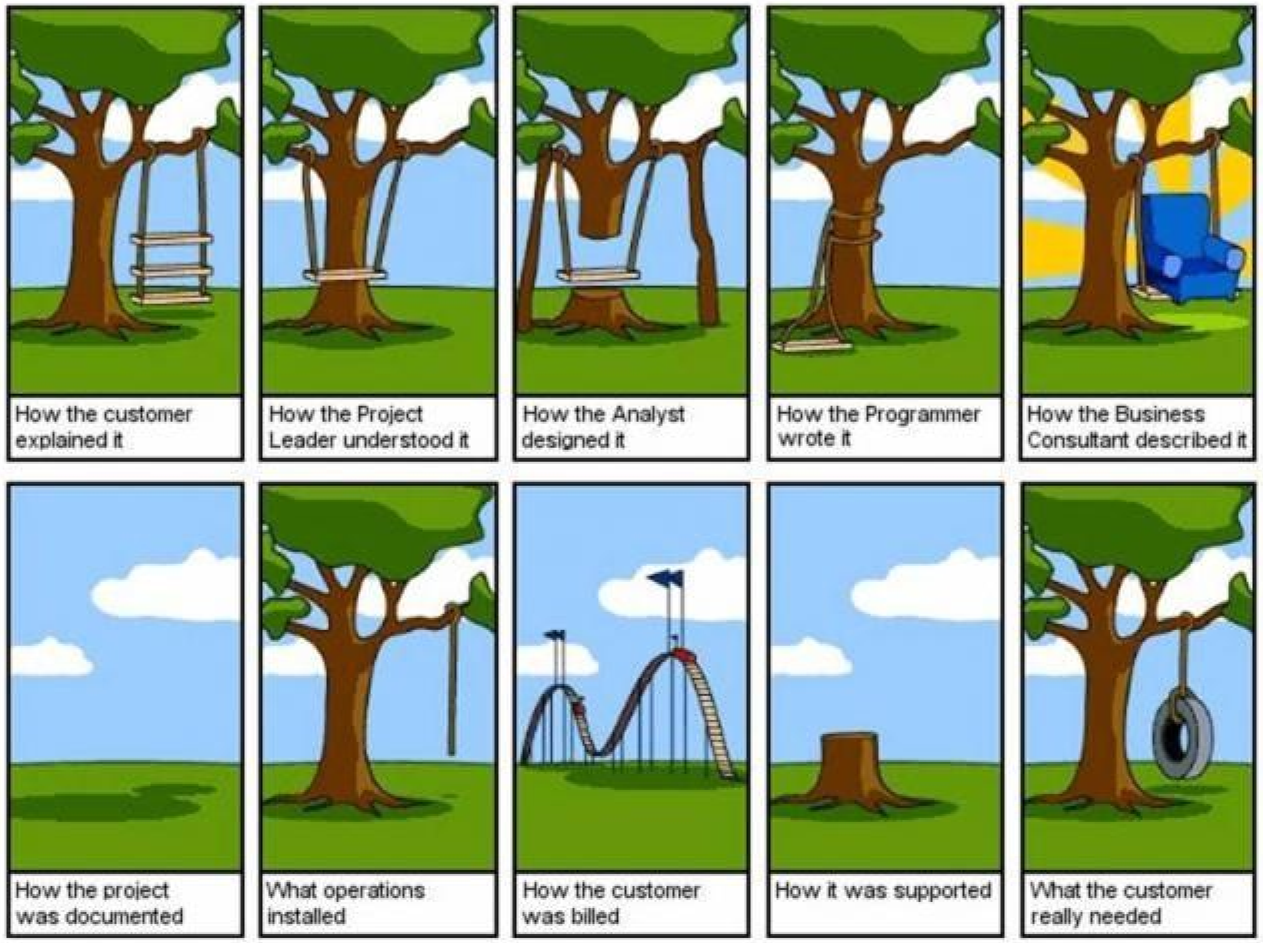
Requirements


How the customer explained it
How the Project Leader understood it
How the Analyst designed it
How the Programmer wrote it
How the Business Consultant described it
How the project was documented
What operations installed
How the customer was billed
How it was supported
What the customer really needed

Lecture outline

- Projects
- What are requirements?
- How can we gather requirements?
- How can we document requirements?
- Use cases

