

Chapter 2: Outline

- The RMO Consolidated Sales and Marketing System Project
- Systems Analysis Activities
- What Are Requirements?
- Levels of Requirements
- Stakeholders
- Information-Gathering Techniques
- Models and Modeling
- Documenting Workflows with Activity Diagrams

Learning Objectives

- Understand project initiation process & Requirements Gathering
- Describe the activities of systems analysis
- Explain the difference between functional and nonfunctional requirements
- Identify and understand different kinds of stakeholders and their contributions to requirements definition
- Describe information-gathering techniques and determine when each is best applied
- Describe the role of models in systems analysis
- Develop UML activity diagrams to model workflows

Overview

- Chapter 1 introduced the system development lifecycle (SDLC) and demonstrated its use for a small project
- This chapter expands the SDLC processes to cover a wider range of concepts, tools and techniques
- Core process 3: Discover and understand the details of the problem or need—is the main focus of systems analysis
- Systems analysis activities are detailed in this chapter
- A larger Ridgeline Mountain Outfitters (RMO) project is introduced that will be used throughout the text to illustrate analysis and design

Ridgeline Mountain Outfitters (RMO)

- RMO has an elaborate set of information systems that support operations and management
- Customer expectations, modern technological capabilities, and competitive pressures led RMO to believe it is time to upgrade support for sales and marketing
- A new Consolidated Sales and Marketing System was proposed
- This is a major project that grew out of the RMO strategic planning process

Project Initiation

- Project initiation is the first phase of the project management life cycle.
- It is when companies decide if the project is needed and how beneficial it will be for them.
- A Project Initiation Document (PRD) is developed at this stage, which is a guide to a project, clearly laying out the justification for a project, what its objectives will be, and how the project will be organized.
 - This helps ensure that everyone knows what's going on right from the beginning.

Project Initiation

Project Initiation

Follow these six steps to start your project off right



1 Business Case

Explain why the project is necessary and how it will succeed

2 Feasibility Study

Research the reason for the project and determine if it will succeed

3 Project Charter

How will the project be structured and executed?

