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* Context-sensitive Traceability Controlling

TraCo is supported and promoted by the "Austrian Research Promotion Agency (FFG)" by the funding program BRIDGE.

Launch of the 18-month project is October 2012.

* Sparx Systems Central Europe

- * Sister Company of Sparx Systems Australia (Headquarter)
- * Provide Licences, Trainings and Consultants
- * With our partner www.LieberLieber.com we provide Plug-Ins for Enterprise Architect.



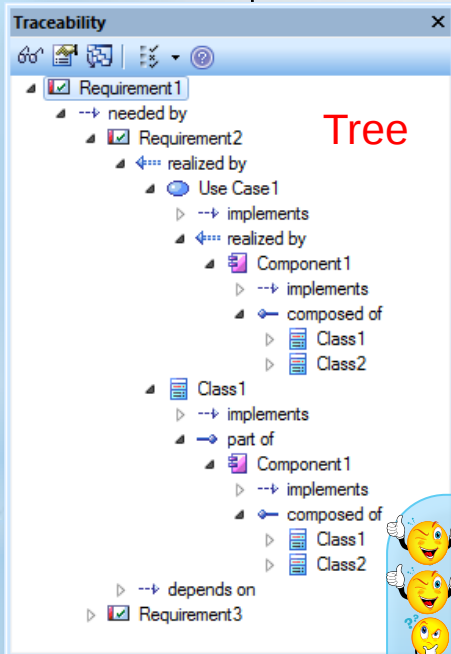
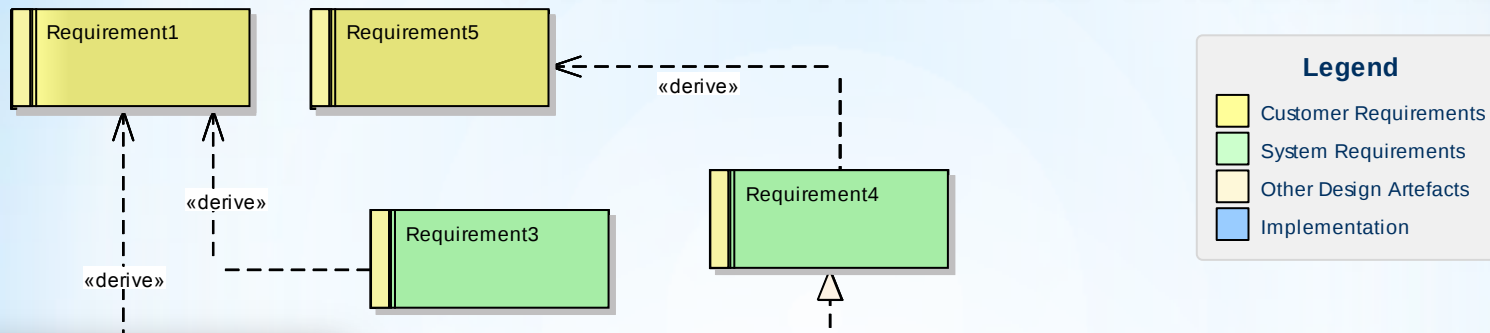
SparxSystems HQ



Vienna (Austria)

Creswick in Victoria (Australia)

