**ITEC 630**

*Information Systems Analysis, Modeling, and Design*

***Lecture Notes***

**Requirements Determination: Information Gathering**

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**Learning objectives**

1. Understand the requirements determination and recognize the importance of requirements discovery
2. Define and describe several information gathering methods that can help systems analysts to discover requirements.

* Interactive Methods (Interviewing, Joint application design, and Questionnaires)
* Unobtrusive Methods (Sampling, Document analysis, and Observation)

1. Describe several requirements analysis strategies that systems analysts could use to discover requirements.

**Overview**

*Information gathering* is a part of the determining human information requirements phase and during this phase, systems analysts work with system users to identify their requirements and what they want the system to do. This week lecture begins by describing the concept of the requirements determination. It then introduces methods to obtain obtaining the organization’s information requirements and there are interactive methods and unobtrusive methods.

Three interactive methods are interviewing, joint application design (JAD), and questionnaires to survey. Using interactive methods, systems analysts are required to talk with and listen to people in the organization. Three unobtrusive methods are sampling, document analysis (investigation), and observing a decision maker’s behavior and physical environment. Even though unobtrusive methods are known to be less disruptive than interactive methods but they gather insufficient information when being used alone. Therefore, it is recommended that systems analysts use the multiple methods approach by using both interactive and unobtrusive methods during information gathering process.

***Note #1: All links provided in this lecture can be activated with a "Ctrl + Click"; however, you can also activate these links by copy and paste the link content to the Web browser address bar, just in case.***

***Note #2: To access links associated with "http://library.books24x7.com.ezproxy.umuc.edu", you might have to log into UMUC Library and activate the link "Books24x7" first.***

**REQUIREMENTS DETERMINATION**

Requirements determination is one of the systems analyst’s activities to come up with a document that identifies the proposed system’s capabilities including what the system should do and/or what features it should have. There are several types of requirements: business requirements, system requirements, functional requirements, and nonfunctional requirements.

* ***Requirements Determination***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/part-two-analysis-phase/chapter\_3\_requirements\_determi#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZjaGFwdGVyXzNfcmVxdWlyZW1lbnRzX2RldGVybWkmcXVlcnk9Y2hvb3NlJTIwaGFyZHdhcmU**=](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/part-two-analysis-phase/chapter_3_requirements_determi#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZjaGFwdGVyXzNfcmVxdWlyZW1lbnRzX2RldGVybWkmcXVlcnk9Y2hvb3NlJTIwaGFyZHdhcmU=)

**THE IMPORTANCE OF REQUIREMENTS DISCOVERY**

The task of determining system requirements is very important and critical to correctly design and build a system to satisfy customers. Errors in this phase may result in cost increased during the development phase and later in the maintenance phase, late delivery, an unreliable and/or erroneous system, users’ dissatisfaction, etc. An expert in IT economics, Barry W. Boehm, published his findings about the cost of errors in requirements that were not discovered until later and the relative cost of fixing an error may go up to 1,000 times.

**INTERACTIVE METHODS**

There are three interactive methods for gathering information requirements: interviewing, joint application design (JAD), and questionnaires.

***Interviewing***

* Interviewing is one of the primary ways for collecting data on system requirements.
* Interviewing involves meeting one or more people and asking them questions.
* There are five basic steps to the interview process

1. selecting interviewees
2. designing interview questions
3. preparing for the interview
4. conducting the interview
5. and post-interview follow-up

* There are three types of interview questions: open‑ended, closed-ended, and probing
* Probing questions are used to obtain additional information.
* There are two basic ways of organizing the interview questions: top-down or bottom-up
* Guidelines for conducting a successful interview

**Steps to Conducting a Successful Interview**

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

1. Make an appointment that is at the convenience of the interviewee.

2. Prepare the interview; know the interviewee.

3. Be on time.

4. Have a planned beginning to the interview.

a. Introduce yourself and your role on the project.

b. Use open-ended general questions to begin the discussion.

c. Be interested in all responses, pay attention.

5. Have a planned middle to the interview.

a. Combine open-ended and closed-ended questions to obtain the information you want.

b. Follow-up comments by probing for more detail.

c. Provide feedback to the interviewee in the form of comments, such as, "Let me tell you what I think you mean, ... "

d. Limit your notetaking to avoid distracting the interviewee.

6. Have a planned closing to the interview.

a. Summarize what you have heard. Ask for corrections as needed.

b. Request feedback, note validation, or other actions of interviewee.

• Give him or her a date by which they will receive information for review.