4 Team

Find the people with the right skills and experience to execute the project

5 Project Office

Where the project manager and support staff are located to assist with projects

6 Review

Review the initiation phase and keep reviewing progress throughout the project

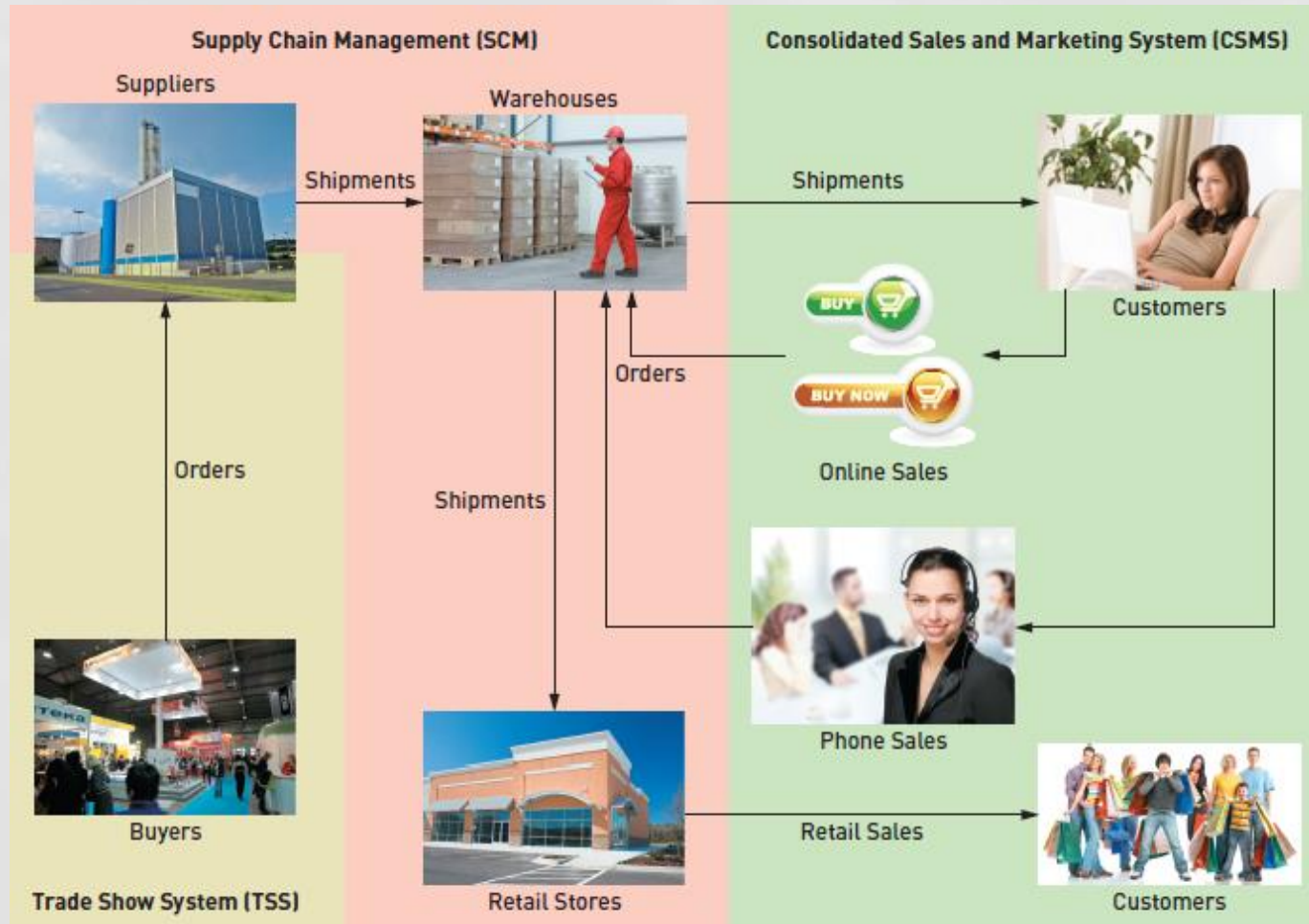
RMO Information Systems Strategic Plan

- **Technology architecture**— the set of computing hardware, network hardware and topology, and system software employed by the organization
- **Application architecture**—the information systems that supports the organization (information systems, subsystems, and supporting technology)

RMO Existing Application Architecture

- Supply Chain Management (SCM)
 - 5 years old; Java/Oracle
 - Tradeshow system will interface with SCM
- Phone/Mail Order System
 - 12 years old; Visual Studio/MS SQL
 - Reached capacity; minimal integration
- Retail Store System
 - Older package solution; minimal integration
- Customer Support System (CSS)
 - Web-based system; evolved over the years, minimal integration
- Consolidated Sales and Marketing System (CSMS)

Proposed Application Architecture: Integrate SCM and New CSMS



New Consolidated Sales and Marketing System (CSMS)

- Sales Subsystem

- Integrates online, phone, and retail stores

- Order Fulfillment Subsystem

- Track shipments, rate products and services

- Customer Account Subsystem

- Shopping history, linkups, “mountain bucks” rewards

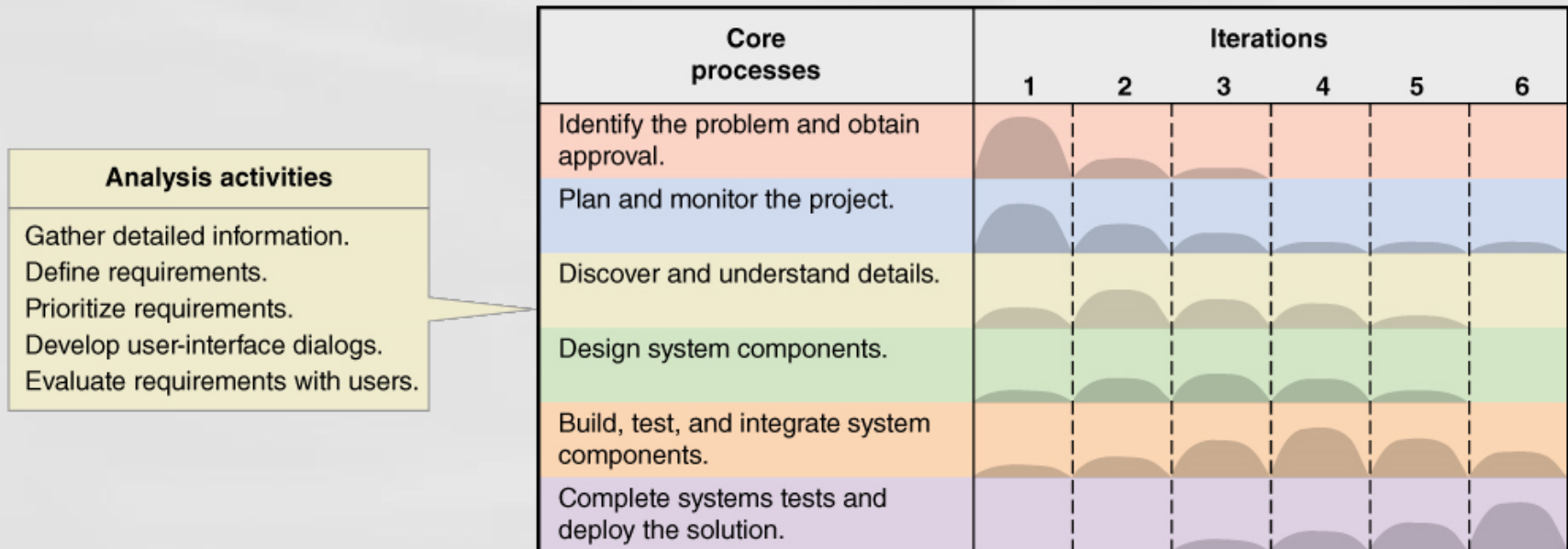
- Marketing Subsystem

- Promotional packages, partner relationships, more complete merchandise information and reporting

