

Software Engineering Project Report



A Sample Document for Generating Consistent Professional Reports

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at the
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How to Use This Document

This document is intended as a sample template that can be copied and edited to suit a particular software engineering project. It was assembled from a combination of documents [1], [2], and [3].

Styles

This document was written in Microsoft Word, and makes heavy use of styles. The styles dialog is initially located on the menu bar under the “Home” tab in MS Word. It is recommended that the styles dialog be pulled off into a separate window when working on formatting of the document. If each paragraph is assigned a style, then modifying that particular style will affect all paragraphs in the document having the same style.

The table of contents uses the document headings and sub-headings to automatically generate table of contents information.

Tracking Changes and Multiple Authors

The “Review” tab in MS Word contains several tools that are of particular use when editing large documents, particularly when multiple authors are involved:

The “Tracking” section allows you to track the (proposed) changes to a document, and to step through each proposed change to either accept or reject the proposed changes.

The “Compare” section allows you to merge changes proposed by different authors, (which will be marked in separate colors for identification), and then to use the change tracking tools described above to accept or deny each change.

The recommended procedure is to start with each author having a copy of a base document, (possibly this template.) Then each author changes the section(s) they are responsible for, and submits their changed version to one person who acts as the overall document editor. This author merges the changes, selectively accepts or rejects each change, and then distributes a new base document to all authors for the next round of changes. It is also possible to merge the changes and then distribute the document, so that all authors can review the proposed changes. (The latter approach may be appropriate for documents such as bylaws, in which the changes must be approved by a committee or a vote before they can be accepted.)

Dealing With Material that is Unwanted (Right Now)

Much of this document includes material that is not needed for every project, and/or which may not have been written yet, and so should be removed before printing or distributing the document. There are several ways to do this, however each has their drawbacks:

1. Delete the material completely. The drawback is that now it is completely gone, and the only way to get it back is to copy it from some other document, if that is even available.
2. Change the font to "Hidden". The drawback is that this does not affect the numbering of sections, either in the text or in the table of contents. However the original style information is retained, so when the text is unhidden, individual paragraphs do not need to be restyled.
3. Change the style to "Hidden". This does cause the document to renumber properly, (because the paragraphs are no longer numbered paragraphs), but all the original style information is gone, so if it is unhidden later, then all the styles of all the unhidden paragraphs will have to be restored manually.
4. Move the text, say to the end of the document, and then do not print or distribute the material at the end of the document. If this is all that is done, then this material will continue to appear in the table of contents. However if the font is also changed to "hidden", then the material will not appear in the TOC, but all the original style information will be retained. The drawback to moving the text is that now you need to keep track of where the information was moved from, in case you ever want to move it back.

Hidden text can be made visible by selecting the backwards "P" paragraph mark on the "Home" tab.

Table of Contents

The table of contents lists the sections of the document and the page upon which each section starts. The table of contents may or may not include subsections, etc.

Microsoft Word (and many similar programs) has the ability to generate a table of contents automatically from section headings, and to update it when the document changes. The table of contents included in this template is automatically generated by MS Word, and can be updated by selecting the table and clicking on the menu that appears above the table at that time.

Note: Remove all instructional materials before finalizing and submitting this document, including this entire page and the one before it.

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List of Figures

(The title above is formatted as Heading 3, so that it appears in the table of contents, but was then modified to be centered and include a page break before the paragraph. Likewise for the List of Tables heading on the next page..) **Note: Remove this instructional paragraph.**

If a document contains a large number of figures, then it is appropriate to include a list of figures at the beginning of the document, following the table of contents. Each figure should include a title, and be numbered in a consistent logical fashion. The following list of figures was automatically generated from figure captions (see Figure 1 on page 11), and can be automatically updated by right-clicking on the table below and selecting “Update Field”. This feature is located in the “Captions” section of the “References” tab in MS Word. **Note: Remove this instructional paragraph.**

Figure 1 - Sample Image of a Survey Dive Boat 11

On a related note, the references in the paragraph above, “(see Figure 1 on page 11)” include cross-references to the Figure and page number that will adjust automatically when other Figures or pages are added or removed. This is done with the “cross-reference” button in the “Captions” section of the “References” tab in MS Word. **Note: Remove this instructional paragraph.**

