Recall The Team Skills

1. Analyzing the Problem (with 5 steps)
2. Understanding User and Stakeholder Needs
3. Defining the System
4. Managing Scope
5. **Refining the System Definition**
    1. Software Requirements: a more rigorous look
    2. Refining the Use cases
    3. Developing the Supplementary Specification
    4. On Ambiguity and Specificity
    5. Technical Methods for Specifying Requirements
6. Building the Right System

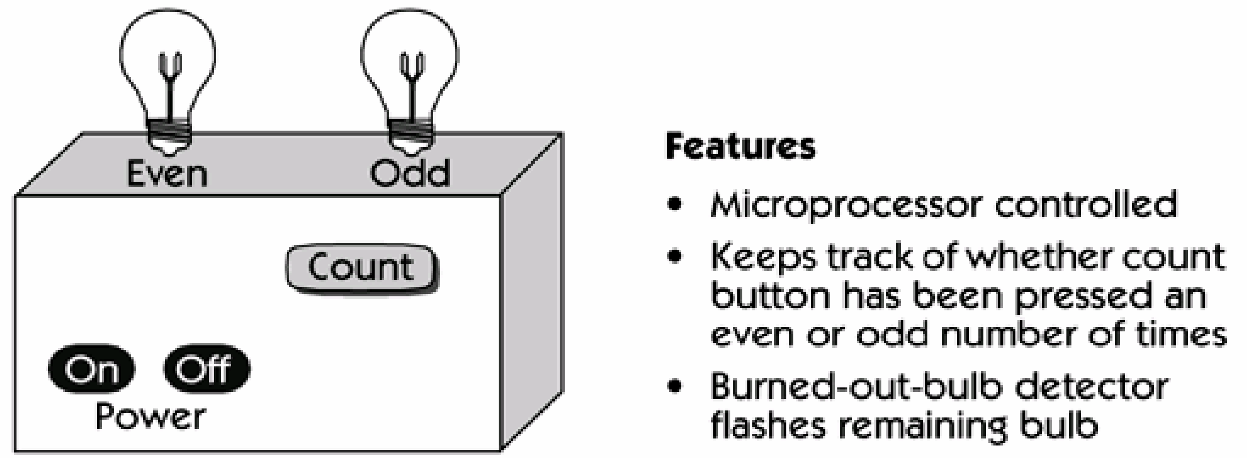
Chapter 23
On Ambiguity and Specificity

- Ambiguity vs. specificity
- Light Box Exercise
- Disambiguation techniques

Introduction

- One of the most difficult challenges we face in the requirements process is making the requirements detailed enough to be well understood without
  - over-constraining the system
  - and predefining things that may be better left to others downstream in the process.
- To what level of specificity must we state the requirements in order to avoid misunderstanding?
- It depends on the context of your application and on how well those doing the implementation can make the right decisions or at least ask questions when there is ambiguity.

