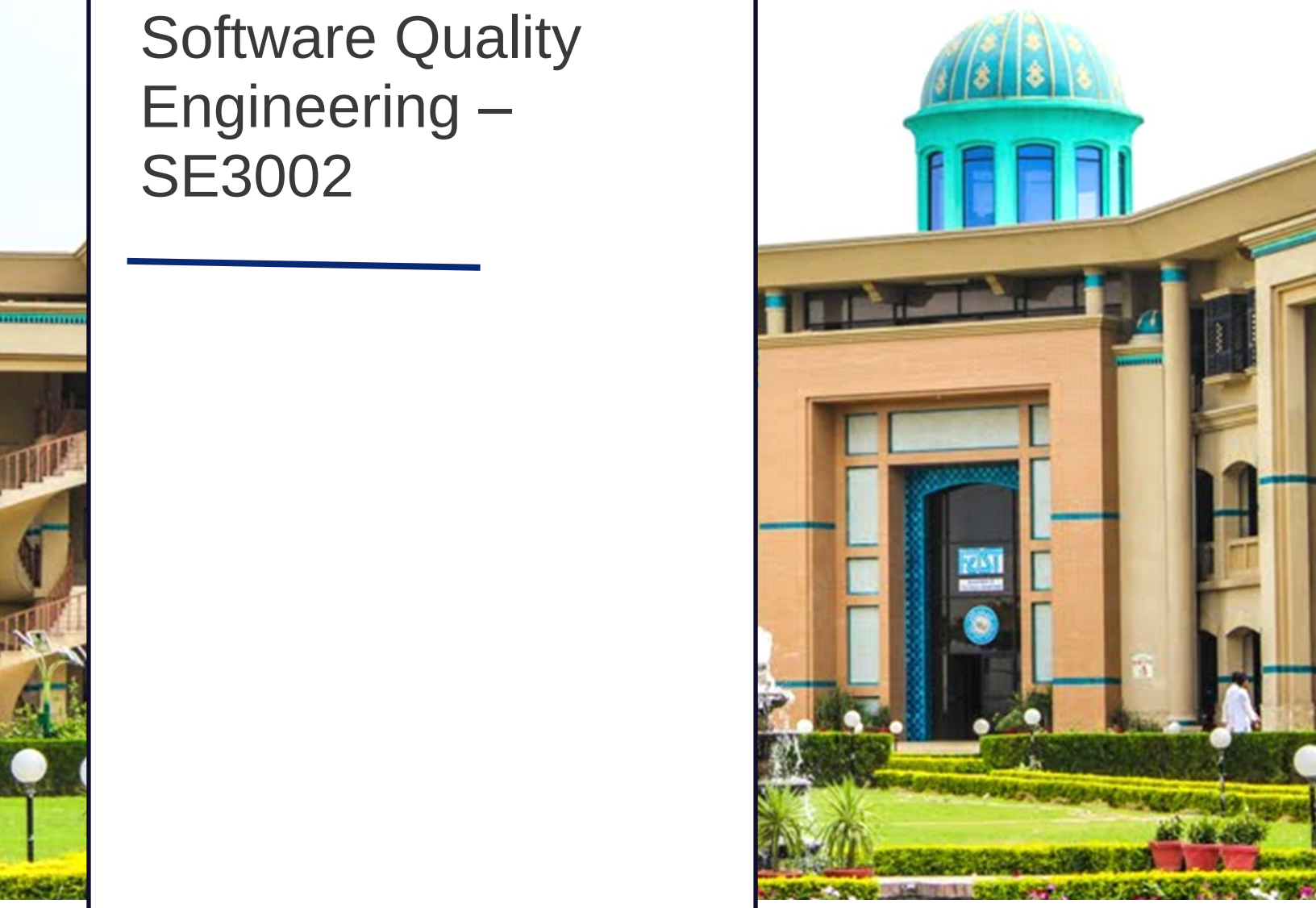
Software Quality Engineering – SE3002



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ARM Findings of SRS: 01 (Daniyal)