List of Tables

If a document contains a large number of tables, then it is appropriate to include a list of tables at the beginning of the document, following the table of contents. Each table should include a title, and be numbered in a consistent logical fashion. The following list of tables was automatically generated from table captions (see below), and can be automatically updated by right-clicking on the table below and selecting “Update Field”. This feature is located in the “Captions” section of the “References” tab in MS Word. **Note: Remove this instructional paragraph.**

Table 1- Sample Table of Survey Dive Activity	11
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The following sample table and figure are only here to initialize the list of figures and list of tables above. They should be removed when real ones are included in the document. (I.e. delete this entire page when you can.)

Date	Participants	Activities	Notes

Table 1- Sample Table of Survey Dive Activity



**Figure 1 - Sample Image of a Survey Dive Boat
(photo by Tony Kiefer)**

I Project Description

1 Project Overview

A brief description of the product to be produced, before getting into details.

2 The Purpose of the Project

2a The User Business or Background of the Project Effort

Content

content, motivation, examples and Considerations

A short description of the business being done, its context, and the situation that triggered the development effort. It should also describe the work that the user intends to do with the delivered product.

Motivation

Without this statement, the project lacks justification and direction.

Considerations

You should consider whether the user problem is serious, and whether and why it needs to be solved.

2b Goals of the Project

(Note: This item and the following one together cover the " Objectives and success criteria of the project" item specified by Bruegge & DuToit.)

Content

This boils down to one sentence, or at most a few sentences, that say why we want this product. Here is where you state the real reason the product is being developed.

Motivation

There is a danger that this purpose may get lost along the way. As the development effort heats up, and as the customer and developers discover more about what is possible, the system could potentially wander away from the original goals as it undergoes construction. This is a bad thing unless there is some deliberate act by the client to change the goals. It may be necessary to appoint a person to be custodian of the goals, but it is probably sufficient to make the goals public and periodically remind the developers of them. *It should be mandatory to acknowledge the goals at every review session.*

Examples

We want to give immediate and complete response to customers who order our goods over the telephone.

We want to be able to forecast the weather.

2c Measurement

Any reasonable goal must be measurable. This is necessary if you are ever to test whether you have succeeded with the project. The measurement must quantify the *advantage* gained by the business through doing the project. If the project is worthwhile, there must be some solid business reason for doing it. For example, if the goal of the project is

We want to give immediate and complete response to customers who order our goods over the telephone.

you have to ask what advantage that goal brings to the organization. If immediate response will result in more satisfied customers, then the measurement must quantify that satisfaction. For example, you could measure the increase in repeat business (on the basis that a happy customer comes back for more), the increase in customer approval ratings from surveys, the increase in revenue from returning customers, and so on.

It is crucial to the rest of the development effort that the goal is firmly established, is reasonable, and is measured. It is usually the latter that makes the former possible.

3 The Scope of the Work

This section describes the (business) environment in which the product will be used.

3a The Current Situation

Content

This is an analysis of the existing business processes, including the manual and automated processes that might be replaced or changed by the new product. Business analysts might already have done this investigation as part of the business case analysis for the project.

Motivation

If your project intends to make changes to an existing manual or automated system, you need to understand the effect of proposed changes. The study of the current situation provides the basis for understanding the effects of proposed changes and choosing the best alternatives. Knowing what users are doing now can give insight into their views of a proposed new system.

