Requirements Engineering Lecture 3: Requirements Evaluation

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Sep-16

Sep-16

Sep-16



Prepare presentation Last name: H-K









RENG in the news



Reflected light from London skyscraper







St Helena airport too windy to open

9 June 2016 Last updated at 19:21 BST

The opening of an airport on the British overseas territory of St Helena has been delayed indefinitely due to high winds.

The £285m project is being paid for by the Department for International Development and was due to open in May.

Related



Planes struç in Spain 14 Decembe

Most w



Moment of I blast caught 18 September



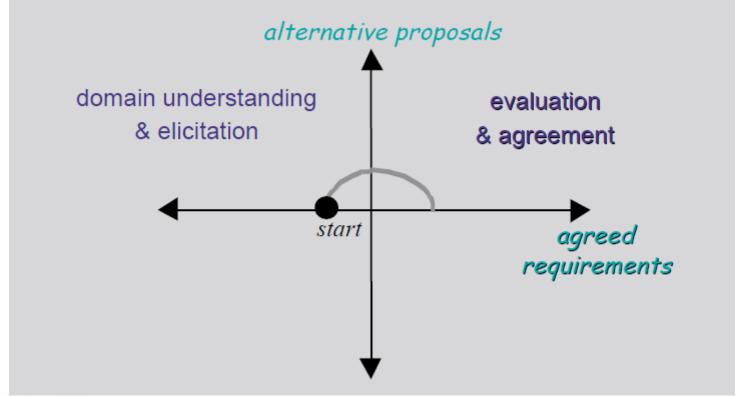
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Requirements Evaluation





Roadmap

- Inconsistency management
 - Types of inconsistency
 - Handling inconsistencies
 - Managing conflicts
- Risk analysis
 - Types of risk
 - Risk management (identification, assessment, reduction)

- Prioritisation
 - Value cost prioritization

Types of inconsistency

- Terminology inconsistency
- Designation inconsistency
- Strong conflict
- Weak conflict or divergence

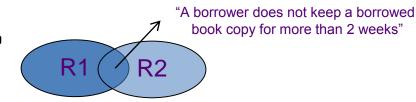




Weak conflict or divergence

- Unsolvable in some cases:
 - Library Management System
 - Library staff: R1 "a borrower should return a borrowed book copy within two weeks"
 - Borrower: R2 "a borrower should keep a borrowed book copy as long as she/he needs it"

Might seem insolvable????







Strong conflict

- Unsolvable in all circumstances
 - Meeting Scheduler System
 - Meeting participant: R1 "the constraints of a participant may not be disclosed to anyone else"
 - Meeting initiator: R2 "the meeting initiator should know the participants' constraints"
 - Building regulatory requirements:
 - Fire department: Tiles in kitchens shall be rough
 - Sanitary department: Tiles in kitchens shall be smooth









Win-Win negotiation – step 1

Identify the personal (win) goals of the stakeholders



Meeting participant: R1 "the constraints of a participant may not be disclosed to anyone else"





Meeting initiator: R2 "the meeting initiator should know the participants" constraints"



Win-Win negotiation – step 2

Capture the differences between the win conditions



Achieve administrability

Privacy vs. Administrability





Win-Win negotiation – step 3

 Reconcile the differences with a mutually agreed set of alternatives with constraints and risks

Privacy vs. Administrability



A1: "participant constraints are only disclosed to initiator"

A2: "participant constraints are anonymously disclosed to initiator"





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What is a risk?
Uncertain factor whose occurrence
may result in loss of satisfaction of a
corresponding objective

e.g. a passenger forcing doors opening while train moving a meeting participant not checking email regularly





A risk has

- a likelihood of occurrence,
 one or more undesirable consequences
 e.g. passengers falling out of train moving with doors open
- Each risk consequence has ...
 - a likelihood of occurrence if the risk occurs (not to be confused with risk likelihood)
 - a severity: degree of loss of satisfaction of objective



Back-up



Risk mitigation

Mitigations are steps the team can take before the condition occurs, and each has one of three effects on the risk:

- Reduce: Risk reduction minimizes the risk's probability or its impact, or both. Ideally, a reduction method reduces probability or impact to zero, but this is not always possible.
- Avoid: Risk avoidance prevents the team from taking actions that increase exposure too much to justify the benefit.
- Transfer: Whereas the avoidance strategy eliminates a risk, the transference strategy often leaves the risk intact but shifts responsibility for it to another group to reduce the risk.





