An Emerging Overview of RequirementsEngineering Tools Supplementary Materials

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This document provides supplementary materials which have not been included in the submitted conference paper due to size restrictions.

2 Nitish Patkar et al.

1 Reviewed Papers

Following table presents the list of papers considered for the literature review in the original work. The first column indicates the assigned identifier for the paper which we refer to throughout this document (S1, S02, ..., S142), second column indicates the year of publication, while the second column represents the title of the corresponding study.

1 2017 Toward model-based requirement engineering tool support 2 2011 A CASE Tool to Support Automated Modelling and Analysis of Security Requirements, Based on Secure Tropos 3 2016 Engineering Requirements with Desiree: An Empirical Evaluation 4 2013 Outsourcing Location Selection with SODA: A Requirements Based Decision Support Methodology and Tool 5 2011 A Tool for Managing Evolving Security Requirements 6 2018 Requirements Engineering for Model-Based Enterprise Architecture Management with ArchiMate 7 2014 ContoGram: A Novel Contextual Requirements Engineering Tool 8 2008 A Requirement Tool to Support Model-Based Requirement Engineering 9 2016 Maintaining Requirements Using Web Usage Data 10 2011 A UML Profile and Tool Support for Evolutionary Requirements Engineering 11 2012 STS-Tool: Using Commitments to Specify Socio-Technical Security Requirements 12 2006 SecTOOL – Supporting Requirements Engineering for Access Control 13 2007 Integrated Support for Product Configuration and Requirements Engineering in Product Derivation 14 2005 Security and Trust Requirements Engineering 15 2006 A tool suite for aspect-oriented requirements engineering	Study Nr.	Year	Title								
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	13	2007									
15 2006 A tool suite for aspect-oriented requirements engineering	14	2005	Security and Trust Requirements Engineering								
	15	2006	A tool suite for aspect-oriented requirements engineering								
16 2009 <u>Wiki-Based Tool for Requirements Engineering According to the ProjectIT Approach</u>	16	2009	Wiki-Based Tool for Requirements Engineering According to the ProjectIT Approach								
17 2012 WebREd: A Model-Driven Tool for Web Requirements Specification and Optimization	17	2012	WebREd: A Model-Driven Tool for Web Requirements Specification and Optimization								
18 2015 <u>I-SafE: An integrated Safety Engineering Tool</u>	18	2015	I-SafE: An integrated Safety Engineering Tool								

19	2008	Automatic Conceptual Analysis of User Requirements with the RequirementsEngineering Assistance Diagnostic (READ) Tool
20	2008	Semantifying requirements engineering—the softwiki approach
21	2005	ST-Tool: A CASE Tool for Modeling and Analyzing Trust Requirements
22	2016	Requirements Elicitation with Extended Goal Graph
23	2017	A Method for Verifying Non-Functional Requirements
24	2009	Supporting Visualization and Analysis of Requirements Evolution
25	2009	Pris Tool: A Case Tool For Privacy-Oriented Requirements Engineering
26	2005	A Process and Tool Support for Managing Activity and Resource Conflicts Based on Requirements Classification
27	2005	Task-Driven Tools for Requirements Engineering
28	2016	Mobility Requirements Engineering Tool (MoRE)
29	2007	Involving Non-Technicians in Product Derivation and Requirements Engineering: ATool Suite for Product Line Engineering
30	2005	Modeling security requirements through ownership, permission and delegation
31	2007	The Mobile Scenario Presenter: A Tool for in situ Requirements Discovery with Scenarios
32	2006	Making Mobile Requirements Engineering Tools Usable and Useful
33	2018	Pinpointing Ambiguity and Incompleteness in Requirements Engineering via Information Visualization and NLP
34	2013	reqT.org – Towards a Semi-Formal, Open and Scalable Requirements Modeling Tool
35	2007	ElicitO: A Quality Ontology-Guided NFR Elicitation Tool
36	2018	<u>Using Tools to Assist Identification of Non-requirements in Requirements Specifications – A</u> <u>Controlled Experiment</u>
37	2006	Towards integrated tool support for the user requirements notation
38	2009	An Enhanced Wiki for Requirements Engineering

