict Identification and Negotiation）

需求分析

目标：对产品及其与环境的交互进行更深入的了解，识别系统需求，设计软件体系结构，建立需求与体系结构组件间的关联，在体系结构设计实现过程中进一步识别矛盾冲突，并通过干系人之间的协调磋商解决问题。

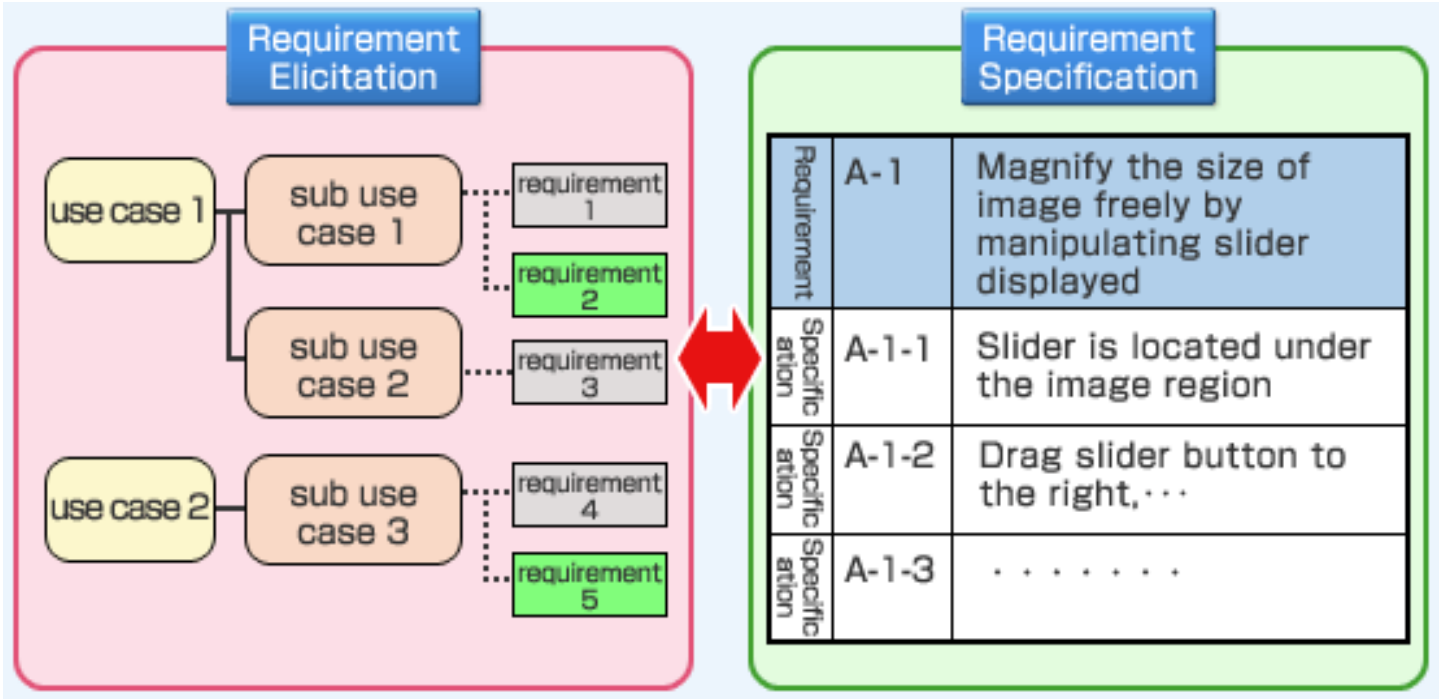
实质：概念建模———选择常用的建模语言，进行功能建模和信息建模

关键：体系结构设计与需求分配

通过评估需求的满足度来评价体系结构设计的质量

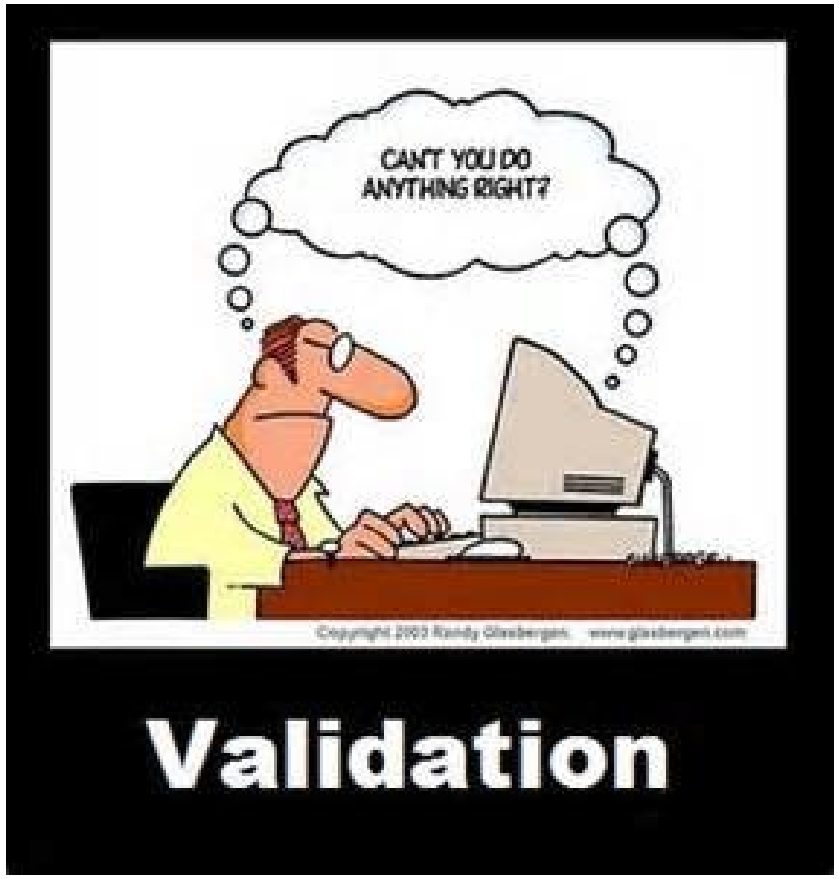
需求规约

- 系统与软件需求的文档化，以便于后续的需求及系统的正式评审，而准备的规范化文档。
- 单个需求项的质量
  - 准确（Concise）
  - 正确（Correct）
  - 明确（Non-ambiguous）
  - 可行（Feasible）
  - 可证（Verifiable）
- 整个需求集合的质量
  - 现实（Realistic）
  - 精确（Concise）
  - 全面（Complete）
  - 一致（Consistent）



需求验证

- 对其他需求工程活动的质量的保证。通过数学的形式化工具或工程化的测试过程来确保系统满足干系人的要求。
- 验证方法
  - 评审（Review）
  - 原型化（Prototyping）
  - 模型验证（Model validation）
  - 确认测试（Acceptance Tests）



需求管理

贯穿从需求获取到软件系统下线的全过程。需求管理设计软件配置管理、需求跟踪、影响分析和版本控制。

- 需求跟踪 （Requirements traceability）

  描述和追踪一条需求的来龙去脉的能力，包括向前追踪到软件制品，向后追踪到需求来源。

- 变更请求管理 （Change Requests）

  系统化的变更管理

- 需求属性管理 （Requirements attributes）

敏捷方法 vs. 传统方法

Sr #	Agile	Traditional
1	Incremental Value & Risk Management	Phased approach with an attempt to know everything at the start
2	Embracing Change	Change Prevention
3	Delivery Early, Fail Early	Delivers value at the end, fails at the end
4	Transparency	Detailed planning, stagnant control
5	Inspect and Adapt	Meta Solution w/tightly controlled procedures & final answers
6	Self Managed	Command and Control
7	Continual Learning	Learning is secondary to the pressure of delivery

