



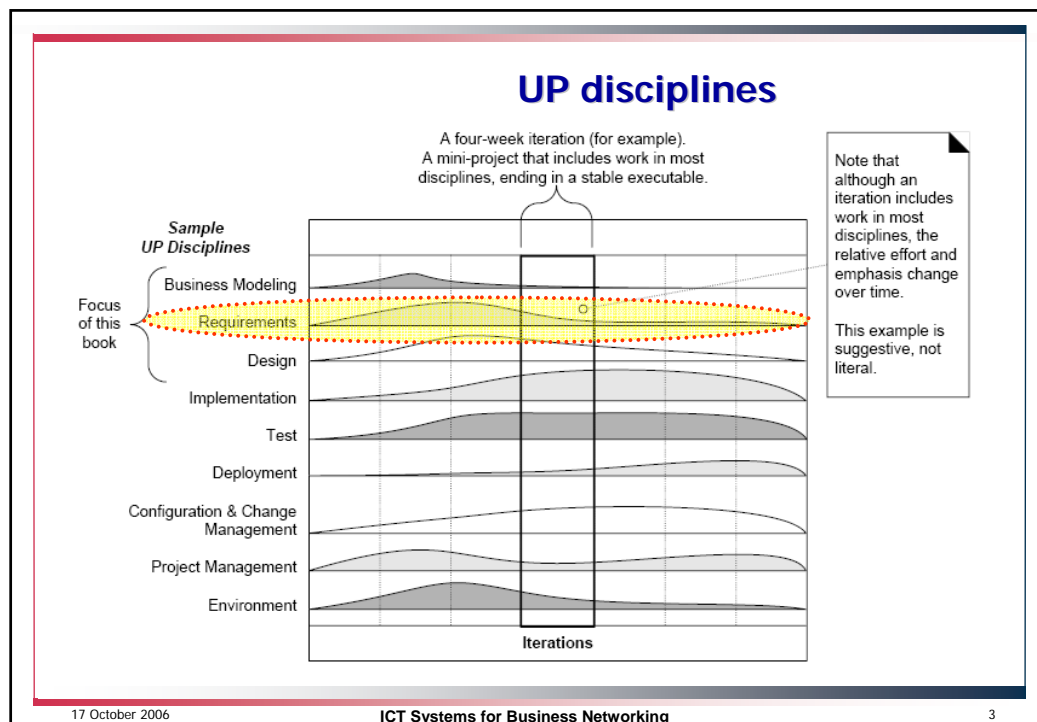
## Sistemi ICT per il Business Networking

**Requirements: Vision, Supplementary  
Specifications, Glossary artefacts**

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## UP Disciplines

- The UP describes **work activities** (e.g. writing a use case) within **disciplines**
- **Discipline**: a set of activities (and related artefacts) in one subject area (e.g. the activities within requirements analysis).
- **Artefact**: any work product (e.g. code, Web graphics, database schema, text documents, diagrams, models, ...).



## Development case

| Discipline         | Artifact<br>Iteration-*     | Incep.<br>I1 | Elab.<br>El. .En | Const.<br>CL.Cn | Trans.<br>T1..T2 |
|--------------------|-----------------------------|--------------|------------------|-----------------|------------------|
| Business Modeling  | Domain Model                |              | s                |                 |                  |
| Requirements       | Use-Case Model              | s            | r                |                 |                  |
|                    | Vision                      | s            | r                |                 |                  |
|                    | Supplementary Specification | s            | r                |                 |                  |
|                    | Glossary                    | s            | r                |                 |                  |
| Design             | Design Model                |              | s                | r               |                  |
|                    | SW Architecture Document    |              | s                |                 |                  |
|                    | Data Model                  |              | s                | r               |                  |
| Implementation     | Implementation Model        |              | s                | r               | r                |
| Project Management | SW Development Plan         | s            | r                | r               | r                |
| Testing            | Test Model                  |              | s                | r               |                  |
| Environment        | Development Case            | s            | r                |                 |                  |

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## Vision

- serves to tersely **communicate** the big ideas regarding
  - **why** the project was proposed
  - **what** the problems are
  - **who** the stakeholders are
  - what they **need**
  - what the proposed **solution** looks like

**From RUP:** "The Vision defines the stakeholders' view of the product to be developed, specified in terms of the stakeholders' key needs and features. Containing an outline of the envisioned core requirements, it provides the contractual basis for the more detailed technical requirements"