39	2015	NAT2TEST Tool: From Natural Language Requirements to Test Cases Based on CSP
40	2008	Wiki supported collaborative requirements engineering
41	2005	Tool-Supported Verification of Product Line Requirements
42	2017	MaramaAIC: tool support for consistency management and validation of requirements
43	2006	An experiment on linguistic tool support for consolidation of requirements from multiple sources in market-driven product development
44	2007	Enhancing Requirements Engineering Activities through the Use of Mobile Technology Devices and Tools
45	2017	A supporting tool for requirements change management in distributed agile development
46	2011	Integrating privacy requirements considerations into a security requirementsengineering method and tool
47	2012	A CSCW Requirements Engineering CASE Tool: Development and usability evaluation
48	2019	<u>Detecting terminological ambiguity in user stories: Tool and experimentation</u>
49	2010	Security requirements engineering framework for software product lines
50	2019	Information quality requirements engineering with STS-IQ
51	2016	Automated COSMIC Function Point measurement using a requirements engineering ontology
52	2014	Agile requirements engineering via paraconsistent reasoning
53	2014	Towards Collaborative Requirements Engineering Tool for ERP Product Customization
54	2014	The NASA automated requirements measurement tool: a reconstruction
55	2008	ReSeT: Reverse Engineering System Requirements Tool
56	2010	Towards tool-Support for usable Secure Requirements engineering with CAIRIS
57	2016	A novel requirements engineering approach for designing data warehouses

58	2018	Automated support to capture verbal just-in-time requirements via audio mining and cluster-based visualization
59	2006	An XML environment for scenario based requirements engineering
60	2018	Introducing TRAILS: A tool supporting traceability, integration and visualisation of engineering knowledge for product service systems development
61	2018	Early validation of system requirements and design through correctness-by-construction
62	2005	Scenario advisor tool for requirements engineering
63	2013	REUBI: A Requirements Engineering method for ubiquitous systems
64	2014	Security Requirements Engineering with STS-Tool
65	2014	From requirements to UML models and back: how automatic processing of text can support requirements engineering
66	2005	Model-Based Requirements Engineering with AutoRAID
67	2013	KBRE: a framework for knowledge-based requirements engineering
68	2010	MUSTER: A Situational Tool for Requirements Elicitation
69	2007	Tool support for computer-aided requirement traceability in architectural design: The case of DesignTrack
70	2009	Athena: A collaborative approach to requirements elicitation
71	2012	Elicitation of situated values: need for tools to help stakeholders and designers to reflect and communicate
72	2015	Web Based Requirement Elicitation Tool
73	2013	A tool for data warehouse multidimensional schema design using ontology
74	2018	CRESUS-T: A COLLABORATIVE REQUIREMENTS ELICITATION SUPPORT TOOL
75	2018	A semi-automated approach for generating natural language requirements documents based on business process models
76	2018	Modeling Security and Privacy Requirements: a Use Case-Driven Approach

77	2015	Requirements simulation for early validation using Behavior Trees and Datalog
68	2017	REASSURE: Requirements elicitation for adaptive socio-technical systems using repertory grid
69	2006	Supporting use case based requirements engineering
70	2014	Supporting the requirement analysis phase for the development of serious games for children
71	2016	Supporting agent oriented requirement analysis with ontologies
72	2014	A Structured Method for Security Requirements Elicitation concerning the Cloud Computing Domain
73	2006	A practical framework for eliciting and modeling system dependability requirements: Experience from the NASA high dependability computing project
74	2010	Living Requirements Space: An open access tool for enterprise resource planning systems requirements gathering
75	2010	Understanding the human context in requirements elicitation
76	2005	Improving the detection of requirements discordances among stakeholders
77	2014	Requirements engineering education: a systematic mapping study
78	2010	Eliciting security requirements and tracing them to design: an integration of Common Criteria, heuristics, and UMLsec
79	2017	Using the AMAN-DA method to generate security requirements: a case study in the maritime domain
80	2016	Managing requirements for the development of a novel elbow rehabilitation device
81	2011	NL-Based Automated Software Requirements Elicitation and Specification
82	2009	Extracting conceptual graphs from Japanese documents for software requirements modeling
83	2008	Computer-aided privacy requirements elicitation technique
84	2010	Enhancing domain knowledge for requirements elicitation with web mining