Winter 2011 Projects

Based on the proposals and preferences, 6 project teams have been “funded”

- 82% class got one of their top 2 choices
- 96% class got one of their top 3 choices
- 100% class got a project their were OK with or better

Drumroll please …

- Coupon Stash
- Your Kitchen Manager
- Simple Family Photos
- Recycle Locator
- WikiMap (Wiki)
- WikiMap (Map)

Teams

CouponStash		**WikiMap-Wiki**	
CHENG	MARVIN K	AMOROZO	MICHAEL ANTHONY
DONG	CHONGHUA	CHU	ROBERT M.
KNUTESON	KNUT-SIGURD KROGVIK	DINH	LIEM HOANG
MCCORD	JONATHAN M	HORKIN	DYLAN REED
SHIEH	BRITTANY	KILLEEN	ALANA M
SPROUSE	DANIEL JACOB	KOENIG	KIMBERLY SHAY
THONG	PANHARITH	KWAN	STEVEN
WALL	ALEXANDER P	LIU	GORDON S
Your Kitchen Manager		**WikiMap-Map**	
BOOTH JR	JEFFREY M.	JORDAN	MARK CURTIS
HASHIMOTO	MITCHELL WRIGHT	LENZ	JEREMY JAMES
LENGKONG	GARY HELMI	MCCLURE	ROBERT WILLIAM
MARSHALL	LAURA M	NAKAMURA	AUSTIN OSAMU
PELL	STEVEN M	RUSH	MICHAEL JAMES
RAO	VENKAT PEMMARAJU	TRAN	KHANH QUOC
REGAN	CHARLES THOMAS	VAN DOREN	THOMAS
WIDJAJA	KEVIN		
Simple Family Photos		**Recycle Locator**	
ARMSTRONG	NATHAN	ABRAMSON	DUSTIN ISAAC
CLARK	TIMOTHY DANIEL	DANG	MAI THANH
COHEN	DAVID VH	FALCONE	MICHAEL
JIANG	SHUAI	HARE	ERIC R
NA	JAYSON JINYONG	HUANG	CHANEL YIH SHYUAN
PAI	ITA	JOHNSON	JILLYN RENAE
SUCIU	CORNELIU SAMUEL	JONES	JARED EARL

Notes

- We honored all reciprocal friends.
- The project belongs to the whole team.
  All members are created equal.
- The teams and the individuals must ensure everyone contributes.
- Wiki and Maps teams will likely diverge in their projects.

Questions about project IP

- The group will own its work's intellectual property

- There are consequences of using 3rd party software. Read the license.

- If you think you may want to commercialize your project, our advice is to consult early with a legal source. Two resources on campus are:
  - CSE commercialization committee (Ed Lazowska)
  - UW Center for Commercialization http://depts.washington.edu/uwc4c

Time to get rolling

- System Requirements Specification
  - Assignment will be up by Tuesday on the Calendar.
  - Due Friday January 21st by 11pm
  - Warning: there may be a late breaking requirement added sometime in the project lifecycle

- In parallel
  - Be thinking about your team organization
  - Be thinking about your architecture
  - Be getting your tools ready
    - Source code repository
    - Languages, frameworks, databases
    - Shared calendar, project management, milestones
  - Talk with the TA's about your resource needs (they can set up project space for you)

Before 12:20 today

1. Identify and meet your group
2. Assign one person to set up an email list for your group
3. Assign another to create/manage a calendar where you all can post your availability
4. Assign another to start work on your wiki (send us a link so we can add it to the class Projects page)
5. Determine your next meeting time/place

Lecture outline

- Projects

➔ What are requirements?

- How can we gather requirements?
- How can we document requirements?
- Use cases

Software requirements

- **requirements**: specify what to build
  - "what" and not "how“
  - the system design, not the software design
  - the problem, not the (detailed) solution

“what vs. how”: it’s relative

- “One person’s what is another person’s how.”
  - “One person’s constant is another person’s variable.” [Perlis]

What	How
Parsing	Stack
Stack	Array or Linked List
Linked List	Doubly Linked List

Why requirements?

