14. Context and Requirements

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Bob Glushko

Plan for Today's Class

Context

Requirements

- Stakeholders
- Methods for identifying requirements
- Specifying requirements
- Classifying requirements; business rule types
Assignments and Course Project Reminder

A3 not due until 3/17; I'm considering some big changes to remaining assignments

Course Project

- 3/12 1-page Project Proposal
- 3/19 present your project
- 4/14 progress report and presentation
- 4/28 progress report and presentation
- 5/12 final presentation
- 5/16 final report due

Setting the Context

Any Document Engineering project worth doing will involve some set of document types and information components that take part in some set of business processes for the benefit of some stakeholders.

Because "no document (or process) is an island" there will always be some point at which the documents and processes you care about will intersect or overlap with some that that you don't care about.

We'll call the CONTEXT whatever characteristics of the situation that define what is in or out of scope, inside or outside of the boundary in which our solution has to work.

Where this boundary falls depends on which stakeholder perspective(s) you emphasize.
Context and Perspective: Cooking School, or Restaurant?

Patterns as Requirement Clusters
Context and Selecting Patterns

Much of what businesses do for themselves and with other businesses can be described using a small repertoire of supply chain or other business process / transaction patterns.

Each of these patterns implies a set of documents and some choreographies of document exchanges.

Selecting an appropriate pattern will help expose the information requirements, rules and constraints for our subsequent document analysis and design.

Choosing a pattern suggests which document payloads we'll need to find or design and in which business processes we are likely to deploy them.

How we describe context influences what patterns we identify and how we apply them.

Business Process is the Most Important Context Dimension

Business processes are the most important context dimensions because they highlight roles, perspectives, and strongly shape the information requirements.

For example, contextualizing a simple procurement pattern to have the seller and buyer in different countries adds new processes and documents.
Simple Procurement Pattern

Imported Goods Procurement Pattern
Other Context Dimensions

- Product Classification
- Industry Classification
- Geopolitical Classification
- Legal or Regulatory Jurisdiction
- Business Process Role or Supporting Role

Representing Context in Document Architecture

[Diagram showing relationships between different categories and their extensions.]
What Are Requirements?

Once a problem or opportunity is defined and scoped, any constraints on possible solutions or goals that must be satisfied can be viewed as REQUIREMENTS: conditions that must be met for the solution to be acceptable.

Requirements are most often functional: descriptions of what the solution must do or must enable someone to do with it.

Requirements can be expressed in terms of quality attributes (often called the "ilities" – usability, reliability, portability, interoperability, maintainability, etc.).

Requirements do not dictate how the solution is to be achieved – that is the responsibility of design.

Some Important Caveats

Document Engineering focuses on the requirements for information and process models and by their computer-processable implementations.

- Requirements for the associated software applications are obviously important, but Document Engineering has nothing special to say about them...
- ... often because the models will be deployed using an existing software platform
- ... or because the constraints and business rules captured by the models are simply the most important ones

Many of the information requirements in document-intensive contexts are contained in existing documents.

There is no sharp line dividing "requirements analysis," in which we get requirements from people, and "document analysis," in which we obtain them from documents.
Stakeholders: People Who Can Provide Requirements

"User-centered design" is a buzzword... but requirements can and must come from a wider range of sources

Users (there may be multiple classes of users, and determining these classes is a challenge in its own right)

Customers (the people who make purchase decisions, who may or may not also be users)

Marketing and sales people who talk with users and customers

Product and technology "visionaries" and technical gatekeepers (inside your firm, or inside the customer firm)

Other People Who Might Provide Requirements (Not Always Correctly)

Consultants

Designers and developers often think they can imagine themselves in user roles

People who manage the users often think they can speak for them
Responsibility vs Task-Centered User Classification

It is usually easy to identify people on the basis of their job titles or formal roles in the organization or environment that you are trying to understand – "system operator," "programmer," "shipping clerk," "truck driver," "professor," etc.

- It can seem straightforward to define requirements in terms of applying technology to the tasks that are defined by these job descriptions (example: "enable the system operator to manage multiple systems"

But this is less useful than classifying people on the basis of what they really do or what their actual responsibilities are, and the titles or formal roles may offer little help in discovering this

- Job titles and formal organizational structure may not reflect what people actually do or what they might be doing better. Their job titles might make it difficult for them to tell you

Responsibility-Centered Classification and Requirements

Once you think in terms of responsibilities, you can define requirements in terms of satisfying them, which should produce better requirements.

The tasks that people currently perform (or the documents they currently produce or use in performing them) might be constrained by their current systems or lack thereof. A new system (or new documents) might support better ways of meeting the responsibilities.
Methods for Identifying Requirements

Studying people or phenomena in their natural surroundings as an anthropologist or ethnographer:
- observing and listening without trying to influence
- asking questions in a non-judgmental way

Conducting face to face interviews or structured group sessions

Requirements "meta-models" or templates or lists of questions can yield more complete and consistently specified requirements

There are always lots of things people want to tell you if they trust you but which they will never write down

Paving the Cow Paths

In "document-intensive" processes (especially those where the documents are paper ones) it is seductively easy to define a requirement of "replacing paper forms with online ones" while otherwise leaving the basic processes the same

But this assumes that the product (or document) was designed to meet requirements in the first place and that these original requirements haven't changed

Most people concede that the "naturalist" perspective is needed if you're designing a new system or a new product (or a new document)

So taking time to identify requirements is desirable, if only to validate existing requirements, and it also ensures that important explicit and tacit knowledge isn't lost
Clarifying and Validating Requirements

If you did your job well in the "naturalist" phase, you can test your understanding of the requirements by conceptualizing alternative ways to satisfy them and trying to "sell" these to the people giving you the requirements.

