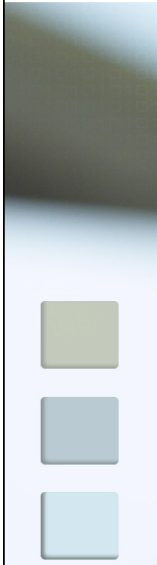


Custom Text Chapter 4

Domain Analysis

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Chapter Topics

- 
- The three components of problem solving.
 - The problem space vs. the solution space.
 - Requirements vs. product specifications.
 - Domains and their boundaries.
 - Identifying domain concepts for analysis and modeling.
 - Domain dictionaries and domain catalog.
 - Identifying and organizing business rules.

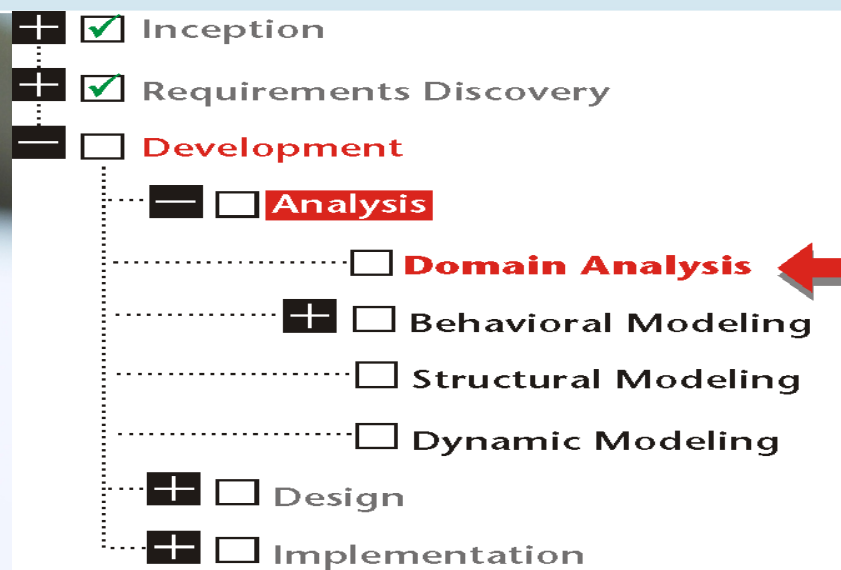
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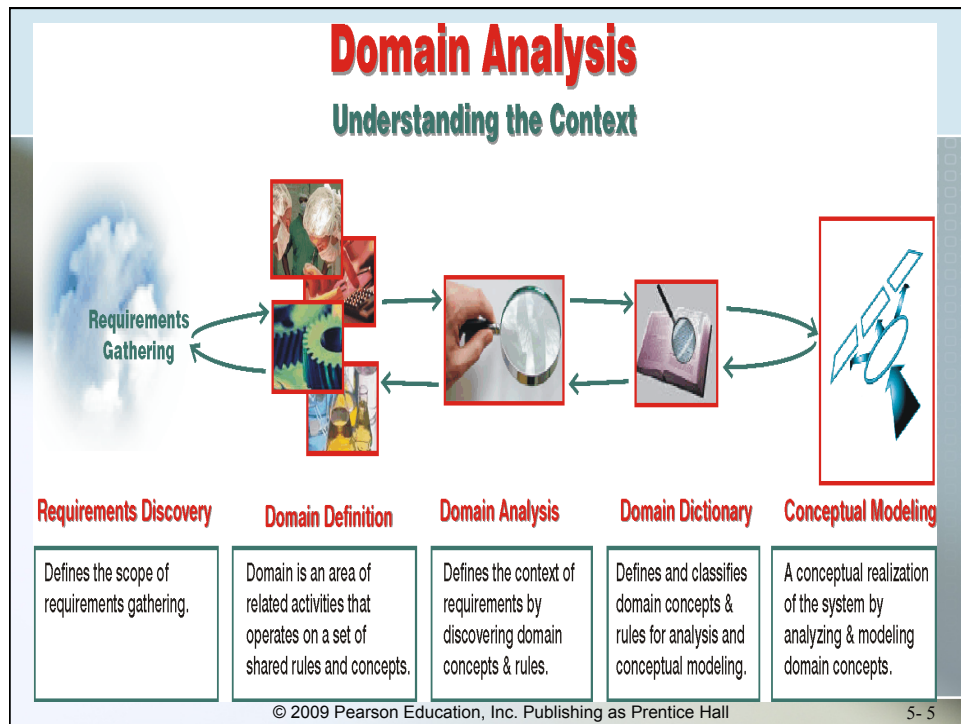
5- 2

Domain Analysis

- Domain analysis identifies business concepts that will be refined into the building blocks of an analysis model for the information system.