Light Box Exercise



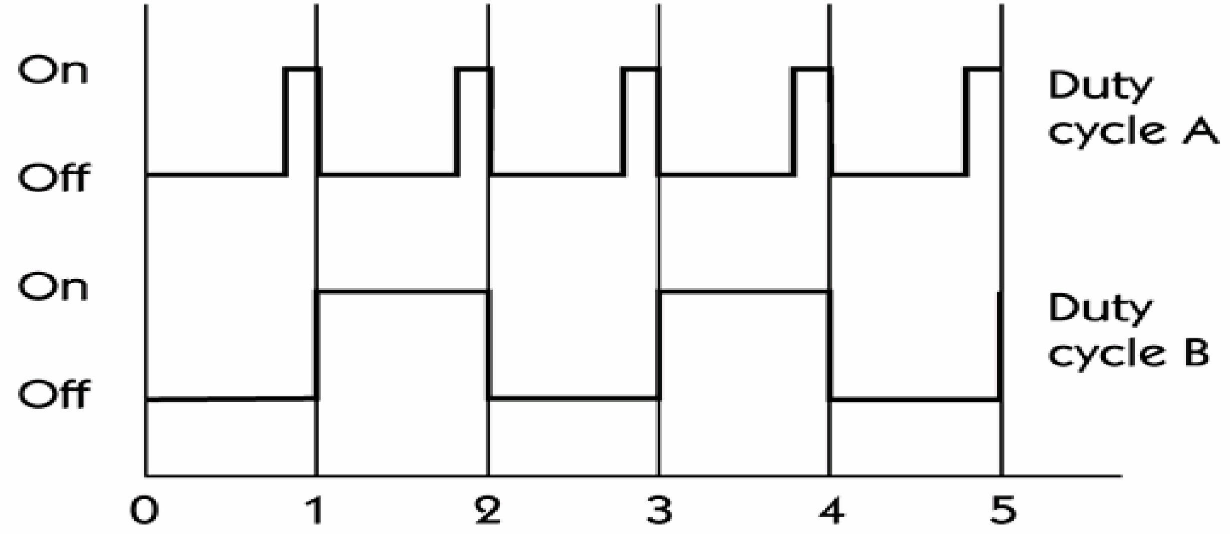
Features

- Microprocessor controlled
- Keeps track of whether count button has been pressed an even or odd number of times
- Burned-out-bulb detector flashes remaining bulb

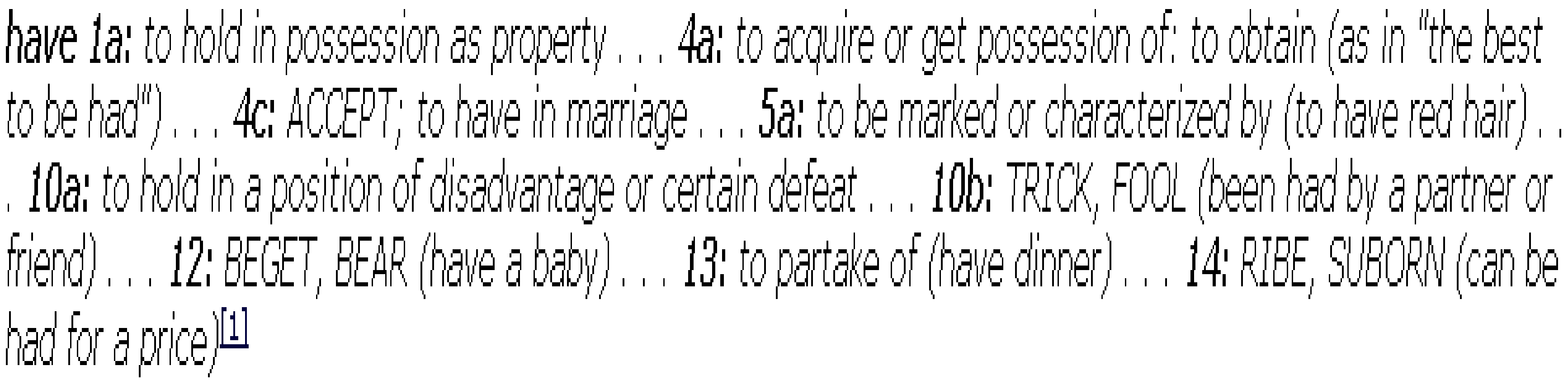
- After On pushed but before Off pushed, system is termed "powered on."
- After Off pushed but before On pushed, system is termed "powered off," and no lights shall be lit.
- Since most recent On press, if Count has been pressed an odd number of times, Odd light shall be lit.
- Since most recent On press, if Count has been pressed an even number of times, Even light shall be lit.
- If either light burns out, the other light shall flash every 1 second.

