



## SEG 3101/3501 Fall 2015 Software Requirements Analysis: Midterm Exam

**Length of Examination: 75 minutes**  
**Professor: Miguel A. Garzón**

**November 3, 2015, 14h30**  
**Page 1 of 10**

**Instructions: Please read carefully!**

1. Complete your identification with an ink pen if possible. The rest of the examination can be done with a pencil.
2. This exam is closed book. **No books or electronic devices (including calculators) are allowed.**
3. The marks allocated to each question are indicated. The questions do not have all the same weight, so plan your time accordingly. This exam is scored on 50 marks and represents **20%** of your final grade. **Take the time to review your answers!**
4. If you do not understand a question, state your assumptions clearly when answering.
5. If a question asks you to provide N items, then *only* the first N items will be marked.
6. The last page contains a summary of the GRL/UCM notation.
7. Les réponses en français seront aussi acceptées.
8. Looking at the questionnaire of another student will get you expelled from this exam.

**For the marker:**

Question	Max	Points
S1-1	5	
S1-2	5	
S1-3	15	
S1-4	6	
S1-5	5	
S2-1	6	
S2-2	6	
S2-3	4	
S2-4	3	
<b>Total</b>	<b>50</b>	

**Identification:**

Name: \_\_\_\_\_

Student #: \_\_\_\_\_

Signature: \_\_\_\_\_

**Good luck!**

## Section 1 - Short Answer Questions

**Question 1 [5 points]:** Modeling is considered an important part of the requirements engineering process

- i) List two benefits of modeling in the requirements process
  - Higher abstraction
  - Guide discovering of the requirements
  - Better communication with stakeholders
  - ....
- ii) Provide one drawback of modeling in the requirements process
  - Analysis-paralysis
  - Time, learning curve, effort to create and manage the models
- iii) What are two merits of the sandwich approach
  - Allows better work division
  - Focus attention on the high level view before the details

**Question 2 [5 points]:** The analysis of existing systems and prototyping are two important techniques for requirement elicitation.

- (a) Under what circumstances is the analysis of the existing system more appropriate than prototyping?
  - When doing an update of the existing system (small changes)
  - When the existing system is the competition
- (b) Inversely?
  - When creating a brand-new (very different) system
  - When customer does not know what he wants
- (c) Mention two dangers associated with the analysis of existing systems.
  - Making the same assumptions (mistakes?)
  - Not innovating
  - Copyright infringement (case of competing existing system)
  - May require much effort

**Question 3 [5x3 marks]**: You were hired as a consultant to produce the software requirements specification of a new *Online Music Store*, which is meant to enable little-known singers and musicians to generate revenues by selling their products.

- i) Singers and musicians are obviously important stakeholders, but they are not the only ones. Identify six (6) other categories of stakeholders for this system with whom you should discuss.

Producers, lawyers, managers, artist unions, accountants, buyers, fan clubs, system analysts, developers, testers, e-commerce experts, marketing people...

- ii) Give an example of **one (1) domain requirement** that would in general be independent of any particular music store.

The Online Music Store shall support secure payment by credit card.

The Online Music Store shall require that each song has a title.

The Online Music Store shall comply with national copyright laws.

- iii) Give an example of **one (1) measurable user requirement** from the viewpoint of musician.

The Online Music Store shall enable musicians to see the revenues of their sales in no more than 3 mouse clicks.

The Online Music Store shall provide non-paying musicians 10GB of space to store their music.

- iv) One of the stakeholders tells you he wants this store to be “accessible from all types of mobile platforms”. Give **two (2) questions** you could ask him in order to be able to refine and measure this goal.

Do you want to support tablets and smart phones, or only one of these two categories?

Which mobile operating systems do you see the most important in your context (for example, iOS, Android, BlackBerry, Windows 8)? Can we restrict the availability to the three most popular platforms?

Do you want Web access or native applications?

Do you want to offer all services on these mobile platforms, or just a subset?

- v) With which category of stakeholders would you use an elicitation questionnaire (instead of an interview or a brainstorming session)? Why?

**Musicians, singers, buyers...** Because there are many of them (too many for interviews and brainstorming sessions), because they are geographically spread out, and because precise questions can be asked of them.

