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**Mestrado em Gestão de Informação**

Master Program in Information Management

## **FOSTERING E-PARTICIPATION SUSTAINABILITY THROUGH A BPM-DRIVEN SEMANTIC MODEL**

João Carlos Serrano Ferreira

Dissertation presented as partial requirement for obtaining  
the Master's degree in Information Management

NOVA Information Management School  
Instituto Superior de Estatística e Gestão de Informação  
Universidade Nova de Lisboa

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by

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Dissertation presented as partial requirement for obtaining the Master's degree in Information Management, with a specialisation in Information Technology and Systems' Management.

**Advisor:** Professor Jurij Jaklič, Ph.D

July 2015



## DEDICATION

To Carla, with infinite love. May our wonderland last forever.

## ACKNOWLEDGEMENTS

I'm happy to express my gratitude to everyone who supported me during this endeavour.

Thank you, Carla, for supporting me in basically everything, including for all the constructive feedback and suggestions throughout this work, which definitely allowed me to improve the quality of the dissertation. My warm thanks to my parents for understanding my recurring absence and for continuously supporting me with endless care; and also to the rest of my close family for understanding my unavailability. A special thanks to those who are gone, and that I so much love, for inspiring me – you are a part of me. Also to Bento. You are also a part of me.

I am also thankful to the MyUniversity project and team for the unique opportunity to fulfil my professional life with my personal beliefs and for providing me the background that inspired this dissertation.

Finally, I'd like to express my gratitude to Professor Jurij Jaklič for his outstanding availability, expertise and guidance throughout this research.

## ABSTRACT

According to a recent Eurobarometer survey (2014), 68% of Europeans tend not to trust national governments. As the increasing alienation of citizens from politics endangers democracy and welfare, governments, practitioners and researchers look for innovative means to engage citizens in policy matters. One of the measures intended to overcome the so-called democratic deficit is the promotion of civic participation. Digital media proliferation offers a set of novel characteristics related to interactivity, ubiquitous connectivity, social networking and inclusiveness that enable new forms of societal-wide collaboration with a potential impact on leveraging participative democracy. Following this trend, e-Participation is an emerging research area that consists in the use of Information and Communication Technologies to mediate and transform the relations among citizens and governments towards increasing citizens' participation in public decision-making. However, despite the widespread efforts to implement e-Participation through research programs, new technologies and projects, exhaustive studies on the achieved outcomes reveal that it has not yet been successfully incorporated in institutional politics. Given the problems underlying e-Participation implementation, the present research suggested that, rather than project-oriented efforts, the cornerstone for successfully implementing e-Participation in public institutions as a sustainable added-value activity is a systematic organisational planning, embodying the principles of open-governance and open-engagement. It further suggested that BPM, as a management discipline, can act as a catalyst to enable the desired transformations towards value creation throughout the policy-making cycle, including political, organisational and, ultimately, citizen value. Following these findings, the primary objective of this research was to provide an instrumental model to foster e-Participation sustainability across Government and Public Administration towards a participatory, inclusive, collaborative and deliberative democracy. The developed artefact, consisting in an e-Participation Organisational Semantic Model (*ePOSM*) underpinned by a BPM-steered approach, introduces this vision. This approach to e-Participation was modelled through a semi-formal lightweight ontology stack structured in four sub-ontologies, namely e-Participation Strategy, Organisational Units, Functions and Roles. The *ePOSM* facilitates e-Participation sustainability by: (1) Promoting a common and cross-functional understanding of the concepts underlying e-Participation implementation and of their articulation that bridges the gap between technical and non-technical users; (2) Providing an organisational model which allows a centralised and consistent roll-out of strategy-driven e-Participation initiatives, supported by operational units dedicated to the execution of transformation projects and participatory processes; (3) Providing a standardised organisational structure, goals, functions and roles related to e-Participation processes that enhances process-level interoperability among government agencies; (4) Providing a representation usable in software development for business processes' automation, which allows advanced querying using a reasoner or inference engine to retrieve concrete and specific information about the e-Participation processes in place. An evaluation of the achieved outcomes, as well a comparative analysis with existent models, suggested that this innovative approach tackling the organisational planning dimension can constitute a stepping stone to harness e-Participation value.

## KEYWORDS

E-Participation, Business Process Management, Organisational Ontology.



# INDEX

<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1. BACKGROUND .....	1
1.2. PROBLEM STATEMENT .....	3
1.3. RELEVANCE AND IMPORTANCE.....	5
1.4. OBJECTIVES .....	7
1.5. SCOPE .....	8
1.5.1. <i>Research Area Constraints</i> .....	8
1.5.2. <i>Domain Constraints</i> .....	8
1.5.3. <i>Political System Constraints</i> .....	8
1.5.4. <i>Research Results Constraints</i> .....	9
1.6. RESEARCH QUESTIONS .....	10
1.7. ORGANISATION OF THE DOCUMENT .....	10
<b>2. LITERATURE REVIEW.....</b>	<b>12</b>
2.1. INTRODUCTION.....	12
2.2. DEMOCRACY MODELS .....	12
2.3. E-PARTICIPATION CONTEXT .....	15
2.4. E-PARTICIPATION CONCEPT.....	17
2.5. E-PARTICIPATION TRENDS.....	19
2.6. BUSINESS PROCESS MANAGEMENT .....	23
2.7. SEMANTIC BUSINESS PROCESS MANAGEMENT.....	25
2.8. E-PARTICIPATION ONTOLOGIES.....	28
2.9. SECTION SUMMARY.....	29
<b>3. METHODOLOGY .....</b>	<b>30</b>
3.1. INTRODUCTION.....	30
3.2. RESEARCH DESIGN .....	30
3.2.1. <i>Research Philosophy</i> .....	31
3.2.2. <i>Research Approach</i> .....	33
3.2.3. <i>Research Strategy</i> .....	36
3.2.4. <i>Time horizon</i> .....	37
3.2.5. <i>Data Collection</i> .....	37
3.3. TARGET OUTPUTS .....	37
3.4. ETHICAL CONSIDERATIONS.....	37
3.5. SECTION SUMMARY.....	38
<b>4. EPOSM DEVELOPMENT AND ACHIEVED RESULTS .....</b>	<b>39</b>
4.1. INTRODUCTION.....	39
4.2. EPOSM SPECIFICATION .....	39
4.2.1. <i>Purpose</i> .....	39
4.2.2. <i>ePOSM Requirements</i> .....	40
4.2.3. <i>Level of formality</i> .....	42
4.2.4. <i>Supporting Tool</i> .....	43
4.3. DOMAIN CONCEPTS .....	44
4.3.1. <i>E-Participation Principles</i> .....	44
4.3.2. <i>Analysis of Existent Models</i> .....	45



4.4.	<i>EPOS</i> M DESCRIPTION .....	54
4.4.1.	<i>ePOS</i> M Overview.....	54
4.4.2.	<i>ePOS</i> M Strategy Ontology .....	55
4.4.3.	<i>ePOS</i> M Organisational Units Ontology.....	59
4.4.4.	<i>ePOS</i> M Functions Ontology.....	62
4.4.5.	<i>ePOS</i> M Roles Ontology .....	72
4.5.	<i>EPOS</i> M VERIFICATION.....	73
4.5.1.	<i>ePOS</i> M Verification Approach.....	73
4.5.2.	Architecture Verification .....	74
4.5.3.	<i>ePOS</i> M Syntax Verification .....	76
4.5.4.	<i>ePOS</i> M Content Verification .....	76
4.6.	<i>EPOS</i> M VALIDATION.....	77
4.7.	SECTION SUMMARY.....	84
5.	<b>CONCLUSIONS .....</b>	<b>86</b>
6.	<b>LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORKS.....</b>	<b>88</b>
7.	<b>BIBLIOGRAPHY .....</b>	<b>89</b>
8.	<b>ANNEXES .....</b>	<b>109</b>
8.1.	TERMS AND DEFINITIONS.....	109
8.1.1.	<i>Democracy Views .....</i>	<i>109</i>
8.1.2.	<i>e-Government Definitions .....</i>	<i>110</i>
8.1.3.	<i>e-Governance Definitions.....</i>	<i>111</i>
8.1.4.	<i>e-Democracy Definitions .....</i>	<i>111</i>
8.1.5.	<i>e-Participation Definitions .....</i>	<i>112</i>
8.2.	COMPARATIVE ANALYSIS OF E-PARTICIPATION REFERENCE MODELS .....	114
8.3.	COMPARATIVE ANALYSIS OF E-PARTICIPATION ENGAGEMENT LEVELS' TYPOLOGIES.....	115
8.4.	PARTICIPATORY METHODS.....	115
8.5.	E-PARTICIPATION TOOLS .....	118
8.6.	<i>EPOS</i> M DEVELOPMENT GUIDELINES .....	121
8.7.	<i>EPOS</i> M CONCEPTUALISATION DETAILS.....	122
8.7.1.	<i>SUPER Project Organisational Ontologies.....</i>	<i>122</i>
8.7.2.	<i>ePOS</i> M Strategy Ontology .....	124
8.7.3.	<i>ePOS</i> M Organisational Units Ontology.....	128
8.7.4.	<i>ePOS</i> M Functions Ontology.....	129
8.7.5.	<i>ePOS</i> M Roles Ontology .....	140
8.8.	<i>EPOS</i> M OWL VERIFICATION .....	142
8.8.1.	Conversion to OWL.....	142
8.8.2.	ConsVISor Consistency Checking .....	159
8.8.3.	Import from Protégé .....	162
8.8.4.	Competency Verification .....	167
8.9.	<i>EPOS</i> M VALIDATION.....	175
8.9.1.	Domain-space Coverage Validation .....	175

## LIST OF FIGURES

Figure 1.1 – Conceptual intersections of e-Government, e-Governance and e-Democracy. Reprinted from “Democratic e-Governance – Basic Concepts, Issues and Future Trends”, by A. Anttiroiko, 2007, <i>I-WAYS, Digest of Electronic Government Policy and Regulation</i> , 30, p. 86. Copyright 2007 by IOS Press and the authors.....	9
Figure 2.1 – Open Governance Framework. Reprinted from “ICT-enabled Public Sector Innovation: Trends and Prospects”, by J. Millard, 2013, <i>ICEGOV '13 – 7th International Conference on Theory and Practice of Electronic Governance</i> , p. 78. Copyright 2013 by J. Millard.....	23
Figure 2.2 – SBPM Ontology Stack. Reprinted from "Organisational ontologies to support semantic business process management", by A. Filipowska et al., 2009, <i>Proceedings of the 4th International Workshop on Semantic Business Process Management – SBPM '09</i> , p. 39. Copyright 2009 by ACM..	27
Figure 3.1 – Research Onion. Reprinted from <i>Research methods for business students</i> (p. 83), by M. Saunders and P. Lewis and A. Thornhill, 2003, Harlow FT Prentice Hall. Copyright 2003 by M. Saunders, P. Lewis and Adrian Thornhill. ....	30
Figure 3.2 – DSR methodology and reasoning. Reprinted from "Promoting Relevance in IS Research: An Informing System for Design Science Research", by B. Kuechler and V. Vaishnavi, 2011, <i>Informing Science – the International Journal of an Emerging Transdiscipline</i> , 14, p.130. Copyright 2011 by the Informing Science Institute. ....	34
Figure 3.3 – ePOSM Research Framework. ....	35
Figure 4.1 – Types of components used.....	44
Figure 4.2 – Policy-making process. ....	52
Figure 4.3 – ePOSM: Overarching Concept Map.....	54
Figure 4.4 – ePOSM_SO: Complete concept map. ....	58
Figure 4.5 – ePOSM_OUO: Concept Map.....	61
Figure 4.6 – E-Participation sustainable model.....	62
Figure 4.7 – ePOSM_FO: Top-level view Concept Map.....	63
Figure 4.8 – ePOSM_FO: e-Participation Governance Concept Map. ....	65
Figure 4.9 – ePOSM_FO: e-Participation Process Concept Map. ....	71
Figure 4.10 – ePOSM_RO: Concept Map.....	73
Figure 4.11 – Competency evaluation steps. Reprinted from "Natural Language Support for Competency Evaluation of Web-ontologies", by M. Annamalai and Z. Sanip, 2010, <i>Journal of IT in Asia</i> , 3, p. 7. ....	77
Figure 4.12 – e-Participation Core Factors. Reprinted from <i>Handbook on Business Process Management 1: Introduction, Methods and Information Systems</i> (p. 112), by M. Rosemann and J. vom Brocke, 2010, Springer Heidelberg Dordrecht London New York. Copyright 2010 by Springer-Verlag Berlin Heidelberg.....	79
Figure 8.1 – Representation of a Class used in other Concept Map signalled by a specific icon.....	121

Figure 8.2 – Business Strategy Ontology (BSO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, <i>Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises</i> , p. 22. ....	122
Figure 8.3 – Organisational Units Ontology (OUO). Reprinted from "Organization Structure Description for the Needs of Semantic Business Process Management", by Filipowska et al., 2008, <i>3rd International Workshop on Semantic Business Process Management (SBPM 2008)</i> , p. 50. ....	123
Figure 8.4 – Business Functions Ontology (BFO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, <i>Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises</i> , p. 14. ....	123
Figure 8.5 – Business Roles Ontology (BRO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, <i>Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises</i> , p. 20. ....	124
Figure 8.6 – ePOSM_SO Construction Verification. ....	142
Figure 8.7 – ePOSM_SO Consistency Verification. ....	143
Figure 8.8 – ePOSM_SO OWL file. ....	149
Figure 8.9 – ePOSM_OUO Construction Verification. ....	149
Figure 8.10 – ePOSM_OUO Consistency Verification. ....	150
Figure 8.11 – ePOSM_OUO OWL file. ....	151
Figure 8.12 – ePOSM_FO Construction Verification. ....	151
Figure 8.13 – ePOSM_FO Consistency Verification. ....	152
Figure 8.14 – ePOSM_OUO Top-level view OWL file. ....	152
Figure 8.15 – ePOSM_OUO Governance Function OWL file ....	154
Figure 8.16 – ePOSM_OUO Process Management Function OWL file. ....	156
Figure 8.17 – ePOSM_RO Construction Verification. ....	157
Figure 8.18 – ePOSM_RO Consistency Verification. ....	157
Figure 8.19 – ePOSM_RO OWL file. ....	159
Figure 8.20 – ConsVISor input in OWL. ....	160
Figure 8.21 – ConsVISor outpt in HTML format. ....	161
Figure 8.22 – ePOSM_SO classes view. ....	163
Figure 8.23 – ePOSM_OUO OWL visualisation. ....	164
Figure 8.24 – ePOSM_FO classes view. ....	165
Figure 8.25 – ePOSM_RO OWL visualisation. ....	166

## LIST OF TABLES

Table 1.1 – e-Participation sustainability problems. ....	4
Table 1.2 – Governance and policy modelling key areas of expected change. Adapted from Misuraca et al. (2010, p. 354). ....	7
Table 1.3 – Specific Objectives of the Dissertation. ....	8
Table 1.4 – Research Constraints. ....	10
Table 1.5 – Research Questions. ....	10
Table 2.1 – Democracy models. Adapted from della Porta (2013, p. 14). ....	13
Table 2.2 – Limitations of e-Participation platforms. Adapted from Charalabidis & Loukis (2010) and Kokkinos et al. (2013). ....	19
Table 2.3 – Web 2.0 operational description. Adapted from Chun (2010), O'Reilly (2007) and Osimo (2008). ....	20
Table 2.4 – Smartphones characteristics that favour m-Participation. Adapted from Ertiö (2013) and Molinari (2010). ....	21
Table 2.5 – Principles of Open Government Data. Adapted from the Open Government Working Group (2007). ....	22
Table 2.6 – Organisational Ontology stack. Adapted from Filipowska et al. (2009; 2007) and Janusch et al. (2008). ....	27
Table 3.1 – Matrix of philosophical assumptions. Adapted from Gregg (2001) Creswell (2003), Dawson (2002), Yin (2009) and Vaishnavi (2004). ....	32
Table 3.2 – <i>ePOSM</i> Research Framework mapping against DSR and Dissertation structure. ....	36
Table 3.3 – Research methods adopted. ....	36
Table 3.4 – Research methodology summary. ....	38
Table 4.1 – <i>ePOSM</i> Competency Questions. ....	42
Table 4.2 – Ontologies formality level. ....	42
Table 4.3 – Components of ontologies. Adapted from Gruber (1993), Perez and Benjamins (1999), Roussey (2005), Munoz et al. (2007) and Tankelevičienė (2008). ....	43
Table 4.4 – Lightweight and Heavyweight ontologies. Adapted from Roussey (2005, p. 2) and Tankelevičienė (2008, p. 8). ....	43
Table 4.5 – Public participation principles. Adapted from OECD (2004), Rosa and Pereira (2008) United Nations (2013b) and Sommer (2007). ....	45
Table 4.6 – Comparative analysis of e-Participation domain concepts present in Macintosh (2004), Wimmer (2007), Kalampokis et al. (2008), Slaviero et al. (2011) and Porwol et al. (2014). ....	46
Table 4.7 – E-Participation areas. ....	47
Table 4.8 – e-Participation levels. Adapted from Tambouris et al. (2007) and IAP2 (2007b). ....	48
Table 4.9 – e-Participation tools' components. Adapted from Slaviero et al. (2012, p. 21), Tsitsanis et al. (2008). ....	50

Table 4.10 – e-Participation tools’ characteristics. Adapted from Macintosh (2004) O’Malley et al. (2007), Sæbø (2007) and Wimmer et al. (2006). .....	50
Table 4.11 – Participation methods’ characteristics. Adapted from Rowe and Frewer (2000), Coleman and Gøtze (2001), Slocum (2003) and Rosa and Pereira (2008). .....	51
Table 4.12 – Participation methods’ selection elements. Adapted from Slocum (2003). .....	52
Table 4.13 – Policy-making cycle stages. Adapted from Lukensmeyer and Torres (2006), OECD (2004), Rosa and Pereira (2008) and Sommer (2007). .....	53
Table 4.14 – e-Participation domain concepts’ description.....	54
Table 4.15 – <i>ePOSM</i> Framework. ....	54
Table 4.16 – <i>BSO</i> classes’ applicability. ....	56
Table 4.17 – <i>ePOSM_SO</i> modelling decisions. ....	56
Table 4.18 – <i>ePOSM_FO</i> : Naming Convention. ....	64
Table 4.19 – Main phases of a civic participation initiative. ....	69
Table 4.20 – <i>ePOSM</i> verification approach. Adapted from Gómez-Pérez (1996).....	74
Table 4.21 – <i>ePOSM</i> overall figures.....	74
Table 4.22 – Ontology Design Principles. Adapted from Gruber (1995) and Uschold (1996). ....	75
Table 4.23 – Six core factors of civic participation. ....	79
Table 4.24 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) Strategic Alignment factor.....	80
Table 4.25 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) Governance factor. ....	81
Table 4.26 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) Methods factor. ....	82
Table 4.27 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) Information Technology factor.....	82
Table 4.28 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) People factor. ....	83
Table 4.29 – <i>ePOSM</i> coverage analysis of the Rosemann and Brocke framework (2010) Culture factor. ....	84
Table 4.30 – Overview of the developed artefacts. ....	85
Table 8.1 – Democracy views. ....	109
Table 8.2 – e-Government definitions. ....	111
Table 8.3 – e-Governance definitions .....	111
Table 8.4 – e-Democracy definitions.....	112
Table 8.5 – e-Participation definitions. ....	113
Table 8.6 – e-Participation ontologies and domain models.....	114
Table 8.7 – Participation levels’ typologies.....	115
Table 8.8 – Participatory Methods.....	118
Table 8.9 – e-Participation tools’ categories. Adapted from Wimmer et al. (2006).....	119

Table 8.10 – Description of the e-Participation core tools’ categories. Adapted from Wimmer et al. (2006). .....	120
Table 8.11 – Guidelines for Maps.....	121
Table 8.12 – Guidelines for Classes and Instances.....	121
Table 8.13 – Guidelines for Relationships. ....	121
Table 8.14 – <i>ePOSM_SO</i> : top-tier classes.....	125
Table 8.15 – Constraints of e-Participation.....	126
Table 8.16 – Advantages of e-Participation. ....	127
Table 8.17 – Summary of the Citizens’ expected benefits. ....	127
Table 8.18 – Summary of the Government’s expected benefits.....	127
Table 8.19 – <i>ePOSM_OUO</i> : Classes. ....	128
Table 8.20 – <i>ePOSM_OUO</i> : Relationships. ....	129
Table 8.21 – <i>ePOSM_FO</i> : Top-level view Classes. ....	129
Table 8.22 – <i>ePOSM_FO</i> : <i>e-Participation Governance</i> Classes. ....	135
Table 8.23 – <i>ePOSM_FO</i> : <i>e-Participation Process</i> Classes.....	140
Table 8.24 – <i>ePOSM_FO</i> : Relationships. ....	140
Table 8.25 – <i>ePOSM_RO</i> : Classes. ....	142
Table 8.26 – <i>ePOSM_RO</i> : Relationships. ....	142
Table 8.27 – Competency Verification: CQ1.1. ....	167
Table 8.28 – Competency Verification: CQ1.2. ....	167
Table 8.29 – Competency Verification: CQ1.3. ....	167
Table 8.30 – Competency Verification: CQ1.4. ....	167
Table 8.31 – Competency Verification: CQ1.5. ....	168
Table 8.32 – Competency Verification: CQ1.6. ....	168
Table 8.33 – Competency Verification: CQ1.7. ....	168
Table 8.34 – Competency Verification: CQ1.8. ....	168
Table 8.35 – Competency Verification: CQ2.1. ....	168
Table 8.36 – Competency Verification: CQ2.2. ....	169
Table 8.37 – Competency Verification: CQ2.3. ....	169
Table 8.38 – Competency Verification: CQ2.4. ....	169
Table 8.39 – Competency Verification: CQ3.1. ....	170
Table 8.40 – Competency Verification: CQ3.2. ....	171
Table 8.41 – Competency Verification: CQ3.3. ....	171
Table 8.42 – Competency Verification: CQ3.4. ....	172
Table 8.43 – Competency Verification: CQ3.5. ....	173
Table 8.44 – Competency Verification: CQ3.6. ....	173
Table 8.45 – Competency Verification: CQ4.1. ....	173
Table 8.46 – Competency Verification: CQ4.2. ....	174

Table 8.47 – Competency Verification: CQ4.3. ....	174
Table 8.48 – <i>ePOSM</i> domain coverage analysis. ....	176

## LIST OF ABBREVIATIONS AND ACRONYMS

<b>API</b>	Application Programming Interface
<b>BPM</b>	Business Process Management
<b>BPMN</b>	Business Process Model and Notation
<b>CoE</b>	Centre of Excellence
<b>DSR</b>	Design Science Research
<b>EU</b>	European Union
<b>G2B</b>	Government to Business
<b>G2C</b>	Government to Citizen
<b>G2G</b>	Government to Government
<b>GUI</b>	Graphical User Interface
<b>IAP2</b>	Association for Public Participation
<b>ICT</b>	Information and Communication Technologies
<b>IT</b>	Information and Technology
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>NGO</b>	Non-Governmental Organisations
<b>OGD</b>	Open Government Data
<b>OWL</b>	Web Ontology Language
<b>RDF</b>	Resource Description Framework
<b>RSS</b>	Really Simple Syndication
<b>SBPM</b>	Semantic Business Process Management
<b>SOA</b>	Service Oriented Architecture
<b>UN</b>	United Nations
<b>UNDESA</b>	United Nations Department of Economic and Social Affairs
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation





## 1. INTRODUCTION

### 1.1. BACKGROUND

Democracy is an evolving concept. The term, concept and set of practices can be credited to the sophisticated city-state of Athens during classical antiquity (Ober, 2003). Etymologically, the term combines the word *demos*, which is associated with people, and *kratos*, which is related to power (Ober, 2008)<sup>1</sup>. Therefore its underlying concept suggests power exercised by citizens and has been the key source of inspiration for the modern political thought, having become the leading standard of political legitimacy nowadays (Finley, 1983; Held, 1996). The Citizenship concept is thoroughly discussed in social sciences (White, 2005), including its inherent assumption of entitlement to political rights. For Marshall (1950), the first basic element of citizenship is the right to participate in the exercise of political power as a citizen and an elector. Nevertheless, effective Participation is fundamentally dependent on knowledge and, consequently, the keystone of participation is the ability to make free and informed choices about the course of action to be pursued (White, 2005). The critique of democracy and, in particular, the acknowledgement of the threats of uninformed participation and disengaged public are not new and can be traced back to the philosopher Plato (428-348 BC). Centuries later, Held's (1996) participatory model highlights the need to engage citizens and civil society organisations in the policy process, yet recognising that participation shouldn't be valued in itself, but only when informed. Furthermore, democracy and the formal political process require effective communication amongst citizens, politicians, officers and other stakeholders who may be impacted by political decisions (Habermas, 1996; Sæbø, Rose, & Skiftenesflak, 2008; White, 2005). Political participation is thus a core component of democracy and can be generically described as citizens' direct involvement in, or influence over governmental processes. The appeal of technology to strengthen these ideals and overcome their intrinsic barriers has triggered a wealth of experiments since the end of the Second World War, following the advent of computers and the emergence of cybernetics (Chadwick, 2012; Vedel, 2006).

Over the last four decades, the digital media proliferation offered a set of novel characteristics related to interaction, location, time, network and inclusiveness (Sommer, 2007; van Dijk, 2013) with a potential impact on the democratisation of politics, thus enabling several waves of visions and expectations. The term Electronic Democracy was coined more than thirty years ago in Saldich's article assessing television's impact on American politics, focusing on the way in which it affects public participation in the political process (Saldich, 1979; Vedel, 2006). In the 1980s the Tele-Democracy concept pioneered by Ted Becker (1981) was centred on a human-machine type of interactivity, in which technology empowered citizens in self-governance through tele-voting, hence promoting Direct Democracy without intermediaries such as parties or elected representatives (Hagen, 1997; van Dijk, 2013). In the early 1990s the virtual community perspective appeared based on the rise of computer networks such as Usenet and Bitnet, stimulating both Online Communities (communities of interest) and Communities Online supporting existing physical communities (van

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<sup>1</sup> By *Demokratia* the Athenians meant political power (*kratos*) exercised by the adult male residents (*demos*) of the polis (city-state) regardless of socio-economic conditions (there was no property qualification for voting rights), constituted for purposes of governmental and legal decision-making, (Ober, 2003, 2008).

Dijk, 2013). This trend originated the concept of Cyberdemocracy which refers to a spaceless place where words, human relationships, data, wealth, status and power are made manifest by people using computer-mediated communications technology (Ogden, 1994; Rheingold, 1993). The Electronic Democracy contracted form, e-Democracy, became a figure of speech in the mid-1990s following the Internet diffusion take-off, mainly through the creation of deliberative spaces, such as discussion forums (Chadwick, 2012). At the turn of the century, the Internet hype brought the vision of a New Democracy, associated to a New Economy (Shapiro, 1999; van Dijk, 2013), that would broaden mass participation in politics and policy-making via the Internet. This led governments to conduct initial experiments of online consultation and debates. Subsequently, the popular Web 2.0 (O'Reilly, 2005) brought the promise of user-generated content leading to the expectation that citizens would contribute to policy-making through a myriad of tools such as weblog, petition, wiki, etc. A new and broader concept emerged – **e-Participation**, which stands for the use of Information and Communication Technologies (ICT) to mediate and transform the relations amongst citizens and governments towards increasing citizens' participation (van Dijk, 2010). Furthermore, Coleman (2005) outlined three relevant conclusions concerning public engagement: (1) engaging the public in policy-making, rather than diminishing the representative relationship, contributes to strengthening it; (2) the alternative to not engaging the public isn't a disengaged public but a public with its own agenda and understandable hostility towards decision-making processes; (3) the dichotomy between experts and the public is false and the trick is to find innovative ways of harnessing the existent expertise and feeding it into the decision-making processes.

In a completely different context and with different purposes, the concept of Business Process entered business mainstream over the last decade (Suhendra & Oswari, 2011). Leading organisations in virtually every industry discovered the possibilities of performance enhancement based on a movement towards a process-driven approach to business (Fisher, 2005). Business Process Management (BPM) is a systematic approach that emerged from the Total Quality Management (TQM) and Business Process Reengineering (BPR) methodologies (Llewellyn & Armistead, 2000), focused on managing and improving business performance by continuously optimising business processes in a closed-loop cycle of modelling, execution and measurement (ABPMP, 2009; vom Brocke & Rosemann, 2010a). BPM has a multi-disciplinary foundation, encompassing organisational theory, computer science, information systems and management science (Muehlen, 2007). Several BPM frameworks have been consolidated to support the BPM strategy and there is a proliferation of BPM software suites intended to support the design, verification, simulation, operation and improvement of processes, thus providing an end-to-end perspective. Although BPM has mainly focused on automation and technology in the past, the concept is gradually becoming more management-oriented (Snabe, Rosenberg, & Møller, 2008).

Despite some characteristics that stem from its private sector roots, BPM is a topic of the greatest relevance to government innovation, with public sector organisations establishing BPM capabilities and being now on the move to further developing them (Niehaves, Plattfaut, & Becker, 2013). In particular, process modelling and process reorganisation have been recognised as being of utmost importance for e-Government successful implementations (Palkovits & Wimmer, 2003). BPM can trigger government transformations by automating and simplifying processes, improving quality, leveraging productivity and fostering collaboration amongst institutions, governmental agencies, private companies and citizens (HandySoft, 2003). The proposed research follows this trend, by

proposing a BPM-driven approach to e-Participation, considering that while ICT *per se* cannot assure active citizenship or solve the problems of democracy, they may be instrumental and operational, if tailored to the political, social, cultural and organisational contexts where they are applied (Coleman & Gøtze, 2001; Rosa & Pereira, 2008).

## **1.2. PROBLEM STATEMENT**

In the first decade of the 21st century, the use of ICT to mediate and transform the relations between citizens and governments towards increasing citizens' participation was increasingly explored, by means of research programs, technology implementations and projects. The implementation of e-Participation initiatives requires an understanding of a multitude of interdependent key dimensions, including level of participation, policy-making stage, actors, technologies used, rules of engagement, duration and sustainability, accessibility, resources and promotion, evaluation and outcomes and critical success factors (Macintosh, 2004). The policy-making cycle may vary. However, for the purpose of this research it can be analysed according to the generically accepted set of sequential stages comprising agenda setting, policy preparation, decision-making, policy execution and policy evaluation (E Tambouris et al., 2013; van Dijk, 2010). The level of engagement determines the extent to which the participants take part in the decision-making process and can comprise different levels of involvement including information, consultation, collaboration and empowerment. The participatory process encompasses the organisation and inter-relation of the stages and activities that support the methodology used to gather contributions and reach conclusions or decisions. Actors primarily refer to participation initiatives' stakeholders with an active role in the process, such as target citizens, subject-matter experts and decision-makers. Lastly, suitable tools (*e.g.* discussion forums, e-Consultation and e-Petition) and their underlying technology (*e.g.* workflow engine, natural language processing, collaborative argumentation) should support the participatory process.

Despite the widespread efforts to strengthen new forms of participation mediated by ICT, there is a generalised trust deficit in Representative Democracy. According to the latest Eurobarometer survey (European Commission, 2014), the average level of trust in national governments is approximately 27%, while the trust in the European Union (EU) institutions remains unchanged for the third successive time at 31%. Conversely, the proportion of Europeans who tend not to trust national governments is approximately 68%, while the proportion of respondents who do not trust the European Union institutions is approximately 56%. The analysis of young people's readiness for political participation, including their willingness to adopt new forms of engagement, further provides relevant insights to bridge the gap between citizens and governments. In this context, the European Association of Communications Agencies (EACA) has recently published a comprehensive report on youth participation in democratic life encompassing several themes, including the role of mainstream media, community media and new media in fostering participation in democratic life amid young people (EACA, 2013). The overall conclusions, rather than providing a disaffected perspective portraying apathy and cynicism amongst young people, concur with the cultural displacement vision (Loader, 2007), suggesting that young people are not necessarily less interested in politics, but rather feel displaced from the formal political sphere due to a mismatch between traditional political activity and contemporary youth culture. Acknowledging that mainstream media fulfils an important role in broadcasting democratic awareness, the study revealed that the lack of

interest in institutional politics and traditional political news is higher in young people than in general population. Additionally, there is a high level of distrust amongst young people regarding the mainstream media as well as a shift in their media consumption from traditional media to new media. In terms of engagement channels, and aligned with other studies involving young people (Serrano Ferreira & Pérez Ortega, 2012), the results claim that the process of participation awakening should consider offline approaches and face-to-face contact, both deemed fundamental for participation encouragement. Finally, while the use of new media was considered a good way to reach young people, the study concluded that, in order to avoid forms of tokenism, there should be a clear link between what happens online and the offline political process.

From the supply-side standpoint, exhaustive studies on the current state of e-Participation practice reveal weaknesses concerning the coverage of policy-making cycle phases and the governments' readiness to strengthen new forms of participation mediated by ICT. Potentially, e-Participation can take place at any stage of the cycle through specific intervention points. Nevertheless, few decision makers are prepared to accept e-Participation and most administrations do not have mechanisms or capacities to put it in place (S. Smith, 2008; van Dijk, 2013). For this reason, Tambouris et al. (E Tambouris et al., 2013) highlight the importance of initiating actions aiming to fully embed e-Participation into all aspects of the overall policy architecture. In fact, there is a prominence of an information provision rationale in e-Participation over consultation and deliberation, which indicates that its potential has not been fully harnessed (E Tambouris et al., 2013; van Dijk, 2013). Moreover, e-Participation is not consistently applied throughout the entire policy cycle, being used mainly in the first phases of the policy-making process, specifically during agenda setting and policy preparation, followed by the policy evaluation stage; governments and public administrations scarcely use e-Participation during decision-making and policy execution phases (van Dijk, 2013). Hence, e-Participation is primarily understood from the legitimacy standpoint rather than as an effective input to influence institutional policy and politics (E Tambouris et al., 2013; van Dijk, 2013).

As e-Participation has not been successfully incorporated in institutional politics and government, it can thus be concluded that there is a lack of sustainability. The main underlying problems are summarised in Table 1.1.

<b>Problem</b>	<b>Description</b>
<b>P1</b>	Generalised trust deficit in representative democracy.
<b>P2</b>	Lack of Decision-makers' preparation to setup e-Participation.
<b>P2</b>	Lack of consistent application of e-Participation throughout the entire policy cycle.
<b>P4</b>	Mismatch between traditional political activity and contemporary youth culture.

Table 1.1 – e-Participation sustainability problems.

These findings suggest that BPM – a holistic management discipline for the identification, design, execution, documentation, measurement and control of processes in order to achieve results aligned with strategic goals – can provide a significant contribution to overcome the current e-Participation barriers. First and foremost, the BPM mindset addressing end-to-end work can be transposed to understanding the policy-making cycle as a macroprocess aligned with a strategic goal. This process can be thought of as integrating subprocesses structured to support public participation and aiming to add value to policy and, ultimately, deliver returns on the investment to both citizens and

decision-makers. The adoption of a BPM lifecycle approach to manage the participatory processes, including planning, analysis, design, modelling, implementation, monitoring and improvement, can leverage the effectiveness and efficiency of public participation and continually increase the level of citizens' engagement. Furthermore, the e-Participation actors' engagement can benefit from the BPM approach focused on thorough stakeholders' analysis and the involvement of cross-functional teams. Lastly, from a technological perspective the process repositories and stand-alone tools for process modelling, analysis, design and execution can be applied to implement e-Participation. For these reasons, a BPM-driven approach can potentially cover the e-Participation key dimensions and, consequently, be further explored within this context. Moreover, following recent trends (Oracle Corporation, 2013; Ovum, 2013), the social extension of BPM seeks to optimise processes by enhancing collaboration among stakeholders through the use of Web 2.0 and social media. The motivations for creating socially enabled processes include discovering and exploiting informal knowledge, enhancing the transparency of decision-making, leveraging participation by eliciting opinions that contribute to making a decision and by engaging a broader community in the generation of awareness on the process outcome (Brambilla, Fraternali, Vaca, Milano, & Butti, 2012). This approach embodies recent visions claiming that e-Participation should no longer be conceived as a silo (Millard, 2012) but rather actually deliver value to the involved stakeholders, thus addressing their demands and expectations. While governments promote participation in order to improve the efficiency, acceptance and legitimacy of political processes, citizens, Non-Governmental Organisations (NGOs), lobbyists and pressure groups may demand participation to sanction their own interests (Sæbø et al., 2008). A BPM-steered approach can contribute to a gradual convergence of these expectations.

Following these considerations, this research stands to contribute to the existing body of knowledge by proposing a model for embedding e-Participation in Government and Public Administration and leveraging interoperability between them, to avoid standalone, loosely connected and divergent initiatives that do not address citizens' needs and lead to poor levels of trust and to the waste of resources. Hence, the proposed research problem is to study how a BPM-steered approach can act as a catalyst to foster e-Participation sustainability towards value creation throughout the policy-making cycle, including political value, organisational value and, ultimately, citizen value. E-Participation sustainability is heavily dependent on organisational planning and assimilation of new tactics, methods and attitudes along the policy-making cycle, thus demanding an holistic engineering approach (Scherer & Wimmer, 2011b). Therefore, the research problem consists in providing a model that reflects the civic participation concepts in the structure, operations and policy-making value chain of governments and public administration.

### **1.3. RELEVANCE AND IMPORTANCE**

Public participation is currently considered a major political concern. Issues such as apathy, democratic deficit, people turning away from politics, declining voter turnout and decreasing membership of political parties (Millard, 2008) portray citizens' confidence deficit in public servants and governmental institutions. The international community has been reaffirming the value of wider public participation for over a decade. The United Nations Millennium Declaration (United Nations, 2000) emphasised the need to work collectively for more inclusive political processes, allowing genuine participation. According to the Organisation for Economic Cooperation and Development

(OECD), the multifaceted problems at global, national and local levels resulting from the 2008 financial and economic crises have brought many implications to public institutions and, consequently, an open and transparent government is key to facilitating social engagement and restoring trust (OECD, 2010). At the United Nations Conference on Sustainable Development (United Nations, 2012b), Member States recognized the utmost importance of creating opportunities for people to influence their own lives and future and participate in decision-making. In Europe, the e-Participation Preparatory Action launched in 2006 by the European Parliament co-funded 21 pilot projects promoting the use of ICT in legislative and decision-making processes until 2013 (European Commission, 2015). The European e-Government Action Plan 2011-2015 has prioritised both User Empowerment and the Efficiency and Effectiveness of Governments and Administrations, as well as the implementation of the Pre-conditions for developing e-Government. In particular, the User Empowerment priority is structured around the following axes: (1) Services designed around users' needs and Inclusive Services; (2) Collaborative Production of Services; (3) Re-use of Public Sector Information; (4) Improvement of Transparency; and (v) Involvement of citizens and businesses in policy-making processes. Moreover, the recent Horizon 2020 (European Commission, 2013) programme continues to support ICT-enabled public sector innovation in Europe under Challenge 6: "Europe in a changing world – Inclusive, innovative and reflective societies", which includes innovation actions for mobile, personalised public services and transparency of public administrations (INSO-1: ICT-enabled open government).

There are real and successful examples of public mobilisation and participation through ICT tools such as the Brazilian Civil Rights Framework for the Internet (*Marco Civil*), which is one of the most advanced legal proposals worldwide aiming to establish Internet rights and principles. A remarkable process of social participation based on online tools supports *Marco Civil*. Studies suggest that, on the one hand, applications of e-Participation initiated by citizens or Civil society organisations and new media developers are more successful than those driven by governments, and, on the other hand, effective influence of e-Participation projects or experiments over institutional policy and politics is scarcely observed (van Dijk, 2010). Despite the importance and widespread prevalence of non-institutional channels and initiatives, the decisive touchstone of e-Participation in terms of democracy is influence on political decisions (van Dijk, 2013). Another example worth studying is the rise and fall of the Iceland so-called world's first crowdsourced<sup>2</sup> constitution. Following the Icelandic banking system collapse and subsequent public demand for changes, a council composed by 25 ordinary citizens was elected by the nation to propose a new constitution. This council was able to deliver a constitution draft gathering inputs from massive public participation received through social networks, which was then submitted to a non-binding constitutional referendum held in 2012 that mobilized nearly half of Iceland's 235,000 eligible voters. The official sanctioning of the constitution draft still required approval by two consecutive parliaments in order to come in force and this unprecedented grassroots initiative eventually failed to pass after long discussions and controversial changes in the process. Regardless of the political decision, this case demonstrates the importance of

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<sup>2</sup> "Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the open call format and the wide network of potential labourers." (Howe, 2008, p. 99)

e-Participation in governments' agendas, acting as a means to strengthen citizens' political and socio-technological capabilities, by offering them a greater share in political discourse and the possibility to contribute with ideas, suggestions and requests (Gatautis, 2010).

However, although there are several inspiring exceptions, there is still a long way for e-Participation full realisation (Millard et al., 2009; Misuraca, Broster, & Centeno, 2010) and many challenges remain, including, among others, the inadequacy of institutional change processes and the lack of innovative e-Government leadership (UNDESA, 2014). The latest edition of the United Nations e-Government Survey (2014), which assesses the e-Governance status of the 193 United Nations Member States, acknowledges that careful strategies are needed to create an enabling environment for e-Participation. This includes the assignment by Governments of independent offices or independent functions to introduce or improve freedom of information, privacy and data protection legislation, addressing both formal and informal approaches to citizen engagement. Similarly, the European Commission recognises that public administrations need to adapt in order to keep up with the rapid transformation of society, as the increased connectivity of citizens leads to new expectations in terms of the quality, transparency and efficiency of public services (European Commission, 2015). After a thorough analysis of policy, research and societal trends, Misuraca et al. (2010) envisioned three scenarios for how governance and policy modelling will be conducted by 2030, by mapping ICT research for prospective governance and policy modelling. The main conclusions of this work in terms of key areas of expected changes driven by ICT are described in Table 1.2. The relevance of the present research relies on its contribution for promoting such changes, by tackling organisational changes across Government and Public Administration in order to translate the widespread rights of citizen participation rights into civic realities.

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#### Key Areas of Expected Change

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1. Facilitation of increased participation, user created content, engagement and ownership of public services in policy-making.
  2. New governance models that introduce efficiency, effectiveness, quality assurance and evaluation, as well as evidence-based policy as core principles for making informed decisions.
  3. Reinforcement of the digitisation of services, processes and interactions, by redesigning governance processes and policy-making mechanisms.
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Table 1.2 – Governance and policy modelling key areas of expected change. Adapted from Misuraca et al. (2010, p. 354).

### 1.4. OBJECTIVES

The ultimate objective of this dissertation is to propose a **conceptual model aiming to foster e-Participation sustainability across Government and Public Administration towards a participatory, inclusive, collaborative and deliberative democracy**. For this purpose it introduces the e-Participation Organisational Semantic Model (*ePOS*M), consisting of a semi-formal ontology steered by a BPM-driven approach. The corresponding specific objectives are identified in Table 1.3.

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#### Specific Objectives

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- O1. Provide a common, unambiguous and cross-functional understanding among Government and Public Administration of e-Participation implementation related concepts and their articulation.
  - O2. Provide a rationale for organisational modelling, in order to embed e-Participation in Government and
-



<b>Specific Objectives</b>	
	Public Administration organisational structures, both effectively and efficiently.
<b>03.</b>	Enable process-level interoperability among Government and Public Administration by providing a standard approach to implement e-Participation processes.
<b>04.</b>	Provide a standardised vocabulary in a semi-formal format potentially usable in software development for business processes' automation.

Table 1.3 – Specific Objectives of the Dissertation.

## 1.5. SCOPE

Considering the variety of the research's underlying disciplines and context complexity, the research scope was structured to frame the research area, define the domain constraints, identify assumptions concerning the political system in place and apply constraints to the research results.