3b The Context of the Work

Content

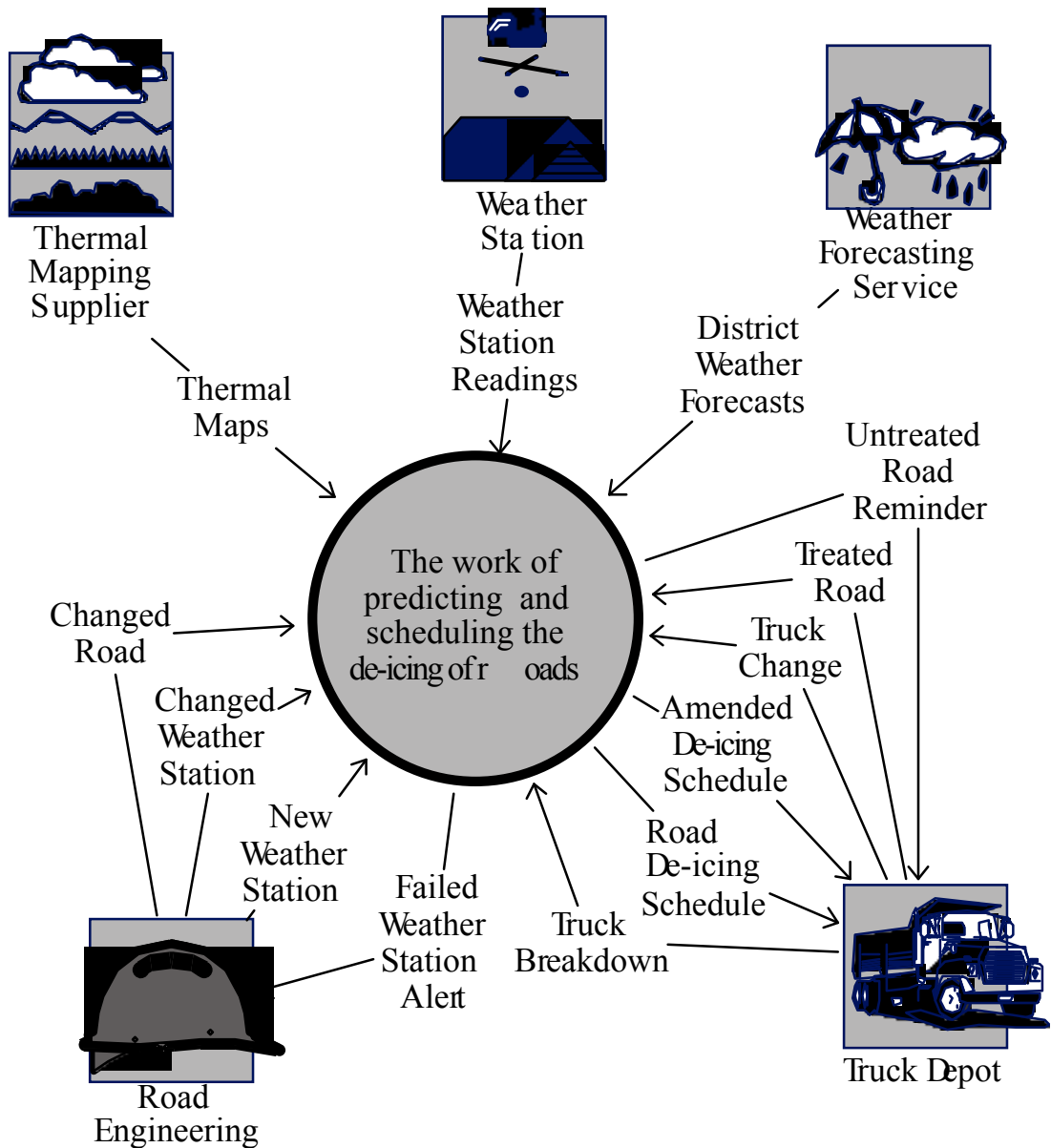
The work context diagram identifies the work that you need to investigate to be able to build the product. Note that it includes more than the intended product. Unless we understand the work that the product will support, we have little chance of building a product that will fit cleanly into its environment.

The adjacent systems on the context diagram (e.g., Weather Forecasting Service) indicate other subject matter domains (systems, people, and organizations) that need to be understood. The interfaces between the adjacent systems and the work context indicate why we are interested in the adjacent system. In the case of Weather Forecasting Service, we can say that we are interested in the details of when, how, where, who, what, and why it produces the District Weather Forecasts information.

Motivation

To clearly define the boundaries for the study of the work and requirements effort. Without this definition, we have little chance of building a product that will fit seamlessly into its environment.

Examples



Considerations

The names used on the context diagram should be consistent with the naming conventions and data dictionary definitions presented in section 5. Without these definitions, the context model lacks the required rigor, and it may be misunderstood. Relevant stakeholders must agree to the definitions of the interfaces shown on the context model.