#### Question 4: Writing Good Requirements (6 marks)

Are these requirements about a *Financial Transaction System (FTS)* correctly written? If not, explain why **and** suggest a better way to write them. Assume that all terms are properly defined in a glossary.

[3 marks]: FTS **users can quickly** access the account of their spouse.

3 problems here: requirement on the user and not on the system, can instead of shall (optional?), and quickly is not measurable and must be refined.

The FTS shall enable users to access the account of their spouse in no more than 3 clicks.

[3 marks]: The FTS shall be **super robust regarding failures** because financial transactions are truly important.

Super is not measurable (and very informal!), which failures to handle should be mentioned, and the last part is a rationale (the rationale could be removed and documented elsewhere, as an attribute of the requirement).

The FTS shall ensure that at least 99.999% of the financial data remains uncorrupted in case of a power loss during a transaction.

#### Question 5: Requirements Classification (5x1 mark)

Classify each of the following five sentences according to its **most appropriate** requirements category. For each requirement below, fill in the selected category by indicating a value between 1 and 9, where these values denote the following categories:

1: performance

2: maintainability

3: portability

4: reliability

5: process

6: security

7: usability

8: legal

9: availability

- a. The system shall prevent detected denial-of-service attacks for up to 1000 simultaneous attackers. \_\_6\_\_
- b. The system shall ensure that users will be able to perform tasks X, Y, and Z after one month of non-usage, with a minimum success rate of 80%. \_\_7\_\_
- c. The system shall comply with Part III of the Freedom of Information and Protection of Privacy Act. \_\_8\_\_
- d. The system shall be able to process 200 registrations per hour in peak load. \_\_1\_\_
- e. The system shall meet or exceed 99.999 % uptime. \_\_9\_\_



**Question 2: Goal Modeling (6 marks)**

You are asked to model the concerns of various stakeholders for a new Web development project to be designed from scratch which involves some technological choices. We are developing a Web application for processing customer orders for an auto car shop.

Create a GRL model that minimally covers the following concerns:

- The **customers** want a very simple interface for placing the orders.
- The **managers** want to visualize interesting sales reports and export them in various formats.
- The **testers** want to simplify testing.
- The **developers** want to shorten the development time, and maximize the utilization of their past experience which includes reusing some existing components (libraries or frameworks).

This system has **three** important functional objectives: to support the data entry forms, to keep the data in persistent storage and to produce reports about sales. Two alternatives are considered for the creation of the entry forms: ASP MVC (which increases the developer productivity and learning curve for new developers but which reduces the support for automated regression testing) and ASP NET (which slightly reduces development productivity, but for which good testing tools are available).

