SENG321: Requirements Engineering

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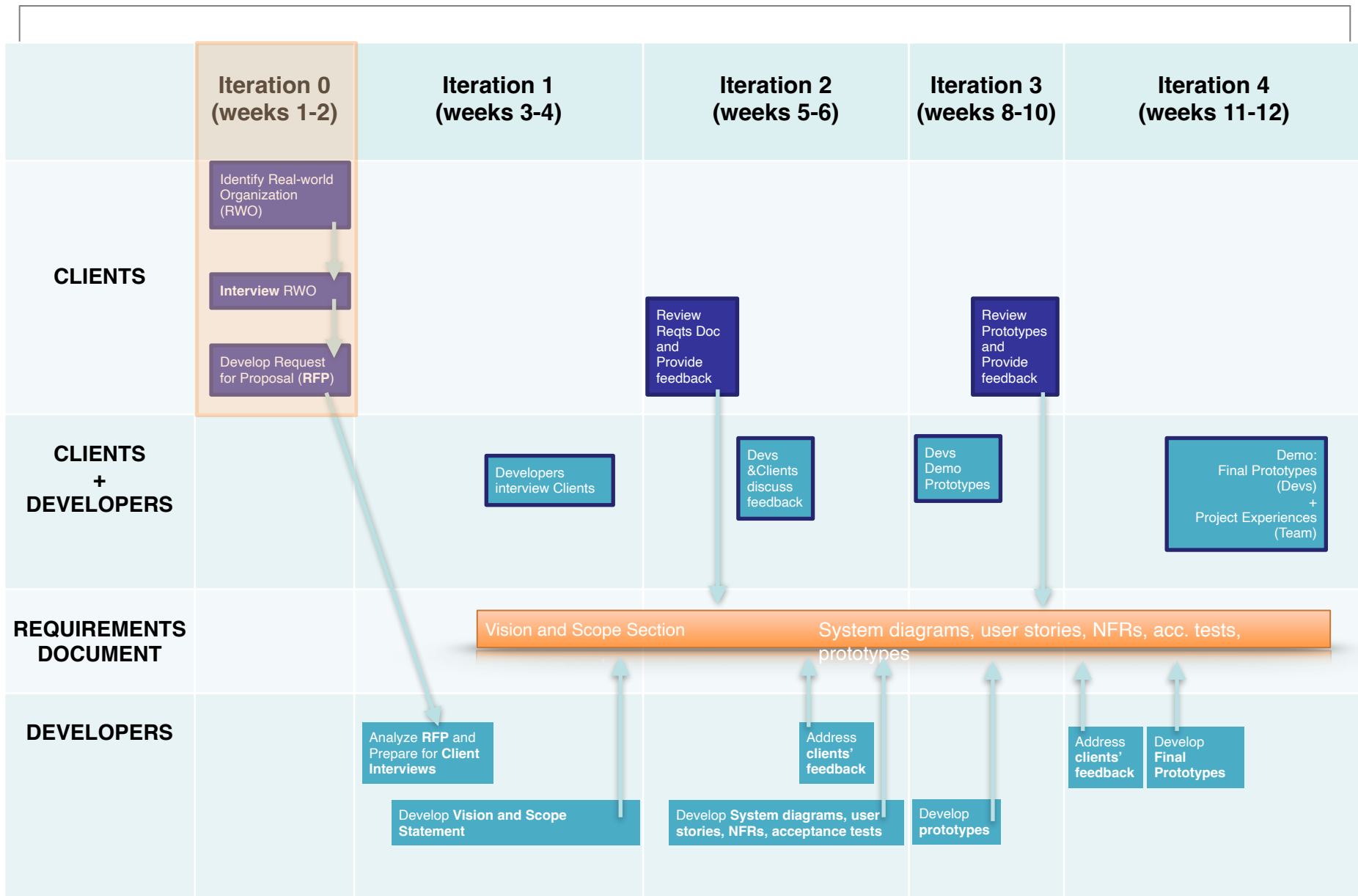thesegalgroup.org

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Outline

Brief Projects update

Requirements Elicitation I – interviews
Techniques, advantages and disadvantages
Defining Business Requirements