Systems Analysis Activities (1 of 2)

- The New Consolidated Sales and Marketing System (CSMS) will require discovering and understanding extensive and complex business processes and business rules
- The SDLC indicates the project starts with identifying the problem, obtaining approval, and planning the project (as seen in Chapter 1)
- To get to the heart of systems analysis, this text skips right to analysis activities generally and the specifically for the RMO C SMS project (Core Process #3)
- Project planning and project management are covered in detail later in the text

Systems Analysis Activities: Involve discovery and understanding



Systems Analysis Activities (2 of 2)

- Gather Detailed Information

- Interviews, questionnaires, documents, observing business processes, researching vendors, comments and suggestions

- Define Requirements

- Modeling functional requirements and non-functional requirements

- Prioritize Requirements

- Essential, important, vs. nice to have

- Develop User-Interface Dialogs

- Flow of interaction between user and system

- Evaluate Requirements with Users

- User involvement, feedback, adapt to changes

Requirements

What are Requirements?

- In Software development, a requirement is a singular documented physical or functional need that a system aims to satisfy.
- It is a condition or capability needed by a user to solve a problem or achieve an objective with a system.
- A condition or capability that must be met or possessed by a system.
- A requirement is simply a specification of a need or want.
 - Requirements must be documented in a requirements' document.

Requirements

- System Requirements =
 - Functional requirements
 - Non-functional requirements
- Functional Requirements– the activities the system must perform
 - Business uses, functions the users carry out
 - Shown as use cases in Chapter 1
- Non-Functional Requirements– other system characteristics
 - Constraints and performance goals

Levels of Requirements

There are usually two distinct levels:

- Business requirements
- Systems Requirements
 - User requirements, and
 - Functional requirements.

In addition, every system has an associated nonfunctional requirements.

Business requirements

- This represent the high-level objectives of the organization or customer who requests the system.
- Business requirements typically come from the funding sponsor of a project, the acquiring customer, or the manager of the actual users.
- Business requirements describe why the organization is implementing the system, and the objectives the organization hopes to achieve.
- Business requirements can be recorded in a Business requirements Documents (BRD) or a project charter

Business Requirements Examples

- A company needs a new sales system.
- A company needs a new content management system.
- A bank needs a screen for entering customer contacts.
- A bank needs an improved online banking system
- A marketing company needs an accurate monthly sales forecast.
- An insurance company needs an improved automated claim processing system
- A college needs a collaborative tool that can enable students to learn from home
- A ministry of health needs a COVID-19 vaccination tracking system

Systems Requirements

- Systems Requirements shows what the system will do, and how it will solve the business need
- Provides a clear understanding of the problem to be solved by the system development project
- It specifies the features or behaviour of the system.
- Recorded in an SRS document
- Has subsets of, User requirements, Functional, and Non functional requirements

User Requirement

- User requirements describe user goals or tasks that the users must be able to perform with the product.
 - Valuable ways to represent user requirements include use cases, scenario descriptions, and event-response tables.
- User requirements describe what the user will be able to do with the system.
 - An example of a user requirement is the use case “Make a Reservation” using an airline, a car rental company, or a hotel Web site.
 - Other examples include, make an online claim submission to an insurance company; make an online bank transfer.
 - Submit Assignment and view grades on Blackboard
 - Check COVID-19 vaccination status

Functional Requirements

- Functional requirements specify the software functionality that the developers must build into the product to enable users to accomplish their tasks, thereby satisfying the business requirements.
 - The activities the system must perform
- Sometimes called behavioral requirements, these are the traditional “shall” statements: “The system shall e-mail a reservation confirmation to the user.” The system shall generate a receipt upon completion of online bank transfer, the system shall display a COVID-19 vaccination status upon request.
- Functional requirements are documented in a system requirements specification (SRS) document, which describes as fully as necessary the expected behavior of the system.
 - The SRS is used in overall design, development, testing, quality assurance, project management, and all other related project functions.
- The SRS also contains nonfunctional requirements.

Non-Functional Requirements

- These include performance goals and descriptions of quality attributes.
 - Other systems characters, Constraints and performance goals
- It specifies how the system will do what it is expected to do. These characteristics include
 - Usability
 - Portability
 - Security
 - Confidentiality
 - Integrity
 - Availability
 - Authentication
 - Non-Repudiation
 - Efficiency
 - Scalability
- Other nonfunctional requirements describe external interfaces between the system and the outside world, and design and implementation constraints

FURPS+ Requirements Acronym (1 of 2)

- Functional requirements
- Usability requirements
- Reliability requirements
- Performance requirements
- Security requirements
- + even more categories...