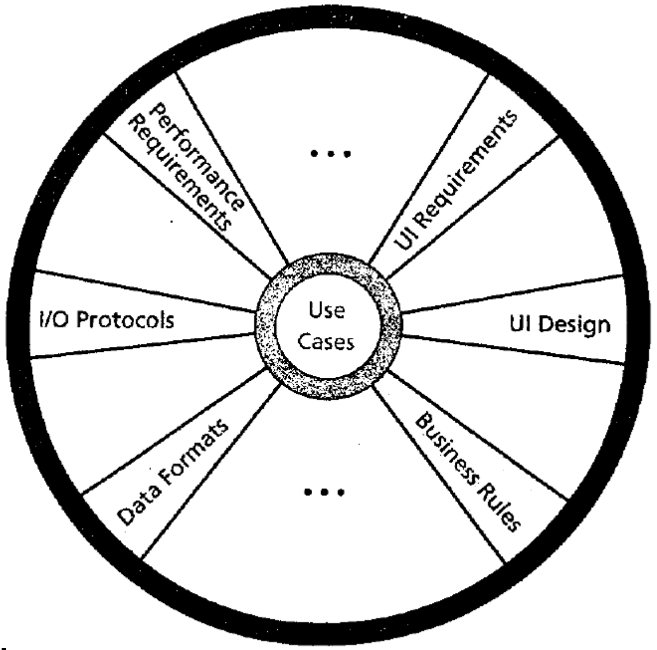
- Some goals of doing requirements:
  - understand precisely what is required of the software
  - communicate this understanding precisely to all development parties
  - control production to ensure that system meets specs (including changes)

- Roles of requirements
  - customers: show what should be delivered; contractual base
  - managers: a scheduling / progress indicator
  - designers: provide a spec to design
  - coders: list a range of acceptable implementations / output
  - QA / testers: a basis for testing, validation, verification

Cockburn's requirements list

Requirements Outline: A template of all functional requirements

1. purpose and scope
2. terms / glossary
3. **use cases**
4. technology used
5. other
   - 5a. development process - participants, values (fast-good-cheap), visibility, competition, dependencies
   - 5b. business rules / constraints
   - 5c. performance demands
   - 5d. security (now a hot topic), documentation
   - 5e. usability
   - 5f. portability
   - 5g. unresolved / deferred
6. human issues: legal, political, organizational, training