Testing your understanding means you won't end up "blaming the victim" for not expressing requirements correctly.

Get people's impression of whether your approach would meet the need in an acceptable and usable way.

Communicating Requirements

The analyst is the "communication middleman" between the customer and the developer, and often between other types of stakeholders.

The analyst translates technical language into business language and vice versa.

An intermediary is necessary because the customer and developer speak different languages.

So the analyst needs to be able to speak the language of both the customer and the developer.
Specifying Requirements

Requirements can be quantitative or qualitative, but in all cases should be verifiable.

PROCESS and DOCUMENT requirements are often closely related, and diagrams that depict their relationships – process / choreography / orchestration model that show document exchanges – are extremely helpful in ensuring that requirements are complete and consistent.

Specifying requirements using something like "simplified technical English" makes them easier to validate and communicate.

"Business Rule" is an up and coming buzzword in information systems that refers to a formal or refined statement of an requirement that is expressed in a technology-independent fashion.

Simplified Technical English

Simplified grammar - short sentences in active voice, simple verb tenses

Simplified logic - temporal or structural ordering of sentences with explicit "control flow"

Controlled vocabulary - approved and unapproved terms, used consistently
**STE Example**

**BEFORE:** Gain access to blade. After removing old blade, new blade may be fitted by proceeding in reverse order, using gloves to avoid injuries by teeth of blade. Before you attempt any of the above, the power should have been switched off.

**AFTER:** Make sure that the on/off switch is in the "off" position. Remove the blade cover from the machine. Warning: wear gloves when you touch the blade. Remove the used blade. Install the new blade. Install the blade cover.

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**Common Errors in Specifying Requirements**

**MISSING ACTOR:** "If the order is incomplete, then..." -- Who determines that the order is incomplete?

**FLOW BREAK, NULL "TRANSFER OBJECT":** "The clerk informs the manager" - How? By sending a document?

**INCOMPLETE CONDITIONAL:** "If x, then y" - What happens if not x?

"OTHERWISE" ORPHAN: "Otherwise" or "else" clauses that aren’t preceded by and related to an "If" clause

**INCONSISTENT NAMES:** Are the "project lead," "project manager," and "lead engineer" the same actor?
Exercise: Identify Errors and Omissions in these Requirements

1. A requestor submits a Purchase Order Request to the purchasing department clerk

2. If the POR is for less than $5000, and if the POR has a valid budget number, then the clerk enters the POR.

3. The Purchasing System issues a PO and notifies the purchasing agent

4. Otherwise, the clerk rejects the POR

Classifying Requirements in Document-Intensive Contexts

SOLUTION requirements – the functional, performance, quality attributes

INFORMATION or DATA requirements – what information is needed, what are its datatypes, possible values

DOCUMENT or STRUCTURE requirements – how is the information organized / assembled / packaged into sets of related information

PRESENTATION or SYNTACTIC requirements – how is the information presented or formatted or rendered – the physical or output model

PROCESSING and USAGE requirements – what relationships between documents have a business purpose
Categories for Business Rules

There are many different schemes for categorizing requirements or business rules.

Most approaches distinguish constraints on content that are represented in data models from constraints on behavior represented in process models.

Other schemes distinguish single-item constraints that must always be true from those that reflect the relationship between two or more items or that can change according to a process context.

Constraints can also be classified according to the manner in which they are represented and enforced in an implemented application.

YART from Chapter 8 of Document Engineering

Rules that Apply to Conceptual Models
- Semantic
- Structural
- Usage

Rules that (Can Also) Apply to Physical Models
- Syntactic
- Processing
- Presentational

Rules that Apply to Instances or Implementations
- Content
Semantic Rules

Establish properties: "The Order Number is an identifier that is unique to the Buyer"

Express generalizations: "An Auto is a type of Vehicle"

Expose dependencies: "The Price of an Item can depend on the Buyer"

Structural Rules

Define co-occurrence or aggregation relationships between components

"Each Illustration must have a Caption"

"Every Order must have an Order Number, a Buyer and an Issue Date"
Usage Rules

Define policies or privileges governing access to information

Often based on organizational roles or responsibilities

"An Employee Salary can be viewed by a Manager but can only be changed by someone in the Human Resources Department"

Syntactic Rules

Concern the form in which models are encoded

Might specify a particular XML vocabulary

"All Purchase Orders must be encoded according to ANSI X12 850"

"All Purchase Orders must conform to the Universal Business Language"
Processing Rules

Define actions to be taken whenever a given condition occurs or set of information is encountered

Also called Procedural or Behavioral rules

"The Seller will respond to an Order with an Order Response"

"If the Item is Out of Stock, create a Back Order Request"

"If the Customer Account Balance is greater than $1000, do not allow any more purchases"

Presentation Rules

Govern the appearance or rendering of an information component

"The Item Description must be adjacent to the Product Image"

"The Title should be centered"
Content Rules

Establish constraints about the values of information components or dependencies among them

"The Total Value of an Order cannot exceed $100,000"

"The Currency Code should be expressed using ISO 4217 codes"

"The Shipping Address must be the same as the Billing Address"

"The Start Date must be earlier than the End Date"

"The Customer's Account Balance must be greater than 0"

Combined Rule Types

"If the Purchase Order Amount exceeds $10000, the Party must supply a Duns Number"

"If the Customer's Account Balance exceeds $1000, display it in Red"

"If the Customer's Account Balance exceeds $10000, send a Past Due Reminder by email, fax, and voice mail"
Readings for 12 March - Document
Anthropology and Archeology

Chapter 11 of *Document Engineering*

Chapter 16 of *Document Engineering*, 540-554 (Capability Assessment)

The Myth of the Paperless Office (2002). "Two Case Studies (pages 33-49)"