1.1. SRS - 2001 – hats.doc

Title Sample SRS		
	Imperatives	
ARE APPLICABLE	0	***Judgment as an independent Business Analyst***
ARE TO	1	A significant number of the imperative shows that specifications are explicit and most of the requirements are concretely defined. The high number of "shall" and a very low number of "should" used in this document shows that requirements are precisely and accurately defined.
IS REQUIRED TO	0	
MUST	5	
RESPONSIBLE FOR	1	
SHALL	266	
SHOULD	3	
WILL	10	
TOTAL	286	
	Continuance	
:	34	***Judgment as an independent Business Analyst***
AND	140	There are an average number of continuances which shows that there are requirements have been organized and structured thus easy to understand.
AS FOLLOWS	0	
BELOW	0	
FOLLOWING	0	
IN PARTICULAR	0	
LISTED	0	
SUPPORTED	0	
TOTAL	174	
	Directive	
E.G.,	0	***Judgment as an independent Business Analyst***
FIGURE	9	Diagrams, figures and tables are used in the document. This implies that there is a visual representation of requirements, but the low count of directives show that document contains less examples or other related illustrative / visual information. This renders the document a little but difficult to understand.
FOR EXAMPLE,	6	
I.E.,	0	
NOTE:	0	
TABLE	18	
TOTAL	33	
	Option	
CAN	2	***Judgment as an independent Business Analyst***
MAY	7	A very small number of options are used implying that the developer shall have a very few loose ends that will give him the latitude to implement that RS or not. But as they are low in number, this implies that the most requirements are atomic in nature.
OPTIONALY	1	
TOTAL	10	
	Weak Phrases	
ADQUATE	0	***Judgment as an independent Business Analyst***
AS APPROPIATE	0	Few weak phrases are used which not significant and cannot contribute to multiple interpretations or uncertainty with the requirements. This also shows that almost all the requirements are complete and unambiguous.
AS REQUIRED	0	
BE ABLE TO	22	
BE CAPABLE OF	0	
CAPABILITT OF	0	
CAPABILITY TO	3	
EAST TO	0	
EFFECTIVE	0	

NORMAL		0
PROVIDE FOR		4
TIMELY		0
	TOTAL	29
Any other phrases	: NO OTHER WEAK PHRASES	

Screenshots of micro-level Indicators:

Imperatives:

IMPERATIVE	OCCURRENCE
ARE APPLICABLE	0
ARE TO	1
IS REQUIRED TO	0
MUST	5
RESPONSIBLE FOR	1
SHALL	266
SHOULD	3
WILL	10
TOTAL	286

Continuances:

CONTINUANCE	OCCURRENCE
:	34
AND	140
AS FOLLOWS:	0
BELOW:	0
FOLLOWING:	0
IN PARTICULAR:	0
LISTED:	0
SUPPORT:	0
TOTAL	174

Directives:

DIRECTIVE	OCCURRENCE
E.G.	0
FIGURE	9
FOR EXAMPLE	6
I.E.	0
NOTE:	0
TABLE	18
TOTAL	33

Options:

OPTION	OCCURRENCE
CAN	2
MAY	7
OPTIONALLY	1
TOTAL	10

Weak Phrases:

WEAK PHRASE	OCCURRENCE
ADEQUATE	0
AS APPROPRIATE	0
AS REQUIRED	0
BE ABLE TO	22
BE CAPABLE OF	0
CAPABILITY OF	0
CAPABILITY TO	3
EASY TO	0
EFFECTIVE	0
NORMAL	0
PROVIDE FOR	4
TIMELY	0
TOTAL	29

ARM Findings of SRS: 02 (Ehsan)