* Requirements Traces

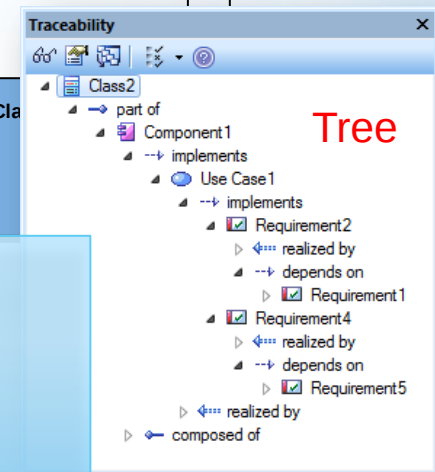


Relationship Matrix

	Requirement2	Requirement3	Requirement4
Requirement1	↑	↑	
Requirement5			↑

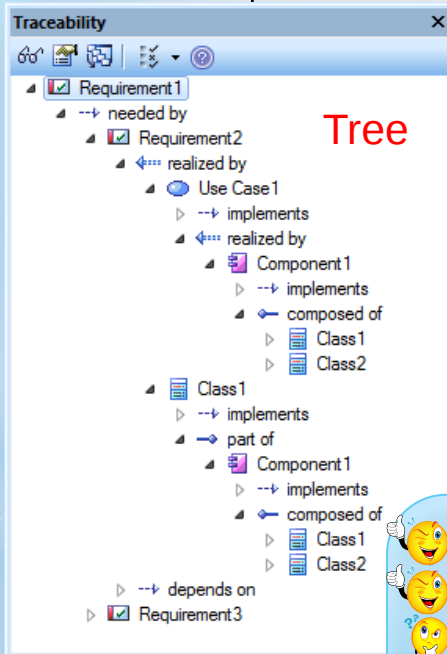
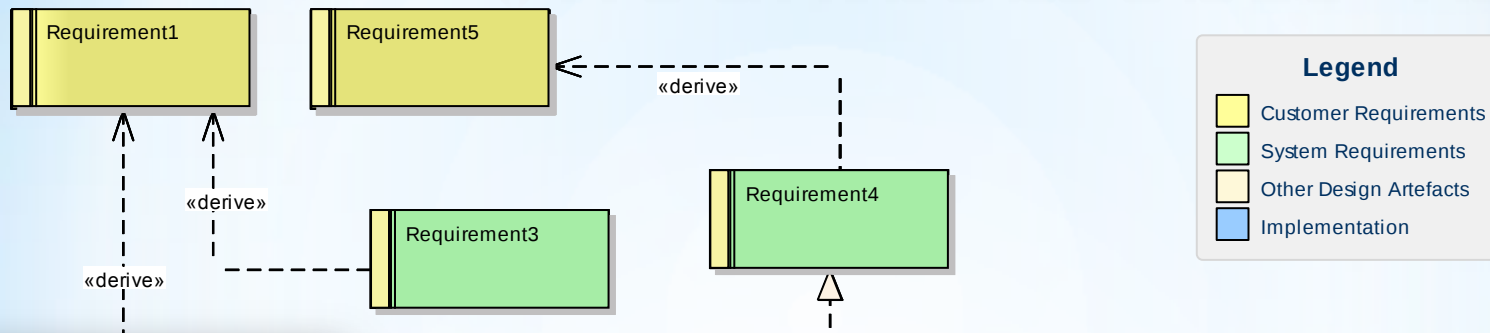
Relationship Matrix

	Requirement2	Requirement3	Requirement4
Use Case1	↑		↑



What is linked with what?
 Are all requirements considered?
 Progress of the implementation?
 Why is the architecture like it is?
 Do we have the same idea of the solution?
 What impact has a change of a requirement?

