System Analysis and Design

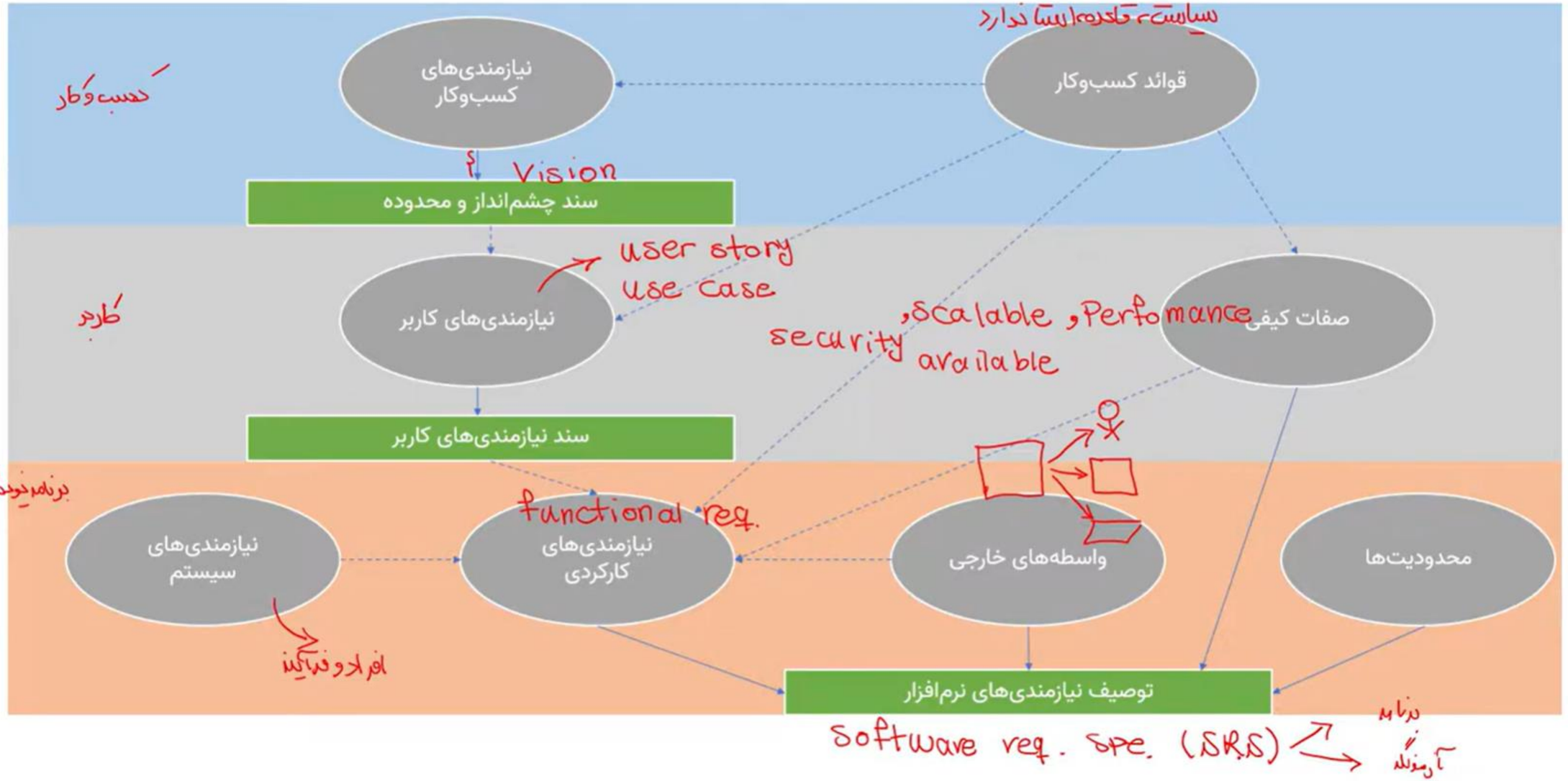
Requirement Modeling

Department of Computer Engineering
Sharif University of Technology
Maryam Ramezani
maryam.ramezani@sharif.edu