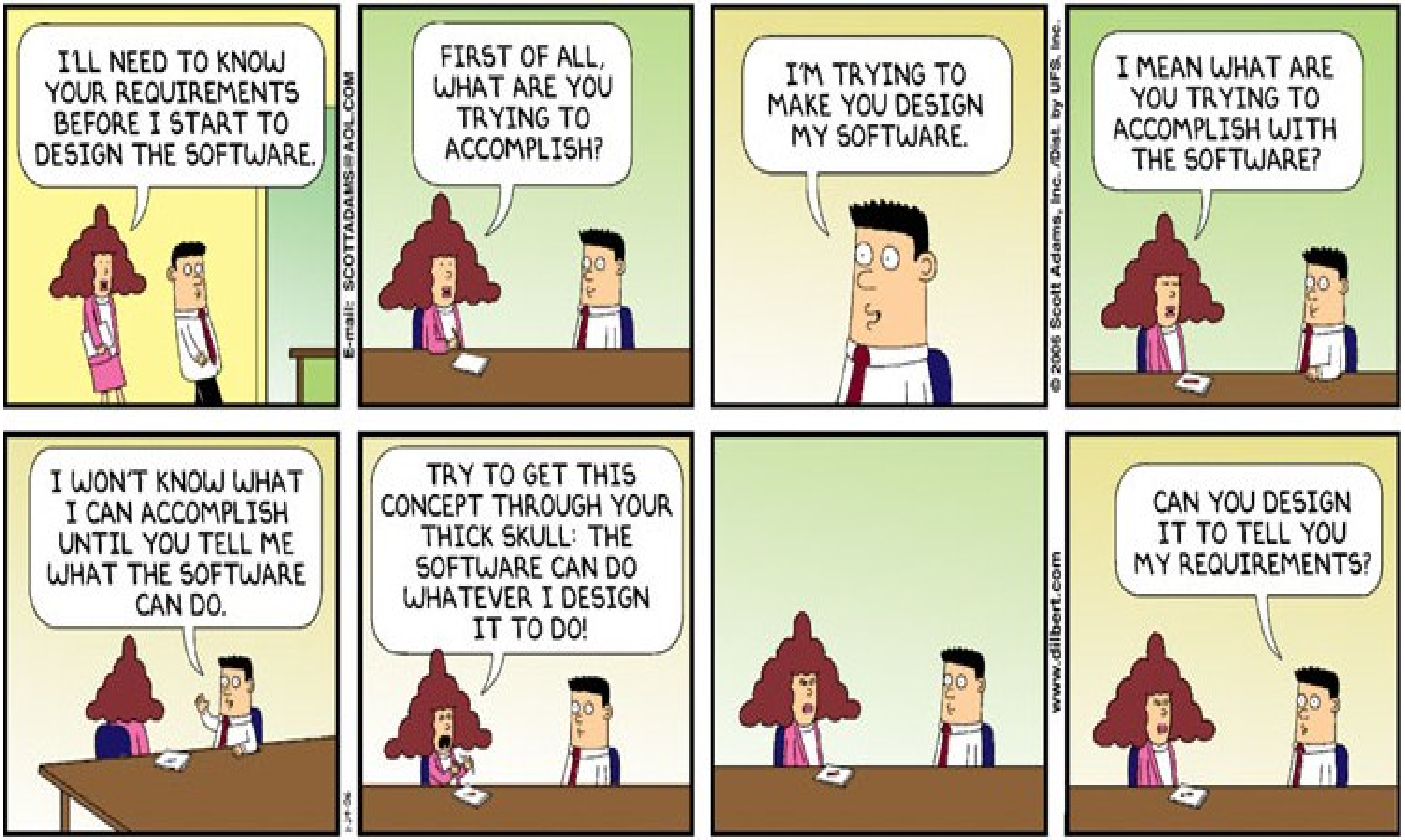


How do we gather requirements?

Let's start with two facts:

- Standish group survey of over 8000 projects, the number one reason that projects succeed is user involvement
- Easy access to end users is one of three critical success factors in rapid-development projects (McConnell)

Typical situation


I'LL NEED TO KNOW YOUR REQUIREMENTS BEFORE I START TO DESIGN THE SOFTWARE.
FIRST OF ALL, WHAT ARE YOU TRYING TO ACCOMPLISH?
I'M TRYING TO MAKE YOU DESIGN MY SOFTWARE.
I MEAN WHAT ARE YOU TRYING TO ACCOMPLISH WITH THE SOFTWARE?
I WON'T KNOW WHAT I CAN ACCOMPLISH UNTIL YOU TELL ME WHAT THE SOFTWARE CAN DO.
TRY TO GET THIS CONCEPT THROUGH YOUR THICK SKULL: THE SOFTWARE CAN DO WHATEVER I DESIGN IT TO DO!
CAN YOU DESIGN IT TO TELL YOU MY REQUIREMENTS?
E-mail: SCOTTADAMS@AOL.COM
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www.dilbert.com

How do we specify requirements?

- Prototype
- Use cases
- List of features
- Paper (UI) prototype

- System Requirements Specification Document

A good use case

- starts with a request from an actor to the system
- ends with the production of all answers to the request
- defines the interactions (between system and actors) related to the function
- from the actor's point of view, not the system's
- focuses on interaction, not internal system activities
- doesn't describe the GUI in detail
- has 3-9 steps in the main success scenario
- is easy to read
- summary fits on a page

Use cases

A use case characterizes a way of using a system. It represents a dialog between a user and the system, from the user's point of view.

Example:
Jane has a meeting at 10AM; when Jim tries to schedule another meeting for her at 10AM, he is notified about the conflict

Use case terminology

Actor: someone who interacts with the system

Primary actor: person who initiates the action

Goal: desired outcome of the primary actor

Level: top or implementation

What are some possible actors?

Do use cases capture these?

Which of these requirements should be represented directly in a use case?