### 1.5.1. Research Area Constraints

Following the aforementioned objectives, e-Participation was the research domain area, while BPM was the adopted management discipline to address the research problem. The proposed solution was developed through an ontology engineering approach. Sæbø et al. (2008) broke down the e-Participation research agenda into different areas, including Normative, Instrumental, Evaluative, Technology and Theoretical & Methodological. The artefact that resulted from the present research primarily integrates the instrumental, as it is intended to improve e-Participation practice through the development of methods or frameworks for varying contexts and objectives (Lehtonen et al., 2007; Sæbø et al., 2008).

### 1.5.2. Domain Constraints

E-Participation can serve multiple purposes, including policy participation and social participation<sup>3</sup> (Meijer, Burger, & Ebbers, 2009). This research was focused on those forms of participation linked to e-Democracy, through which citizens are able to influence institutional policy processes, from agenda setting to policy evaluation. The research therefore adopted the UNDESA (2014, p. 81) e-Participation definition consisting in “the process of engaging citizens through ICTs in policy and decision-making in order to make public administration participatory, inclusive, collaborative and deliberative for intrinsic and instrumental ends”. The proposed conceptual model targets government-led initiatives, meaning that the addressed participatory processes are launched by Government, Public Administration or citizens using institutional or Government-defined channels (*i.e.* non-institutionalised bottom-up e-Participation is out of scope). In this sense, the research artefact is primarily regulative, aiming to facilitate a more effective political governance through e-Participation without changing its underlying democratic or political structure (Lehtonen et al., 2007).

### 1.5.3. Political System Constraints

E-Participation is often mentioned in different contexts, namely e-Government, e-Governance and e-Democracy, denoting their blurred conceptual boundaries. Anttiroiko (2007) has articulated these

<sup>3</sup> Social participation focuses on increasing social capital through social networking (Meijer et al., 2009).

concepts by defining Democratic e-Governance as a technologically mediated interaction in transparent policy-making, development and service processes, through which citizens have the opportunity to participate and effectively influence relevant issues through various institutionally organised and legitimate modes of participation. This concept combines different structures to support the interaction between citizens, Government and Public Administration (refer to Figure 1.1), including government services and regulation (e-Government), citizens' institutionalised contribution to the democratic system (e-Democracy) and forms of civic activism (e-Communities). In particular, it entails Participatory Democracy, supported by e-Participation, as one of its structural pillars. The current research acknowledged the interdependence between e-Participation practice and the political system in which it is embedded (Macintosh, Coleman, & Schneeberger, 2009; P. Norris, 2000). Accordingly, it assumed the existence of a Democratic Governance system setting in place that combines elements of both direct and representative democracy (Aragonès & Sánchez-Pagés, 2004) by promoting a socialisation of politics and encouraging an active citizenship (van Dijk, 2000).

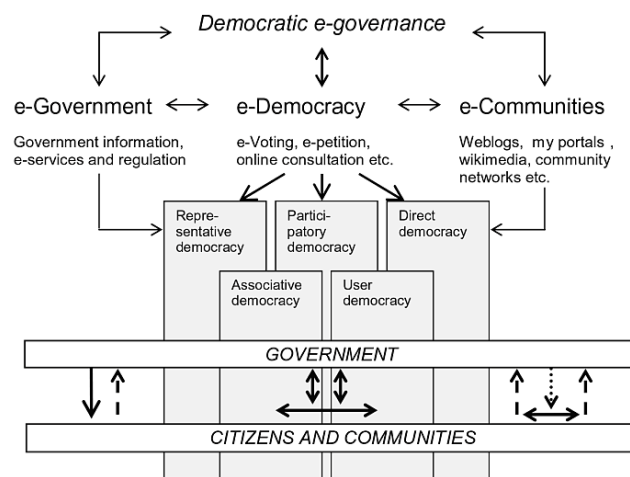


Figure 1.1 – Conceptual intersections of e-Government, e-Governance and e-Democracy. Reprinted from “Democratic e-Governance – Basic Concepts, Issues and Future Trends”, by A. Anttiroiko, 2007, *I-WAYS, Digest of Electronic Government Policy and Regulation*, 30, p. 86. Copyright 2007 by IOS Press and the authors.

#### 1.5.4. Research Results Constraints

The proposed e-Participation Organisational Semantic Model is focused on organisational modelling and supported by a BPM-driven management approach. The model was conceived through ontology engineering and, considering the multi-disciplinary nature of the research, the constraints identified in Table 1.4, have been applied.

Discipline	In Scope	Out of Scope
<b>e-Participation</b>	Study of the domain including: <ul style="list-style-type: none"> <li>• Theoretical background;</li> <li>• Principles and best practices;</li> <li>• Contextual factors;</li> <li>• Levels of public engagement;</li> <li>• Benefits of public participation;</li> <li>• Barriers and opportunities;</li> </ul>	Excluded from the developed artefacts: <ul style="list-style-type: none"> <li>• Participatory processes modelling;</li> <li>• Prescriptive implementation plan for the developed model.</li> </ul>

Discipline	In Scope	Out of Scope
	<ul style="list-style-type: none"> <li>• Policy Cycle stages;</li> <li>• Stakeholder analysis;</li> <li>• Supporting technology;</li> <li>• Trends and state-of-the-art.</li> </ul> Development of artefacts covering: <ul style="list-style-type: none"> <li>• Strategic alignment;</li> <li>• Processes;</li> <li>• Governance;</li> <li>• Roles;</li> <li>• Organisational modelling.</li> </ul>	
<b>BPM</b>	Analysis of BPM from a process-oriented management perspective, including: <ul style="list-style-type: none"> <li>• BPM principles;</li> <li>• BPM lifecycle;</li> <li>• BPM Centres of Excellence;</li> <li>• Maturity models;</li> <li>• Semantic BPM.</li> </ul>	Excluded from the analysis: <ul style="list-style-type: none"> <li>• Technology-centric approach.</li> </ul>
<b>Ontology Engineering</b>	Study of: <ul style="list-style-type: none"> <li>• Methodologies for ontology development;</li> <li>• E-Participation ontologies;</li> <li>• BPM ontologies.</li> </ul> Adopted representation: <ul style="list-style-type: none"> <li>• Semi-formal representation.</li> </ul>	Excluded from the representation: <ul style="list-style-type: none"> <li>• Rigorously formal representation.</li> </ul> Excluded from the research: <ul style="list-style-type: none"> <li>• Instantiation of the developed model to a specific use case.</li> </ul>

Table 1.4 – Research Constraints.

## 1.6. RESEARCH QUESTIONS

Following the presented research problem, objectives and scope, the proposed e-Participation Organisational Semantic Model aims at addressing the research questions stated in Table 1.5.

Research Questions	
<b>RQ1</b>	How to ensure the strategic alignment of e-Participation initiatives with the citizens' needs, based on a BPM-driven approach?
<b>RQ2</b>	How can the Government organisational structure constituents reflect a BPM-driven approach to e-Participation?
<b>RQ3</b>	Which organisational functions within Government are required to implement a BPM-driven approach to e-Participation?
<b>RQ4</b>	Which organisational roles within Government are required to implement a BPM-driven approach to e-Participation?

Table 1.5 – Research Questions.

## 1.7. ORGANISATION OF THE DOCUMENT

The dissertation is structured in six sections. The first section – Introduction – describes the research motivation, defining the problem, objectives, scope and research questions. The second section – Literature Review – provides the theoretical grounding that supported the research, covering democracy models, e-Participation, BPM and ontology engineering. The third section – Methodology

– presents the adopted research methodology and the rationale behind the options made. The fourth section – *ePOSM* Development and Achieved Results – is the core part of the dissertation, comprising research outcomes as well as an evaluation of the results achieved. The fifth section – Conclusions – encompasses an analysis of the archived results with regard to the overall objectives. The sixth section – Limitations and Recommendations for Future Works – suggests possible directions for subsequent derivative works.

Beyond the body of the document, the dissertation includes two additional sections, namely Bibliography and Annexes. The Bibliography outlines the consulted literature. The Annexes include additional research that supports the analysis and results presented throughout the dissertation.

*"I think we often speak as if there is a completed project called 'democracy' and there is another completed project called 'the internet' and we ask 'what will this thing called the internet do to this thing called democracy?'. Both of these are in a state of evolution. We haven't got a completed democracy; we haven't got a completed internet. Both are up for grabs. So the question we need to ask is whether the internet is likely to reinforce traditional ways of doing politics, which has tended to be rather remote from the public. Or whether the internet, as an interactive medium, can enable the public to get into a more collaborative and conversational style of politics which makes it more meaningful to them." (Coleman, 2004)*

## **2. LITERATURE REVIEW**

### **2.1. INTRODUCTION**

The multidisciplinary nature of the research required a broad literature review encompassing both social and technical disciplines. This section provides the theoretical grounding that supported the *ePOSM* development. The result of the conducted review is structured based on a top-down approach, starting by providing background information on e-Participation and progressively directing the analysis to the research purpose. Consequently, the initial sections are focused on providing an understanding of democracy models (refer to Section 2.2), the e-Participation context (refer to Section 2.3) and the e-Participation concept (refer to Section 2.4). Following the introductory sections, the analysis covers the state-of-the-art of e-Participation practice (refer to Section 2.5). The final sections are focused on the methodologies and techniques used to develop the *ePOSM*, by analysing the BPM field (refer to Section 2.6), the Semantic Business Process Management (refer to Section 2.7) and existent e-Participation ontologies (refer to Section 2.8). Finally, it is provided a summary of the most relevant insights (refer to Section 2.9).

### **2.2. DEMOCRACY MODELS**

The Vienna Declaration states that "Democracy is based on the freely expressed will of the people to determine their own political, economic, social and cultural systems and their full participation in all aspects of their lives" (United Nations, 1993, p. 3). Theories on democracy are numerous and rooted on different philosophical, political, cultural, social and economic perspectives. Moreover, this form of government, remarkably difficult to create and sustain (Held, 1996), can be supported by several models thoroughly analysed in the body of theoretical literature on democracy. Inspired by Held's (1996)<sup>4</sup> models and after having analysed the potential impact of digital democracy, Dijk (2000) has identified six ideal views on democracy, comprising both government-centric views, namely Legalist and Competitive, and citizen-centric views, namely Plebiscitary, Pluralist, Libertarian and Participatory (refer to Annex 8.1.1). While government-centric views intend to strengthen institutional politics, citizen-centric views aim at a socialisation of politics, based on a more prominent role for social organisations and individual citizens. In these views, it is assumed that ICT will enable citizenry to effectively influence politics through opinion making, or even to bypass or replace institutional politics (van Dijk, 2010). Combining normative theory with empirical analysis on how some models have developed and recently inspired real institutional changes, della Porta (2013)

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<sup>4</sup> Ideal forms comprise four historical models including Classical Athenian, Republicanism, Liberal, and Direct Marxism; and four contemporary models including Compleitive Elitist, Pluralism, Legal, and Participatory. In reality, views of democracy are usually combinations of these types.

outlined four different conceptions of democracy relevant for the purpose of this research. These include a government-centric view – Liberal Democracy – and three citizen-centric views – Radical Participatory, Liberal Deliberative and Participatory Deliberative. These conceptions are represented in Table 2.1, crossing the dimensions of delegation vs. participation and majority vote vs. deliberation.

	Majority vote	Deliberation
Delegation	Liberal Democracy	Liberal Deliberative
Participation	Radical Participatory	Participatory Deliberative

Table 2.1 – Democracy models. Adapted from della Porta (2013, p. 14).

Liberal democracy became the dominant form of government after the end of the Cold War. It consists in a representative system grounded in the principles of liberalism, including a vision of society made up of individuals and electing as the primary social good the equal protection of human rights, civil rights, civil liberties and political freedoms for all persons (Chan, 2002; Pace, 2009). It is characterized by competitive elections between distinct political parties and by a separation of powers. Political decision-making is delegated to the elected representatives and decisions are made according to the extent of support to opposing views, *i.e.* majority wins. The process legitimacy results from the electoral accountability by allowing citizens to reward or punish those in government. Additionally, there are other controlling mechanisms, such as the widespread constitutional conception which limits every type of power including the representative one (della Porta, 2013). Over the last decades, several factors contributed to an increasing focus on the citizen-centric views, including the exclusion of alternative voices due to the elitist and technocratic nature of the Liberal model, the weakening of the party system and the perceived loss of public legitimacy motivated by low voters' turnout. According to della Porta (2013), regardless of the trend of decreasing voter turnout, citizens are no less interested in or knowledgeable about politics. Therefore, a revival of the pluralistic and participatory ideals that emerged in the 1960s unleashed new trends in political visions towards an increasing focus on Participatory Democracy and Deliberative Democracy (Ekelin, 2007; Escobar, 2012).

Participatory Democracy theories were initially<sup>5</sup> formulated by Pateman (1970)<sup>6</sup> and MacPherson (1977) and subsequently reinterpreted by Held (1996). Participatory Democracy relies on the socialisation of politics, seeking the broadest possible opinion formation about political affairs. It combines direct<sup>7</sup> and representative<sup>8</sup> democracy, by promoting an active citizenship directly involved

<sup>5</sup> Although inspired by earlier figures such as Rousseau (Aragonès & Sánchez-Pagés, 2009).

<sup>6</sup> Pateman questioned the nature of public power, the relationship between the private and public spheres and how deep politics and democracy could reach in citizen's lives. She further claimed the need for a far-reaching democratisation, not only concerning governmental work, but also the rest of the society (Ekelin, 2007; Held, 1996).

<sup>7</sup> According to the direct Democracy model, citizens are entitled to vote directly on policy alternatives and decide on each important issue (Ginneken, 2006); therefore, network-based groups and individuals take over the role of traditional institutions (Held, 1996).

<sup>8</sup> A form of democratic government whereby "citizens' interests are represented by elected officials in open elections. Representatives act in the interests of their electors, either by martialling together electors' views, or through personal initiative and independence between elections" (Parliament of Victoria - Australia, 2005).

in governmental decision-making processes (Milakovich, 2010; Sæbø et al., 2008; van Dijk, 2013). This model privileges social inclusion and is characterised by citizens' direct representation in the governing of societal institutions. Citizens' determine the degree of their involvement in affecting policy and determining social priorities (Milakovich, 2010). Furthermore, in this model education is an essential condition to enable citizen and coalition leaders' participation in public decision-making, focusing on specific social issues (van Dijk, 2000; Woods, 2008). Della Porta (2013, p. 59) claims that the participative approach has gradually penetrated the democratic State through reforms in public institutions, the political recognition of the "right to dissent" and several social movement organisations.

Deliberative Democracy ideals have been widely disseminated in recent years and encompass several visions. According to Habermas (1984) and Rawls (1984) a legitimate political choice must result from a "deliberation about ends among free, equal, and rational agents" (Elster, 1998, p. 5). This model aims to create legitimacy for communication amongst decision-makers acting as equals to make rational democratic decisions based on shared norms, values and objectives (Habermas, 1984). Accordingly, this model relies on constructive confrontation during the discursive process, through which opinions are formed and transformed towards the public good. For Habermas, the public should be involved in the decision-making process as long as it is constitutionally mandated (*e.g.* holding official public hearings on all public decisions), although he does not advocate a general need to include the public in developing the vision for which the policy was conceived (Woods, 2008).

Therefore Participatory Democracy and Deliberative Democracy hold opposed tenets. While the former privileges the quantitative dimension of the political role of civil society, the latter favours the quality of politics and the public sphere (Cini, 2011). Cohen and Fung (2004, p. 27) stressed the trade-off between these models: (1) "Improving the quality of deliberation may come at a cost to public participation"; (2) "Conversely, expanding participation – either numbers of people, or the range of issues under direct popular control – may diminish the quality of deliberation". Furthermore, "social complexity and scale limit the extent to which modern politics can be both deliberative and participatory" (J. Cohen & Fung, 2004, p. 27). Several contemporary deliberative democrats consider that these models, rather than being competitive, in fact offer complementary methodologies and based on that they have developed new converging approaches of Participatory and Deliberative Democracy (Cini, 2011; J. Cohen & Fung, 2004; della Porta, 2013). According to Cini (2011), the Participatory Deliberative paradigm encompasses the notion of citizen empowerment and political inclusion and can be implemented by fostering two different types of political arenas. The first type consists in formal collective spaces aiming to create high quality deliberative participation with a direct impact on the exercise of power. These include spaces such as citizen juries, electronic town meetings, deliberation polls, table scheme displays and participatory budgeting (Cini, 2011). The second type includes political venues of a more informal nature aiming to broaden deliberative participation within organisations of civil society with indirect and limited impact on the exercise power. These complementary arenas attempt to influence decision-making from the outside and can include self-organised citizens' committees, grassroots' workplace assemblies, non-institutional social forums and collective movement organisations (Cini, 2011).

### 2.3. E-PARTICIPATION CONTEXT

The adoption of the “e” prefix to denote ICT mediation of new or existing processes is nowadays a common terminology in several domains, including Government and Public Administration. In this context, the term e-Participation appears alongside with e-Democracy, e-Government and e-Governance. These terms are deeply intertwined (Freeman & Quirke, 2013; D. Norris, 2010; Saparniene, 2008) and their corresponding scopes often overlap (Medimorec, Schossböck, & Frick, 2011). Hence, for the purpose of the present research it was important to understand their underlying concepts in order to frame e-Participation within the overarching setting of Government and Public Administration electronic-driven reforms and trends.

The term e-Government emerged as a concept and practice in the 1990s (Yildiz, 2007) and has been used to describe a wide range of applications and objectives, conveying multiple definitions depending on the specific context, regulatory environment, dominance of a group of actors in a given situation and different priorities in government strategies (Alshehri & Drew, 2010; L. Torres, Pina, & Acerete, 2005). The analysis of e-Government definitions found in both academic literature and prominent Organisations’ publications (refer to Annex 8.1.2) exposed the existence of a common theme consisting in using ICT, and especially the Internet, to improve the delivery of government services to citizens, businesses, and other government agencies (S. Palvia & Sharma, 2007), tackling principles of effectiveness, efficiency and quality. However, despite these similarities, conceptual differences were found, revealing either broader or narrower perspectives.

The e-Government broader perspective goes beyond the traditional hierarchical and supply-side oriented conception, involving different types of governance relations among stakeholders, including government-to-government (G2G); government-to-business (G2B) and its reverse; and government-to-consumer/citizen (G2C) and its reverse<sup>9</sup>. Moreover, some definitions (European Commission, 2003; Fang, 2002; UNDESA, 2005) explicitly target democratic processes’ improvement and public participation in policy decision-making. Following this approach, the European Commission (EC & European Commission, 2010) e-Government Action Plan 2011-15, harnessing ICT to promote smart, sustainable & innovative Government and aiming to enable the vision contained in the Malmö Declaration<sup>10</sup> (2009), included the promotion of initiatives to facilitate active participation in the civic and democratic life of the European Union (EU). A similar approach has been adopted by the United Nations (UN) by defining an ascending four-stage model, in which each stage builds upon the previous level of sophistication of a state’s online presence, in particular embodying the concept of collective decision-making, participatory democracy and citizen empowerment as democratic rights. In the most mature stage, the Connected Presence, Government encourages participatory deliberative decision-making and is willing and able to involve the society in a two-way open dialogue (United Nations, 2012a).

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<sup>9</sup> Further types were also found in the literature (*e.g.* Fang (2002)), but an exhaustive review of e-Government types and models was kept out of the scope of the research.

<sup>10</sup> By 2015, European public administrations should "Involve stakeholders in public policy processes. We will actively develop and promote effective, useful and better ways for businesses and citizens to participate in the policy processes. Increased public engagement through more effective methods at all levels enhances government’s efficiency and effectiveness and improves the quality of its decisions and services"(European Commission, 2009, p. 3).



The narrower perspective of e-Government mainly consists in translating e-Commerce<sup>11</sup> experiences in the private sector to the public sector (Lourdes Torres, Pina, & Royo, 2005). In fact, information dissemination and service delivery often dominated e-Government initiatives' use as these practices offer governments the greatest chance for economic gains (Freeman & Quirke, 2013; O'Toole, 2009). Furthermore, such developments were primarily focused on improving efficiency through ICT, rather than being used to aid the effectiveness of democratic processes, neglecting online civic inclusion in political decision-making (Verdegem & Hautekeete, 2010). Therefore, regardless of the ICT full potential captured in the aforementioned literature, e-Government is often perceived as the application of ICT to the implementation of public government functions, focused on public electronic services (Saparniene, 2008).

The terms e-Government and e-Governance are frequently used interchangeably, although several authors highlight this misconception (Anttiroiko, 2007; D. Norris, 2010; Rogers, 2000; Sheridan & Riley, 2006). The governance term in the public sector arose in the early 1990s to describe non-hierarchical ways of organising public policies, service provision and development activities (Anttiroiko, 2007). The analysis of e-Governance definitions found both in academic literature and prominent Organisations' publications (refer to Annex 8.1.3) revealed the existence of common principles related to Good Governance enhancement, encompassing new concepts of citizenship – both in terms of citizen needs and responsibilities – In order to engage, enable and empower citizens (Rogers, 2000; UNESCO, 2005). The European Commission (2001) elected five principles underpinning Good Governance, namely openness, participation, accountability, effectiveness and coherence. Similarly, United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) characterised Good Governance as entailing participation, transparency and accountability. According to these concepts and aligned with a narrower perspective of e-Government, e-Government mainly addresses electronic delivery of information and services, whereas e-Governance brings forth new concepts of regulation and control both by governments and citizens (Anttiroiko, 2007; Freeman & Quirke, 2013; D. Norris, 2010). Therefore, e-Governance can be considered as a wider concept, encompassing e-Government and e-Democracy (Peristeras, Mentzas, Tarabanis, & Abecker, 2009; Rogers, 2000; UNESCO, 2005). According to this view, e-Governance can be defined as the union of political and administrative subsystems, covering two major types of society governance interfaces that support relevant interactions (Peristeras et al., 2009), namely those of society-to-administrative and society-to-political. On the one hand, the ICT processes handling the society-to-administrative system interface are designated as e-Government and cover a broad range of communication types, such as G2G, G2C and G2B. On the other hand, the ICT processes mediating the society-to-political system interface, including interactions through processes of public policy analysis, formulation and selection, can be designated as e-Democracy.

Amongst the collected e-Democracy definitions (refer to Annex 8.1.4), different emphasis and scopes were identified, although no major conflicts emerged. The common thread broadly defines e-Democracy as the use of ICT to increase and enhance citizens' engagement in democratic structures and processes. Trechsel (2002) stresses how ICT can strengthen democracy, namely by increasing the

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<sup>11</sup> OECD (2002a, p. 89) broad definition for e-Commerce transaction refers to the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over computer mediated networks.

transparency of the political process, enhancing the direct involvement and participation of citizens and improving the quality of opinion formation by opening new spaces of information and deliberation. Clift (2004) refers the use of ICT by democratic actors within the political practices at national, regional and local levels. These actors comprise governments, elected officials, media, political parties or interest groups, civil society organisations, international governmental organisations and citizens/voters. There are also contrasting visions that defend dystopian views, either considering e-Democracy a threat (Government, Norris, & Reddick, 2011; P. Norris, 2000) or arguing that the digital divide may lead to populism and increase information inequality (Regéczi, 2004). Winkler (2003) adopted the Hacker and Dijk (2001) definition of digital democracy for e-Democracy: the use of ICT (mainly the Internet and mobile technologies) to enhance an active participation of citizens and to support collaboration between actors for policy-making purposes without the limits of time, space or other physical conditions in democratic communication. This is applicable to those acting as citizens, their elected representatives or on behalf of administrations, parliaments or associations (*i.e.* lobby groups, interest groups, NGOs) within political processes of all stages of governance. On the other hand, according to Tsagarousianou (2009), e-Democracy encompasses three components: information provision, deliberation and participation in decision-making. The European Council “Recommendation CM/Rec (2009)1” further provided a comprehensive set of principles and guidelines on e-Democracy; among these is e-Participation, considered to comprise the sectors of e-Democracy where civil society and businesses are involved in drawing up formal and informal agendas, as well as in shaping and taking decisions.

## 2.4. E-PARTICIPATION CONCEPT

Heterogeneity is often stressed to characterise the e-Participation domain, described as a complex field involving several disciplines and employing a wide range of theories, concepts and methods (Kubicek, Lippa, & Westholm, 2007; Sæbø et al., 2008). Aichholzer (2007) identified thirty nine partner disciplines involved in e-Participation research. Conversely, Pietro-Martín (2012) claims that e-Participation should be a sub-domain of the Participation or Civic & Political Engagement fields, arguing that its interdisciplinary nature is not a problem restricted to e-Participation, but rather an issue that has affected the whole Participation domain for decades. It was precisely in a study within the Civic Engagement domain that Brodie *et al.* (2009, p. 4) identified three broad categories of participation, namely public, social<sup>12</sup> and individual<sup>13</sup>. In particular<sup>14</sup>, public participation (also referred to as political, civic or participatory governance) is described as the engagement of individuals with the various structures and institutions of democracy. For the International Association for Public Participation (IAP2), public participation means to involve in the decision-making process those affected by a decision, to promote sustainable decisions by providing participants with the information they need to be involved in a meaningful way, as well as to communicate to participants how their input affects the decision (IAP2, 2007a). The inherent

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<sup>12</sup> Social participation refers to collective activities that individuals may be involved in as part of their everyday lives, such as being a member of a trade union, volunteering, etc. (Brodie et al., 2009, p. 5).

<sup>13</sup> Individual participation, covers the choices and actions that individuals make as part of their daily life and that are statements of the kind of society they want to live in, such as choosing fair-trade goods, green energy, donating money to charities, etc. (Brodie et al., 2009, p. 5).

<sup>14</sup> Social and individual participation were kept out of scope of the research.

ideology is rooted in democratic values and, especially, in citizen-centric views (van Dijk, 2013) as Participatory Democracy and Deliberative Democracy (Maier-rabler & Huber, 2010; Milakovich, 2010).

An analysis of relevant literature (refer to Annex 8.1.5) confirmed that e-Participation is essentially the electronic version of public participation, embodying the above-mentioned principles. Following an extensive literature review, Rose and Sanford (2007) concluded that although there wasn't a precise definition of e-Participation, it could be operationally characterised as technology-facilitated citizen participation in (democratic) deliberation and decision-making. O'Donnell et al. (2007, p. 2) provided a slightly more detailed definition consisting in the efforts to broaden and deepen political participation by enabling citizens to connect with one another, civil servants and elected representatives using ICT. This definition encompasses the five-way information flow of representative democracy (OECD, 2004), including Citizen to Government (C2G) and its reverse (G2C), Citizen to Representative (C2R) and its reverse (R2C), and Citizen to Citizen (C2C). While mentioning the same stakeholders, Macintosh & White (Macintosh & Whyte, 2006) highlighted the participation driver by mentioning that e-Participation entails both top-down (*i.e.* government-led initiatives) and bottom-up (*i.e.* citizens, civil society-led initiatives) engagement. The process orientation is also denoted in several authors that often point out decision-making processes and democratic process (Lehtonen et al., 2007; Macintosh & Whyte, 2008; United Nations, 2014). Following the UN General Assembly Millennium Declaration, whereby member states reaffirmed their commitment towards more inclusive political processes, the allowance for genuine participation by all citizens and the right of the public to have access to information, the United Nations Department of Economic and Social Affairs (UNDESA) established a vision of e-Participation. The said vision emphasises its inherent democratic values by defining e-Participation as the process of engaging citizens, through ICT, in policy and decision-making in order to make public administration participatory, inclusive and deliberative for intrinsic and instrumental ends (UNDESA, 2014, p. 61). While there is no commonly accepted definition for e-Participation, all tend to mention ICT mediation between (1) the civil society sphere and the formal politics sphere and (2) between the civil society sphere and the administration sphere. Consequently, e-Participation is a wider concept than e-Democracy, as it deals with political issues in their broadest sense and with public service issues involving relationships between citizens and the State at large (van Dijk, 2013). In accordance to the previously described *ePOSM* scope (refer to Section 1.5), after analysing the collected definitions, it was decided to adopt the UNDESA (2014, p. 61) concept as it fully addresses the motivation of this research.

The United Nations (2005) claim that promoting citizens' participation is the cornerstone of socially inclusive governance, considering e-Participation to comprise both government programs to encourage citizen participation and citizens' willingness to do so. At the European level, the European Commission (2015) considers that e-Participation helps people engage in politics and policy-making, while making decision-making processes easier to understand. The OECD (2004, p. 33) defined three overarching reasons for improved citizen engagement in the policy-making process: (1) to produce better quality policy; (2) to build trust and gain acceptance of policy and (3) to share responsibility for policy-making. Therefore, at the institutional level, e-Participation results from a "participatory turn", which promises to spread politics into society by boosting the various modes of participation in the political process, across the entire policy cycle, as a counterstrategy to overcome

the democratic deficit (Beckert et al., 2008; Ekelin, 2007). This trend is, therefore, aligned with the aforementioned citizen-centric views of democracy (van Dijk, 2013), including Participatory Democracy, Deliberative Democracy or the combination of both.

## 2.5. E-PARTICIPATION TRENDS

Following the growth of social networking after the turn of the century, many official e-Participation platforms have been deployed. The participation spaces were typically administered by government agencies and were characterised by the provision of both extensive information on government activities, decisions, plans and policies, and of e-Survey, e-Voting and e-Consultation tools through which citizens could enter opinions on the issues at stake (Charalabidis & Loukis, 2010; Kokkinos, Koumoutsos, Doulamis, Varvarigos, & Petrantonakis, 2013). At the research level, the DEMO-net project and its derivative studies have identified emerging technologies considered important to the advancement of e-Participation (Efthimios Tambouris, Liotas, & Tarabanis, 2007; Wimmer, 2007; Wimmer et al., 2006), including collaborative environments, argumentation support systems, ontologies, web services, semantic web services, knowledge management and knowledge engineering. These research efforts and experiments have significantly contributed to the development of the e-Participation domain. Nonetheless, while the existent platforms were, to some extent, successful in engaging communities in political discussions, the majority failed to achieve widespread uptake (Charalabidis & Loukis, 2010; Kokkinos et al., 2013; Luehrs & Molinari, 2010). The analysis of these results suggested a number of reasons for such a limited outcome (Charalabidis & Loukis, 2010; Maizite & Cave, 2012), including the ones identified in Table 2.2.

Limitation	Description
<b>Standalone platforms</b>	In order to participate, it was necessary for citizens to move from their own online environments to the e-Participation platform and adapt to new structures, language and rules.
<b>Content</b>	The topics addressed were defined by government and often did not match the citizens' needs.
<b>Usability</b>	The adopted ICT were not sufficiently user-friendly and appropriate for wide citizens' participation.
<b>Citizens' diversity</b>	The target participants' heterogeneity in terms of educational level, ICT skills and culture made it difficult to create inclusive spaces.
<b>Scalability</b>	The restriction to specific target groups and the prevalence of methodologies conceived for Trials hindered scalability for large-scale e-Participation.

Table 2.2 – Limitations of e-Participation platforms. Adapted from Charalabidis & Loukis (2010) and Kokkinos et al. (2013).

The advent of Web 2.0<sup>15</sup> brought a combination of technologies, applications and values that offered the ability to create, publish and share content within a collaborative environment (refer to Table

<sup>15</sup> The term was initially used in 2004 and it consists in a generic designation for a renewal, or second generation of the internet in which user-generated content has a central place (de Kool & van Wamelen, 2008). Miller (2005) defined it as “the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources,

2.3). Initially used as a means for social communication, Web 2.0 was then adopted by the private sector (Constantinides, 2008, 2009; Malthouse, Haenlein, Skiera, Wege, & Zhang, 2013) and, lastly, by the public sector to support different areas, including public participation (Charalabidis, Loukis, Spiliotopoulou, & Diamantopoulou, 2013; Charalabidis & Loukis, 2010; Maizite & Cave, 2012; Osimo, 2008), aiming to overcome the aforementioned limitations.

<b>Web 2.0</b>	
<b>Values</b>	User as producer; Collective intelligence; Perpetual beta; Extreme ease of use.
<b>Applications</b>	Blog; Mashup; Microblogging; Multimedia sharing; RSS; Social Bookmarking Social tagging/Folksonomy; Social networks; Virtual World; Widgets; Wiki.
<b>Technologies</b>	Ajax; XML; Open API; Microformats; Flash/Flex

Table 2.3 – Web 2.0 operational description. Adapted from Chun (2010), O'Reilly (2007) and Osimo (2008).

Following an analysis of successful cases of Web 2.0 use in government, Mergel, Schweik and Fountain (2009) concluded that Web 2.0 technology might have stronger transformational effects on government than previous ICT, enabling changes at organisational, technological and informational levels. According to Linden (2012), in the age of social media interactivity and pervasiveness connectivity, citizens' act as co-producers playing the role of partners rather than customers. Envisioning the reshaping of the traditional citizens-government relationship through an enhanced interaction, a new approach is moving from hosting e-Participation exclusively in standalone platforms towards setting participation in electronic spaces that citizens and decision makers use in their daily lives (Charalabidis, Loukis, et al., 2013; Maizite & Cave, 2012; Serrano Ferreira & Pérez Ortega, 2013). In terms of technology, this approach requires the ability to concurrently publish/retrieve content to/from multiple social media (e.g. Blogger, Delicious, Digg, Facebook, Flickr, Foursquare, LinkedIn, Picasa, Twitter, Ustream or YouTube), taking advantage of mashup-based web applications – termed as widgets or gadgets – that can be deployed in different environments and tailored to the target users. Additionally, the Web 2.0 social media trend is to adhere to open Application Programming Interface (API) standards and to increasingly provide deeper functionality, thus spurring innovative developments from third-parties (Charalabidis, Loukis, et al., 2013; Charalabidis & Loukis, 2010).

The massive growth of wireless technology is also transforming e-Participation. New devices, such as smartphones or tablets, and ubiquitous online access offer new opportunities for citizens' participation facilitated by applications (apps) – small programs downloadable from application stores. The sub-area of e-Participation using mobile ICT is often referred to as *m-Participation* (Ertiö, 2013; Wimmer, Grimm, Jahn, & Hampe, 2013). Supported by tools that comprise mobile digital client device, mobile access to the Internet and service support of the related communication, m-Participation provides opportunities for overcoming the digital divide in terms of geography and uneven infrastructure (United Nations, 2013b; Wimmer et al., 2013). Therefore, the level of portability and readiness of this emerging trend can potentially leverage new types of engagement in

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including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an architecture of participation and going beyond the page metaphor of Web 1.0 to deliver rich user experiences”.

political decision-making. According to a recent report, smartphones represent the fastest growing segment of mobile devices and will reach a global penetration of 60% in 2019 (Ericson, 2013). The key distinguishing characteristics of smartphones that foster m-Participation are outlined in Table 2.4. However, concerns have also arisen regarding costs, privacy and data (Ertiö, 2013). Additionally m-Participation poses new technological challenges for existing e-Participation platforms that have to cope with a multi-channel approach (United Nations, 2013b).

Characteristic	Description
<b>Permanently carried</b>	Smartphones are persistently carried by users, which allows feedback in real time from any location.
<b>Readiness</b>	Smartphones' users tend to be permanently powered-on and connected, thus being available at the point of impulse.
<b>Participatory sensing</b>	Smartphones come equipped with sensors such as cameras, GPS, audio and voice recognition, thus enabling data collection.
<b>Social interaction</b>	Most user-generated content in the social networks is actually created via mobile devices.
<b>Widespread adoption</b>	Smartphone ownership has been increasing steadily and may exceed that of computers <sup>16</sup> .
<b>Apps distribution</b>	Apps' distribution to users takes place through app stores and is usually free of charge or at a minimal cost.

Table 2.4 – Smartphones characteristics that favour m-Participation. Adapted from Ertiö (2013) and Molinari (2010).

Nowadays, public organisations produce and collect a wealth of different types of data that can be used to significantly boost transparency. Social movements<sup>17</sup> claim increased openness of information, documents and datasets held by public bodies so that society can benefit from the inherent social and economic value of information generated and collected with public funds (Ubaldi, 2013). The term Open Government Data (OGD) became popular in 2008 after the publication of a set of open government data principles in the United States (refer to Table 2.5). OGD aggregates Government Data and Open Data. Government Data refers to data and information produced or commissioned by public bodies (e.g. demographic datasets, geographical data, maps, plans, environmental data, materials of parliaments, ministries and authorities), while Open Data essentially means data free for anyone to use, re-use and re-distribute (Open Knowledge Foundation, 2012). Consequently, OGD refers to stored data of the public sector that could be made accessible by Government in the public interest, without any restrictions for use and distribution (Geiger & Lucke, 2012). Following this trend and regardless of differences in interpretations, focus and theoretical approaches (Sandoval-almazán, 2011), governments worldwide implement OGD initiatives. From an e-Participation standpoint, OGD brings opportunities for a more socially inclusive service delivery, increased informed decision-making, greater service innovation, enhanced transparency and

<sup>16</sup> "There is continued strong momentum for smartphone uptake in all regions. Around 50 percent of all mobile phones sold in Q1 2013 were smartphones" (Ericson, 2013, p. 5)

<sup>17</sup> Examples: Open Government Data (<http://opengovdata.org/>, accessed in 2015-07-06), Right to Information (<http://righttoinformation.info/>, accessed in 2015-07-06), Open Institute (<http://openinstitute.com/>, accessed in 2015-07-06), Open Data Foundation (<http://www.opendatafoundation.org/>, accessed in 2015-07-06) and Open Knowledge Foundation (<http://okfn.org/>, accessed in 2015-07-06).

improved political and social collaboration (Geiger & Lucke, 2012; United Nations, 2013b). Notwithstanding, e-Participation also brings up the challenges of data quality, accuracy, protection and privacy. Further to this, the shift towards a data-driven socio-economic model, in which data is a core asset, leads to the notion of Big Data<sup>18</sup>, referring to “high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision-making” (Gartner, 2013). From a technological perspective, new technology and, in particular, the fast rise of open source technologies such as Hadoop<sup>19</sup> and other NoSQL<sup>20</sup> ways of storing and manipulating data (Elliott, 2013), accommodated the demanding requirements in terms of volume, velocity and variety.

Principle	Description
<b>Complete</b>	All public data is made available. Public data is data that is not subject to valid privacy, security or privilege limitations.
<b>Primary</b>	Data is as collected at the source, with the highest possible level of granularity, not in aggregate or modified forms.
<b>Timely</b>	Data is made available as quickly as necessary to preserve the value of the data.
<b>Accessible</b>	Data is available to the widest range of users for the widest range of purposes.
<b>Machine processable</b>	Data is reasonably structured to allow automated processing.
<b>Non-discriminatory</b>	Data is available to anyone, with no registration requirement.
<b>Non-proprietary</b>	Data is available in a format over which no entity has exclusive control.
<b>License-free</b>	Data is not subject to any copyright, patent, trademark or trade secret regulation.

Table 2.5 – Principles of Open Government Data. Adapted from the Open Government Working Group (2007).

In addition to OGD, recent studies (Millard, 2013; Tallan, 2012) introduced the concept of Open Governance Framework (refer to Figure 2.1), which considers that a broader framework that not only integrates government parts but also other relevant actors is necessary to create public value. In particular, open engagement and participation are considered important pillars of the Open Governance Framework. These include co-creation through ICT in several areas of interest, such as the public policy-making that is part of the overall democratic process (Millard, 2013). Furthermore, recent research proposes new forms of passive crowd-sourcing in the social media, namely through the retrieval and sophisticated processing of the public policies’ content that is created freely by citizens in Web 2.0 sources (e.g. political blogs, Facebook and Twitter) and without any direct encouragement by the government (Charalabidis, Karkaletsis, Triantafillou, Androutsopoulou, & Loukis, 2013).

<sup>18</sup> Big data features include digital generation (as opposed to being digitized manually), passive production (as a product of our daily lives), automatic collection (by a system), geographic or temporal traceability and continuous analysis (United Nations, 2013a).

<sup>19</sup> <http://hadoop.apache.org/> (accessed in 2015-07-06)

<sup>20</sup> <http://nosql-database.org/> (accessed in 2015-07-06)

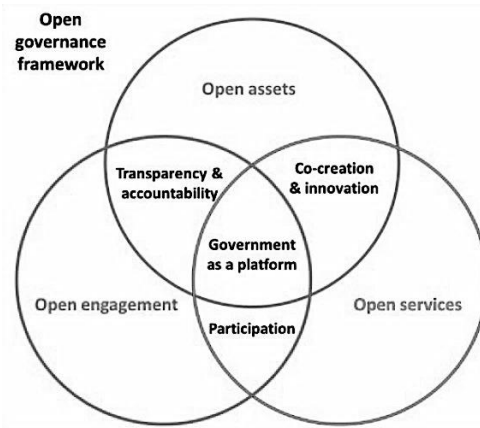


Figure 2.1 – Open Governance Framework. Reprinted from “ICT-enabled Public Sector Innovation: Trends and Prospects”, by J. Millard, 2013, *ICEGOV '13 – 7th International Conference on Theory and Practice of Electronic Governance*, p. 78. Copyright 2013 by J. Millard.

Alongside government-driven initiatives, ICT is also changing the ways activists communicate, collaborate and demonstrate. According to della Porta (2013, p. 99), social movements’ activism is vital for “counterdemocracy”, as it allows, not only the control of government, but also the improvement of participation and deliberation chances. Research on social movements’ media (della Porta, 2013) stresses their capacity to spread alternative information and, following fieldwork on the Spanish *Indignados* (or 15M) movement, Postill (2013, p. 51) termed this period of protest an “age of viral reality”. According to Postill, the list of media that made this movement go viral includes tools as Web forums, blogs, collaborative documents, video clips, live streaming, citizens’ photography, aggregator websites, Facebook and Twitter.

Acknowledging the importance of these areas, UNDESA considered OGD, social media and mobility and wireless technology as the most representative technological trends in e-Participation, complementing the traditional One Stop Shop portals (United Nations, 2013b).

## 2.6. BUSINESS PROCESS MANAGEMENT

Over the last decade BPM has gained broad acceptance as a foundation for a holistic management philosophy and practice through the analysis of business processes all the way to the roots of an organisation (Suhendra & Oswari, 2011; Weske, 2007). The definition of BPM can be incrementally elaborated in three steps, comprising the notions of Process, Business Process and, finally, BPM. According to Davenport (1993), a process consists on a structured, measured set of activities designed to produce a specified output for a particular customer or market, with a strong emphasis on how work is done within an organisation. Processes are triggered by events and have outcomes that may result either in the conclusion of the process or in a handoff to other processes. The Association of Business Process Management Professionals International (ABPMP) considers that the term Business refers to individuals interacting together to deliver value to customers and a return on investment to the stakeholders. It is worth mentioning that, in the context of BPM, the term Business refers to all types of for-profit, not-for-profit and government organisations (ABPMP, 2009). The term Business Process introduces the notion of coordinated activities to achieve a business goal (Weske, 2007), thus merging the two previous concepts. It can be defined as a set of end-to-end activities aiming to deliver value to customers. Two relevant characteristics emerge from this definition, as



highlighted by Davenport & Short (1990): (1) Business processes have customers, either internal or external to the Organisation, who are the recipients of the business outcome; (2) Processes cross the organisational boundaries across or among organisational units.

The BPM acronym has been used loosely, depending on the context, including definitions that range from ICT-centred views to BPM as a holistic management practice (ABPMP, 2009; Suhendra & Oswari, 2011). ICT-centred views define BPM from the perspective of business process automation (Harmon, 2003) and highlight the services and tools that support workflows under performance constraints (Sinur & Bell, 2003). According to TIBCO Software (TIBCO, 2003) a BPM technology is a framework of applications that effectively tracks and orchestrates business process. The current concept of BPM has been referred to as the third wave of process management (H. Smith & Fingar, 2003), after the first wave initiated by Taylor's theories on scientific management from the 1920s, focused in process standardisation, and the second wave targeting business process automation in the 1990s. Nowadays, the prevalent concept of BPM that underpinned this research is primarily management-oriented. Following this trend, ABPMP defines BPM as a disciplined approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated Business Processes to achieve consistent, targeted results aligned with an Organisation's strategic goals (ABPMP, 2009). Furthermore, the way BPM is perceived is evolving. Recent trends (Oracle Corporation, 2013; Ovum, 2013) include cloud, mobility and Social BPM. The latter is of particular relevance for the scope of this research. The social extension of BPM seeks to optimise processes by enhancing the collaboration among stakeholders through Web 2.0 and the social media. The motivations for creating socially enabled processes include discovering and exploiting informal knowledge, enhancing transparency in decision-making, leveraging participation through the engagement of a broader community to provide awareness on the process outcome, and eliciting opinions that contribute to making a decision (Brambilla et al., 2012).