3c Work Partitioning

Note: Volere talks of dividing up the work according to the different *business events* to which the business must respond. However each response to a business event is effectively a use-case, so Volere's list of business events is effectively the same as a use-case diagram and a descriptive list of the associated use-cases.

Content

A list showing all business events to which the work responds. Business events are happenings in the real world that affect the work. They also happen because it is time for the work to do something—for example, produce weekly reports, remind nonpaying customers, check the status of a device, and so on. The response to each event is called a business use case; it represents a discrete partition of work that contributes to the total functionality of the work.

The event list includes the following elements:

- Event name
- Input from adjacent systems (identical with name on context diagram)
- Output to adjacent systems (identical with name on context diagram)
- Brief summary of the business use case (This is optional, but we have found it is a very useful first step in defining the requirements for the business use case—you can think of it as a mini-scenario.)

Motivation

To identify logical chunks of the system that can be used as the basis for discovering detailed requirements. These business events also provide the subsystems that can be used as the basis for managing detailed analysis and design.

Example

Business Event List

Event Name	Input and Output	Summary
1. Weather Station transmits reading	Weather Station Readings (in)	Record the readings as belonging to the weather station.
2. Weather Service forecasts weather	District Weather Forecast (in)	Record the forecast.
3. Road engineers advise changed roads	Changed Road (in)	Record the new or changed road. Check that all appropriate weather stations are attached.
4. Road Engineering installs new Weather Station	New Weather Station (in)	Record the weather station and attach it to the appropriate roads.
5. Road Engineering changes Weather Station	Changed Weather Station (in)	Record the changes to the weather station.
6. Time to test Weather Stations	Failed Weather Station Alert (out)	Determine if any weather stations have not transmitted for two hours, and inform Road Engineering of any failures.
7. Truck Depot changes a truck	Truck Change (in)	Record the changes to the truck.
8. Time to detect icy roads	Road De-icing Schedule (out)	Predict the ice situation for the next two hours. Assign a truck to any roads that will freeze. Issue the schedule.
9. Truck treats a road	Treated Road (in)	Record the road as being in a safe condition for the next three hours.
10 Truck Depot reports problem with truck	Truck Breakdown (in) Amended Gritting Schedule (out)	Reassign available trucks to the previously assigned roads.
11. Time to monitor road treatment	Untreated Road Reminder (out)	Check that all scheduled roads have been treated in the assigned time, and issue reminders for any untreated roads.

Considerations

Attempting to list the business events is a way of testing the work context. This activity uncovers uncertainties and misunderstandings about the project and facilitates

precise communications. When you do an event analysis, it will usually prompt you to make some changes to your work context diagram.

We suggest you gather requirements for discrete sections of the work. This requires you to partition the work, and we have found business events to be the most convenient, consistent, and natural way to break the work into manageable units.

3d Competing Products

Content

Other alternatives that already exist can be described here. Why should we go to all the trouble of creating a new product? What flaws or deficiencies do the existing products have that justify the creation of something new?

Motivation

Knowing what other choices the customer has to choose from can help us judge whether or not our project is even worth doing, and if so, what we need to do different to be better than the available alternatives.

Considerations

Note the subtle difference between this item and the “Off the Shelf” solutions documented in sections 6d or 35 below. The latter refers to software that we can buy and incorporate into our solution.

4 Product Scenarios

Scenarios are somewhat informal stories describing how the end users would use the product once it is completed. They take the form of narratives and may involve specific individuals and examples.

4a Product Scenario List

The product scenario list is quite simply a list of the product scenarios that will appear in the next section. It is a good idea to either number or name each scenario for later reference, and it can also be a good idea to organize the list so that related scenarios appear together. (Depending on the naming / numbering scheme, they can be grouped into sections and subsections, etc.)

4b Individual Product Scenarios

Product scenarios are written in a natural narrative fashion, easily understood by clients and other non-technical stakeholders. Each one tells a story of how the end users are expected to eventually use the finished product. For example:

Monthly Reports: At the end of every month Mary has to generate the monthly reports, and distribute copies to all the managers and sub-managers. The first

thing she has to do is to make sure that all the end-of-the-month tests have been run, and that everyone else is logged off of the system. Then she selects the date range and the specific information she wants included in her reports, selects either the long or short format, and selects a printer. Depending on how busy the month has been, it may take as long as fifteen minutes, during which time no one else can use the system. She only prints one copy on the computer, and then makes all the rest of the copies she needs on the copy machine.

