

VU Research Portal

Needs-driven service bundling in a multi-supplier setting

de Kinderen, S.

2010

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

de Kinderen, S. (2010). *Needs-driven service bundling in a multi-supplier setting: The computational e3 service approach*.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

Contents

Acknowledgements	vii
1 Introduction	1
1.1 Automated needs-driven service bundling in a multi-supplier setting	2
1.1.1 A needs-driven process	2
1.1.2 Services	3
1.1.3 Service bundling	3
1.1.4 A multi-supplier setting	4
1.1.5 A semi-automatic process	4
1.2 Research question	5
1.3 Research approach	6
1.4 Research contributions	8
1.5 Publications	9
1.6 Structure of this thesis	10
2 Customer-supplier interaction to reason about bundling commercial services	11
2.1 What is a service?	12
2.2 Customer needs analysis	15
2.2.1 Separation of problem and solution	16
2.2.2 Gradual specification of customer need into solutions	17
2.2.3 Customer-supplier interaction: Balancing positive and negative service features	19

2.3	Commercial perspective on services bundling	20
2.3.1	What is a service bundle?	20
2.3.2	Reasons for service bundling	20
2.3.3	Needs-driven customization of service bundles	22
2.3.4	Creating needs-driven packages of commercial services	23
2.4	Computational perspective on services bundling	24
2.4.1	Composition by syntactic workflow	24
2.4.2	Semantic web service composition	26
2.4.3	Web service composition lacks pragmatic service expressions	28
2.5	Formal reasoning about services bundling	28
2.6	Summary	30
3	Consequences as a key concept	33
3.1	Positioning of the <i>e³service</i> ontologies	34
3.1.1	Ontologies for shared understanding and formal reasoning	34
3.1.2	Formal conceptualization of established business literature	35
3.2	The <i>e³service</i> ontologies	36
3.2.1	A supplier and customer perspective ontology	36
3.2.2	The customer perspective ontology	36
3.2.3	The supplier perspective ontology	42
3.2.4	Using Service catalogues to hide the complexity of the <i>e³service</i> ontologies	47
3.3	Creating a customer perspective service catalogue	47
3.3.1	Elicit service suppliers and the offered elementary services	48
3.3.2	Formalizing ICT services from a customer perspective	48
3.4	Create a supplier perspective catalogue of ICT services	51
3.5	Reasoning about needs-driven service bundling	53
3.6	Computational implementation of the customer perspective service catalogue	61
3.7	Summary: Consequences are key	62

4	Applying e^3service to practical business cases	65
4.1	B2B Case: Online design of mailings for SMEs	65
4.1.1	Case study setup	67
4.1.2	Creating a customer perspective service catalogue	68
4.1.3	Create a supplier perspective service catalogue	72
4.1.4	Reasoning with mailing ontology instantiations	75
4.2	Practical usefulness and theoretical reflections	81
4.3	B2C Case: Bundling of end-customer telecom services	82
4.3.1	Case study setup	83
4.3.2	Creating a customer perspective service catalogue	84
4.3.3	Reasoning about ISP ontology instantiations	86
4.4	Practical usefulness and theoretical reflections	92
5	Towards interactive, consequence-based, reasoning	95
5.1	Consequences as a key concept for needs-driven service bundling .	96
5.2	Service bundling requires customer-supplier interaction	96
5.3	Elaborating on consequence-based, interactive reasoning	98
5.3.1	Incrementally creating service bundles	98
5.3.2	Supporting computational reasoning by Problem Solving methods	99
5.3.3	Ontology clean-up	101
5.4	Summary	103
6	Adding customer-supplier interaction to e^3service	105
6.1	The e^3 service ontology	106
6.1.1	The customer perspective ontology	106
6.1.2	The supplier perspective ontology	111
6.1.3	The pricing model ontology	115
6.2	Adding customer-supplier interaction to the reasoning process . .	118
6.2.1	Propose-Critique-Modify	118
6.2.2	Needs driven services bundling as PCM	121

6.3	Detailed explanation of the high-level reasoning steps	127
6.4	<i>PCM²</i> : Modifying solutions <i>and</i> requirements	140
6.5	Summary	150
7	The <i>PCM²</i> software reasoner	151
7.1	Tools used: Protege and Jena.	151
7.2	Inferencing with the software reasoner	153
7.2.1	Methods for inferencing and producing intermediate output	153
7.2.2	The tool reasoning process	155
7.3	Tool implementation reflection	158
7.3.1	Developing tool support: Contributions to research	158
7.4	Concluding outlook	159
8	Hosted ICT services	161
8.1	Finding needs-driven bundles of hosting services at OGD	161
8.2	Case study setup	162
8.3	Creating catalogues of hosted services	164
8.3.1	Instantiating the supplier perspective ontology	164
8.3.2	Instantiating the customer perspective ontology	166
8.4	Reasoning about bundling hosting services	169
8.5	Lessons learned	178
9	Dementia-care services	183
9.1	Reasoning about bundling dementia-care services in the privatized health-care domain	183
9.2	Case study setup	184
9.3	A customer and supplier catalogue of dementia-care services	185
9.3.1	A supplier catalogue of dementia-care services	185
9.3.2	A customer catalogue of dementia-care services	187
9.4	Reasoning with the dementia-care service catalogues	190
9.4.1	Scenario 1: Finding a meal-preparation service	192

9.4.2	Scenario 2: Loaning a wheelchair and finding related, value-enhancing services	200
9.5	Lessons learned	203
10	Conclusions	207
10.1	Revisiting the detailed research questions	207
10.1.1	Formalization of customer needs	207
10.1.2	Finding multi-supplier service bundles that satisfy needs, against acceptable customer sacrifices	208
10.2	Future research	210
10.3	The bundling of commercial ICT services: A cross-disciplinary perspective	213
	Appendix A: Intentionality as a guiding principle for defining a service	215
	Samenvatting	219
	Summary	223
	Bibliography	227