* Requirements Traces

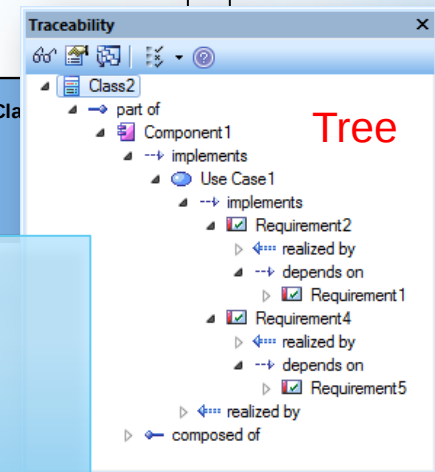


Relationship Matrix

	Requirement2	Requirement3	Requirement4
Requirement1	↑	↑	
Requirement5			↑

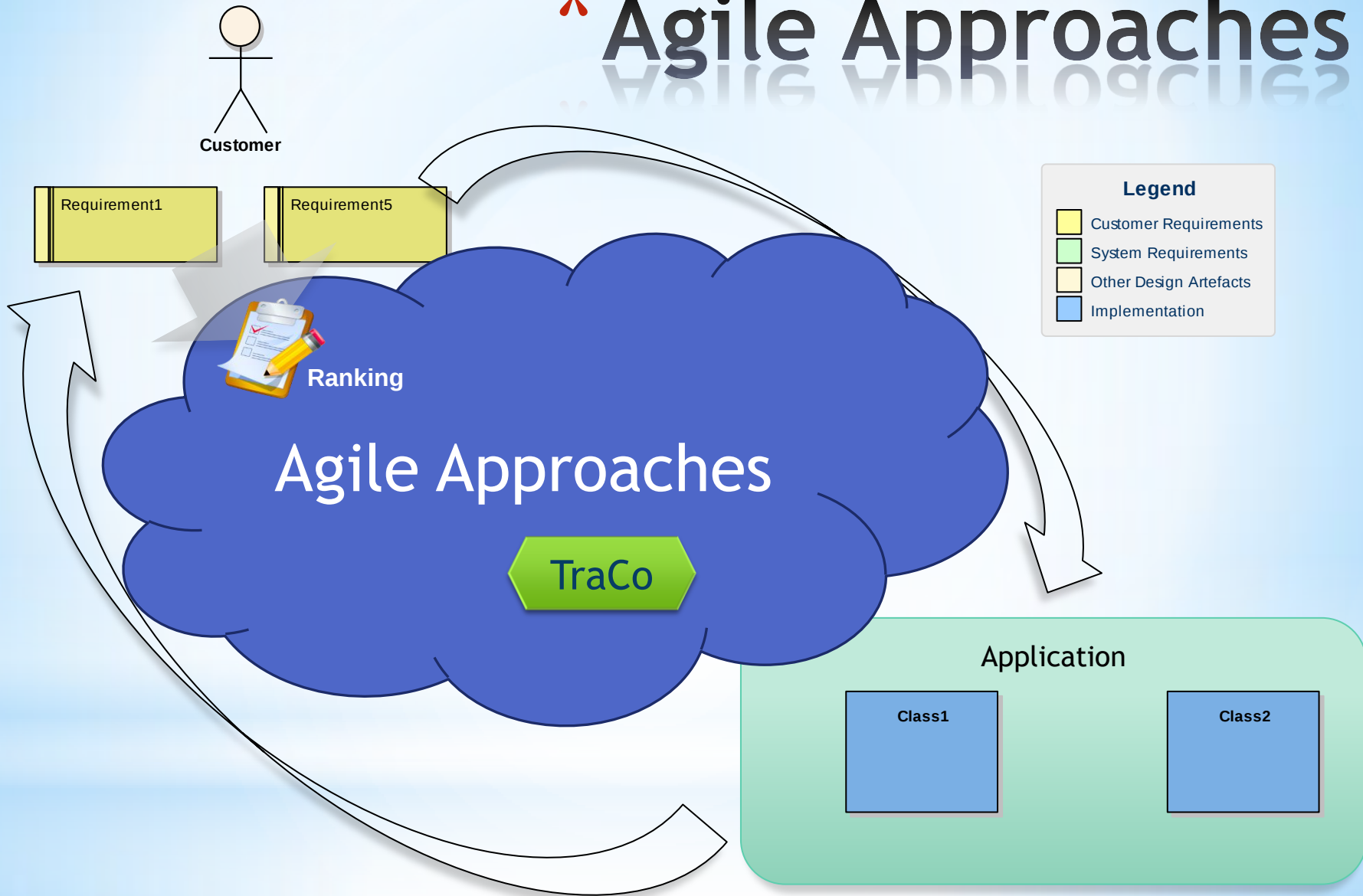
Relationship Matrix

	Requirement2	Requirement3	Requirement4
Use Case1	↑		↑

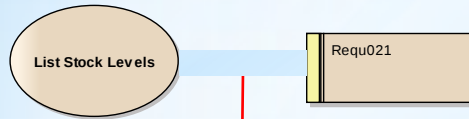


What is linked with what?
 Are all requirements considered?
 Progress of the implementation?
 Why is the architecture like it is?
 Do we have the same idea of the solution?
 What impact has a change of a requirement?