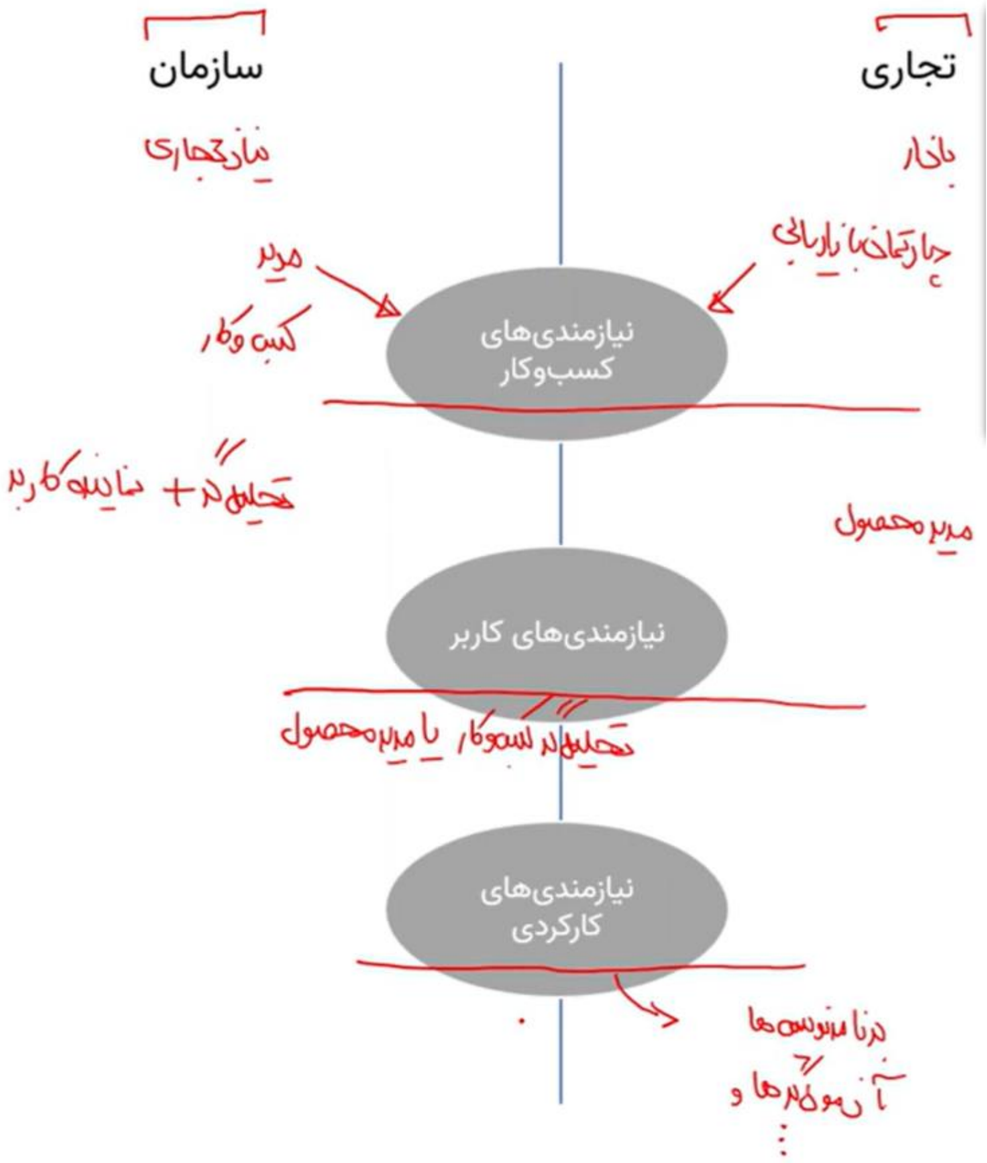
01

Introduction

Introduction



Introduction



02 Requirement Discovery

INTRODUCTION TO REQUIREMENTS DISCOVERY

Requirements discovery – the process and techniques used by systems analysts to identify or extract system problems and solution requirements from the user community.