需求抽取

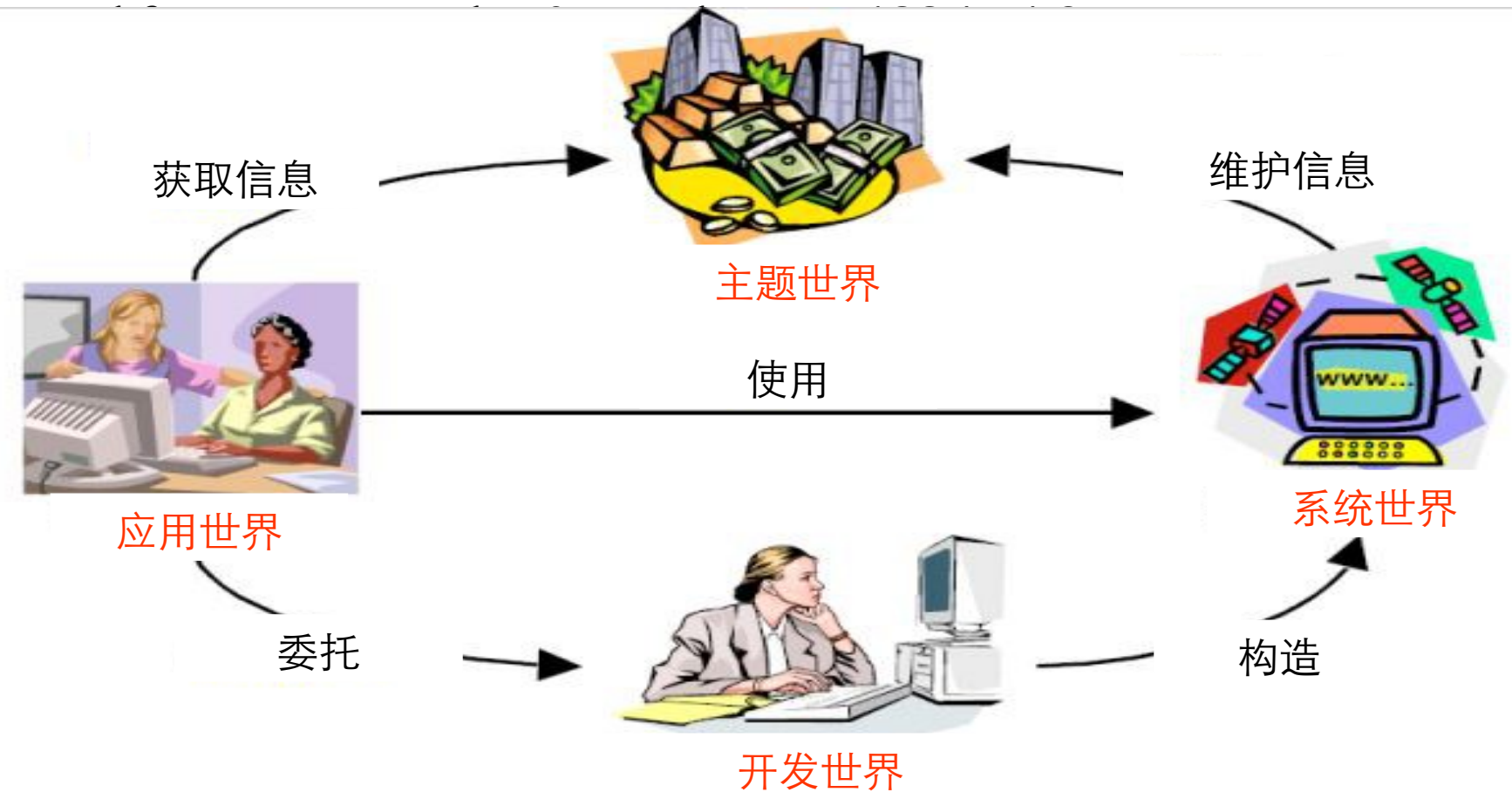
Requirements Elicitation

需求抽取

需求抽取过程中，最困难的不是记录用户需求，而是与用户探讨磋商，发现真正要解决的问题，确定适用的方案。

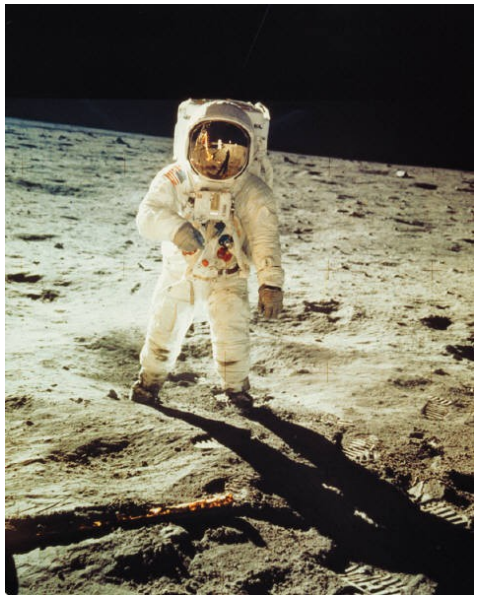
— Steve McConnell

四世界模型



出发点

- 确定干系人
  - 这里需要强调与客户之间的联络关系
  - 系统的设计到底与谁的利益息息相关
- 定义边界
  - 怎样界定问题的范围?
- 定义目标与情景实例
  - 目标与情景实例是组织原始需求信息的有效手段
- 分析可行性
  - 如何进行可行性研究
  - 如何选择好的项目
- 分析风险
  - 风险管理应长期、持续进行，而非阶段性、一次性的任务
  - 进行灾难及事故分析，以确定风险



干系人

- 干系人分析
  - 找出所有干系人
  - 分析其隶属于哪个世界
- 干系人举例
  - **用户**—关心新系统特征和功能
  - **设计师**—想要构造完美的系统，尽量重用已有的代码
  - **系统分析师**—想要获取正确的需求
  - **培训与用户支持人员**—确保系统可用和可管理
  - **业务分析师**—想确保“我们做得比竞争对手好”
  - **技术文档作者**— 为系统准备用户手册及其他相关文档
  - **项目经理**—希望按时、按预算、按目标完成项目
  - **客户**—为新系统买单的人

What is a requirement?
(from Alan M. Davis, JREM Tutorial)

- Requirement:
  - An Externally-Observable Characteristic of a Desired System

Formally IEE Std 610.12.1990

1) A condition or capability needed by a user to solve a problem or achieve an objective

2) A condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents.

3) A documented representation of a condition or capability as in (1) or (2).

What is a Requirement?

- A requirement is some aspect of a system's content or behavior, which is necessary or desired by the customer or client
  - Provides a clear understanding of the problem domain
  - Establishes a context of the need/problem
- Requirements define
  - *What* the system must do
  - *What* characteristics or properties the system must have
  - *What* information is involved
  - *What* degree of quality is expected
  - *What* constraints apply to the solution
  - *Who* will use the system
  - *How* the system is to be used
- Well defined requirements are measurable and provide the basis for defining project success

What is a Requirement?