• Ask him or her for a date by which the review should be complete.

c. If a follow-up interview is scheduled, confirm the date and time.

* ***Interviews (under the Requirements Elicitation in Practice section)***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=)

***Joint application design***

* Joint application development (JAD) allows the project team, users, and management to work together to identify the system’s requirements.
* Electronic JAD or e-JAD resolves the traditional problems associated with groups with JAD (fear of reprisal from people with differing opinions.)
* There are five basic steps to the JAD process

1. selecting participants
2. designing the JAD session
3. preparing for the JAD session
4. conducting the JAD session
5. post-JAD follow-up

* ***Joint Application Development******(under the Requirements Elicitation in Practice section)***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=)

***Questionnaires***

* A questionnaire is a set of written questions developed for obtaining information from individuals.
* Questionnaires often are used when a large number of organization members from whom information and opinions are needed. Questionnaires are valuable if organization members are widely dispersed.
* Questionnaires are commonly distributed in electronic form, either via e-mail or on the Web.
* There are four basic steps to the questionnaire process

1. selecting participants
2. designing the questionnaire
3. administering the questionnaire
4. questionnaire follow-up

* Guideline for questionnaire development

**Guidelines for Questionnaire Development**

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

1. Determine what facts are desired and which people are best qualified to provide them.

2. For each fact, select either an open-ended or close-ended question. Write several questions and choose the one or two that most clearly ask for the information.

3. Group questions by topic area, type of question, or some context-specific criteria.

4. Examine the questionnaire for problems:

• More than two questions asking the same information

• Ambiguous questions

• Questions for which respondents might not have the answer

• Questions that bias the response

• Questions that are open to interpretation by job function, level of organization, etc.

• Responses that are not comprehensive of all possible answers

• Confusing ordering of questions or responses

5. Fix any problems identified above.

6. Test the questionnaire on a small group of people (e.g., 5-10). Ask for both comments on the questions and answers to the questions.

7. Analyze the comments and fix wording ambiguities, biases, word problems, etc. as identified by the comments.

8. Analyze the responses to ensure that they are the type desired.

9. If the information is different than you expected, the questions might not be direct enough and need rewording. If you don't get useful information that you don't already know, reexamine the need for the questionnaire.

10. Make final edits, print in easy-to-read type. Prepare a cover letter.

11. Distribute the questionnaire, addressing the cover letter to the person by name. Include specific instructions about returning the questionnaire. Provide a self-addressed, stamped envelope if mailing is needed.

* ***Questionnaires******(under the Requirements Elicitation in Practice section)***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=)

**UNOBTRUSIVE METHODS**

There are three unobtrusive methods for obtaining information requirements: sampling, document analysis or investigation, and observation.

***Sampling***

* Sampling is used to select representative elements of a population such as target documents or target interviewees
* There are several different methods of sampling: simple, stratified, systematic, and cluster random sampling; and convenience, judgment, quota, and snowball nonrandom sampling.
* The reasons systems analysts do sampling are reduction of costs, speeding up the data gathering process, improving effectiveness, and reduction of data-gathering bias.
* Four fundamental steps that systems analysts need to follow to design a good sample are:
  1. Determining the data to be collected or described.
  2. Determining the population to be sampled.
  3. Choosing the type of sample.
  4. Deciding on the sample size.
* ***Sampling***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/statistics/9781118494769/chapter-7-sampling-and-sampling-distributions/ch007\_sec004\_html?query=((sampling+survey+and+stratified))#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTg0OTQ3NjklMkZjaDAwN19zZWMwMDRfaHRtbCZxdWVyeT0oKHNhbXBsaW5nJTIwc3VydmV5JTIwYW5kJTIwc3RyYXRpZmllZCkp**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/statistics/9781118494769/chapter-7-sampling-and-sampling-distributions/ch007_sec004_html?query=((sampling+survey+and+stratified))#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTg0OTQ3NjklMkZjaDAwN19zZWMwMDRfaHRtbCZxdWVyeT0oKHNhbXBsaW5nJTIwc3VydmV5JTIwYW5kJTIwc3RyYXRpZmllZCkp)

* ***Estimating Sample Size***

### <http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/statistics/9781118494769/chapter-8-statistical-inference-estimation-for-single-populations/ch008_sec028_html?query=((sample+size+decision))#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTg0OTQ3NjklMkZjaDAwOF9zZWMwMjhfaHRtbCZxdWVyeT0oKHNhbXBsZSUyMHNpemUlMjBkZWNpc2lvbikp>

***Document Analysis (Investigation)***

* Document analysis entails reviewing the existing documentation and examining the system itself. It can provide insights into the formal and informal system.
* There are many helpful documents in the organization for this purpose including paper reports, memorandums, policy manuals, user training manuals, organization charts, and forms.
* Problem reports filed by the system users can be another rich source of information about issues with the existing system.