The Vision and Scope Document

	Iteration 0 (weeks 1-2)	Iteration 1 (weeks 3-4)	Iteration 2 (weeks 5-6)	Iteration 3 (weeks 8-10)	Iteration 4 (weeks 11-12)
CLIENTS	Identify Real-world Organization (RWO) **Interview** RWO Develop Request for Proposal (**RFP**)		Review Reqts Doc and Provide feedback	Review Prototypes and Provide feedback	
CLIENTS + DEVELOPERS		Developers interview Clients	Devs &Clients discuss feedback	Devs Demo Prototypes	Demo: Final Prototypes (Devs) + Project Experiences (Team)
REQUIREMENTS DOCUMENT		Vision and Scope Section	System diagrams, user stories, NFRs, acc. tests, prototypes		
DEVELOPERS		Analyze **RFP** and Prepare for **Client Interviews** Develop **Vision and Scope Statement**	Develop **System diagrams, user stories, NFRs, acceptance tests** Address **clients' feedback**	Develop **prototypes**	Address **clients' feedback** Develop **Final Prototypes**

Reqts Elicitation: Goals and Info to gather

Identify the business need and objectives

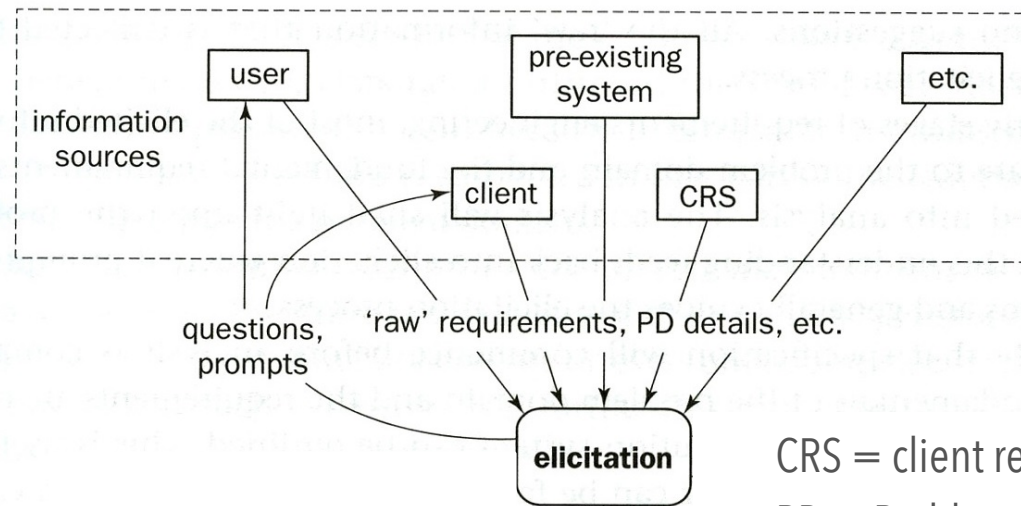Identify the product's expected user classes and other stakeholders

Understand user tasks and goals, business objectives

Learn about the environment in which the new product will be used

Reqts Elicitation

From what sources can this info be gathered?

By which mechanisms or techniques it may be gathered?

CRS = client requirements specification
PD = Problem Description

Requirements elicitation

One of the very difficult activities in RE

Gathering information from stakeholders is hard

  Availability of stakeholders

  Bias in communicating requirements

  Conflictual situations among stakeholders

  Tacit/situated knowledge

An Overview — Main Elicitation techniques

Background reading/inspection of documents

Interviews (open ended or structured)

Questionnaires

Observations

Group techniques (JAD, Participatory design, focus groups)

Contextual Design

Newer methods:

Data mining (DM) techniques in eliciting from large groups

DM for requirements discovery **at runtime**

Elicitation *at design time*

Define major service areas for the client – e.g. retail sales, inventory management, billing, advertising, etc.

Define areas where there is a need for automation/improvement

  Are there manual processes that could be automated?

  Are there any system processes with manual or system workarounds?

  Are there any processes that are duplicated in whole or part by multiple people/roles?