- Well defined requirements are
  - Needed
  - Correct
  - Complete
  - Concise
  - Unambiguous
  - Discrete
  - Unique
  - Verifiable
  - Traceable
  - Consistent

- Requirements can be stated, unstated or derived
  - Stated Requirements: Requirements stated in the Statement of Work (SOW) or similar documentation identifying specific problems to be solved
  - Unstated Requirements: Requirements implied or understood although not apparent in the SOW or similar documentation
  - Derived Requirements: Requirements identified during the analysis effort

Requirement Types

Product / process

- Product requirements
- process requirements

Product Requirements

- Functional requirements
- Non-functional requirements

Levels of Detail

- **User requirements**, targeting
  - customer administrative personnel
  - contractor administrative personnel
  - end users
  - customer engineers
  - system architects
- **System requirements**, targeting
  - end users
  - customer engineers
  - system architects
  - contractor programmers
- **Software design specification**, targeting
  - customer engineers (possibly)
  - system architects
  - contractor programmers

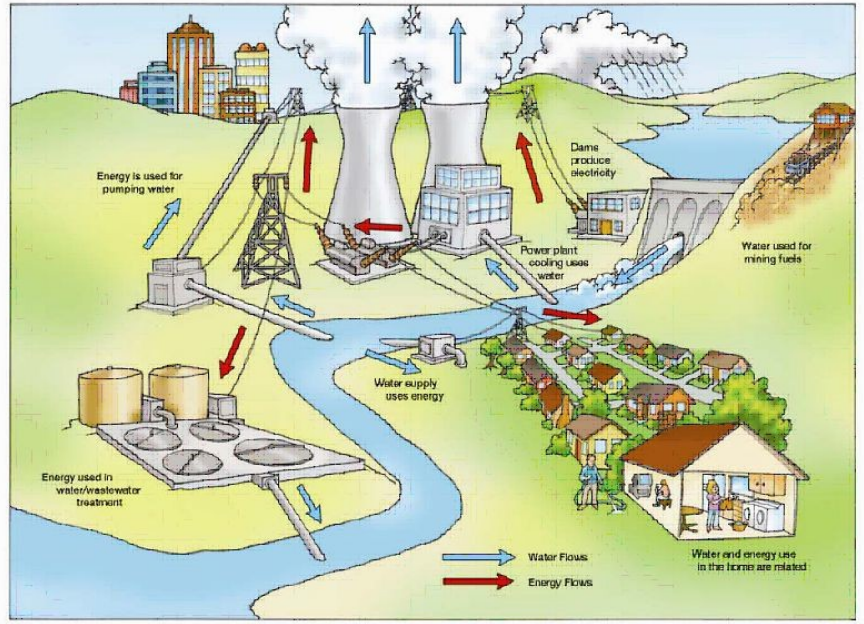
Why Define Requirements?

- Ill-defined requirements and unmanaged requirement changes lead to
  - Disagreement with customers on requirements and product acceptance
  - Unrealistic estimates and commitments to customers
  - Schedule slippage
  - Cost overruns
  - Uncertainty regarding project closure
  - Team burnout
  - Unhappy customers

- It is critical to involve the customers and stakeholders early in the requirements definition process

SOURCES OF REQUIREMENTS

- Stakeholders
- Business Processes
- Organizational Policies and Procedures
  - Organization Standards
  - Protocols
  - Technical Standards
- Existing Automated Systems
  - User Manuals
  - Data Samples
  - Interface Descriptions
  - Sample Reports
  - Sample Screens

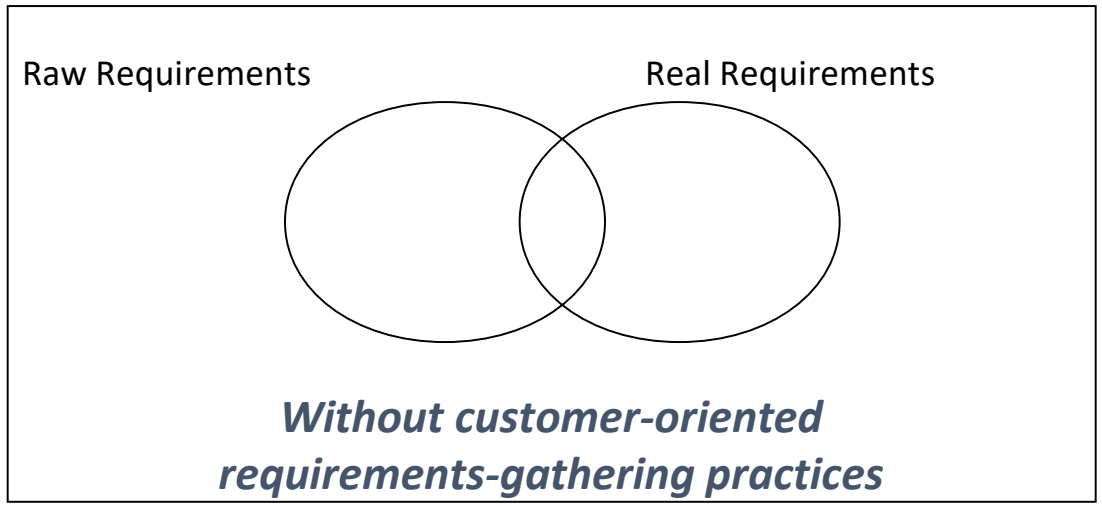


Stakeholders

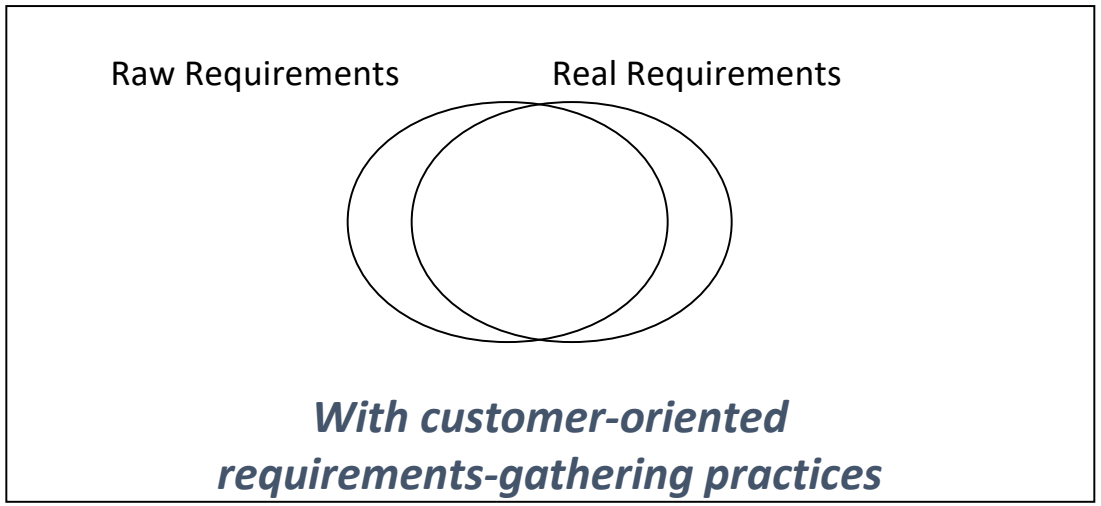
- Stakeholders include anyone with an interest in the system, for example
  - Sponsors
  - Customers
  - System Users/Domain Experts
  - Project Team
- Identify stakeholders by asking questions
  - Who will use the product?
  - Who will provide the inputs?
  - Who will get the outputs?
  - Who has an oversight role?
  - Who has a related role?
  - Who will be rewarded?
  - Who will be penalized?