System requirement – something that the information system must do or a property that it must have. Also called a *business requirement*.

FUNCTIONAL VS. NONFUNCTIONAL REQUIREMENTS

Functional requirement - something the information system must do

Nonfunctional requirement - a property or quality the system must have

- Performance
- Security
- Costs

RESULTS OF INCORRECT REQUIREMENTS

The system may cost more than projected.

The system may be delivered later than promised.

The system may not meet the users' expectations and they may not to use it.

Once in production, costs of maintaining and enhancing system may be excessively high.

The system may be unreliable and prone to errors and downtime.

Reputation of IT staff is tarnished as failure will be perceived as a mistake by the team.

RELATIVE COST TO FIX AN ERROR

Phase in Which Error Discovered	Cost Ratio
Requirements	1
Design	3–6
Coding	10
Development Testing	15–40
Acceptance Testing	30–70
Operation	40–1000

CRITERIA FOR SYSTEM REQUIREMENTS

Consistent – not conflicting or ambiguous.

Complete – describe all possible system inputs and responses.

Feasible – can be satisfied based on the available resources and constraints.

Required – truly needed and fulfill the purpose of the system.

Accurate – stated correctly.

Traceable – directly map to functions and features of system.

Verifiable – defined so can be demonstrated during testing.

REQUIREMENTS DISCOVERY

Given an understand of problems, the systems analyst can start to define requirements.

Fact-finding – the formal process of using research, meetings, interviews, questionnaires, sampling, and other techniques to collect information about system problems, requirements, and preferences. It is also called *information gathering* or *data collection*.

REQUIREMENTS DEFINITION DOCUMENT

Requirements Definition Document – A formal document that communicates the requirements of a proposed system to key stakeholders and serves as a contract for the systems project.

Synonyms

- Requirements definition report
- Requirements statement
- Requirements specification
- Functional specifications

SAMPLE REQUIREMENTS DEFINITION REPORT OUTLINE

REQUIREMENTS DEFINITION REPORT

1. Introduction
   - 1.1. Purpose
   - 1.2. Background
   - 1.3. Scope
   - 1.4. Definitions, Acronyms, and Abbreviations
   - 1.5. References
2. General Project Description
   - 2.1. Functional Requirements
3. Requirements and Constraints
   - 3.1. Functional Requirements
   - 3.2. Nonfunctional Requirements
4. Conclusion
   - 4.1. Outstanding Issues

Appendix (optional)

REQUIREMENTS MANAGEMENT

Requirements management - the process of managing change to the requirements.

- Over the lifetime of the project it is very common for new requirements to emerge and existing requirements to change.
- Studies have shown that over the life of a project as much as 50 percent or more of the requirements will change before the system is put into production.

SEVEN FACT-FINDING METHODS

Sampling of existing documentation, forms, and databases.

Research and site visits.

Observation of the work environment.

Questionnaires.

Interviews.

Prototyping.

Joint requirements planning (JRP).

SAMPLING EXISTING DOCUMENTATION, FORMS, & FILES

Sampling –process of collecting a representative sample of documents, forms, and records.