* Agile Approaches



*TraCo Approach



Chose Context (Quality Criteria)

The 'Kopplung bewerten' dialog box is shown. It has a dropdown menu 'Wählen Sie einen Kontext aus:' with a red arrow pointing to it. Below are three groups of radio buttons: 'schwach relevant' (1-3), 'relevant' (4-6), and 'hoch relevant' (7-9). The '9' button is selected. There is a text area 'Notiz:' with the text 'Additional thought about, why this link is relevant.' At the bottom are buttons 'Speichern', 'Speichern + weitere Bewertung', 'Abbrechen', and a circled 'ZeigeBewertungen >>' button.

All available votes for this trace

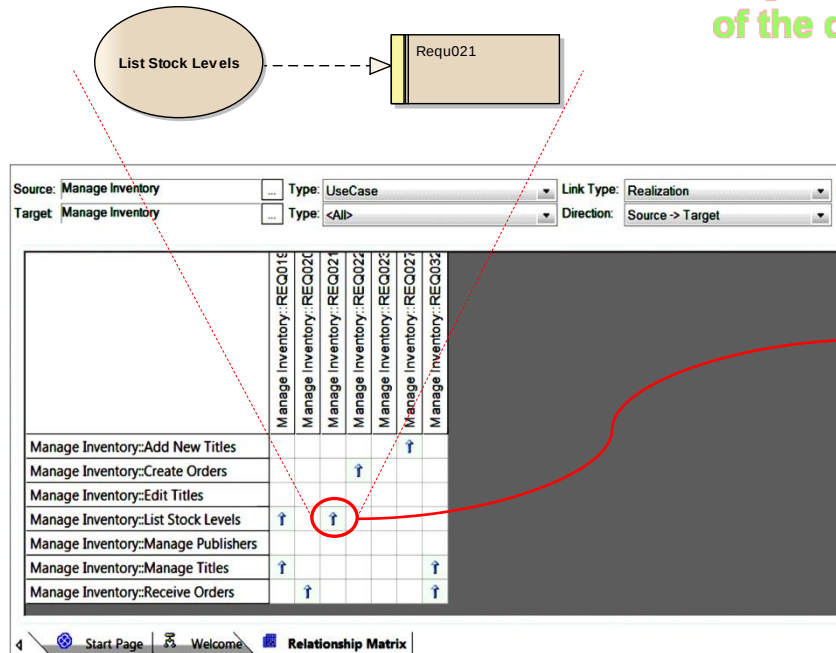
The 'Relationship Matrix' is shown. It has a table with rows and columns. The columns are labeled 'Manage Inventory: REQ001', 'Manage Inventory: REQ002', 'Manage Inventory: REQ003', 'Manage Inventory: REQ004', 'Manage Inventory: REQ005', 'Manage Inventory: REQ006', 'Manage Inventory: REQ007', 'Manage Inventory: REQ008', 'Manage Inventory: REQ009', 'Manage Inventory: REQ010'. The rows are labeled 'Manage Inventory: Add New Titles', 'Manage Inventory: Create Orders', 'Manage Inventory: Edit Titles', 'Manage Inventory: List Stock Levels', 'Manage Inventory: Manage Publishers', 'Manage Inventory: Manage Titles', 'Manage Inventory: Receive Orders'. A red circle highlights the cell at the intersection of 'Manage Inventory: List Stock Levels' and 'Manage Inventory: REQ002'. A red arrow points from this cell to the 'Kopplung bewerten' dialog box.