Stakeholders

- Involving stakeholders in individual or group requirements sessions to define system details
  - Results in a high quality system from the customer/user point of view
  - Results in higher end-user satisfaction
  - Helps to educate customer/user about system through their participation



Without customer-oriented requirements-gathering practices



With customer-oriented requirements-gathering practices

Stakeholders

- Benefits of stakeholder involvement include
  - Improved system information content
  - Improved system information quality
  - Improved system productivity
  - Improved customer/user understanding of the system
  - Creation of customer/user consensus
  - Creation of customer/user commitment to system success
  - Determination of early scoping decisions
  - Increased confidence that consensus will be reached
  - Improved quality of requirements
  - Development of an integrated team

Business Processes

- Analysis of the existing business processes facilitates identification of business problems and potential improvements
  - Identify and list problems with the current business process
  - Consider problems (missing, not working, needed)
  - Consider opportunities for improvement
  - Consider improvement activities
    - Improvements may involve opportunities for automation (system requirements) and/or changes to the current business process (business process improvements)

Policies and Procedures

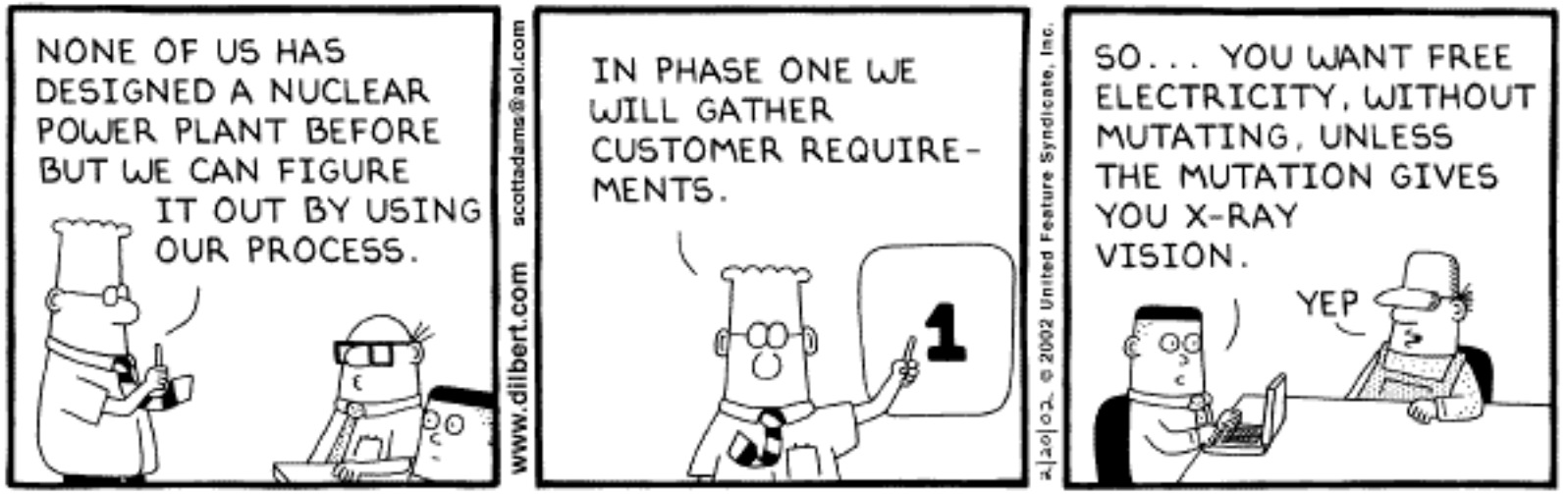
- Policies and procedures define work practices and how things are done in the workplace
- Review and analysis of policies, procedures, protocols and technical standards aid in determining business rules and constraints
  - Business Rule: a statement that defines some aspect of the business process. It is intended to assert structure or to control or influence the behavior of the business processes surrounding the system
  - Constraint: restrictions in the way a system is developed. Constraints can be economic, political, technical, or environmental and pertain to project resources, schedule, target environment, or to the system itself
- Organizational documentation may also explicitly define requirements for process automation, including workflow, relationships, and interactions

Existing Automated Systems

- Analysis of existing automated systems provides insight into data that might be used by the new system
  - Data objects
  - Data relationships
  - Database structure and architecture
  - System reports

Elicitation

- The Art of *Listening* to Stakeholders
- The Art of *Sending Appropriate Stimuli* to Stakeholders So That the Responses are Worth Listening To
- The Art of *Establishing an Environment* in Which Stakeholders Are Willing and Able to Describe Their Problems and Needs



What Is "Just Enough" Requirements Management?

- What is "just enough" life insurance?
  - Enough so you sleep well at night knowing that others will be "taken care of" if you die
  - Not so much that you stay awake at night worrying about the money you are paying for insurance
- What is "just enough" RM?
  - Enough so you can keep your customers happy
  - Not so much that your project becomes late or over-budget

- Too much
  - You would spend so much time understanding the problem that no time would be left to solve it
- Too little
  - You would build system before understanding problem, and would likely build the wrong system

Secrets of "Just Enough" Elicitation

- Don't ignore elicitation
- Recognize that 1 stakeholder cannot speak for all
- Care
- Who's smart?
- Maintain glossary of terms
- Use appropriate elicitation techniques
- Prepare for change
- Prepare for triage
- Select appropriate notations

Expanded on Next Few Slides

x

Who's Smart?

- Don't Try to Convince Stakeholders that *You* Are Smart – Wrong Place to Do That!
- Instead Take Every Opportunity to Show You Think the Stakeholder is Smart
- Contrast These Two Cases

My Elevators Are Too Slow!

I See. Tell Me Why You Feel They Are Too Slow.

I Don't Think So. I Think You Have an Elevator Throughput Problem, not a Speed Problem

Maintain Glossary

- Ellen Gottesdeiner Has Observed that a Large Percentage of Requirements Miscommunication Is Caused by Word Meanings

- Appoint a Glossary Czar
  - Asks Questions Like: "What Do *You* Mean by *X*?"
  - Records All Agreements Concerning Definitions

Use Appropriate Elicitation Techniques

- One elicitation technique is not “good enough”
- Function of people involved
- Function of requirements not yet understood
- Function of application domain

Question:

What Elicitation Techniques do you know ?

When do you use them ?

What are their pros and cons?

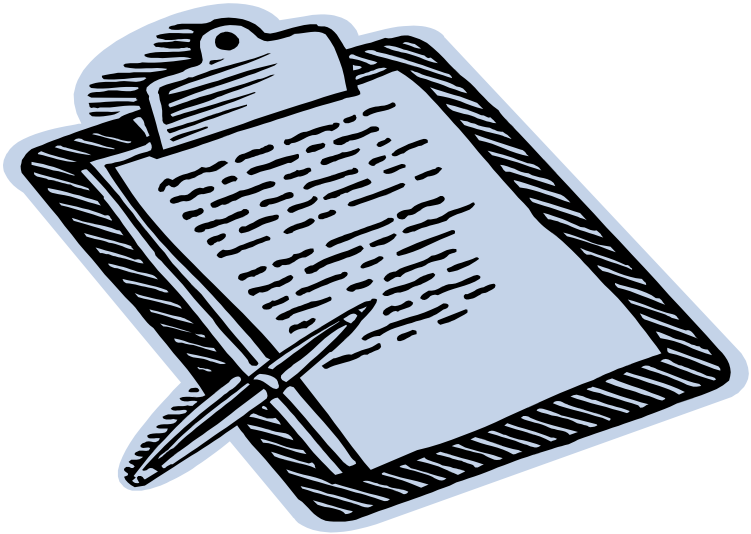
Techniques for Elicitation

- Interviews
  - Same Place, Same Time
  - Few People, Analyst-Driven
- Questionnaires
  - Different Time, Different Place
  - Many People, Analyst-Observer
- Group Sessions
  - Same or Different Place, Same Time
  - <20 People, Analyst-Facilitated
- Observation
  - Same Time, Same Place
  - Analyst-Observer

- Documentation Review
- Brainstorming
- Apprenticing
- Scenario Analysis
- Prototyping/Mock-up
- Modeling
- Workshops

Interviewing

- Purpose
  - Use interviews to clarify and validate stated requirements and elicit unstated and derived requirements
- Guidelines
  - Work with individuals first, then with groups; group dynamics change responses and feedback
  - Talk to the people who actually do the work and the people who are funding the project
  - Two analysts should attend each interview
  - Use a tape recorder, if possible



Use a Questionnaire

- Prepare interview questions in advance
- Ask open-ended questions
- Ask essential questions
  What? Why? When? Who? How? Where?