FURPS+ Requirements Acronym (2 of 2)

Requirement categories	FURPS categories	Example requirements
Functional	Functions	Business rules and processes
Nonfunctional	Usability Reliability Performance Security	User interface, ease of use Failure rate, recovery methods Response time, throughput Access controls, encryption

Common Issues in Requirements

- The project's requirements, vision and scope are never clearly defined.
- Customers are too busy to spend time working with business analysts, systems analysts, or developers on the requirements.
- User surrogates (Proxies, substitutes), such as product managers, development managers, user managers, or marketers, claim to speak for the users, but they don't accurately represent user needs.
- Requirements exist in the heads of "the experts" in your organization and are never written down.
- Customers claim that all requirements are critical, so they don't prioritize them.
- Your customers sign off on the requirements and then change them continuously.
- The project scope increases when you accept requirements changes, but the schedule slips because no additional resources are provided, no additional time is added, and no functionality is removed.
- Customers request certain functionality and developers build it, but no one ever uses it.
- The specification is satisfied, but the customer is not.

Requirements Gathering

- This is the exploratory process of researching and documenting project requirements.
- Primarily done during stakeholder meetings
- Requirements gathering is done at the very beginning of the project
- During Requirements Gathering, you'll identify the key stakeholders in the project
 - The people who brainstorm, analyze, approve or deny project updates, such as customers, team leads, department managers, board members, business owners, partners or manufacturers. They'll have the most say in the progress of the overall project.
- Requirements gathering helps to clearly understand and document the project goals.

Who gathers requirements in I.T Projects?

- Business analysts, Systems Analysts, and subject experts are responsible for requirement gathering process.
- Business customers would normally expect the project teams to be mind-readers, and to deliver a solution based on unspoken or unknown requirements.
- All of the requirements will need to be formally captured in a business requirement document, and translated/converted into functional specification.
- The Project manager manages requirements gathering and all other areas of an Information Technology Project.

Functional & Non-Functional Requirements

The **what** and the **how**

- Functional Requirements describe the what
 - What the system does
- While Non functional requirements describe the how
 - How the system does what it does

Additional Requirements Categories

- Design constraints –

- Specific restrictions for hardware and software

- Implementation requirements

- Specific languages, tools, protocols, etc.

- Interface requirements

- Interface links to other systems

- Physical requirements

- Physical facilities and equipment constraints

- Supportability requirements

- Automatic updates and enhancement methods

Stakeholders

Who is a Stakeholder?

- Before you can start determining how a business or system works (or will work), you must understand the stakeholder community
- You need to know the stakeholders to be able to get the best of your requirements gathering.
- A stakeholder is an individual who is materially affected by the outcome of the system (or business) or the project(s) producing the system
- Note that this definition comprises individuals both directly affected by the business or system as well as those that are indirectly affected by their involvement in the project

Stakeholders: Who do you involve and talk to?

- **Stakeholders**— persons who have an interest in the successful implementation of the system
- **Internal Stakeholders**— persons within the organization
- **External stakeholders** – persons outside the organization
- **Operational stakeholders** – persons who regularly interact with the system
- **Executive stakeholders**— persons who don't directly interact, but use the information or have financial interest
- **Customers** – the people that directly or indirectly do business with the project sponsors (could be internal or external)

Stakeholders of a comprehensive accounting system for public company



How do we determine stakeholders?

The full set of stakeholders is very large; we have to remember to include:

- The people who suffer from the problem;
- Those investing in the business or system;
- People determining the success of the solution;
- Who are the people making decisions?
- Who will get something from the business or system?

Stakeholder Examples

- Customers who fund a project or acquire a product to satisfy their organization's business objectives.
- Users who interact directly or indirectly with the product (a subclass of customers).
- Requirements analysts who write the requirements and communicate them to the development community.
- Designers and Developers who design, implement, and maintain the product.
- Testers who determine whether the product behaves as intended and meets the quality.
- Documentation writers who produce user manuals, training materials, and help systems.
- Project managers who plan the project and guide the development team to a successful delivery.
- Legal staff who ensure that the product complies with all pertinent laws and regulations.
- Manufacturing people who must build the products that contain software.
- Sales, marketing, field support, help desk, and other people who will have to work with the product and its customers.
- Department managers, board members, business partners, or Directors who make decisions, or have influence on the progress or success of a project.