Identify the goals and objectives for the service/organization

Identify assumptions and constraints

Understand the business and its operations *as_is*

Discovering requirements *at runtime* in unpredictable environments

Worked with a team of 4 rowers
Crossing the Atlantic Ocean

Data mining techniques to
discover patterns in usage and
context

→ emerging contextual requirements

Elicitation techniques
Interviews

Most widely used technique in requirements engineering

Analysts interview future users of the system individually to find out

what the present system does and

what changes are needed

The information gathered during the interviews allows for a design that eliminates the shortcomings of the current one.

Elicitation techniques
Interviews

Advantages

- – Access to individual stakeholders and their opinions

- – Rich collection of information

- – Ability to adapt questions to particular situations

Disadvantages

- Information from multiple sources, hard to analyze

- Difficult to be a skilled interviewer

- May intimidate the interviewee

Best practices for Interviews

- Establish report

- Stay in scope

- Prepare questions ahead of time

- Listen actively

Elicitation techniques
Interviews

Five steps of an interview:

Preparing for the interview

Planning and scheduling the interview

Opening and closing the interview

Conducting the interview

Following up for clarification

Types of interviews:

- structured
- unstructured

Supporting material in Github Lectures/LectureNotes/interviewingtips.md

Elicitation techniques
Structured Interviews

Advantages

1. Forces an **organization** on the interview

2. Very **goal-directed**

3. Attempts to **remove distortion** from interviewees subjectively

4. Allows better **integration** of material after the interview

5. Forces the interviewee to be **systematic**

6. Requirements engineer **identifies gaps** in the knowledge which acts as a basis for questions

7. **Purpose** of session is clear to interviewee

Disadvantages

1. Needs **more preparation** by the requirements engineer

2. Needs to **study background** material extensively

3. May **overconstrain the interviewee**, preventing discovery of requirements

4. May **intimidate** the interviewee

Elicitation techniques
Unstructured Interviews

Advantages

1. Appropriate when the RE wants to **explore** an issue

2. Facilitates description of domain in a way that is **easy for the interviewee**

3. **Goal** is to establish rapport and to get a broad view

Disadvantages

1. Data acquired is often **unrelated and difficult** to integrate

2. Often exhibits **lack of structure**

3. Does not allow gathering of **specific knowledge**

4. Takes time and **training** to do well

5. **Similar questions** asked in future sessions may annoy interviewee

Elicitation techniques
Questionnaires

Gathering of information by means of a survey using a set of uniform written questions

Advantages

– Ability to reach a large pool of people

– Uniformity of questions

– Geographical distribution of stakeholders not an issue

Disadvantages

– Difficult to collect contextual information

– Difficult to design well (leading questions, ambiguity in questions, misinterpretation, sample population)

Elicitation techniques
Observations

Takes the analyst in the working context

Advantages

- Ability to collect contextual information
- Reveals details of tacit knowledge

Disadvantages

- Often difficult to obtain access to the customer site
- Time consuming
- Does not collect information on personal opinions
- Easy to "go native"

Group techniques in RE

Recognition of the need for a high degree of user involvement in system design

Elicitation techniques
Group techniques

Advantages

– Bring stakeholders together!

– More informal interaction than

  interviews

Disadvantages

– More difficult to deal with groups, needs a trained facilitator

– Risk of groupthink

Group techniques for elicitation

- Focus groups

- Brainstorming

- JAD (Joint Application Design)

- Also referred to as Requirements Workshops

Characteristics

- Communication between group members

- Sharing of information

- Sharing of workspace

- Coordination and control of shared objects

- Decision making

- Common understanding of the work process

- **Facilitation**

Elicitation techniques
JAD (Joint Application Design)

- Originated at IBM in late 1970s

- A **structured** workshop where people come together to plan projects, design computer systems, or make business decisions

- Involves a **detailed agenda**, **visual aids**, a **facilitator** who moderates the session, and a **scribe** who records the agreed-upon requirements

- Culminates with a **final document** containing all the decisions made by the group

- Used to elicit or negotiate specifications with clients

Workshops and facilitation

"Facilitation is the art of leading people through processes toward agreed-upon objectives in a manner that encourages participation, ownership, and productivity from all involved"
[David Silbert, Effective facilitation, 1994]

Balances the needs of content, process and people

Best practices for effective Workshops

- Establish and enforce ground rules

- Fill all of the team roles

Trap Watch out for off-topic discussions, such as design explorations, during elicitation sessions. Keep the participants focused on the session's objectives, while assuring them that they'll have future opportunities to work through other issues that arise.