1.1. SRS - 2001 - esa.doc

Title Sample SRS		
Imperatives		
ARE APPLICABLE	0	***Judgment as an independent Business Analyst***
ARE TO	1	The larger the number of imperatives the well-defined requirements are. As there are 75 imperatives in the SRS which is a significant number. we can infer that the requirements are concrete and well defined.
IS REQUIRED TO	0	
MUST	0	
RESPONSIBLE FOR	2	
SHALL	56	
SHOULD	0	
WILL	16	
TOTAL	75	
Continuance		
:	54	***Judgment as an independent Business Analyst***
AND	132	Larger number of continuances show that the requirements are mixed into one another. As there is a huge number of continuances which show that the requirements are mixed up and are not atomic. Hence there is a factor of requirement amalgamation.
AS FOLLOWS	1	
BELOW	0	
FOLLOWING	0	
IN PARTICULAR	0	
LISTED	0	
SUPPORTED	0	
TOTAL	187	
Directive		
E.G.	2	***Judgment as an independent Business Analyst***
FIGURE	0	Diagrams and tables are used to clearly explain the requirements the larger the number of directives the well explained and understandable the requirements are. Here only 13 directives are used, which show that the requirements are not very well explained and are not very well understandable.
FOR EXAMPLE,	1	
I.E.	0	
NOTE:	1	
TABLE	9	
TOTAL	13	
Option		
CAN	6	***Judgment as an independent Business Analyst***
MAY	5	

OPTIONALY		0	Options make a requirement weak and ambiguous the larger the number of options the ambiguous the requirement is. It becomes harder to understand an ambiguous requirement. There is a small number of options used which shows that requirements are very less ambiguous or not ambiguous at all.
	TOTAL	11	
			Weak Phrases
ADQUATE		0	***Judgment as an independent Business Analyst***
AS APPROPIATE		0	Like options, weak phrases also add to the ambiguity of the SRS, larger weak phrases show that the requirements are ambiguous. Not even a single weak phrase is used in the SRS, which again shows that the requirements are not ambiguous.
AS REQUIRED		0	
BE ABLE TO		0	
BE CAPABLE OF		0	
CAPABILITT OF		0	
CAPABILITY TO		0	
EAST TO		0	
EFFECTIVE		0	
NORMAL		0	
PROVIDE FOR		0	
TIMELY		0	
	TOTAL	0	
Any other phrases	TBD		

Screenshots of Findings:

Imperatives:

IMPERATIVE	OCCURRENCE
ARE APPLICABLE	0
ARE TO	1
IS REQUIRED TO	0
MUST	0
RESPONSIBLE FOR	2
SHALL	56
SHOULD	0
WILL	16
TOTAL	75

Continuance:

CONTINUANCE	OCCURRENCE
:	54
AND	132
AS FOLLOWS:	1
BELOW:	0
FOLLOWING:	0
IN PARTICULAR:	0
LISTED:	0
SUPPORT:	0
TOTAL	187

Directive:

DIRECTIVE	OCCURRENCE
E.G.	2
FIGURE	0
FOR EXAMPLE	1
I.E.	0
NOTE:	1
TABLE	9
TOTAL	13

Option:

OPTION	OCCURRENCE
CAN	6
MAY	5
OPTIONALLY	0
TOTAL	11

Weak Phrase:

WEAK PHRASE	OCCURRENCE
ADEQUATE	0
AS APPROPRIATE	0
AS REQUIRED	0
BE ABLE TO	0
BE CAPABLE OF	0
CAPABILITY OF	0
CAPABILITY TO	0
EASY TO	0
EFFECTIVE	0
NORMAL	0
PROVIDE FOR	0
TIMELY	0
TOTAL	0

ARM Findings of SRS: 03 (Saman)

1.1. SRS - 2001 - libra.doc

Title	Libra SRS		
		Imperatives	
ARE APPLICABLE		0	***Judgment as an independent Business Analyst***
ARE TO		0	The use of imperatives has a positive impact on the specification. The significant number of the imperative shows most of the requirements are concretely defined.
IS REQUIRED TO		0	
MUST		0	
RESPONSIBLE FOR		1	
SHALL		0	
SHOULD		1	
WILL		38	
	TOTAL	40	
		Continuance	
:		7	***Judgment as an independent Business Analyst***
AND		75	Continuances show that there are multiple requirements and requirements are not atomic which in turn has a negative impact on the specification. But sometimes the use of "and" is not that much discouraged in comparison to all of the other continuances. Therefore, in this very case, continuances will have a lesser negative impact on the specification.
AS FOLLOWS		0	
BELOW		0	
FOLLOWING		0	
IN PARTICULAR		0	
LISTED		0	
SUPPORTED		0	
	TOTAL	82	
		Directive	
E.G.		0	***Judgment as an independent Business Analyst***
FIGURE		0	Directives enhance the understanding of the requirements. As there is no use of directives in this specification document so it can be deduced that there is no enhancement present for specifications.
FOR EXAMPLE,		0	
I.E.		0	
NOTE:		0	
TABLE		0	
	TOTAL	0	
		Option	
CAN		6	***Judgment as an independent Business Analyst***
MAY		6	Options give margin in the implementation of a specification requirement. Less frequent use of options show that this specification is less prone to variation in terms of implementations.
OPTIONALY		0	
	TOTAL	12	
		Weak Phrases	
ADQUATE		0	***Judgment as an independent Business Analyst***
AS APPROPIATE		0	Weak phrases have a negative impact on the specifications. Since, a very few of weak phrases are used, so it can be concluded that this specification has a little impact because of weak phrases.
AS REQUIRED		1	
BE ABLE TO		3	
BE CAPABLE OF		0	
CAPABILITT OF		0	
CAPABILITY TO		0	
EAST TO		0	
EFFECTIVE		0	
NORMAL		0	
PROVIDE FOR		0	
TIMELY		0	
	TOTAL	4	
Any other phrases	TBD		