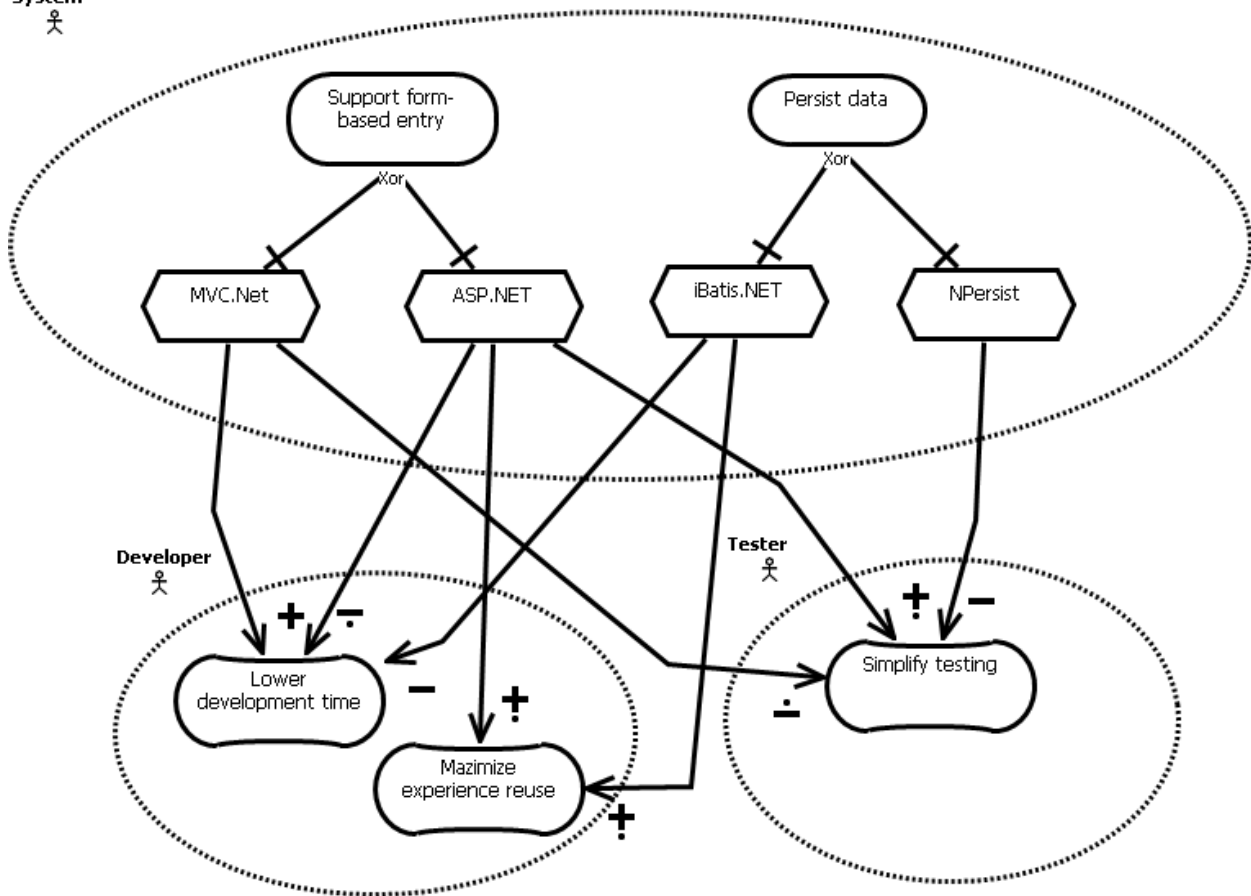
There are also two alternatives for producing the reports: NPersist (which is not easy to test), and iBatis.Net (which is difficult to use during development, but for which the developers have received some training in the past). The developers have also used ASP.NET in two previous projects.

Finally, there are two alternatives for producing the reports, Crystal Reports (which supports a wide range of exporting formats but whose learning curve may affect the productivity of the developers) and QuickBooks (which supports only the generation of PDF reports and it is very easy to learn/integrate). 40% of the developers (former employees of IBM) have experience working with Crystal Reports integration.

Ensure that you have used suitable actors with their intentional elements, suitable links, and at least one OR decomposition. Specify the contribution levels with **qualitative** labels.

Please answer on page 7. (Suggestion: make first a draft drawing ...)

System  
⊗



(GRL Model)

**Question 3 (3+1 marks):** We want to do a quantitative evaluation (on a [0..100] satisfaction scale) of the following GRL model. Assume that tasks A, B, C and D can only take the values 100 or 0 (i.e., they are selected or not). Moreover, it is essential that the System actor be fully satisfied. In this context:

- a. What is the best strategy here (among the 16 possible combinations of 0 or 100 for A, B, C, D) leading to the best satisfaction value possible for Stakeholder while ensuring that System is fully satisfied?

A= **100**    B= **100**            (must be both 100 for System to be at 100)

C= **100**    D= **0**            (optimal on a [0..100] scale, as Softgoal Q's evaluation can't be negative)

Also accepted (optimal on a [-100..100] scale, but this was not the question):