The practice of BPM as a management approach relies on a continuous lifecycle of iterative activities. A wealth of BPM lifecycles have been proposed in the literature (de Moraes, Kazan, de Pádua, & Costa, 2014; Malinova, Hribar, & Mendling, 2014). Benedict et al. (2009) defines a BPM lifecycle based on generally accepted phases encompassing (1) Planning; (2) Analysis; (3) Design and Modelling; (4) Implementation; (5) Monitoring and Control; and (6) Refinement. The Planning phase consists in developing a process-driven strategy and plan for the organisation towards the desired goals. The Analysis phase operationalises methodologies intended to understand the organisational processes in light of the defined goals. The Design and Modelling phase includes the identification of the "as-is" processes, as well as the specification and representation of the "to-be" processes. The Implementation phase corresponds to the execution of the modelled processes. The Monitoring and Control phase includes the processes' execution tracking and performance assessment. Finally, the Refinement phase is an added-value activity that optimises the implemented processes considering the performance achieved.

Following the process management mainstreaming in the private sector during the 1990s (Zwicker, Fettke, & Loos, 2010), several publications on this concept in the context of the public sector began to appear at the turn of the century. These addressed challenges related to efficiency, cost-saving and flexibility to both satisfy emerging requirements and improve the services delivered to citizens (Hawrysz & Hys, 2013; TIBCO, 2010; Weerakkody, Baire, & Choudrie, 2006). However, much of the

process management literature is focused on private sector organisations, including the inherent assumptions of profit-driven, tangible deliverables and well-defined customer groups. As a result, it may be problematic to simply transpose the private sector experience to the public sector. In fact, studies on the implementation of BPM initiatives in the public sector suggest that key differences between the public and private sectors should be considered, including public interest, accountability, political sensitivity, whole-of-government ecosystem, budget cycle complexity, information exchange, regulating society, readiness for change, organisational structure and culture (Tregear & Jenkins, 2007; Zwicker et al., 2010). Hence, these differences are applicable to e-Participation (Hawrysz & Hys, 2013) and of the utmost importance to identify and structure the business functions required to manage it. Recognising the paramount relevance of process modelling and process reorganisation in e-Government, Palkovits and Wimmer (2003) advocate the need of a BPM methodology and toolkit tailored to the public sector. This study introduces a holistic framework for modelling and managing e-Government applications and was subsequently addressed within the e-Participation context (Kubicek et al., 2007). However, references to BPM in e-Participation literature are scarce and it was not possible to identify use cases or actual experiments adopting a BPM-based approach to manage e-Participation.

## **2.7. SEMANTIC BUSINESS PROCESS MANAGEMENT**

Currently, an intensified globalisation requires an outstanding level of readiness to adapt to new situations and, therefore, Organisations are forced to apply flexible processes. BPM encompasses methods, techniques and tools aiming to support modelling, implementation, execution and analysis of business processes and enacts the automation of processes' choreography and orchestration (Weske, 2007), thus contributing to reduce human error and miscommunication. Additional benefits emerge when BPM is complemented with Service Oriented Architecture (SOA), which promotes flexible Information Technology (IT) architectures able to seamlessly accommodate changing business directions, goals and processes driven by BPM. Nevertheless, while the BPM & SOA offer a solid support for managing business processes, this approach does not allow the management of transitions throughout the BPM lifecycle, such as modelling to implementation (Filipowska, Hepp, Kaczmarek, & Markovic, 2009; Wetzstein et al., 2007). Hepp et al. (2005) advocated that the degree of automation in the BPM lifecycle is limited, thus creating inertia in the necessary evolution and dynamics of business processes, since it does not provide a unified view of the business process space<sup>21</sup> of an organisation due to the lack of machine accessible semantics. In particular, the origin of this weakness is two-fold: the terminology is not formalised and the dynamic semantics of the process model is not formally defined (Lautenbacher, Bauer, & Seitz, 2008). Business process models describe the structure and flow of tasks on a highly abstract level. There are several notations for modelling business processes, covering different aspects of a business process, such as the functional, behavioural, informational, organisational and operational perspectives (Jablonski & Bussler, 1996). These include BPMN<sup>22</sup> for workflow representation, EPC<sup>23</sup> for event-driven process

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<sup>21</sup> "Business process space is a place where all facts associated with intra- and inter-organisation business processes are stored and maintained" (Kim & Suh, 2011).

<sup>22</sup> Business Process Model and Notation (BPMN) was originally developed by the Business Process Management Initiative (BPMI) and is currently maintained by the Object Management Group (OMG). BPMN provides a standard graphical representation for specifying business processes in a business process model (OMG, 2011).

chains, UML for activity diagrams, Petri<sup>24</sup> nets and others. However, the automated processing and querying of such models is hampered by the ambiguous terminology used in names of process actions, business functions, actors' roles, organisation units, etc. (Lautenbacher et al., 2008), which is especially problematic when combining processes from different organisations or departments (Thomas & Fellmann, 2007). These ontological limitations eventually gave rise to Semantic Business Process Management (SBPM), introduced by Hepp et al. (2005) to bridge the gap between Business and IT spheres towards an increased automation of the BPM lifecycle through the combined use of BPM technology with semantic Web services technology<sup>25</sup>.

Semantic Web techniques include ontology languages and reasoners to automate the discovery, exchange and reuse of business processes (Liu, Le Calvé, Cretton, Evéquo, & Mugellini, 2013). In recent years, Ontology Engineering has been established for semantically enriched formalisation of knowledge, being widely used as a means for conceptually structuring domains of interest. The term Ontology<sup>26</sup> was taken from the branch of philosophy that investigates and explains the nature and essential properties and relationships of all beings (Wand & Weber, 1993). Likewise, the Ontology concept transposed to Computer Science consists in the formal and explicit specification of a shared conceptualisation (Studer, Benjamins, & Fensel, 1998). Hence, this widely accepted definition entails four fundamental properties. Firstly, *conceptualisation* refers to an abstract model containing the relevant concepts of a given phenomenon and the relationships between them. Secondly, *explicit* means that the type of concepts used and the constraints on their use are explicitly defined. Thirdly, *formal* refers to the fact that the Ontology should be machine-understandable. Finally, *shared* reflects that an Ontology captures consensual knowledge. Ontologies can serve multiple purposes (Mizoguchi, Vanwelkenhuysen, & Ikeda, 1995; Obitko, 2001; Perez & Benjamins, 1999; Uschold & Gruninger, 1996) including that of organisational modelling by means of Organisational Ontologies representing static and dynamic aspects of an enterprise structure, operations and value chain. Several relevant initiatives have emerged in this context, such as the TOVE (Fox, 1992), REA (Geerts & McCarthy, 2002), e3-value (Gordijn, 2002), Enterprise Ontology (Dietz, 2006) and SUPER (Yan, Cimpian, Mazzara, & Zaremba, 2007), aiming at improving collaboration among computer systems, among people and between computers and people towards the creation of value.

According to Filipowska et al. (2009) the semantic process representation required by the SBPM stack comprises three main layers, namely Process, Organisational and Domain-specific ontologies, as represented in Figure 2.2. Process Ontologies capture the control flow of business processes (Yan et al., 2007). Domain Ontologies express conceptualisations of a specific domain and the

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<sup>23</sup> Event-driven Process Chain (EPC) is a method developed by Keller et al. (1992) within the framework of Architecture of Integrated Information System (ARIS) to model business processes that can be used to configure Enterprise Resource Planning (ERP) systems (Mendling & Nüttgens, 2006).

<sup>24</sup> Mathematical modelling language introduced by Carl Adam Petri to represent distributed systems, consisting in directed bipartite graphs with two node types – called places – and transitions connected via directed arcs (der Aalst, 1995).

<sup>25</sup> "The semantic web services are semantic extensions of web services and procedure oriented extensions of the semantic web. The semantic web services turn the programming interface oriented description of web services into meaning oriented description which supports the automatic discovery, composition, invocation and interoperation of services." (Varga & Sztaki, 2005)

<sup>26</sup> Rooted in the Greek terms for being – *Ontos* – and study – *Logos*.

relationships between them, including activities that take place and governing theories (Perez & Benjamins, 1999; Roussey, 2005; van Heijst, Schreiber, & Wielinga, 1997). In the context of SBPM, Domain Ontologies provide additional information from a given domain, specific to an organisation (Filipowska, Hepp, et al., 2009). Finally, on the one hand, Organisational Ontologies provide a basic vocabulary and structure for describing organisations, including business goals, resources, business units, roles and tasks; on the other hand, they define common types of business resources (M. Hepp & Roman, 2007). Therefore, Organisation Ontologies capture concepts and constraints describing the environment in which processes are carried out from the organisation standpoint.

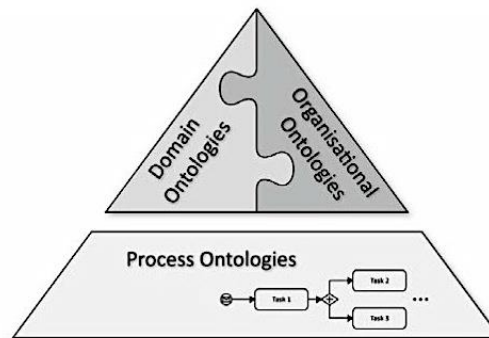


Figure 2.2 – SBPM Ontology Stack. Reprinted from "Organisational ontologies to support semantic business process management", by A. Filipowska et al., 2009, *Proceedings of the 4th International Workshop on Semantic Business Process Management – SBPM '09*, p. 39. Copyright 2009 by ACM.

Following the developments made within the SUPER project (Janusch et al., 2008), Filipowska et al. (2009; 2007) proposes an Organisational Ontology logically broken-down into the six sub-ontologies described in Table 2.6.

Organisational sub-ontology	Description
<b>Organisational Structure Ontology (OSO)</b>	Captures the organisational structure (hierarchy) of a company. It is designed as a domain-independent upper-level ontology providing the main structure and relations.
<b>Organisational Units Ontology (OUO)</b>	Captures the specification of the typical units that may be found in a company.
<b>Business Roles Ontology (BRO)</b>	Captures a common understanding of concepts related to multiple roles featured by the organisational members ( <i>i.e.</i> actors).
<b>Business Functions Ontology (BFO)</b>	Captures the hierarchy of different functions that may be carried out within the company. It is designed as a domain-independent ontology.
<b>Business Resources Ontology (BReO)</b>	Captures the resources spent when carrying out certain processes or that may be the result of a certain task in a process.
<b>Business Strategy Ontology (BSO)</b>	Captures general strategy and goals-related concepts, modelling strategic alignment factors such as desired market and its sector, strategy and objectives.

Table 2.6 – Organisational Ontology stack. Adapted from Filipowska et al. (2009; 2007) and Janusch et al. (2008).

## 2.8. E-PARTICIPATION ONTOLOGIES

Given the manifold semantic differences related to laws, regulations, citizen services and administrative processes, the increasing amount and complexity of information that results from e-Government poses significant challenges to interoperability among public institutions (Liu et al., 2013). Semantic technologies, especially those related to the semantic Web and ontologies, have proved useful to many government-related applications in coping with these problems (Fonou-Dombeu & Huisman, 2011).

In the last decade several research and innovation projects have been promoted by governments in order to put e-Participation principles into practice (European Commission, 2015; van Dijk, 2010), resulting in several reference models for e-Participation. The work of Rose and Sanford (2007) and Sæbø et al. (2008) contributed to shape the e-Participation research agenda, by conducting an exhaustive literature analysis to systematically identify reference disciplines, research motivations, research areas and related technologies. Phang and Kankanhalli (2008) proposed a framework to assist e-Participation designers in choosing appropriate ICT tools according to the participation objectives. Acknowledging the importance of a careful planning of citizen participation and of its integration into the policy-making process, Scherer and Wimmer (2011a, 2011b, 2012) proposed a reference framework for the development and implementation of e-Participation projects supported by Enterprise Application Frameworks, such as TOGAF<sup>27</sup> and Zachman<sup>28</sup>. Motivated by the interdisciplinary expertise and knowledge that e-Participation requires, as well as by the lack of widely accepted models and technological standards, Paganelli et al. (2013) proposed a reference model and a Web-based framework for e-Participation services design. Their goal is to support public bodies in the conception, design and carrying out of participation processes by means of web-based information and communication services.

In terms of ontologies, it was not possible to identify mature and commonly accepted e-Participation reference ontologies. Macintosh (2004) recognised the need of understanding e-Participation projects in order to better identify types of citizen participation exercises and the appropriate supporting technology, thus providing an analytical framework for electronic participation. Within the scope of the DEMO-net project co-funded by the European Commission 6<sup>th</sup> Framework Program, Wimmer (2007) introduced an e-Participation ontology resulting from the project findings. Kalampokis et al. (2008) argued the e-Participation frameworks have been developed to address specific purposes and that, consequently, a domain model was necessary to formalise the relationships among the organisational and social aspects of the participation process using with ICT tools. Slaviero et al. (2011) proposed a domain ontology to help select and provide appropriate ICT for deploying e-Participation. Lastly, Porwol et al. (2014) introduced a domain ontology providing a conceptualisation and corresponding formal ontology for e-Participation, covering the democratic process, initiative and the sociotechnical system. A comparative analysis of the e-Participation

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<sup>27</sup> The Open Group Architecture Framework (TOGAF) describes a detailed method and a set of supporting best practices for designing, planning, implementing and governing an enterprise information technology architecture (Josey, 2011).

<sup>28</sup> Enterprise Architecture concept published in 1987 by John Zachman, describing a collection of perspectives pertinent to systems' development and enterprise engineering in order to relate computer systems to the business world (O'Rourke, Fishman, & Selkow, 2003; Zachman, 2012).

related concepts covered by these works, including ontologies, domain models and frameworks, is available in Annex 8.2. According to this analysis, while these models provide a comprehensive conceptualisation of the e-Participation domain, covering the social, technical and democracy perspectives, they lack the organisational perspective that is the cornerstone to sustain e-Participation.

## **2.9. SECTION SUMMARY**

The literature review provided relevant inputs for the *ePOSM* development. The analysis of Democracy models revealed general principles rooted in the values of participative democracy that should be considered while implementing e-Participation, especially for the definition of goals and strategy. The analysis of its context provided an understanding of e-Participation within the wider context of the e-Governance, e-Government and e-Democracy areas, as well as of their blurred boundaries, which stressed the importance of processes' interoperability to sustain e-Participation practice. The study of the e-Participation concept allowed the narrowing down of the research area to public participation, as well as the adoption of a specific concept.

Following the theoretical grounding that resulted from the initial sections of the literature review, the analysis of e-Participation state-of-the-art captured current managerial and technological trends such as Open Governance, social media, mobility and wireless technology, providing insights concerning their impact on e-Participation.

Notwithstanding a few references to BPM having been found in the collected e-Participation literature, it was not possible to identify any use cases of an effective BPM management approach applied to e-Participation. Nevertheless, the literature review did provide encouraging leads – based on BPM cases of adoption in e-Government – to the suitability of the present research proposal. Additionally, it revealed important influencing factors specific to the public sector. Lastly, the analysis of SBPM and existing e-Participation ontologies demonstrated the significance of the present study, due to the innovative proposal to introduce a semantic BPM-driven approach to e-Participation practice.

### 3. METHODOLOGY

#### 3.1. INTRODUCTION

The eclectic nature of the dissertation core subject, involving the transformation of traditional citizens' participation forms into ICT-aided processes, brings together several disciplines. As it is typical of emergent research areas, e-Participation lacks its own well-developed theories and depends on adapting methodologies from its parent disciplines (Sæbø et al., 2008). Hence, a thorough study of suitable research approaches was conducted. This section presents the results of this study, including the research methodology eventually adopted and the underlying rationale. It comprises the subsections Research Design (Section 3.2), Target Outputs (Section 3.3) and Ethical Considerations (Section 3.4). Additionally, this section provides a summary of the conceived methodology (Section 3.5).

#### 3.2. RESEARCH DESIGN

The approach adopted to design the research was derived from the generic Research Onion process (Saunders, Lewis, & Thornhill, 2003), which comprises several outer layers, acting as design elements, that need to be "peeled away" in order to guide the research design towards its core, namely the collection and analysis of data (refer to Figure 3.1). In particular, the layers include Philosophy Approaches; Choices; Strategies; Time horizons and Data Collection Methods. The following sections describe how these layers were considered and applied to the present research.

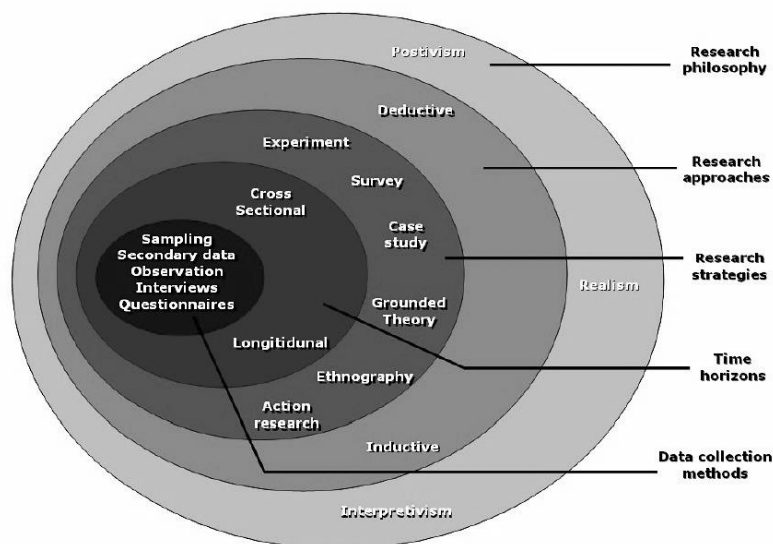


Figure 3.1 – Research Onion. Reprinted from *Research methods for business students* (p. 83), by M. Saunders and P. Lewis and A. Thornhill, 2003, Harlow FT Prentice Hall. Copyright 2003 by M. Saunders, P. Lewis and Adrian Thornhill.

### 3.2.1. Research Philosophy

The outermost layer of the Saunders's Research Onion (Saunders et al., 2003) addresses the research philosophical grounding. The research philosophy can be defined as the development of the research background, research knowledge and its nature (Saunders et al., 2003) and it is based on a paradigm. The research paradigm consists in the broad framework, comprising the perception, beliefs and understanding of several theories and practices that are used to conduct a research (L. Cohen, Manion, & Morrison, 2007). Research encompasses creative work undertaken on a systematic basis in order to increase the stock of knowledge (OECD, 2002b). Knowledge is obtained through the articulation between appropriate philosophical assumptions about the techniques used and the researcher's perspective. These techniques include: (1) ontology<sup>29</sup>; (2) epistemology<sup>30</sup>; (3) axiology<sup>31</sup>, (4) methodology<sup>32</sup> (Creswell, 2003; Crotty, 1998; Easterby-Smith, Thorpe, & Lowe, 2001). Research makes assertions on the nature of the addressed reality (ontology), how it is known (epistemology), what values it holds (axiology) and what are the processes to obtain knowledge (methodology).

The two foremost contrasting research paradigms advocated in the literature that were relevant for this study are Positivism/Post-positivism and Interpretivism/Constructivism (Creswell, 2003; N. Denzin & Lincoln, 2000; Easterby-Smith et al., 2001; Falconer & Mackay, 1999; Probert, 1999; Stephen & Athena, 1999). The Positivist/Post-positivist paradigm relies on the empiricist approach, based on the assumption that social worlds are analogous to the natural world and consequently can be studied using akin principles (Gregg, 2001). It derives from natural science and is characterised by the testing of hypothesis developed from existing theory through the measurement of observable social realities (Flowers, 2006). This paradigm can be applied to isolated phenomena, includes repeatable observations and often involves manipulation of reality. According to this paradigm, research is not influenced by the researcher's values. Alternatively, the Interpretive/Constructivist paradigm advocates that knowledge is socially constructed by the people participating in the research process, thus reflecting the values of the researchers (Mertens, 1998; Schwandt, 1994). Unlike with Positivism, phenomena are studied in their natural environment, the paradigm assumes that the research is value-bound and admits that there might be several interpretations of reality. Again, as opposed to Positivism/Post-positivism, the Interpretive/Constructivist paradigm is concerned with gathering rich insights into subjective meanings rather than with providing law-like generalisations (Saunders & Tosey, 2012). Notwithstanding, it maintains that these interpretations are part of the scientific knowledge being pursued.

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<sup>29</sup> Ontology refers to the branch of philosophy concerned with articulating the nature and structure of the world (Wand & Weber, 1993).

<sup>30</sup> Epistemology, also referred to as theory of knowledge, is the branch of philosophy that is concerned with the nature of human knowledge and with understanding that can possibly be acquired through different types of inquiry and alternative methods of investigation (Hirschheim, Klein, & Lyytinen, 1995).

<sup>31</sup> Axiology, also referred to as theory of value, is the branch of philosophy that considers the nature of value and what kinds of things have value (Arneson, 2009).

<sup>32</sup> Methodology refers to the systematic theoretical analysis of the methods applied to a field of study (Ishak & Alias, 2005).



Although these paradigms provide a good basis for Information Systems' (IS) research, system development is typically not the main focus. In fact the Positivist/Post-positivist research often assume that technology is a variable that is either present or absent, whereas the Interpretive/Constructivist paradigm usually studies the effect of introducing or using ICT in an organisation. Consequently, these paradigms do not address the creation of unique knowledge associated with the development of IS, from their conception to inception (Gregg, 2001). Accordingly, the development of a conceptual model for e-Participation claimed a third option, able to mitigate this limitation by interconnecting the aforementioned paradigms.

The Design Science Research (DSR) paradigm has its roots in Simon's (1996) influential work on sciences of the artificial which has gained significant importance in the IS domain, complementing the Positivist/Post-positivist and Interpretive/Constructivist perspectives. Moreover, DSR seeks to create descriptive and prescriptive knowledge concerning the artificially constructed reality in the interrelation between the social and technological sub-systems (Kopenhagen, Gass, Müller, & Maedche, 2012). It is essentially a problem-solving paradigm and, therefore, rather than producing general theory, DSR aims to achieve knowledge through the building and application of the artefacts (Hevner, March, Park, & Ram, 2004). In this context, an artefact is something that is artificial, constructed by humans (Hevner & Chatterjee, 2010), fundamentally new (*e.g.* new modelling concept, new method, new programming language) and potentially applicable to a specific domain. Following the above-mentioned considerations, the philosophical assumptions underlying DSR were presented by Gregg (2001) as intrinsically interdependent of both Positivist and Interpretive paradigms, as described in Table 3.1.

Philosophical Assumption	Paradigm		
	Positivism	Interpretivism	Design Science Research
<b>Ontology</b>	Single reality; Knowable; Probabilistic.	Multiple realities; Socially constructed.	Multiple, contextually situated realities; Socio-technically enabled.
<b>Epistemology</b>	Objective; Researcher-independent	Subjective; Researcher-dependent.	Objectively constructed within a context.
<b>Axiology</b>	Truth; Universal.	Understanding; Situated and descriptive.	Control; Creation; Improvement; Understanding.
<b>Methodology</b>	Primarily quantitative.	Primarily qualitative.	Primarily developmental.

Table 3.1 – Matrix of philosophical assumptions. Adapted from Gregg (2001) Creswell (2003), Dawson (2002), Yin (2009) and Vaishnavi (2004).

Considering the research objective previously defined (refer to Section 0), the following philosophical grounding was assumed:

- Ontologically, the nature of e-Participation involves multiple social and technologically constructed realities.

- Epistemologically, the conceptual model is constructed upon objective information and the created knowledge should interactively evolve based on the results of its application in the target context.
- Axiologically, the creation of the concept model aims to deliver an artefact for a specific domain (Participative Democracy) towards the improvement of current practice (sustainability of e-Participation), thus contributing to the enhancement of the body of knowledge.
- Methodologically, knowledge is derived through a structured development process, starting from the concept and design, and all the way through the system's formal description and basis for its implementation.

Furthermore, according to Hevner (2004), the nature of the typical problems addressed by DSR entails the following characteristics:

- Unstable requirements and constraints based upon imprecise environmental contexts.
- Complex interactions among sub-components of the problem.
- Inherent flexibility to change design processes as well as to design artefacts.
- Critical dependence on both human cognitive and social abilities to produce effective solutions.

As these characteristics are inherent to e-Participation, the DSR paradigm was adopted to underpin the research work as it is further explored in the following sections.

### 3.2.2. Research Approach

The second outermost layer of Saunders's Research Onion (2003) refers to the research approach, namely deductive and/or inductive reasoning. Deductive research processes aims to derive knowledge from theory, relying on an experimental design approach that mainly involves the collection of quantitative data. Therefore, this is the dominant approach in the Positivist paradigm and is suitable for the generalisation of the artefact (Saunders et al., 2003). Alternatively, inductive research is essentially theory-building rather than theory-testing. It begins with the study of a situation and then seeks broader generalisations and theories. Consequently, the inductive approach is mostly associated with the Interpretative paradigm. In addition to these reasoning processes, abduction is the logic used to derive technical or social scientific descriptions from the everyday activities, languages and concepts used by social actors (Lewis-Beck, Bryman, & Liao, 2004).

DSR combines different research approaches. In particular, the reasoning that occurs in a design cycle mainly comprises abduction and deduction, as represented in Figure 3.2. The DSR process starts with the *Awareness* of the real-world problem, acknowledging that it can be solved through an artefact. The output of this step is a proposal for a research. *Awareness* is followed by a conceptual stage, *Suggestion*, in which the prior attempted solutions and/or knowledge and technology are reviewed in order to suggest a novel tentative configuration based on new or existent elements. The output is a *Tentative Design* that should be abductively grounded on the existing knowledge base for the identified problem. Subsequently, the idea is refined in the *Development* step, through a context specific implementation of the tentative solution. The output of this step is an artefact. The artefact is then deductively assessed in the *Evaluation* step, according to the specification that supported the

suggestion. During this step it is checked whether the artefact effectively resolves the problem by tackling its strengths and weaknesses. Finally, the *Conclusion* step sets out the end of the research project. This step comprises the compilation of results, the solution relevance evaluation and the identification of open issues and ideas for further research.

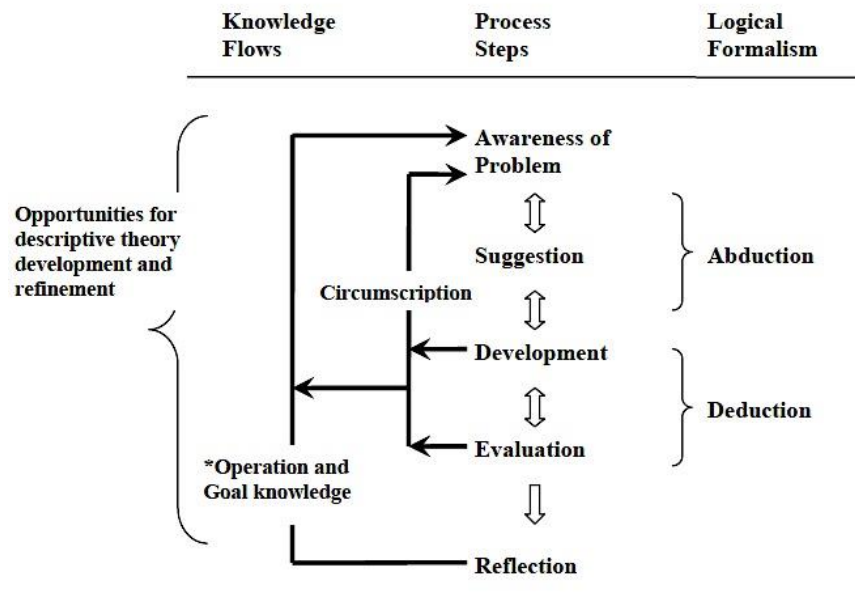


Figure 3.2 – DSR methodology and reasoning. Reprinted from "Promoting Relevance in IS Research: An Informing System for Design Science Research", by B. Kuechler and V. Vaishnavi, 2011, *Informing Science – the International Journal of an Emerging Transdiscipline*, 14, p.130. Copyright 2011 by the Informing Science Institute.

According to Ahmad et al. (2012) the adoption of ontology engineering to provide a novel solution for a given problem fulfils the key characteristics of DSR. There is a plethora of methodologies for ontology development (Iqbal, Azrifah, Murad, Mustapha, & Sharef, 2013; Perez & Benjamins, 1999; Roussey, 2005), including reusing existing ones or building new ones from scratch, and ranging from manual to semi-automatic or automatic approaches, depending on the domain and purpose. Regardless of the specificities of each methodology, there is a common set of steps that comprise Ontology specification, knowledge acquisition, conceptualisation, formalisation, evaluation and documentation. From the analysed approaches, the METHONTOLOGY framework (Fernández-López, Gómez-Pérez, & Juristo, 1997) was considered appropriate for the purpose of this research. Fernández-López et al. (Fernández-López et al., 1997) criticise the waterfall and incremental methodologies, proposing an evolving prototype approach in which the ontologist can add, remove or modify concepts at any time in the process, keeping the reusability principle in focus. This framework encompasses development-oriented activities assisted by support-oriented activities. The latter are performed concurrently to the former and are essential to the ontology building. The development-oriented activities comprise specification, conceptualisation, formalisation, integration, implementation and maintenance. The support-oriented activities consist of knowledge acquisition, documentation and evaluation. Furthermore, acknowledging the engineering nature of development, the framework considers the role of planning activities. Inspired by the

METHONTOLOGY principles, the *ePOSM* Research Framework is represented in Figure 3.3, assembling six interrelated building blocks.

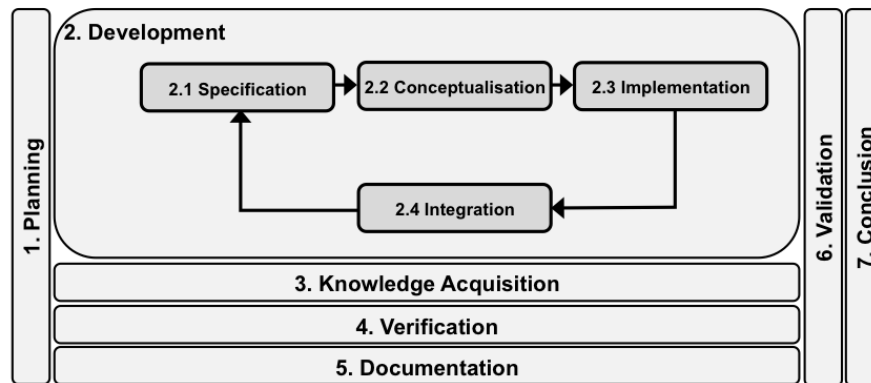


Figure 3.3 – *ePOSM* Research Framework.

The *Planning* building block refers to the activities carried out to define the work breakdown structure, schedule the research tasks, select the development tools supporting the research and select productivity tools to ensure the efficiency of the research work. The *Development* building block consists in an iterative cycle that was continually executed until the *Verification* completion, including the phases *Specification*, *Conceptualisation*, *Implementation* and *Integration*. The purpose of the *Specification* phase is to prepare a specification document outlining a collection of requirements that the ontology should fulfil, including reasons to build the ontology, intended use, target group, level of formality and scope. The *Conceptualisation* phase corresponds to the core development process conducted to identify concepts, relationships and properties using an informal representation. The *Implementation* phase includes the implementation of the ontology in a formal representation. The *Integration* phase refers to the activities carried out to reuse existent ontologies, including meta-ontologies and others (Fernández-López et al., 1997). Three building blocks and corresponding activities took place concurrently to *Development*, namely *Knowledge Acquisition*, *Verification* and *Documentation*. *Knowledge Acquisition* included the elicitation of domain knowledge based on literature review and analysis of relevant existent ontologies. It was more intensively performed during the requirements specification and decreased as the development moved forward (Fernández-López et al., 1997). *Verification* refers to the technical process that evaluated the correctness of the developed artefacts by ensuring that the definitions implement correctly the ontology requirements (Fernández-López et al., 1997; Lovrenčić & Čubrilo, 2008). *Documentation* essentially refers to the activities that documented the results from *Development*. Following the *Development* activities, the *Validation* building block refers to the activities performed to evaluate the extent to which the *ePOSM* fulfils its specific intended purpose (Fernández-López et al., 1997; Lovrenčić & Čubrilo, 2008). Finally, *Conclusion* refers to analysis performed to identify major achievements, known limitations, lessons learnt and recommendations for future work. The mapping of the *ePOSM* Research Framework against the DSR paradigm, as well as the corresponding section of the Dissertation is presented in Table 3.2.

Part	DSR Step	Dissertation Section
<b>1. Planning</b>	<i>Problem Awareness</i>	1. Introduction 3. Methodology
<b>2. Development</b>	<i>Suggestion Development</i>	4.2 <i>e</i> POSM Specification Annex 8.2 Comparative Analysis of e-Participation Reference Models 4.4 <i>e</i> POSM Description
<b>3. Knowledge Acquisition</b>	<i>Problem Awareness</i>	2. Literature Review 4.3 Domain Concepts Annex 8.1 Terms and Definitions Annex 8.3 Comparative Analysis of e-Participation Engagement Levels' Typologies Annex 8.4 Participatory Methods Annex 8.5 e-Participation Tools
<b>4. Verification</b>	<i>Evaluation</i>	4.5. <i>e</i> POSM Verification Annex 8.8 <i>e</i> POSM OWL Verification
<b>5. Documentation</b>	<i>Not applicable</i>	Annex 8.7 <i>e</i> POSM Conceptualisation Details
<b>6. Validation</b>	<i>Evaluation</i>	4.6. <i>e</i> POSM Validation
<b>7. Conclusion</b>	<i>Conclusion</i>	5. Conclusions 6. Limitations and Recommendations for Future Works

Table 3.2 – *e*POSM Research Framework mapping against DSR and Dissertation structure.

### 3.2.3. Research Strategy

Research strategy is the overall approach to answering the specific research questions, providing a structured plan of action that guides and governs the research process (Johannesson, Perjons, & Bider, 2013; Saunders et al., 2003). The rationale for the selected strategy is rooted in the three criteria identified by Yin (2009), namely (1) the type of research question; (2) the extent of control a researcher has over actual behavioural events and (3) the degree of focus on contemporary or historical events. These criteria were applied to the universe of methods commonly used in Management Information Systems (P. Palvia et al., 2004) and the resulting adopted methods are listed in Table 3.3.

Method	Description
<b>Speculation/ Commentary</b>	Analysis not supported by hard evidence, but derived from the author's knowledge and experience. Relevant when the research is directed to new and developing areas (P. Palvia, Mao, Soliman, & Salam, 2003).
<b>Library Research</b>	Research that is based mainly on the review of existing literature (P. Palvia et al., 2004).
<b>Literature Analysis</b>	Research that criticises, analyses and extends existing literature and attempts to build new groundwork. <i>E.g.</i> meta-analysis (P. Palvia et al., 2004).
<b>Content Analysis</b>	A method of analysis in which text (notes) is systematically examined by identifying and grouping themes and coding, classifying and developing categories (P. Palvia et al., 2004).
<b>Frameworks and Conceptual Models</b>	Research that intends to develop a framework or a conceptual model (P. Palvia et al., 2004).

Table 3.3 – Research methods adopted.

Speculation/commentary triggered the initial idea of adopting a BPM-steered approach to manage e-Participation, which was essentially the creative phase wherein a novel configuration was envisioned (Vaishnavi & Kuechler, 2004). Library Research was relevant essentially to establish the starting point of the research, by providing a broad understanding of e-Participation state-of-the-art. Literature Analysis was the method used to expose the research problem, as well as to review e-Participation existent ontologies and domain models. The *ePOSM* development relied on ontology engineering and, therefore, was supported by the combination of the Content Analysis and Frameworks and Conceptual Models methods.

#### **3.2.4. Time horizon**

The research time horizon can be considered as being cross-sectional (Saunders et al., 2003) as it was essentially focused on studying the current status of e-Participation practice to derive the research problem.

#### **3.2.5. Data Collection**

The research was based on secondary data collection (Saunders et al., 2003) supported by different types of sources that brought together both theoretical and experimental aspects. Survey-based secondary data was used to identify the research problem (refer to Section 1.2). A thorough analysis and triangulation of these sources allowed the formulation of the research questions – based on the issues that determine the sustainability of e-Participation – and the determination of the research scope. Additionally, the *ePOSM* development was supported by existent models published in academic journal articles and project deliverables.

### **3.3. TARGET OUTPUTS**

DSR outputs (*i.e.* the artefacts) can be of four types, namely Constructs, Models, Methods and Instantiations (March & Smith, 1995). A Construct consists in conceptual vocabulary and symbols of the domain (March & Smith, 1995). A Model is an abstraction based on propositions and statements involving the constructs in order to represent a real world situation, the problem design and its solution (Hevner et al., 2004; Schön, 1983; Simon, 1996; Vaishnavi & Kuechler, 2004). A Method is an algorithm, or sets of steps, that provides guidance on how to solve problems, based on the underlying Constructs and Models (March & Smith, 1995). An Instantiation corresponds to the operationalisation of Constructs, Models and Methods as a working system (March & Smith, 1995). Hence, the current research outputs comprise Constructs, consisting in the *ePOSM* vocabulary, and Models, corresponding to the set of developed ontologies.

### **3.4. ETHICAL CONSIDERATIONS**

Acknowledging that ethics is a central aspect of Information Systems' research (Myers, 2009; Stahl, 2005), the principles cited by Myers (2009) were adopted throughout the research. Plagiarism was avoided by crediting all used sources by means of proper referencing. Research bias was avoided by applying systematic research methods, including the triangulation of the sources used in the problem statement as well as in the *ePOSM* development. Notwithstanding these guiding principles, e-Participation is ethically charged *per se*, as it holds political values rooted in democratic beliefs that

cannot be detached from the research motivation. For the sake of transparency, the political view underpinning the research was clarified in the research scope (refer to Section 1.5).

### 3.5. SECTION SUMMARY

This section presented the research methodology design – driven by the Saunders’s Research Onion (Saunders et al., 2003) – which provided the rationale for options made in each step. The summary of the research methodology is outlined in Table 3.4.

<b>Research Paradigm</b>	DSR
<b>Complementary Theoretical Background</b>	BPM Ontology Engineering
<b>Research Approach</b>	1. Planning 2. Development 3. Knowledge Acquisition 4. Verification 5. Documentation 6. Validation 7. Conclusion
<b>Research Strategy</b>	Speculation/Commentary Library Research Literature Analysis Content Analysis Frameworks and Conceptual Models
<b>Time Horizon</b>	Cross-sectional
<b>Data Collection</b>	Secondary sources
<b>Target Output</b>	Constructs Models

Table 3.4 – Research methodology summary.

*“Unless there is a clear definition of what it means for a participation exercise to be effective, there will be no theoretical benchmark against which performance may be assessed” (Rowe and Frewe, 2004)*

## **4. EPOSM DEVELOPMENT AND ACHIEVED RESULTS**

### **4.1. INTRODUCTION**

This section describes the outcomes of the research and provides an evaluation of the results achieved, following the adopted methodological approach. The subsection *ePOSM* Specification (Section 4.2) defines the *ePOSM* requirements based on the defined research objectives. The subsection Domain Concepts (Section 4.3) assembles a baseline for the e-Participation domain knowledge that underpinned the *ePOSM* conceptualisation. The subsection *ePOSM* Description (Section 4.4) portrays and explains the artefacts from the research. In particular this section covers the results from the Conceptualisation, Implementation and Integration activities of the *ePOSM* Research Framework (refer to Figure 3.3). The subsection *ePOSM* Verification (Section 4.5) describes the technical process that evaluated the correctness of the developed artefacts. The subsection *ePOSM* Validation (Section 4.6) addresses the activities performed to evaluate the extent to which the *ePOSM* fulfils its specific intended purpose. Finally, the subsection Section Summary (Section 4.7) outlines the main outcomes of the *ePOSM* development.

### **4.2. EPOSM SPECIFICATION**

#### **4.2.1. Purpose**

The purpose of the envisioned *ePOSM* comprises four main objectives: (1) targeting communication; (2) organisational modelling; (3) interoperability; and (4) systems' engineering (refer to Section 0). According to the analysis performed in the Problem Statement (refer to Section 1.2), rather than a standalone endeavour, the sustainable implementation of e-Participation demands cross-functional and cross-institutional articulated efforts. Consequently, seamless communication is of the utmost importance. According to Dietz (2006), the ontological view of the enterprise addresses the intention of information in addition to its content, articulating these two and providing a formal and explicit specification for a shared conceptualisation among a community of people in an enterprise. Hence, ontologies can provide a common ground for critical concepts so that people use terms with the same meaning and intention. Such explicit concepts save much effort whenever collaborators from different areas have to work together (Obitko, 2001). Therefore, the first objective of the *ePOSM* is to provide a common, unambiguous and cross-functional understanding among Government and Public Administration of e-Participation implementation-related concepts and of their articulation.

In addition to having to meet the communication needs, the integration of e-Participation in the existent institutional structures across Government and Public Administration demands an organisational model that includes the functions required to ensure e-Participation sustainability. Ontologies can also be used to represent the organisational dimension, in particular concepts and relations among business functions, roles, objectives, resources and activities. Therefore, the second objective of the *ePOSM* is to provide a rationale for organisational modelling, in order to effectively



and efficiently embed e-Participation within Government and related Public Administration organisational structures.

E-Participation sustainability is related to the ability to implement effective and efficient participatory processes. For this purpose, and in order to implement a *whole-of-Government* approach (Tregear & Jenkins, 2007), it is necessary to establish cross-functional and cross-institutional coordination and collaboration, while maintaining vertical accountability (Australian Government, 2007). Therefore, the third objective of the *ePOSM* is to enable process-level interoperability among Government and Public Administrations by providing a standard approach to implement e-Participation processes.

Finally, in order to cope with the new trends of e-Participation (refer to Section 2.5), it is necessary to implement enterprise models, consisting in the computational representation of the structure, activities, processes, information, resources, people, behaviour, goals and constraints (Fox & Gruninger, 1998) of Government and Public Administration. While it is not expected that the *ePOSM* provides a formal model, it can, nevertheless, introduce a standardised terminology. Therefore, the fourth objective of the *ePOSM* is to provide a standardised vocabulary potentially usable in software development for business processes' automation.

Considering the above-described purpose, the *ePOSM* can be used by a broad range of stakeholders, namely Policy-makers, Information Systems Experts, Civic Participation Domain Experts and Public Administration managerial staff.

#### **4.2.2. *ePOSM* Requirements**

The *ePOSM* requirements were expressed through competency questions. The notion of competency question was introduced by Gruninger and Fox (1995), within the scope of enterprise modelling and business process engineering, as a form of defining ontology modelling requirements. The competency questions should be elaborated so as to ensure that the related ontologies are necessary and sufficient for their purpose (Fox, Barbuceanu, Gruninger, & Lin, 1998). Competency questions are typically identified by ontology engineers before starting the development (Annamalai & Sanip, 2010) and provide a basis for a rigorous characterisation of the problems that the ontology needs to cover (Gómez-Pérez, 1996). Annamalai and Sterling (2003) advocate that the competency questions be identified based on the context of the ontology planned applications. Gangemi (2005), on the other hand, recommends a top-down approach to prepare competency questions, through the refactoring of generic questions that arise from the domain knowledge. Concurring with these guidelines, the *ePOSM* competency questions were derived from the research questions (refer to Section 1.6).