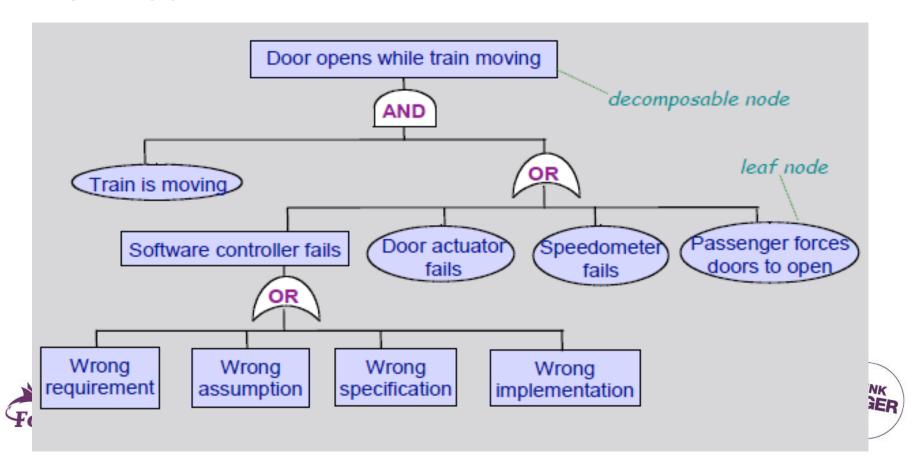
Contingency

A contingency is a step the team takes if the condition occurs or a trigger becomes true. The contingency plan documents the set of contingencies the team will use when reacting to a particular condition.





Risk tree



Risk assessment matrix

	CONSEQUENCES												
LIKELIHOOD	Catastrophic 5	Major 4	Moderate 3	Minor 2	Insignificant 1								
Almost certain 5	10	9	8	7	6								
Likely 4	9	8	7	6	5								
Possible 3	8	7	6	5	4								
Unlikely 2	7	6	5	4	3								
Rare 1	6	5	4	3	2								

- + Easy to use
- Limited conclusions: coarse-grained, subjective estimates, likelihood of consequences not considered



Risk assessment

Risk exposure for risk r with independent consequences c:

Exposure (r) =
$$\sum_{c}$$
 Likelihood (c) × Severity (c)





Classroom assignment

 Calculate the risk exposure (probable loss) for a mortgage portfolio:

Risk: Probability of Default (PD)

Severity risk: Loss Given Default

(LGD)

PD	Mortgage sum	LGD
0,1	300.000	30.000
0,02	450.000	25.000
0,5	125.000	15.000
0,01	95.000	70.000
	970.000	140.000





Classroom assignment 7

Calculate the risk exposure for:

Risk: Door open while train is moving

Likelihood risk: 0,02

Consequence	Likelihood consequence
Loss of life	0,1
Serious injuries	0,3
Train car damaged	0,4
reputation	0,7





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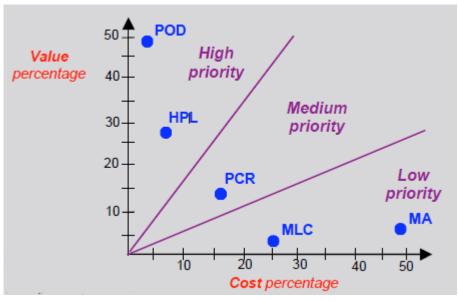
Requirements prioritization

- Why?
- How recorded?





Value – Cost prioritisation



- For each req: Three steps:
 - 1. Estimate Value
 - Estimate Costs
 - 3. Plot contributions

POD – Produce optimal dates

HPL – Handle preferred locations

PCR – Parameterize Conflict resolution

MLC – Multi lingual communication

MA – Provide meeting assistant





How to estimate relative cost and value?