- Organization chart
- Memos and other documents that describe the problem
- Standard operating procedures for current system
- Completed forms
- Manual and computerized screens and reports
- Samples of databases
- Flowcharts and other system documentation
- And more

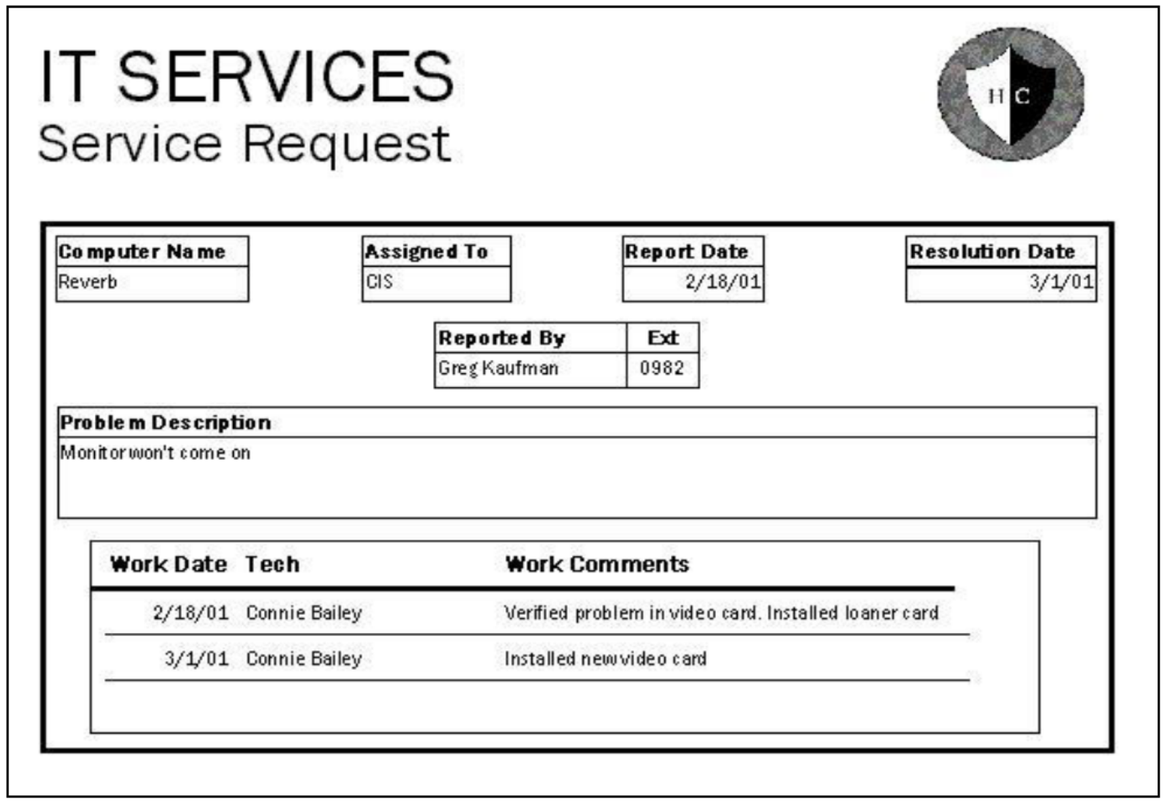
WHY TO SAMPLE COMPLETED RATHER THAN BLANK FORMS

Can determine type of data going into each blank

Can determine size of data going into each blank

Can determine which blanks are not used or not always used

Can see data relationships



IT SERVICES

Service Request

Computer Name	Assigned To	Report Date	Resolution Date
Reverb	CIS	2/18/01	3/1/01

Reported By	Ext
Greg Kaufman	0982

Problem Description
Monitor won't come on

Work Date	Tech	Work Comments
2/18/01	Connie Bailey	Verified problem in video card. Installed loaner card
3/1/01	Connie Bailey	Installed new video card

OBSERVATION

Observation – a fact-finding technique wherein the systems analyst either participates in or watches a person perform activities to learn about the system.

Advantages?

Disadvantages?

Work sampling - a fact-finding technique that involves a large number of observations taken at random intervals.

QUESTIONNAIRES

Questionnaire – a special-purpose document that allows the analyst to collect information and opinions from respondents.

Free-format questionnaire – a questionnaire designed to offer the respondent greater latitude in the answer. A question is asked, and the respondent records the answer in the space provided after the question.

Fixed-format questionnaire – a questionnaire containing questions that require selecting an answer from predefined available responses.

