Retrospective and Trends in Requirement Engineering through WER

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OUTLINE

Retrospective and Trends in Requirement Engineering through WER

- Introduction
- Method
- Results and Discussion
- Conclusion

Introduction

- Despite the advances in the Requirements Engineering area, as software become much more complex and bigger, new problems emerge and new solutions are proposed (Dominguez, 2009)

Introduction

- It is important to provide a broad vision of the main discussed topics among research groups, as well as identifying these groups

- This information may bring several benefits to the scientific area, such as:
  - identification of new information sources;
  - establishment of new partnerships; and
  - the orientation of researches toward more relevant topics at a given time

Introduction

- As an initial source of research, the Workshop on Requirements Engineering (WER) was chosen

- The WER is a workshop that has been taking place since 1998 with the goal of consolidating the Iberoamerican Requirements Engineering research community

Method

- **1 - Development of the research questions**
  - 1.1 - What are the main countries that published in WER?
  - 1.2 - What are the main institutions that published in WER?
  - 1.3 - What are the main topics discussed in WER?
  - 1.4 - Which institutions have been discussed the main topics?
  - 1.5 - Which topics have been discussed for the main institutions?
  - 1.6 - What are the trends in Requirements Engineering?

Method

- **2 - Extraction of information**

  Each one of the 258 papers has been analyzed with the goal of extracting the following information:

  - 2.1 - Institutions involved in research;
  - 2.2 - Home country of the institution; and
  - 2.3 - Main discussed topics.

Method

- **2 - Extraction of information** (main discussed topics)

The topics of WER

Year	Topics						
1999	Multidisc. approach and Educa-tion	Analysis	Modeling and Repre-sent. Requirem.	Negotiation and Requirem. elicitation	Process e Manage-ment Requirem.		
2001	Require-ments elicitation	Require-ments modeling	Process and req. manage-ment	Quality Require-ments	Non-functional require-ments	Require-ments reuse	
2003	Require-ments elicitation	Specifica-tion and Require-ments modeling	Require-ments manage-ment and Experi-mental studies	Process, model, methods and tools	Quality require-ments and Quality Assessment		
2004	Require-ments elicitation	Experi-mental studies	Require-ments manage-ment	Modeling and Speci-fication	Process, Methods and Tools	Quality require-ments	Require-ments for agent-oriented paradigm
2005	Cognitive approaches and Reuse	Agents and objectives	Analysis and Model-ing	Aspects and Com-position	Require-ments elicitation	Process	Quality and Metrics

Method

- **2 - Extraction of information** (main discussed topics)

The topics of WER

Year	Topics						
2008	Analysis	Elicitation /Empirical Studies	Elicitation /Methodologies and Tools	Modeling	Process and Quality	Reuse and Traceability	
2009	Early requirements	Requirements elicitation and Management	Requirements specification and Management	Later Requirements and architecture	Traceability and Product Lines		
2010	Requirements elicitation	Req.specification and Modeling	Req. management and Traceability	Business process mod. and P. Families			
2011	Aligning req. with business objectives and process	Early requirements	Late requirements	Non-functional requirements	Reuse of requirements	Models transformation	

- in back 1998, 2000, 2002, 2006, 2007 and 2012, no classification was proposed by the event
- variation in their nomenclature

Method

- **2 - Extraction of information** (main discussed topics)

Topics proposed for classification

Requirements Engineering topics
Cognitive approaches, educational and knowledge management
Requirements analysis and Requirements negotiating
Requirements elicitation
Requirements specification
Tools
Requirements management
Measurement/Metrics
Requirements modeling
Process/Method
Quality requirements
Requirements traceability
Non-functional requirements
Agent-oriented paradigm
Reuse
Requirements Validation

Two students (one master and one doctor) read the papers with the goal of identifying the main discussed topics.
The paper must be related to at least one topic presented in table but new topics not listed could be included and related

Results and discussion

- 1.1 - What are the main countries that published in WER?
  - 20 countries had at least one publication at WER through 121 institutions

Number of the papers per country

Country	Number of institutions	Number of papers	Percentage (of 258 papers)
Brazil	52	208	80.62%
Argentina	14	61	23.64%
Spain	13	60	23.26%
Canada	10	29	11.24%
Italy	4	5	1.94%
United Kingdom	4	4	1.55%
Netherlands	1	4	1.55%
Switzerland	1	3	1,16%
Malaysia	1	2	0,78%
Venezuela	1	2	0,78%
Cuba	2	2	0,78%
China	2	2	0,78%
Costa Rica	1	1	0,39%
Ecuador	1	1	0,39%
Finland	1	1	0,39%
Sweden	1	1	0,39%
United States	1	1	0,39%

Results and discussion

- 1.2 - What are the main institutions that published in WER?