- Pairwise comparison:
- Traditional method calculate the cost by money spent
 - slow, vague, and various in many factors
- Prioritization based on relative value rather than absolute assignments
 - Fast, accurate, and trustworthy





You can easily tell **A** is taller than **B**, but it is difficult to tell what **A**'s height is.





Step 1:Compare requirements pairwise (value)

Scale for comparing R_i's contribution to value to R_j's:

1: contributes equally 7: contributes very strongly more

3: contributes slightly more 9: contributes extremely more

5: contributes strongly more

• In comparison matrix, $R_{ji} = 1 / R_{ij}$ $(1 \le i, j \le N)$

		0	0		
Crit: value	Produce optimal date	Handle preferred locations	Parameterize conflict resolution strategy	Multi-lingual communication	Meeting assistant
Produce optimal date	1	3	5	9	7
Handle preferred locations	1/3	1	3	7	7
Parameterize conflict resolution strategy	1/5	1/3	1	5	3
Multi-lingual communication	1/9	1/7	1/5	1	1/3
Meeting assistant	1/7	1/7	1/3	3	1





Step 2: Normalize matrix

• Criterion distribution = eigenvalues of comparison matrix

2.a Normalize columns: R'ij:= Rij / ∑i Rij

2.b Average accross lines: Contrib (R₁, Crit) = ∑¡R'ij/ N

The result:

		Produce optim. date	Handle preferred locations	Param. conflict resolution strategy	Multi-lingual communication	Meeting assistant	Relative value	
	Produce optimal date	0.56	0.65	0.52	0.36	0.38	0.49	
	Handle preferred locations	0.19	0.22	0.31	0.28	0.38	0.28	
	Parameterize conflict resolution strategy	t 0.11	0.07	0.10	0.20	0.16	0.13	_
	Multi-lingual communication	0.06	0.03	0.02	0.04	0.02	0.03	1
n	Meeting assistant	0.08	0.03	0.03	0.12	0.05	0.07	-

Calculation

1,79	4,62	9,53	25,00	18,33
0,14	0,14	0,33	3,00	1,00
0,11	0,14	0,20	1,00	0,33
0,20	0,33	1,00	5,00	3,00
0,33	1,00	3,00	7,00	7,00
1,00	3,00	5,00	9,00	7,00

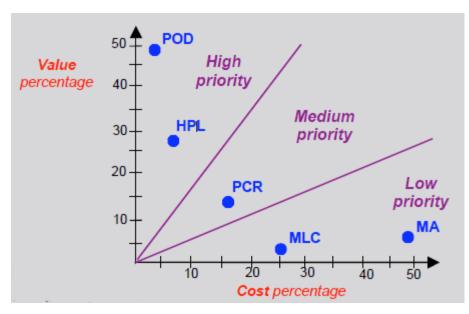
- 1. The comparison matrix
- 2. Sum the columns
- 3. Divide cells by sum
- 4. Sum the rows
- 5. Divide the sums by N (5)

0,56	0,65	0,52	0,36	0,38	2,48	0,495
0,19	0,22	0,31	0,28	0,38	1,38	0,276
0,11	0,07	0,10	0,20	0,16	0,65	0,131
0,06	0,03	0,02	0,04	0,02	0,17	0,034
0,08	0,03	0,03	0,12	0,05	0,32	0,064





Plotting contributions on value-cost diagram



- Redo the steps for the costs
- Visualize value/cost contributions on diagram partitioned in selected priority levels

POD – Produce optimal dates

HPL – Handle preferred locations

PCR - Parameterize Conflict resolution

MLC – Multi lingual communication

MA – Provide meeting assistant





Assignment 8 Create value cost diagram: See separate document





Assignment 9 Case:

Make a mock-up of the user interface of the case assigned to you





For next week

- Upload no later than Thursday
 17.00 the completed
 assignments 7, 8 and 9
- Presents and discusses (3-5 min) the solutions to the assignments:

Lastname(s): L-P

 Read chapter 3 of: van Lamsweerde





Assignment 10 (after next weeks interviews) Case:

Create the 2nd chapter in the SRS

- 1) Product perspective
- 2) Product Functions (Use cases)
- 3) User Characteristics
- Constraints → e.g. regulations, HW and resource limitations
- 5) Assumptions and dependencies









Example Risk template

column, rest you to appear.	s spreadsheet as a template to for a product, situation, event, or cursor over the column hea et displays sample risks asso- IT department.	etc. For explanation of each																
Master Ris	sks List - Contoso			Sources of Risk: People, Proc	ess, Tecknology, Environmental Fac	itors						List Last	Reviewed: 4	3/2007				
Project: IT	Reorganization (ITF	REORG010)		Modes of Failure: Performance	e, Capability, Security, Cost													
SOURCE OF RISK	DOVNSTREAM EFFECT	* RISK CONDITION *	EXPLANATION	OPERATIONAL CONSEQUENCES	BUSINESS EFFECT	PROBABILIT Y	INITIAL IMPACT		MITIGATION	CONTINGENCY	TRIGGER	LAST UPDAT E	TEAM MEMBER ASSIGNED	ACTIONS	STATUS	MODIFIED PROBABILIT Y	MODIFIED IMPACT	EXPOSURE
Process	Performance Cost	Present service desk process inefficiencies could lead to increased cost to support current IT services.	Field office support is not a coordinated effort with centralized help dook functions. Often field support professionals respond to and resolve incidents without those incidents being recorded and a knowledge base being populated.	Without a comprehensive, shared knowledgebare of incidente, problems and recolutions, redendum incident and problem management activity will be performed throughout the export organization.	Extended cornics outages and inadequate communications requiriling situates of the continuous will further allemant the customer from IT. This will enforce the riew of IT as not being sligned with the needs of the business. The perceived value of the custices provided by IT will be difficultied.		5	3,5	Implement MOF lacident and Problem management processes. Coordinate second and third line support groups.	Allocation of excessive recourses to accommodate firefighting reactive issues. Boar the costs of increased supports within and staff.	Continual firefighting. Repeated problems occur. Uncoordinated and recurring changes. Poor neutrine to recolution.		Toom A	Probability has decreased due to the implementation of MOF-based incident and problem management processor. Original probability will be kept in the Master Rick List and Risk Knowledge Base for historical purposes.	Орев	40%	5	2
People	Performance Cupublity	Changes implemented by one IT group could negatively affect systems and services delivered to other IT groups.	Although change management strifts withis some groups, a common formal change management process does not exist screes all fig groups. Additionally, some changes, when reviewed at the weekly other menting, how not be no proporty assessed for impact to all groups.	Lack of commitment to a standard set of operational processes will lead to besince with the fail to treat such other. Frustration between IT groups will occur as operation under the responsibility of one group will be affected by others.	Survice disruptions caused by failed changes will interrupt besides? fast-dose, Additionally, failure to communicate plasmed downtime of mission-critical pervices to sees and the high dash buffers carries interruptions occur will result in reduced treat in IT. This has of treat will force the business to wonder show the what of the time of the provisions and force than to this about controlled IT factoring IT sections.	65%	5	3.25	A standard formalized and communicated MOP -based change management process will be implemented across AIIIT groups.	Assign additional resources to reactive problem management. Communication to outcomers and	Information gathered during project status needings and operations management reviews regarding process and service		Toom B	Probability has decreased due to the implementation of MOF-based change monagement processes. Original probability will be kept in the moeter risk lie and risk knowledge base for historical purposes.		35%	5	1,75
Process	Performance Cost	Present service desk process inefficiencies could lead to increased cost to support current IT services.	Field office support is not a coordinated effort with controlled help dock fractions. Often field support professionals respond to said receive incidence without those incidents being recorded and a knowledge base being populated.		Extended cervice outages and inadequate communications regarding states of resolutions will further alliantative certains from IT. This will refere the risks will be suffered the risks of IT has not being aligned with the acceds of the business. The precised value of the certains provided by IT will be difficulted.		5	3.5	Implement MOF lecident and Problem management processes. Coordinate second and third line support groups.	Allocation of excessive recourses to accommodate firefighting reactive issues. Boar the costs of increased appost actifities and staff.	Coatinual firefighting. Reposted problems occur. Uncoordinated and recurring changes. Poor matables to recolution.		Team A	Probability has decreased due to the implementation of MDF-based incident and problem management processes. Original probability will be kept in the Master Rick List and Risk Knowledge Base for historical purposes.		40%	5	2
Psople	Performance Cupublity	Changes implemented by one IT group could negatively affect systems and services delivered to other IT groups.	Although change management scients within some groups, a common formal change management proceed sides not exist series at III groups. Additionally, some changes, when reviewed at the weekly states meeting, lave not be properly assected for impact to all groups.	Luck of commitment to a standard set of operational processes will lead to besince usin the fail to treat such other. Frustration between IT groups will occur as operation under the responsibility of one group will be uffected by others.	Survice disruptions caused by failed changes will interrupt besizes functions. Additionally, failure to communicate plasmed downtime of mission-critical pervices to excess and the high desk before sorrice interruptions occur will reach in reduced treat in IT. This lack of treat will force the business to wooder shoot the what of the what of the will force to wooder shoot the what of the what of the shoot of treatment of IT operations and force than to think shoot not reaching IT functions.		5	3,25	A standard formalized and communicated MOF-based change management process will be implemented accord IIIT groups.	Accign additional recourses to reactive problem management. Communication to eustoners and end-more in a prompt, descriptive and meaningful maner can reduce the expelies effect on eustones satisfaction.			Toom B	Probability has decreased due to the implementation of MOP-based change management processes. Original probability will be kept in the macter risks lies and risk knowledge base for historical gurposes.	Open	35×	5	1,75
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Daniela .	Performance Canadalism	Changes implemented by one IT group could acquirely affect systems and services delivered to other IT	Although change management strict within some groups, a common formal change management process does not exist sense as III groups. Additionally, some changes, when reviewed at the weekly states meeting, hore not been proposity assessed for impact to all	Luck of commitment to a standard set of operational processes will lead to benince usite that fall to treat each other. Frustration between IT groups will occur as gestern under the responsibility of one group will be s	Service disruptions canced by failed changes will interrupt business factories. Additionally, failure to commission planed downline of mission-critical services to sees and the high dash buffers carried interruption cours will make in reduced treat in factories that in reduced treat in This lock of treat will force the business to worselve about the raine of the state of the country of the cou		5	3.25	A stondard formuliced and communicated MOT-based change monogenest process will be innerested a process will To common	and woors in a prompt, descriptive and meaningful manner can reduce			Tora B	Probability has decreased dus to the implementation of MOF-based change monagement processe. Original probability will be kept in the macter risks for and risk knowledge base for historical gurpose.		35%	5	175