## Vision: problem statement

### Are We Solving the Same Problem? The Right Problem?

- It will **reduce** the likelihood that stakeholders are trying to solve slightly different problems
- Usually **quickly** created
- The effort often reveals **fundamental differences** of opinion in what the parties are trying to achieve

|                                |     |
|--------------------------------|-----|
| The problem of                 | ... |
| affects                        | ... |
| the impact of which is         | ... |
| a successful solution would be | ... |

## Vision: The Key High-Level Goals and Problems of the Stakeholders

### Are We Solving the Same Problem? The Right Problem?

- A table summarizing the **goals** and **problems** at a high level and revealing important non-functional and quality goals.  
E.g.
  - We need fault-tolerant sales processing
  - We need the ability to customize the business rules

| Need         | Priority | Concerns        | Current Solution | Proposed Solutions |
|--------------|----------|-----------------|------------------|--------------------|
| <b>goals</b> |          | <b>problems</b> |                  |                    |
|              |          |                 |                  |                    |

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## Vision: System Features

- An **externally observable service** provided by the system which **directly fulfills a stakeholder need**
- Features are **things the system can do** → They should pass this linguistic test: The system shall do <feature X>
  - E.g. the system shall do payment authorization
- The Vision may be used as a formal or informal **contract** between development and business → system features are a mechanism **to summarize what the system will do**
- **Complementary to the use cases**, as the features are terse and precise
- **Suggestion**: A Vision should include less than 50 features. If more, consider grouping and abstracting the features

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## Vision: example

### Introduction

We envision a next generation fault-tolerant point-of-sale (POS) application, NextGen POS, with the flexibility to support varying customer business rules; multiple terminal and user interface mechanisms, and integration with multiple third-party supporting systems.

### Positioning

#### **Business Opportunity**

Existing POS products are not adaptable to the customer's business, in terms of varying business rules and varying network designs (for example, thin client or not; 2, 3, or 4 tier architectures). In addition, they do not scale well as terminals and business increase. And, none can work in either on-line or off-line mode, dynamically adapting depending on failures. None easily integrate with many third-party systems. None allow for new terminal technologies such as mobile PDAs. There is marketplace dissatisfaction with this inflexible state of affairs, and demand for a POS that rectifies this.

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## Vision: example

### **Problem Statement**

Traditional POS systems are inflexible, fault intolerant, and difficult to integrate with third-party systems. This leads to problems in timely sales processing, instituting improved processes that don't match the software, and accurate and timely accounting and inventory data to support measurement and planning, among other concerns. This affects cashiers, store managers, system administrators, and corporate management.

### **Product Position Statement**

— Terse summary of who the system is for, its outstanding features, and what differentiates it from the competition.

### **Alternatives and Competition...**

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## Vision: example

| High-Level Goal                           | Priority | Problems and Concerns  | Current Solutions  |
|---|----------|--|--|
| Fast, robust, integrated sales processing | high     | <p>Reduced speed as load increases.</p> <p>Loss of sales processing capability if components fail.</p> <p>Lack of up-to-date and accurate information from accounting and other systems due to non-integration with existing accounting, inventory, and HR systems.</p> <p>Leads to difficulties in measuring and planning.</p> <p>Inability to customize business rules to unique business requirements.</p> <p>Difficulty in adding new terminal or user interface types (for example, mobile PDAs).</p> | Existing POS products provide basic sales processing, but do not address these problems. |
| ...                                       | ...      | ...  | ...  |

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## Vision: example

### Summary of System Features

- sales capture
- payment authorization (credit, debit, check)
- system administration for users, security, code and constants tables, and so forth.
- automatic offline sales processing when external components fail
- real-time transactions, based on industry standards, with third-party systems, including inventory, accounting, human resources, tax calculators, and payment authorization services
- definition and execution of customized "pluggable" business rules at fixed, common points in the processing scenarios
- 

### Other Requirements and Constraints

Including design constraints, usability, reliability, performance, supportability, design constraints, documentation, packaging, and so forth: See the Supplementary Specification and use cases.

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## Vision: template

# Vision

## The Supplementary Specifications

- capture kinds of requirements such as **documentation**, **packaging**, **supportability**, **licensing**, and so forth
- captures other requirements, information, and constraints not easily captured in the use cases or Glossary, including system-wide **"URPS+"** quality attributes or requirements
- Note. **Constraints** are not behaviors, but some other kind of restriction on the design or project. They are **also requirements**, but are commonly called "constraints" to emphasize their restrictive influence. For example:
  - Must use Oracle (we have a licensing arrangement with them)
  - Must run on Linux (it will lower cost)

## Elements of the Supplementary Specification

- **URPS+ requirements:** usability, reliability, performance, and supportability
- **hardware and software** constraints: operating and networking systems, ...
- **development** constraints (for example, process or development tools)
- other **design and implementation** constraints
- **internationalization** concerns (units, languages, ...)
- **documentation** (user, installation, administration) and help
- **licensing** and other **legal** concerns
- **standards** (technical, safety, quality)
- **physical environment** concerns (for example, heat or vibration)
- **operational** concerns (for example, how do errors get handled, or how often to do backups)
- **domain or business rules**
- information in **domains of interest** (for example, what is the entire cycle of credit payment handling?)