* ***Document Analysis******(under the Requirements Elicitation in Practice section)***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=)

***Observation***

* Observation is an information‑gathering technique that enables the systems analyst to see what organizational members actually do.
* Observation could be used to validate information gathered from other sources such as interviews and questionnaires.
* Observation is often used to supplement interview information
* ***Observation******(under the Requirements Elicitation in Practice section)***

[**http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=**](http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629/chapter-1-the-systems-analyst-and-information-systems-development/navpoint-19#X2ludGVybmFsX0h0bWxWaWV3P3htbGlkPTk3ODExMTgwNTc2MjklMkZuYXZwb2ludC00MSZxdWVyeT0=)

* STROBE is a structured technique for observing the decision maker's environment.
* STROBE analyzes seven environmental elements:
  1. Office location
  2. Placement of the decision maker's desk
  3. Stationary office equipment
  4. Props
  5. External information sources
  6. Office lighting and color
  7. Clothing worn by decision makers
* STROBE may be implemented using an anecdotal checklist.
* ***Observing Decision Makers Behavior***

[**www.w3computing.com/systemsanalysis/observing-decision-makers-behavior/**](http://www.w3computing.com/systemsanalysis/observing-decision-makers-behavior/)

* ***Observing Physical Environment***

[**www.w3computing.com/systemsanalysis/observing-physical-environment/**](http://www.w3computing.com/systemsanalysis/observing-physical-environment/)

**SELECTING THE APPROPRIATE TECHNIQUES**

Each requirements elicitation technique has its strengths and weaknesses shown below in “Summary of Data Collection Techniques”. Thus, it is important to understand the strengths and weaknesses of each technique and when to use each.

In general, systems analysts use the following six features to compare among requirements elicitation techniques: type of information, depth of information, breadth of information, integration of information, user involvement, and cost

***Summary of Data Collection Techniques***

**Interviews**

|  |  |
| --- | --- |
| ***Strengths*** | ***Weaknesses*** |
| * Get both qualitative and quantitative information * Get both detail and summary information * Good method for surfacing requirements | * Takes some skill * May obtain biased results * Can result in misleading, inaccurate, or irrelevant information * Requires triangulation to verify results * Not useful with large numbers of people to be interviewed (e.g., over 50) |

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

**Observation**

|  |  |
| --- | --- |
| ***Strengths*** | ***Weaknesses*** |
| * Surface unarticulated procedures, decision criteria, reasoning processes * Not biased by opinion * Observer gets good problem domain understanding | * Might not be representative time period * Behavior might be changed as a result of being observed * Time consuming |

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

**Review Internal Documents**

|  |  |
| --- | --- |
| ***Strengths*** | ***Weaknesses*** |
| * Good for learning history and politics * Explains current context * Good for understanding current application | * May bias future design work * Saves interview/user time * Not useful for obtaining attitudes or motivations |

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

**Review External Documents**

|  |  |
| --- | --- |
| ***Strengths*** | ***Weaknesses*** |
| * Good for identifying industry trends, surveys, expert opinions, other companies’ experiences, and technical information relating to the problem domain | * May not be relevant * Information may not be accurate * May bias future design work |

**[Source: Conger, Sue (2008), The New Software Engineering, a Creative Commons Attribution 3.0 License]**

* ***Selecting the appropriate techniques (under the Requirements Elicitation in Practice section)***

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**REQUIREMENTS ANALYSIS STRATEGIES**

In order to help business users like stakeholder think critically about the needs for their new system and identify their new system requirements, systems analysts employ several strategies including “problem analysis”, “root cause analysis”, “duration analysis”, “activity-based costing”, “informal benchmarking”, “outcome analysis”, “technology analysis”, and “activity elimination”.

* ***Requirements Analysis Strategies***

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1. Conger, Sue (2008). The New Software Engineering. A Creative Commons Attribution 3.0 License.
2. Alan Dennis, Barbara Haley Wixom, and **Roberta M. Roth** (2012). **System Analysis and Design, Fifth Edition, John Wiley & Sons**.  
   < http://proquestcombo.safaribooksonline.com.ezproxy.umuc.edu/book/software-engineering-and-development/9781118057629 >
3. www.w3computing.com

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