Relationship Matrix

The 'Kopplung bewerten' dialog box is shown. It has a dropdown menu 'Wählen Sie einen Kontext aus:' with a red arrow pointing to it. Below are three groups of radio buttons: 'schwach relevant' (1-3), 'relevant' (4-6), and 'hoch relevant' (7-9). The '9' button is selected. There is a text area 'Notiz:'. At the bottom are buttons 'Speichern', 'Speichern + weitere Bewertung', 'Abbrechen', and 'Versteckte Bewertungen <<'. On the right, there is a table with columns 'Gruppe/Standard', 'Kontext:', 'Bewertung', and 'Notiz'. The table has one row: 'ISO/IEC 25010', 'Sicherheit', '9', and a red 'X' icon. Below the table is a note: 'Sie können Bewertungen und Notizen durch einen Klick in das jeweilige Feld bearbeiten. Durch ein Klick auf das X können Sie existierende Bewertungen wieder löschen.'

*TraCo Approach

Relationship Matrix



Degree of fulfilment of the quality aspect

Weighted Design Decision Matrix

Quality-related contexts, based on ISO/IEC 25010

Context Template	relative weighting	Functionality	Performance	Usability	Reliability	Maintainability	Security	Portability	Compatibility	...	...
Sum / Effective size (RoF):	34	28%	21%	26%	5%	15%	9%	0%	0%	0%	0%
Requ021 x ListStockLevels	4,57	7				7	5				
Requ019 x ListStockLevels	4	9	4	5							
Requ19 x ManageTitels	3	4	9				1				
Requ32 x ManageTitels	4			5		2					
Requ20 x ReceiveOrders	7	2									
Requ32 x ReceiveOrders	6			8	3	2					
Requ022 x CreateOrders	1,43	1					4				
Requ027 x Add New Titels	4		7								

Rating Objects

Kopplung bewerten

Wählen Sie einen Kontext aus:

schwach relevant relevant hoch relevant

Notz:

Speichern Speichern + weitere Bewertung Abbrechen

ZeigeBewertungen >>

ListStockLevel <-> Requ021

high Functionality relevant
high Maintainability relevant
weak Security relevance

:Team Member

:Team Member

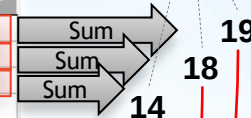
ListStockLevel <-> Requ021

high Usability relevance
relevant Security relevance
weak Performance relevance

Weighted Design Decision Matrix

0-3 weak relevant 4-6 relevant 7-9 high relevant											
Context Template	relative weighting	Functionality	Performance	Usability	Reliability	Maintainability	Security	Portability	Compatibility	..	..
Detailed information concerning the quality criteria:	=>										
Sum / Effective size (RoF):	34	28%	21%	26%	5%	15%	9%	0%	0%	0%	0%
Requ021 x ListStockLevels	4,57	7				7	5				
Requ019 x ListStockLevels	4	9	4	5							
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Requ32 x ReceiveOrders	6			8	3	2					
Requ022 x CreateOrders	1,43	1					4				
Requ027 x Add New Titels	4		7								
...											
...											

Aggregated relevance



Simple Relationship Matrix	Manage Inventory:REQ001	Manage Inventory:REQ002	Manage Inventory:REQ003	Manage Inventory:REQ004	Manage Inventory:REQ005	Manage Inventory:REQ006	Manage Inventory:REQ007	Manage Inventory:REQ008	Manage Inventory:REQ009	Manage Inventory:REQ010
Manage Inventory:Add New Titles										
Manage Inventory:Create Orders										
Manage Inventory>Edit Titles										
Manage Inventory:List Stock Levels										
Manage Inventory:Manage Publishers										
Manage Inventory:Manage Titles										
Manage Inventory:Receive Orders										

Level of Utility

Classes	Utility Scoring
[> 0.75]	highest
[0.51 ≥ 0.75]	high
[0.26 ≥ 0.50]	middle
[0.16 ≥ 0.25]	low
[≤ 0,15]	lowest