85	2005	EA-Miner: a tool for automating aspect-oriented requirements identification
86	2009	A tool for attributed goal-oriented requirements analysis
87	2009	An automated tool for generating UML models from natural language requirements
88	2011	Generating essential user interface prototypes to validate requirements
89	2010	Tool support for essential use cases to better capture software requirements
90	2010	Automatic detection of nocuous coordination ambiguities in natural
		language requirements
91	2017	Tool-supported collaborative requirements prioritisation
92	2015	REfine: A gamified platform for participatory requirements engineering
93	2012	NLARE, a natural language processing tool for automatic requirements evaluation
94	2005	Mining aspects in requirements
95	2007	A situational approach and intelligent tool for collaborative requirements elicitation
96	2011	Social networks and collaborative filtering for large-scale requirements elicitation
97	2011	Ontology-driven guidance for requirements elicitation
98	2007	itSIMPLE 2.0: An Integrated Tool for Designing Planning Domains.
99	2013	WEBSTUIRE: WEB-based Support Tool for user interface requirements elicitation
100	2010	Distributed requirements elicitation using a spatial hypertext wiki
101	2011	COLLABORATIVE MIND MAP TOOL TO FACILITATE REQUIREMENT ELICITATION
102	2011	StakeSource2. 0: using social networks of stakeholders to identify and prioritise requirements
103	2010	End-user requirements blogging with iRequire
104	2010	Winbook: a social networking based framework for collaborative requirements elicitation and WinWin negotiations
105	2008	Collaborative Development of Knowledge Bases in Distributed Requirements Elicitation.

106	2007	An Integrated Tool for Supporting Ontology Driven Requirements Elicitation
107	2009	Knowledge-based Requirement-Engineering of building automation systems by means of Semantic Web technologies
108	2015	VISPEC: A graphical tool for elicitation of MTL requirements
109	2007	Constructing POSE: A Tool for Eliciting Quality Requirements
110	2011	OpenOME: An Open-source Goal and Agent-Oriented Model Drawing and Analysis Tool.
111	2007	<u>Towards Tool Support for Service-Oriented Development of Embedded Automotive Systems.</u>
112	2011	iRequire: Gathering end-user requirements for new apps
113	2013	Mira: A tooling-framework to experiment with model-based requirements engineering
114	2011	UML4PF—A tool for problem-oriented requirements analysis
115	2016	Supporting Requirements Elicitation by Tool-Supported Video Analysis
116	2009	Allowing end-users to actively participate within the elicitation of pervasive system requirements through immediate visualization
117	2008	Mobile discovery of requirements for context-aware systems
118	2011	Supporting requirements engineers in recognising security issues
119	2009	Scenarios in the wild: Experiences with a contextual requirements discovery method
120	2010	Ambiguity detection: Towards a tool explaining ambiguity sources
121	2016	Web-based Collaborative Security Requirements Elicitation
122	2012	Pattern-based security requirements specification using ontologies and boilerplates
123	2010	A requirements elicitation framework and tool for sourcing business-IT aligned e-services
124	2016	Collaborative requirements elicitation using elicitation tool for small projects

126 2009 Ontology-based reasoning in requirements elicitation 127 2006 Performing Requirements Elicitation Activities Supported by Quality Ontologies 128 2005 QuARS: A tool for analyzing requirements 129 2009 Personas based Support Tool for Requirements Elicitation 130 2012 iThink: A Game-Based Approach Towards Improving Collaboration and Participation in Requirement Elicitation 131 2009 Exploring how to use scenarios to discover requirements 132 2007 Determining Stakeholder Needs in the Workplace: How Mobile Technologies CanHelp 133 2005 Enhancing GSS-based requirements negotiation with distributed and mobiletools 134 2019 Scade2Nu: A Tool for Verifying Safety Requirements of SCADE Models with Temporal Specifications 135 2019 ReMinds-CMT: An Interactive Tool Supporting Constraint Mining for Requirements Monitoring 136 2019 QuARS A NLP Tool for Requirements Analysis - KSU Faculty Web 137 2019 Supporting the Selection of Constraints for Requirements Monitoring from Automatically Mined Constraint Candidates 138 2010 Using Mobile RE Tools to Give End-Users Their Own Voice 139 2008 Story Based Mobile Application for Requirements Engineering Process 140 2012 Using mobile devices for collaborative requirements engineering </th <th>125</th> <th>2009</th> <th>Community Driven Elicitation of Requirements with Entertaining Social Software</th>	125	2009	Community Driven Elicitation of Requirements with Entertaining Social Software
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138 2010 Using Mobile RE Tools to Give End-Users Their Own Voice 139 2008 Story Based Mobile Application for Requirements Engineering Process 140 2012 Using mobile devices for collaborative requirements engineering	136	2019	QuARS A NLP Tool for Requirements Analysis - KSU Faculty Web
 2008 Story Based Mobile Application for Requirements Engineering Process 140 2012 Using mobile devices for collaborative requirements engineering 	137	2019	
140 2012 <u>Using mobile devices for collaborative requirements engineering</u>	138	2010	<u>Using Mobile RE Tools to Give End-Users Their Own Voice</u>
	139	2008	Story Based Mobile Application for Requirements Engineering Process
	140	2012	Using mobile devices for collaborative requirements engineering
141 2018 MobiQ: A modular Android application for collecting social interaction ,repeated survey , GPS and photographic data	141	2018	
142 2014 Are smartphones better than CRC cards?	142	2014	Are smartphones better than CRC cards?