5 Stakeholders

5a The Client

Content

This item gives the name of the client. It is permissible to have several names, but having more than three negates the point.

Motivation

The client has the final say on acceptance of the product, and thus must be satisfied with the product as delivered. You can think of the client as the person who makes the investment in the product. Where the product is being developed for in-house consumption, the roles of the client and the customer are often filled by the same person. If you cannot find a name for your client, then perhaps you should not be building the product.

Considerations

Sometimes, when building a package or a product for external users, the client is the marketing department. In this case, a person from the marketing department must be named as the client.

5b The Customer

Content

The person intended to buy the product. In the case of in-house development, the client and the customer are often the same person. In the case of development of a mass-market product, this section contains a description of the kind of person who is likely to buy the product.

Motivation

The customer is ultimately responsible for deciding whether to buy the product from the client. The correct requirements can be gathered only if you understand the customer and his aspirations when it comes to using your product.

5c Hands-On Users of the Product

Content

A list of a special type of stakeholder—the potential users of the product. For each category of user, provide the following information:

- User name/category: Most likely the name of a user group, such as schoolchildren, road engineers, or project managers.
- User role: Summarizes the users' responsibilities.
- Subject matter experience: Summarizes the users' knowledge of the business. Rate as novice, journeyman, or master.
- Technological experience: Describes the users' experience with relevant technology. Rate as novice, journeyman, or master.
- Other user characteristics: Describe any characteristics of the users that have an effect on the requirements and eventual design of the product. For example:

Physical abilities/disabilities

Intellectual abilities/disabilities

Attitude toward job

Attitude toward technology

Education

Linguistic skills

Age group

Gender

Motivation

Users are human beings who interface with the product in some way. Use the characteristics of the users to define the usability requirements for the product. Users are also known as actors.

Examples

Users can come from wide variety of (sometimes unexpected) sources. Consider the possibility of your users being clerical staff, shop workers, managers, highly trained operators, the general public, casual users, passers-by, illiterate people, tradesmen, students, test engineers, foreigners, children, lawyers, remote users, people using the system over the telephone or an Internet connection, emergency workers, and so on.

5d Priorities Assigned to Users

Content

Attach a priority to each category of user. This gives the importance and precedence of the user. Prioritize the users as follows:

- Key users: They are critical to the continued success of the product. Give greater importance to requirements generated by this category of user.
- Secondary users: They will use the product, but their opinion of it has no effect on its long-term success. Where there is a conflict between secondary users' requirements and those of key users, the key users take precedence.
- Unimportant users: This category of user is given the lowest priority. It includes infrequent, unauthorized, and unskilled users, as well as people who misuse the product.

The percentage of the type of user is intended to assess the amount of consideration given to each category of user.

Motivation

If some users are considered to be more important to the product or to the organization, then this preference should be stated because it should affect the way that you design the product. For instance, you need to know if there is a large customer group who has specifically asked for the product, and for which, if they do not get what they want, the results could be a significant loss of business.

Some users may be listed as having no impact on the product. These users will make use of the product, but have no vested interest in it. In other words, these users will not complain, nor will they contribute. Any special requirements from these users will have a lower design priority.

5e User Participation

Content

Where appropriate, attach to the category of user a statement of the participation that you think will be necessary for those users to provide the requirements. Describe the contribution that you expect these users to provide—for example, business knowledge, interface prototyping, or usability requirements. If possible, assess the minimum amount of time that these users must spend for you to be able to determine the complete requirements.

Motivation

Many projects fail through lack of user participation, sometimes because the required degree of participation was not made clear. When people have to make a choice

between getting their everyday work done and working on a new project, the everyday work usually takes priority. This requirement makes it clear, from the outset, that specified user resources must be allocated to the project.

5f Maintenance Users and Service Technicians

Content

Maintenance users are a special type of hands-on users who have requirements that are specific to maintaining and changing the product.

Motivation

Many of these requirements will be discovered by considering the various types of maintenance requirements detailed in section 14. However, if we define the characteristics of the people who maintain the product, it will help to trigger requirements that might otherwise be missed.