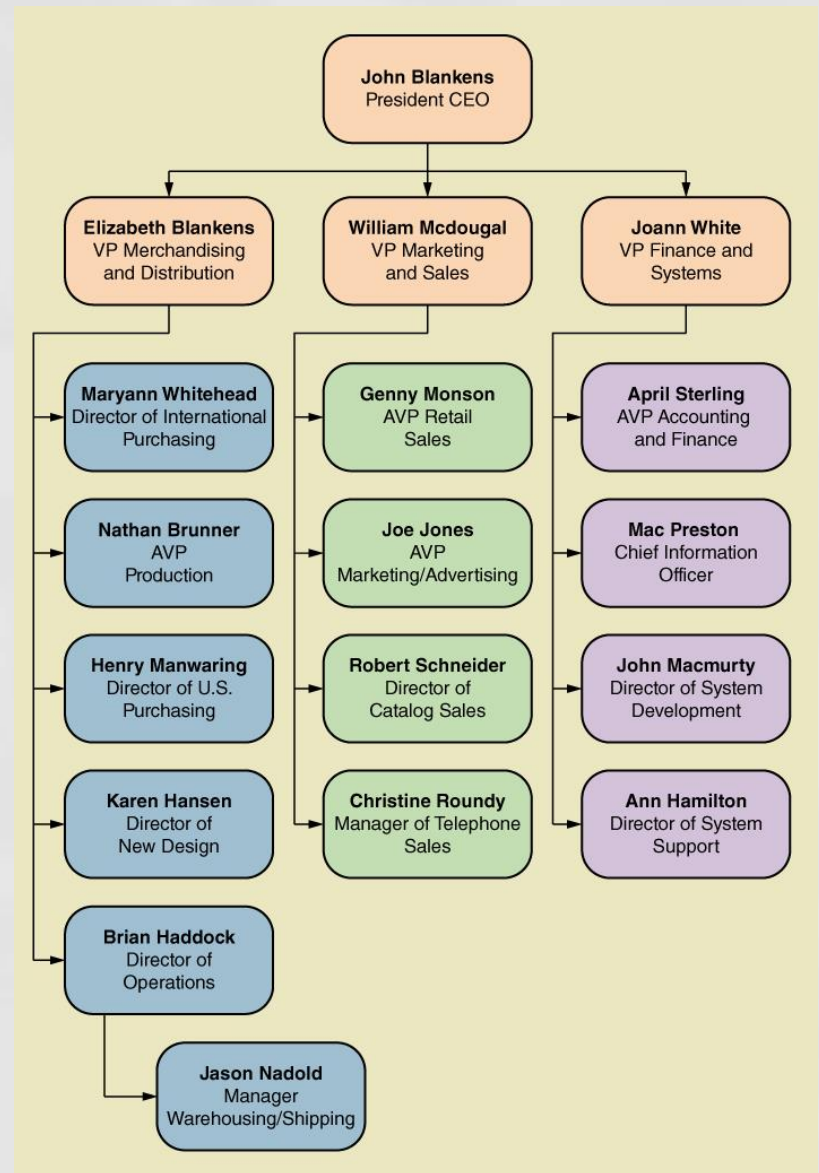
Stakeholder Representatives

- There can be many hundreds or thousands of stakeholders involved in a project, and it is often impossible to speak with every stakeholder.
- To deal with this, we can **recruit** a set of *stakeholder representatives* to be directly involved in a project.
 - This will ideally allow us to involve many different stakeholder **roles**, without having to deal with every *person*.
 - This also has implications especially when stakeholder representatives do not **exactly** understand the needs of the stakeholders they represent.

Stakeholders For RMO CSMS Project

- Phone/mail sales order clerks
- Warehouse and shipping personnel
- Marketing personnel who maintain online catalog information
- Marketing, sales, accounting, and financial managers
- Senior executives
- Customers
- External shippers (e.g., UPS and FedEx)

RMO Internal Stakeholders



Information Gathering Techniques

- Interviewing users and other stakeholders
- Distributing and collecting questionnaires
- Reviewing inputs, outputs, and documentation
- Observing and documenting business procedures
- Researching vendor solutions
- Participants' Observation
- Collecting active user comments and suggestions

Interviewing Users and Other Stakeholders

- Prepare detailed questions
- Meet with individuals or groups of users
- Obtain and discuss answers to the questions
- Document the answers
- Follow up as needed in future meetings or interviews

Themes for Information Gathering Questions

Theme	Questions to users
What are the business operations and processes?	What do you do?
How should those operations be performed?	How do you do it? What steps do you follow? How could they be done differently?
What information is needed to perform those operations?	What information do you use? What inputs do you use? What outputs do you produce?

Preparing for the Interview (1 of 2)

Before

- Establish the objective for the interview.
- Determine correct user(s) to be involved.
- Determine project team members to participate.
- Build a list of questions and issues to be discussed.
- Review related documents and materials.
- Set the time and location.
- Inform all participants of objective, time, and locations.

During

- Arrive on time.
- Look for exception and error conditions.
- Probe for details.
- Take thorough notes.
- Identify and document unanswered items or open questions.

Preparing for the Interview (2 of 2)

After

- Review notes for accuracy, completeness, and understanding.
- Transfer information to appropriate models and documents.
- Identify areas needing further clarification.
- Thank the participants.
- Follow up on open and unanswered questions.

Interview Session Agenda (1 of 2)

Discussion and Interview Agenda

Setting

Objective of Interview

Determine processing rules for sales commission rates

Date, Time, and Location

April 21, 2016, at 9:00 a.m. in William McDougal's office

User Participants (names and titles/positions)

*William McDougal, vice president of marketing and sales,
and several of his staff*

Project Team Participants

Mary Ellen Green and Jim Williams

Interview Session Agenda (2 of 2)

Interview/Discussion

1. *Who is eligible for sales commissions?*
2. *What is the basis for commissions? What rates are paid?*
3. *How is commission for returns handled?*
4. *Are there special incentives? Contests? Programs based on time?*
5. *Is there a variable scale for commissions? Are there quotas?*
6. *What are the exceptions?*

Follow-Up

Important decisions or answers to questions

See attached write-up on commission policies

Open items not resolved with assignments for solution

See Item numbers 2 and 3 on open items list

Date and time of next meeting or follow-up session

April 28, 2016, at 9:00 a.m.