Interviews

- Asking Questions; Listening to the Answers
- When Do You Interview?
  - Ability to Meet with Them
  - When a "Few" People Each Know a "Lot"
  - When True SME's Exist
  - When the Stakeholders May Not Be Brought Together
  - When the Problem Does Not Require Interaction to Arrive at an Optimal Answer
- Best Source: Gause & Weinberg, *Exploring Requirements*, Dorset House, 1989.

Interviews

- Types
  - Structured - agenda of fairly open questions
  - Open-ended - no pre-set agenda
- Advantages
  - Rich collection of information
    - Good for uncovering opinions, feelings, goals, as well as hard facts
  - Can probe in depth, & adapt follow up questions to what the person tells you
  - Disadvantages
  - Large amount of qualitative data can be hard to analyze
  - Hard to compare different respondents
  - Interviewing is a difficult skill to master
- Watch for
  - Unanswerable questions ("how do you tie your shoelaces?")
  - Tacit knowledge (and post-hoc rationalizations)
  - Removal from context
  - Interviewer's attitude may cause bias (e.g. variable attentiveness)

Interviewing Tips

- Starting off…
  - Begin the interview with an innocuous topic to set people at ease
    - e.g. the weather, the score in last night's hockey game
    - e.g. comment on an object on the person's desk: "My,… what a beautiful photograph! Did you take that?"
- Ask if you can record the interview
  - but put tape recorder in front of person
  - say that they can turn it off any time
- Ask easy questions first
  - perhaps personal information
    - e.g. "How long have you worked in your present position?"

- Follow up interesting leads
  - E.g. watch for things people say that indicate that your plan of action may be wrong,
    - e.g. "Could we pursue what you just said a little further?"
- Ask open-ended questions last
  - e.g. "Is there anything else you would like to add?"

Questionnaires

- Pre-defined Series of Questions
- Widely Used
- Appear Scientific Due to Statistical Analysis
- When Do You Use Questionnaires?
  - Large Base of Individuals
  - Need Answers to Well-Defined Specific Issues
  - To Verify Results of Limited Interviews
  - When You Want a Specific Outcome ☺

- Best Source: Fowler, *Survey Research Methods*, Sage, 1993.

Questionnaires

Advantages

- Can quickly collect info from large numbers of people
- Can be administered remotely
- Can collect attitudes, beliefs, characteristics

Disadvantages

- Simplistic (presupposed) categories provide very little context
  - No room for users to convey their real needs

Questionnaires

Watch for

- Bias in sample selection
- Bias in self-selecting respondents
- Small sample size (lack of statistical significance)
- Open ended questions (very hard to analyze!)
- Leading questions ("have you stopped beating your wife?")
- Appropriation ("What is this a picture of?")
- Ambiguous questions (I.e. not everyone is answering the same question)

Questionnaires MUST be prototyped and tested!

Group Sessions

- Gather (3 to 20) Stakeholders in One Room
- Everybody Shares Ideas Out Loud
- Team Answers Are Usually Better than Individual Answers
- When Conduct Group Session?
  - When Many People Each Knows a (Small) Part of the Whole
  - When Problem Needs Interaction to Optimize Solution
  - When You Can Get Them All Together
  - Anonymity Necessary? Use a Tool
  - Distributed? Use a Tool

Best Source : Gottesdeiner, *Requirements by Collaboration,* Addison-Wesley, 2000.

Tricks for Making Group Sessions More Effective

- Domination by a Few
  - Facilitator Role
  - “Five-Minute Position Statement” Coupon
- Lack of Participation by Some
  - Facilitator Role
  - “Great Idea” Coupon
- Insults
  - “Cheap Shot” Coupon

Group Elicitation Techniques

- Types:
  - Focus Groups
  - Brainstorming
- Advantages
  - More natural interaction between people than formal interview
  - Can gauge reaction to stimulus materials (e.g. mock-ups, storyboards, etc)
- Disadvantages
  - May create unnatural groups (uncomfortable for participants)
  - Danger of Groupthink
  - May only provide superficial responses to technical questions
  - Requires a highly trained facilitator
- Watch for
  - sample bias
  - dominance and submission

Meetings

- Used for summarization and feedback
  - E.g. meet with stakeholders towards the end of each stage
    - to discuss the results of the information gathering stage
    - to conclude on a set of requirements
    - to agree on a design etc.
  - Use the meeting to confirm what has been learned, talk about findings

- Meetings are an important managerial tool
  - Used to move a system development project forward
  - Need to determine objectives for the meeting
  - Plan the meeting carefully

Meetings

Meetings are an important managerial tool

- Need to determine objectives for the meeting
  - E.g. presentation, problem solving, conflict resolution, progress analysis, gathering and merging of facts, training, planning,...
- Plan the meeting carefully
  - Schedule the meeting and arrange for facilities
  - Prepare an agenda and distribute it well in advance
  - The meeting itself may be structured or unstructured depending on objective
  - Keep track of time and agenda during the meeting
  - Follow up with a written summary to be distributed to meeting participants
  - Special rules apply for formal presentations (and how to prepare them), project walkthroughs, brainstorming,...

Observation

- Analyst Observes Stakeholders Performing Their "Usual" Work
- Analyst Should Be As Passive As Possible
  - See Heisenberg Uncertainty Principle: Observation Affects Outcome
  - "Action Research" When Observer Participates
- When to Observe?
  - When There Exists Someone/thing to Observe
  - When Knowledge is (Believed to Be) Tacit
- The Goguen/Jirotka Story

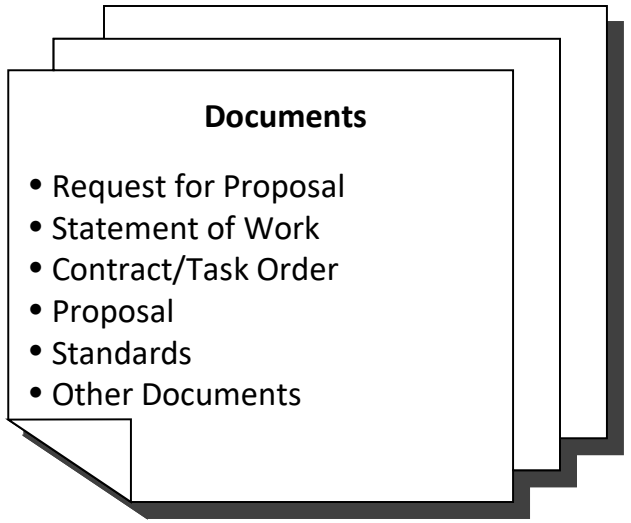
Best Source : Goguen & Jirotka, *Requirements Engineering: Social and Technical Issues*, Academic Press, 1994.

Participant Observation

- Approach
  - longitudinal studies
    - Observer spends time with the subjects, joining in, long enough to become a member of the group
- Advantages
  - Contextualized
  - Reveals details that other methods cannot
- Disadvantages
  - Extremely time consuming!
  - Resulting 'rich picture' is hard to analyze
  - Cannot say much about the results of proposed changes
- Watch for
  - going native!