Number of the papers per institution

Institution	Country	Number of papers	Percentage (of 258 papers)
Universidade Federal de Pernambuco	Brazil	44	17%
Pontifícia Universidade Católica do Rio de Janeiro	Brazil	35	14%
Universidad Politécnica de Valencia	Spain	24	9%
Universidad Nacional del Centro de la Provincia de Buenos Aires	Argentina	16	6%
Universidad Nacional de La Plata	Argentina	14	5%
Universidade Estadual do Rio de Janeiro	Brazil	11	4%
York University	Canada	11	4%
Universitat Politécnica de Catalunya	Spain	10	4%

Results and discussion

- 1.3 - What are the main topics discussed in WER?

The most discussed topics in WER

Topic	Number of papers	Percentage (of 258 papers)
Requirements modeling	80	31%
Requirements elicitation	73	28%
Process/Method	41	16%
Requirements management	35	14%
Requirements specification	32	12%
Tools	32	12%
Quality requirements	26	10%
Reuse	25	10%
Non-functional requirements	25	10%
Measurement/Metrics	16	6%
Agent-oriented paradigm	12	5%
Requirements traceability	11	4%
Cognitive approaches, educational and knowledge management	10	4%
Requirements analysis and Requirements negotiating	6	2%
Requirements validation	6	2%

Results and discussion

- 1.3 - What are the main topics discussed in WER?

Other relevant topics discussed in WER

Topic	Number of papers	Percentage (of 258 papers)
i*	26	10%
Models transformation	22	9%
Oriented goals (GORE)	18	7%
LEL/LAL	12	5%
Meta model, ontology and taxonomy	11	4%
Natural language	10	4%
Tropos	9	3%
Distributed development	8	3%
Model driven development	8	3%
Patterns	8	3%
Organizational modeling	8	3%
Inspection	7	3%
Product lines	6	2%
Variability	6	2%
Verification	6	2%
NFR Framework	5	2%
Aspects	5	2%
Software transparency	4	2%

Results and discussion

- 1.4 - Which institutions have been discussed the main topics?

The main topics and related institutions

Topic	Institution	Number of papers
Requirements elicitation	Pontifícia Universidade Católica do Rio de Janeiro	13
	Universidade Federal de Pernambuco	11
	Universidad Nacional de La Plata	8
Requirements modeling	Universidade Federal de Pernambuco	14
	Universidad Politécnica de Valencia	11
	Pontifícia Universidade Católica do Rio de Janeiro	11
Process/Method	Universidade Federal de Pernambuco	10
	Pontifícia Universidade Católica do Rio de Janeiro	6
	York University	4
	Universidade Estadual do Rio de Janeiro	4
i*	Universidade Federal de Pernambuco	12
	Universidade Estadual do Rio de Janeiro	4
	Universitat Politécnica de Catalunya	4

Results and discussion

- 1.5 - Which topics have been discussed for the main institutions?

The main institutions and the related topics

Institution	Topic	Number of papers
Universidade Federal de Pernambuco	Requirements modeling	14
	i*	12
	Requirements elicitation	11
Pontifícia Universidade Católica do Rio de Janeiro	Requirements elicitation	13
	Requirements modeling	11
	Process/Method	6
Universidad Politécnica de Valencia	Requirements modeling	11
	Models transformation	9
	Business modeling	6
	Requirements specification	6
Universidad Nacional del Centro de la Provincia de Buenos Aires	Scenarios	6
	Requirements elicitation	5
	Requirements modeling	5
Universidad Nacional de La Plata	Requirements elicitation	8
	LEL/LAL	7
	Measurement/Metrics	5