Design Decision Traceability Grid

DDT-Grid	Priorization	Add New Titel	Create Orders	Edit Titels	List Stock Levels	Manage Publishers	Manage Titels	Receive Orders	...	Sum of Series	Standardized Level of Utility	Utility Scoring
Customer Requirements	Ranking Stakeholder Value	4 11%	5 10%		1 41%		2 32%	3 22%				
Requ019	6				18		14			32	0,38	middle
Requ020	4							2		2	0,02	lowest
Requ021	3				19					19	0,22	middle
Requ022	8		5							5	0,06	lowest
Requ023	7									0	0,00	lowest
Requ027	6	7								7	0,08	lowest
Requ032	6						7	13		20	0,24	mittel
...												
		7	5	0	37	0	21	15	0	85	1	

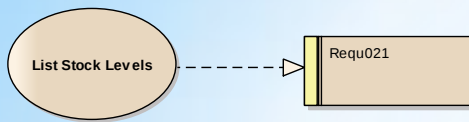
$$6 \cdot 18 + 3 \cdot 19 = 165$$

$$165 / (6 + 4 + 3 + 8 + 7 + 6 + 6) = 4,125$$

$$4,125 / 10 = 0,412 \Rightarrow 41\%$$

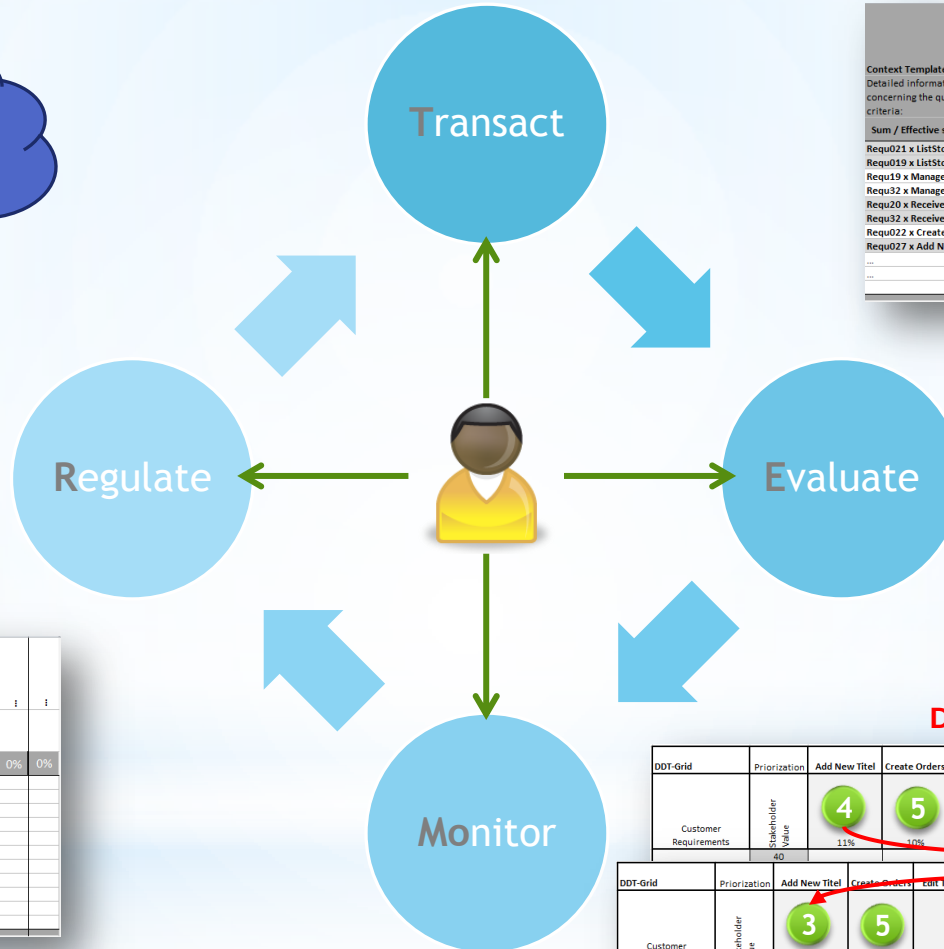
$$32 / 85 = 0,38$$

Sum



*TEMoR Process

Create New Link



Weighted Design Decision Matrix

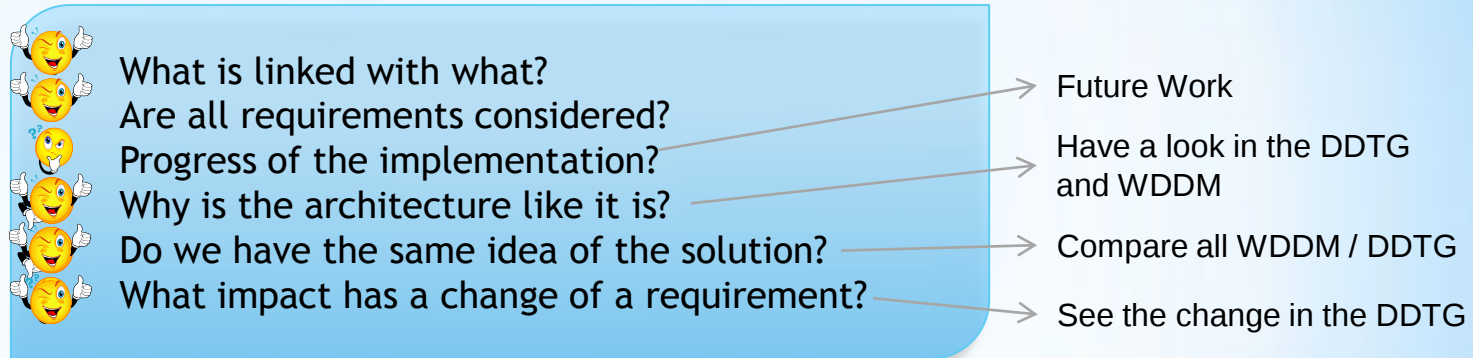
Context Template	relative weighting	Functionality	Performance	Usability	Reliability	Maintainability	Security	Portability	Compatibility	..	..
Sum / Effective size (RoF):	34	28%	21%	26%	5%	15%	9%	0%	0%	0%	0%
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Requ027 x Add New Titels	4		7								

Context Template	relative weighting	Functionality	Performance	Usability	Reliability	Maintainability	Security	Portability	Compatibility	..	..
Sum / Effective size (RoF):	34	11%	47%	58%	22%	27%	34%	0%	0%	0%	0%
Requ021 x ListStockLevels	4,57	2	9	9	2	7	5				
Requ019 x ListStockLevels	4	2	8	5		7					