Additional Techniques

- Observe and Document Business Processes
 - Watch and learn
 - Document with Activity diagram (next section)
- Research Vendor Solutions
 - See what others have done for similar situations
 - White papers, vendor literature, competitors
- Collect Active User Comments and Suggestions
 - Feedback on models and tests
 - Users know it when they see it

Models and Modeling

- How do we define requirements? After collecting information, create models
- Model– a representation of some aspect of the system being built
- Types of Models
 - Textual model– something written down, described
 - Graphical models– diagram, schematic
 - Mathematical models– formulas, statistics, algorithms
- Unified Modeling Language (UML)
 - Standard graphical modeling symbols/terminology used for information systems

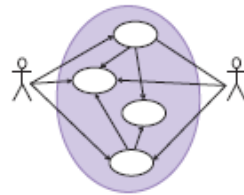
Reasons for Modeling

- Learning from the modeling process
- Reducing complexity by abstraction
- Remembering all the details
- Communicating with other development team members
- Communicating with a variety of users and stakeholders
- Documenting what was done for future maintenance/enhancement

Some Analysis and Design Models

1 buy new car
2 sell car
3 get car serviced
4 make payment
5 trade in car

Event list



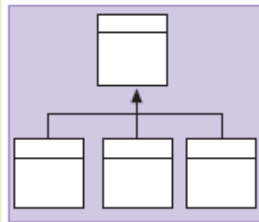
Use case
diagram



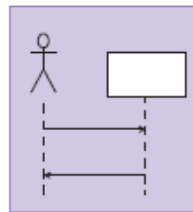
Use case
description



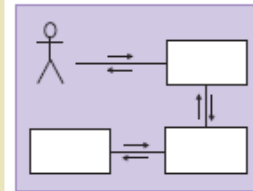
Location
diagram



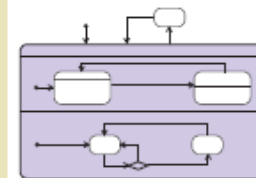
Class diagram



Sequence
diagram



Communication
diagram

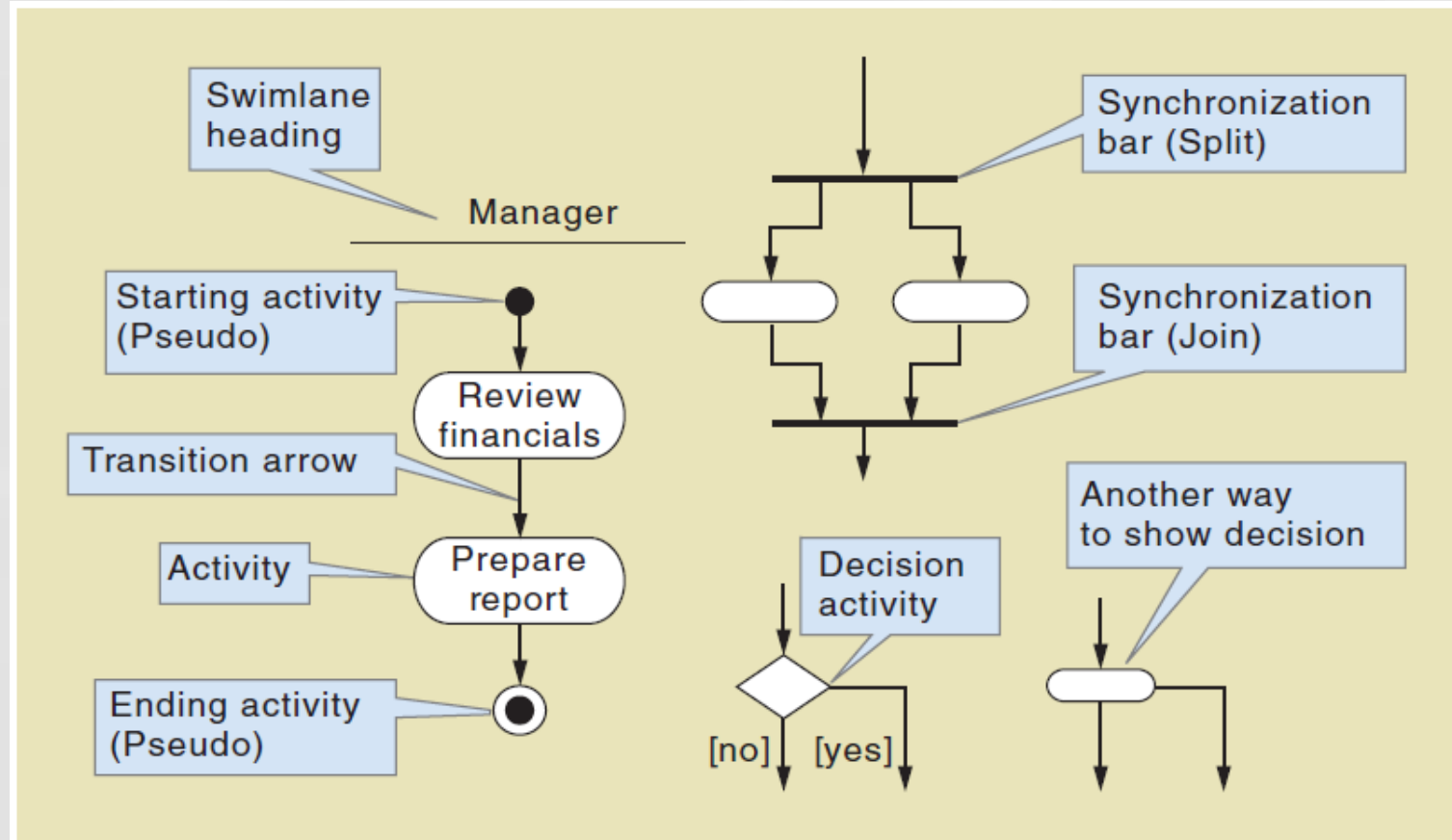


State machine
diagram

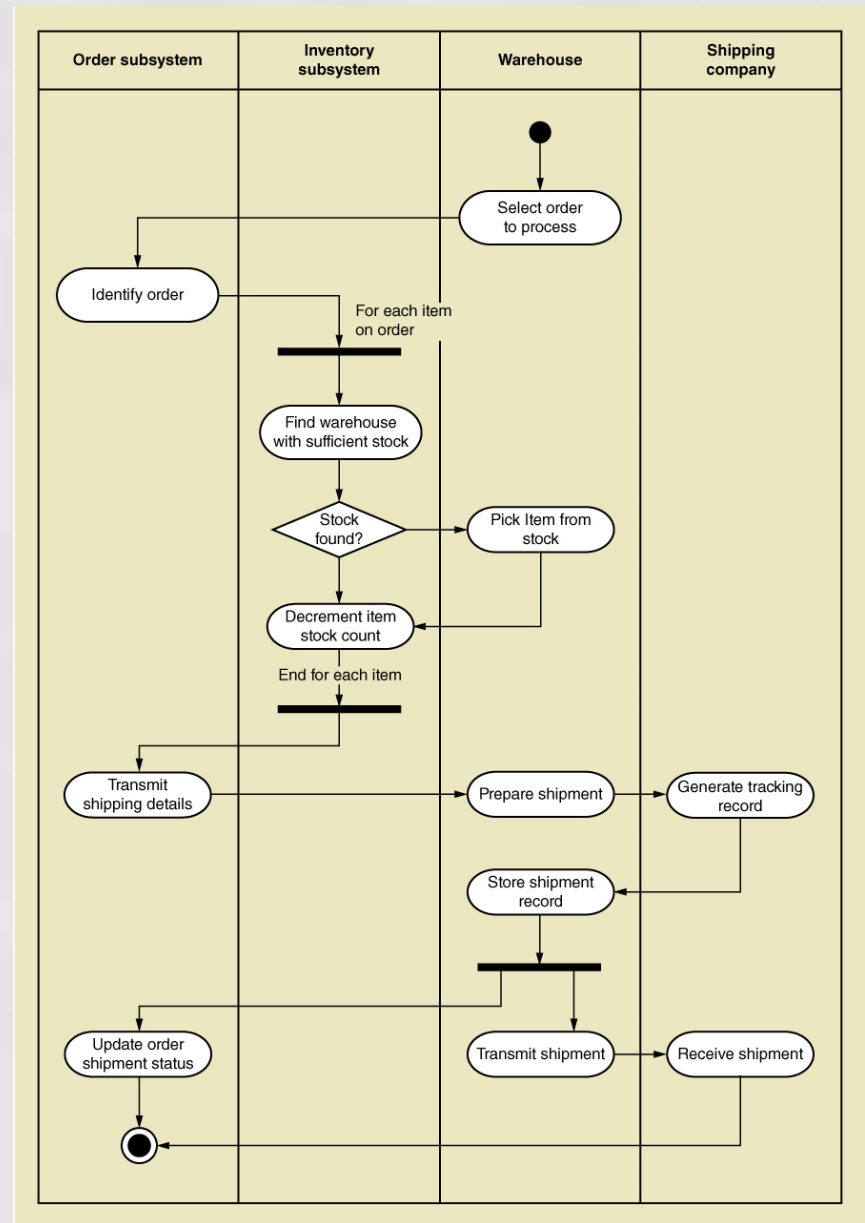
Use case Models, Workflows & Activity Diagrams

- **Use case** – a methodology used in system analysis to identify, clarify and organize system requirements.
 - Shows how a user uses a system to accomplish a goal
- **Workflow**– sequence of processing steps that completely handles one business transaction or customer request
- **Activity Diagram**– describes user (or system) activities, the person who does each activity, and the sequential flow of these activities
 - Useful for showing a graphical model of a workflow
 - A UML diagram