- Use parking lots to capture items for later consideration

- Time box discussions

- Keep the team small but include the right stakeholders

In the absence of appropriate human communication
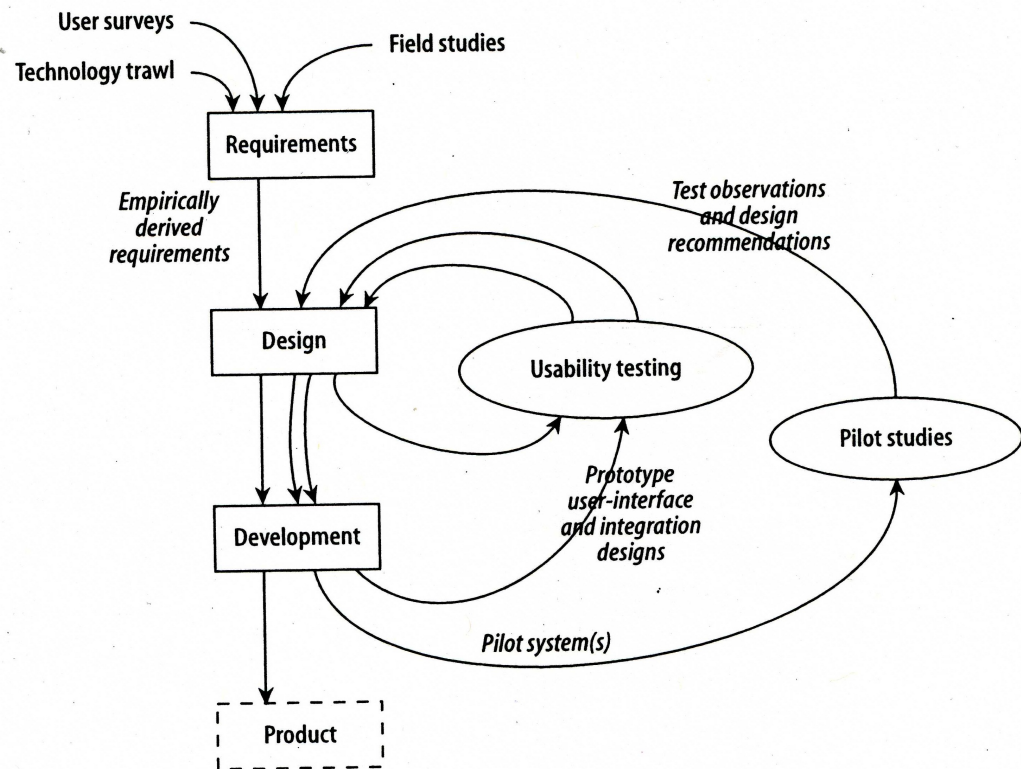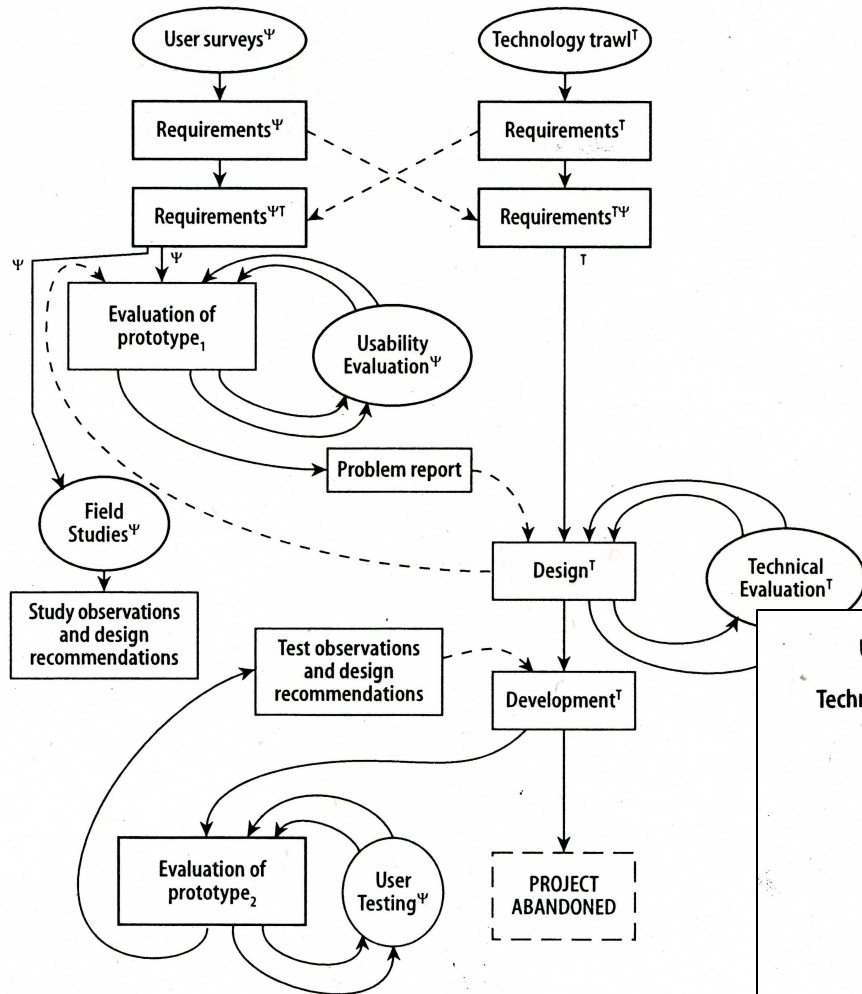
Technical power (by developers)