The research question RQ1 addresses the strategic alignment of e-Participation initiatives with the citizens' needs, adopting BPM-driven approach. In particular, it covers how to ensure the said strategic alignment. This question was broken down into a set of a competency questions that transpose the BPM approach to the strategic alignment of e-Participation. In order to address these competency questions, the *ePOSM* must structure the e-Participation domain concepts and relate them with organisational concepts, providing a reasoning for the strategic alignment. In return, when

implementing and instantiating the ontology in a specific context, it should be possible to expose that reasoning, thus obtaining the rationale supporting the defined strategy and goals and their corresponding status.

The research question RQ2 addresses the Government organisational structure reflecting a BPM approach. In order to address this question, a set of competency questions were prepared to allow the characterisation of an organisational structure, including permanent units dedicated to e-Participation and temporary units with cross-functional and transformational missions.

The research question RQ3 concentrates on the Government organisational functions required to implement a BPM-driven approach to e-Participation. This question encompasses different aspects of organisational modelling, including functional areas and their related activities. Following an analysis through the lens of BPM, a set of competency questions was streamlined, covering the governance and process management dimensions, as well as the mapping of the functions against the organisational structure.

Finally, the research question RQ4 focuses on the different roles related to e-Participation. This question involves issues associated to the e-Participation functions covered in RQ3; however, it differs for the latter in the sense that it tackles the sociological side of the organisation. Although for human beings this type of knowledge is straightforward, for automated information processing and machine reasoning it is fundamental to model it explicitly (Filipowska, Kaczmarek, Starzecka, Stolarski, & Walczak, 2008). As such, RQ3 was decomposed into a set of competency questions to explicitly retrieve information concerning the roles associated with e-Participation functions.

The *ePOSM* competency questions and corresponding research questions are defined in Table 4.1.

Competency Question
<b>RQ1</b> How to ensure the strategic alignment of e-Participation initiatives with the citizens' needs, based on a BPM-driven approach?
<b>CQ1.1</b> What is the basis of the e-Participation goals?
<b>CQ1.2</b> What defines the e-Participation strategy?
<b>CQ1.3</b> What are the e-Participation implementation constraints?
<b>CQ1.4</b> What are the e-Participation quantifiable objectives?
<b>CQ1.5</b> What is the advancement of the e-Participation strategic goals?
<b>CQ1.6</b> What types of activities are covered by the e-Participation strategy?
<b>CQ1.7</b> What stages of policy-making are covered by the e-Participation strategy?
<b>CQ1.8.</b> How is the e-Participation strategy implemented?
<b>RQ2</b> How can the Government organisational structure constituents reflect a BPM-driven approach to e-Participation?
<b>CQ2.1</b> Which organisational units are permanently allocated to e-Participation functions?
<b>CQ2.2</b> How are the e-Participation permanent organisational units structured?
<b>CQ2.3</b> Which organisational units are temporarily allocated to e-Participation functions?
<b>CQ2.4</b> How are temporary organisational units assigned to e-Participation functions?

Competency Question
<b>RQ3</b> Which organisational functions within Government are required to implement a BPM-driven approach to e-Participation?
<b>CQ3.1</b> What are the functional areas governing e-Participation?
<b>CQ3.2</b> What are the activities performed to govern e-Participation?
<b>CQ3.3</b> What are the functional areas executing e-Participation processes?
<b>CQ3.4</b> What are the activities performed to execute e-Participation processes?
<b>CQ3.5</b> Which Organisational Units are allocated to the e-Participation governance functions?
<b>CQ3.6</b> Which Organisational Units are allocated to the e-Participation process management functions?
<b>RQ4</b> Which organisational roles within Government are required to implement a BPM-driven approach to e-Participation?
<b>CQ4.1</b> Which roles are used in the e-Participation process?
<b>CQ4.2</b> Which roles are used to govern e-Participation?
<b>CQ4.3</b> Which stakeholders' groups play e-Participation roles?

Table 4.1 – *ePOSM* Competency Questions.

#### 4.2.3. Level of formality

Uschold (1996) proposed to classify the ontologies' formality according to the four levels represented in Table 4.2. The level of formality to adopt is essentially dependent on the intended purposed of the ontology. Formal ontologies are machine-understandable and are implemented in RDF (Resource Description Framework) and OWL (Web Ontology Language). According to Shirky (2003), the more the semantic consistency required by a standard, the sharper is the trade-off between complexity and scale. Considering the *ePOSM* purpose that was previously defined (refer to Section 4.2.1), as well as the low maturity level of this research area (refer to Section 2), it was considered that a semi-formal representation would deliver a balanced level of formality. As such, both technical and non-technical target users can understand the resulting artefact, thus contributing to bridging the gap between these two spheres.

Level	Description
<b>Highly informal</b>	Expressed loosely in natural language.
<b>Structured informal</b>	Expressed in a restricted and structured form of natural language, greatly increasing clarity by reducing ambiguity.
<b>Semi-formal</b>	Expressed in an artificial formally defined language.
<b>Rigorously formal</b>	Meticulously defined terms with formal semantics' theorems and proofs of such properties as soundness and completeness.

Table 4.2 – Ontologies formality level.

Gruber (1993) identified five types of structural components of ontologies, namely Classes, Relations, Functions, Formal Axioms and Instances, as described in Table 4.3. Following the above-mentioned justification for selecting a semi-formal representation, it was considered that the *ePOSM* should make use of Classes, Relations and Instances.

Component	Description
<b>Classes (Concepts, Categories, Concept types)</b>	Formal description of an entity that belongs to a defined domain, consisting in the basic building block of knowledge construction. A concept aggregates Instances in one group of the world that share the same properties. Therefore, it can include domain concepts, tasks, functions, actions, strategy, reasoning process, etc.
<b>Relations (Properties, Slots, Attributes<sup>33</sup>, Roles)</b>	Type of interaction between concepts of the domain. Formally defined as any subset of a product of n sets: $R: C_1 \times C_2 \times \dots \times C_n$ .
<b>Functions</b>	Used to compute a given value associated to a concept, consisting in a special case of relations in which the $n^{th}$ element of the relationship is unique for the $n-1$ preceding elements. Formally defined as: $F: C_1 \times C_2 \times \dots \times C_{n-1} \rightarrow C_n$
<b>Formal Axioms</b>	Propositions that are always true.
<b>Instances (Individuals, Concept instance)</b>	Item that is an implementation of a concept. It represents the concretisation of a concept in the instance world. The concept attributes are filled in with values.

Table 4.3 – Components of ontologies. Adapted from Gruber (1993), Perez and Benjamins (1999), Roussey (2005), Munoz et al. (2007) and Tankelevičienė (2008).

Depending on the language used for formalisation, ontologies are often referred as lightweight or heavyweight, as described in Table 4.4. According to this terminology, the *ePOSM* can be considered a lightweight-type of ontology.

Aspect	Lightweight Ontology	Heavyweight Ontology
<b>Structural components</b>	Classes, relations, instances (not mandatory)	Classes, relations, instances (not mandatory), formal axioms
<b>Expressiveness</b>	Lower	Higher
<b>Manageability</b>	Easier	Harder
<b>Constraints</b>	Less	More
<b>Applicability</b>	Wider	More narrow

Table 4.4 – Lightweight and Heavyweight ontologies. Adapted from Roussey (2005, p. 2) and Tankelevičienė (2008, p. 8).

#### 4.2.4. Supporting Tool

Considering the research purpose, and after testing different available ontology engineering tools, CMapTools Ontology Editor<sup>34</sup> was considered an appropriate choice since it uses concept maps to display, edit and compose OWL, in an integrated GUI (Graphical User Interface), requiring only a minimum knowledge of ontology languages (Sarker, Wallace, & Gill, 2007). The CMapTools Ontology Editor can be used as an ontology viewer, editor and also as a concept search engine. It bridges the gap between the informal nature of concept maps and the formal machine-readable Web ontology

<sup>33</sup> Attributes are sometimes distinguished from relations; in particular, the difference between them is that the range of an attribute is a datatype and not a class (Tankelevičienė, 2008).

<sup>34</sup> COE (<http://www.ihmc.us/groups/coe/>, accessed in 2015-07-06) is an RDF/OWL ontology viewing, composing and editing tool built on top of the IHMC (<http://www.ihmc.us/>, accessed in 2015-07-06) CmapTools concept mapping software suite.

languages (Hayes et al., 2005), by making use of a set of conventions that allow the construction of syntactically valid Web ontologies through the concept-mapping graphical interface.

As previously described (refer to Section 4.2.3), the *ePOSM* uses three of the ontologies' components, namely Classes, Relations and Instances. Classes represent concepts, which can be considered generic entities, while Relations represent interactions between concepts or concepts' properties. Relations fall into two broad groups: hierarchical relationships and associative relationships. Hierarchical relations identify the hierarchy between super-classes and subclasses. A class is a subclass of another class if it inherits its properties. Using the adopted CMapTools Ontology Editor notation, the hierarchical relations can be of type '*are*' or '*is a*'. The '*are*' relationship links a class to a subclass (e.g. Woman *are* Person). The '*is a*' relationship links an instance to its class (e.g. Carla *is a* Woman). Associative relations connect concepts that are not in the same hierarchy, defining restriction on a property (e.g. Carla *hasNationality* Portuguese). In order to maximise the consistency of the developed ontology, specific guidelines for Maps, Classes and Instances, and Relationships have been established and applied throughout the development process (refer to Annex 8.6). In order to be able to import and export formal and machine-interpretable knowledge representations in OWL, dedicated templates for commonly used OWL structures have been used, as represented in Figure 4.1.

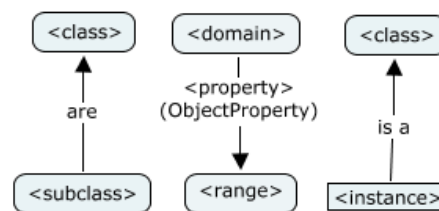


Figure 4.1 – Types of components used.

## 4.3. DOMAIN CONCEPTS

### 4.3.1. E-Participation Principles

A review of the literature indicated that there is a series of commonly accepted principles or core values that should drive public participation in order to ensure a meaningful and effective engagement. The IAP2 (2007a) defined a set of core values for the practice of public participation. While ICT is constantly evolving, the principles identified are time-proof and detached from any IT paradigm or specific technology, as they are focused on the social experience. Therefore, the same overarching principles can be interchangeably applied to both traditional and electronic participation. The OECD (2009) outlined a set of principles to guide practitioners when designing, implementing and evaluating open and inclusive policy-making. The analysis of these principles revealed that some of them, such as Inclusion, Commitment, Rights and Active citizenship, can be understood as cross-cutting values that are interlinked and mutually re-enforcing: an increase or decrease in one will necessarily impact the others in the same direction. Additionally, other principles, such as Clarity, Evaluation, Time, Resources, Coordination and Accountability, can be understood as operating or process-oriented.

Principle	Description
<b>1. Commitment</b>	Ensure a genuine and devoted attempt to implement a participatory process and incorporate the participants' opinions even when they conflict with the organisers' point of view.
<b>2. Rights</b>	Ensure that the citizens' right to information, consultation and public participation in policy-making and service delivery are grounded in law or policy.
<b>3. Clarity</b>	Ensure the definition of clear objectives, limits, resources, roles and responsibilities from the outset of the participatory process, as well as transparency concerning the potential impact.
<b>4. Time</b>	Ensure that adequate time is allotted to each phase, as well as an early involvement in the policy process to allow a larger range of solutions, thus increasing the chance of a successful implementation.
<b>5. Inclusion</b>	Ensure equal opportunities for all stakeholders who have an interest in the topic at hand or who would be affected by the outcomes of the process.
<b>6. Resources</b>	Ensure the provision of adequate financial, human and technical resources, as well as access to appropriate skills, guidance and training.
<b>7. Coordination</b>	Ensure consistency and coherence within the organisation responsible for the participatory process, excluding duplication of effort and preventing 'participation fatigue'.
<b>8. Accountability</b>	Ensure the effective, responsible and transparent use of the contributions collected during the participatory process. Participants should be able to perceive the extent to which they have actually influenced the policy making process, including how their inputs have been assessed and why their contributions have (or have not) influenced the outcomes reached and been incorporated in them.
<b>9. Evaluation</b>	Ensure an effective assessment mechanism to evaluate their performance of the participatory process.
<b>10. Active citizenship</b>	Ensure the encouragement civic activism, by increasing capacities and skills of the citizenry to participate in policy making in a meaningful and informed manner.

Table 4.5 – Public participation principles. Adapted from OECD (2004), Rosa and Pereira (2008) United Nations (2013b) and Sommer (2007).

#### 4.3.2. Analysis of Existent Models

The reference e-Participation ontologies, domain models and frameworks studied (refer to Section 2.8) address different aspects of e-Participation. Nevertheless, a comparative analysis revealed the subset of structural concepts provided in Table 4.6 and that are further described in the following sections.

Concept	Comment
<b>e-Participation Area</b>	Present in Wimmer (2007), Kalampokis et al.(2008) and Slaviero et al. (2011) with similar meaning and slightly different sub-concepts.
<b>e-Participation Level</b>	Present in all models with similar meaning and slightly different sub-concepts.
<b>e-Participation Process</b>	Present in all models with slightly different meanings.
<b>e-Participation</b>	Present in Wimmer (2007), Kalampokis et al. (2008) and Porwol et al. (2014) with similar

Concept	Comment
<b>Stakeholder Category</b>	meaning and slightly different sub-concepts.
<b>e-Participation Tool</b>	Present in Wimmer (2007), Kalampokis et al.(2008), Slaviero et al. (2011), Porwol et al. (2014) with similar meaning and slightly different sub-concepts.
<b>Participation Method</b>	Present in Kalampokis et al. (2008) and Slaviero et al. (2011) with similar meaning, although using different terminology and different sub-concepts.
<b>Policy-making Stage</b>	Present in Macintosh (2004), Wimmer (2007), Kalampokis et al. (2008) and Slaviero et al. (2011) with similar meaning and sub-concepts.

Table 4.6 – Comparative analysis of e-Participation domain concepts present in Macintosh (2004), Wimmer (2007), Kalampokis et al. (2008), Slaviero et al. (2011) and Porwol et al. (2014).

#### 4.3.2.1. E-Participation Area

The citizens' engagement in social practices related to e-Participation encompasses several areas. ICT can modernise or facilitate established and recognised political forms (Sæbø et al., 2008) or contribute to the development of new forms. The most representative areas found in the literature are described in Table 4.7.

e-Participation Area	Description
<b>Activism</b>	ICT supporting voluntary organisations and interest groups in promoting their special interests or viewpoints and influencing the political process (Sæbø et al., 2008).
<b>Consultation</b>	ICT supporting the collection of viewpoints concerning specific issues, corresponding to two-way relationships between citizens and decision makers (Sæbø et al., 2008; Tsitsanis, Ergazakis, & Giannantonakis, 2008). The process is managed by a public authority that provides background information to citizens on the issues that are set for consultation, defines a set of questions that need to be answered and establishes the roles of the stakeholders involved in the consultation process. The citizens' role is to provide information on the issue set for consultation, responding interactively and submitting online comments. Citizens have opportunity to build their arguments based on resources such as online data repositories, RSS feeds, newsletters and others (Sæbø et al., 2008; Tsitsanis et al., 2008).
<b>Community Building</b>	ICT supporting the citizens in joining and forming communities that have a special common characteristic, empowering and shaping such community makers (Sæbø et al., 2008; Tsitsanis et al., 2008; Wimmer et al., 2006). This type of initiatives builds cohesion and trust through free interactions and opinion sharing. These communities can either share common interests or come from specific distinct domains such as regional communities, religious communities, political communities or social communities. Community building is the core element of social networking, such as <i>Facebook</i> where users come together and create groups with the same hobbies, views, likes and dislikes and, in such a way, they empower their voices. This is a way to engage more supporters and make citizens more active and much more aware of issues that are of their interest, through interacting with other people and sharing opinions with absolute freedom and without manipulation from power holders (Tsitsanis et al., 2008).
<b>Deliberation</b>	ICT supporting the process of reflection and consideration of issues in a public exchange of opinions, as well as of formation of solutions in order to achieve consensus (Sæbø et al., 2008; Tsitsanis et al., 2008; Wimmer et al., 2006). Participants are provided with detailed information on the subject under analysis and time to

e-Participation Area	Description
	reflect and consolidate arguments. This technique requires moderation and facilitation as well as clear engagement rules. By means of appropriate ICT, citizens are involved in the highest possible way in a deliberation process, actively participating in the decision-making process. This happens especially in the initial stages of the deliberation procedure ( <i>e.g.</i> for the preparation of a law), since, in the latest stages, their role becomes less important, as their participation is confined to posting opinions and comments to a discussion that is moderated by subject-matter specialists, legal experts and public officers (Tsitsanis et al., 2008).
<b>Discourse</b>	ICT supporting the analysis, argumentation and representation of political discourse (Sæbø et al., 2008).
<b>Information provision</b>	ICT supporting a one-way relationship in which information is produced and delivered to citizens. Information provision plays a critical role in any e-Participation system, as one of the main goals of an e-Participation process is to create informed participants that can contribute with opinions that are supported by strong arguments. These can only be created if a person has deep knowledge of the issue discussed. The information shall be well structured, accurate, legible and immediately related to the corresponding issue.
<b>Electioneering</b>	ICT supporting politicians, political parties and lobbyists in the context of election campaigns, including activities directed towards the electorate by the candidates, whose main aim is to be elected (Tsitsanis et al., 2008; Wimmer et al., 2006). The Barack Obama's 2008 successful run for the United States presidency is a prominent example of the application of new information technologies and participation strategies to garner political contributions and generate new voters. Indeed, the use of electronic media struck a responsive chord motivating millions of younger, tech-savvy new voters to participate by direct and fast contact, collaboration and information sharing with the candidate (Medimorec et al., 2011; Milakovich, 2010; S. Smith, Efraxia, Panopoulou, Tambouris, & Nielsen, 2009).
<b>Mediation</b>	ICT supporting the resolution of disputes or conflicts through a process where a third party intervenes to settle them. Mediators use appropriate techniques – tools and/or skills – to open and improve dialogue between disputants, aiming to help the parties reach an agreement on the disputed matter (Tsitsanis et al., 2008; Wimmer et al., 2006).
<b>Petitioning</b>	ICT supporting the posting of online petitions aiming to mobilise citizens to propose issues for consideration by the political system (Sæbø et al., 2008; Tsitsanis et al., 2008).
<b>Polling</b>	ICT supporting surveys and measurement of the public's opinions and sentiment in a variety of topics (Wimmer, 2007). These surveys are conducted through a series of questions that aim at the extrapolation of generalities in ratio or within confidence intervals. Usually, there are no stringent security requirements, with errors affecting a small percentage of votes being tolerated, without compromising the final result.
<b>Voting</b>	ICT supporting processes of production of a final choice among several alternatives, by voting in elections, referenda or local plebiscites (Wimmer, 2007).

Table 4.7 – E-Participation areas.

#### 4.3.2.2. E-Participation Level

A number of authors have developed engagement levels' typologies that systematise the depth and quality of traditional and electronic participation (refer to Annex 8.3). Arnstein (1969) argued that civic participation consists in the redistribution of power from authority to citizens and developed an



analytical schema described by a ladder that includes eight rungs, representing increasing depths of participation and grouped into three categories, including non-participation, degrees of tokenism and degrees of citizen control. The OECD (2001) defined a different classification for participation including the levels of Information, Consultation and Active Participation. Influenced by Arnstein, the IAP2 (2007b) proposed a spectrum which encompasses a more prominent role for citizens' participation, providing a framework for analysing the scope and depth of public participation. The spectrum is structured into five increasing participation levels: Inform, Consult, Involve, Collaborate and Empower. Traditional participation typologies were adapted to e-Participation. Following the OECD (2001) classification, Macintosh (2004) proposed a three-tier model including e-Enabling, e-Engaging and e-Empowerment. Similarly, Tambouris et al. (2007) mapped IAP2 (2007b) spectrum against e-Participation, introducing a more granular classification which resulted in the levels of e-Informing, e-Consulting, e-Involving, e-Collaborating and e-Empowerment (refer to Table 4.8).

<b>Tambouris et al. (2007)</b>	<b>e-Participation Level Description</b>
<b>e-Informing</b>	The role of technology is to implement a one-way channel for providing balanced and objective information. It aims at keeping citizens informed.
<b>e-Consulting</b>	The role of technology is to implement a two-way channel through which official initiatives of government institutions allow stakeholders and citizens to contribute with their opinion on specific issues. It aims at obtaining feedback from the citizens' analysis of alternative governmental decisions.
<b>e-Involving</b>	The role of technology is to allow government to work directly with citizens. It aims at ensuring that the citizens' concerns are understood and taken into consideration.
<b>e-Collaboration</b>	The role of technology is to facilitate and support the implementation of partnerships between government and citizens for the development of alternatives and identification of preferred solutions. It aims to incorporate the citizens' contribution in policy making, to the maximum extent possible.
<b>e-Empowerment</b>	The role of technology is to facilitate the transfer of influence, control and policy-making responsibility to citizens. It aims to delegate decision-making to citizens.

Table 4.8 – e-Participation levels. Adapted from Tambouris et al. (2007) and IAP2 (2007b).

#### **4.3.2.3. e-Participation Process**

Several authors adopted a process view of democracy and participation (Anttiroiko, 2003; Renn, Webler, Rakel, Dienel, & Johnson, 1993). A participation process comprises a number of participation activities related to citizen engagement and involvement in the Policy-making Cycle (refer to 4.3.2.7). In the Kalampokis et al. (2008) domain model, the e-Participation model plays a pivotal role, aggregating all aspects of an e-Participation initiative.

#### **4.3.2.4. E-Participation Stakeholder Category**

A broad range of groups can have interest on the e-Participation issue at stake, either being affected by any resulting decision or being able to affect that decision. The ability to engage, understand their characteristics and address the different needs and expectations is a critical success factor for implementing e-Participation initiatives (Rosa & Pereira, 2008; Sæbø et al., 2008; Serrano Ferreira & Pérez Ortega, 2012). The most common e-Participation stakeholders' groups identified in the

literature (Kalampokis et al., 2008; Panopoulou, Tambouris, & Tarabanis, 2008; Rosa & Pereira, 2008; Sæbø et al., 2008; Tsitsanis et al., 2008) include Academia and Research, Civil Society Organisations, NGOs, Citizens, Citizens' Groups, Mass Media, Elected Representatives, Government, Public Administration, Industry and Political Parties. Sussha and Grönlund (2012) grouped these into three categories, namely Government and Administration, Citizenry and Collective Agents.

#### 4.3.2.5. E-Participation Tool

There is an extensive number of online tools and technologies available to government organisations (Abu-shanab & Al-Dalou', 2013; Rosa & Pereira, 2008; Wimmer, 2007) that support the electronic implementation of the previously referred participatory methods (refer to Section 4.3.2.6). Within the scope of the notable DEMO-net<sup>35</sup> project, Wimmer et al. (2006) developed a classification of the ICT tools that support the main areas of participation, structured into three distinct groups, namely (1) core e-Participation tools, (2) tools extensively used in e-Participation but not specific to e-Participation and (3) basic tools to support e-Participation (refer to Annex 8.5). Having observed the existence of horizontal functionalities, Slaviero et al. (2012) identified the most relevant components, which act as the tools' building blocks (refer to Table 4.9).

Component	Description	Use
<b>Chat</b>	Enables two-way communication in terms of sending and receiving messages in real time, allowing the creation of a space of free discussion. Chats conducted for e-Participation purposes are offered for a limited time-horizon.	Chat rooms for e-Participation
<b>Profile</b>	Participant registration, when this is a requirement of the participatory process.	Potentially applicable to any tool.
<b>Forum</b>	Provides a structured discussion space where users, usually with common interests, can exchange open messages within the scope of specific issues. Users can pick a topic, see a "thread" of messages, reply and post their own message. It can resort to moderation.	e-Participation Discussion forum/board
<b>Debate</b>	Provides a discussion space in which participations exchange opinions and vote on the addressed topic. It can use a specific language ( <i>e.g.</i> DemIL <sup>36</sup> ) to structure the discussion.	e-Deliberative Polling e-Consultation
<b>Information provision</b>	Information provision from different sources, such as audio, video, wikis, blogs, podcasts, video casts, links or documents.	Podcast, Wiki, Blog, FAQ, e-mail
<b>Petition</b>	System for hosting petitions, allowing citizens to draft their own petitions online and have others join in, as a means of pressure towards decision-making.	e-Petition
<b>Meeting</b>	Provides meeting spaces for citizens and decision-makers to share opinions. It can operate in real-time or not, using audio and video.	Webcast
<b>Questionnaire</b>	Provides a set of questions to be answered by citizens as a form of consultation.	e-Deliberative Polling e-Consultation
<b>Poll</b>	Instant or short time survey which collects public opinion via	e-Deliberative Polling

<sup>35</sup> [http://cordis.europa.eu/projects/rcn/79315\\_en.html](http://cordis.europa.eu/projects/rcn/79315_en.html) (accessed in 2015-03-27)

<sup>36</sup> Democracy Interaction Language (Maciel, Cristina, & Garcia, 2006)

Component	Description	Use
	interviewing a random sample of people on a specific question, simply stated, either with mere yes/no answers or allowing participants to select one answer from a list of alternatives.	e-Consultation
<b>Voting</b>	Voting system, providing a secure environment for casting a vote and counting the votes.	e-Voting
<b>Alert</b>	Provides alerts to citizens on topics they are interested in, or to make them aware of a participatory process.	Newsletters, listservs, e-mail, instant messaging, SMS

Table 4.9 – e-Participation tools’ components. Adapted from Slaviero et al. (2012, p. 21), Tsitsanis et al. (2008).

Several authors acknowledged that there is no definitive list of tools, as these will continually evolve, and, thus, have systematised templates including the most relevant characteristics to describe existing and future tools (Macintosh, 2004; O’Malley, Higgins, Hayward, Watson, & Hilton, 2007; Sæbø, 2007; Wimmer et al., 2006). Table 4.10 lists the most representative characteristics of e-Participation tools found in the consulted literature.

Characteristic	Description
<b>General description</b>	High-level description of the tool functionality.
<b>Overall Objectives</b>	Tool purpose.
<b>Participation Area</b>	Typical e-Participation areas (refer to Section 4.3.2.1) where the tool category is relevant.
<b>Level of Participation</b>	Levels of participation provided (refer to Section 4.3.2.2).
<b>Stakeholders</b>	Actors involved (refer to 4.3.2.4) assuming different roles ( <i>e.g.</i> participants, decision-makers, content providers, administration).
<b>Stage in policy cycle</b>	Applicable stages in the policy-making cycle (refer to Section 4.3.2.7)
<b>Privacy and Security</b>	Identity management; ability to preserve user privacy; ability to preserve navigation security.
<b>Accessibility</b>	Extent to which stakeholders are able to access and use the tools in terms of: <ul style="list-style-type: none"> <li>• Level of experience and skills needed to develop, add content and use;</li> <li>• Access for users with disabilities;</li> <li>• Used language.</li> </ul>
<b>Channels</b>	Available channels ( <i>e.g.</i> web, mobile, TV).
<b>Technology</b>	Technology used ( <i>e.g.</i> web server, database management system, application server, visual argumentation)
<b>Evaluation of the tool</b>	Typical form of evaluating the tool use, including inbuilt evaluation data collection mechanisms, in order to assess the engagement success.
<b>Deployment</b>	Requirements to setup the tool.

Table 4.10 – e-Participation tools’ characteristics. Adapted from Macintosh (2004) O’Malley et al. (2007), Sæbø (2007) and Wimmer et al. (2006).

#### 4.3.2.6. Participatory Method

According to Smith (1983), Public Participation comprehends procedures designed to inform, consult and involve citizens in order to obtain inputs for decision-making. To Slocum (2003), Participatory

Methods provide structure and organisation to various forms of dialogue. The literature analysis revealed a number of methods that can be applied in different stages of the policy-making cycle and that address different participation levels. Further to this, participatory methods range from those that elicit input in the form of opinions, such as Public Opinion Surveys or Focus Groups, to those that elicit judgments and decisions from which actual policy might be derived, such as Consensus Conferences or Citizens' Juries (Rowe & Frewer, 2000). A participatory method can be specified according to a set of inherent characteristics, as summarised in Table 4.11.

Method Characteristic	Description
<b>Number of Participants</b>	The number of participants can be reduced ( <i>e.g.</i> Focus Group of 10 participants), medium ( <i>e.g.</i> 21st Century Town Meeting involving hundreds or thousands participants) or high ( <i>e.g.</i> referendum at national level).
<b>Selection of Participants</b>	Form of selection, which can either be open to any citizen or selective, based on a given criteria. The selection can be representative of a population at large, or instrumental, if directed to a specific group of citizens ( <i>e.g.</i> subject-matter experts).
<b>Topic Type</b>	Type of the subject-matter to be addressed in terms of maturity, complexity, controversy and existing knowledge.
<b>Duration</b>	Timeframe of the process and its stages.
<b>Form of Participation</b>	The type of interaction can assume multiple forms, such as deliberative discussion, expressing opinions, voting, negotiation, formal testimony and others. It is possible to combine several types of interaction.
<b>Type of facilitation and moderation</b>	The participation can be facilitated if there is an assigned responsible person to steer the process, address conflicts and drive the group work towards its purpose. It can be moderated if there is an assigned responsible person to ensure the content produced is functioning.
<b>Target outcome</b>	The participatory process can have different purposes, such as community building, awareness-raising, consultation, decision-making, co-governance, protest and others.

Table 4.11 – Participation methods' characteristics. Adapted from Rowe and Frewer (2000), Coleman and Gøtze (2001), Slocum (2003) and Rosa and Pereira (2008).

The choice of the appropriate method or combination of methods to apply depends on the participatory process purpose and contextual factors (Rosa & Pereira, 2008). Slocum (2003) developed a toolkit for participatory processes, defining five elements to be taken into account for the selection of the appropriate method to employ, namely objectives, topic, participants, timeframe and budget, as described in Table 4.12.

Selection Elements	Description
<b>Objectives</b>	Comprises two dimensions: <ul style="list-style-type: none"> <li>• Motivation <ul style="list-style-type: none"> <li>○ Democratisation: enable participants to employ their own knowledge to create options for tackling policy issues. The output has weight in the decision-making process.</li> <li>○ Advising: reveal participants' knowledge, values and views. The output is used as an input to the decision-support process.</li> </ul> </li> </ul>

Selection Elements	Description
	<ul style="list-style-type: none"> <li>Target Outcomes <ul style="list-style-type: none"> <li>Mapping out diversity: generate a spectrum of options and information, as well as enable a group to disclose information or test alternative strategies.</li> <li>Reaching Consensus: enable a group to reach a single informed decision on an issue.</li> </ul> </li> </ul>
Topic	<ul style="list-style-type: none"> <li>Knowledge: to which extent is the public aware of the issue.</li> <li>Maturity: to which extent there are consolidated views.</li> <li>Complexity: to which extent the issue complexity or specificity demands subject-matter expertise.</li> <li>Controversy: to which extent the issue is polarised, impacting the ability to reach consensus.</li> </ul>
Participants	Identification of who is affected, interested in or can play a role in the participatory process.
Timeframe	Policy issues should be addressed in a timely manner, in alignment with the policy cycle. The timeframe comprises, not only the participatory process itself, but also pre-planning and post-event follow-up.
Budget	Required costs to prepare, implement and follow-up the participatory process.

Table 4.12 – Participation methods' selection elements. Adapted from Slocum (2003).

#### 4.3.2.7. Policy-making Stage

The policy-making cycle may vary, although it can be generally considered as a sequence of stages comprising Agenda Setting, Policy Preparation, Policy Formulation, Policy Execution and Policy Evaluation (Lukensmeyer & Torres, 2006; OECD, 2009; Rosa & Pereira, 2008; van Dijk, 2013), represented in Figure 4.2.

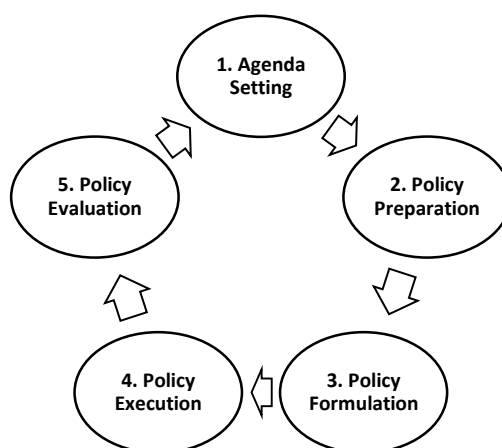


Figure 4.2 – Policy-making process.

The purpose of each stage and the potential role of public participation are described in Table 4.13.

Stage	Purpose	Public Participation Role
Agenda Setting	<ul style="list-style-type: none"> <li>Identification of relevant problems or needs that can be addressed by creating or changing a policy.</li> </ul>	<ul style="list-style-type: none"> <li>Identify needs.</li> <li>Define priorities.</li> <li>Weight alternatives.</li> </ul>

Stage	Purpose	Public Participation Role
<b>Policy Preparation</b>	<ul style="list-style-type: none"> <li>Definition of the key challenges and opportunities related to an issue included in the agenda.</li> <li>Collection of supporting information from a wide range of sources aligned with policy alternatives.</li> <li>Preparation of a policy draft.</li> </ul>	<ul style="list-style-type: none"> <li>Provide expertise or experimental knowledge.</li> <li>Express preferences in available options.</li> </ul>
<b>Policy Formulation</b>	<ul style="list-style-type: none"> <li>Evaluation of alternative policy proposals.</li> <li>Policy design, according a pre-defined methodology and based on the analysis performed. It can involve a broad range of mechanisms, such as formal consultation, risk analysis and pilot studies.</li> <li>Definition of the implementation plan.</li> </ul>	<ul style="list-style-type: none"> <li>Subject alternatives to public debate or scrutiny.</li> </ul>
<b>Policy Execution</b>	<ul style="list-style-type: none"> <li>Policy implementation, including the development of supporting legislation, regulations, guidance, plans and resources allocation.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure broad public awareness and support of policy.</li> <li>Test implementation plan feasibility.</li> </ul>
<b>Policy Evaluation</b>	<ul style="list-style-type: none"> <li>Monitoring of the outcomes of the policy execution with respect to the intended goals.</li> </ul>	<ul style="list-style-type: none"> <li>Assess policy impact.</li> <li>Define success criteria.</li> <li>Review evaluation reports.</li> </ul>

Table 4.13 – Policy-making cycle stages. Adapted from Lukensmeyer and Torres (2006), OECD (2004), Rosa and Pereira (2008) and Sommer (2007).

#### 4.3.2.8. Domain Concepts Overview

Following the analysis provided in the sections above, the relevant e-Participation domain concepts for the *ePOSM* development are described in Table 4.14.

Concept	Description	Sub-concepts
<b>e-Participation Area</b>	Social practice of citizen engagement and involvement in the democratic process.	Activism; Consultation; Community Building; Deliberation; Discourse; Information provision; Electioneering; Mediation; Petitioning; Polling; Voting.
<b>e-Participation Level</b>	Depth of the participants' engagement.	e-Informing; e-Consulting; e-Involving; e-Collaboration; e-Empowerment.
<b>e-Participation Process</b>	Sequence of interdependent and structured activities or tasks, which transform inputs into outputs and that, once completed, should accomplish the e-Participation initiative goal.	Not applicable.
<b>e-Participation Stakeholder Category</b>	Categorisation of person or group who has an interest in e-Participation or who could potentially be affected by its outcome.	Government and Administration; Citizenry; Collective Agents
<b>e-Participation Tools</b>	ICT component used to support citizens' participation.	Chat; Profile; Forum; Debate; Information provision; Petition; Meeting; Questionnaire; Poll;

Concept	Description	Sub-concepts
		Voting; Alert.
<b>Participatory Method</b>	Procedure designed to inform, consult and involve citizens in policy-making.	Citizens' Jury; Citizens' Panel; Consensus Conference; Deliberative Polling; Delphi Survey; Expert Panel; Focus Group; Petition; Participatory Strategic Planning; Public Hearings; Referendum; The World Café.
<b>Policy-making Stage</b>	Stage of the Policy-making cycle.	Agenda Setting; Policy Preparation; Policy Formulation; Policy Execution; Policy Evaluation.

Table 4.14 – e-Participation domain concepts' description.

## 4.4. *EPOS*M DESCRIPTION

### 4.4.1. *ePOS*M Overview

The *ePOS*M stack comprises the four sub-ontologies described in Table 4.15, extending the Organisational Ontology developed in the SUPER project (refer to Section 2.7) to the e-Participation domain. For reference purposes, the concept maps corresponding to the SUPER project (Janusch et al., 2008) ontologies are represented in Annex 8.7.1.

Name	Description	Content
<b><i>ePOS</i>M_SO</b>	e-Participation Strategy Ontology	Extension of the Janusch et al. (Janusch et al., 2008) <i>BSO</i> , by adding the concepts and relations required to ensure the strategic alignment of e-Participation goals.
<b><i>ePOS</i>M_OUO</b>	e-Participation Organisational Units Ontology	Extension of the Filipowska et al. (2009) <i>OUO</i> , by instantiating the organisational units required to implement and sustain e-Participation.
<b><i>ePOS</i>M_FO</b>	e-Participation Functions Ontology	Extension of the Filipowska et al. (2009) <i>BFO</i> , by adding the hierarchy of business functions required to manage e-Participation.
<b><i>ePOS</i>M_RO</b>	e-Participation Roles Ontology	Extension of the Filipowska et al. (2009) <i>BRO</i> , by adding the concepts of the roles required to perform the e-Participation functions.

Table 4.15 – *ePOS*M Framework.

The overarching *ePOS*M concept map, including the adopted concept of e-Participation (refer to Section 1.5) and the relations between the central concepts of each of the five developed sub-ontologies is available in Figure 4.3. In order to ensure a consistent network of ontologies, reflecting various dimensions of e-Participation implementation, structure and operation, the sub-ontologies provide a compatible degree of detail and include interrelated concepts.



Figure 4.3 – *ePOS*M: Overarching Concept Map.

#### **4.4.2. *ePOSM* Strategy Ontology**

##### **4.4.2.1. Purpose**

The *ePOSM* Goals Ontology (*ePOSM\_SO*) extends the Janusch et al. (Janusch et al., 2008) Business Strategy Ontology (*BSO*) by identifying the concepts and relationships required to ensure the strategic alignment of e-Participation goals, addressing competency questions CQ1.1 through CQ1.8 (refer to Section 4.2.2). Further to this, the *ePOSM\_SO* defines a set of concepts relevant to the remaining *ePOSM* ontologies.

##### **4.4.2.2. Model Rationale**

The *ePOSM\_SO* provides a strategy-driven model to define goals for e-Participation across Government and Public Administration, by establishing cause-and-effect relationships among concepts defined by the ontology, concepts of the domain (refer to Section 4.3) and concepts included in the remaining *ePOSM* ontologies. In fact, from an ontological perspective, while the conceptualisations carried-out in the other *ePOSM* sub-ontologies were essentially focused decomposition of concepts, in the case of the *ePOSM\_SO*, it was focused on defining associative relationships. These act as the glue between domain and organisational concepts, towards harnessing strategic alignment. Strategy alignment is the cornerstone of BPM, meaning that the processes have to be designed, executed, managed and measured according to the Organisation's defined strategy. In the e-Participation domain, this approach consists in the capability of linking civic participation priorities to the e-Participation processes embedded in the policy-making cycle. According to Dijk (2010), the perceived effectiveness and efficiency of e-Participation depends on the goals of governments or citizens. Different views of democracy (refer to Section 2.2) require different strategies. For example, while a deliberative view focuses on the quality of policy-making, a participative view tends to privilege the quantity of contributions. Likewise, different visions for several other factors, such as the Level of e-Participation (refer to Section 4.3) to apply, the Participation Area (refer to Section 4.3) to address or the envisioned benefits, are inherently part of the strategy and should be explicitly stated. Consequently, the main challenge of conceiving the *ePOSM\_SO* was to capture the key concepts that characterise different views and approaches to Participatory Democracy and should be considered in the scope of strategy definition. Grounded in BPM, the *ePOSM\_SO* provides a conceptual model to translate the high-level strategic goals into process-specific quantifiable objectives, facilitating the effective control of e-Participation implementation.

##### **4.4.2.3. Conceptualisation**

According to Janusch et al. (2008), the *BSO* (refer to Annex 8.7.1) aims at modelling the environment the Enterprise intends to reach, as well as at defining general strategy-related concepts in order to provide a foundation for developing enterprise-specific ontologies. As the *BSO* entails concepts clearly rooted in the private sector context, it was necessary to evaluate the applicability of the *BSO* classes. The analysis performed revealed that, while all the classes directly linked to Strategy could be applied, some of the subclasses were not applicable, as described in Table 4.16. The designation used for some classes, namely *Market*, *Market Segment* and *Competitive Advantage*, might be



unusual in the context of e-Participation; nevertheless, it was considered that their properties and relationships were relevant. Therefore it was decided to tailor these concepts to the domain. According to Wikipedia (2015d), a market is one of the varieties of systems, institutions, procedures, social relationships and infrastructures whereby parties engage in exchange. This definition fits the purpose of the *ePOSM\_SO*, which covers the supply and demand forces behind policy-making. With respect to the *Competitive Advantage* class, it was used to identify e-Participation benefits.

Applicable Classes	Classes Not Applicable
<ul style="list-style-type: none"> <li>• <i>Strategy</i></li> <li>• <i>Strategy Type</i></li> <li>• <i>Objective</i></li> <li>• <i>Stakeholder Expectation</i></li> <li>• <i>Market</i></li> <li>• <i>Market Segment</i></li> <li>• <i>Competitive Advantage</i></li> <li>• <i>Activity Type</i></li> <li>• <i>Target Group</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Price Leadership (Strategy Type subclass)</i></li> <li>• <i>Diversification (Strategy Type subclass)</i></li> <li>• <i>Cost Leadership (Strategy Type subclass)</i></li> <li>• <i>Market Dominance (Strategy Type subclass)</i></li> <li>• <i>New Product Development (Strategy Type subclass)</i></li> <li>• <i>Business Unit Strategy (Strategy subclass)</i></li> <li>• <i>Corporate Strategy (Strategy subclass)</i></li> <li>• <i>Operational Strategy (Strategy subclass)</i></li> </ul>

Table 4.16 – BSO classes' applicability.

The *e-Participation Strategy* is a subclass of the *Strategy* class defined in the BSO, which is understood as a long-term course of action to achieve a goal. Therefore, *e-Participation Strategy* inherits the properties of the *Strategy* class, making use of its related classes which were modelled as subclasses of the BSO, as described in Table 4.17.

BSO Class	<i>ePOSM_SO</i> related Subclass
<i>Strategy</i>	<i>e-Participation Strategy</i>
<i>Strategy Type</i>	<i>e-Participation Level</i>
<i>Objective</i>	<i>e-Participation Objective</i>
<i>Stakeholder Expectation</i>	<i>e-Participation Expectation</i>
<i>Market</i>	<i>Policy-making</i>
<i>Market Segment</i>	<i>Policy-making Stage</i>
<i>Competitive Advantage</i>	<i>e-Participation Advantage</i>
<i>Activity Type</i>	<i>e-Participation Activity</i>
<i>Target Group</i>	<i>e-Participation Stakeholder Category</i>

Table 4.17 – *ePOSM\_SO* modelling decisions.

In order to answer the specified competency questions it was necessary to add concepts that were not available in the BSO. Inspired in the Business Motivation Model (OMG, 2010), the *ePOSM\_SO* introduces the classes of *e-Participation Vision*, *e-Participation Course of Action*, *e-Participation Goal*, *e-Participation Constraint*, as well as specific properties for the *e-Participation Objective* class. The *ePOSM\_SO* concept map, including the classes' hierarchy, is available in Figure 4.4, comprising 90 concepts and 22 relationships.