1. Order cost = order item costs × 1.06 (tax)
2. Promotions may not run longer than 6 months.
3. Customers only become Preferred after 1 year
4. A customer has one and only one sales contact
5. Response time is less than 2 seconds
6. Uptime requirement is 99.8%
7. Number of simultaneous users will be 200 max

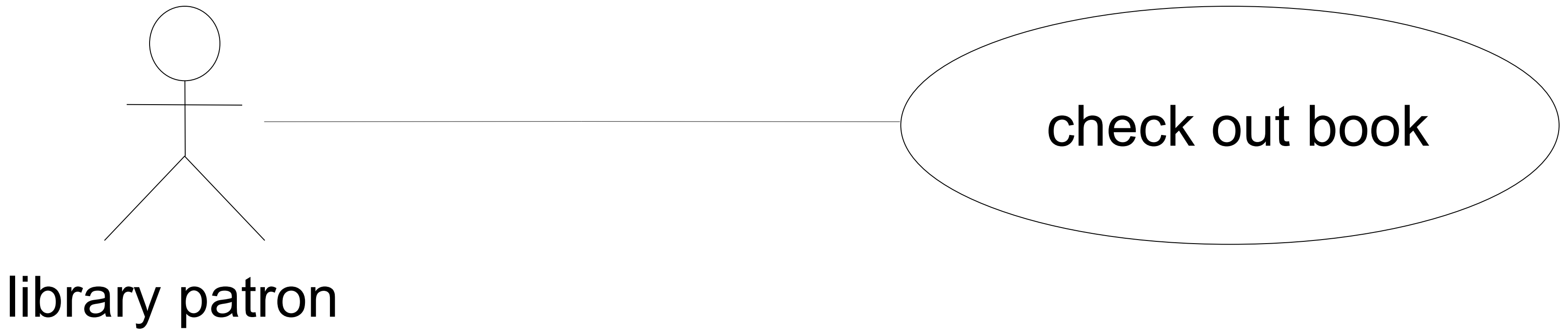
Three ways to write down use cases

- Diagrams
  - unified modeling language (UML)
- Informal language
- Formal specification

Use case summary diagrams

The overall list of your system's use cases can be drawn as high-level diagrams, with:

- actors as stick-men, with their names (nouns)
- use cases as ellipses with their names (verbs)
- line associations, connecting an actor to a use case in which that actor participates
- use cases can be connected to other cases that they use / rely on