Light Box Exercise - Ambiguity

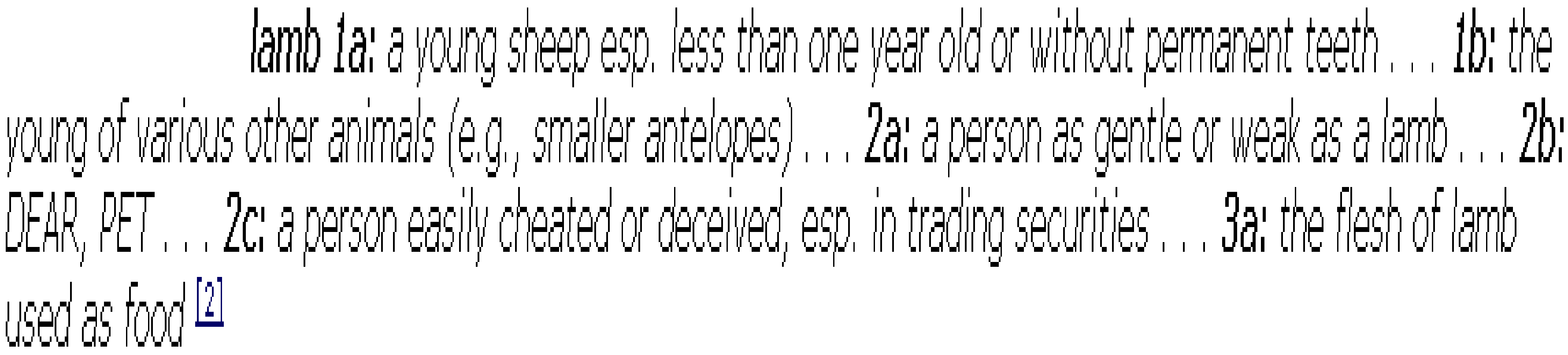
- A programmer who has the task of writing a program to simulate this behaviour will discover at least one ambiguity in this exercise almost immediately:
  - What does it mean to flash the bulb every 1 second?
- Possible lamp duty cycles:



Another example of Ambiguity: “Mary Had a Little Lamb” Example

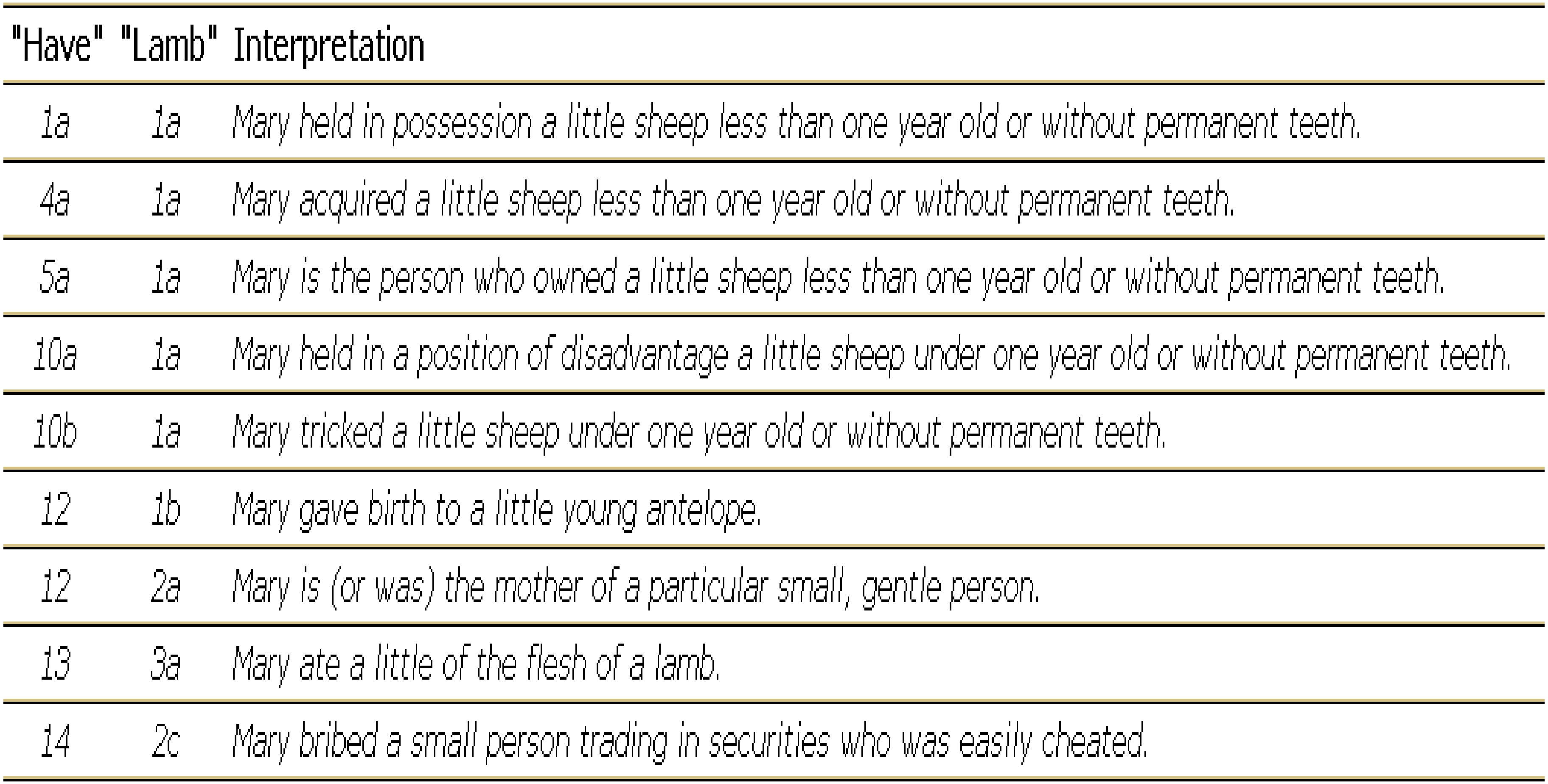


have 1a: to hold in possession as property . . . **4a:** to acquire or get possession of: to obtain (as in "the best to be had") . . . **4c:** ACCEPT; to have in marriage . . . **5a:** to be marked or characterized by (to have red hair) . . . **10a:** to hold in a position of disadvantage or certain defeat . . . **10b:** TRICK, FOOL (been had by a partner or friend) . . . **12:** BEGET, BEAR (have a baby) . . . **13:** to partake of (have dinner) . . . **14:** RIBE, SUBORN (can be had for a price)[1]



lamb 1a: a young sheep esp. less than one year old or without permanent teeth . . . **1b:** the young of various other animals (e.g., smaller antelopes) . . . **2a:** a person as gentle or weak as a lamb . . . **2b:** DEAR, PET . . . **2c:** a person easily cheated or deceived, esp. in trading securities . . . **3a:** the flesh of lamb used as food [2]

Ambiguity: “Mary Had a Little Lamb” Example



"Have"	"Lamb"	Interpretation
1a	1a	Mary held in possession a little sheep less than one year old or without permanent teeth.
4a	1a	Mary acquired a little sheep less than one year old or without permanent teeth.
5a	1a	Mary is the person who owned a little sheep less than one year old or without permanent teeth.
10a	1a	Mary held in a position of disadvantage a little sheep under one year old or without permanent teeth.
10b	1a	Mary tricked a little sheep under one year old or without permanent teeth.
12	1b	Mary gave birth to a little young antelope.
12	2a	Mary is (or was) the mother of a particular small, gentle person.
13	3a	Mary ate a little of the flesh of a lamb.
14	2c	Mary bribed a small person trading in securities who was easily cheated.

Techniques for Disambiguation

1. Memorization heuristic.
   - Ask several individuals, both from the development group and from the user/stakeholder group, to try recalling, from memory the customer's real requirement.
   - Parts that are not clear and cannot be easily remembered are likely to be the most ambiguous. Focus on them and try to restate them with more clarity so they can be remembered.
2. Keyword technique.
   - Identify the key operational words in a statement and to list all their definitions, using an authoritative source that the various members of the project environment will accept.
   - Then mix and match the definitions to determine different interpretations, as with “Mary had a little lamb” example.