The *e-Participation Strategy* is the central concept of the *ePOSM\_SO*, having multiple associative relationships. The strategy type defines the envisioned form of government, which is reflected in the

projected engagement depth. Consequently, the *BSO Strategy Type* concept was modelled by introducing the subclass *e-Participation Level*, which was subsequently decomposed in the applicable levels (refer to Section 4.3). There are several possible application areas for e-Participation, such as managing social assets or dispute and conflict resolution (Millard, 2013), and different target groups (Rosa & Pereira, 2008). Notwithstanding, the purpose of this research is restricted to policy-making. Hence, the *BSO class Market* was modelled by introducing the subclass *Policy-making* only, whilst the *BSO class Target Group* was modelled solely by the subclass *e-Participation Stakeholder Category*.

The *ePOSM\_SO* contains three intertwined concepts that are fundamental to ensure the strategic alignment of e-Participation, namely the *e-Participation Vision*, *e-Participation Goal* and *e-Participation Strategy*. The *e-Participation Vision* correspond to the Government envisioned future state, in the form of overall societal goals or public value to which e-Participation should contribute (e.g. Institutional transparency, Subsidiarity). The *e-Participation Vision* should be consolidated in specific qualitative goals, modelled by the *e-Participation Goal* class. In turn, the latter should drive the *e-Participation Strategy* definition, which is operationalised through a specific course of action, including transformation projects to improve e-Participation practice and the execution of e-Participation processes. This course of action was modelled by the *e-Participation Tactic Plan* class.

The *e-Participation Goal* refers to a specific objective, corresponding to a direct outcome for an *e-Participation Stakeholder*. It can have different natures, namely political, social and technical (Macintosh, 2004). Following a continuous improvement approach, the *e-Participation Goal* should represent an improvement with regards to the current status. Therefore, it was modelled by establishing a relationship with the *e-Participation Evaluation Result*. Additionally, the *ePOSM\_SO* introduces the concept of *e-Participation Constraint* to model the restrictions that should be considered when defining the goals. Inspired by the key ICT Contextual Constraining Factors identified by the World Bank (2014), political, social and technical types of restrictions were considered.

The ability to objectively measure the added-value with supporting data is a core concept of BPM. Therefore, the goals should be converted into tangible objectives to facilitate the effective control of e-Participation implementation. This was modelled by means of the *e-Participation Objective* class, which links the *e-Participation Goal* class to a statement of an attainable, time-targeted, prioritised and measurable objective.

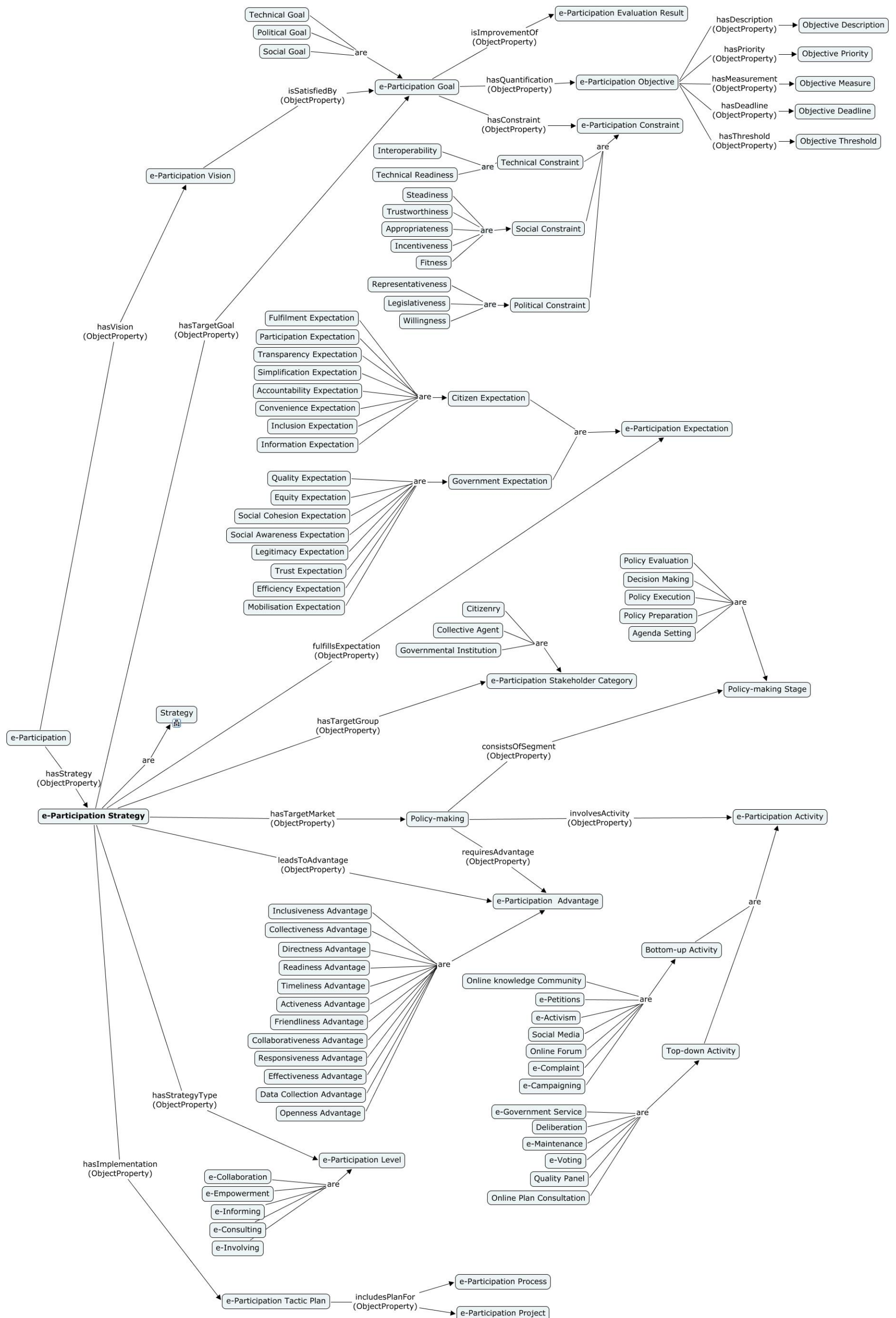


Figure 4.4 – *ePOSMSO*: Complete concept map.

Modelling the *Policy-making* class required the extension of the *BSO* concepts *Market Segment*, *Activity Type* and *Competitive Advantage*. Having policy-making as the target market, the *Market Segment* represents the different stages of the policy-making cycle (refer to Section 4.3) that can be addressed within the e-Participation processes.

The *Activity Type* class represents the intervention areas within the market space and was modelled by the subclass *e-Participation Activity*, which was further decomposed according to the activity initiator, comprising both Citizen-driven (*Bottom-up Activity*) and Government-driven (*Top-down Activity*) types of initiatives (refer to Section 4.3). The *Competitive Advantage* class represents a characteristic that creates uniqueness in the eyes of the *Target Group*. The deployment and sustainability of e-Participation for policy-making depends on enabling factors that were modelled by means of the subclass *e-Participation Advantage*. The *ePOSM\_SO* considers a set of advantages inspired by the key ICT Enabling Factors identified by the World Bank (2014). These factors represent the added-value that Public Sector actors interacting with ICT should experience, namely Openness, Timeliness, Directness, Friendliness, Responsiveness, Collaborativeness, Inclusiveness, Collectiveness, Activeness and Effectiveness. In addition to these factors, the *e-Participation Advantage* decomposition considers the Readiness and Data Collection related factors.

The *Stakeholder Expectation* class refers to the expected benefit from the stakeholders' standpoint and was decomposed in two subclasses, namely *Citizen Expectation* and *Government Expectation*, which were themselves further decomposed. The identified expectations resulted from a comprehensive analysis of literature on this matter.

The definition of all *ePOSM\_SO* classes is available in Annex 8.7.2.1.

#### **4.4.3. *ePOSM* Organisational Units Ontology**

##### **4.4.3.1. Purpose**

The *ePOSM Organisational Units Ontology* (*ePOSM\_OUO*) extends the Filipowska et al. (2009) *OUO*, by instantiating the organisational units required to implement and sustain e-Participation, in order to address the competency questions CQ2.1 through CQ2.4 (refer to Section 4.2.2). The purpose of this ontology is to propose a specification for the Organisational Units specifically related to e-Participation. However, that does not preclude the need of support from other cross-functional Organisational Units (e.g. IT, Human Resources).

##### **4.4.3.2. Model Rationale**

The *ePOSM\_OUO* was conceived to specify an organisational structure that allows a consistent partitioning of the e-Participation related functions (refer to Section 4.4.4). Following the issues identified in the Problem Statement (refer to Section 1.2), the objective of this approach was to avoid the existence of standalone, loosely connected and divergent initiatives across Government and Public Administration, liable to result in wasted resources and reduced motivation among stakeholders. Hence, an e-Participation governance unit was created aiming towards a centralised and consistent roll-out of e-Participation initiatives, and supported by operational units dedicated to the execution of transformation projects and participatory processes.

BPM Centres of Excellence (CoEs) are popular organisational setups to ensure the organisation-wide adoption of BPM (ABPMP, 2009; Dyer, Forget, Osmani, & Zahn, 2013; Jesus, Macieira, Karrer, & Rosemann, 2009). There are successful experiences of CoEs being adopted in the public sector (ABPMP, 2009; Rosemann, 2008). The BPM CoEs deliver process management services to the Organisation, provide the necessary standards and enforce a BPM mindset (Rosemann, 2008). Based on cumulative experience, Dyer et al. (2013) identified three critical success factors for implementing BPM programmes. Firstly, a BPM initiative can only survive by achieving business value, and the latter must support the strategic objectives of the organisation. Secondly, long-term success depends on the ability to establish a scalable BPM delivery model. Thirdly, the transformative nature of BPM requires a shared infrastructure that can scale-out according to a growing demand for BPM projects. Following these conclusions, the author proposes a CoE structured in three focus areas, namely Strategy, Delivery and Infrastructure. The Strategy area is responsible for the strategic alignment, long-term planning for the overall BPM initiative, BPM awareness, funding model and organisation-wide performance tracking, going beyond the tactical success of individual projects. The Delivery area is responsible for creating a scalable delivery model for both staffing and delivering BPM initiatives. Lastly, the Infrastructure area is responsible for the design, administration and maintenance of a shared infrastructure for hosting the solutions resulting from the BPM initiatives. This CoE model was adopted in the *ePOSM\_OUO* and tailored to e-Participation.

#### 4.4.3.3. Conceptualisation

The *ePOSM\_OUO* concept map is available in Figure 4.5, including 16 concepts and 2 associative relationships. It makes use of the classes *Organisational Unit*, *Temporary Organisational Unit*, *Permanent Organisational Unit*, *Project Unit*, *Task Unit* and *Committee Unit* defined in the *OUO* (refer to Annex 8.7.1) and it was not considered necessary to define additional concepts. The Organisational Units assigned to e-Participation were modelled as subclasses of the *OUO* classes.

Following the above-mentioned rationale, the *ePOSM\_OUO* introduces the concept of *e-Participation CoE* as a permanent organisational structure, pivotal to sustain and enhance the benefits of e-Participation. The *e-Participation CoE* encompasses the three key focus areas proposed by Dyer et al. (2013) tailored to e-Participation, including the *e-Participation Centre of Strategy*, the *e-Participation Centre of Delivery* and the *e-Participation Centre of Infrastructure*.

The mission of the *e-Participation Centre of Strategy* sub-Unit covers the definition of e-Participation goals and sets the course for e-Participation across Government and Public Administration. Due to this broad scope of intervention, this sub-Unit is further decomposed into three sub-Units, namely *e-Participation Executive Team*, *e-Participation Strategy Team* and *e-Participation Architecture Team*. The mission of the *e-Participation Centre of Delivery* sub-Unit includes the creation of a scalable delivery model for both staffing and delivering e-Participation (Dyer et al., 2013).

The mission of the *e-Participation Centre of Infrastructure* sub-Unit encompasses designing, building and governing e-Participation infrastructure (Dyer et al., 2013).

In addition to the permanent organisational structure, the implementation of e-Participation requires temporary units for specific missions, including the execution of structural projects to improve e-

Participation practice, conducting specific e-Participation initiatives and overall evaluation of e-Participation. Furthermore, as these are temporary endeavours, the corresponding missions are appointed by a permanent structure of the organisation. Consequently, while e-Participation Improvement projects are created by the *e-Participation Centre of Delivery*, e-Participation initiatives result from the initiatives' prioritisation defined within the *e-Participation Centre of Strategy*. Likewise, the evaluation of e-Participation is related to the overall follow-up of e-Participation practice and, thus, should be performed by an independent committee appointed by the *e-Participation Centre of Strategy* that has the responsibility of setting the e-Participation strategy. The relationships among functions and organisational units are established in the *ePOSM Functions Ontology* (refer to Section 4.4.4).

The definition of all *ePOSM\_OUO* classes and relationships is available in Annex 8.7.3.

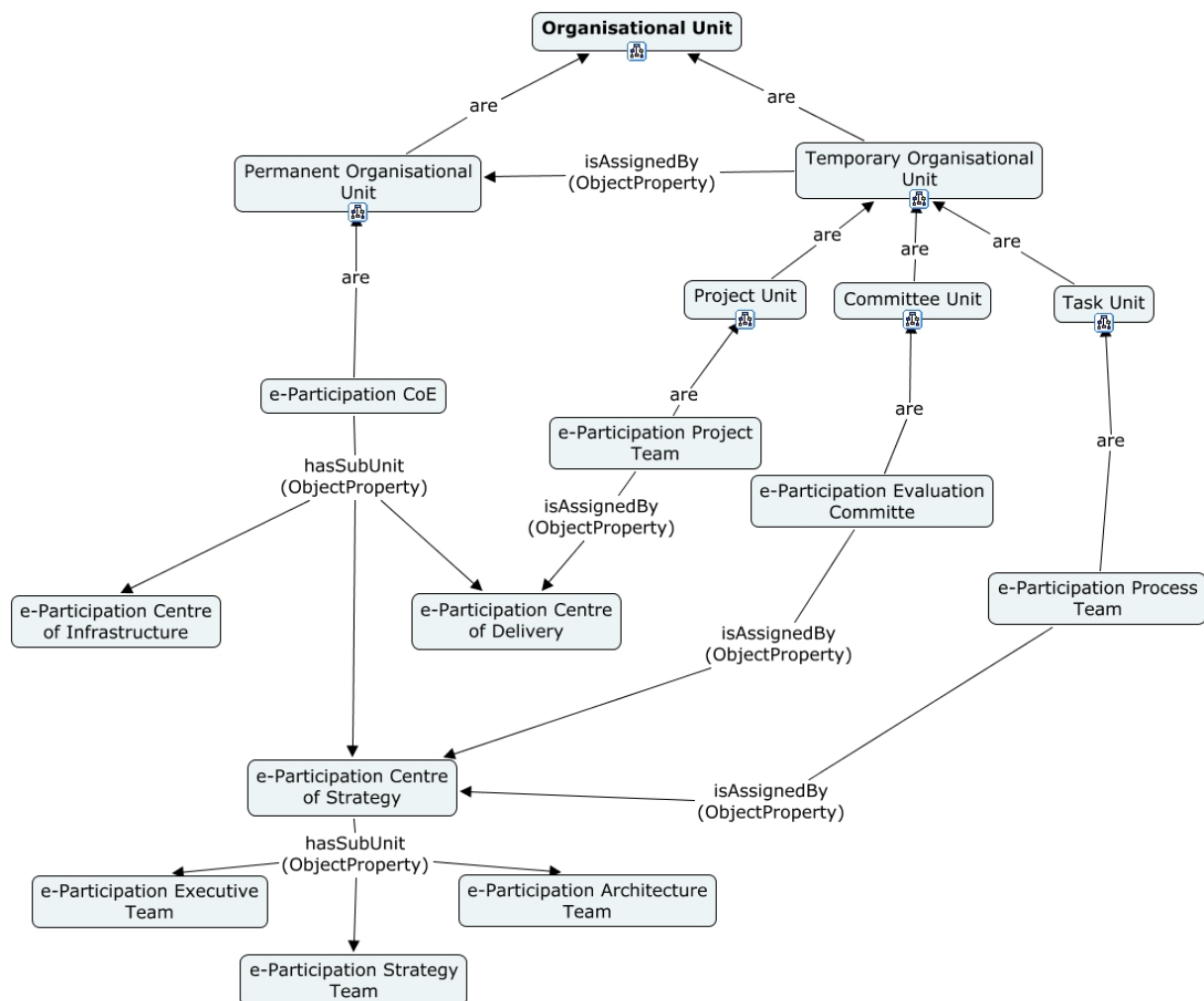


Figure 4.5 – *ePOSM\_OUO*: Concept Map.

#### 4.4.4. *e*POSM Functions Ontology

##### 4.4.4.1. Purpose

The *e*POSM Functions Ontology (*e*POSM\_FO) extends the Filipowska et al. (2009) *BFO* reference ontology by adding the business functions required to manage e-Participation, in order to address the competency questions CQ3.1 through CQ3.6 (refer to Section 4.2.2). The primary purpose of the *e*POSM\_FO is to specify the e-Participation related functions by means of common vocabulary, in order to foster cross-functional and cross-organisational processes interoperability, while avoiding the creation of silos and redundant functions.

##### 4.4.4.2. Model Rationale

The *BFO* was structured to encompass concepts that range from highly abstract functions – such as strategic planning – to highly detailed activities – including the physical execution of step-by-step procedures with detailed routines (Filipowska et al., 2008). Following the overall purpose and scope defined for the *e*POSM (refer to Section 1), it was considered that the *e*POSM\_FO should include specific functions to manage e-Participation, steered by a BPM approach and decomposed into a procedural level potentially adaptable by the target organisations.

The initial step for developing the *e*POSM\_FO was to conceive the abstract model for e-Participation represented in

Figure 4.6. This model adopts the BPM lifecycle (refer to Section 2.6) and introduces a continuous improvement approach to implement and govern e-Participation with a view to fostering sustainability. It relies on three dimensions.

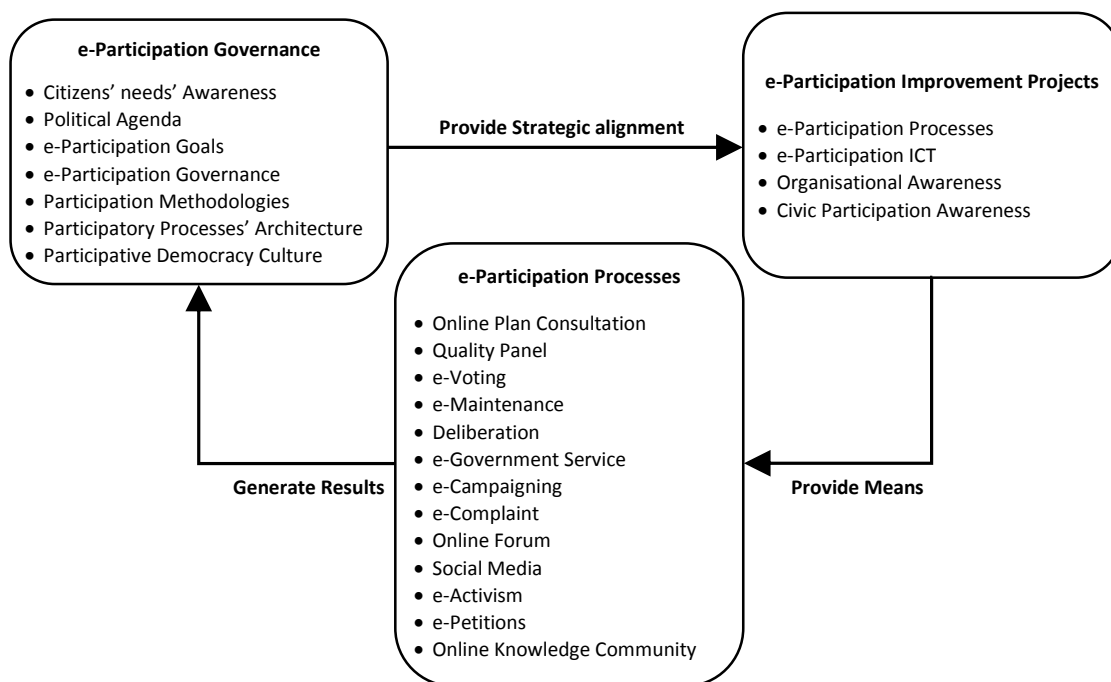


Figure 4.6 – E-Participation sustainable model.

The first dimension corresponds to the management of e-Participation practice. The second dimension corresponds to the capability to implement strategic transformations on a continual basis so as to cumulatively create means for the operationalisation of e-Participation, as well as to address ICT, processes, e-Participation and organisational awareness. Lastly, the third dimension corresponds to the practice of e-Participation as a regular operation by means of processes embedded in the policy-making cycle. According to the proposed approach, the management of participatory processes is essentially an operational function, corresponding to the execution of initiatives which are part of a strategic planning and supported by processes and infrastructure implemented by means of transformation projects. The results of such processes feed into further incremental iterations in order to enhance enhancing e-Participation maturity. Hence, the ability to effectively embed this model across Government and Public Administration was considered the cornerstone to e-Participation sustainability. From an ontology engineering standpoint, the conception of the *ePOSM\_FO* consisted in identifying and structuring the functions required by this abstract model.

#### 4.4.4.3. Conceptualisation

##### *ePOSM* Functions Ontology: Top-level

The top-level view, available in Figure 4.7, makes use of the concepts *Function* and *Project Management* defined in the *BFO* (refer to Annex 8.7.1). Additionally, it extends the *BFO* by introducing new concepts, namely the *e-Participation Process Management* and *e-Participation Management* classes.

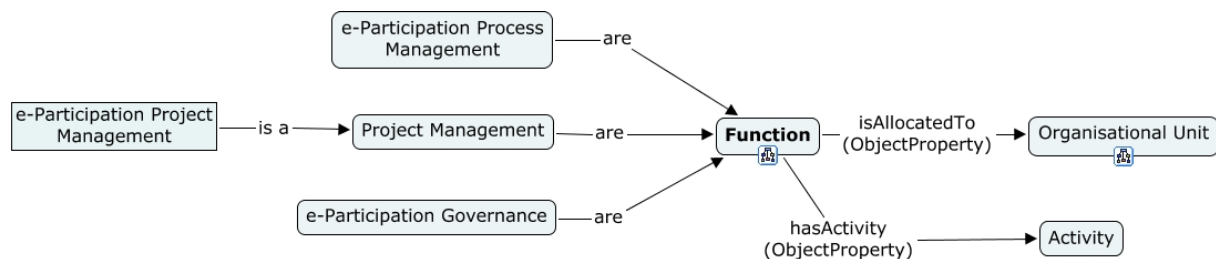


Figure 4.7 – *ePOSM\_FO*: Top-level view Concept Map.

As previously mentioned (refer to Section 4.4.4.1), one of the primary goals of the *ePOSM\_FO* is to contribute to organisational consistency, avoiding the creation of silos and redundant functions. These principles have been observed in the identification of the *e-Participation Project Management* as an instance of the *Project Management* class, meaning that, from a methodological perspective, e-Participation projects are not deemed different from other types of projects. Hence, the management of e-Participation projects should adhere to the project management best practices used in the organisation, regardless of the domain. Consequently, the conceptualisation of *e-Participation Project Management* is out of the *ePOSM\_FO* scope. The definition of all *ePOSM\_FO* top-level classes and relationships is available in Annex 8.7.4.

As the *ePOSM\_FO* vocabulary addresses functions and activities, the designations tend to include two to three words. For the sake of consistency, and in accordance with the Conceptualisation Guidelines (refer to Annex 8.6), the naming convention described in Table 4.18 was adopted.



Class	Naming Convention
<b>Function</b>	[e-Participation]<Functional Areas (noun)><Type of Function (noun)> <i>e.g. e-Participation Stakeholders Engagement</i>
<b>Activity</b>	<Type of Activity (verb in active form)> <Work Unit (noun)> <i>e.g. Planning Results</i>

Table 4.18 – *ePOSM\_FO*: Naming Convention.

### ***ePOSM* Functions Ontology: e-Participation Governance**

The *e-Participation Governance* function concept map is available in Figure 4.8, including its decomposition into sub-functions and the specification of the related Organisational Units. In accordance to the rationale described above, the decomposition was performed up to the maximum level of detail that was considered not to be bound to organisation-specific concepts. Following the approach introduced by the *ePOSM\_OUO*, the *e-Participation Governance* function is essentially a responsibility of the *e-Participation CoE*. The functions' breakdown was inspired in Dyer (2013) and Rosemann's (2008) works concerning the service portfolio of a BPM CoE.

The functions allocated to the e-Participation Centre of Strategy teams comprise *e-Participation Strategic Alignment*, *e-Participation Stakeholders Engagement*, *e-Participation Funding Management*, and *e-Participation Architecture Management*.

From an ontological standpoint, the purpose of the *e-Participation Strategic Alignment* function is to instantiate all classes included in the *ePOSM\_SO* (refer to Section 4.4.2), considering the context and moment in time, meaning that it consists in defining tangible values for all the classes while ensuring the consistency of relationships. From an operational perspective, it means that the success of the *e-Participation Tactic Plan* outcomes depends, first and foremost, on ensuring the articulation among all the *ePOSM\_SO* concepts. The *e-Participation Strategic Alignment* is decomposed into two sub-functions: *e-Participation Ends Definition* and *e-Participation Means Definition*. The *e-Participation Ends Definition* aims at identifying the desired status and includes the activities *Defining Vision*, *Planning Results* and *Identifying Constraints*. The activity *Defining Means* is intended to identify and plan how the ends should become a reality, which requires the activities *Defining Strategy* and *Planning Tactic*. The *Identifying Constraints* activity corresponds to the identification of the constraints' types defined in the *ePOSM\_SO*.

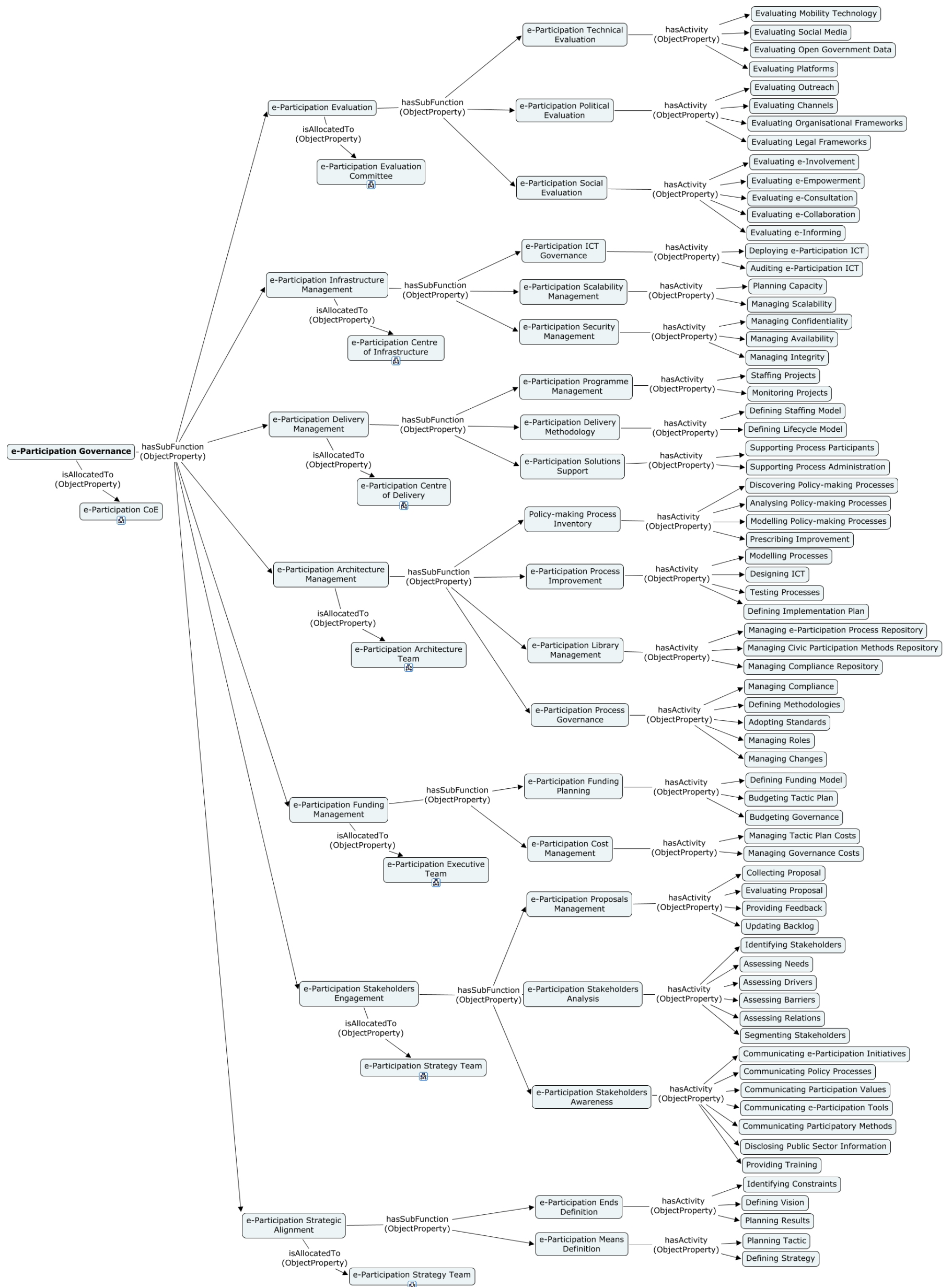


Figure 4.8 – ePOSM\_FO: e-Participation Governance Concept Map.

The *e-Participation Stakeholders Engagement* function aims at persuading e-Participation Stakeholders to take part in the policy-making process, comprising the sub-functions *e-Participation Stakeholders Awareness*, *e-Participation Stakeholders Analysis* and *e-Participation Proposals Management*. The *e-Participation Stakeholders Awareness* function aims at mobilising civic participation values and beliefs towards the improvement of e-Participation. For this purpose, several awareness activities were collected from both BPM and civic participation reports. Raising awareness to the planned initiatives by informing on what to expect, when to expect, why it is important and what is available for participants is essential for generating momentum (MyUniversity, 2013) and overcoming possible reluctance. This can be done through a variety of methods and channels, using both online and offline approaches (Millard, 2013; MyUniversity, 2013). In order to enable bottom-up innovation, it is necessary to build widespread skills and competencies amongst potential participants (Millard, 2013), covering participatory methods, e-Participation tools, civic participation values and policy-making processes (refer to Section 4.3). Furthermore, this approach is compliant with the Open Governance Framework (refer to Section 2.5), by opening data routinely collected by the public sector for administrative, service provision or public policy purposes. This data is designated as Public Sector Information<sup>37</sup> and its disclosure allows public value creation (Millard, 2013; Ricolfi et al., 2012). However, further to creating the data catalogue, it is equally important to ensure its quality control and updates. Accordingly, systematic policies on government information management ought to be in place (World Bank, 2014). Lastly, the *e-Participation Stakeholders Awareness* function includes the activity of providing hands-on practical interaction with tools, thus demonstrating that the functionality advertised is actually being delivered. The *e-Participation Stakeholders Analysis* function includes the activities required to collect relevant information concerning *e-Participation Stakeholders Expectation* in order to define the *e-Participation Strategy* (refer to Section 4.4.2). E-Participation stakeholders evolve. In the public sector, new partnerships and intermediaries are emerging (Misuraca et al., 2010), while citizens, civil society and advocacy groups should increasingly be empowered to organise themselves and play a role. Consequently, it is important to continually identify relevant stakeholders according to the policy subject and scope (MyUniversity, 2013). Additionally, *e-Participation Stakeholders Analysis* comprises activities to systematically evaluate the stakeholders' needs and e-Participation adoption drivers and barriers, as well as activities to influence the relationships between these (Australian Government, 2010). The information assessed should be used to group the identified stakeholders into segments according to attributes of interest. As for *e-Participation Proposals Management*, it is of the utmost importance for leveraging e-Participation maturity, as it allows a move from a top-down, centralised, institutional approach – typically based on administrative silos – to a collaborative approach which enables leadership, ownership and accountability at grassroots' level (Millard, 2013). Taking advantage of the tools and channels currently available for citizens' engagement, the *e-Participation Proposals Management* activity aims to leverage the wealth of citizen-generated feedback towards an effective outcome.

The *e-Participation Funding Management* function was decomposed into two sub-functions, namely *e-Participation Funding Planning*, which encompasses activities related to the funding model

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<sup>37</sup> Wide range of information that public sector bodies collect, produce, reproduce and disseminate in many areas of activity while accomplishing their institutional tasks, such as social, economic, geographical, cadastral, weather, tourist, and business information (Ricolfi et al., 2012).

definition and the budgeting, and *e-Participation Cost Management*. The funding-related activities cover the execution of the *e-Participation Governance* function and the initiatives included in the Tactic Plan (which includes e-Participation Processes and Projects as referred in Section 4.4.2).

The *e-Participation Architecture Management* function covers the management of the e-Participation value-driven and enabling processes, encompassing several sub-functions. *Policy-making Process Inventory* corresponds to the discovery, identification and modelling of the key policy-making processes that are aligned with the *e-Participation Strategy*. The processes including e-Participation value-chain should be analysed according to a systematic evaluation of process-level and activity-level attributes (Dyer et al., 2013) in order to identify a suitable tactic to integrate civic participation. This should be subsequently consolidated in an improvement plan. The *e-Participation Process Improvement* function consists in the integration of e-Participation in the policy-making cycle by designing or redesigning end-to-end processes, specifying ICT requirements, testing and preparing the correspondent implementation plan. The *e-Participation Library Management* function is an essential function to continually improve the maturity of e-Participation through the adoption of process repositories. The latter are essential components of a Business Process Management System solution (ABPMP, 2009) to ensure consistent communication, including a comprehensive characterisation of processes and supporting information. In addition, the e-Participation library includes a repository for the participatory methods (refer to Section 4.3) that underpin e-Participation processes and another repository for the applicable regulations. Lastly, the function *e-Participation Process Governance* covers the lifecycle management of e-Participation processes.

The *e-Participation Delivery Management* function covers the realisation of e-Participation transformations following the orientations provided by the *e-Participation Process Improvement* function. To this end, it includes the management of the portfolio of e-Participation projects and e-Participation Processes initiatives, the user support on the available e-Participation solutions and the definition of methodologies that underpin the delivery of e-Participation processes and transformation projects.

The *e-Participation Infrastructure Management* function covers the administration of the technical platform that hosts the e-Participation solutions. It includes three main sub-functions: ICT governance, covering how the e-Participation applications are deployed; scalability management, to ensure business continuity; and security management, covering the information confidentiality, integrity and availability (ISO/IEC 27001, 2005).

The *e-Participation Evaluation Management* function deals with the continuous effort to evaluate the outcomes of e-Participation towards continuous improvement. The adopted approach was inspired in the framework *Measuring and Evaluating e-Participation* (United Nations, 2013b), which aims to diagnose the factors that make e-Participation succeed or fail, through a holistic assessment covering technical, political and social perspectives.

The definition of the *ePOSM\_FO e-Participation Governance* related classes is available in Annex 8.7.4.1.

### ***e*POSM Functions Ontology: e-Participation Process Management**

The proposed model for the *e-Participation Process Management* function corresponds to the operationalisation of an *e-Participation Process* (refer to Section 4.3) in accordance with the abstract model represented in

Figure 4.6. A participatory process incorporates interrelated steps that demand a broad range of interdisciplinary *Functions*, comprising technical, organisational, managerial, political and social activities. No references to these functions, from an organisational standpoint, were found in the literature. Nonetheless, there is a wealth of procedural models for e-Participation (Scherer & Wimmer, 2011b) with a comprehensive description of the steps that an e-Participation process comprises. These models are usually derived from the plans and practice related to the implementation of e-Participation projects. Thus, rather than being limited to the execution of participatory processes, the available models are deeply focused on the development, from scratch, of the related ICT infrastructure and of the methodological framework. Consequently, the review of the existing literature revealed that such models often include tasks within the scope of the *ePOSM\_FO* previously defined *e-Participation Project Management*. From an ontological standpoint, and following the vision exposed in the abstract model represented in

Figure 4.6, *e-Participation Project Management* and *e-Participation Initiative Management* are disjoint concepts. Hence, the conceptualisation of the *e-Participation Process Management* included an analysis with a view to identifying the procedural models' tasks that are effectively related to the execution of an e-Participation process, as well as to discard those intended to improve or transform e-Participation practice. Table 4.19 includes a summary of the models that are most aligned with this vision. It is worth noticing that, for the specific purpose of the *ePOSM\_FO*, a prescriptive sequencing of the tasks is out of scope. Indeed, the main focus of the *ePOSM\_FO* is the extension of the *BFO* upper-level ontology by proposing a hierarchy of the functions required to manage e-Participation initiatives, through the adoption of an end-to-end approach.

Author	Scope	Steps
<b>Phang and Kankanhalli (2008)</b>	A framework of ICT exploitation for e-Participation initiatives.	<ol style="list-style-type: none"><li>1. Identification of the objective</li><li>2. Selection of the best participation techniques</li><li>3. Selection of electronic tools</li></ol>
<b>Islam (2008)</b>	A framework for an effective e-Participation model that can be suitable under certain socio-economic settings and applicable to any country.	<ol style="list-style-type: none"><li>1. Policy and capacity building</li><li>2. Planning and goal setting</li><li>3. Program and content development</li><li>4. Process and tools</li><li>5. Promotion</li><li>6. Participation</li><li>7. Post-implementation analysis</li></ol>
<b>Koop (2010)</b>	Guidelines for online consultation including practical recommendations for the involvement of citizens over the Internet.	<ol style="list-style-type: none"><li>1. Identification of the objectives and conditions</li><li>2. Design of the procedure</li><li>3. Implementation of the consultation</li><li>4. Evaluation and conclusion</li></ol>
<b>Slocum (2003)</b>	Practical information for	<ol style="list-style-type: none"><li>1. Recruitment of a project team</li></ol>

Author	Scope	Steps
	starting up and managing participatory projects. It presents participatory techniques, methods or applications, including participatory assessment, monitoring.	<ol style="list-style-type: none"> <li>2. Definition of the strategy's purpose and goals</li> <li>3. Determination of the scope and focus of a public involvement process</li> <li>4. Understanding of the legislative, legal, jurisdictional and social context of the issue and any decision(s) to be made</li> <li>5. Determination of who should be involved and why</li> <li>6. Understanding of the time frame and process for decisions</li> <li>7. Design of the plan (choosing one or multiple methods)</li> <li>8. Assembly of the funding</li> <li>9. Setting of adequate timelines and other resources required to make the process work.</li> <li>10. Recruitment of participants</li> <li>11. Promotion of the event</li> <li>12. Implementation of the plan</li> <li>13. Evaluation of the process and results</li> <li>14. Production and dissemination of the final report</li> </ol>
<b>Scherer et al. (2010)</b>	Hands-on guidelines for e-Participation initiatives incorporating the needs of citizens, politicians and other actors into the functionalities of a platform.	<ol style="list-style-type: none"> <li>1. Initiation</li> <li>2. Design of Participation</li> <li>3. Design of e-Participation</li> <li>4. Implementation of Tools</li> <li>5. Preparation of Information</li> <li>6. Maintenance</li> <li>7. Marketing</li> <li>8. Evaluation</li> </ol>
<b>Rosa and Pereira (2008)</b>	Conditions for deploying electronic based public participation methodologies and online ICT based participatory processes within public policy processes.	<ol style="list-style-type: none"> <li>1. Identification of the Scope</li> <li>2. Clarification of the Purpose</li> <li>3. Analysis of the Context</li> <li>4. Selection of the Participants</li> <li>5. Definition of the Outputs</li> <li>6. Setting of the Outcomes</li> <li>7. Preparation of the Venue</li> <li>8. Institutional Response</li> <li>9. Evaluation of the Process</li> </ol>

Table 4.19 – Main phases of a civic participation initiative.

Following the analysis of the main phases of a civic participation initiative, it was decided to breakdown the *e-Participation Process Management* function into a first tier of sub-functions addressing the Initiation, Setup, Dissemination, Implementation and Closure of the process. The resulting *e-Participation Process* function concept map is available in Figure 4.9.

The *e-Participation Process Initiation* function addresses the *e-Participation Process* requirements and constraints from an end-to-end perspective, in order to maximise the potential value of planned outcomes. Hence, it encompasses a set of sub-functions related to staffing the process with the

required skills and competences, defining the required resources, defining the process targets, framing the scope of the process and raising awareness on contextual influencing factors.

Following the envisioned abstract model represented in

Figure 4.6, the *e-Participation Process Management* makes use of existing means to realise e-Participation. Consequently, the process implementation is based on the existent Reference Processes, developed within the scope of *e-Participation Project*, available in the e-Participation Library (refer to the *e-Participation Governance* function). Therefore, the *e-Participation Process Setup* function consists in instantiating and tailoring a Reference Process according to the selected *Participatory Method* and all the requirements and constraints covered by the *e-Participation Process Initiation* function. To this end, it involves three main sub-functions addressing the ICT setup, the integration of external processes and the preparation of the content required to run the process.

While the remaining functions are inevitably related to a process lifecycle approach, the dissemination is horizontal to the sequence of participatory phases, as it takes place throughout the entire process. The *e-Participation Process Dissemination* encompasses all functions and activities required to guarantee the target participants' awareness and engagement. Online promotion has the ability to be time and location-transcendent, with all the inherent advantages. However, and similarly to some activities of *e-Participation Process Setup*, a multi-channel approach, combining traditional and electronic tools to engage people, is more likely to reach a wider, more diverse audience and, thus, to contribute to better policy and service (Millard, 2013; Serrano Ferreira & Pérez Ortega, 2012; UNDESA, 2014).

The *e-Participation Process Implementation* comprises the functions and activities required for the realisation of the e-Participation Process, comprising *e-Participation Process Administration* and *e-Participation Process Execution*. The *e-Participation Process Administration* function includes the back-office activities that support the *e-Participation Process Execution*, which, in turn, corresponds to the implementation of the participatory method and, therefore, can include one or more activities related to the *e-Participation Areas*. For this reason, in order to avoid redundancies, the definition of the *e-Participation Process Execution* activities are basically references to the domain concepts.

Finally, the *e-Participation Process Closure* comprises the functions and activities required to organise the process closure, adopting a continuous improvement approach. Bearing this in mind, it includes the functions of *e-Participation Process Evaluation* and *e-Participation Process Archival*. It is worth noticing that the *e-Participation Process Evaluation* is dedicated to the specific process, while the previously defined function of *e-Participation Evaluation* (part of *e-Participation Governance*) addresses the overall status of e-Participation, considering the results of all processes and projects. The *e-Participation Process Archival* aims to feed into the e-Participation Library all information that might be relevant to improve subsequent e-Participation initiatives.

The definition of the *ePOSM\_FO e-Participation Process Management* related classes is available in Annex 8.7.4.1.