Documentation Review

- Purpose
  - Understand what needs to be done
  - Use as basis for further study, business process definition, interviews, etc
- Guidelines
  - Determine what is right and wrong with the current business process or products
  - Identify opportunities to reuse existing products or information
  - Extract requirements from many diverse sources into a consolidated requirements list



Brainstorming

- Purpose
  - Use the group effect to generate new ideas for the product/system
  - Useful when there are many unstated or derived requirements
- Guidelines
  - Use in a facilitated workshop
  - All ideas are good; do not evaluate, debate or criticize
  - Do not be bounded by what is possible
  - Attempt to produce lots of ideas, novel ideas
  - Use random words to seed the session
  - Piggyback on others' ideas

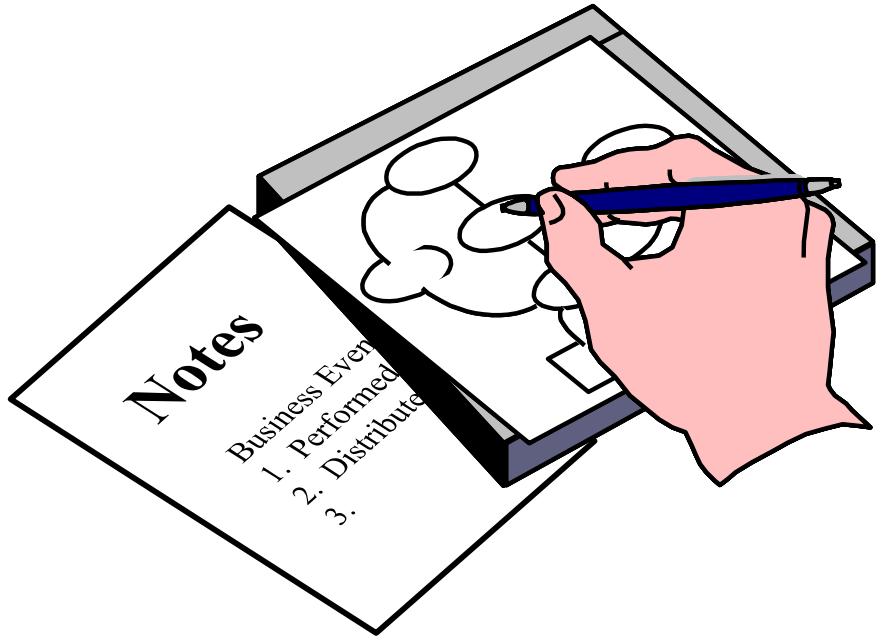
IDEA GENERATION

Broad ideas may yield good requirements or result in requirements creep

Set expectations for participants

Apprenticing

- Purpose
  - Learn the job by observation and asking questions
  - Real-time capture of work
  - Immediate feedback
- Guidelines
  - Users are too busy to take time off for interviews
  - People are not aware of what they do
  - See the same task performed many times
  - Learn the task and repeat while user is watching
  - Establish a relationship with customers/users



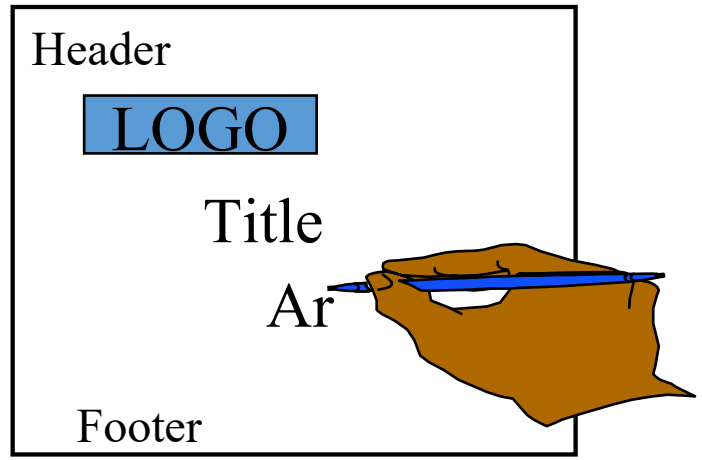
"Nobody can talk better about what they do, and why they do it, than they can while in the middle of doing it."
[Beyer and Holtzblatt]

Scenario Analysis

- Purpose
  - Clearly delineates the series of steps to complete the business event to the customer/user
  - Elicit user-recognizable actions
- Guidelines
  - Identify possible interactions between customer/user and other business events or domains of interest
  - Breakdown the business events into discrete activities or business processes

Prototyping, Mock-Ups, Outlines

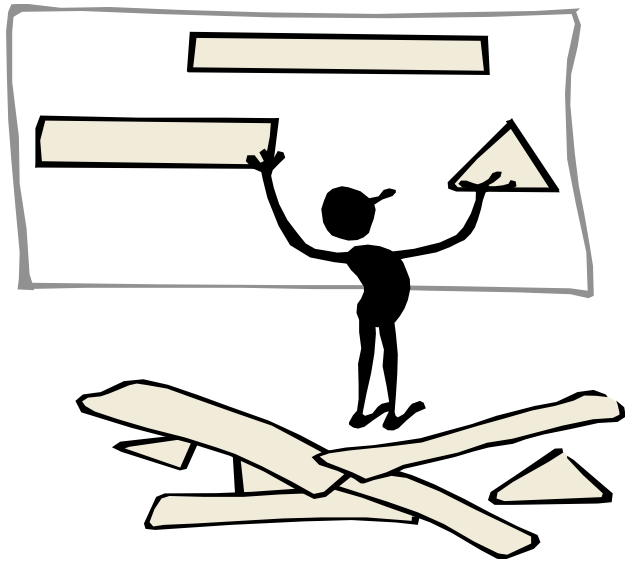
- Purpose
  - Clarify requirements that are ambiguous or uncertain
  - Simplify requirements documentation and acceptance needs
  - Provide early feedback to customer and end user
- Guidelines
  - A useful communication tool
  - Use to validate requirements
  - Use to provide sizing data for cost estimations
  - Use to assess alternative user interfaces
  - Help users visualize essential functionality



A picture says a thousand words!

Modeling

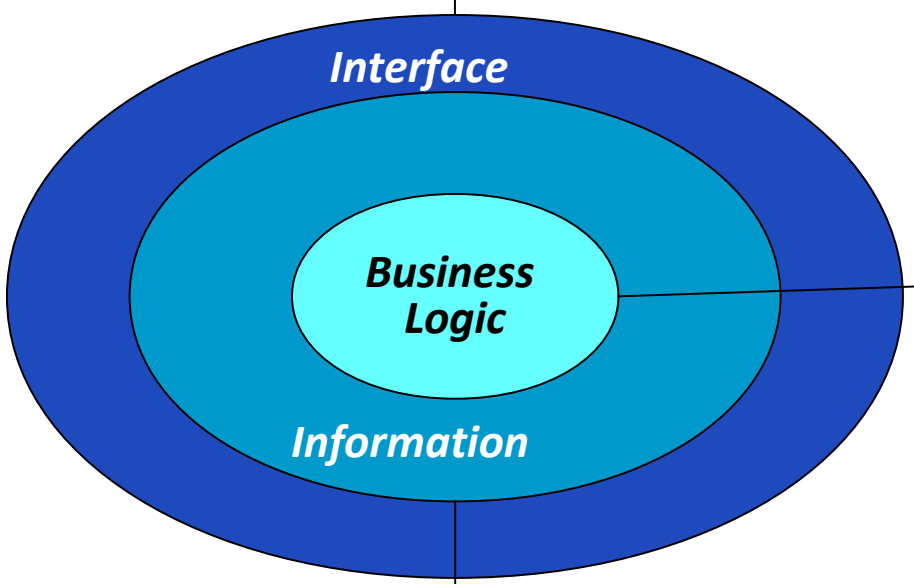
- Purpose
  - Uses pictures to represent reality
  - The analysis creates models of the system-to-be, that is, abstract representations of what will eventually become the system
  - Modeling facilitates the evaluation, extension, and clarification of raw requirements to make them clear, complete, correct and consistent
- Guidelines
  - Model Types
    - Activity
    - Decomposition
    - Data
    - Object Oriented
    - Process
    - Use Case