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## Supplementary Specification: Quality Attributes

- They refer to the **qualities** of the system, not that these attributes are necessarily of high quality
  - E.g. the quality of supportability might deliberately be chosen to be low if the product is not intended to serve a long-term purpose
- Two types:
  - **Observable** at execution (usability, reliability, performance, ...)
  - **Not observable** at execution (supportability, testability, ...)
- Although functionality is a valid quality attribute, in common usage, the term "**quality attribute**" is most often meant to imply "qualities of the system other than functionality"
- **Subset of non-functional requirements**
- have interdependencies and involve trade-offs

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## Supplementary Specification: Quality Attributes example

### Usability

#### Human Factors

The customer will be able to see a large-monitor display of the POS. Therefore:

- Text should be easily visible from 1 meter.
- Avoid colors associated with common forms of color blindness.

Speed, ease, and error-free processing are paramount in sales processing, as the buyer wishes to leave quickly, or they perceive the purchasing experience (and seller) as less positive.

The cashier is often looking at the customer or items, not the computer display. Therefore, signals and warnings should be conveyed with sound rather than only via graphics.

### Reliability

#### Recoverability

If there is failure to use external services (payment authorizer, accounting system, ...) try to solve with a local solution (e.g., store and forward) in order to still complete a sale. Much more analysis is needed here...

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## Supplementary Specification: Quality Attributes example

### Performance

As mentioned under human factors, buyers want to complete sales processing very quickly. One potential bottleneck is external payment authorization. Our goal is to achieve authorization in less than 1 minute, 90% of the time.

### Supportability

#### Adaptability

Different customers of the NextGen POS have unique business rule and processing needs while processing a sale. Therefore, at several defined points in the scenario (for example, when a new sale is initiated, when a new line item is added) pluggable business rule will be enabled.

#### Configurability

Different customers desire varying network configurations for their POS systems, such as thick versus thin clients, two-tier versus N-tier physical layers, and so forth. In addition, they desire the ability to modify these configurations, to reflect their changing business and performance needs. Therefore, the system will be somewhat configurable to reflect these needs. Much more analysis is needed in this area to discover the areas and degree of flexibility, and the effort to achieve it.

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## Supplementary Specification: constraints example

### Implementation Constraints

NextGen leadership insists on a **Java technologies solution**; predicting this will improve long-term porting and supportability, in addition to ease of development.

### Purchased Components

- Tax calculator. Must support **pluggable calculators for different countries**.

### Free Open Source Components

In general, we recommend maximizing the use of free Java technology **open source components** on this project.

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## Supplementary Specification: constraints example

### Noteworthy Hardware and Interfaces

- **Touch screen monitor** (this is perceived by operating systems as a regular monitor, and the touch gestures as mouse events)
- **Barcode laser scanner** (these normally attach to a special keyboard, and the scanned input is perceived in software as keystrokes)
- **Receipt printer**
- **Credit/debit card reader**
- Signature reader (but not in release 1)

### Software Interfaces

For most **external collaborating systems** (tax calculator, accounting, inventory, ...) we need to be able to plug in varying systems and thus varying interfaces.

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## Supplementary Specification: Domain (Business) Rules

- How a domain or business may operate
- They are **NOT** requirements of **ONLY** one application ...
- ... although requirements are **often by** domain rules
- **Common domain rules** concern with:
  - Company policies
  - physical laws
  - government laws
- Commonly called **business rules** (the most common) ...
  - ... even though the term is limited, as some software applications are for non-business problems, such as weather simulation or military logistics
    - A weather simulation has "domain rules" that influence the application requirements, related to physical laws and relationships