Domain Analysis and Development



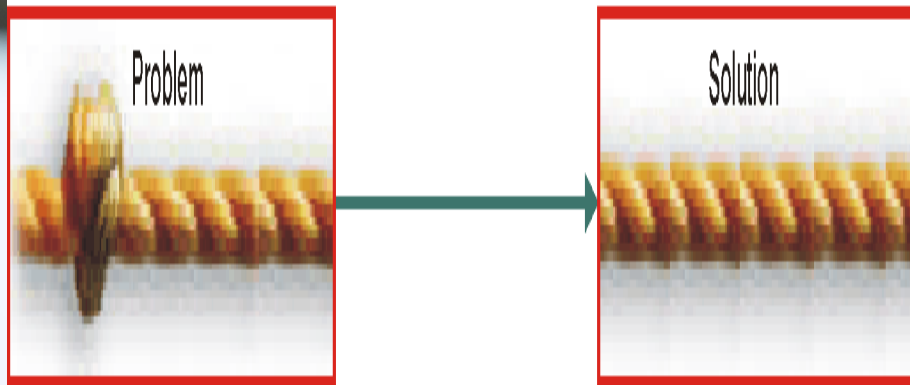


Problems, Solutions, and Methods

- Solving problems involves not a pair but a trio of components: problem, solution as method or process, and solution as answer. Each one can be understood only in relation to the whole.

Problem vs. Solution

The Paired View



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Problems, Solutions, and Requirements

- To build a software system — a product — we must understand the problem. We must also understand **what** is required to solve the problem *before* we can decide **how** to solve it.

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Problems, Solutions, and Methods

- Three components of problem solving: the problem that we want to solve, the answer to the problem, and the method to arrive at the answer.

Solution as Two Concepts

Method vs. Answer



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Context, Method, and Solution

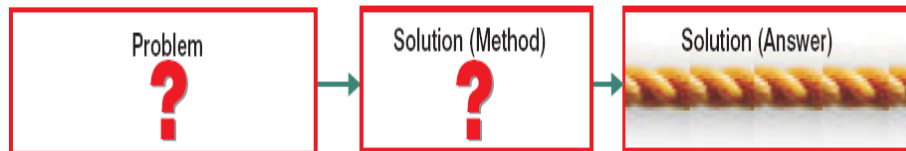
- Merely knowing the features of the solution is inadequate for building it correctly.
 - We must understand the context to:
 - find the proper method(s), and
 - design a solution that takes the context into account.

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Requirements as The Answer

'What' Needs 'Why', 'Where' & 'How'



Problem Space Versus Solution Space

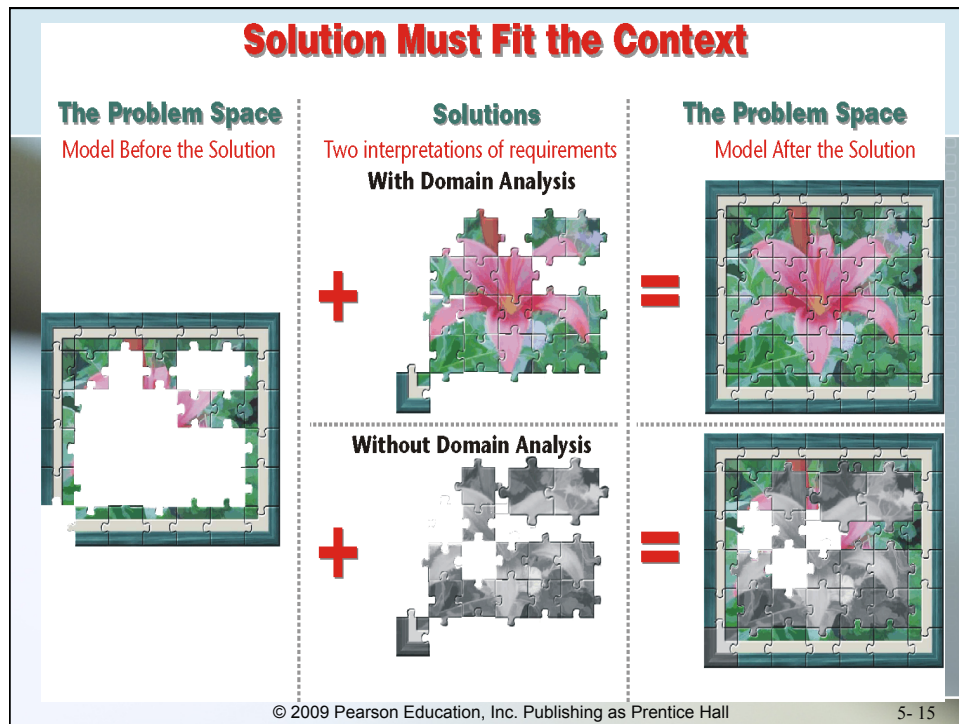
- The three components of problem solving reside in two organically related spaces: the problem space and the solution space. Changing an element within one space has a ripple effect across both.