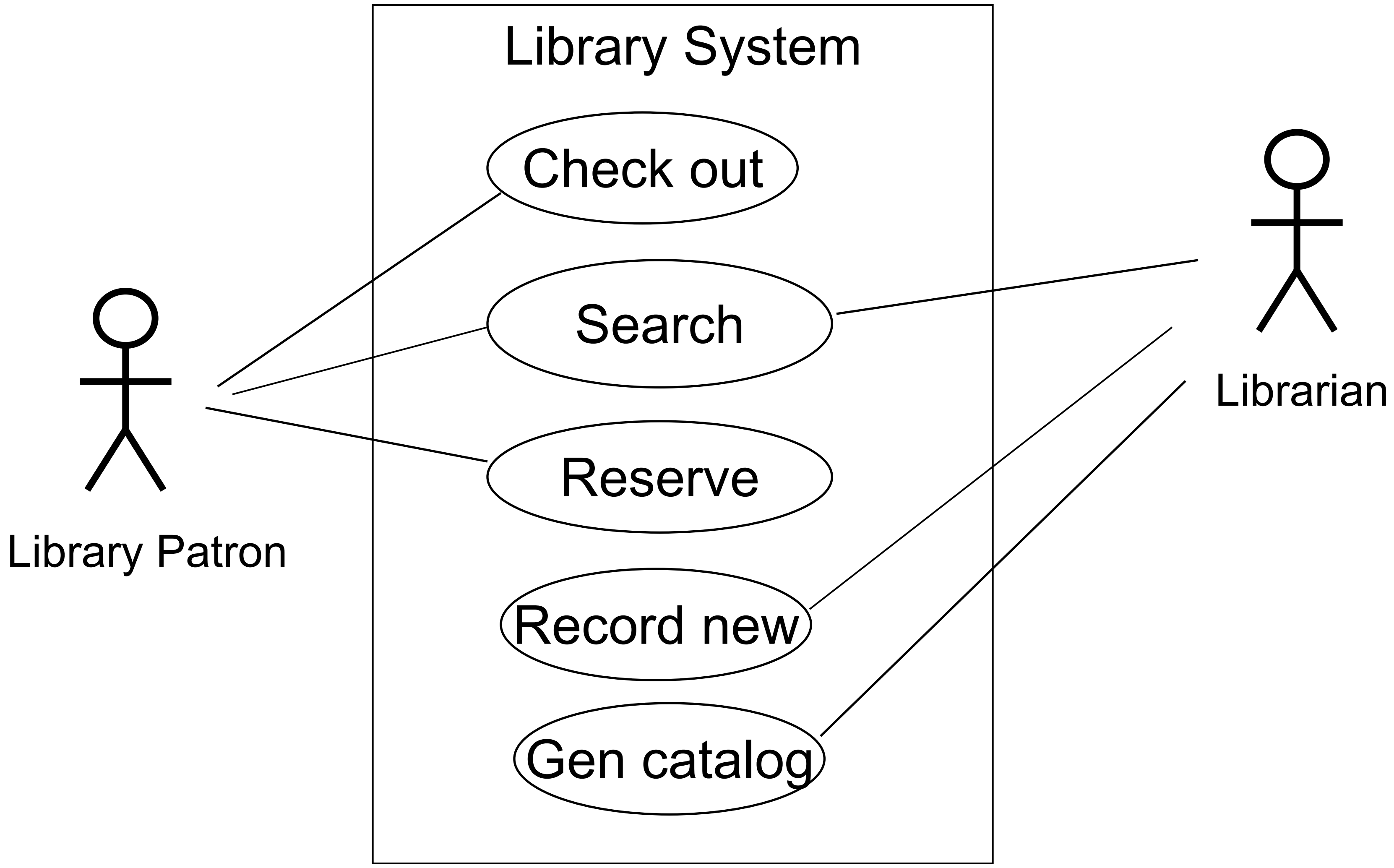


Use case summary diagrams

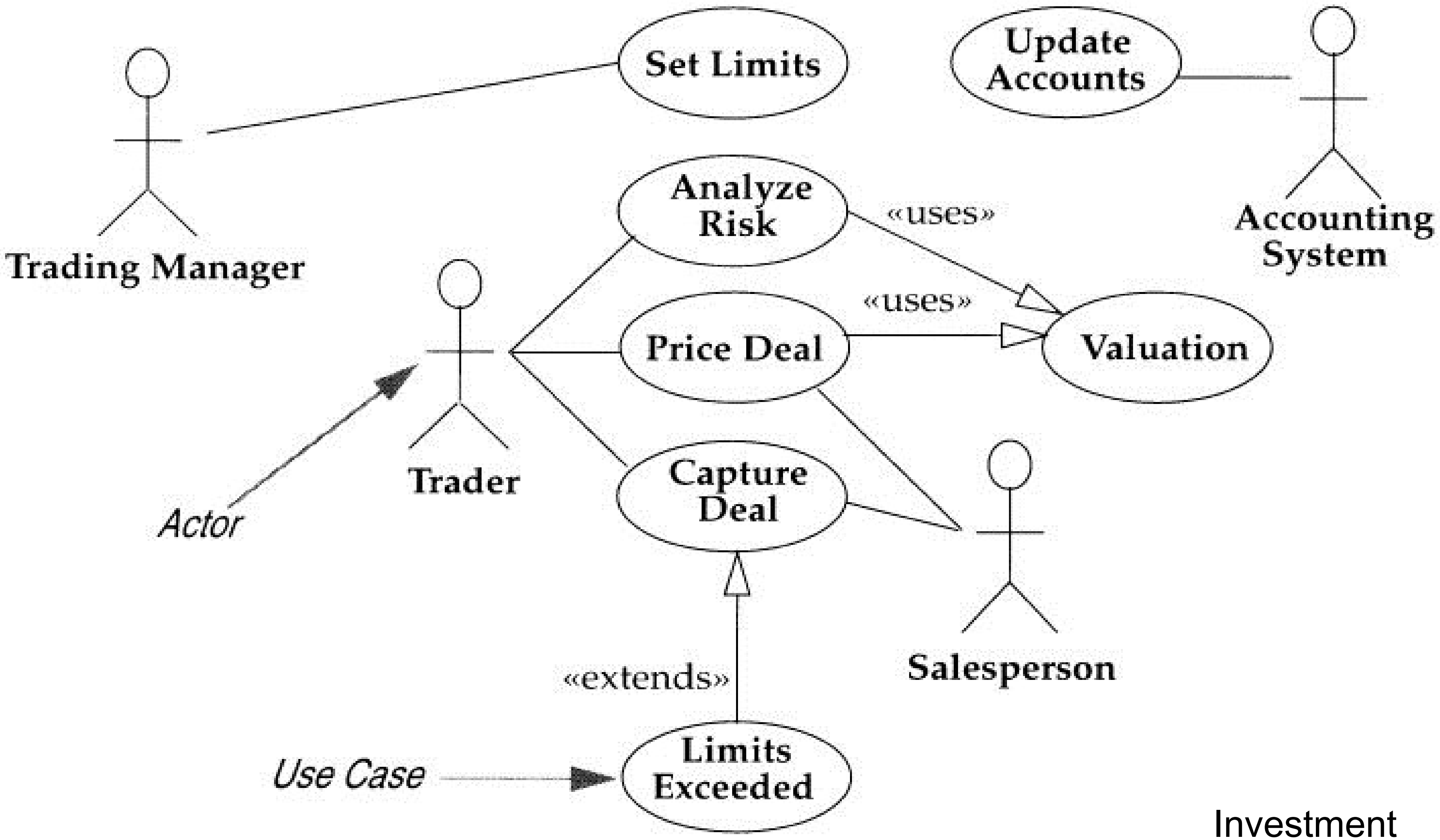
It can be useful to create a list or table of primary actors and their "goals"