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### Domain (Business) Rules

| ID    | Rule  | Changeability   | Source  |
|-------|---|---|---|
| RULE1 | Signature required for credit payments.   | Buyer "signature" will continue to be required, but within 2 years most of our customers want signature capture on a digital capture device, and within 5 years we expect there to be demand for support of the new unique digital code "signature" now supported by USA law. | The policy of virtually all credit authorization companies. |
| RULE2 | Tax rules. Sales require added taxes. See government statutes for current details.                      | High. Tax laws change annually, at all government levels.   | law   |
| RULE3 | Credit payment reversals may only be paid as a credit to the buyer's credit account, not as cash.       | Low   | credit authorization company policy                         |
| RULE4 | Purchaser discount rules. Examples:<br>Employee— 20% off. Preferred Customer— 10% off. Senior— 15% off. | High. Each retailer uses different rules.   | Retailer policy.  |

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| ID    | Rule   | Changeability  | Source           |
|-------|--|--|------------------|
| RULE5 | Sale (transaction-level) discount rules. Applies to pre-tax total. Examples:<br>10% off if total greater than \$100 USD. 5% off each Monday.<br>10% off all sales between 10am and 3pm today.<br>Tofu 50% off from 9am-10am today. | High. Each retailer uses different rules, and they may change daily or hourly. | Retailer policy. |
| RULE6 | Product (line item level) discount rules. Examples:<br>10% off tractors this week. Buy 2 veggieburgers, get 1 free.  | High. Each retailer uses different rules, and they may change daily or hourly. | Retailer policy. |

### Legal Issues

We recommend some open source components if their licensing restrictions can be resolved to allow resale of products that include open source software.

All tax rules must, by law, be applied during sales. Note that these can change frequently.

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## Supplementary Specification: Information in Domains of Interest

- Some **explanation** of **domains** related to the new software system
- To provide context and deeper insight for the **development team**
- Subject matter expert** to write (or provide URLs to)
- Pointers to important **literature** or experts, formulas, laws, or other references
- For example:** EAN coding schemes and bar code symbols must be understood to proper develop trading and e-commerce applications

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## Information in Domains of Interest

### Pricing

In addition to the pricing rules described in the domain rules section, note that products have an *original price*, and optionally a *permanent markdown price*. A product's price (before further discounts) is the permanent markdown price, if present. Organizations maintain the original price even if there is a permanent markdown price, for accounting and tax reasons.

### Credit and Debit Payment Handling

When an electronic credit or debit payment is approved by a payment authorization service, they are responsible for paying the seller, not the buyer. Consequently, for each payment, the seller needs to record monies owing in their accounts receivable, from the authorization service. Usually on a nightly basis, the authorization service will perform an electronic funds transfer to the seller's account for the daily total owing, less a (small) per transaction fee that the service charges.

### Sales Tax

Sales tax calculations can be very complex, and regularly change in response to legislation at all levels of government. Therefore, delegating tax calculations to third-party calculator software (of which there are several available) is advisable. Tax may be owing to city, region, state, and national bodies. Some items may be tax exempt without qualification, or exempt depending on the buyer or target recipient (for example, a farmer or a child).

### Item Identifiers: UPCs, EANs, SKUs, Bar Codes, and Bar Code Readers

The NextGen POS needs to support various item identifier schemes. UPCs (Universal Product Codes), EANs (European Article Numbering) and SKUs (Stock Keeping Units) are three common identifier systems for products that are sold. Japanese Article Numbers (JANs) are a kind of EAN version.

SKUs are completely arbitrary identifiers defined by the retailer.

However, UPCs and EANs have a standards and regulatory component. See [www.adams1.com/pub/rus-sadam/upccode.html](http://www.adams1.com/pub/rus-sadam/upccode.html) for a good overview. Also see [www.uc-council.org](http://www.uc-council.org) and [www.ean-int.org](http://www.ean-int.org).

## Supplementary Specifications: template

# Supplementary Specifications

## The Glossary

- A **list of noteworthy terms** and their **definitions**
- **Rationale**: it is surprisingly common that a term, often technical or particular to the domain, will be used in slightly different ways by different stakeholders → reduce problems in communication and ambiguous requirements
- **Suggestion**: start the Glossary early
- **Do not** record all possible terms, but those that are unclear, ambiguous, or which require some kind of noteworthy elaboration

## Vision, Features, or Use Cases: Which First?

- There is no a general rule
- A suggested sequence
  1. Write a brief first draft of the Vision
  2. Identify user goals and the supporting use cases
  3. Write some use cases and start the Supplementary Specification
  4. Refine the Vision, summarizing information from these

## References

- **Identify other requirements** (Capitolo libro "Applying UML and patterns")

## Other references

- *The Rational Unified Process — An Introduction* by Philippe Kruchten
- *The Unified Software Development Process* by Jacobson, Booch, and Rumbaugh