– Advocating a particular course of action without providing users with the evidence to make their own evaluations

Structural power (by customers)

– Defining project tasks

Conceptual power (by customers and developers)

– Evaluating other existing systems; Shaping users' concepts of what IT can provide

User surveys$^\Psi$

Technology trawl^T

Requirements$^\Psi$

Requirements^T

Requirements$^{\Psi T}$

Requirements$^{T\Psi}$

Ψ

Ψ

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Evaluation of prototype$_1$

Usability Evaluation$^\Psi$

Problem report

Field Studies$^\Psi$

Study observations and design recommendations

Test observations and design recommendations

Design^T

Technical Evaluation^T

Development^T

Evaluation of prototype$_2$

User Testing$^\Psi$

PROJECT ABANDONED

User surveys

Technology trawl

Field studies

Requirements

Empirically derived requirements

Test observations and design recommendations

Design

Usability testing

Prototype user-interface and integration designs

Pilot studies

Development

Pilot system(s)

Product

Elicitation techniques
Contextual inquiry

A **field interviewing technique** aimed at revealing work structure. It studies a few carefully selected individuals in depth to arrive at a fuller understanding of the work practice across all customers.

Principles

- **Context** -- go to the customers' workplace and watch them do their own work

- **Partnership** -- talk to them about their work

- **Interpretation** -- develop a shared understanding with the customer about the aspects of work that matter

- **Focus** -- direct the inquiry from a clear understanding of your own purpose.

Powerful in context dependent, complex safety critical environments (healthcare, aviation)

Elicitation techniques
In the world of big data (to be cont'd

Online reviews, user forums everywhere

Ongoing monitoring of customer satisfaction and suggestions –> ideas for new features

Dedicated roles: community manager, customer success manager –> inform user stories, new features for development

Machine learning or other natural language text processing techniques to focus improvement

Establishing the Business requirements

"a set of information that, in the aggregate, describes a need that leads to one or m ore projects to deliver a solution and the desired ultimate business outcomes"

Functionality should not be built unless it relates to Business Requirements

Define and quantify* Business Objectives (should illustrate

* using Success Metrics, as in this Table

TABLE 5-1 Examples of financial and nonfinancial business objectives

Financial	Nonfinancial
■ Capture a market share of X% within Y months. ■ Increase market share in country W from X% to Y% within Z months. ■ Reach a sales volume of X units or revenue of $Y within Z months. ■ Achieve X% return on investment within Y months. ■ Achieve positive cash flow on this product within Y months. ■ Save $X per year currently spent on a high-maintenance legacy system. ■ Reduce monthly support costs from $X to $Y within Z months. ■ Increase gross margin on existing business from X% to Y% within 1 year.	■ Achieve a customer satisfaction measure of at least X within Y months of release. ■ Increase transaction-processing productivity by X% and reduce data error rate to no more than Y%. ■ Develop an extensible platform for a family of related products. ■ Develop specific core technology competencies. ■ Be rated as the top product for reliability in published product reviews by a specified date. ■ Comply with specific federal and state regulations. ■ Receive no more than X service calls per unit and Y warranty calls per unit within Z months after shipping. ■ Reduce turnaround time to X hours on Y% of support calls.