Problem Space

- Problem space is the context from which the problem arises and in which the solution must operate.

Solution Space

- Solution space defines the territory in which concrete decisions about the information system — as opposed to its features — are made.



Requirements Versus Product Specifications

- Requirements specify the *desired* features of the product or service.
- Product specifications define the product that must realize those features.

Products Are Solutions to Real or Perceived Problems

Product	Requirements
Hammer	Drive in a nail and pull out a nail.
Watch	Tell time and attach to wrist.
Telephone	Enable people to talk to others across vast distances in real time.
Movie	Entertain with sound, music and moving pictures.
Plane	To fly people from location to location.
Rocket	To carry people into space.

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Products and Requirements

- Sometimes more than one product or service can satisfy a requirement. The choice depends on many factors. The covered wagon was one of the few choices before railroads. Though still a choice, we doubt that it will be used.

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Alternate Solutions

For the Same Requirement

Problem

Shellfish spoils fast



Various Solutions

Can be used separately or combined;
Can be bought, built, or customized



1



2



3



4



5



Requirement

Get the catch to the consumers
before it goes bad

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Domain Definition

- A business domain is an area of related activities that operate on a set of shared rules and concepts:
 - Business domains are organized domains.
 - Business domains are goal-oriented.
 - Business domains can change fast.

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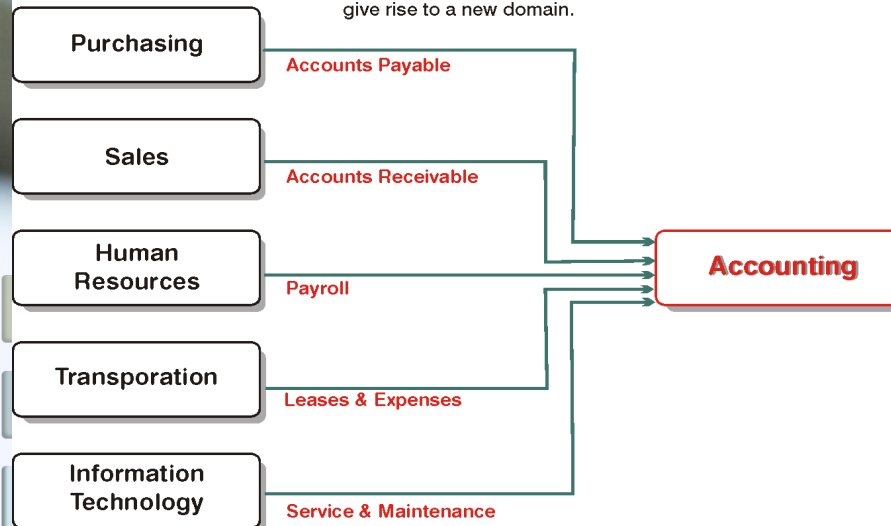
The Domain Scope

- Domain scope defines the boundaries that separate shared activities, rules and concepts within a domain from those on the outside.

Derivative Domains

The Case of Accounting

Common activities, concepts and rules across several domains may give rise to a new domain.



Domains and Subsystems

- Domain definition provides a framework for the conceptual subsystems within the information system.

Walden Medical Center: *Domain Definitions*

(Partial Listing)

Domain	Scope Outline
Patient Management:	All activities that directly come into contact with patients fall within this domain, including: <ul style="list-style-type: none">▪ Referrals▪ Scheduling▪ Registration, Admissions▪ Treatments▪ Patient Billing Issues
Drug Inventory & Purchasing:	<ul style="list-style-type: none">▪ Pharmaceutical Inventory▪ Drug Supply Chain
...	...
Medical & Lab Technology:	<ul style="list-style-type: none">▪ Medical Equipment Purchasing▪ Medical Equipment Inventory▪ Medical Equipment Maintenance
House Services:	<ul style="list-style-type: none">▪ Laundry▪ Cleaning▪ Food Preparation & Diets
...	...

The Information System Strategy for Walden

■ A software consulting company

- preferably experienced in medical fields, to build the system in cooperation with a small number of employees who would coordinate the communication between the consultants and the knowledgeable hospital staff.