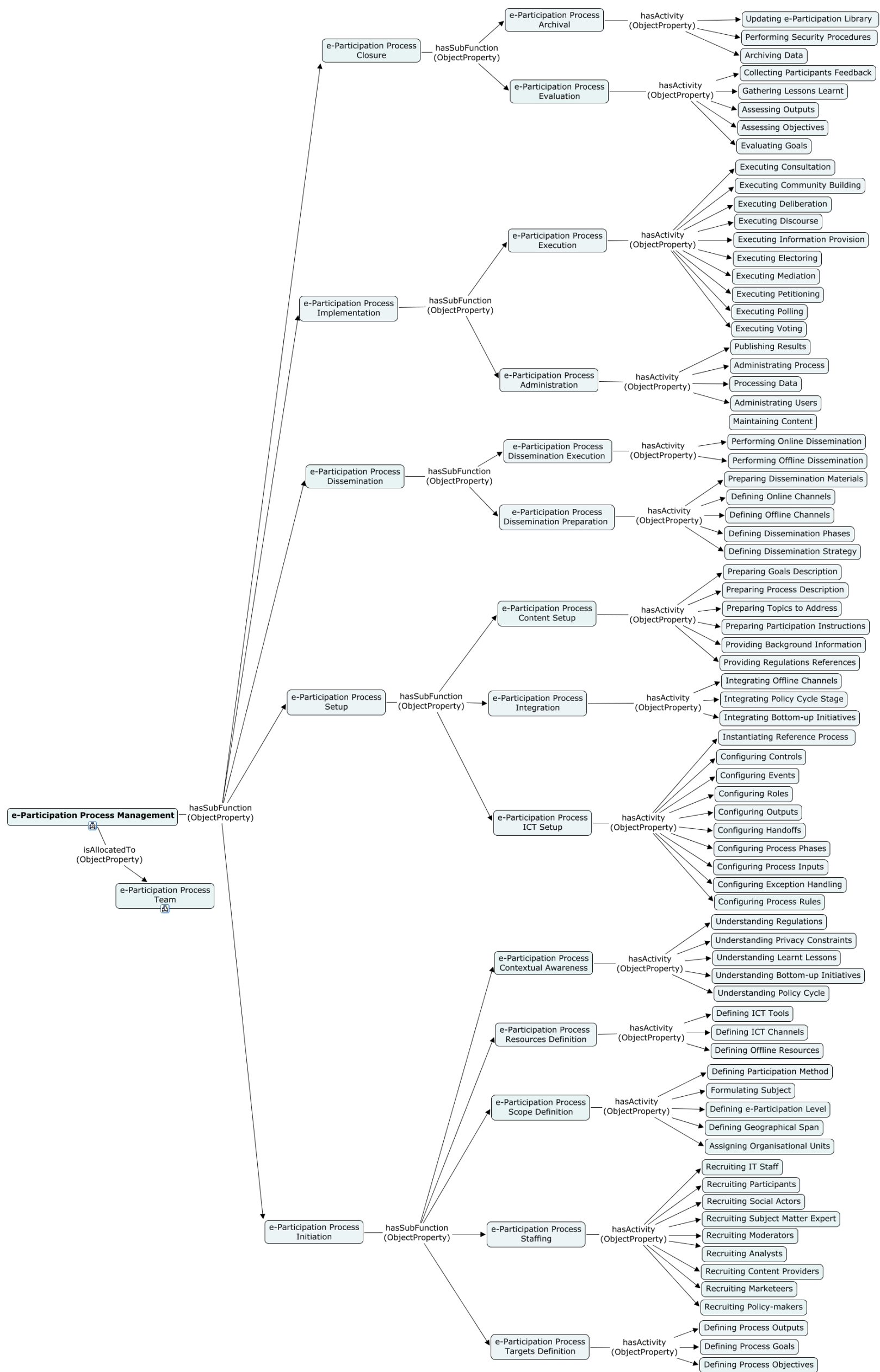


Figure 4.9 – ePOS<sub>M</sub>\_FO: e-Participation Process Concept Map.



#### 4.4.5. *e*POSM Roles Ontology

##### 4.4.5.1. Purpose

The *e*POSM Roles Ontology (*e*POSM\_RO) extends the Janusch et al. (2008) Business Roles Ontology (*BRO*) by providing a conceptual structure for the roles required to perform the e-Participation functions, addressing competency questions CQ4.1 through CQ4.3 (refer to Section 4.2.2). It is worth mentioning that additional cross-functional roles are required to implement e-Participation. However, and as with the approach adopted in the *e*POSM\_OUO, the *e*POSM\_RO is limited to roles specifically focused on e-Participation.

##### 4.4.5.2. Model Rationale

The *e*POSM\_RO was conceived upon the analysis of the roles required to perform the functions defined in the *e*POSM\_FO. There were three main guiding principles. First, the specified roles should not be limited to Government and Public Administration, but rather should comprise all the e-Participation stakeholder groups. The underlying idea is that Government should engage the community to assume roles, not limited to participation itself, but also regarding the ownership and leadership of the e-Participation functions, in order to capitalise the existent ICT and Processes' infrastructure for the benefit of citizenry. This vision reflects the Millard (2013) Open Governance Framework to leverage open engagement and open participation (refer to Section 2.5). A role consists in a set of expected behaviours, prerogatives and obligations featured by an actor (Filipowska et al., 2008). Adopting a BPM approach, the second guiding principle was to consider the dynamic nature of the roles, meaning that an actor can play different roles depending on the process. Finally, it was acknowledged that the *e*POSM\_RO couldn't encompass all the potential roles required by the *Participation Methods* (refer to Section 4.3 and Annex 8.3), as these can be highly specific. Thus, rather than creating a highly complex or restrictive ontology, the *e*POSM\_RO was conceived as a scalable baseline that can be further expanded with additional roles upon specific needs.

##### 4.4.5.3. Conceptualisation

The *e*POSM\_RO concept map is available in Figure 4.10, including 24 concepts and 2 associative relationships. The conceptualisation was essentially based on the hierarchical decomposition of concepts rather than on the creation of associative relations. The *e*POSM\_RO makes use of the *BRO* central concept (refer to Annex 8.7.1) – the class *Role*, which was decomposed to identify the e-Participation specific roles required to perform the *e*POSM\_RO functions *e-Participation Process Management* and *e-Participation Governance*.

In accordance to the first guiding principle described in the ontology rationale (refer to 4.4.5.2), it was decided not to use the *Role* subclasses *InternalRole* and *ExternalRole* (Janusch et al., 2008), as these reflect an organisation-centric approach, breaking down all existing roles in internal and external ones. While this separation makes sense for other domains (e.g. private company), it collides with the above-mentioned Open Governance approach. Consequently, the subclass *e-Participation Role* was defined detached from organisational boundaries. One additional concept was introduced to model the stakeholder group: the *Stakeholder Category*. This modelling approach allows the characterisation of the *Role* within the stakeholder group to which the actor belongs. This

might be relevant for retrieving information without imposing any pre-defined restrictions between stakeholders and roles. Following the second guiding principle (refer to 4.4.5.2), it was decided not to apply any constraints to impose mutually exclusive roles or stakeholders' groups. Accordingly, the *ePOSM\_RO* classes are free to be used in any combination. Nevertheless, if need be, constraints can be added when tailoring the *ePOSM\_RO* to a specific organisation. With respect to the additional roles required by specific participatory methods, these can be added as subclasses of the *e-Participation Process Role* classes. The definition of all *ePOSM\_RO* classes and relationships is available in Annex 8.7.5.

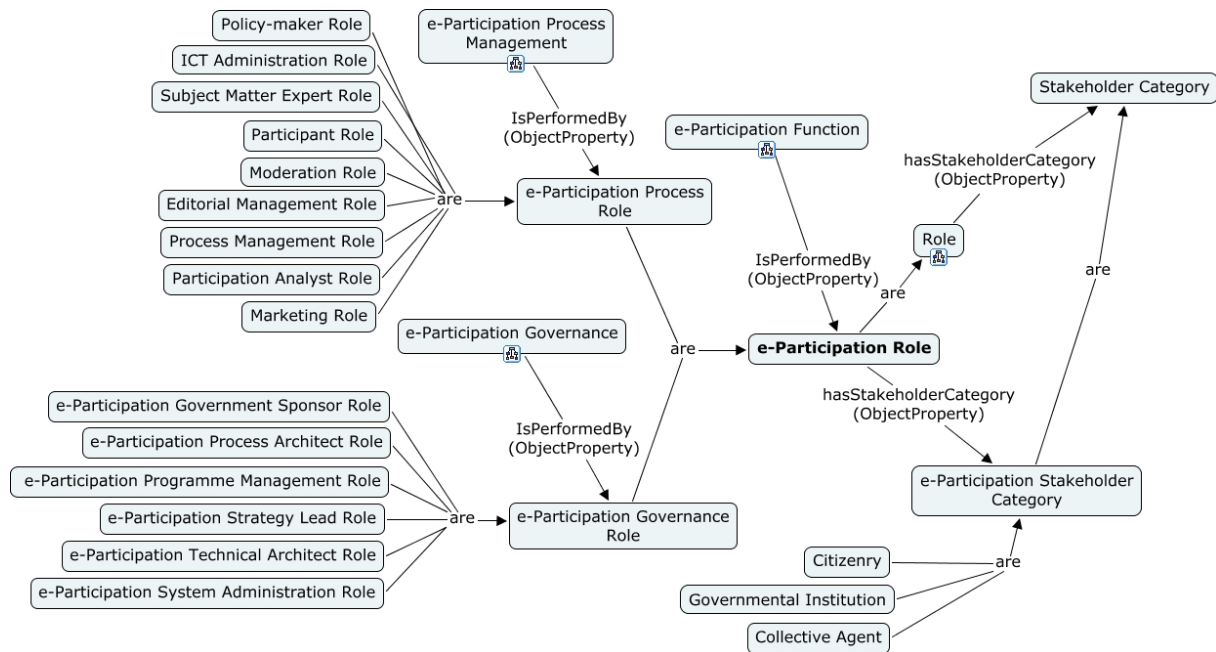


Figure 4.10 – *ePOSM\_RO*: Concept Map.

## 4.5. *ePOSM* VERIFICATION

### 4.5.1. *ePOSM* Verification Approach

The *ePOSM* verification was based on ontology engineering verification techniques. In this context, the purpose of verification is to ensure the correct building of the ontology. According to Gómez-Pérez (1996), the verification addresses the architecture, lexicon and syntax, as well as content. The architecture verification aims to confirm if the structure of the ontology was conceived according to adequate design principles and whether it is grounded in solid criteria (Gómez-Pérez, 1996). The lexicon and syntax verification consists in parsing the ontology representation to detect whether the lexical and syntactic structure of the expressions are correct (Gómez-Pérez, 1996). Lastly, the content verification refers to the semantic features of the ontology. The semantic evaluation was interpreted from different perspectives, including software engineering (Brewster, Alani, Dasmahapatra, & Wilks, 2004; De Nicola, Missikoff, & Navigli, 2009), philosophy (Guarino & Welty, 2002) and knowledge engineering (Fox & Gruninger, 1998; Gómez-pérez, 2001; Uschold & Gruninger, 1996). Considering the *ePOSM* format and purpose (refer to Section 4.2), the knowledge engineering approach was considered the most appropriate, as it focus on aspects of generality to enable ontology reuse (Annamalai & Sanip, 2010), encompassing a set of criteria of desirable qualities such as consistency, completeness, conciseness and extensibility. In addition to the logical consistency, conceptual

definitions ought to be semantically consistent with the requirements of the ontology. Annamalai (2005) stresses that competency is a consequential quality of a usable ontology and that a competent ontology is not only conceptually consistent with respect to its frame of reference, but also functionally complete in the sense that it can adequately represent the terminological knowledge for which it was designed. The evaluation of the competency can be performed through competency questions. According to Grüninger and Fox (1995) competency questions are benchmarks in the sense that the ontology must be necessary and sufficient to represent the tasks specified by the competency questions and their solution. Web-ontology editors, including Protégé and CMapTools Ontology Editor, provide limited support for competency evaluation. In fact, queries are only allowed over the instances of the defined concepts and, therefore, it is not possible to evaluate competency prior to the use of the ontology. Nevertheless, Annamalai (2010) claims that competency evaluation should also be performed during the development process, as formative evaluation towards ensuring the progressive verification of the conceptualisation. This approach was adopted for the *ePOSM* verification. Following these considerations, the *ePOSM* overall verification approach is summarised in Table 4.20.

Level	Criteria	Description
<b>Architecture</b>	Soundness	Structure developed according to adequate design principles.
<b>Lexicon and syntax</b>	Correctness	Lexical and syntactical correctness of the definitions.
<b>Content</b>	Competency	Consistency with the requirements.

Table 4.20 – *ePOSM* verification approach. Adapted from Gómez-Pérez (1996).

#### 4.5.2. Architecture Verification

The *ePOSM* aggregates a total of 327 concepts, 28 types of associative relationships and 348 propositions<sup>38</sup>, distributed by four sub-ontologies, as summarised in Table 4.21.

Sub-ontology	Concepts	Relationships	Propositions
<i>ePOSM_SO</i>	90	22	99
<i>ePOSM_OUO</i>	16	2	19
<i>ePOSM_FO</i>	197	2	203
<i>ePOSM_RO</i>	24	2	27
<b>Total</b>	<b>327</b>	<b>28</b>	<b>348</b>

Table 4.21 – *ePOSM* overall figures.

From a structural standpoint, the *ePOSM* design adhered to the widely accepted Gruber (1995) guidelines for ontologies which purpose is knowledge sharing and interoperation among programmes based on a shared conceptualisation. These are outlined in Table 4.22.

Guideline	Description
<b>Clarity</b>	Provide the intended meaning of defined terms and include objective definitions. The definitions should be documented in natural language.

<sup>38</sup> Concept-Relationship-Concept triples (e.g. '*e-Participation Process ICT Setup*' *hasActivity* '*Configuring Roles*').

Guideline	Description
<b>Coherence</b>	Be coherent to allow inferences that are consistent with the definition. Coherence should also apply to the concepts that are defined informally, such as those described in natural language documentation and examples. If a sentence that can be inferred from the axioms contradicts a definition or example given informally, then the ontology is incoherent. It should also be externally consistent so that terms better conform to common usage.
<b>Extendibility</b>	Design it in order to anticipate the uses of the shared vocabulary. It should offer a conceptual foundation for a range of anticipated tasks, and the representation should be crafted with a view to the ontology being extended and specialised monotonically <sup>39</sup> .
<b>Minimal Encoding Bias</b>	Specify the conceptualisation at the knowledge level without depending on a particular symbol-level encoding <sup>40</sup> .
<b>Minimal ontological commitment</b>	Make the minimum possible claims about the world being modelled, allowing the parties committed to the ontology the freedom to specialise and instantiate the ontology as needed.

Table 4.22 – Ontology Design Principles. Adapted from Gruber (1995) and Uschold (1996).

As the conception of the *ePOSM* as a lightweight ontology (refer to Section 4.2.3) was a design option, no formal axioms have been included. Nevertheless, the Clarity guideline was respected since all new concepts were objectively defined using natural language underpinned by a justified rationale.

In terms of the Coherence guideline, the *ePOSM* extends the SUPER project (Janusch et al., 2008) ontologies and is consistent with the SBPM Ontology Stack (Filipowska, Kaczmarek, Kowalkiewicz, Markovic, & Zhou, 2009). Hence, the SUPER project concepts have been reused and only new concepts have been introduced. Additionally, the *ePOSM* makes use of the e-Participation existent concepts identified in the Knowledge Acquisition phase (refer to Section 4.3), in accordance to the research approach (refer to Section 3.2.2). The new concepts introduced were based on solid references from the e-Participation or BPM areas. From the construction perspective, the Coherence guideline is related to consistency (Uschold, 1996), which, in turn, depends on circularity errors<sup>41</sup>, partition errors<sup>42</sup> and semantic errors<sup>43</sup>. The *ePOSM* is a semi-formal ontology that essentially relies on the partition of concepts (with the exception of the *ePOSM\_SO*), as can be confirmed by the ratio between concepts and relationships (refer to Table 4.21). Consequently, the risk of inconsistency is reduced. Nonetheless, the *ePOSM* was checked for consistency using the ConsVISor tool<sup>44</sup> (refer to Annex 8.8.2) and Protégé Reasoner Hermit 1.3.8<sup>45</sup>.

<sup>39</sup> Monotonic extendibility means that new general or specific terms can be included in the ontology without requiring the revision of existing definitions (T Gruber, 1995).

<sup>40</sup> An encoding bias results when representation choices depend on the notation or implementation (T Gruber, 1995).

<sup>41</sup> A class is defined as a specialisation or generalisation of itself (Lovrenčić & Čubrilo, 2008).

<sup>42</sup> Improper definition of disjoint classes or incomplete class definition (Lovrenčić & Čubrilo, 2008).

<sup>43</sup> A concept is a subclass of a concept to which it doesn't belong (Lovrenčić & Čubrilo, 2008).

<sup>44</sup> Rule-based system for checking consistency of ontologies serialised in RDF (<http://www.w3.org/RDF/>, accessed in 2015-07-13), OWL (<http://www.w3.org/TR/owl-features/>, accessed in 2015-07-13) or DAML (<http://www.daml.org/language/>, accessed in 2015-07-13).

<sup>45</sup> Hermit is a reasoner for ontologies written using OWL developed by the Information Systems Group of the Department of Computer Science of the University of Oxford. Given an OWL file, Hermit determines whether the ontology is consistent or not (<http://hermit-reasoner.com/>, accessed in 2015-07-13).

The Minimal Encoding Bias was guaranteed as there were no modelling decisions dependent on tools or representation formats. This was confirmed by exporting the *ePOSM* to OWL and importing the output files from Protégé 4.3<sup>46</sup>. The results of this verification are available in Annexes 8.8.1 and 8.8.3.

By definition, compliance with the Extendibility and Minimal Ontological Commitment guidelines can only be fully confirmed upon a specific instantiation and real use of the *ePOSM*. Nevertheless, within the Research Framework scope (refer to Section 3.2.2), these guidelines were carefully addressed during conceptualisation. In terms of Extendibility, e-Participation can be approached from different ways and, in particular, it can be based on different visions and strategies. The *ePOSM* was conceived to allow the tailoring to different environments without requiring changes in the existent concepts. With respect to the Minimal Ontological Commitment, the *ePOSM* includes the concepts that were considered essential to communicate the e-Participation sustainability principles, excluding organisation-specific constraints. Furthermore, the application of the Minimal Ontological Commitment guideline was particularly stressed in the modelling options of the *ePOSM\_FO* and *ePOSM\_RO* sub-ontologies (refer to Sections 4.4.4 and 4.4.5).

#### **4.5.3. *ePOSM* Syntax Verification**

The syntax and lexicon of the ontology depend on the representation format. Subsequent to the development of the concept maps, the *ePOSM* was implemented in OWL to prove its adherence to semantic Web standards. For this purpose, the concept maps construction and consistency was verified by the CMapTools Ontology Editor and exported to OWL. The final results confirming the correctness, as well as the resulting OWL files are available in Annex 8.8.1.

#### **4.5.4. *ePOSM* Content Verification**

The competency evaluation verifies the applicability of the ontology conceptual definitions by checking and ensuring that it represents all the necessary concepts and relationships in a computable manner (Annamalai, 2005; Uschold & Gruninger, 1996). The competency formative evaluation (Annamalai & Sanip, 2010) was performed concurrently to the *ePOSM* development (refer to Section 3.2.2). The reference process adopted is available in Figure 4.11. This approach allowed the iterative assurance of compliance with the requirements throughout the development, by correcting the improperly defined concepts or relationships and dropping unnecessary concepts. The results of the competency verification are available in Annex 8.8.4, exhaustively covering all *ePOSM* sub-ontologies. This evaluation led to the conclusion that the *ePOSM* reasoning fully covers the competency questions. At this stage, the results of the formative evaluation are the concepts defined. The *ePOSM* implementation in a real context will instantiate each concept defined with concrete data and, thus, the same competency questions will allow the retrieval of tangible results. The competency questions formulated were derived from the research questions (refer to Section 1.6). As such, the competency evaluation results revealed that the designed artefact adequately answers the research questions.

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<sup>46</sup> [http://protege.stanford.edu/download/protege/4.3/installanywhere/Web\\_Installers/](http://protege.stanford.edu/download/protege/4.3/installanywhere/Web_Installers/) (accessed in 2015-07-14).

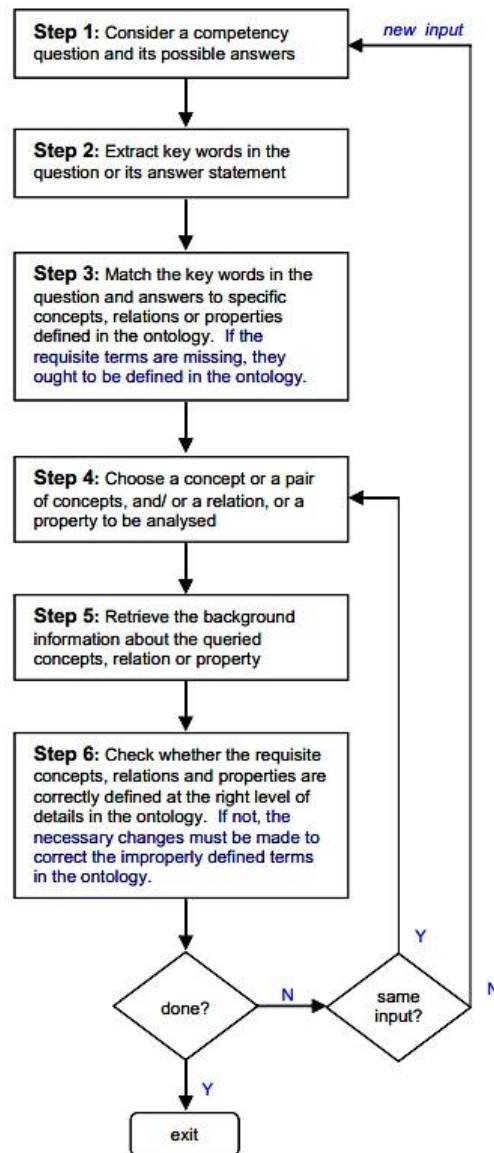


Figure 4.11 – Competency evaluation steps. Reprinted from "Natural Language Support for Competency Evaluation of Web-ontologies", by M. Annamalai and Z. Sanip, 2010, *Journal of IT in Asia*, 3, p. 7.

#### 4.6. *e*POSM VALIDATION

The *e*POSM validation aims at evaluating the extent to which the developed model corresponds to the systems that it is supposed to represent and fulfils its specific intended purpose (Fernández-López et al., 1997; Lovrenčić & Čubrilo, 2008). Some authors (Gómez-Pérez, 1996; Gómez-pérez, 2001; Sure, Staab, & Studer, 2009) suggest two independent methods for ontology validation, namely content validation and application ontology. The application ontology consists in associating instances from the real world to the ontology concepts, *i.e.* it consists in the application of the ontology in a real environment. For the time being, it was not possible to use the *e*POSM in a real environment and, accordingly, the validation was restricted to content validation. According to the defined specification (refer to Section 4.2), the scope of the *e*POSM is restricted to the organisational dimension of implementing e-Participation based on a BPM approach, which includes the conceptual representation for organisational units, functions, roles and strategy. On the other hand, the ultimate goal of the *e*POSM is to foster e-Participation sustainability across Government and Public

Administration towards a participatory, inclusive, collaborative and deliberative democracy. Following these considerations, the content validation was twofold, encompassing an assessment of the *ePOSM* scope with regard to the e-Participation domain, as well as an assessment of the BPM approach to validate the potential to effectively foster sustainability.

The purpose of this first assessment was to validate the coverage of the e-Participation domain-space, in order to confirm the extent to which the *ePOSM* effectively models an organisation reflecting the relevant aspects that characterise e-Participation. To this end, the e-Participation ontologies and domain models found during the literature review were thoroughly analysed and mapped in the *ePOSM*. The analysis results are summarised in Annex 8.9.1. It was concluded that all domain concepts are addressed in the *ePOSM*, with the exception of a few tools-related concepts. It was further decided not to develop a sub-ontology to model the e-Participation resources and, consequently, the tools-related concepts are not reflected in the *ePOSM*.

The purpose of the second assessment was to validate the *ePOSM* potential to foster sustainability using a BPM-driven-approach. To be sustainable, e-Participation has to become an organisational capability, rather than limited to standalone or loosely-connected experiments. Hence, in the second assessment, the *ePOSM* was analysed from the perspective of a BPM maturity framework. Rosemann and Brocke developed a framework (2010) derived from research in the field of maturity models, which consolidates and structures a set of six essential factors for BPM, thus providing a holistic perspective (refer to Figure 4.12). These are critical success factors that need to be considered by organisations striving for success with BPM (vom Brocke & Rosemann, 2010b) and they encompass Strategic Alignment, Governance, Methods, Information Technology, People and Culture. The Strategy Alignment factor points out that the BPM initiative should be tightly linked with the organisational strategy, meaning that the processes have to be designed, executed, managed and measured according to the Organisation's defined strategy. The Governance factor addresses transparency by clearly defining and consistently executing the decision-making processes, including the specification of process roles and responsibilities, collections' process metrics and links to performance criteria, as well as the definition of process management standards and controls. The Methods factor focuses on the set of tools and techniques required to support and enact Organisation-wide BPM initiatives along the process lifecycle. The Information Technology factor includes the needs concerning the ICT solutions that support BPM adoption, implementation and sustainability. The People factor stresses that people are the core of an Organisation, and also the need to have adequate process skills, expertise and process management knowledge. Finally, the Culture factor entails values, beliefs, attitudes and behaviours (Hofstede, 1993) and is, therefore, related to the creation of the proper environment to foster a process-oriented mindset and readiness for change. The interpretation of the Rosemann and Brocke framework factors applied to civic participation processes is provided in Table 4.23. As represented in Figure 4.12, the core factors are further disaggregated into specific capability areas. The validation that was performed consisted in verifying the extent to which the *ePOSM* contributes to each core factor and, specifically, to each capability area.

Strategic Alignment	Governance	Methods	Information Technology	People	Culture	Factors
Process Improvement Planning	Process Management Decision Making	Process Design & Modelling	Process Design & Modelling	Process Skills & Expertise	Responsiveness to Process Change	Capability Areas
Strategy & Process Capability Linkage	Process Roles and Responsibilities	Process Implementation & Execution	Process Implementation & Execution	Process Management Knowledge	Process Values & Beliefs	
Enterprise Process Architecture	Process Metrics & Performance Linkage	Process Monitoring & Control	Process Monitoring & Control	Process Education	Process Attitudes & Behaviors	
Process Measures	Process Related Standards	Process Improvement & Innovation	Process Improvement & Innovation	Process Collaboration	Leadership Attention to Process	
Process Customers & Stakeholders	Process Management Compliance	Process Program & Project Management	Process Program & Project Management	Process Management Leaders	Process Management Social Networks	

Figure 4.12 – e-Participation Core Factors. Reprinted from *Handbook on Business Process Management 1: Introduction, Methods and Information Systems* (p. 112), by M. Rosemann and J. vom Brocke, 2010, Springer Heidelberg Dordrecht London New York. Copyright 2010 by Springer-Verlag Berlin Heidelberg.

Factor	Definition
<b>1. Strategic Alignment</b>	Linkage between civic participation priorities and e-Participation processes embedded in the policy-making cycle.
<b>2. Governance</b>	Systematic management of e-Participation initiatives through established decision guidance and processes.
<b>3. Methods</b>	Set of methods that support and enable activities along the e-Participation process lifecycle.
<b>4. ICT</b>	ICT that enable and support the e-Participation related activities.
<b>5. People</b>	Individuals and groups who continually enhance and apply their skills and knowledge to improve e-Participation.
<b>6. Culture</b>	Collective values and beliefs that shape e-Participation practice.

Table 4.23 – Six core factors of civic participation.

The Strategic Alignment factor includes the five capability areas defined in Table 4.24. The Process Improvement Planning (C1.1) capability area is related to the ability to define a process improvement plan derived from the organisation's strategy to meet prioritised goals. The Strategy and Processes Capability linkage (C1.2) capability area characterises the ability to establish a bidirectional linkage between strategy and business processes, including the identification of the cause-and-effect relationships between strategy and business processes. The Enterprise Process Architecture (C1.3) capability area represents the ability to implement and use a comprehensive inventory of the business processes of the value-chain. The Process Measures (C1.4) capability area concerns the adoption of process-oriented Key Performance Indicators that translate the strategic objectives into process-specific goals, thus facilitating the effective process control. Finally, the Process Customers & Stakeholders (C1.5) capability area addresses the ability to evaluate the actual priorities of key customers and other stakeholders. The *ePOSM* coverage analysis of the Strategic Alignment factor is available in Table 4.24. It demonstrates that the *ePOSM* effectively models the concepts that establish the linkage between civic participation priorities and the e-Participation processes that are



related to the Strategic Alignment capability. In fact, the *ePOSM\_SO* sub-ontology is essentially dedicated to this core factor. In addition, the *ePOSM\_FO* includes concepts related to the processes' architecture that are also part of the Strategic Alignment core factor.

Factor: <b>Strategic Alignment</b>	
<b>Capability</b>	<b><i>ePOSM</i> Mapping</b>
<b>C1.1 Process Improvement Planning</b>	The <i>ePOSM_SO</i> models a process improvement planning approach based on the concepts of <i>e-Participation Vision</i> , <i>e-Participation Strategy</i> and <i>e-Participation Goal</i> . These are defined with a view to improving the current status evaluation, which is modelled through the concept <i>e-Participation Evaluation Result</i> .
<b>C1.2 Strategy and Processes Capability linkage</b>	The <i>ePOSM_SO</i> models the cause-and-effect relationships that allow the determination of how the strategy and goals are translated to the improvement initiatives included in the <i>e-Participation Tactic Plan</i> .
<b>C1.3 Enterprise Process Architecture</b>	The <i>ePOSM_FO</i> models the <i>e-Participation Architecture Management</i> function which addresses the policy value-driven processes covering the <i>Policy-making Process Inventory</i> , the <i>e-Participation Process Improvement</i> , <i>e-Participation Library Management</i> and <i>e-Participation Process Governance</i> .
<b>C1.4 Process Measures</b>	The <i>ePOSM_SO</i> models strategy-driven goals and quantitative objectives. The strategy is also translated to an <i>e-Participation Tactic Plan</i> that includes the reference to the e-Participation Processes. The management of the e-Participation Processes models the process-oriented quantitative objectives definition and assessment.
<b>C1.5 Process Customers &amp; Stakeholders</b>	The <i>ePOSM_SO</i> models the evaluation of citizens' priorities with respect to policy-making through the <i>e-Participation Expectation</i> concept and relationships. The added-value to citizens is also modelled by the <i>ePOSM_SO</i> through the <i>e-Participation Advantage</i> concept and relationships. Further to this, the <i>ePOSM_FO</i> includes concepts related to the e-Participation Stakeholders Analysis functions and activities.

Table 4.24 – *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) Strategic Alignment factor.

The Governance factor includes the five capability areas defined in Table 4.25. The Process Management and Decision-making (C2.1) capability area addresses the existence of a systematic leadership and control of BPM through the decision guidance and processes established. The Process Roles and Responsibilities (C2.2) capability area concerns the existence of the process roles and responsibilities defined. The Process Metrics and Performance Linkage (C2.3) capability area focuses on the existence of established processes to ensure the direct linkage of process performance with strategic goals. The Process Related Standards (C2.4) capability area consists in the ability to establish procedures to coordinate process management initiatives across the organisation. Lastly, the Process Management Compliance (C2.5) capability area addresses the ability to adhere to the applicable directives and regulations when applicable. The *ePOSM* coverage analysis of Governance factor is available in Table 4.25. It demonstrates that the *ePOSM* effectively models the systematic management concepts related to the Governance core factor, which are included in the *ePOSM* four sub-ontologies.

Factor: <b>Governance</b>	
<b>Capability</b>	<b><i>ePOSM</i> Mapping</b>
<b>C2.1 Process Management and Decision-making</b>	The <i>ePOSM_OUO</i> models an organisational structure including the e-Participation Executive team assuming the sponsorship of e-Participation, who is responsible for aligning the direction and funding of e-Participation.

Factor: <b>Governance</b>	
<b>Capability</b>	<b>ePOSM Mapping</b>
<b>C2.2 Process Roles and Responsibilities</b>	The <i>ePOSM_RO</i> models the e-Participation process roles and responsibilities.
<b>C2.3 Process Metrics and Performance Linkage</b>	The <i>ePOSM_SO</i> models the linkage of process performance with strategic goals, including the definition of strategic goals and their correspondent translation to a tactic plan that comprises e-Participation initiatives.
<b>C2.4 Process Related Standards</b>	The <i>ePOSM_OUO</i> models an organisational structure aiming to ensure the existence of a unified and consistent approach to process management. Additionally, the <i>ePOSM_FO</i> models the standard process management functions and activities.
<b>C2.5 Process Management Compliance</b>	The <i>ePOSM_FO</i> models a specific function to manage e-Participation adherence to standards and its compliance assurance.

Table 4.25 – *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) Governance factor.

The Methods factor includes the five capability areas defined in Table 4.26. The Process Design and Modelling (C3.1) capability area is related to the use of methods to identify and conceptualise *as-is* and *to-be* processes, including modelling and analysis methods. The Process Implementation and Execution (C3.2) capability area encompasses the use of methods that support the transformation of process models into feasible business process specifications. The Process Monitoring and Control (C3.3) capability area covers the use of methods for guiding the collection and consolidation of process-related data. The capability area Process Improvement and Innovation (C3.4) focuses on the use of methods to facilitate the development of improved business processes. Finally, the Process Programme and Project Management (C3.5) capability area addresses the use of methods for the overall organisation-wide management of BPM and related BPM projects. The *ePOSM* coverage analysis of the Methods factor is available in Table 4.26. It ascertained that the *ePOSM* and in particular the *ePOSM\_FO* effectively models the concepts related to the Methods core factor.

Factor: <b>Methods</b>	
<b>Capability</b>	<b>ePOSM Mapping</b>
<b>C3.1 Process Design and Modelling</b>	The <i>ePOSM_FO</i> defines the <i>e-Participation Architecture Management</i> governance function, sub-functions and related activities, which include a systematic approach to inventorying policy-making processes and, subsequently, designing and modelling of e-Participation processes.
<b>C3.2 Process Implementation and Execution</b>	The <i>ePOSM_FO</i> defines the <i>e-Participation Architecture Management</i> governance function, which includes activities specifically addressing the transformation of process models into feasible and testable ICT specifications, as well as the correspondent implementation plan.
<b>C3.3 Process Monitoring and Control</b>	The <i>ePOSM_FO</i> models the <i>e-Participation Process Management</i> function which includes sub-functions and activities covering the collection and consolidation of e-Participation processes related data. In particular, the <i>e-Participation Process Evaluation</i> function encompasses activities dedicated to data collection, while the <i>e-Participation Process Archival</i> function involves activities dedicated to the update of the e-Participation Library with the processes' evaluation and control data.
<b>C3.4 Process Improvement and</b>	The <i>ePOSM_FO</i> models the <i>e-Participation Process Improvement</i> sub-function that comprises activities addressing the e-Participation process improvement.

Factor: <b>Methods</b>	
<b>Capability</b>	<b>ePOS<i>M</i> Mapping</b>
<b>Innovation</b>	
<b>C3.5 Process Programme and Project Management</b>	The <i>ePOS<i>M</i>_FO</i> exhaustively models the e-Participation process management. It also models functions dedicated to e-Participation programme management and delivery methodology.

Table 4.26 – *ePOS*M** coverage analysis of the Rosemann and Brocke framework (2010) Methods factor.

The Information Technology factor includes the five capability areas defined in Table 4.27. The capability area Process Design and Modelling (C4.1) addresses the use of IT solutions for process design and modelling. The capability area Process Implementation and Execution (C4.2) focuses on the process implementation automation by transforming process models into executable specifications and their subsequent workflow-based process execution. The capability area Process Control and Measurement (C4.3) addresses the use of solutions that facilitate process escalation management, exception handling, performance visualisation and process controlling. The capability area Process Improvement and Innovation (C4.4) comprises the use of tools for process improvement and innovation, providing semi-automated support to the generation of improved business processes. Lastly, the capability area Process Project Management and Program Management (C4.5) tackles the use of tools that facilitate the management of BPM initiatives. The *ePOS*M** coverage analysis of the Rosemann and Brocke framework (2010) Information Technology factor is available in Table 4.27. It evidences that the *ePOS*M** and, in particular, the *ePOS*M*\_FO*, effectively model the main concepts related to the e-Participation ICT management included in the Information Technology core factor. Nonetheless, the analysis revealed that the *ePOS*M** does not model concepts related to specific tools and technology for the management of e-Participation.

Factor: <b>Information Technology</b>	
<b>Capability</b>	<b>ePOS<i>M</i> Mapping</b>
<b>C4.1 Process Design and Modelling</b>	The <i>ePOS<i>M</i>_FO</i> defines functions covering the process design and modelling. However it does not explicitly include reference to ICT solutions to support these functions.
<b>C4.2 Process Implementation and Execution</b>	The <i>ePOS<i>M</i></i> is, by definition, an artefact to automate the process implementation (refer to Section 4.2).
<b>C4.3 Process Control and Measurement</b>	The <i>ePOS<i>M</i>_FO</i> models the <i>e-Participation Process ICT Setup</i> function which includes activities covering the ICT configuration of the process execution and control attributes.
<b>C4.4 Process Improvement and Innovation</b>	The <i>ePOS<i>M</i></i> scope consists in improving and innovating policy-making processes through the use of ICT. Additionally, the <i>ePOS<i>M</i>_FO</i> structures the concepts of e-Participation functional areas based on a continuous improvement approach.
<b>C4.5 Process Project Management and Program Management</b>	The <i>ePOS<i>M</i>_FO</i> defines functions covering the e-Participation programme management. Nevertheless, it does not explicitly include references to ICT solutions to support these functions.

Table 4.27 – *ePOS*M** coverage analysis of the Rosemann and Brocke framework (2010) Information Technology factor.

The People factor includes the five capability areas defined in Table 4.28. The capability area Process Skills and Expertise (C5.1) addresses the competences required to manage and execute business processes. The capability area Process Management Knowledge (C5.2) consolidates the explicit and tacit knowledge about BPM principles and practices, covering the level of understanding of BPM – including the knowledge of process management methods and information technology, as well as their impact on the business process outcomes. The capability area Process Education and Learning (C5.3) addresses the commitment level of the organisation towards the development and maintenance of process management skills and knowledge. The capability area Process Collaboration and Communication (C5.4) addresses the communication patterns among process stakeholders, including the way of discovering, exploring and disseminating process knowledge. Finally, the capability area Process Management Leaders (C5.5) addresses the willingness the willingness to lead and be accountable for the business processes. The *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) People factor is available in Table 4.28. It verified that the *ePOSM* effectively models the concepts related to skills and knowledge included in the People core factor, by means of the *ePOSM\_OUO*, *ePOSM\_FO* and *ePOSM\_RO* sub-ontologies.

Factor: <b>People</b>	
<b>Capability</b>	<b><i>ePOSM</i> Mapping</b>
<b>C5.1 Process Skills and Expertise</b>	The <i>ePOSM_RO</i> models the e-Participation processes roles' concepts, which were conceived with the policy-making processes required expertise in mind. Further to this, the <i>ePOSM_FO</i> models the process management functions' concepts which include an <i>e-Participation Process Staffing</i> function specifically introduced to establish the requirements for the process skills and expertise.
<b>C5.2 Process Management Knowledge</b>	The <i>ePOSM_FO</i> models functions dedicated to leveraging and sustaining process management knowledge, introducing, in particular, the function of <i>Policy-making Process Inventory</i> and <i>e-Participation Library Management</i> .
<b>C5.3 Process Education and Learning</b>	The <i>ePOSM_FO</i> models an activity specifically dedicated to the provision of training in e-Participation.
<b>C5.4 Process Collaboration and Communication</b>	The <i>ePOSM_FO</i> models a function dedicated to ensuring the <i>e-Participation Stakeholders Awareness</i> , including several related activities.
<b>C5.5 Process Management Leaders</b>	The leadership accountability is addressed by the <i>ePOSM</i> at process level and also in the overall e-Participation governance. At process level, it is covered by the <i>ePOSM_FO</i> functions related to the results communication and process evaluation. At governance level it is covered the <i>ePOSM_FO</i> functions related to e-Participation evaluation. Furthermore, the <i>ePOSM_OUO</i> includes the concept of a temporary and external committee assigned to the e-Participation overall evaluation function that is defined in the <i>ePOSM_FO</i> .

Table 4.28 – *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) People factor.

The Culture factor includes the five capability areas defined in Table 4.29. The capability area Responsiveness to Process Change (C6.1) concerns the overall receptiveness and propensity to process change. The capability area Process Values and Beliefs (C6.2) addresses the organisational commitment to adopt and foster a process-oriented approach. The capability area Process Attitudes and Behaviour (C6.3) addresses the willingness of those who are involved in or affected by BPM to assess the existent processes towards continual improvement. The capability area Leadership Attention to Process Management (C6.4) covers the senior executives' level of commitment to

process management. Lastly, the capability area Process Management Social Networks (C6.5) covers the influence of BPM communities of practice, the use of social network techniques and the recognition and use of informal networks. The *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) Culture factor is available in Table 4.29. It demonstrates that the *ePOSM* effectively models the concepts that promote the e-Participation values and beliefs included in the Culture core factor, by means of the *ePOSM\_OUO*, *ePOSM\_FO* and *ePOSM\_RO* sub-ontologies.

Factor: <b>Culture</b>	
<b>Capability</b>	<b><i>ePOSM</i> Mapping</b>
<b>C6.1 Responsiveness to Process Change</b>	The <i>ePOSM_OUO</i> models an organisation structure that is dedicated to e-Participation precisely aiming to ensure a high level of change management. Additionally, the <i>ePOSM_FO</i> includes the function <i>e-Participation Process Governance</i> that comprises a change management activity.
<b>C6.2 Process Values and Beliefs</b>	The <i>ePOSM_FO</i> models the function <i>e-Participation Stakeholders Awareness</i> that includes a specific activity to promote civic participation values.
<b>C6.3 Process Attitudes and Behaviour</b>	The <i>ePOSM_FO</i> models the function <i>e-Participation Proposals Management</i> that aims at the continuous evaluation of citizens' proposals towards policy-making issues, as well as at the promotion of transparency.
<b>C6.4 Leadership Attention to Process Management</b>	The <i>ePOSM_FO</i> models the functions of <i>e-Participation Ends Definition</i> and <i>e-Participation Means Definition</i> which are intended to operationalise the Government level of commitment and attention to e-Participation processes.
<b>C6.5 Process Management Social Networks</b>	The <i>ePOSM_FO</i> process management functions and activities include the integration of bottom-up initiatives, including social networks-related processes.

Table 4.29 – *ePOSM* coverage analysis of the Rosemann and Brocke framework (2010) Culture factor.

The two evaluations performed thus revealed that the *ePOSM* provides a conceptual representation for organisational units, functions, roles and strategy integrating the e-Participation domain concepts. Furthermore, the proposed organisational model embeds the critical success factors for e-Participation sustainability. Notwithstanding, it was noticed that the *ePOSM* can be extended with an e-Participation Resources ontology in order to fully cover the e-Participation domain concept.

#### 4.7. SECTION SUMMARY

In order to cope with the objectives defined – targeting communication, organisational modelling, interoperability and systems engineering – the *ePOSM* requirements have been expressed through a set of twenty one competency questions derived from the research questions. Additionally, considering the purpose envisioned, it was decided to conceive the *ePOSM* as a semi-formal lightweight type of ontology.

As the *ePOSM* was defined as an organisational ontology, there was a special concern with focusing the conceptualisation on organisational aspects only. Therefore, instead of creating domain concepts that would be redundant with existing works, the *ePOSM* makes use of commonly accepted e-Participation concepts. For this purpose, a triangulation of reference models allowed the retrieval of a set of domain concepts that was used as a baseline for the *ePOSM* conceptualisation.

The artefacts developed include an ontology stack comprising four sub-ontologies represented by means of concept maps and exported to OWL, as summarised in Table 4.30.