Workshops

- Purpose
  - Introduce the project team and project stakeholders
  - Gather a comprehensive requirements "wish list" from stakeholders of the project
  - Provides a framework for applying the other elicitation techniques, such as brainstorming, storyboarding, role playing, review of existing requirements
- Guidelines
  - The facilitator leads the session, which includes:
    - Giving everyone an opportunity to speak
    - Keeping the session on track
    - Gathering input for applicable Requirement Attributes
    - Recording the findings
    - Summarizing the session and working out conclusions

Technique Selection



Interface to humans/user interface
Use prototyping, scenarios, modeling

Essential operating activities
Use apprenticing, interviews, scenarios

Policy architecture, stored data
Use interviews, existing systems analysis

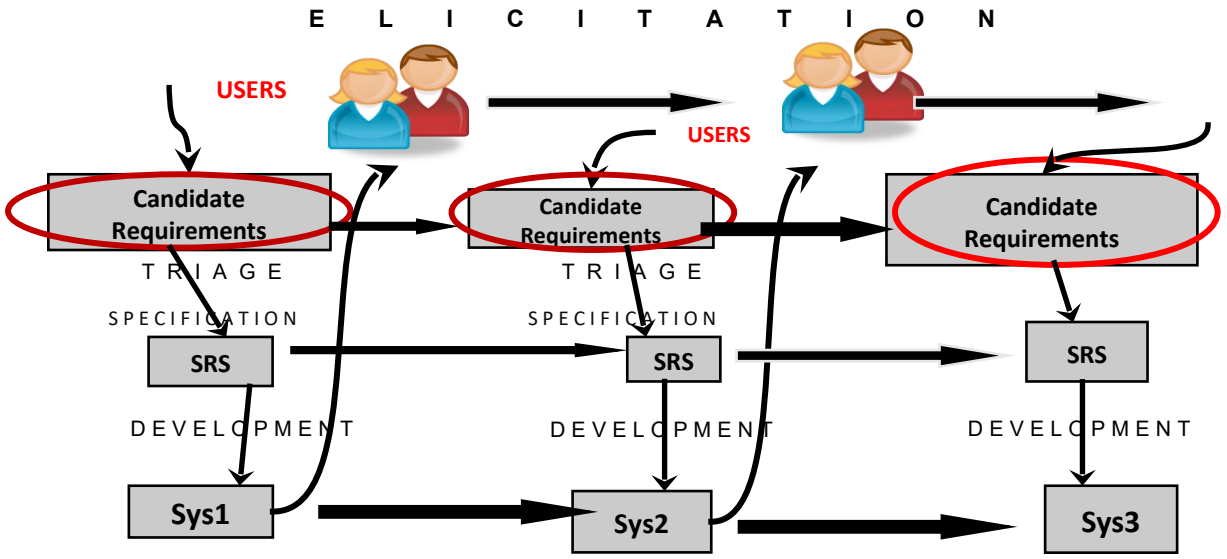
- Rigorous modeling of everything is likely not feasible
- Prototyping everything is likely not feasible
- Match requirements/analysis techniques to needs and situations

Prepare for Change

- This is an “attitude”
- The more stakeholders are involved, the more features they will want
- Don’t solve this “problem” by eliminating stakeholders
- Stakeholders have the right to change their minds
- Don’t Ever Ask: “Ok, Is that Your Final Requirement?”
- See suggested changes as opportunities, not threats

Prepare for Triage/Prioritize

- This is an "attitude"
- Elicitation's purpose is to gather all *candidate* requirements
- Make sure everybody knows that triage will follow in order to select *the* requirements



Summary

- Many experts have a standard technique used for many years (Okay because often invariant domains)
- When faced with new situations or domains, many experts simply alter their standard approach without changing its name
- Almost all concur that collaborative sessions and interviewing are fundamental
- Most experts driven by "create this model" rather than "follow this technique"
- Almost all analysts use models

West Bank Gaza (WBG) Project

- USAID/W is assisting the WBG Mission in design and development of an information system to replace a simple database that is not meeting user needs
  - Scope of work includes definition of process models, documentation of system requirements and development of an enhanced system
  - Activities include TDY trips to the Mission to define and validate requirements
- Reviewed applicable materials and documentation in preparation for TDY
  - Current database and report structure
  - Procedural Discussion Paper
  - Automated Directives System 545, Information Systems Security
  - Applicable WBG Mission Order

  → ***Elicitation Technique?***

  → ***Documentation Review***
- Met with subject matter experts to discuss business process and other pre-TDY findings

  → ***Elicitation Technique?***

  → ***Interviewing***

PROJECT HIGHLIGHT
West Bank Gaza (WBG) Project

- Conducted a TDY to the WBG Mission in April 2006 to define business processes, requirements, and constraints
  - Interviewed system users and stakeholders
    - → ***Elicitation Technique?***
    - → ***Interviewing***
  - Observed the business process and current system in use
    - → ***Elicitation Technique?***
    - → ***Apprenticing, Scenario Analysis***
  - Defined system enhancements, proposed system roles and high level processes/requirements
- Next Steps
  - Document process model and high level functional requirements
    - → ***Elicitation Technique?***
    - → ***Modeling***
  - Document screen designs and workflow
    - → ***Elicitation Technique?***
    - → ***Prototyping, Mock-Ups***

WBG Mission Interview Questions

1. What is your role in the Mission?
2. What specific activities are you responsible for?
   - Who do you interact with?
   - What tools/information do you use?
3. Do you use the current database? If so, in what way?
4. What is good about the current database? What could be improved

CLOSING MESSAGES

- Project success is driven by the clarity of project scope and requirements
- An extra day spent on collecting, analyzing, documenting, and reviewing requirements can save five to ten days in the overall project lifecycle
- Involve all key stakeholders (internal and external) in the requirements process to get buy-in and ensure acceptance of the final product
- Collect as many requirements as possible, but prioritize them to stay within the defined scope of the project
  - Remaining requirements are a starting point for follow-on work

谢谢大家！

THANKS

Assignment: Requirements Elicitation Exercise

- **Planning for requirements elicitation:**
  - **What information needs to be gathered?**
    - **Users**
    - **Business environment and flow**
    - **Functionalities and non-functionalities**
    - **etc.**
  - **Where and from whom would the information be gathered?**
    - **Managers**
    - **Users/customers**
    - **Support and IT people**
    - **etc.**
  - **What techniques would you use ?**
    - **Interviewing**
    - **Prototyping**
    - **Background reading**
    - **Observation of work place**
    - **etc.**

Requirements Elicitation Exercise (cont.)

- **Divide into two teams:**
  - **A requirements gathering team**
  - **A business organization that has a problem**
- **The requirements gathering team will elicit requirements from the other team and produce a "first cut" of the requirements**

  (May include a prototype)
- **Then switch team roles and the other team perform requirements elicitation.**

Requirements Elicitation Exercise (cont.)

- **The two teams will write up their respective experience of this exercise including:**

1. **The initial plan of attack**
2. **A self analysis of the result of performing elicitation**
3. **Discussion of areas that may be improved if given another chance to perform elicitation**
4. **The actual elicited requirements (draft statements that were documented)**

Requirements Elicitation Exercise (cont.)