Requ19 x ManageTitels	3	2	9		3		1				
Requ32 x ManageTitels	4		8	5							
Requ20 x ReceiveOrders	7	2		8			7				
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Design Decision Traceability Grid

DDT-Grid	Priorization	Add New Titel	Create Orders	Edit Titels	List Stock Levels	Manage Publishers	Manage Titels	Receive Orders	...	Sum of Series	Standardized Level of Utility	Utility Scoring
Customer Requirements	Stakeholder Value	4	5		1		2	3				
	40	11%	10%	0%	41%	0%	32%	22%	0%			
Requ019	6				22					37	0,24	middle
Requ020	4					15		17		17	0,11	lowest
Requ021	3				34					34	0,22	middle
Requ022	8		12							12	0,08	low
Requ023	7									0	0,00	lowest
Requ027	6	29								29	0,18	low
Requ032	6					15	13			28	0,18	middle
...	29	12	0	56	0	30	30	0	157	1		

* Conclusion and Outlook



- * Evaluation in a praxis study
- * Use this approach on different levels
 - * Customer Requirements 2 System Requirements
 - * System Requirements 2 Design Artefacts
 - * Design Artefacts 2 Implementation Elements

ICSEA 2012 Lisbon, Portuga
The Seventh International Conference on Software Engineering Advances

Cognitive Engineering meets Requirements Engineering

Bridging the Traceability Gap

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CBI 2013 Vienna, Austria
15th International IEEE Conference on Business Informatics

Context-sensitive Traceability Controlling

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Object Spectrum (Print Version) April 2014



www.sparxsystems.eu

*Questions?