SCREENSHOTS OF MICRO-LEVEL INDICATORS IN LIBRA (SRS)

IMPERATIVES

IMPERATIVE	OCCURRENCE
ARE APPLICABLE	0
ARE TO	0
IS REQUIRED TO	0
MUST	0
RESPONSIBLE FOR	1
SHALL	0
SHOULD	1
WILL	38
TOTAL	40

CONTINUANCES

CONTINUANCE	OCCURRENCE
:	7
AND	75
AS FOLLOWS:	0
BELOW:	0
FOLLOWING:	0
IN PARTICULAR:	0
LISTED:	0
SUPPORT:	0
TOTAL	82

DIRECTVES

DIRECTIVE	OCCURRENCE
E.G.	0
FIGURE	0
FOR EXAMPLE	0
I.E.	0
NOTE:	0
TABLE	0
TOTAL	0

OPTIONS

OPTION	OCCURRENCE
CAN	6
MAY	6
OPTIONALLY	0
TOTAL	12

WEAK PHRASES

WEAK PHRASE	OCCURRENCE
ADEQUATE	0
AS APPROPRIATE	0
AS REQUIRED	1
BE ABLE TO	3
BE CAPABLE OF	0
CAPABILITY OF	0
CAPABILITY TO	0
EASY TO	0
EFFECTIVE	0
NORMAL	0
PROVIDE FOR	0
TIMELY	0
TOTAL	4

Requirements Specification quality ranking

This is an example of ranking SRS

After analyzing all the selected SR using the NASA ARM tool, we have devised a strategy to identify the best SRS based on NASA ARM provided metrics. For that, we have devised a formula to find the ration of metrics that have positive impact on overall SRS with metrics that have negative impact. The metric that has positive impact are imperative and directive and the metric that have negative impact are continuance, option and weak phrases. **Error! Reference source not found.**Table 1 presents the ranking of selected SRS based on NASA ARM Metrics.

Table 1: SRS ranking based on NASA ARM Metrics

ID	*Document Name*	*Imperative*	*Continuance*	*Directive*	*Option*	*Weak Phrases*	*Positive %*	*Rank*
RS1	***SRS1 - hats***	286	174	33	10	29	30.76	**1**
RS2	***SRS2 - esa***	75	187	13	11	0	54.20	**2**
RS3	***SRS3 - libra***	40	82	0	12	4	44.56	**3**

Technique used to Rank SRS:

Table 5.10 Sample Statistics from 56 NASA Requirements Specifications (Rosenberg)

	Lines of Text	*Imperatives*	*Continuances*	*Directives*	*Weak Phrases*	*TBD, TBS, TBR*	*Option (can, may…)*
Minimum	143	25	15	0	0	0	0
Median	2265	382	183	21	37	7	27
Average	4772	682	423	49	70	25	63
Max	28459	3896	118	224	4	32	130
Std Dev	759	156	99	12	21	20	39
Level 3 Specs	1011	588	577	10	242	1	5
Level 4 Specs	1432	917	289	9	393	2	2

Reference: [Applied software engineering series] Phillip A. Laplante - Requirements Engineering for Software and Systems (2009, CRC Press,Auerbach Publications)(1)(1)