Recall The Team Skills

1. Analyzing the Problem
2. Understanding User and Stakeholder Needs
3. Defining the System
4. Managing Scope
5. Refining the System Definition
6. **Building the Right System**
   - From Use Cases to Implementation
   - From Use Cases to Test Cases
   - **Tracing Requirements**
   - Managing Change
   - Assessing Requirements Quality

Chapter 27
Tracing Requirements

- Role of traceability
- Definition
- Traceability model
- Traceability matrix

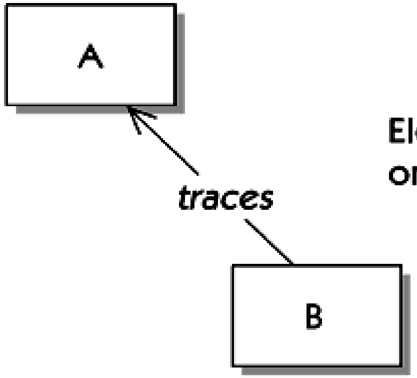
The Role of Traceability in Systems Development

- Definition of traceability:
  - "The degree to which a relationship can be established between two or more products of the development process, especially products having a predecessor-successor or master-subordinate relationship to one another; for example, the degree to which the requirements and design of a given software component match." (IEEE 610.12-1990)

- Experience has shown that the ability to trace requirements artifacts through the stages of specification, architecture, design, implementation, and testing is a significant factor in assuring a quality software implementation.

The Traceability Relationship

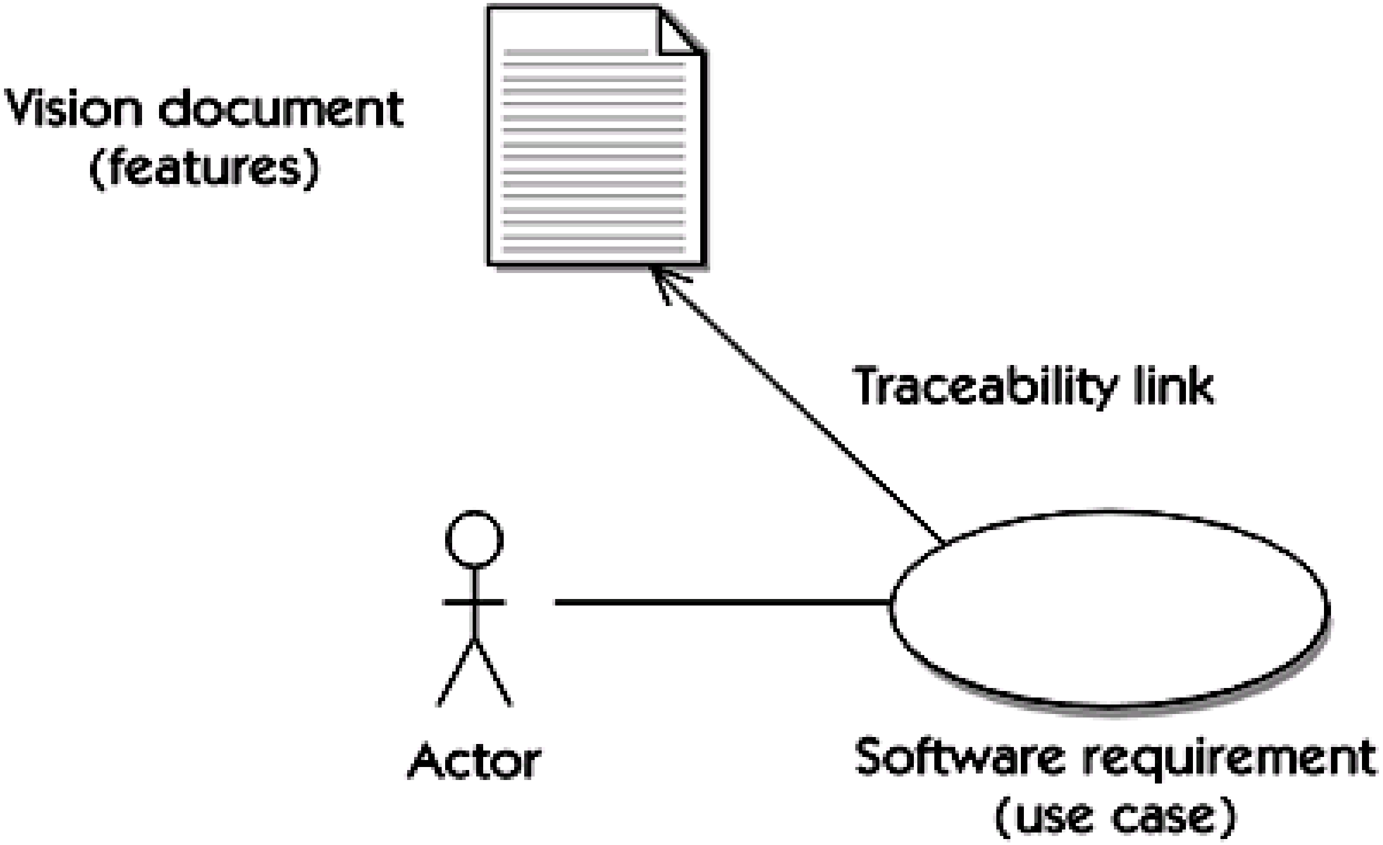
- A traceability relationship is a relationship between two project elements.
- A traceability relationship is a type of dependency relationship between elements.