- **Elicitation team will plan and divide the roles.**

- **Problem team divide roles (stakeholders):**
  - **Management personnel who commissioned the project and has some specific goals in mind such as productivity gain.**
  - **Users of the software**
    - **One person is excited about new and improved tools**
    - **One person is apprehensive of new tools, but is a very experienced and friendly person.**
    - **One person is hostile to anything new and don't really want it.**
  - **IT support personnel who will have to support this tool once it gets into production.**

实验项目一

□□□□□□□□ V2.0

结对编程是敏捷开发方法推荐的一种最佳实践，要求两个开发人员坐在同一台机器前共同完成一个开发任务，以达到优势互补、事半功倍的目的。随着网络应用和即时通讯技术的飞速发展，越来越多的软件开发项目由分布在不同地理位置的虚拟团队来协作完成，远程结对编程也逐渐成为一种常见的工作方式。

本项目要求对一个已有的在线编程协作平台进行分析和完善，该系统支持在线同时编辑代码，对大部分语言具有语法高亮、自动缩进等功能，也可以帮助程序员在不具备本地环境的情况下在线编译运行代码。源文件可以公开，也可以分享给指定程序员用户，可以查看修改记录，支持实时进行聊天和讨论。

http://sase.seforge.org/

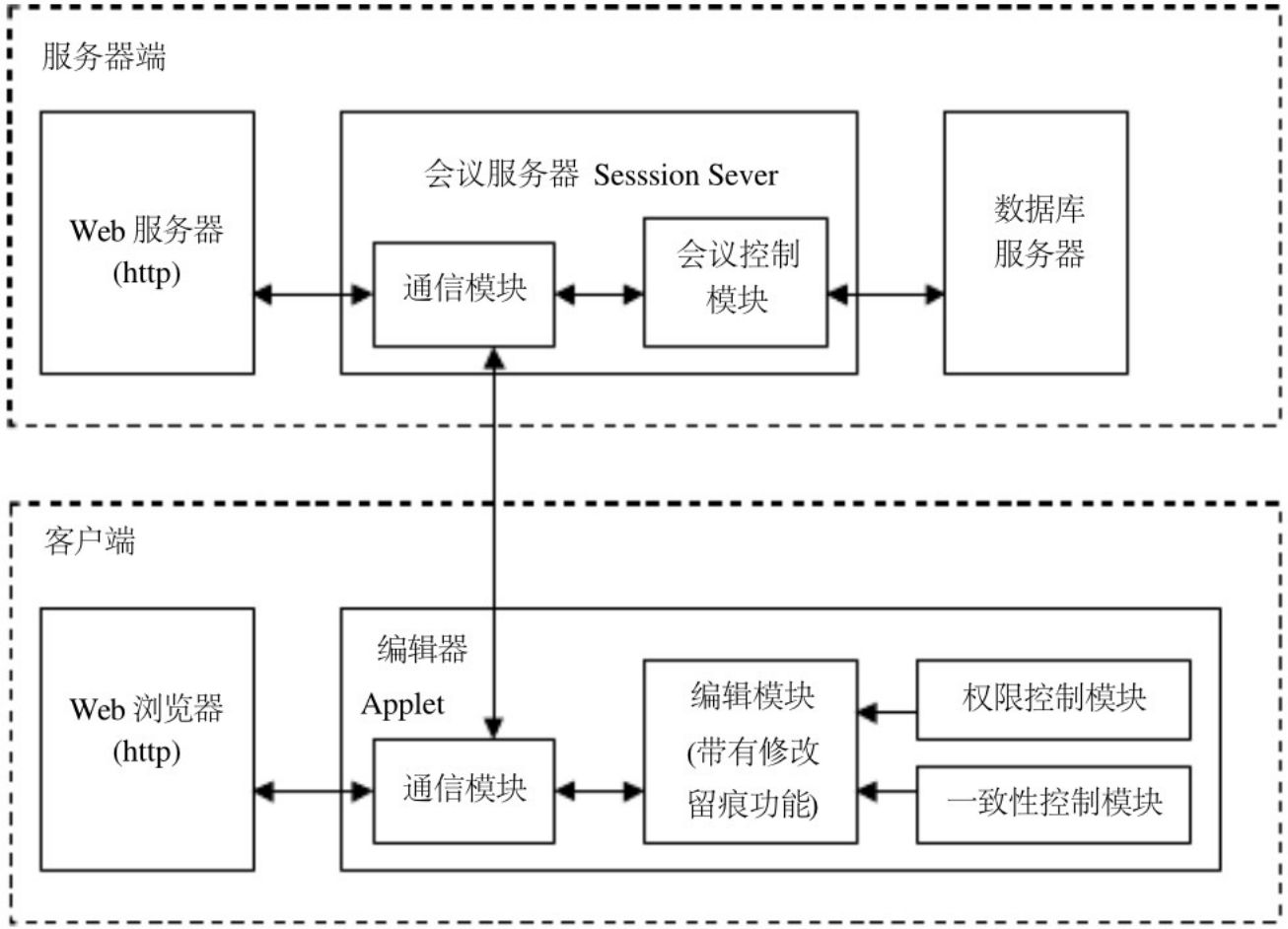


图 1　基于 WEB 的实时协同编辑系统的系统结构图

Requirements Elicitation Exercise (cont.)

- **Exercise 1:**
  - **A medium sized dinner china manufacturing company has been handling a large number of their orders from the web application.**
  - **Some number of orders still come through telephone orders and catalogue mail orders.**
  - **Once the orders come in, there is a set of people who consolidate and sort through the various orders.**
  - **The grouping is fed into a manufacturing planning software system which then feeds into the production system that produces all the china that are ordered.**
  - **However, the ordered china may also be available in the warehouse (past inventory).**
  - **In that case the order should be filled from the warehouse first.**
  - **The company has had continuous problem in deciding when to manufacture and when to take things from the warehouse, causing either a shortage or an excess of different types of china.**
  - **The company management would like to fix this problem and have a software that will allow them to keep the "right" amount in the warehouse and manufacture the "right" amount.**
  - **They asked a software company for help.**

Bone up on order processing and manufacturing business domain

Requirements Elicitation Exercise (cont.)

- **Exercise 2:**
  - **A small hospital has been keeping a manual record and work scheduling of all their employees, both full-time, part-time, regular, and temporary workers.**
  - **From time to time the hospital runs into scheduling problem where needed personnel is not available for various reasons.**
  - **Other times, there are more people than needed. This problem has not been a major impact to the hospital business.**
  - **But recently, the hospital received a grant to double its size and serve more people.**
  - **The scheduling of the hospital personnel needs to be a lot better than before.**
  - **Of special concern is that excess personnel should be minimized to keep the cost down.**
  - **The hospital administrative management decided to invite your company to see if automation and software could help the situation.**

Bone up on scheduling and hospital business domain

Follow-on Analysis and Negotiations

- **Analyze the collected draft requirements statements for**
  - **Clarify**
  - **Consistency**
  - **Completeness**
  - **Prioritization**
  - **Feasibility**
- **Negotiate**
- **Produce the Preliminary Requirements Document**

Dates and Points

- **This will be a team project that is worth 30 points total:**
  - **15 points for elicitation portion**
  - **15 points on analysis, negotiation, and producing the preliminary draft**

- **Elicitation Date is in class (Oct. 12) --- you need to prepare ahead of that**

  (May have a prototype to show other team)

- **Initial Document completion date is (Oct. 23)**
  1. **Initial Requirements document**
  2. **A short discussion (1-2 pages) of "lesson learned – any improvements"**