Model	Description	Constructs
<b><i>ePOSM_SO</i></b>	Ontology modelling the strategy and goals-related concepts and relationships required to ensure the strategic alignment of the e-Participation goals.	90 Concepts 22 Relationships 99 Propositions
<b><i>ePOSM_OUO</i></b>	Ontology modelling the organisational units' concepts and relationships required to implement and sustain e-Participation.	16 Concepts 2 Relationships 19 Propositions
<b><i>ePOSM_FO</i></b>	Ontology modelling the hierarchy of functions required to manage e-Participation, covering process management and e-Participation governance.	197 Concepts 2 Relationships 203 Propositions
<b><i>ePOSM_RO</i></b>	Ontology modelling the governance and process-related roles required to perform the e-Participation functions.	24 Concepts 2 Relationships 27 Propositions

Table 4.30 – Overview of the developed artefacts.

The *ePOSM* correctness was verified through the evaluation of its architecture, lexicon and syntax, and content. The architecture adherence to widely accepted guidelines was successfully evaluated. The correctness of both lexicon and syntax was verified using the adopted tools. The content verification relied on competency formative evaluation, which evidenced that the *ePOSM* reasoning fully covers the specified competency questions.

Finally, the *ePOSM* was validated with a view to determining the extent to which the developed model corresponds to the systems it is supposed to represent, and fulfils its specific intended purpose. The validation was twofold, encompassing an assessment of the *ePOSM* scope with regard to the e-Participation domain, and an assessment of the BPM approach to validate the potential to effectively foster sustainability. The *ePOSM* was found to provide a conceptual representation for organisational units, functions, roles and strategy integrating the e-Participation domain concepts, as well as to embed the critical success factors for e-Participation sustainability. Lastly, these validations evidenced that the *ePOSM* could be further extended with an e-Participation Resources ontology in order to fully cover the e-Participation domain.

## 5. CONCLUSIONS

The motivation for the present research resulted from the identification of a set of barriers that prevent the sustainable integration of e-Participation in institutional politics and lead both to poor levels of public trust and to the waste of resources. Following these findings, the primary objective of the dissertation was to provide an instrumental model to foster e-Participation sustainability across Government and Public Administration towards a participatory, inclusive, collaborative and deliberative democracy. The analysis of the underlying problems of e-Participation sustainability, complemented by a contextualised analysis of the current trends in this domain, suggested that a BPM-steered approach would enable the desirable transformations. In particular, it was considered that a BPM-steered approach can act as a catalyst to foster the envisioned e-Participation sustainability towards value creation throughout the policy-making cycle, including political, organisational and, ultimately, citizen value. Furthermore, acknowledging that e-Participation sustainability is heavily dependent on organisational planning, it was decided to conceive a semantic model aiming to embed civic participation concepts in the structure, operations and policy-making value chain of Government and Public Administration. Considering the sociotechnical nature of the domain, as well as the problem-solving purpose of the research, it was decided to adopt the Design Science Research (DSR) paradigm. Following this research approach, the developed artefact consisted in an e-Participation Organisational Semantic Model (*ePOSM*) steered by a BPM-driven approach. The ultimate goal was then broken down into four specific objectives.

The first objective was to provide a common, unambiguous and cross-functional understanding among Government and Public Administration of e-Participation implementation related concepts and their articulation. To this end, it was decided to conceive an organisational ontology capturing the vocabulary and constraints describing the environment in which e-Participation processes should be carried out, from the public institutions' perspective. Hence, the *ePOSM* provides a holistic model that integrates domain knowledge in the organisational context in order to facilitate the e-Participation sustainable implementation. The approach to e-Participation that was conceived was modelled by means of an ontology stack structured in four sub-ontologies, namely the (1) e-Participation Strategy Ontology (*ePOSM\_SO*); the (2) e-Participation Organisational Units Ontology (*ePOSM\_OUO*); the (3) e-Participation Functions Ontology (*ePOSM\_FO*); and the (4) e-Participation Roles Ontology (*ePOSM\_RO*). Furthermore, the *ePOSM* is provided as a semi-formal lightweight ontology. This type of representation provides a balanced level of formality so as to be understood by both technical and non-technical users, thus bridging the gap between these two spheres.

The second objective was to provide a rationale for organisational modelling, in order to embed e-Participation in Government and Public Administration organisational structures, both effectively and efficiently. The analysis that was conducted demonstrated that the existing conceptual models are essentially technology and project-oriented. Therefore, they do not foster sustainability. In order to effectively embed public participation concepts in the value chain of governments and institutions it is necessary to address the organisational dimension. For this purpose, the *ePOSM* complements the existing reference models by introducing an organisational model to manage e-Participation. The proposed model allows a centralised and consistent roll-out of strategy-driven e-Participation initiatives, supported by operational units dedicated to the execution of transformation projects and participatory processes. The e-Participation governance relies on an organisational structure inspired

by the services offered by BPM centres of excellence, encompassing e-Participation strategy, delivery and shared infrastructure. The functions allocated to the defined organisational units cover the complete BPM lifecycle, including the planning, analysis, design and modelling, implementation, monitoring and refinement of e-Participation.

The third objective was to enable process-level interoperability among Government and Public Administration by providing a standard approach to implement e-Participation processes. In view of this, the *ePOSM* models the integration of e-Participation into existent institutional structures, ensuring the connection between the decision sphere and administrative practices through an end-to-end process approach. A participatory process incorporates interrelated steps that demand a broad range of interdisciplinary functions, comprising technical, organisational, managerial, political and social activities. The *ePOSM* enhances process-level interoperability among government agencies by standardising the organisational structure, goals, functions and roles related to e-Participation processes. In addition, it defines the functions required to maintain a process library with a view to fostering the reuse, continuous improvement and scaling out of the conceived e-Participation processes.

The fourth objective was to provide a standardised vocabulary, in a semi-formal format, potentially usable in software development for business processes' automation. In order to accomplish this objective the *ePOSM* representation adhered to semantic web standards and was verified based on ontology engineering evaluation techniques. So as to be used as a reference model, the *ePOSM* concepts were defined up to the maximum level of detail that was considered not to be bound to organisation-specific contexts. Following this approach, the *ePOSM* can be instantiated by virtually any public institution. As such, it provides a scalable baseline for annotating business processes with formalised knowledge about the organisational context. Overall, the *ePOSM* comprises 327 related concepts and establishes a total of 348 propositions that provide the means to answer the defined 21 competency questions. Upon the *ePOSM* implementation in a real environment, the currently defined concepts will be decomposed into tangible instances describing the goals, strategy, organisational units, functions and roles assigned to e-Participation. As a result, such implementation will allow the performance of advanced querying using a reasoner or inference engine to retrieve concrete and specific information about e-Participation processes. The *ePOSM* can, thus, be used to assist e-Participation management by facilitating the alignment among goals, strategy, organisational structure, functions and roles. Moreover, it can be used to efficiently and transparently share the rationale of e-Participation implementation with citizens.

The existent reference models provide a comprehensive conceptualisation of the e-Participation domain, covering social, technical and democracy perspectives. However, they are essentially project-driven, not allowing the effective embedding of e-Participation in highly structured organisational environments. Indeed, the cornerstone for implementing e-Participation in public institutions as a sustainable value-creation activity is a systematic organisational planning, embodying the principles of open-governance and open-engagement. The above-mentioned *ePOSM* outcomes introduce this vision. Hence, this model provides an innovative approach to implement e-Participation through a BPM-driven organisational semantic model that can establish a solid foundation to enable e-Participation sustainability.



James Hacker: *When am I going to do all this correspondence?*  
Bernard Woolley: *You do realize you don't actually have to, Minister.*  
James Hacker: *Don't I?*  
Bernard Woolley: *Not if you don't want to. We can draft an official reply.*  
James Hacker: *What's an official reply?*  
Bernard Woolley: *It just says "The Minister has asked me to thank you for your letter"; then we say something like "The matter is under consideration", or even, if we feel so inclined, "under active consideration."*  
James Hacker: *What's the difference?*  
Bernard Woolley: *Well, 'under consideration' means we've lost the file; 'under active consideration' means we're trying to find it.*  
*(TV Show "Yes Minister: The Official Visit" - 1980)*

## 6. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORKS

The *ePOSM* provides an original approach to sustain e-Participation and, consequently, it should be acknowledged as a stepping stone to be further developed and improved.

From a contents' standpoint, and according to the validation that was performed, the main limitation of the *ePOSM* is the absence of an e-Participation Resources ontology to model the ICT that support the participatory processes. The Resources ontology was left out of the *ePOSM* scope since the research questions were chosen to focus on the most relevant problems that contribute to the sustainability deficit of the e-Participation experiments. Nevertheless, for the sake of completeness of an organisational ontology stack, it is relevant to extend the *ePOSM* with an e-Participation Resources ontology in order to model the tangible (*e.g.* hardware) and intangible (*e.g.* software, information) resources required to carry out the e-Participation processes. Such ontology should define the types of resources, as well as the corresponding notions of access, maintenance, ownership and use.

As for future work, the next natural stage is to take a step further in the validation of the developed artefact by instantiating the *ePOSM* in a real environment. Such endeavour will allow the collection of relevant feedback for the *ePOSM* improvement. Considering that public institutions are inherently complex and operate under the influence of political cycles, the definition of a suitable implementation strategy is of paramount importance. On the one hand, the *ePOSM* should be implemented as a whole, since the end-to-end approach constitutes its main added-value. On the other hand, it would be wise to adopt a progressive implementation, as it is risky to apply disruptive transformations in complex and highly structured environments before having a mature model. Taking these caveats in consideration, it is recommended to start by implementing the *ePOSM* in a self-contained environment that allows the enactment of its full scope in a manageable environment. It is, therefore, suggested to start at local government level before scaling out to wider contexts. Such an approach brings several benefits, including a facilitated visibility of the initiative for all stakeholders, high level of proximity with target participants, controllable organisational transformations and reasonable implementation time frame. Moreover, it will allow the launch of very tangible e-Participation initiatives, potentially attractive to the target participants and through which it is possible to have effective and immediate influence in decision-making.

From the ontology representation standpoint, it is worth considering a different tool to support subsequent steps. While the concept mapping was appropriate for both the conceptualisation in question and for sharing knowledge, it may be insufficient for instantiation purposes. Hence, it is recommended to adopt a more powerful knowledge acquisition system, such as Protégé, including deductive classifiers to validate the models' consistency and providing inference engines.

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## 8. ANNEXES

### 8.1. TERMS AND DEFINITIONS

#### 8.1.1. Democracy Views

Table 8.1 contains a description of different views of democracy.

View	Descriptions
<b>Legalist</b>	The Legalist is the classical western view, grounded in Locke (1690) and Montesquieu (1748), in which the state strongly constrained by the law. It is rooted in three basic, namely (1) separation of powers (legislative, executive, judiciary); (2) a system of checks and balances between the government, the public administration and the judiciary; and (3) representation. Decision-making and representation are the goal and the means of democracy. (Held, 1996; van Dijk, 2000) ICT can mainly be used for information campaigns, information retrieval by citizens and information gathering among citizens (van Dijk, 2010).
<b>Competitive</b>	Grounded in Weber and Schumpeter theories, the Competitive democracy is a representative view characterised by the competition between alternative elites and is mainly supported in countries with a two-party or a presidential system. In this view, parties and leaders compete to represent the electorate and assume decision-making (Held, 1996; van Dijk, 2000). Digital media can primarily be used for information and election campaigns (van Dijk, 2013).
<b>Plebiscitary</b>	The Plebiscitary democracy is a radical view of democracy, in which political decisions have to be made through referenda or plebiscites. It is based on notions of direct democracy, advocating that decisions making should primarily done by individual citizens by means of plebiscites, reducing representation as much as possible. Motivated by Becker (1981) experiments, relies on ICT capability to overcome traditional barriers of direct democracy in a large, complex society. Therefore in the Plebiscitary view ICT use includes voting, polling, referenda and online discussions (van Dijk, 2013).
<b>Pluralist</b>	The Pluralist democracy emphasizes opinion formation among societal organisations. It privileges pluralism through a dynamic coalition of minorities instead majorities and the state should act as an arbiter. It combines elements of both direct and representative democracy, since representation includes not only politicians but also organisational representatives. ICT can provide several opportunities for pluralism in public debates, including online discussions within and between organisations (van Dijk, 2000, 2013).
<b>Libertarian</b>	The Libertarian view emerged as a dominant model amongst the Internet community pioneers and is close to the Pluralist and Plebiscitary forms. It has the particularity of promoting autonomous politics by citizens in their own associations, using ICT horizontal communication capabilities bypassing institutional politics. The most radical view claims that institutional politics is obsolete and can be put aside by a new political reality collectively created in networks. It favours the so-called user-generated content and Web 2.0 tools on the Internet (van Dijk, 2000, 2013).
<b>Participatory</b>	It is a combination of representative and direct democracy centred in the value of citizenship. A necessary condition of this model of democracy is the presence of informed citizens and active engagement (Cunningham, 2001). Rousseau is the first classical theorist of this model advocating the development of citizenship by means of collective discussion and education. Contemporary proponents, such as Pateman (1970) and Macpherson (1977) claim that the centres of political power themselves should become more accessible to citizens.

Table 8.1 – Democracy views.

### 8.1.2. e-Government Definitions

Table 8.2 contains definitions of e-Government found during the literature review.

Author	Definition
<b>Baum and Maio (2000)</b>	The continuous optimization of service delivery, constituency participation and governance by transforming internal and external relationships through technology, the Internet and new media.
<b>Global Business Dialogue on Electronic Commerce (2001)</b>	Electronic government (hereafter e-Government) refers to a situation in which administrative, legislative and judicial agencies (including both central and local governments) digitize their internal and external operations and utilize networked systems efficiently to realize better quality in the provision of public services
<b>World Bank (2001)</b>	Refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet and mobile computing) that have the ability to transform relations with citizens, businesses and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth and/or cost reductions.
<b>Fang (2002)</b>	A way for governments to use the most innovative information and communication technologies, particularly web-based Internet applications, to provide citizens and businesses with more convenient access to government information and services, to improve the quality of the services and to provide greater opportunities to participate in democratic institutions and processes.
<b>United States 107th Congress (2002)</b>	The use by the Government of web-based Internet applications and other information technologies, combined with processes that implement these technologies, to: (a) enhance the access to and delivery of Government information and services to the public, other agencies and other Government entities; or (b) bring about improvements in Government operations that may include effectiveness, efficiency, service quality, or transformation.
<b>European Commission (2003)</b>	The use of information and communication technologies in public administrations combined with organisational change and new skills in order to improve public services and democratic processes and strengthen support to public policies.
<b>OECD (2003)</b>	The use of ICTs, and particularly the Internet, as a tool to achieve better government.
<b>UNDESA (2005)</b>	The use of ICT and its application by the government for the provision of information and public services to the people. The aim of e-government therefore is to provide efficient government management of information to the citizen; better service delivery to citizens; and empowerment of the people through access to information and participation in public policy decision-making.
<b>Hai (2007)</b>	The utilization of Information Technology (IT), Information and Communication Technologies (ICTs) and other web-based telecommunication technologies to improve and/or enhance on the efficiency and effectiveness of service delivery in the public sector.
<b>Anttiroiko (2007)</b>	Is about all political-administrative operations of governments in which ICTs are utilized.
<b>Wikipedia (2015b)</b>	Consists of the digital interactions between a citizen and their government (C2G), between governments and government agencies (G2G), between government and citizens (G2C), between government and employees (G2E), and between government and

Author	Definition
	businesses/commerce (G2B).

Table 8.2 – e-Government definitions.

### 8.1.3. e-Governance Definitions

Table 8.3 contains definitions of e-Governance found during the literature review.

Author	Definition
<b>Oakley (2002)</b>	Set of technology-mediated processes that are changing both the delivery of public services and the broader interactions between citizens and government.
<b>UNESCO (2005)</b>	The public sector's use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective. E-governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organizing and delivering information and services. E-governance is generally considered as a wider concept than e-government, since it can bring about a change in the way citizens relate to governments and to each other. E-governance can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen.
<b>Council of Europe (2007)</b>	The use of information technology to raise the quality of the services governments deliver to citizens and businesses. It is hoped that it will also reinforce the connection between public officials and communities thereby leading to a stronger, more accountable and inclusive democracy.
<b>Anttiroiko (2007)</b>	Is about managing and steering multi-sectoral stakeholder relations with the help of ICTs the purpose of taking care of policy, service and development functions of government.
<b>Bose and Rashel (2007)</b>	Is a process of reform in the way governments work share information, engage citizens and deliver services to external and internal clients for the benefit of both government and the clients that they serve.

Table 8.3 – e-Governance definitions

### 8.1.4. e-Democracy Definitions

Table 8.4 contains definitions of e-Democracy found during the literature review.

Author	Definition
<b>Trechsel et al. (2002)</b>	Consists of all electronic means of communication that enable/empower citizens in their efforts to hold rulers/politicians accountable for their actions in the public realm. Depending on the aspect of democracy being promoted, e-democracy can employ different techniques: (1) for increasing the transparency of the political process; (2) for enhancing the direct involvement and participation of citizens; and (3) improving the quality of opinion formation by opening new spaces of information and deliberation.
<b>Clift (2004)</b>	The use of information and communications technologies and strategies by "democratic sectors" within the political processes of local communities, states/regions, nations and on the global stage. The "democratic sectors" include the following democratic actors: <ul style="list-style-type: none"> <li>• Governments</li> <li>• Elected officials</li> <li>• Media (and major online Portals)</li> <li>• Political parties and interest groups</li> </ul>



Author	Definition
	<ul style="list-style-type: none"> <li>• Civil society organisations</li> <li>• International governmental organisations</li> <li>• Citizens/voters</li> </ul>
<b>Macintosh (2004)</b>	Is concerned with the use of information and communication technologies to engage citizens, support the democratic decision-making processes and strengthen representative democracy. The principal ICT mechanism is the internet accessed through an increasing variety of channels, including PCs, both in the home and in public locations, mobile phones and interactive digital TV. The democratic decision-making processes can be divided into two main categories: one addressing the electoral process, including e-Voting, and the other addressing citizen e-Participation in democratic decision-making.
<b>Anttiroiko (2007)</b>	Refers to democratic structures and processes in which ICTs are utilized.
<b>Peart (Peart, 2007)</b>	Relates to those uses of ICTs which provide either novel or more efficient, practicable means for citizens to exercise influence in the governing process. In other words, this term applies when ICTs are used to revolutionize the relationship between citizen and representative.
<b>Council of Europe (2010)</b>	The use of ICTs by different actors within the political processes of local communities, regions, nations or the international level. ICTs can be used in various ways, not only for voting: In a bottom-up perspective, citizens and organisations can use them as resources to get their voice heard, parties use them for campaigning and governments and administrations to improve the services they are delivering to citizens by introducing electronic ways for petition or consultation
<b>Wahed, Arabawy, and Gohary (2013)</b>	Refers to the use of ICTs in democratic processes. It builds on opportunities provided by new ICTs, such as the internet, interactive digital television and mobile communication systems, to increase public participation in government decision-making.
<b>Wikipedia (2015a)</b>	Means using 21st century Information and communications technology to promote Democracy. That means a form of government in which all adult citizens are presumed to be eligible to participate equally in the proposal, development and creation of laws. E-democracy encompasses social, economic and cultural conditions that enable the free and equal practice of political self-determination.

Table 8.4 – e-Democracy definitions.

#### 8.1.5. e-Participation Definitions

Table 8.5 contains definitions of e-Participation found during the literature review.

Author	Definition
<b>Macintosh (2006)</b>	The use of information and communication technologies to broaden and deepen political participation by enabling citizens to connect with one another and with their elected representatives.
<b>Macintosh and Whyte (2006)</b>	The use of ICTs to support information provision and “top-down” engagement, <i>i.e.</i> government-led initiatives, or “ground-up” efforts to empower citizens, civil society organisations and other democratically constituted groups to gain the support of their elected representatives.
<b>Donnell et al. (2007)</b>	Refers to efforts to broaden and deepen political participation by enabling citizens to connect with one another, with civil servants and with elected representatives using ICTs.
<b>Lehtonen et al. (2007)</b>	ICT-supported participation in processes involved in government and governance. Processes may concern administration, service delivery, decision-making and policy-making.

<b>Author</b>	<b>Definition</b>
<b>Rose and Sanford (2007)</b>	ICT-facilitated citizen participation in (democratic) deliberation and decision-making.
<b>Sæbø et al. (2008)</b>	E-participation involves the extension and transformation of participation in societal democratic and consultative processes mediated by information and communication technologies (ICT), primarily the Internet.
<b>van Dijk (2010)</b>	The use of ICTs to mediate and transform the relations of citizens to governments and to public administrations in the direction of more participation by citizens.
<b>UNDESA (2014)</b>	The process of engaging citizens through ICTs in policy and decision-making in order to make public administration participatory, inclusive, collaborative and deliberative for intrinsic and instrumental ends.
<b>Wikipedia (2015c)</b>	ICT-supported participation in processes involved in government and governance. Processes may concern administration, service delivery, decision-making and policy-making. E-participation is hence closely related to e-government and (e-)governance participation.

Table 8.5 – e-Participation definitions.

## 8.2. COMPARATIVE ANALYSIS OF E-PARTICIPATION REFERENCE MODELS

The e-Participation related concepts covered by the relevant reference models found, including ontologies, domain models and frameworks, are available in Table 8.6.

Author	Description	Concepts	
<b>Macintosh (2004)</b>	Descriptive framework characterising e-Participation in Policy-Making.	Actors; Critical factors for success; Duration & sustainability; Evaluation and Outcomes;	Level of Participation; Resources and Promotion; Rules of engagement; Stage in Decision-making; Technologies Used.
<b>Wimmer (2007)</b>	Ontology for an e-Participation virtual resource centre. Includes concepts and relations represented in Protégé <sup>47</sup> .	Actors; Aspects of Success; e-Participation Areas; Level of Participation; Policy Lifecycle;	Projects; Research Disciplines; Research Type; Tools and Technologies; Type of Activities.
<b>Kalampokis et al.(2008)</b>	Domain Model for e-Participation. Represented in Unified Modelling Language <sup>48</sup> (UML) package and class diagrams.	Channel; Decision Makers; e-Participation process; e-Participation tool; Outcome; Initiator; Moderator; Participation Activity;	Participation Level; Participation Area; Participation Technique; Policy Cycle stage; Role; Scope; Stakeholder; Technology; Tool category.
<b>Slaviero et al. (2011)</b>	Domain ontology designed to support the deployment of e-Participation environments. Includes concepts and relations represented in Protégé.	Actor; ICT; Participation Area;	Participation Level; Participation Method; Phase.
<b>Porwol et a. (2014)</b>	Semantic model for e-Participation. Includes concepts and relations represented in Protégé.	Actor; Adoption; Communication Type; Cost; Deliberation Aim; Deliberation End; Deliberation Result; Deliberation Start Time; Discussion Monitoring; Discussion Summary; Dissemination; End Time; Engagement Level; e-Participation Channels; Evaluation Measure; Execution Procedure;	Funding; Goal; Instrument; Management Performance; Platform Maintenance; Policy-making Handle; Ranking; Result; Stakeholder Motivation; Strategy; Start Time; Technical Performance; Measure; Time; Tool; Topic.

Table 8.6 – e-Participation ontologies and domain models.

<sup>47</sup> Widespread free and open source ontology editor and knowledge acquisition system developed by the Stanford Center for Biomedical Informatics Research at the Stanford University School of Medicine (<http://protege.stanford.edu/>, accessed in 2015-07-06)

<sup>48</sup> Unified Modelling Language is a general-purpose modelling language, in the field of software engineering, which is designed to provide a standard way to specify, visualise, construct and document artefacts of a software system.

### 8.3. COMPARATIVE ANALYSIS OF E-PARTICIPATION ENGAGEMENT LEVELS' TYPOLOGIES

The table below includes a comparative analysis of the existent typologies of e-Participation engagement levels.

Author	Description	Levels
<b>Arnstein (1969)</b>	Typology including eight levels of participation arranged in a ladder pattern, with each rung corresponding to the extent of citizens' power to influence policy.	1. Citizen Control (citizen power) 2. Delegated Power (citizen power) 3. Partnership (citizen power) 4. Placation (tokenism) 5. Consultation (tokenism) 6. Informing (tokenism) 7. Therapy (non-participation) 8. Manipulation (non-participation)
<b>OECD (2001)</b>	Model designed to strengthen representative democracy by enhancing government-citizen relations.	1. Active Participation 2. Consultation 3. Information
<b>Lukensmeyer and Torres (2006)</b>	Framework based on OECD's model to strengthen representative democracy (2001) and intended to facilitate the incorporation of citizen engagement into government practice.	1. Collaboration 2. Engagement 3. Consultation 4. Communication
<b>Macintosh (2004)</b>	Model based on OECD's model to strengthen representative democracy (2001) and intended to characterise e-Democracy initiatives.	1. e-Empowering 2. e-Engaging 3. e-Enabling
<b>Tambouris et al. (2007)</b>	Adaptation of the IAP2 (2007b) participation spectrum initially proposed for traditional participation, intended to accommodate five e-Participation levels.	1. e-Empowerment 2. e-Collaborating 3. e-Involving 4. e-Consulting 5. e-Informing
<b>IAP2 (2007b)</b>	Spectrum based on increasing levels of public participation which provides a framework for analysing the scope and depth of public participation.	1. Empower 2. Collaborate 3. Involve 4. Consult 5. Inform

Table 8.7 – Participation levels' typologies.

### 8.4. PARTICIPATORY METHODS

Table 8.8 includes a sample of the vast spectrum of participatory techniques found in the literature. It does not meant to be exhaustive, but merely representative of possible approaches.

Method	Description	References
<b>21st Century Town Meeting Forum</b>	Forum that brings together hundreds or thousands of ordinary citizens without specific expertise on the topic under discussion, during one or several days. Demographic targets for participants set according to census or other relevant data. Participants receive discussion guides that present further information about the issues under consideration. The form of participation consisting in facilitated round-table discussions in small groups (around 10 participants) to allow actively listen and learn from one another, in order to deliberate in depth about key policy issues. Participants' ideas are recorded in laptops. Each table submits ideas using wireless groupware computers and each participant can vote on specific proposals with keypad polling.	Slocum (2003) Rosa and Pereira (2008)

Method	Description	References
	The entire group votes on the final recommendations to submit to decision makers. Resulting recommendations are provided to decision-makers. Method developed by the AmericanSpeaks <sup>49</sup> .	
<b>Citizens' Jury</b>	Forum composed by approximately 18 to 24 randomly selected citizens (referred as the Jury), representative of the demographics in the area, that come together to deliberate on a specific issue, during a period from 4 to 7 days. Initially the Jury supplied with background material in order to get an understanding of the process and the addressed issue. Following this introduction the following days are dedicated to hearings of subject-matter experts (referred as the witnesses). The witnesses must represent all sides so that the Jury can receive balanced and complete information of the issue. The jurors go then through a process of deliberation in which the different points of view are assessed in order to render a decision about the best course of action. A final report is prepared and presented to the sponsoring body (e.g. local authority), which is required to respond either by acting on it or by explaining why disagrees with it. Method developed by the Jefferson Center <sup>50</sup> .	Rowe and Frewer (2000) Slocum (2003) Rosa and Pereira (2008)
<b>Citizens' Panel</b>	Large group of statistically representative sample of residents in a given area used to assess public preferences and opinions (e.g. identify local service needs). The Citizens Panels' are requested to participate in surveys over the course of the membership and, when appropriate, in further in-depth research as Focus Groups. The techniques most common used include surveys (e.g. postal, telephone). Panel members should be aware about their role, the expected outcome and how often will the consultations take place. Method developed by The Market Research Group <sup>51</sup> .	Rosa and Pereira (2008) Tsitsanis (2008)
<b>Consensus Conference</b>	Aims at broaden the debate on a given issue in order to include the viewpoints of non-experts in policy-making. Consists in a public enquiry involving a group of 10 to 30 citizens, representing the average society member's view, who are charged with the assessment of a socially controversial topic. These laypeople pose questions to panel of experts, assess the answers and then negotiate among themselves. The result is a consensus statement in the form of a written report, expressing their expectations, concerns and recommendations directed at policy-makers and the general public. Method developed by the Developed by the Danish Board of Technology <sup>52</sup> .	Rowe and Frewer (2000) Slocum (2003) Rosa and Pereira (2008)
<b>Deliberative Polling</b>	Form of political consultation that combines techniques of public opinion research and public deliberation, aiming to measure what the public would think about an issue if they had the opportunity to reflect on it. Randomly selected citizens are asked to provide feedback on an initial questionnaire intended to evaluate the knowledge and preference of the general public on a specific issue. Then another random representative sample of citizens is asked to participate in a deliberative event to be held	Slocum (2003) Rosa and Pereira (2008)

<sup>49</sup> <http://en.wikipedia.org/wiki/AmericaSpeaks> (accessed in 2015-07-06)

<sup>50</sup> <http://jefferson-center.org/> (accessed in 2015-07-06)

<sup>51</sup> <https://mrg.bournemouth.ac.uk//Home/PublicSector> (accessed in 2015-07-06)

<sup>52</sup> <http://www.tekno.dk/?lang=en> (accessed in 2015-07-06)

Method	Description	References
	within 1 or 2 days. This group is provided with balanced background materials and participants and assigned to small groups with trained moderators. During the group-sessions, the participants are encouraged to develop questions to pose a panel of experts and policymakers at a plenary session held towards the end of the event. After this deliberation, the participants are asked to answer to the original questionnaire again. The results of the second poll are compared to the first and the opinion change is calculated, providing decision-makers with a snapshot of how citizens would be likely to respond to the issue if they had the opportunity to become fully informed. Method developed by the Centre for Deliberative Polling at the University of Texas <sup>53</sup> .	
<b>Delphi Survey</b>	Structured group interaction process organised in rounds of opinion collection through surveys followed by feedback on the whole set of responses. The result of each survey is presented to the group and the questionnaire used in the next round is built upon the result of the previous round. This process is then repeated as many times as useful. The underlying concept is to promote exposing and weighting of dissimilar views on the addressed issue in order to expose the principal pro and con arguments for these positions. Usually all participants are subject-matter experts and remain anonymous throughout the entire process and even after the completion of the final report. Method developed by the developed by the Rand Corporation <sup>54</sup> .	Slocum (2003) Rosa and Pereira (2008)
<b>Expert Panel</b>	Method in which a variety of experts are engaged based on various fields of expertise to issues that require highly technical knowledge and/or are highly complex synthesis crossing different disciplines. The aim of the panel is to investigate and study the topics assigned and set forth their conclusions and recommendations in the form of a written report. This method is not intended to actively involve the wider public.	Slocum (2003) Rosa and Pereira (2008)
<b>Focus Group</b>	One-time session in which a skilled moderator leads a small group of participants through a semi-structured face-to-face discussion in order to collect their views and preferences on a particular issue. It usually involves 4 to 12 participants selected to meet a certain criteria. Participants can question each other and open and informal discussion is encouraged in order to create a favourable environment for generation of creative ideas. After the session, the research staff analyses the outcomes and produces a report that is send to all the participants for appraisal and eventually to the sponsoring body. This was developed the private sector, mainly as a market research tool.	Coleman & Gøtze (2001) Slocum (2003) Rosa and Pereira (2008)
<b>Petition</b>	A citizen or group states a position of a given issue and invites the public to subscribe it. The result is submitted to a representative body ( <i>e.g.</i> a Parliament), or to government ( <i>e.g.</i> a local authority) in the expectation that the collected level of support will influence its decisions.	Tsitsanis (2008)
<b>Participatory</b>	Consensus-building approach that helps the community to	Rosa and Pereira (2008)

<sup>53</sup> <https://www.utexas.edu/features/archive/2003/polling.html> (accessed in 2015-07-06)

<sup>54</sup> <http://www.rand.org/> (accessed in 2015-07-06)

Method	Description	References
<b>Strategic Planning</b>	articulate together how they would like to develop over the next few years. It comprises four stages. Firstly, the group determines their vision for the future. Secondly identifies the obstacles that are preventing them from reaching their vision. Thirdly, the group proceed to agree on the methods that will overcome the barriers in order to reach the previously defined vision. Lastly a plan is defined. Each stage uses a consensus workshop process guided by a trained and experience facilitator. Method developed by Developed by Institute of Cultural Affairs <sup>55</sup> .	
<b>Public Hearings</b>	Hearings are typically organised by the authority who wants to take a measure, before the final decision is made. During the hearing the initiators provide information and the participating citizens can present their views on issues, while policy-makers are able to sense the public support or opposition to the issue at stake. The report of the hearing is an input to the decision-making process.	Tsitsanis (2008)
<b>Public Opinion Survey</b>	Written questionnaire used for information gathering involving a large representative sample of the population segment of interest.	Rowe & Frewer (2000)
<b>Referendum</b>	Direct voting process wherein an entire electorate is asked to either accept or reject a given proposal. It can be initiated by the government, civil society organisations or citizens. Results may or may not be considered binding.	Coleman & Gøtze (2001)
<b>The World Café</b>	Event hosting conversations about relevant issues intended to promote collaborative dialogue and the sharing of knowledge and ideas. Discussions take place in small groups (referred as tables) and at regular intervals participants move to a different table. The table host digests the content of the previous discussion to the new group in order to cross-share ideas among tables. After the discussions there is a plenary session where the main conclusions are presented as well as future possibilities. The number of participants can vary significantly according to the purpose and hosting constraints. Methodology created by Brown & Isaacs (2005).	Brown & Isaacs (2002) Rosa and Pereira (2008) The World Café (2008)

Table 8.8 – Participatory Methods.

## 8.5. E-PARTICIPATION TOOLS

The tools' categories considered as more relevant for e-Participation by Wimmer et al. (2006) are identified in Table 8.9 . The core e-Participation tools' categories are described in Table 8.10.

Group	Tool Category
<b>Core e-Participation tools</b>	E-participation Chat Rooms E-participation Discussion forum/board Decision-making Games Virtual Communities Online Surgeries e-Panels

<sup>55</sup> <http://www.ica-usa.org/> (accessed in 2015-07-06)

Group	Tool Category
	e-Petitioning e-Deliberative Polling e-Consultation e-Voting Suggestion Tools for (formal) Planning Procedures
<b>Tools extensively used in e-Participation but not specific to e-Participation</b>	Webcasts Podcasts Wiki Blogs Quick polls Surveys GIS-tools (Map-server for maps and plans)
<b>Basic tools to support e-Participation</b>	Search Engines Alert services Online newsletters Frequently asked questions (FAQ) Web Portals Groupware tools

Table 8.9 – e-Participation tools' categories. Adapted from Wimmer et al. (2006).

Core e-Participation tool	Tool description
<b>E-participation Chat Rooms</b>	Web applications where a chat session takes place in real time, which is especially launched for e-Participation purposes
<b>E-participation Discussion forum</b>	Web applications for online discussion groups where users, usually with common interests, can exchange open messages on specific e-Participation issues. Users can pick a topic, see a "thread" of messages, reply and post their own message.
<b>Decision-making Games</b>	Decision-making Games: These typically allow users to view and interact with animations that describe, illustrate or simulate relevant aspects of an issue; here with the specific scope of policy decision-making
<b>eDeliberative Polling</b>	Applications that combine deliberation in small group discussions with random sampling to facilitate public engagement on specific issues.
<b>Virtual Communities:</b>	Applications in which users with a shared interest can meet in virtual space to communicate and build relationships; the shared interest being within e-Participation contexts.
<b>ePanels</b>	Applications where a 'recruited' set, as opposed to a self-selected set, of participants give their views on a variety of issues at specific intervals over a period of time.
<b>ePetitioning</b>	Applications that host online petitions and allow citizens to sign in for a petition by adding their name and address online.
<b>eConsultation</b>	Applications designed for consultations, which allow a stakeholder to provide information on an issue and others to answer specific questions and/or submit open comments.
<b>eVoting</b>	Remote internet enabled voting or voting via mobile phone, providing a secure environment for casting a vote and tallying of the votes (other types of electronic voting are available, but for the purposes of this report we focus on internet voting).



<b>Core e-Participation tool</b>	<b>Tool description</b>
<b>Suggestion Tools for Planning Procedures</b>	Applications supporting participation in formal planning procedures where citizens' comments are expected to official documents within a restricted period

Table 8.10 – Description of the e-Participation core tools' categories. Adapted from Wimmer et al. (2006).

## 8.6. *EPOS*M DEVELOPMENT GUIDELINES

The *ePOS*M development was underpinned by guidelines for maps (refer to Table 8.11), Classes and Instances (refer to Table 8.12) and Relationships (Table 8.13).

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### Guidelines for Maps

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There should be a top-level map only.

Every map should have at least one link to the top-level map or to an intermediate map.

Relationships between concepts are propagated to all connected maps and it should not be required to repeat the same relationships in different maps.

Maps' partitioning should be based on a limited domain of knowledge and multiple maps can be created as needed.

The map context should guide the determination of the hierarchical structure of the concept map.

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Table 8.11 – Guidelines for Maps.

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### Guidelines for Classes and Instances

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The key concepts applicable to the domain should be identified.

The concepts should be written using the singular and should be capitalised.

The map layout should be hierarchically organised, *i.e.* the general concepts at the top of the map and the more specific, less general concepts arranged hierarchically below.

If it is possible to further specify types of an object, then it should be a class and not an instance. The final instances are elements that cannot be further detailed.

Concepts should not be repeated unless strictly necessary. If needed, a reference should be added to concepts already existing in other maps by means of links.

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Table 8.12 – Guidelines for Classes and Instances.

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### Guidelines for Relationships

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All relationship names should be written starting with lower case and capitalising other words, without any space.

The Relations should use linking words or phrases to form a meaningful statement, adopting a *camelCase*<sup>56</sup> style.

Every concept could be related to every other concept: the most prominent and most useful cross-links are the ones that should be identified. If needed, it is possible to divide links in different maps.

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Table 8.13 – Guidelines for Relationships.

Further to this, it is worth noticing that a class is defined in a given Concept Map. When used in different Concept Maps, a link is created pointing to the original map, to avoid redundant classes. These links are identified by a dedicated icon, as show in Figure 8.1.

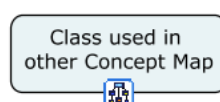


Figure 8.1 – Representation of a Class used in other Concept Map signalled by a specific icon.

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<sup>56</sup> Style in which each next word or abbreviation of compound words or phrases begins with a capital letter.

## 8.7. EPOS M CONCEPTUALISATION DETAILS

### 8.7.1. SUPER Project Organisational Ontologies

The Business Strategy Ontology (BSO) concept map developed in the SUPER project (Janusch et al., 2008) is represented in Figure 8.2.

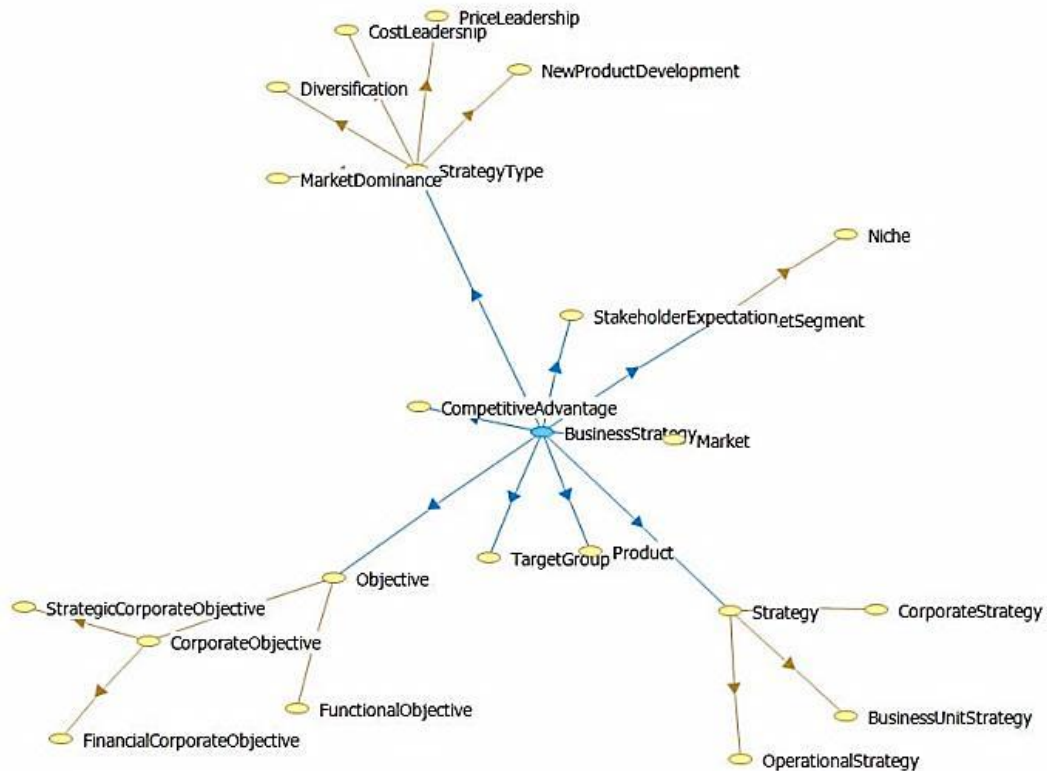


Figure 8.2 – Business Strategy Ontology (BSO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, *Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises*, p. 22.

The Organisational Units Ontology (OUO) concept map developed in the SUPER project (Janusch et al., 2008) is represented in Figure 8.3.

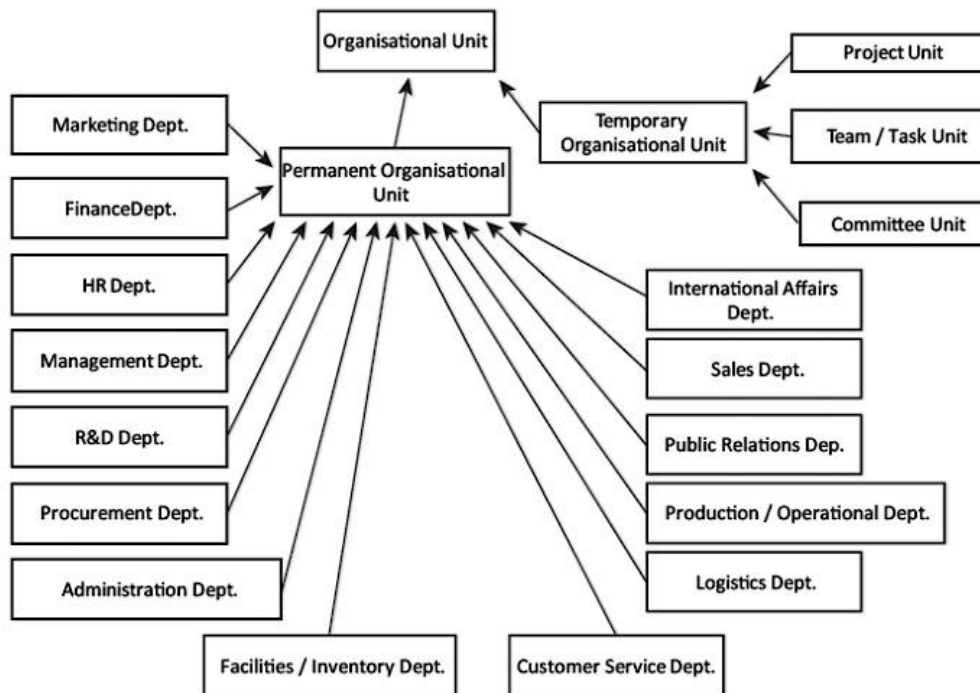


Figure 8.3 – Organisational Units Ontology (OOU). Reprinted from "Organization Structure Description for the Needs of Semantic Business Process Management", by Filipowska et al., 2008, *3rd International Workshop on Semantic Business Process Management (SBPM 2008)*, p. 50.

The Organisational Functions Ontology (BFO) concept map developed in the SUPER project (Janusch et al., 2008) is represented in Figure 8.4.