INTERVIEWS

Interview - a fact-finding technique whereby the systems analysts collect information from individuals through face-to-face interaction.

- Find facts
- Verify facts
- Clarify facts
- Generate enthusiasm
- Get the end-user involved
- Identify requirements
- Solicit ideas and opinions

The personal interview is generally recognized as the most important and most often used fact-finding technique.

DISCOVERY PROTOTYPING

Discovery prototyping – the act of building a small-scale, representative or working model of the users' requirements in order to discover or verify those requirements.

JOINT REQUIREMENTS PLANNING

Joint requirements planning (JRP) – a process whereby highly structured group meetings are conducted for the purpose of analyzing problems and defining requirements.

- JRP is a subset of a more comprehensive joint application development or JAD technique that encompasses the entire systems development process.

03 Samples

نیازمندی‌های کارکردی

نیازمندی‌های کارکردی عملکرد و عملیات خاصی را که نرم‌افزار باید انجام دهد، توصیف می‌کنند. این نیازمندی‌ها بر روی اقدامات و فعالیت‌هایی که سیستم باید انجام دهد، تمرکز دارند، مانند محاسبات، پردازش داده‌ها و تعامل با کاربران یا سایر سیستم‌ها.
نمونه‌ای از نیازمندی‌های کارکردی عبارتند از:

احراز هویت کاربران

کاربران باید بتوانند با استفاده از نام کاربری و رمز عبور وارد سیستم شوند

ورود اطلاعات

سیستم باید به کاربران اجازه ورود اطلاعات به فیلدهای تعریف شده را بدهد

تولید گزارش

سیستم باید گزارش‌های ماهانه فروش را به صورت پی‌دی‌اف تولید کند

نیازمندی‌های غیرکارکردی

نیازمندی‌های غیرکارکردی، گاهی به عنوان "ویژگی‌های کیفی" یا "محدودیت‌ها" نیز شناخته می‌شوند، ویژگی‌ها یا ویژگی‌هایی را تعیین می‌کنند که سیستم باید داشته باشد یا نشان دهد. این نیازمندی‌ها بر روی نحوه عملکرد سیستم تمرکز دارند تا اینکه سیستم چه کاری انجام می‌دهد.
نمونه‌هایی از نیازمندی‌های غیرکارکردی عبارتند از:

عملکرد

سیستم باید به درخواست‌های کاربر در دو ثانیه زمان بیشینه در شرایط بار مشترک پاسخ دهد

امنیت

رمزهای عبور کاربر باید با استفاده از الگوریتم‌های رمزنگاری استاندارد صنعتی رمزگذاری شوند

استفاده‌پذیری

رابط کاربری سیستم باید ساده و آسان برای ملاحظه و مرور با برچسب‌ها و پیام‌های خطا واضح باشد

تفاوت نیازمندی‌های کارکردی و غیرکارکردی

- **تمرکز**: الزامات عملکردی بر آنچه سیستم انجام می دهد تمرکز می کنند، در حالی که الزامات غیر عملکردی بر نحوه عملکرد سیستم تمرکز می کنند
- **ماهیت**: الزامات عملکردی اعمال یا رفتارهای خاصی هستند که سیستم باید انجام دهد، در حالی که الزامات غیرعملکردی کیفیت ها یا ویژگی هایی هستند که سیستم باید داشته باشد
- **ملموس بودن**: الزامات عملکردی اغلب صریح و به راحتی قابل مشاهده هستند، در حالی که الزامات غیرعملکردی اغلب ضمنی هستند و ممکن است نیاز به تفسیر یا توضیح داشته باشند
- **قابلیت اندازه‌گیری**: الزامات عملکردی را می توان به راحتی بر حسب اینکه آیا آنها به درستی اجرا می شوند یا نه اندازه گیری کرد، در حالی که الزامات غیر عملکردی ممکن است به ارزیابی ذهنی یا معیارهای خاصی برای ارزیابی نیاز داشته باشند