Actor	Goal
Library Patron	Search for a book
	Check out a book
	Return a book
Librarian	Search for a book
	Check availability
	Request a book from another library

Use case summary diagram 1



Use case summary diagram 2



Investment System

Informal use case

Informal use case is written as a paragraph describing the scenario/interaction

- Example:
  - <u>Patron Loses a Book</u>
    The library patron reports to the librarian that she has lost a book. The librarian prints out the library record and asks patron to speak with the head librarian, who will arrange for the patron to pay a fee. The system will be updated to reflect lost book, and patron's record is updated as well. The head librarian may authorize purchase of a replacement tape.

Structured natural language

- I
  - I.A
    - I.A.ii
      - I.A.ii.3
        - » I.A.ii.3.q

Although not ideal, it is almost always better than unstructured natural language

Formal use case

Goal	**Patron wishes to reserve a book using the online catalog**
Primary actor	**Patron**
Scope	**Library system**
Level	**User**
Precondition	**Patron is at the login screen**
Success end condition	**Book is reserved**
Failure end condition	**Book is not reserved**
Trigger	**Patron logs into system**

Main Success Scenario	1. Patron enters account and password 2. System verifies and logs patron in 3. System presents catalog with search screen 4. Patron enters book title 5. System finds match and presents location choices to patron 6. Patron selects location and reserves book 7. System confirms reservation and re-presents catalog
Extensions (error scenarios)	2a. Password is incorrect 2a.1 System returns patron to login screen 2a.2 Patron backs out or tries again 5a. System cannot find book 5a.1 …
Variations (alternative scenarios)	4. Patron enters author or subject

Steps to creating a use case

- Identify actors and their goals
- Write the success scenario
  - identify happy path
- List the failure extensions
  - almost every step can fail
- List the variations
  - forks in the scenario

Jacobson example: recycling

The course of events starts when the customer presses the "Start-Button" on the customer panel. The panel's built-in sensors are thereby activated.

The customer can now return deposit items via the customer panel. The sensors inform the system that an object has been inserted, they also measure the deposit item and return the result to the system.

The system uses the measurement result to determine the type of deposit item: can, bottle or crate.

The day total for the received deposit item type is incremented as is the number of returned deposit items of the current type that this customer has returned…

Another example: buy a product

http://ontolog.cim3.net/cgi-bin/wiki.pl?UseCasesSimpleTextExample

1. Customer browses through catalog and selects items to buy
2. Customer goes to check out
3. Customer fills in shipping information
4. System presents full pricing information, including shipping
5. Customer fills in credit card information
6. System authorizes purchase
7. System confirms sale immediately
8. System sends confirming email to customer

- Alternative: **Authorization Failure**
  - At step 6, system fails to authorize credit purchase
  - Allow customer to re-enter credit card information and re-try
- Alternative: **Regular Customer**
  - 3a. System displays current shipping information, pricing information, and last four digits of credit card information
  - 3b. Customer may accept or override these defaults
  - Return to primary scenario at step 6

Pulling it all together

How much is enough?

You have to find a balance.

comprehensible vs. detailed
graphics vs. explicit wording and tables
short and timely vs. complete and late

Your balance may differ with each customer
depending on your relationship and flexibility