What?, if, then?

	Α	В	С	D	Е	F
	identified risks for column, rest you appear.	et displays sample risks assoc				
1						
2	Master Risk	s List - Contoso			Sources of Risk: People, Process,	Technology, Environmental Factors
_	D 1 (17.D	utbeoba	2040)			175 0 5 0 1
4	Project: II Rec	organization (ITREORG	010)		Modes of Failure: Performance, Ca	ipability, Security, Cost
5						
6	SOURCE OF RISK	DOWNSTREAM EFFECT	RISK CONDITION	EXPLANATION	OPERATIONAL CONSEQUENCES	BUSINESS EFFECT
7	Process	Performance Cost	Present service desk process inefficiencies could lead to increased cost to support current IT services. Changes implemented by one IT group could	Field office support is not a coordinated effort with centralized help desk functions. Often field support professionals respond to and resolve incidents without those incidents being recorded and a knowledge base being populated. Although change management exists within some groups, a common formal change management process does not exist across all IT groups.	Without a comprehensive, shared knowledgebase of incidents, problems and resolutions, redundant incident and problem management activity will be performed throughout the support organization. Lack of commitment to a standard set of operational processes will lead to business units that fail to trust each other. Frustration between IT groups	Extended service outages and inadequate communications regarding status of resolutions will further alienate the customer from IT. This will enforce the view of IT as not being aligned with the needs of the business. The perceived value of the services provided by IT will be diminished. Service disruptions caused by failed changes will interrupt business functions. Additionally, failure to communicate planned downtime of mission-critical services to users and the help desk before service interruptions occur will result in reduced trust in IT. This lack of trust will force the business to wonder