2 Further evaluation parameters

Following Figure 1 and Figure 2 indicate further evaluation parameters we considered in our study.

Tool (* Given names)	Year of first publication	Prototype?	Vision tool?	Accessible	Installable	Updates	Available versions	Requires internet?	Works offline?	Collaborative	Improvement identified?
CT'12	2012	No	No	Yes	Yes	3	3	No	Yes	No	Yes
TRAILS	2018	Yes	No	No	No					Yes	Yes
REVV-Light	2018	No	No	Yes	Yes	1	1	No	Yes	No	Yes
SREPPLineTool	2010	Yes	No	No	No					No	Yes
UMLet-REUBI	2013	No	No	Yes	Yes	14	1	No	Yes	No	Yes
I-SafE	2015	No	No	No	No					No	No
EGG (Extended Goal Graph)	2016	Yes	No	No	No					No	Yes
SME (Scenario Model Environment)	2005	Yes	No	No	No					No	Yes
T1* Japanese Prototype Tool	2017	Yes	No	No	No					No	No
REQAnalytics	2016	No	No	No	No					No	No
STS-IQ	2019	Yes	No	Yes	No		1	No	Yes	No	Yes
RERD	2018	No	No	No	No					No	Yes
RE-KOMBINE	2014	Yes	No	No	No					No	Yes
T2* Requirements Change Management Tool	2017	No	No	No	No					Yes	Yes
Wisdom	2016	No	No	No	No					No	No
JITREvisu	2018	Yes	No	No	No					No	Yes
T3* Tool for ERP product customisation	2014	Yes	No	No; broken link	No					Yes	No
T4* Scenario Advisor Tool	2005	No	No	No	No					No	Yes
ReqSimile	2005	No	No	No	No					No	No
AUTOANNoTATOR	2014	No	No	No	No					No	Yes
TEAM	2018	Yes	No	Yes	Yes		1	No	Yes	No	Yes
DECIMAL	2005	No	No	No	No					No	No
SecTro	2011	No	No	No	No					No	Yes
reqT	2013	No	No	Yes	Yes	12	12			No	Yes
WebREd	2012	No	No	No; restricted access	No					No	No
T5* omated Requirements Measurement Tool by NASA	2014	No	No	No; broken link	No					No	No
ST-Tool	2005	No	No	No: broken link	No					No	No

T6* Prototype CASE Tool	2016	Yes	No	No	No				No	No
ElicitO	2006	No	No	No	No				No	Yes
MaramaAlC (earlier: MaramaAl, MaramaEssential)	2010	No	No	No	No				No	Yes
SecTOOL	2006	No	No	No	No				No	No
REInDetector	2013	Yes	No	No; broken link	No				No	Yes
Desiree	2016	Yes	No	Yes	Yes	1	No	Yes	No	Yes
T7* Requirements Specification Analysis Tool	2016	No	No	No	No				No	No
SODA	2013	Yes	No	No	No				No	No
SeCMER	2011	No	No	No	No				No	Yes
RECOMA (REquirements COnflicts MAnagement Tool)	2005	No	No	No	No				No	No
NAT2TEST	2015	No	No	Yes	No; No machine available to fulfill system requirements				No	No