5g Other Stakeholders

Content

The roles and (if possible) names of other people and organizations who are affected by the product, or whose input is needed to build the product.

Examples of stakeholders:

- Sponsor
- Testers
- Business analysts
- Technology experts
- System designers
- Marketing experts
- Legal experts
- Domain experts
- Usability experts
- Representatives of external associations

For a complete checklist, download the stakeholder analysis template at www.volere.co.uk.

For each type of stakeholder, provide the following information:

- Stakeholder identification (some combination of role/job title, person name, and organization name)
- Knowledge needed by the project
- The degree of involvement necessary for that stakeholder/knowledge combination
- The degree of influence for that stakeholder/knowledge combination
- Agreement on how to address conflicts between stakeholders who have an interest in the same knowledge

Motivation

Failure to recognize stakeholders results in missing requirements.

6 Mandated Constraints

This section describes constraints on the eventual design of the product. They are the same as other requirements except that constraints are mandated, usually at the beginning of the project. Constraints have a description, rationale, and fit criterion, and generally are written in the same format as functional and nonfunctional requirements.

6a Solution Constraints

Content

This specifies constraints on the way that the problem must be solved. Describe the mandated technology or solution. Include any appropriate version numbers. You should also explain the reason for using the technology.

Motivation

To identify constraints that guide the final product. Your client, customer, or user may have design preferences, or only certain solutions may be acceptable. If these constraints are not met, your solution is not acceptable.

Examples

Constraints are written using the same form as other atomic requirements (refer to the requirements shell for the attributes). It is important for each constraint to have a rationale and a fit criterion, as they help to expose false constraints (solutions

masquerading as constraints). Also, you will usually find that a constraint affects the entire product rather than one or more product use cases.

Description: The product shall use the current two-way radio system to communicate with the drivers in their trucks.

Rationale: The client will not pay for a new radio system, nor are any other means of communication available to the drivers.

Fit criterion: All signals generated by the product shall be audible and understandable by all drivers via their two-way radio system.

Description: The product shall operate using Windows XP.

Rationale: The client uses XP and does not wish to change.

Fit criterion: The product shall be approved as XP compliant by the MS testing group.

Description: The product shall be a hand-held device.

Rationale: The product is to be marketed to hikers and mountain climbers.

Fit criterion: The product shall weigh no more than 300 grams, no dimension shall be more than 15 centimeters, and there shall be no external power source.

Considerations

We want to define the boundaries within which we can solve the problem. Be careful, because anyone who has experience with or exposure to a piece of technology tends to see requirements in terms of that technology. This tendency leads people to impose solution constraints for the wrong reason, making it very easy for false constraints to creep into a specification. The solution constraints should only be those that are absolutely non-negotiable. In other words, however you solve this problem, you must use this particular technology. Any other solution would be unacceptable.

6b Implementation Environment of the Current System

Content

This describes the technological and physical environment in which the product is to be installed. It includes automated, mechanical, organizational, and other devices, along with the nonhuman adjacent systems.

Motivation

To describe the technological environment into which the product must fit. The environment places design constraints on the product. This part of the specification provides enough information about the environment for the designers to make the product successfully interact with its surrounding technology.

The operational requirements are derived from this description.

Examples

Examples can be shown as a diagram, with some kind of icon to represent each separate device or person (processor). Draw arrows to identify the interfaces between the processors, and annotate them with their form and content.

Considerations

All component parts of the current system, regardless of their type, should be included in the description of the implementation environment.

If the product is to affect, or be important to, the current organization, then include an organization chart.

6c Partner or Collaborative Applications

Content

This describes applications that are not part of the product but with which the product will collaborate. They can be external applications, commercial packages, or preexisting in-house applications.

Motivation

To provide information about design constraints caused by using partner applications. By describing or modeling these partner applications, you discover and highlight potential problems of integration.

Examples

This section can be completed by including written descriptions, models, or references to other specifications. The descriptions must include a full specification of all interfaces that have an effect on the product.

Considerations

Examine the work context model to determine whether any of the adjacent systems should be treated as partner applications. It might also be necessary to examine some of the details of the work to discover relevant partner applications.