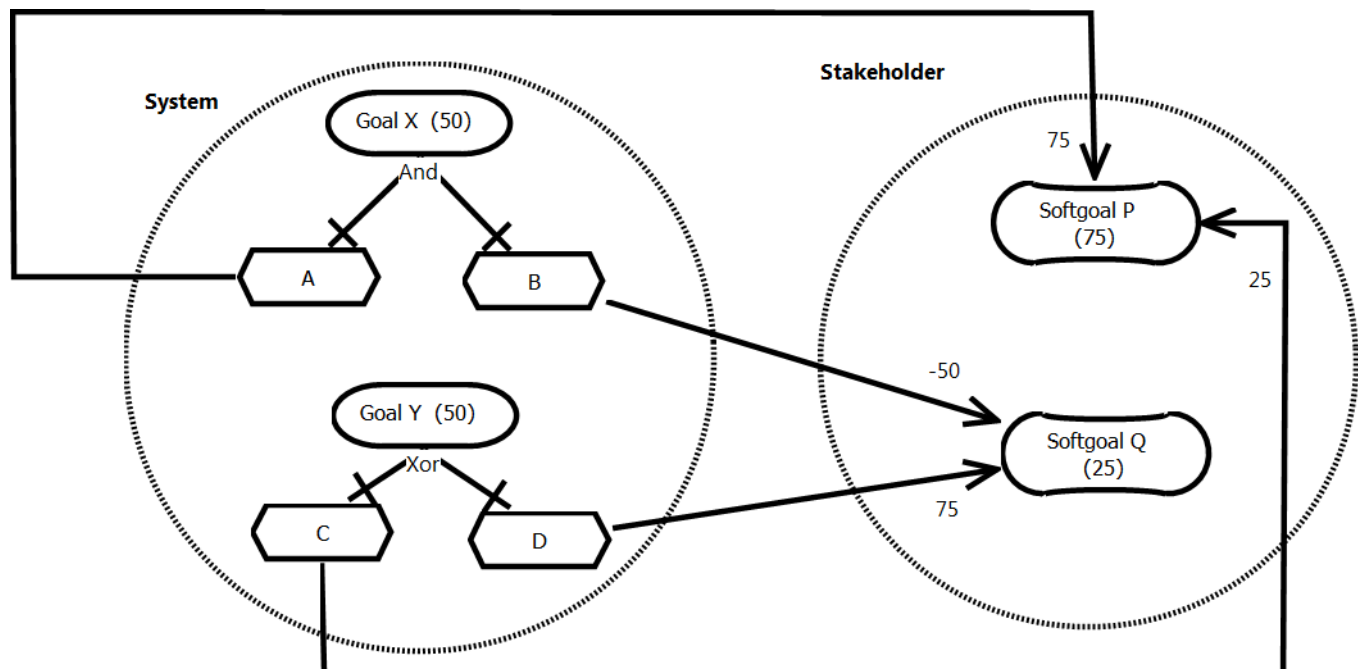
C= **100**    D= **0** or C= **0**    D= **100** (2 equivalent solutions. Can't be both 100 because of XOR)

- b. What is the satisfaction value of actor Stakeholder in your strategy? \_\_\_\_\_

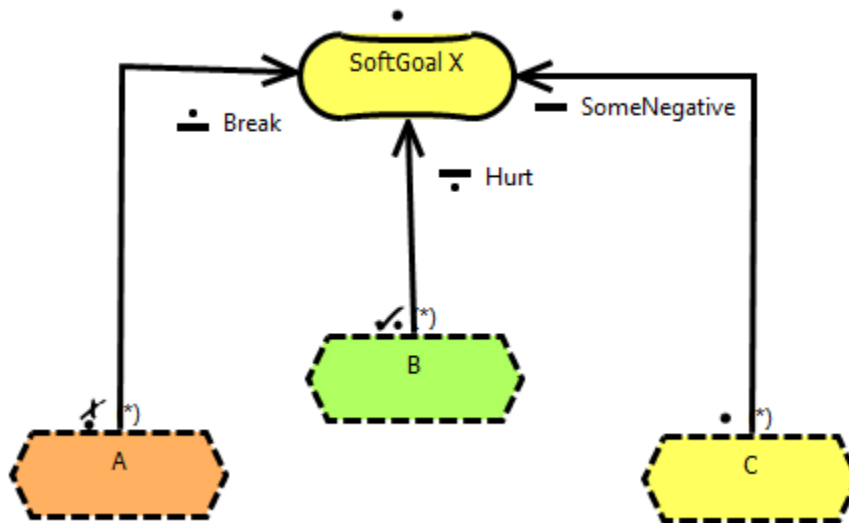
On [0..100]:  $0.75 \times (75+25) + \max(0, 0.25 \times (-50+0)) = 75 + 0 = 75$

On [-100..100]: First solution:  $0.75 \times (75+25) + 0.25 \times (-50+0) = 62$  (62.5)