Probability, impact, mitigation, contingency, trigger

PROBABILITY \	INITIAL IMPACT	EXPOSURE `	MITIGATION	CONTINGENCY	TRIGGER
80%	5	4	Establish an additional external vendor relationship for temporary or permanent hardware acquisition suitable for lab environment. Utilize virtual machines within available hardware to simulate additional hardware.	Examine cost of delay to production implementation. Borrow equipment currently being utilized for other lower priority purpose. Notify operations staff of significant change procedure to copy production environment to test environment.	Frequent monitoring of requisition process shows no progress to hardware arrival.
20%	5	1	Maintain regular communication with all project managers and project sponsors.	Aggressively train and go through knowledge transfer. Adjust deployment schedule as necessary.	Personnel involved with project turnover or Contoso financial situation greatly changes.



Current status

List Last R	eviewed: 4/3/20	003				
LAST UPDATE	TEAM MEMBER ASSIGNED	ACTIONS	STATUS `	MODIFIED PROBABILITY	MODIFIED IMPACT	EXPOSURE
	Team A	Probability has decreased due to new relationship with Vendor X. This will allow the rapid acquisition of necessary hardware, if needed. Original probability will be kept in the master risks list and risk knowledge base for historical purposes.	Open	30%	5	1,5
		Probability has increased due to project team member changes. Original probability will be kept in the master risks list and risk knowledge.				

Example Risk template

identified risks to column, rest you to appear.	spreadsheet as a template to or a product, situation, event, or custor over the column hear of displays sample risks associ of displays sample risks associ	etc. For explanation of each																
Master Ris	ks List - Contoso			Sources of Risk: People Prop	ess, Technology, Environmental Fac	itors						List Last	Reviewed: 4/	3/2007				
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Process	Performance Cost	Present service desk process inefficiencies could lead to increased cost to support current IT services.	Field office support is not a coordinated effort with controlled help dook harchine. Often field support professional report of the order of the discoler incidents without those incidents being recorded and a knowledge base being populated.	Without a comprehensive, shared knowledgebase of incidente, problems and recolations, redundent incident and problem management activity will be purformed throughout the expport organization.	Extended service outrages and insedequate communications regarding status of resolutions will further alienate the exchange from IT. This will enforce the rises of IT as not being aligned with the needs of the business. The perceived value of the ournices provided by IT will be distributed.		5	3,5	Implement MIDF Incident and Problem management processes. Coordinate second and third line support groups.	Allocation of excessive recourses to accommodate firefighting reactive issues. Boar the costs of increased support exhibits and stelf.	Continual firefigiting, Repeated problems occur. Uncoordinated and reuning changes. Poor metables to recolution.		Toom A	Probability has decreased due to the implementation of MOF-based incident and problem management processor. Original probability will be kept in the Master Rick List and Rick Knowledge Base for historical purposes.	Орев	40%	5	2
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Process	Performance Cost	Present service desk process inefficiencies could lead to increased cost to support current IT services.	Field office support is not a coordinated effort with controlled high desk fractions. Often field support professionals respond to said resolve incidents without those incidents being recorded and a knowledge base being populated.		Extended service outages and inadequate communications regarding studes of resolution will further alliciate the cestomer from IT. This will enforce the view of IT as not being aligned with the secols of the business. The precised value of the services provided by IT will be difficulted.		5	3.5	Implement MOF lecident and Problem management processes. Coordinate second and third line support growth.	Allocation of accessive recourses to accommodate firefighting reactive issues. Bear the costs of increased support actificities and staff.	Continual fireflighting. Repeated problems occur. Uncoordinated and recurring changes. Poor machine to recolution.		Team A	Probability has decreased due to the implementation of MDF-based incident and problem management probability will be kept in the Master Risk List and Risk Knowledge Base for historical purposas.	Opus	40%	5	2
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