Results and discussion

- 1.6 - What are the trends in Requirements Engineering

Numbers of paper published per triennium

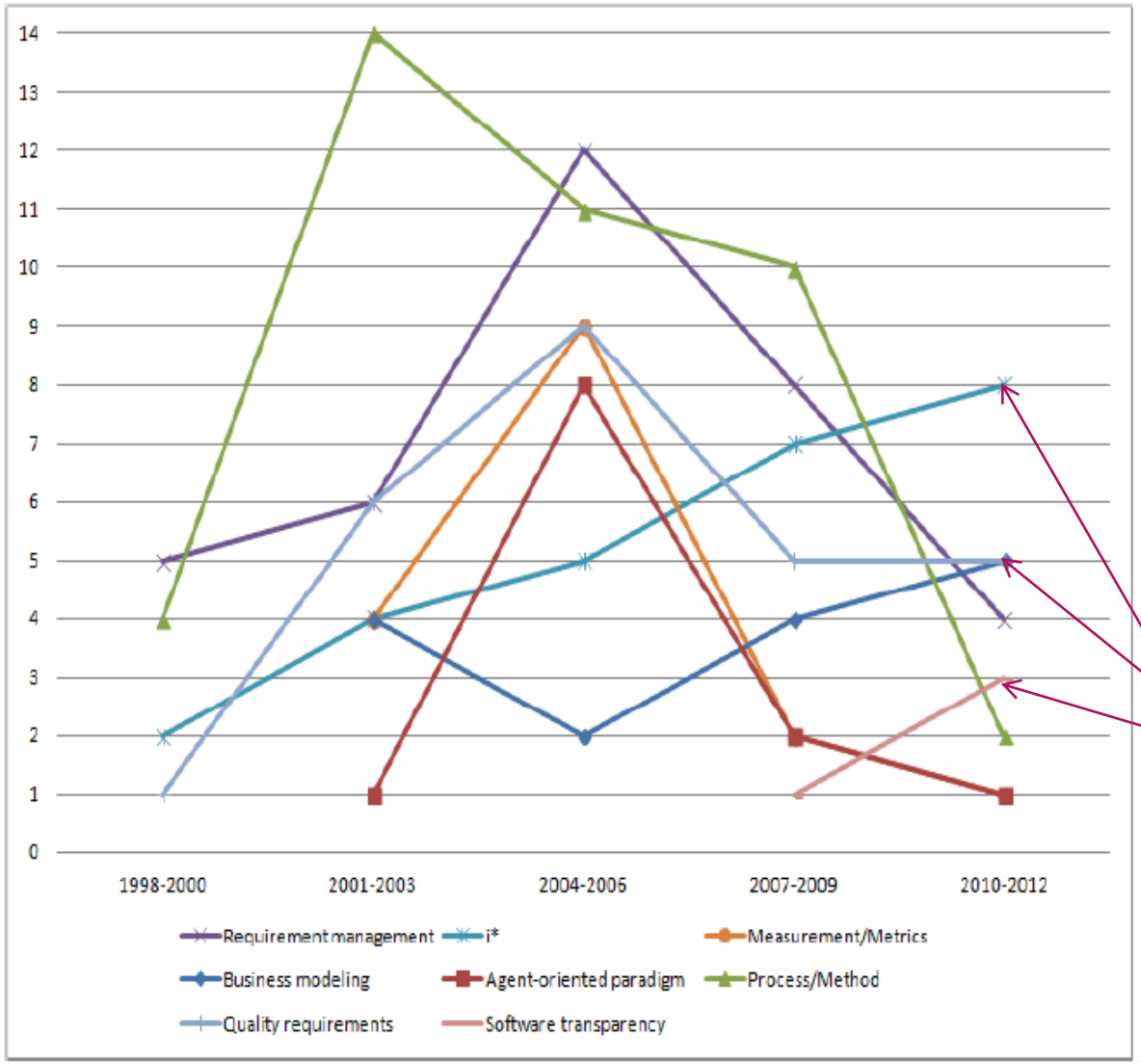
Year	Number of papers
1998-2000	37
2001-2003	63
2004-2006	63
2007-2009	55
2010-2012	40

Number of publications per topic/year

Topic/year	1998/2000	2001/2003	2004/2006	2007/2009	2011/2012
Requirements management	5 (14%)	6 (10%)	12 (19%)	8 (15%)	4 (10%)
i*	2 (5%)	4 (6%)	5 (8%)	7 (13%)	8 (20%)
Measurement/Metrics		4 (6%)	9 (14%)	2 (4%)	1 (3%)
Business modeling		4 (6%)	2 (3%)	4 (7%)	5 (13%)
Oriented-agent paradigm		1 (2%)	8 (13%)	2 (4%)	1 (3%)
Process/Method	4 (11%)	14 (22%)	11 (17%)	10 (18%)	2 (5%)
Quality requirements	1 (3%)	6 (10%)	9 (14%)	5 (9%)	5 (13%)
Software transparency				1 (2%)	3 (8%)