A system integrator company

- which would work, through the same staff as above, to provide the infrastructure — networking, workstations, servers, etc. — to deploy the software as it becomes available.

■ A Help Desk staff

- which would really be the same employees who would work with the software and hardware consultants to implement the system. Both consulting companies would be required to train the Help Desk. In turn, these employees would be responsible for training users, reporting problems and requesting services and enhancements.

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Snapshot of Medical Goals

Beds:	800 licensed beds
Doctors:	Close to 300 fulltime & 150 participating
Nurses:	More than 1,600
Labs:	30
Lab Technicians:	150
Non-Medical Staff:	400
Permanent Research Projects:	5
Referral Admissions:	5,000
Out-Patient Visits:	10,000
Emergency Admissions:	200 per day

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The Scope of Walden's Patient Management

- Referral
- Appointment
- Registration
- Medical Service
- Hospitalization
- Cost & Record Keeping
- Discharge
- Patient Billing

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Domain Analysis

- Domain analysis is analyzing the context of requirements. It has a two-fold task:
 - define the context in which the information system will operate.
 - discover and define concepts that the product must incorporate or take into account in order to meet its objectives.

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Finding Domain Concepts

- Domain concepts are objects, processes, people and rules that constitute the goals, the behavior and the structure of a domain.

Finding Domain Concepts

- ① Discover the essence of the requirements.
- ② Discover problems that the requirements are supposed to solve.
- ③ Discover the components of the problem.
- ④ Discover related domain concepts.

Walden's Patient Management: An Interview

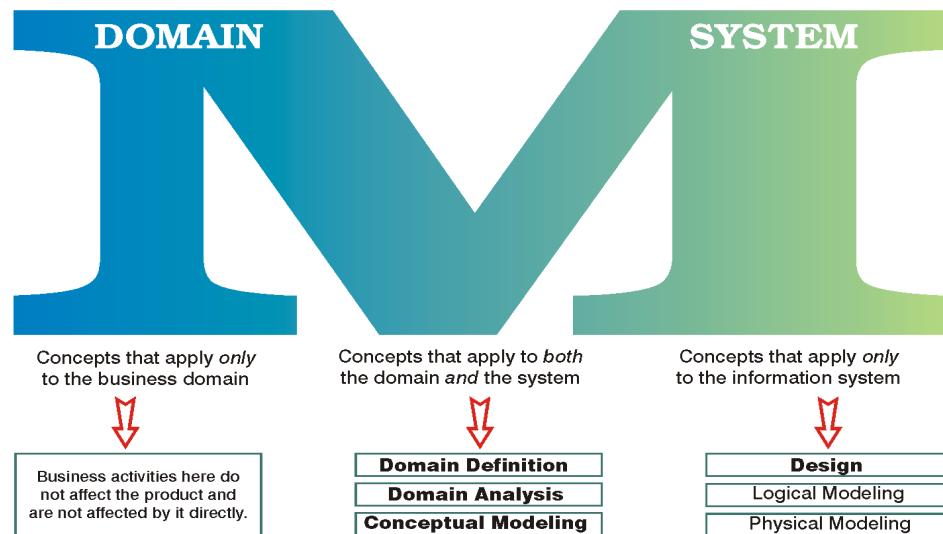
- Refer to Table 5.3 on Page 160.

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'M' for Model

The Passage from
The Problem Domain to the Solution Domain



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Domain Dictionary

- Domain dictionary organizes and brands domain concepts. It is the link between stakeholders who must verify the concepts and the analysts who would use them as the foundation for building a conceptual model of the system.

Domain Dictionary

- The dictionary organizes domain concepts (the **problem space**) pertinent to the system (the **solution space**).
- To populate the dictionary, we turn to all the products of information gathering: requirements, interviews, manuals.

Domain Dictionary

- The most promising concepts are:

- **Subjects**

- “The noun, noun phrase, or pronoun in a sentence or clause that denotes the **doer of the action.**”

- **Objects**

- “**a.** A noun or substantive that receives or is affected by the action of a verb within a sentence. **b.** A noun or substantive following and governed by a preposition.”
 - These nouns are candidates for becoming objects in an **object-oriented** sense.

- **Verbs**

- They can indicate processes, but they can also hide nouns, or grammatical objects: “ordering a book” is a variant of “placing *an order* for book.” The object “order” is hidden in the verb “order.”

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Domain Dictionary An Example

- **Medical Service.** Depending on the nature of the medical service, doctors, nurses and lab technicians provide the patient with appropriate service (s) for which the appointment has been made.