Analyst Questions   **Executive Responses**

What motivates your interest in a chemical
tracking system?

Managing chemical inventories manually costs too
much and is inefficient.

How much would you like to reduce your
chemical expenses?

By 25% within one year.

What is keeping you from cutting by 25% today?
What is causing the high cost and inefficiency?

We buy unnecessary chemicals because we don't
know what we have in inventory. We discard
too much unused material that has expired.

Anything else I should know?

Placing orders is complicated; it takes users a long
time. The government reports we create are
manually generated, which takes far too much time.

FIGURE 5-4 Example of a conversation between a business analyst and an executive sponsor.
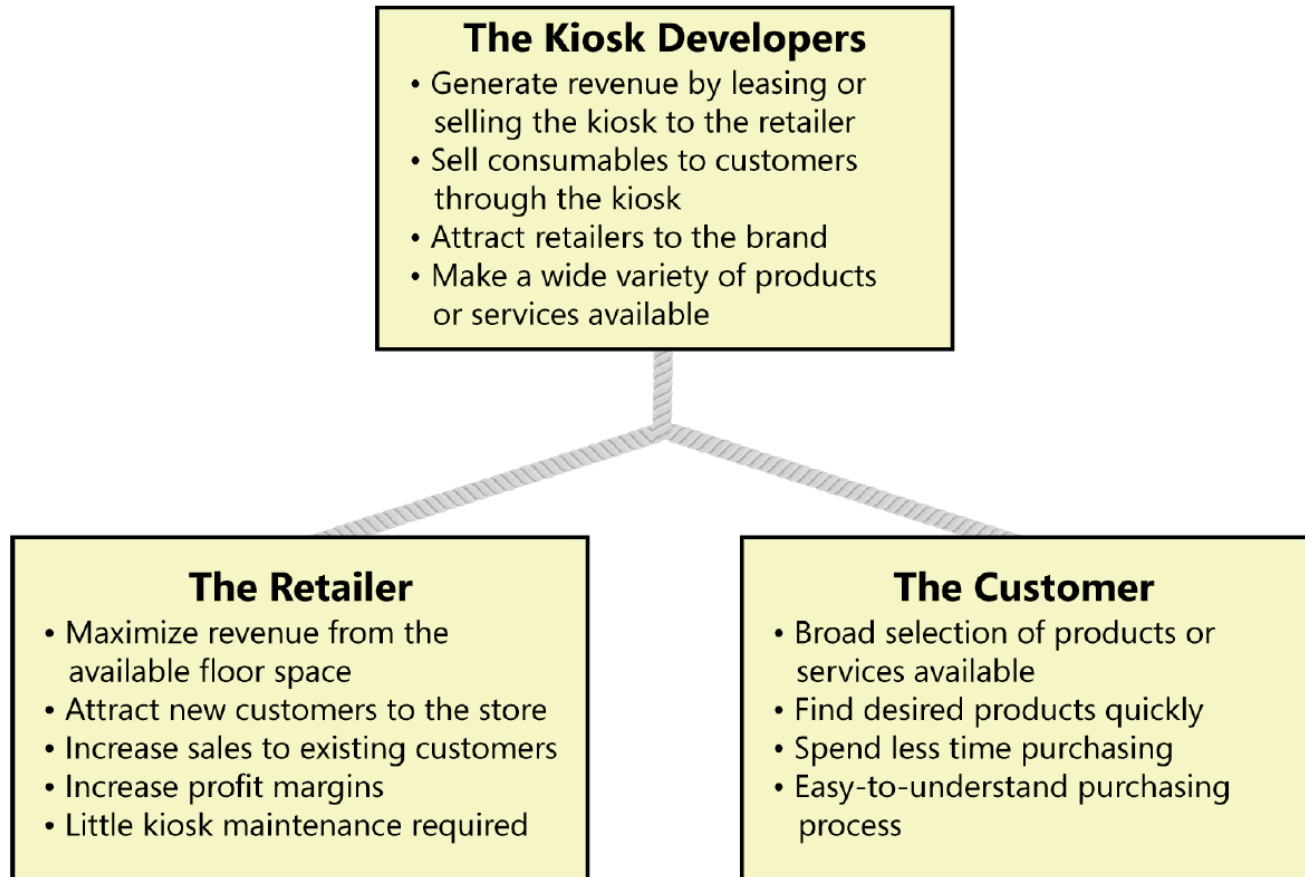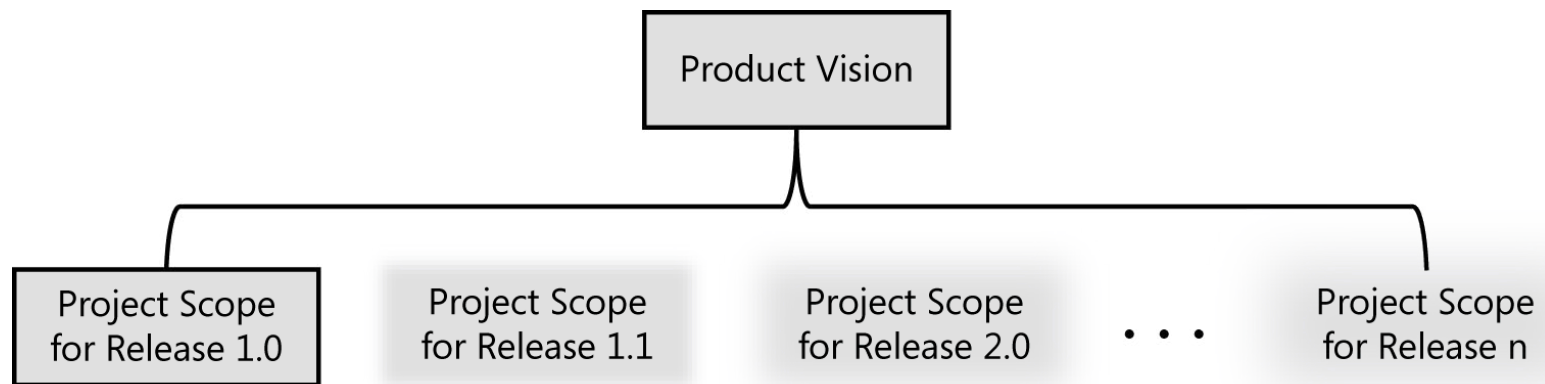
Business requirements might conflict