Results and discussion

- 1.6 - What are the trends in Requirements Engineering

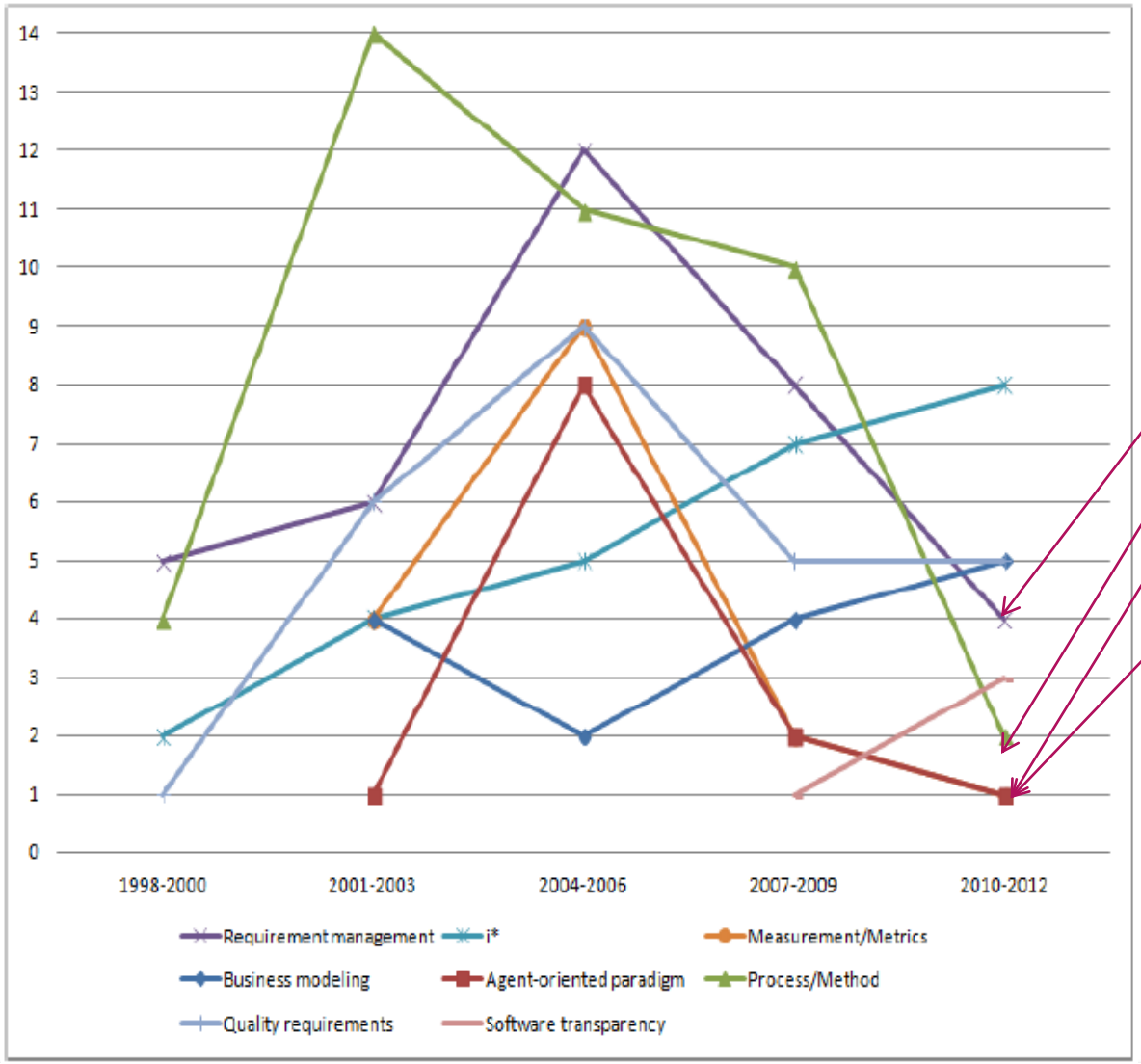


Increase topics:

- i*
- Business modeling
- Software transparency

Results and discussion

- 1.6 - What are the trends in Requirements Engineering

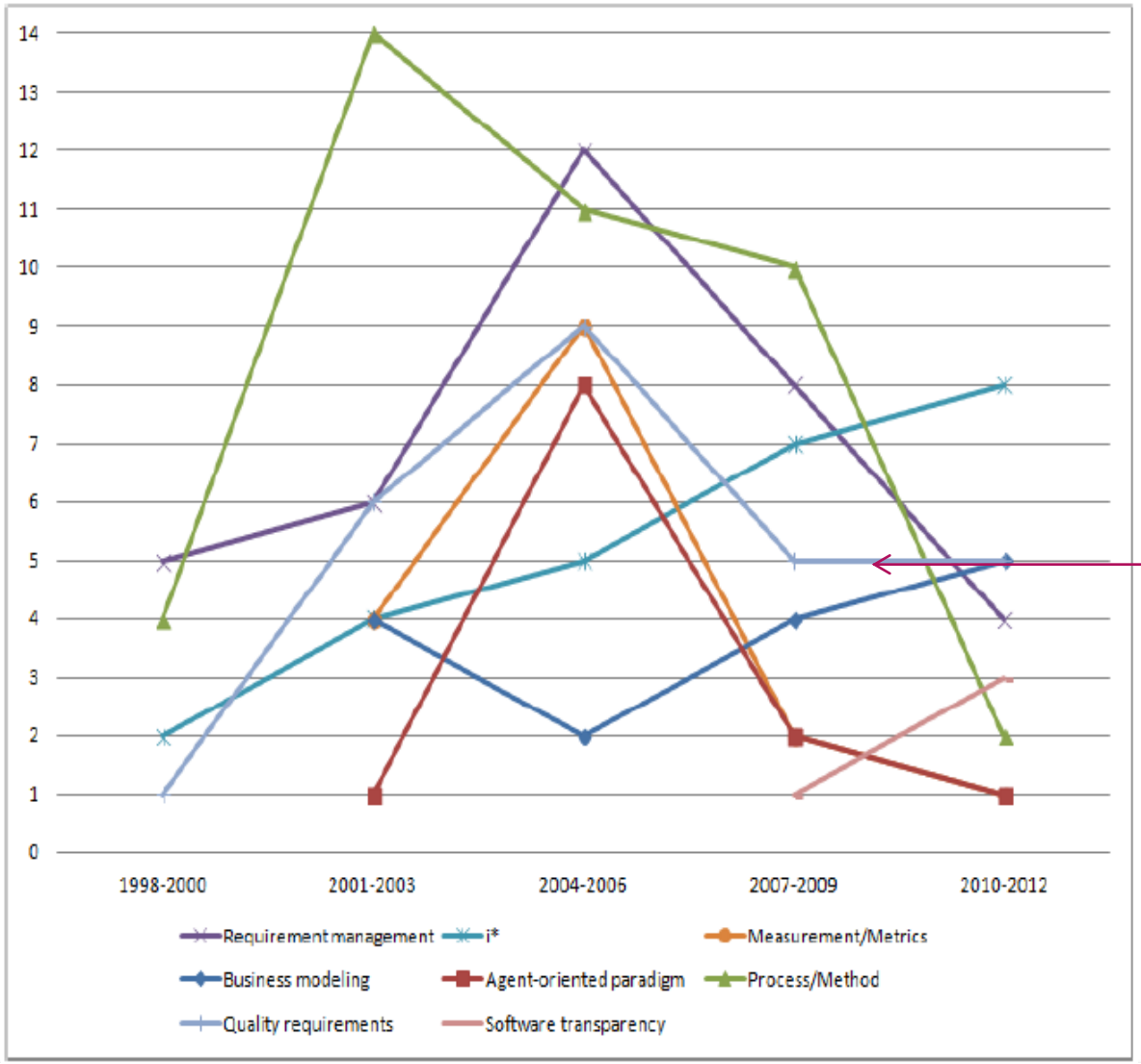


Decrease topics:

- Requirements Management
- Process/Method
- Agent-oriented paradigm
- Measurement/Metrics

Results and discussion

- 1.6 - What are the trends in Requirements Engineering



Stable topic:

- Quality software topic had its pinnacle in the 2004-2006 trienniums, but it still bears certain stability

Conclusion

- This is a preliminary study, since the issues exposed here may be broaden and explored in a deeper fashion in future works
- A similar but more refined review may be performed, including the main events or journals in the Requirements Engineering area

Contato

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