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The Dictionary Template

- Name
- Type
- Description
- Source
- Notes

The Dictionary Template

- **Type**
 - Process
 - A series of actions, changes, or functions bringing about a result.
 - A series of operations performed in the making or treatment of a product.
 - Function
 - The purpose or the result of one action or a set of actions.
 - Role
 - A grouping of any entity.
 - Object
 - Something perceptible by one or more of the senses, especially by vision or touch.
 - Something intelligible or perceptible by the mind. Or we can use Entity instead.
 - Business Rule
 - To be discussed in detail later.
 - Formula.
 - A statement, especially an equation, of a fact, rule, principle, or other logical relation.
 - A method of doing or treating something that relies on an established model or approach.
 - Identifier
 - A symbol that identifies an object.

Patient Management: Domain Dictionary

Name	Type	Description
Appointment	Process	Scheduling of a <u>patient</u> to receive <u>medical service(s)</u> . Performed by the <u>appointment clerk</u> .
Appointment	Object	The scheduled date and time for providing a <u>medical service</u> to a <u>patient</u> .
Appointment Clerk	Role	Makes <u>appointments</u> for the <u>patient</u> .
Medical Service	Object	Any service of medical nature provided by <u>medical staff</u> to a <u>patient</u> ; diagnosis, prescription, administration of drugs, lab tests, etc.
Medical Service	Function	The act of providing a <u>medical service</u> to the <u>patient</u> by <u>medical staff</u> .
...
Referral Source	Role	A <u>primary care physician</u> , an <u>emergency medical worker</u> or an <u>outside hospital</u> that refers a <u>patient</u> for an <u>appointment</u> to receive a <u>medical service</u> . <u>Patient</u> himself or herself can be a referral source.
Registration	Process	Carried out before a set of <u>medical services</u> are performed. The process gathers new or changed personal and insurance information for a new or an existing <u>patient</u> . A hospital <u>ID card</u> may be issued as part of this process. Performed by the <u>registration clerk</u> .
Registration Clerk	Role	Performs <u>registration</u> .

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Business Rules

- Business rules are a set of detailed policies, laws, procedures, guidelines and standards under which an enterprise operates. A business rule is a statement that defines or demands adherence to a unit in the set.

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Classification of Business Rules

- Classification helps us to correctly incorporate business rules in the design and the implementation of an information system.

Managing Business Rules

- Business rules must be organized, maintained and verified for the life of a business, not for the duration of an application.

Rules Dictionary

- Requirements specify features of the product, while business rules apply beyond any single solution.

Patient Management: Business Rules Dictionary

- Refer to Table 5.5 on Page 175.

Patient Management: Business Rules Questionnaire

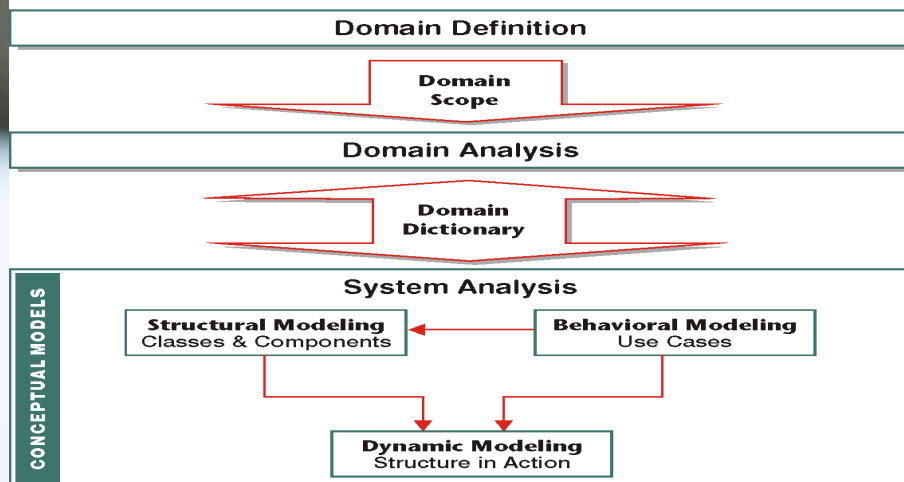
ID	Definition	True / False	Comment
001	A patient is anybody who suffers from a medical condition and is referred to the hospital by a referral source — a doctor, a medical emergency worker or another hospital.	<input type="checkbox"/> <input type="checkbox"/>	
...			
003	A patient less than 18-years old must be accompanied by a related adult or an emergency medical worker.	<input type="checkbox"/> <input type="checkbox"/>	
...			
006	If the patient bill is not paid within 30 days, then the bill is considered overdue.	<input type="checkbox"/> <input type="checkbox"/>	

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Next: Conceptual Modeling

To Conceptual Modeling From Domain Modeling



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