The Kiosk Developers
- Generate revenue by leasing or selling the kiosk to the retailer
- Sell consumables to customers through the kiosk
- Attract retailers to the brand
- Make a wide variety of products or services available

The Retailer
- Maximize revenue from the available floor space
- Attract new customers to the store
- Increase sales to existing customers
- Increase profit margins
- Little kiosk maintenance required

The Customer
- Broad selection of products or services available
- Find desired products quickly
- Spend less time purchasing
- Easy-to-understand purchasing process

FIGURE 5-2 Stakeholders for a kiosk don't always have congruent business interests.

Product Vision and Project Scope

Product Vision describes the product that will help the organization achieve its
Business Objectives

Product vision defines the Product/Project Roadmap

Product Vision

Project Scope for Release 1.0   Project Scope for Release 1.1   Project Scope for Release 2.0   . . .   Project Scope for Release n

Product Vision and Project Scope

Define **Major Features**

- Questions to answer to *define the scope*:

    - which user capabilities are needed?

    - do they help accomplish the business objectives?

    - what are their priorities and constraints (financial, deployment, time-to-market)?

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The Vision and Scope Document

It is **the first Developer team Deliverable**

Template suggested in the Textbook (Appendix C).

In our Project relevant sections are included in the **Requirements Document** template (GH Project space)

It contains the **Business Requirements, Product Vision** and **Project Scope**