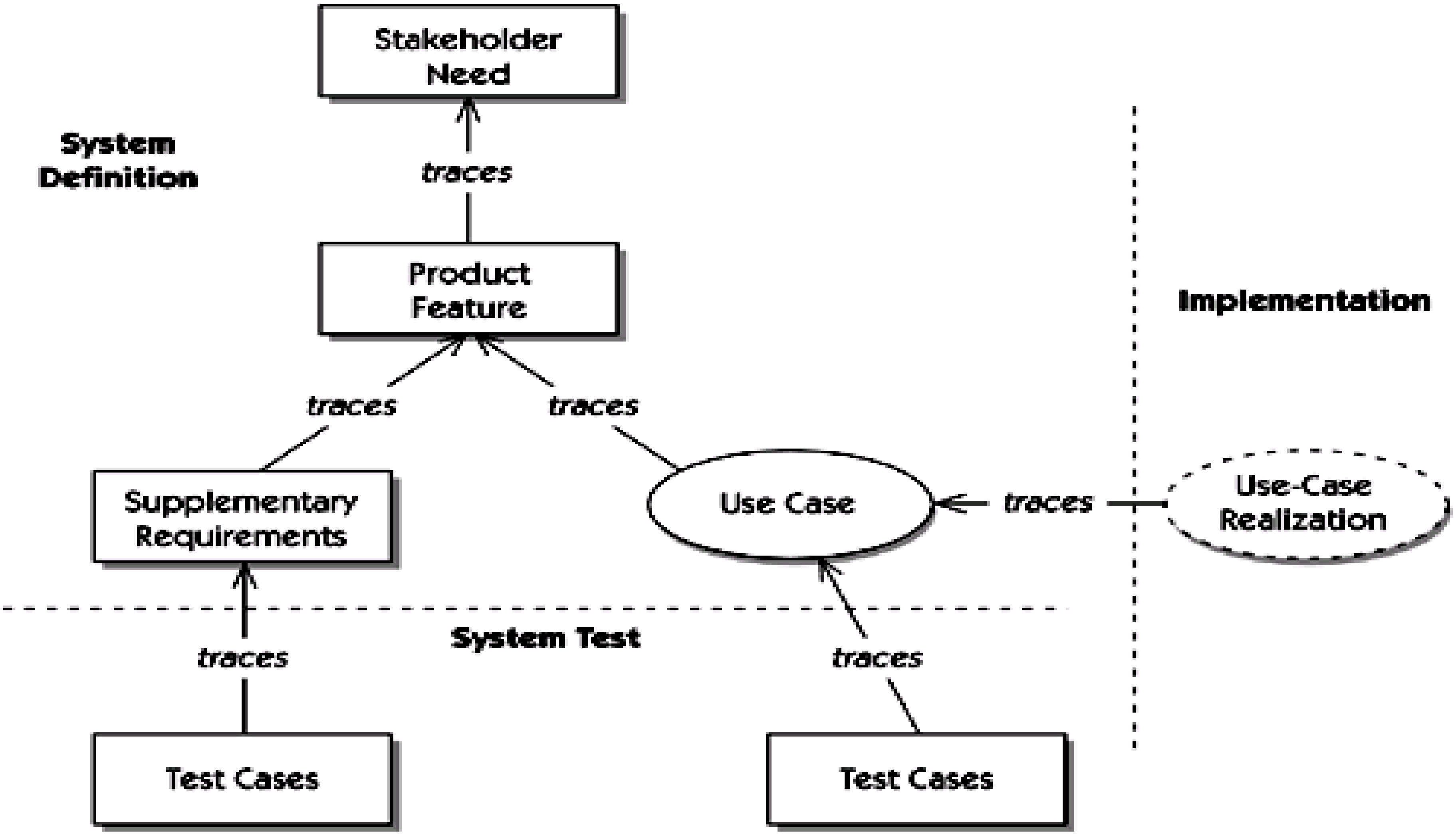
Element B is in some way dependent on element A