On [-100..100]: Second solution:  $0.75 \times (75+0) + 0.25 \times (-50+75) = 62$  (62.5)



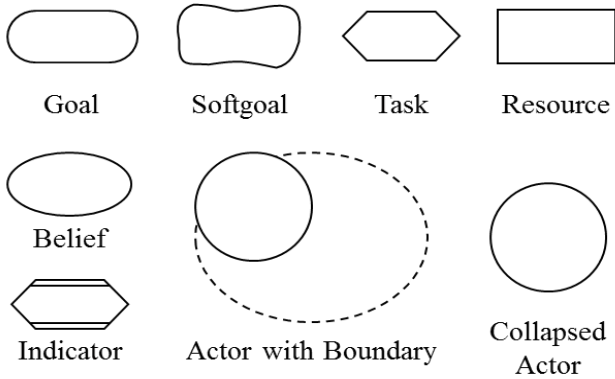
**Question 4 [3 marks]:** What is the qualitative value propagated to softgoal X?



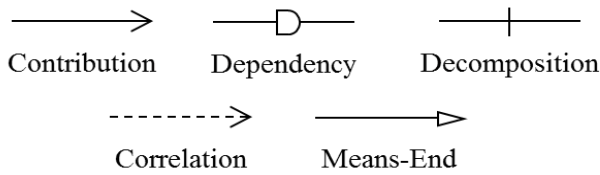
	<i>Make</i>	<i>Help</i>	<i>SomePositive</i>	<i>Unknown</i>	<i>SomeNegative</i>	<i>Hurt</i>	<i>Break</i>
<i>Denied</i>	Denied	WeaklyDenied	WeaklyDenied	None	WeaklySatisfied	WeaklySatisfied	Satisfied
<i>WeaklyDenied</i>	WeaklyDenied	WeaklyDenied	WeaklyDenied	None	WeaklySatisfied	WeaklySatisfied	WeaklySatisfied
<i>WeaklySatisfied</i>	WeaklySatisfied	WeaklySatisfied	WeaklySatisfied	None	WeaklyDenied	WeaklyDenied	WeaklyDenied
<i>Satisfied</i>	Satisfied	WeaklySatisfied	WeaklySatisfied	None	WeaklyDenied	WeaklyDenied	Denied
<i>Conflict</i>	Undecided	Undecided	Undecided	Undecided	Undecided	Undecided	Undecided
<i>Undecided</i>	Undecided	Undecided	Undecided	Undecided	Undecided	Undecided	Undecided
<i>None</i>	None	None	None	None	None	None	None

	<i>Denied</i>	<i>Satisfied</i>	<i>Conflict</i>	<i>None</i>
<i>Weakly Denied</i>	Denied	Weakly Satisfied	Conflict	Weakly Denied
<i>Weakly Satisfied</i>	Weakly Denied	Satisfied	Conflict	Weakly Satisfied
<i>None</i>	Denied	Satisfied	Conflict	None

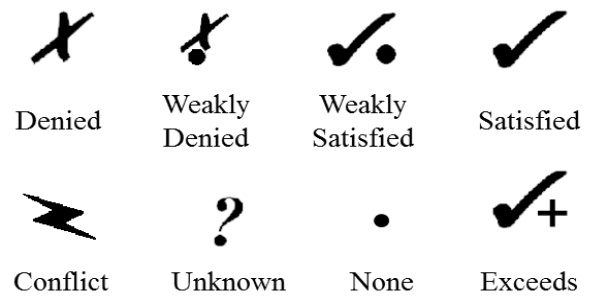
### Annex: Summary of the GRL/UCM Notation



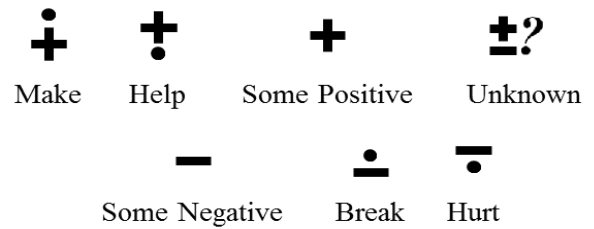
(a) GRL Elements



(b) GRL Links



(c) GRL Satisfaction Levels



(d) GRL Contributions Types