Fig. 1: Further evaluation parameters- 1

Tool (* Given names)	Evaluation	Real project evaluation	Type of Evaluation?	Intended audience	Technologies used	Capabilities?
CT12	Yes	No	student evaluation	requirements engineers	Microsoft Visual Studio	refine existing requirements
TRAILS	Yes	Yes	industry evaluation	All	RDF, RDF-XML, HTTP, Apache Jena	reduce the cost/efforts of the process
REVV-Light	Yes	No	controlled experiment, student evaluation	requirements engineers	PHP, Bootstrap, D3.js, REST API, HTML, CSS, JS	reduce the cost/efforts of the process
SREPPLineTool	Yes	Yes	industry evaluation	requirements engineers	XML	reduce the cost/efforts of the process
UMLet-REUBI	Yes	Yes	controlled experiment	requirements engineers	Java	reduce the cost/efforts of the process
I-SafE	No			requirements engineers		reduce the cost/efforts of the process
EGG (Extended Goal Graph)	Yes	Yes	controlled experiment	Project Stakeholders	Microsoft Excel, VBA	Generate new requirements
SME (Scenario Model Environment)	Yes	Yes	industry evaluation	requirements engineers	XML, Java, Stylesheet Language, Apache Tomcat	refine existing requirements
T1* Japanese Prototype Tool	No			requirements engineers	Java, Eclipse 4.4 Luna	refine existing requirements
REQAnalytics	Yes	Yes	industry evaluation	requirements engineers	PHP, MySQL, HTML, XML	Generate new requirements; refine existir requirements
STS-IQ	Yes	Yes	industry evaluation, controlled experiment	requirements engineers	Java, Eclipse Sirius, Eclipse Acceleo	refine existing requirements
RERD	Yes	Yes	industry evaluation	requirements engineers		reduce the cost/efforts of the process
RE-KOMBINE	Yes	Yes	industry evaluation	requirements engineers		refine existing requirements
T2* Requirements Change Management Tool	Yes	No	expert evaluation	Project Stakeholders	Microsoft SQL server database	reduce the cost/efforts of the process
Wisdom	Yes	Yes	controlled experiment	requirements engineers	Java, Oracle Database	refine existing requirements
JITREvisu	No			All	Java	refine existing requirements
T3* Tool for ERP product customisation	No			All		refine existing requirements
T4* Scenario Advisor Tool	Yes	No	expert evaluation	requirements engineers	HTML	Generate new requirements
ReqSimile	Yes	No	student evaluation	requirements engineers		reduce the cost/efforts of the process
AUTOANNoTATOR	Yes	No	student evaluation	requirements engineers		reduce the cost/efforts of the process
TEAM	Yes	No	industry evaluation, expert evaluation	requirements engineers	ArchiMate, Microsoft SQL Server 2012	refine existing requirements
DECIMAL	Yes	Yes	industry evaluation	requirements engineers	SQL, XML	reduce the cost/efforts of the process
SecTro	Yes	Yes	industry evaluation, student evaluation	requirements engineers	Java	reduce the cost/efforts of the process
reqT	Yes	No	student evaluation	requirements engineers	Java Virtual Machine, HTML, Scala	refine existing requirements
WebREd	No			requirements engineers	Eclipse Modeling Framework (EMF) and Graphical Modeling Framework (GMF)	reduce the cost/efforts of the process

T5* Automated Requirements Measurement Tool by NASA	Yes	Yes	controlled experiment	requirements engineers		reduce the cost/efforts of the process
ST-Tool	No			requirements engineers	XML	refine existing requirements
T6* Prototype CASE Tool	No			requirements engineers	Java	refine existing requirements
ElicitO	Yes	Yes	industry evaluation	project Stakeholders & requirements engineers	Protégé API	reduce the cost/efforts of the process
MaramaAlC (earlier: MaramaAl, MaramaEssential)	Yes	Yes	expert evaluation	requirements engineers	Java, Eclipse, HTML, MS Access database	Generate new requirements; refine existing requirements; reduce the cost/efforts of the process
SecTOOL	No			requirements engineers	VPL, XACML	Generate new requirements; refine existin requirements
REInDetector	Yes	No	industry evaluation	requirements engineers	Java, JUNG library	Generate new requirements; refine existing requirements
Desiree	Yes	No	controlled experiment	requirements engineers	Eclipse, .xisx	refine existing requirements
T7* Requirements Specification Analysis Tool	Yes	No	controlled experiment	requirements engineers		reduce the cost/efforts of the process
SODA	Yes	No	student evaluation	project Stakeholders & requirements engineers		refine existing requirements
SeCMER	Yes	No	expert evaluation	requirements engineers	Eclipse, Java, GMF, Xtext, EMF	refine existing requirements; reduce the cos efforts of the process
RECOMA (REquirements COnflicts MAnagement Tool)	No			requirements engineers	Java, JDK 1.4.0_02	reduce the cost/efforts of the process
NAT2TEST	No			requirements engineers	Java. Eclipse	reduce the cost/efforts of the process

Fig. 2: Further evaluation parameters- 2