- A dependency relationship states that a change in one element (A) may affect another element (B), but the reverse is not necessarily true.

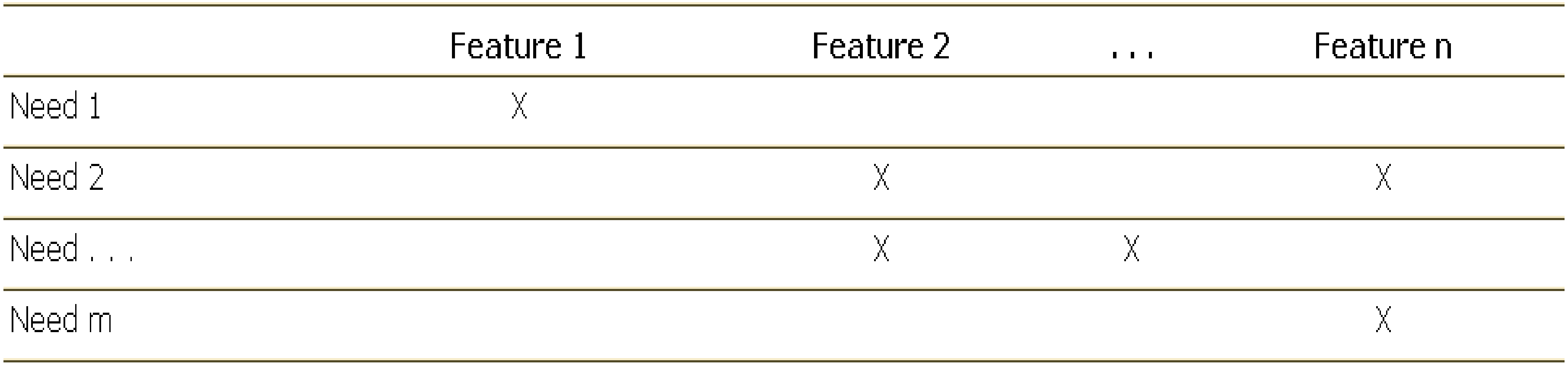
Traceability Link from Vision Document to Software Requirement



A Generalized Traceability Model



Traceability Matrix:
User Needs versus Features



	Feature 1	Feature 2	. . .	Feature n
Need 1	X			
Need 2		X		X
Need . . .		X	X	
Need m				X

Traceability Matrix: User Needs versus Features

- after you've established all known need–feature relationships, you should once again examine the traceability matrix for potential indications of error.
- If inspection of a row fails to detect any Xs, a possibility exists that no feature is yet defined to respond to a user need.
- If inspection of a column fails to detect any Xs, a possibility exists that a feature has been included for which there is no defined product need.

Using Traceability Tools

- Offer a simple user-guided procedure to "point and click" through the explicit relationships that may exist between two elements of the lifecycle.
- Allow building large matrices required for more sophisticated projects and to examine the data automatically for many of the types of potential red flags.
- Provide support for some of the implicit forms of traceability (e.g. use case to use-case realization), and provide navigational mechanisms and other methods to help assure that the implementation is correct as the application evolves.

Proceeding without Traceability Tools

- Many of the matrix relationships could be easily handled with a spreadsheet.
- The problem with spreadsheets, however, is maintenance, especially in extensive hierarchies of relationships.
- The other alternative is to use a database.

Key Points

- Requirements traceability is a proven technique that can increase the quality and reliability of software.
- Traceability is mandated in certain high-assurance software development environments.
- Traceability extends from user needs to product features to use cases and supplementary requirements, and from there to implementation and testing.
- The value and cost of traceability varies with project context and available tooling.