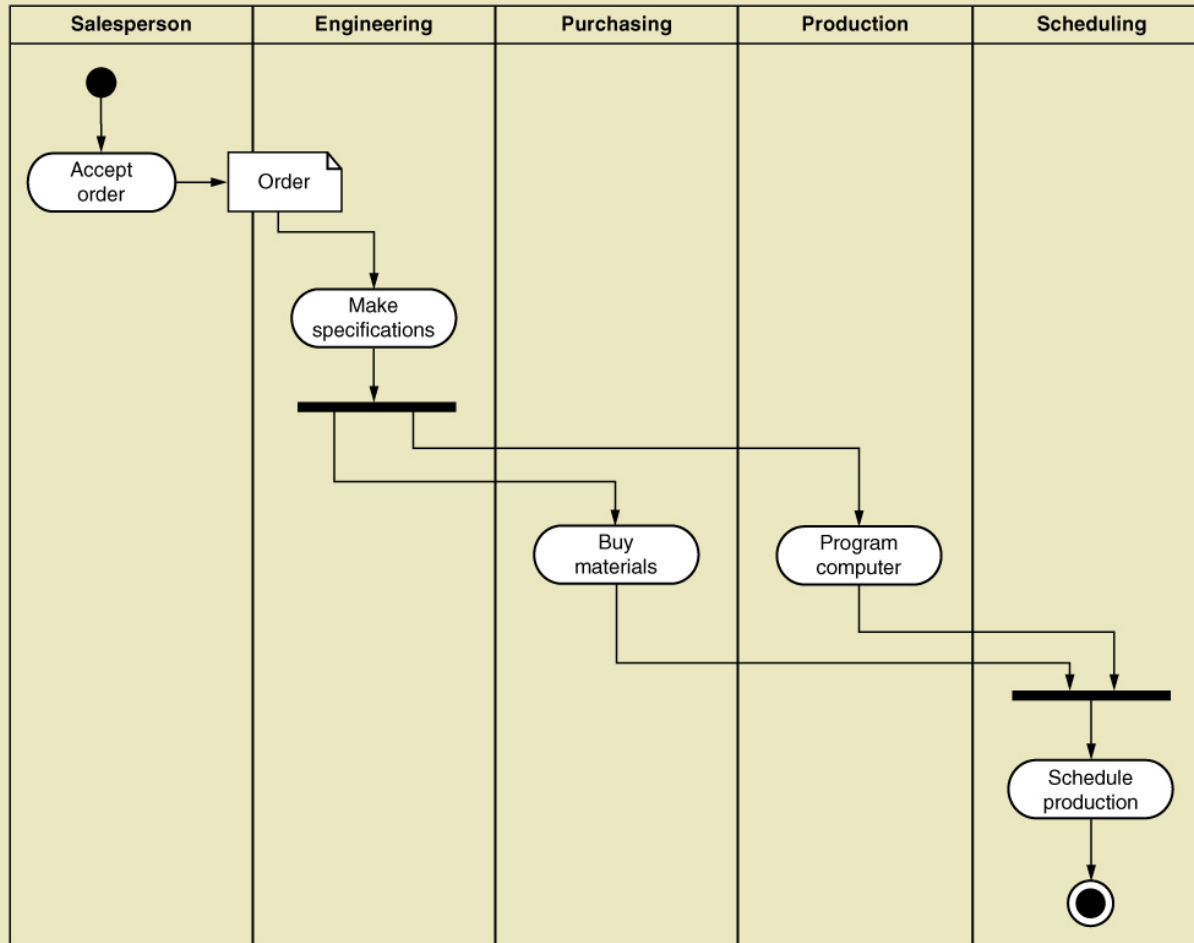
Activity Diagrams Symbols



Activity Diagram for RMO Order Fulfillment



Activity Diagram with Concurrent Paths



Summary (1 of 4)

- Systems analysis activities correspond to the core SDLC process *Discover and understand details*
- System projects originate from the information system strategic plan, which contains a technology architecture plan and an application architecture plan
- The RMO CSMS Project will be used throughout the text as an example of analysis and design

Summary (2 of 4)

- Systems analysis involves defining system requirements– functional and non-functional
- Analysis activities include
 - Gather detailed information
 - Define requirements
 - Prioritize requirements
 - Develop user-interface dialogs
 - Evaluate requirements with users
- FURPS+ is the acronym for functional, usability, reliability, performance, and security requirements

Summary (3 of 4)

- Information gathering techniques are used to collect information about the project
 - Interviews, questionnaires, reviewing documents, observing business processes, researching vendors, comments and suggestions
- The UML Activity Diagram is used to document (model) workflows after collecting information
- Models and modeling are used to explore and document requirements
- Unified Modeling Language (UML) is the standard set of notations and terminology for information systems models

Summary (4 of 4)

- Stakeholders are the people who have an interest in the success of a project
- There are internal & external stakeholders as well as operational & executive stakeholders
- Requirements gathering techniques are used to collect information about a project
 - Interviews, questionnaires, reviewing documents, observing business processes, researching vendors, comments and suggestions
- Project initiation is the first phase of the project management life cycle.