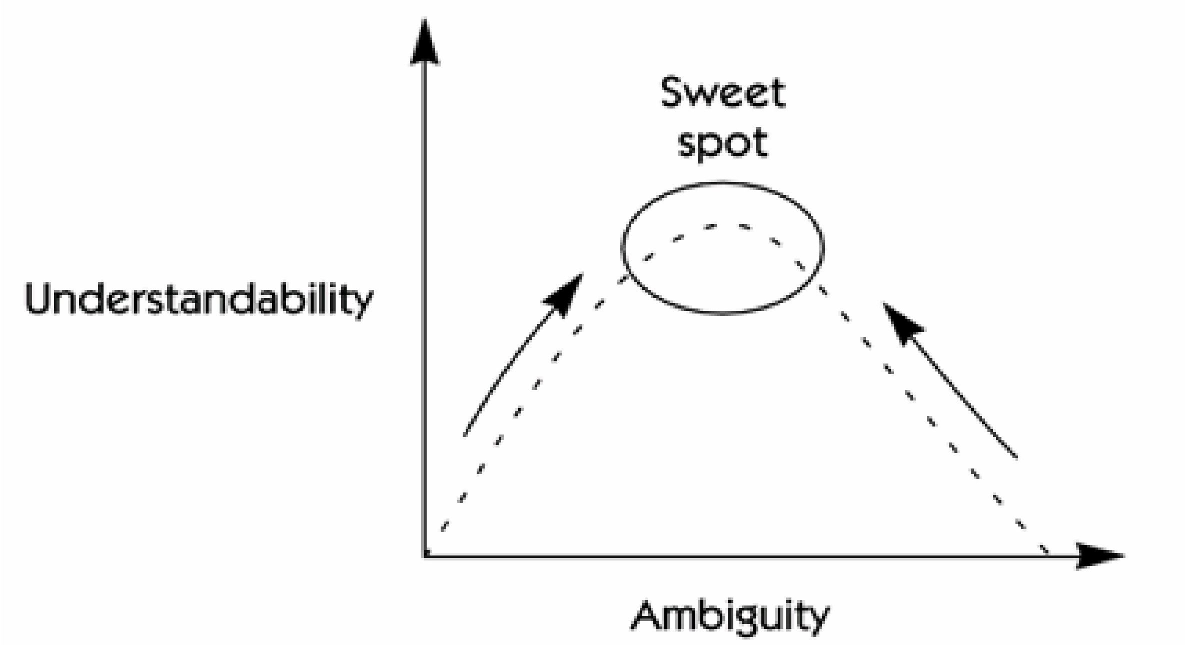
Techniques for Disambiguation

3. Emphasis technique: Read the requirement aloud and emphasize individual words until as many different interpretations as possible have been discovered. Example:
   - *Mary* - if this is the case, perhaps the user is telling us that it was Mary's lamb, not Richard's or anyone else's.
   - *had* - perhaps she no longer has it. Perhaps it's the tense of the statement that's significant.
   - *a* - thus, the key point may be that Mary had only one lamb, not an entire flock.
   - *little* - indeed, it was one of the littlest lambs you ever saw.
   - *lamb* - the emphasis here reminds us that Mary didn't have a pig, a cow, or even a grown-up sheep. Nevertheless, we might still be misled into thinking she had a baby antelope.

Techniques for Disambiguation

- Other techniques. If appropriate, try using pictures, graphics, or formal methods to flush out the ambiguity and eliminate it.

Ambiguity versus Understandability



- The goal is to find the sweet spot: The balance point where the investment in requirements provides "just the right amount of specificity" and leaves "just the right amount of ambiguity" for others to resolve further downstream.

Key Points

- The requirements "sweet spot" is the balance point of the greatest amount of understandability and the least amount of ambiguity.
- A learned skill, finding the sweet spot will depend on the team members' abilities, the application context, and the level of certainty you must provide so that your system works as intended.
- If the risk of misunderstanding is unacceptable, more formal requirements techniques may need to be applied.