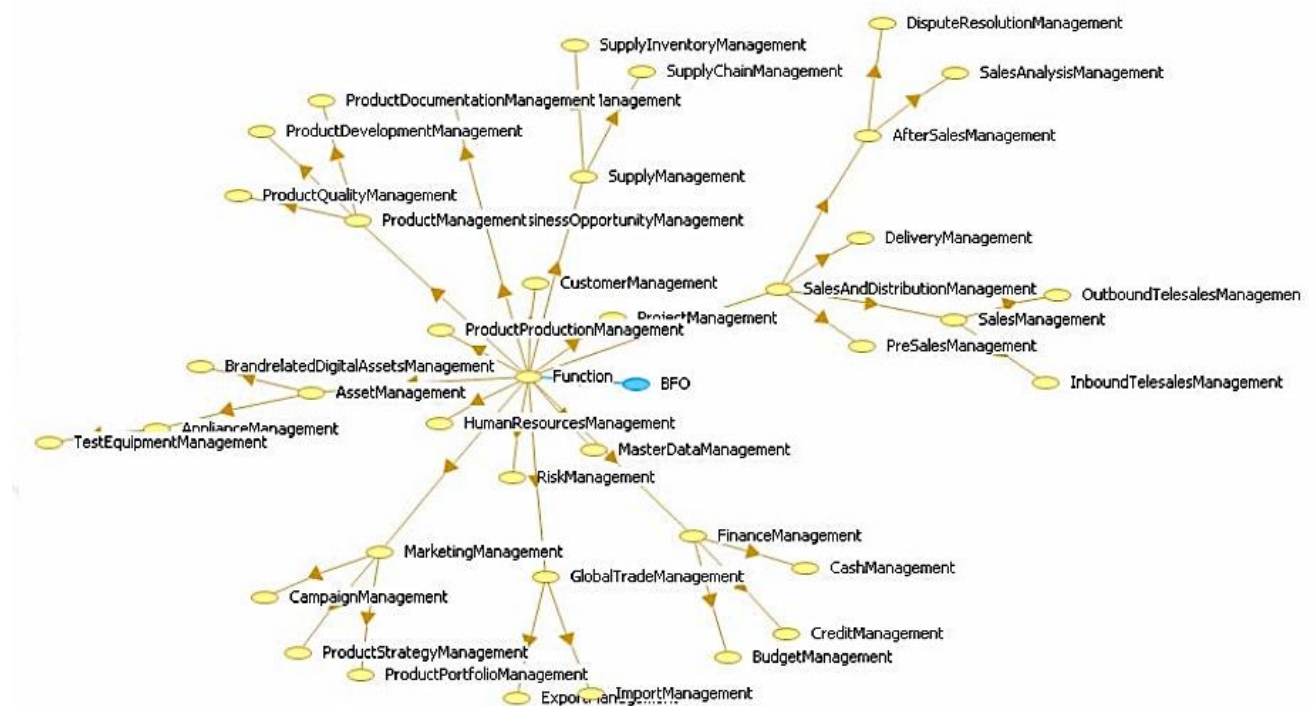


Figure 8.4 – Business Functions Ontology (BFO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, *Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises*, p. 14.

The Business Roles Ontology (BRO) concept map developed in the SUPER project (Janusch et al., 2008) is represented in Figure 8.5.

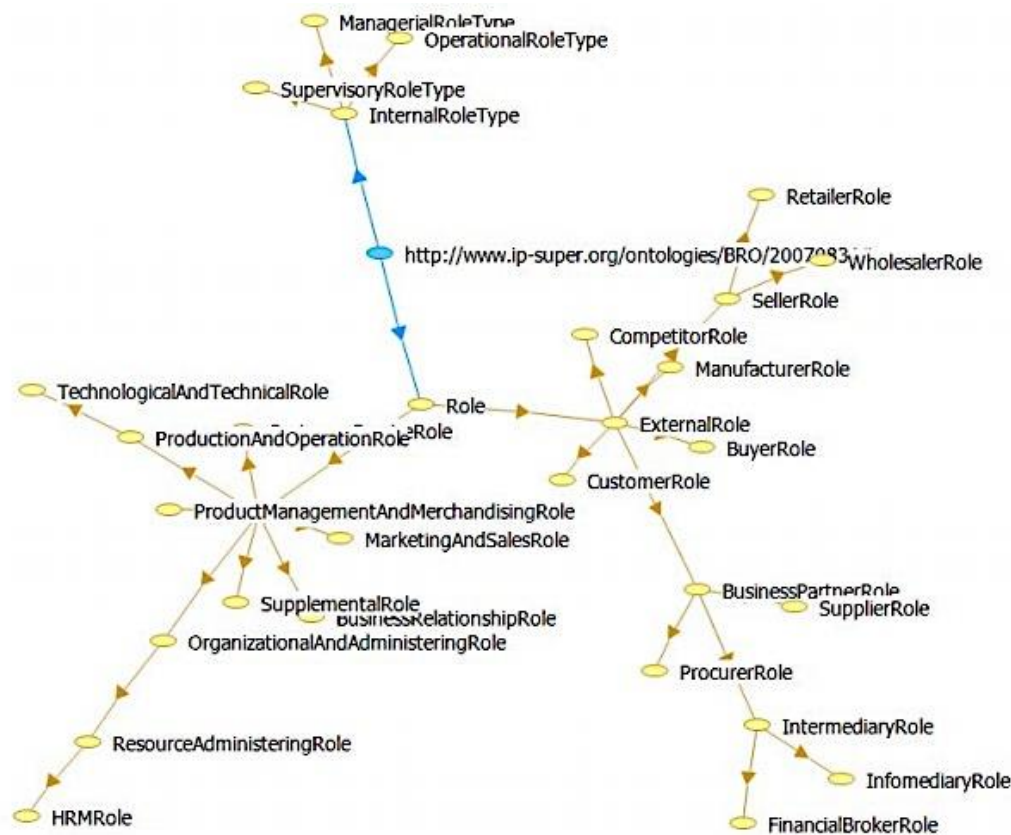


Figure 8.5 – Business Roles Ontology (BRO). Reprinted from "BP Oriented Organisational Ontology: Deliverable 1.2", by Filipowska et al., 2008, *Project IST 026850 SUPER - Semantics Utilized for Process management within and between enterprises*, p. 20.

## 8.7.2. ePOSM Strategy Ontology

### 8.7.2.1. Classes Definition

The tables below contain the definition of the *ePOSM\_SO* classes.

Class	Definition
<b><i>e-Participation Strategy</i></b>	Essential course of action to achieve one or a set of <i>e-Participation Goal</i> .
<b><i>e-Participation Vision</i></b>	Envisioned impact of implementing e-Participation, corresponding to the ultimate goals expressed through societal goals or public value, which are not specific to e-Participation, but for which the e-Participation outcomes should contribute (Millard et al., 2009).
<b><i>e-Participation Goal</i></b>	Statement about a state or condition derived from the <i>e-Participation Vision</i> , corresponding to a direct outcome to an e-Participation Stakeholder.
<b><i>e-Participation Evaluation Result</i></b>	Statement about a state or condition resulting from <i>e-Participation Evaluation</i> .
<b><i>e-Participation Constraint</i></b>	Restriction to the goals of <i>e-Participation Goal</i> .

<b>Class</b>	<b>Definition</b>
<b><i>e-Participation Objective</i></b>	Statement of an attainable, time-targeted and measurable target (Markovic & Kowalkiewicz, 2008; OMG, 2010).
<b><i>Objective Priority</i></b>	Value allowing the ranking of different goals (Markovic & Kowalkiewicz, 2008).
<b><i>Objective Deadline</i></b>	Expression of the latest time possible for achieving the goal (Markovic & Kowalkiewicz, 2008).
<b><i>Objective Measure</i></b>	Attribute, or a set of attributes, used to express the advancement of the goal (Markovic & Kowalkiewicz, 2008).
<b><i>Objective Threshold</i></b>	Threshold value of <i>Objective Measure</i> that expresses whether the goal has been achieved or not (Markovic & Kowalkiewicz, 2008).
<b><i>e-Participation Level</i></b>	Domain concept (refer to Section 4.3).
<b><i>Policy-making</i></b>	Domain concept (refer to Section 4.3).
<b><i>e-Participation Stakeholder Category</i></b>	Domain concept (refer to Section 4.4.5).
<b><i>e-Participation Advantage</i></b>	Uniqueness perceived by an <i>e-Participation Stakeholder</i> in taking part in an <i>e-Participation Process</i> .
<b><i>e-Participation Activity</i></b>	Domain concept (refer to Section 4.3).
<b><i>e-Participation Expectation</i></b>	Benefit expected by an <i>e-Participation Stakeholder</i> in taking part in an <i>e-Participation Process</i> .
<b><i>Policy-making Stage</i></b>	Domain concept (refer to Section 4.3).
<b><i>e-Participation Tactic Plan</i></b>	Specific plan to implement the <i>e-Participation Strategy</i> .
<b><i>e-Participation Project</i></b>	Transformative project to improve e-Participation implementation, addressing e-Participation ICT, processes, awareness and others.
<b><i>e-Participation Process</i></b>	Participatory process assisted by ICT.

Table 8.14 – *ePOSM\_SO*: top-tier classes.

<b>e-Participation Goal Constraint Class</b>	<b>Type</b>	<b>Description</b>
<b><i>Willingness</i></b>	Political	Barrier related to the political will to implement e-Participation (Millard et al., 2009; World Bank, 2014).
<b><i>Representativeness</i></b>	Political	Barrier related to ensuring a fair and representative participation (Rosa & Pereira, 2008; World Bank, 2014).
<b><i>Legislativeness</i></b>	Political	Barrier related to laws and regulations (Millard et al., 2009; Rosa & Pereira, 2008; World Bank, 2014).
<b><i>Incentiveness</i></b>	Social	Barrier related to lack of incentives to participate (World Bank, 2014).
<b><i>Fitness</i></b>	Social	Barrier related the digital divide, including literacy and informational capabilities, to participate in decision-making processes in a meaningful way (Millard et al., 2009; Rosa & Pereira, 2008; World Bank, 2014).
<b><i>Appropriateness</i></b>	Social	Barrier related to ICT suitability for the local socioeconomic context (World

<b>e-Participation Goal Constraint Class</b>	<b>Type</b>	<b>Description</b>
		Bank, 2014).
<b>Trustworthiness</b>	Social	Barrier related to scepticism about Government and participatory processes (Millard et al., 2009; Rosa & Pereira, 2008; World Bank, 2014).
<b>Steadiness</b>	Social	Barrier related to the long-term sustainability of e-Participation (World Bank, 2014).
<b>Technical Readiness</b>	Technical	Barrier related to the technological pool and ICT infrastructure available (Millard et al., 2009; Rosa & Pereira, 2008; World Bank, 2014).
<b>Interoperability</b>	Technical	Barrier related to the ability of different information systems and processes to communicate and exchange data in an accurate, effective and consistent manner (Liu et al., 2013; Santana, Alves, Santos, & Felix, 2011).

Table 8.15 – Constraints of e-Participation.

<b>e-Participation Advantage Subclass</b>	<b>Description</b>
<b>Openness Advantage</b>	Advantage related to enabling Open Government Data (Millard, 2013; World Bank, 2014).
<b>Timeliness Advantage</b>	Advantage related to allowing real time communication and data collection (Ertiö, 2013; Millard, 2013; World Bank, 2014).
<b>Directness Advantage</b>	Advantage related to leapfrogging communication barriers in order to reach a desired end point (World Bank, 2014).
<b>Friendliness Advantage</b>	Advantage related to enhancing participation by means of attractive and user-friendly platforms (Ertiö, 2013; van Dijk, 2010).
<b>Responsiveness Advantage</b>	Advantage related to supporting more substantive civic engagement by encouraging recurring interaction through a timely, precise and prompt response from Government (World Bank, 2014).
<b>Collaborativeness Advantage</b>	Advantage related to promoting collaborative government encouraging active participation by citizens in the design and delivery of public services (Millard, 2013; World Bank, 2014).
<b>Inclusiveness Advantage</b>	Advantage related to reducing communication barriers and, under proper conditions, being a critical enabler for inclusiveness, as it can enhance the reach of the delivery of public services and disaster response to marginalised and remote communities (Ertiö, 2013; van Dijk, 2010; World Bank, 2014).
<b>Collectiveness Advantage</b>	Advantage related to collective learning and intelligence (Geiger & Lucke, 2012) through co-creation and crowdsourcing, enabling citizens to act collectively, including by observing, suggesting, ranking, deliberating, evaluating, voting and revising (Petrik, 2010).
<b>Activeness Advantage</b>	Advantage related to enabling citizens to be active producers of data, content and knowledge (as opposed to passive consumers) (Millard, 2013; World Bank, 2014).
<b>Effectiveness Advantage</b>	Advantage related to promoting cost and time savings in Participation processes and structures (Ertiö, 2013; Millard, 2013; World Bank, 2014).
<b>Data Collection Advantage</b>	Advantage related to enabling massive data collection (including participatory sensing by means of cameras, GPS, audio and voice recognition), data analytics, data mining and data reusability (Ertiö, 2013; Millard, 2013; World Bank, 2014).
<b>Readiness Advantage</b>	Advantage related to the ubiquitous nature of ICT and, in particular, mobile devices, which tend to be permanently powered-on and connected, available at the point of impulse, as well as to allow an easy distribution of software Applications (Ertiö, 2013).

Table 8.16 – Advantages of e-Participation.

<b>Citizen Expectation Subclass</b>	<b>Description</b>
<b>Fulfilment Expectation</b>	Expectation of increased satisfaction and ownership when contributions are reflected in the outcomes (Millard et al., 2009).
<b>Participation Expectation</b>	Expectation of having the opportunity to help solve particular social problems, to raise new, forgotten or neglected issues and to discuss them with policy-makers (van Dijk, 2010).
<b>Transparency Expectation</b>	Expectation of transparent policy-making processes, including the possibility to see what is going on and how decisions are being made (Millard et al., 2009; Rosa & Pereira, 2008).
<b>Simplification Expectation</b>	Expectation of less bureaucracy and administration (Millard et al., 2009).
<b>Accountability Expectation</b>	Expectation of enhanced accountability by perceiving the extent to which participation has actually influenced the policy-making process and ability to monitor the execution of policies (Millard et al., 2009; Rosa & Pereira, 2008).
<b>Convenience Expectation</b>	Expectation of time savings and of overcoming geographical or physical location constraints (Millard et al., 2009).
<b>Inclusion Expectation</b>	Expectation of feelings of involvement and inclusion (Millard et al., 2009; Rosa & Pereira, 2008).
<b>Information Expectation</b>	Expectation of being informed (van Dijk, 2010).

Table 8.17 – Summary of the Citizens' expected benefits.

<b>Government Expectation Subclass</b>	<b>Description</b>
<b>Social Cohesion Expectation</b>	Expectation of enhanced social cohesion and other society-wide policies (Millard et al., 2009).
<b>Social Awareness Expectation</b>	Expectation of knowing the growing social, cultural and opinion diversity in society: e-Participation as a social antenna (van Dijk, 2010).
<b>Quality Expectation</b>	Expectation of improving the quality of government policies and services (van Dijk, 2010).
<b>Equity Expectation</b>	Expectation of ensuring equity of access to public policy-making and services (OECD, 2009).
<b>Legitimacy Expectation</b>	Expectation of boosting the legitimacy of government policy because citizens are consulted (van Dijk, 2010).
<b>Trust Expectation</b>	Expectation of closing the gap perceived to be growing between governments and citizens (van Dijk, 2010).
<b>Efficiency Expectation</b>	Expectation of better outcomes at lower cost and of innovative solutions (OECD, 2009).
<b>Mobilisation Expectation</b>	Expectation of mobilising unknown creativity and expertise in society at large, both among professionals and lay people (van Dijk, 2010).

Table 8.18 – Summary of the Government's expected benefits.



### 8.7.3. ePOSM Organisational Units Ontology

#### 8.7.3.1. Classes' Definition

The tables below contain the definition of the *ePOSM\_OUO* classes.

Class	Definition
<b>Organisational Unit</b>	Recognised association of people in the context of an organisation (Filipowska, Hepp, et al., 2009).
<b>Temporary Organisational Unit</b>	<i>Organisational Unit</i> that is responsible for carrying out a business <i>Function</i> during a limited and defined amount of time.
<b>Permanent Organisational Unit</b>	<i>Organisational Unit</i> that is responsible for carrying out a set of business <i>Function</i> on a permanent basis.
<b>Project Unit</b>	<i>Temporary Organisational Unit</i> that is assigned to execute a Project.
<b>Committee Unit</b>	<i>Temporary Organisational Unit</i> assigned to perform a specific <i>Function</i> .
<b>Task Unit</b>	<i>Temporary Organisational Unit</i> that is assigned to perform a process <i>Function</i> .
<b>e-Participation CoE</b>	<i>Permanent Organisational Unit</i> responsible for the governance of e-Participation, including strategy, delivery and shared infrastructure.
<b>e-Participation Centre of Delivery</b>	Sub-organisation of the <i>e-Participation CoE</i> responsible for staffing and execution of e-Participation projects and initiatives, definition of e-Participation methodologies, execution review of e-Participation initiatives and overall support to e-Participation implementation.
<b>e-Participation Centre of Infrastructure</b>	Sub-organisation of the <i>e-Participation CoE</i> responsible for the implementation, deployment, monitoring and improving of e-Participation ICT.
<b>e-Participation Centre of Strategy</b>	Sub-organisation of the <i>e-Participation CoE</i> responsible for defining e-Participation ends and means upon the assessment of the e-Participation influencers.
<b>e-Participation Executive Team</b>	Sub-organisation of the <i>e-Participation Centre of Strategy</i> responsible for aligning direction and the funding of e-Participation.
<b>e-Participation Strategy Team</b>	Sub-organisation of the <i>e-Participation Centre of Strategy</i> responsible for planning, prioritisation and organisational awareness of e-Participation.
<b>e-Participation Architecture Team</b>	Sub-organisation of the <i>e-Participation Centre of Strategy</i> responsible for the building, leverage and reuse of e-Participation solutions.
<b>e-Participation Evaluation Committee</b>	<i>Temporary Organisational Unit</i> responsible for evaluating the results and impacts of e-Participation.
<b>e-Participation Project Team</b>	<i>Temporary Organisational Unit</i> assigned to the implementation of transformational project towards the improvement of e-Participation.
<b>e-Participation Process Team</b>	<i>Temporary Organisational Unit</i> assigned to carry out a specific participatory initiative assisted by ICT.

Table 8.19 – *ePOSM\_OUO*: Classes.

#### 8.7.3.2. Relationships' Definition

The tables below contain the definition of the *ePOSM\_OUO* relationships.

Relationship	Domain & Range	Definition
<b>hasSubUnit</b>	Domain: <i>Organisational Unit</i> Range: <i>Organisational Unit</i>	Represents hierarchical containment of Organisations or Organisational Units; indicates an Organisation which contains this Organisation.
<b>isAssignedBy</b>	Domain: <i>Temporary Organisational Unit</i> Range: <i>Permanent Organisational Unit</i>	Indicates the <i>Permanent Organisational Unit</i> that is entitled to enable and disable a <i>Temporary Organisational Unit</i> .

Table 8.20 – *ePOSM\_OUO*: Relationships.

#### 8.7.4. *ePOSM* Functions Ontology

##### 8.7.4.1. Classes' Definition

The tables below contain the definition of the *ePOSM\_FO* classes.

##### *ePOSM* Functions Ontology: Top-level

Class	Definition
<b>Function</b>	Functional area of the <i>Organisation</i> .
<b>Activity</b>	Work unit within a business process.
<b>Project Management</b>	Management of transformation projects.
<b>e-Participation Process Management</b>	Management of <i>e-Participation Process</i> (refer to Section 4.3)
<b>e-Participation Governance</b>	Management of e-Participation practice by means of a process management-based approach

Table 8.21 – *ePOSM\_FO*: Top-level view Classes.

##### *ePOSM* Functions Ontology: *e-Participation Governance*

Class	Definition
<b>e-Participation Strategic Alignment</b>	<i>Function</i> addressing the strategy-driven e-Participation improvement planning by instantiating all classes defined in <i>ePOSM_SO</i> .
<b>e-Participation Evaluation</b>	<i>Function</i> addressing the systematic evaluation of the results and impacts of e-Participation.
<b>e-Participation Stakeholders Engagement</b>	<i>Function</i> addressing the coordinated efforts to engage the <i>e-Participation Stakeholder's</i> groups (refer to Section 4.3) to take part in e-Participation projects or processes.
<b>e-Participation Funding Management</b>	<i>Function</i> addressing the planning and control of e-Participation required funding.
<b>e-Participation Awareness</b>	<i>Function</i> addressing the coordinated efforts to enhance the cultural awareness on e-Participation in order to create a facilitating environment.

<b>Class</b>	<b>Definition</b>
<b><i>e-Participation Infrastructure Management</i></b>	<i>Function addressing the management of the implementation, deployment and monitoring of e-Participation dedicated ICT.</i>
<b><i>e-Participation Architecture Management</i></b>	<i>Function addressing the management of the e-Participation value-driven and enabling processes.</i>
<b><i>e-Participation Delivery Management</i></b>	<i>Function addressing the management of the realisation of e-Participation related transformations.</i>
<b><i>e-Participation Ends Definition</i></b>	<i>Function addressing the definition of the desired outcomes of e-Participation.</i>
<b><i>Defining Vision</i></b>	<i>Activity of defining the e-Participation Vision (refer to Section 4.4.2).</i>
<b><i>Planning Results</i></b>	<i>Activity of planning of one or more e-Participation Goal and e-Participation Objective (refer to Section 4.4.2).</i>
<b><i>e-Participation Means Definition</i></b>	<i>Function addressing the definition of how the e-Participation Goal and e-Participation Objective (refer to Section 4.4.2) will be achieved.</i>
<b><i>Defining Strategy</i></b>	<i>Activity of defining the e-Participation Strategy (refer to Section 4.4.2).</i>
<b><i>Planning Tactic</i></b>	<i>Activity of defining the e-Participation Tactic Plan (refer to Section 4.4.2).</i>
<b><i>Identifying Constraints</i></b>	<i>Activity of identifying the set of e-Participation Constraint (refer to Section 4.4.2) which may impact the e-Participation Goal and e-Participation Objective (refer to Section 4.4.2).</i>
<b><i>e-Participation Stakeholders Awareness</i></b>	<i>Function addressing the persuasion of e-Participation Stakeholder to assume a Role (refer to Section 4.4.5) in one or more e-Participation Process (refer to Section 4.3).</i>
<b><i>e-Participation Stakeholders Analysis</i></b>	<i>Function addressing the collection of information to be considered in the definition of the e-Participation Strategy (refer to Section 4.4.2).</i>
<b><i>Assessing Expectations</i></b>	<i>Function addressing the identification of the set of e-Participation Expectation (refer to Section 4.4.2) that should be considered to define the e-Participation Strategy.</i>
<b><i>e-Participation Proposals Management</i></b>	<i>Function addressing the leveraging of the e-Participation stakeholders' proposals towards an effective outcome in the Agenda Setting stage of the Policy-making cycle (refer to Section 4.3).</i>
<b><i>Communicating e-Participation Initiatives</i></b>	<i>Activity of providing information concerning the planned e-Participation initiatives, covering the initiatives' description, schedule and motivation.</i>
<b><i>Communicating e-Participation Tools</i></b>	<i>Activity of providing information concerning the e-Participation available tools.</i>
<b><i>Communicating Participation Principles</i></b>	<i>Activity of providing information concerning the Civic Participation Principles (refer to Section 4.3).</i>
<b><i>Communicating Policy Processes</i></b>	<i>Activity of providing background information concerning the ongoing policy-making processes.</i>
<b><i>Communicating Participatory Methods</i></b>	<i>Activity of providing information that explains available Participatory Methods (refer to Section 4.3).</i>

<b>Class</b>	<b>Definition</b>
<b>Disclosing Public Sector Information</b>	Activity of providing Public Sector Information ensuring availability, updates and quality control.
<b>Providing Training</b>	Activity of providing training on the available tools and methods.
<b>Identifying Stakeholders</b>	Activity of continually identifying the groups of <i>e-Participation Stakeholder</i> .
<b>Assessing Needs</b>	Activity of continually identifying <i>e-Participation Stakeholder's</i> needs concerning policy-making for which e-Participation can potentially contribute.
<b>Assessing Drivers</b>	Activity of identifying, evaluating and understanding the factors that may leverage participation.
<b>Assessing Barriers</b>	Activity of identifying, evaluating and understanding the factors that may prevent participation.
<b>Assessing Relations</b>	Activity of identifying and classifying the existent relationships among groups of <i>e-Participation Stakeholder</i> .
<b>Segmenting Stakeholders</b>	Activity of creating and maintaining a systematic typology of groups of <i>e-Participation Stakeholder</i> , including a classification according to attributes of interest for e-Participation.
<b>Collecting Proposal</b>	Activity of collecting proposals concerning issues to address in the e-Participation processes.
<b>Evaluating Proposal</b>	Activity of evaluating the proposals in terms of issues to address in the e-Participation processes according to pre-defined criteria (e.g. relevancy, feasibility, priority, ability to delegate, available tools, available methods, participation potential).
<b>Providing Feedback</b>	Activity of providing feedback concerning the proposals' evaluation.
<b>Updating Backlog</b>	Activity of updating the backlog of initiatives, following the <i>Evaluating Proposal</i> .
<b>e-Participation Funding Planning</b>	Function addressing the planning of the e-Participation overall funding.
<b>e-Participation Cost Management</b>	Function addressing the management of the costs allocated to all e-Participation related functions.
<b>Defining Funding Model</b>	Activity of defining how the e-Participation functions are funded.
<b>Budgeting Governance</b>	Activity of planning the budget allocation to the <i>e-Participation Governance</i> function.
<b>Budgeting Tactic Plan</b>	Activity of planning the budget allocation to the <i>e-Participation Process Management</i> and <i>e-Participation Project Management</i> functions.
<b>Managing Tactic Plan Costs</b>	Activity of managing costs related to the <i>e-Participation Process Management</i> and <i>e-Participation Project Management</i> functions.
<b>Managing Governance Costs</b>	Activity of managing costs related to the <i>e-Participation Governance</i> function.
<b>Policy-making Process</b>	Function addressing the discovery, identification and documentation of policy-making processes that inherently deliver value to citizens and directly impact the <i>e-Participation</i>

<b>Class</b>	<b>Definition</b>
<b>Inventory</b>	<i>Strategy.</i>
<b>e-Participation Process Improvement</b>	<i>Function</i> addressing the design of new e-Participation processes or redesign of existing processes based on the analysis of improvement opportunities.
<b>e-Participation Library Management</b>	<i>Function</i> addressing the maintenance of the e-Participation Reference Processes' library.
<b>e-Participation Processes Governance</b>	<i>Function</i> addressing the set-up of appropriate governance structures to ensure the consistency of <i>e-Participation Processes</i> .
<b>Discovering Policy-making Processes</b>	Activity of identifying policy-making processes that can potentially integrate e-Participation.
<b>Analysing Policy-making Processes</b>	Activity of understanding the current state of policy-making processes' activities and measure the alignment with the <i>e-Participation Goal</i> .
<b>Modelling Policy-making Processes</b>	Activity of modelling the current state of policy-making processes including activities, events, responsibilities, related systems and documents using a defined notation.
<b>Prescribing Improvement</b>	Activity of defining proposals to improve policy-making processes towards the <i>e-Participation Goal</i> .
<b>Modelling e-Participation Processes</b>	Activity of modelling <i>e-Participation Processes</i> , including defining activities, rules that control the activities, handoffs of processes between functional groups, linkages with other processes and desired metrics.
<b>Designing ICT</b>	Activity of defining the ICT requirements for deploying e-Participation processes.
<b>Testing Processes</b>	Activity of validating new or modified e-Participation processes.
<b>Defining Implementation Plan</b>	Activity of defining the e-Participation processes' implementation plan, covering change management, technology, human resources and facilities' requirements.
<b>Managing e-Participation Process Repository</b>	<p>Activity of maintaining a repository of reference e-Participation Processes to foster reusability including:</p> <ul style="list-style-type: none"> <li>• Process model;</li> <li>• Process ownership;</li> <li>• Target participants;</li> <li>• Process purpose;</li> <li>• Stakeholders;</li> <li>• Supporting ICT;</li> <li>• Expected results;</li> <li>• Execution calendar;</li> <li>• Policy-cycle interfaces;</li> <li>• Results generated;</li> <li>• Process metrics;</li> <li>• Linkage to <i>e-Participation Goals</i>;</li> <li>• Regulatory requirements.</li> </ul>
<b>Managing Civic Participation</b>	Activity of maintaining a repository of reference <i>Participatory Methods</i> (refer to Section 4.3).

<b>Class</b>	<b>Definition</b>
<b>Methods Repository</b>	
<b>Managing Compliance Repository</b>	Activity of maintaining a repository of relevant legislation and directives.
<b>Managing Compliance</b>	Activity of ensuring the e-Participation Processes compliance with existing legislation and directives.
<b>Defining Methodologies</b>	Activity of defining methodologies for analysing, modelling, designing, implementing and maintaining e-Participation processes.
<b>Adopting Standards</b>	Activity of adopting standards for BPM methods, tools and techniques.
<b>Managing Roles</b>	Activity of defining and maintaining the <i>Roles</i> related to e-Participation (refer to Section 4.4.5).
<b>Managing Changes</b>	Activity of ensuring a smooth transition of transformations related to the implementation of <i>e-Participation Processes</i> .
<b>e-Participation Programme Management</b>	Function addressing the management of the portfolio of e-Participation projects and e-Participation Processes initiatives.
<b>e-Participation Solutions Support</b>	Function addressing the provision of support to users on e-Participation processes and the corresponding tools' functionality.
<b>e-Participation Delivery Methodology</b>	Function addressing the definition of the methodologies related to the delivery of e-Participation processes and transformation projects.
<b>Monitoring Projects</b>	Activity of controlling the execution of e-Participation Projects.
<b>Staffing Projects</b>	Activity of assigning the required human resources and corresponding profiles to the e-Participation Projects.
<b>Supporting Process Administration</b>	Activity of providing support on e-Participation processes and the corresponding tools' functionality to users involved in the administration of the processes.
<b>Supporting Process Participants</b>	Activity of providing support on e-Participation processes and the corresponding tools' functionality to users that participate in the processes.
<b>Defining Lifecycle Model</b>	Activity of defining a methodology for all phases of the e-Participation process lifecycle, including Planning, Analysis, Design and Modelling, Implementation, Monitoring and Improvement.
<b>Defining Staffing Model</b>	Activity of defining a model through which individual projects can make requests for resources.
<b>e-Participation ICT Governance</b>	Function addressing the administration and production support of e-Participation ICT.
<b>e-Participation Scalability Management</b>	Function addressing the management of procedures and techniques to ensure adequate performance upon the load demand of the <i>e-Participation Processes</i> .
<b>e-Participation Security Management</b>	Function addressing the management of procedures and techniques to protect and preserve the confidentiality, integrity and availability of information related to e-Participation processes.

<b>Class</b>	<b>Definition</b>
<b>Deploying e-Participation ICT</b>	<i>Activity of configuring and installing the e-Participation ICT encompassing the execution procedure, acceptance criteria and rollback plan.</i>
<b>Auditing e-Participation ICT</b>	<i>Activity of monitoring the conformity of the execution of e-Participation processes through business-level auditing (application level logging), legal regulations compliance auditing and system-level auditing (technical logging).</i>
<b>Planning Capacity</b>	<i>Activity of planning the required capacity to ensure the specified availability and performance levels, considering the load estimation.</i>
<b>Managing Vertical Scalability</b>	<i>Activity of managing the e-Participation ICT scalability by controlling the vertical scalability (change the assigned resources such as cores, CPUs, memory) or horizontal scalability (change the allocated hardware) to cope with the availability or performance specifications.</i>
<b>Managing Confidentiality</b>	<i>Activity of ensuring that the e-Participation processes and participants' information is not made available or disclosed to unauthorised entities.</i>
<b>Managing Availability</b>	<i>Activity covering the management of procedures and techniques to minimise e-Participation ICT failures.</i>
<b>Managing Integrity</b>	<i>Activity of protecting the accuracy and completeness of the e-Participation processes and participants' information.</i>
<b>e-Participation Technical Evaluation</b>	<i>Function addressing the evaluation of the extent to which the ICT-based engagement tools supporting the e-Participation Process have directly contributed to the e-Participation outcome (e.g. usability, functionality, availability).</i>
<b>e-Participation Political Evaluation</b>	<i>Function addressing the evaluation of the extent to which the e-Participation Process has effectively contributed to the policy-making (e.g. did it engage the community affected, contributions' relevance, contributions' impact, conflicts' handling, achieved consensus).</i>
<b>e-Participation Social Evaluation</b>	<i>Function addressing the evaluation of the e-Participation Process outcomes (e.g. impact on the citizens' needs, inclusion).</i>
<b>Evaluating Mobility Technology</b>	<i>Activity of evaluating the mobility and wireless technology supporting the e-Participation Process.</i>
<b>Evaluating Social Media</b>	<i>Activity of evaluating the use of citizen generated content through the social media as a co-creation mechanism for policy-making.</i>
<b>Evaluating Open Government Data</b>	<i>Activity of evaluating the contribution of open data to transparency leverage and better decision-making.</i>
<b>Evaluating Platforms</b>	<i>Activity of evaluating the e-Participation dedicated ICT platforms.</i>
<b>Evaluating Legal Frameworks</b>	<i>Activity of evaluating of the extent to which the existent legal frameworks facilitate e-Participation implementation.</i>
<b>Evaluating Organisational Frameworks</b>	<i>Activity of evaluating how the Government and Public Administration organisational arrangements facilitate the utilisation of resources assigned for e-Participation activities and determine their efficiency, productivity and responsiveness.</i>
<b>Evaluating Channels</b>	<i>Activity of evaluating the extent to which the communication means that were used contributed to the outcomes of the e-Participation Processes.</i>

Class	Definition
<b>Evaluating Outreach</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to the inclusiveness.
<b>Evaluating e-Informing</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to <i>e-Informing</i> (refer to Section 4.3).
<b>Evaluating e-Consultation</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to <i>e-Consultation</i> (refer to Section 4.3).
<b>Evaluating e-Involvement</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to <i>e-Involvement</i> (refer to Section 4.3).
<b>Evaluating e-Collaboration</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to <i>e-Collaboration</i> (refer to Section 4.3).
<b>Evaluating e-Empowerment</b>	Activity of evaluating the extent to which the <i>e-Participation Processes</i> contributed to <i>e-Empowerment</i> (refer to Section 4.3).

Table 8.22 – *ePOSM\_FO: e-Participation Governance Classes.*

### ***ePOSM Functions Ontology: e-Participation Process Management***

Class	Definition
<b>e-Participation Process Initiation</b>	Function addressing the definition of the <i>e-Participation Process</i> requirements and constraints from an end-to-end perspective.
<b>e-Participation Process Setup</b>	Function addressing the customisation of the <i>e-Participation Process</i> to the defined requirements and constraints based on the reference models available in the <i>e-Participation Library</i> (refer to the <i>e-Participation Governance</i> function).
<b>e-Participation Process Dissemination</b>	Function addressing the continual promotion and communication of the <i>e-Participation Process</i> to stakeholders.
<b>e-Participation Process Implementation</b>	Function addressing the realisation of the <i>e-Participation Process</i> .
<b>e-Participation Process Closure</b>	Function addressing phase-out activities of the <i>e-Participation Process</i> .
<b>e-Participation Process Staffing</b>	Function addressing the allocation of the human resources required to execute the selected <i>Participatory Method</i> (refer to Section 4.3).
<b>e-Participation Process Resources Definition</b>	Function addressing the selection of the tangible non-human resources required to implement the <i>e-Participation Process</i> .
<b>e-Participation Process Targets Definition</b>	Function addressing the definition of the <i>e-Participation Process</i> expected outcomes.
<b>e-Participation Process Scope Definition</b>	Function addressing the definition of the ambit in which the <i>e-Participation Process</i> will act.
<b>e-Participation Process Contextual Awareness</b>	Function addressing the evaluation of contextual factors influencing the <i>e-Participation Process</i> .
<b>Defining Process Goals</b>	Activity of planning social, political and technical qualitative goals that should be satisfied by executing the <i>e-Participation Process</i> .



<b>Class</b>	<b>Definition</b>
<b>Defining Process Objectives</b>	Activity of planning the attainable, time-targeted and measurable targets that the <i>e-Participation Process</i> seeks to meet in order to achieve its Goals.
<b>Defining Process Outputs</b>	Activity of planning of tangible results that should be produced throughout the execution of the <i>e-Participation Process</i> .
<b>Recruiting Policy-makers</b>	Activity of recruiting actors to perform the <i>Policy-Maker Role</i> (refer to Section 4.4.5).
<b>Recruiting Marketeers</b>	Activity of recruiting actors to perform the <i>Marketing Role</i> (refer to Section 4.4.5).
<b>Recruiting Content Providers</b>	Activity of recruiting actors to perform the <i>Editorial Management Role</i> (refer to Section 4.4.5).
<b>Recruiting Analysts</b>	Activity of recruiting actors to perform the <i>Participation Analyst Role</i> (refer to Section 4.4.5).
<b>Recruiting Moderators</b>	Activity of recruiting actors to perform the <i>Moderation Role</i> (refer to Section 4.4.5).
<b>Recruiting Subject Matter Expert</b>	Activity of recruiting actors to perform the <i>Subject Matter Expert Role</i> (refer to Section 4.4.5).
<b>Recruiting Participants</b>	Activity of recruiting actors to perform the <i>Participant Role</i> (refer to Section 4.3).
<b>Recruiting IT Staff</b>	Activity of recruiting actors to perform the <i>ICT Administration Role</i> (refer to Section 4.4.5).
<b>Assigning Organisational Units</b>	Activity of assigning the <i>Organisational Units</i> responsible for playing any <i>e-Participation Process Role</i> (refer to Section 4.4.5).
<b>Defining Geographical Span</b>	Activity of selecting the <i>e-Participation Process</i> geographical span, such as local, regional, national or supra-national.
<b>Defining e-Participation Level</b>	Activity of selecting the type(s) of <i>e-Participation Level</i> (refer Section 4.3) to be applied in the <i>e-Participation Process</i> .
<b>Formulating Subject</b>	Activity of elaborating the issues at stake in the <i>e-Participation Process</i> .
<b>Defining Participation Method</b>	Activity of defining the <i>Participatory Method</i> (refer Section 4.3) to be applied in the <i>e-Participation Process</i> .
<b>Defining Offline Resources</b>	Activity of selecting the non-ICT <i>e-Participation Resource</i> (refer Section 4.3).
<b>Defining ICT Channels</b>	Activity of selecting the ICT communication media to be used (refer Section 4.3).
<b>Defining ICT Tools</b>	Activity of selecting the specific ICT tools to be used within the available <i>e-Participation Tools Category</i> (refer Section 4.3).
<b>Understanding Policy Cycle</b>	Activity of understanding how the participation results should be integrated in the policy-making cycle.
<b>Understanding Bottom-up</b>	Activity of understanding the existent bottom-up initiatives addressing the issues at stake.

Class	Definition
<b>Initiatives</b>	
<b>Understanding Learnt Lessons</b>	Activity of understanding the relevant lessons learnt from previous <i>e-Participation Processes</i> that should be considered in the <i>e-Participation Process Setup</i> .
<b>Understanding Privacy Constraints</b>	Activity of understanding ethical constraints related to the collection, use and disclosure of one's personally identifiable info (Cavoukian, 2011).
<b>Understanding Regulations</b>	Activity of understanding the legislative, legal and jurisdictional constraints related to the issues at stake that should be considered in the <i>e-Participation Process Setup</i> .
<b>e-Participation Process ICT Setup</b>	Function addressing the customisation of an <i>e-Participation Process</i> reference model instance according to the requirements and constraints identified through the <i>e-Participation Process Initiation</i> function.
<b>e-Participation Process Integration</b>	Function addressing the integration of the <i>e-Participation Process</i> into existing formal and informal processes related to the issues at stake.
<b>e-Participation Process Content Setup</b>	Function addressing the preparation of all types of content required to ensure an informed participation.
<b>Configuring Process Rules</b>	Activity of tailoring the process rules (ABPMP, 2009) in the selected ICT, covering: <ul style="list-style-type: none"> <li>• Entry Rules</li> <li>• Exit Rules</li> <li>• Transition Rules</li> <li>• Participation Rules</li> <li>• Branching Rules</li> <li>• Joining Rules</li> </ul>
<b>Configuring Exception Handling</b>	Activity of configuring mechanisms to trigger alerts whenever there is an exception that results in an ICT failure.
<b>Configuring Process Inputs</b>	Activity of configuring the ICT interfaces responsible for receiving the participants' contributions according to the expected format.
<b>Configuring Process Phases</b>	Activity of configuring the process phases according to the selected <i>Participatory Method</i> (refer Section 4.3).
<b>Configuring Handoffs</b>	Activity of configuring the points in the process where work or information passes from one system, person or group to another (ABPMP, 2009).
<b>Configuring Outputs</b>	Activity of configuring the ICT interfaces responsible for providing the process results throughout the <i>e-Participation Process</i> .
<b>Configuring Events</b>	Activity of configuring the ICT to handle the events that impact the <i>e-Participation Process</i> execution.
<b>Configuring Roles</b>	Activity of assigning the <i>e-Participation Process Roles</i> (refer to Section 4.4.5) to the assigned <i>Actors</i> .
<b>Configuring Controls</b>	Activity of configuring controls that allow the monitoring of the progress and performance of the <i>e-Participation Process</i> throughout its execution.
<b>Instantiating Reference Process</b>	Activity of instantiating a reference process from the <i>e-Participation Library</i> that implements the selected <i>Participatory Method</i> (refer Section 4.3).
<b>Integrating Bottom-up Initiatives</b>	Activity of integrating the existent Bottom-up Initiatives (refer Section 4.3) in the <i>e-Participation Process</i> in order to foster inclusion and leverage existing contributions.

<b>Class</b>	<b>Definition</b>
<b>Integrating Policy Cycle Stage</b>	Activity of integrating the <i>e-Participation Process</i> in the policy-making cycle stage.
<b>Integrating Offline Channels</b>	Activity of integrating the existent offline channels (refer Section 4.3) in the <i>e-Participation Process</i> in order to foster inclusion and leverage existing contributions.
<b>Providing Regulations References</b>	Activity of preparing the content to be made available related to legislative, legal and jurisdictional constraints concerning the issues at stake.
<b>Providing Background Information</b>	Activity of preparing the content to be made available related to information aiming to improve the awareness on the issues at stake in order to increase the quality of the participants' contributions.
<b>Preparing Participation Instructions</b>	Activity of preparing the content to be made available related to instructions on how to participate.
<b>Preparing Topics to Address</b>	Activity of preparing the content to be made available related to the description of the issues at stake.
<b>Preparing Process Description</b>	Activity of preparing the content to be made available related to the description of the <i>e-Participation Process</i> in order to ensure transparency and accountability (refer Section 4.3.1).
<b>Preparing Goals Description</b>	Activity of preparing the content to be made available related to the description of the <i>e-Participation Process</i> goals to promote awareness and focus the participation on the process target.
<b>e-Participation Process Dissemination Preparation</b>	Function addressing the preparation of how, when and by what means the <i>e-Participation Process</i> should be promoted towards maximising the targeted outcomes.
<b>e-Participation Process Dissemination Execution</b>	Function addressing the execution of activities intended to communicate and promote the <i>e-Participation Process</i> .
<b>Defining Dissemination Phases</b>	Activity of defining how the dissemination strategy should be operationalised, including the planning of what to communicate and promote, and when.
<b>Defining Dissemination Strategy</b>	Activity of defining the essential course of action with regard to promoting and communicating the <i>e-Participation Process</i> .
<b>Defining Offline Channels</b>	Activity of selecting the offline communication means.
<b>Defining Online Channels</b>	Activity of selecting the online communication means.
<b>Preparing Dissemination Materials</b>	Activity of conceiving and elaborating the online and offline materials that should be used in the <i>e-Participation Process Dissemination Execution</i> .
<b>Performing Offline Dissemination</b>	Activity of conducting offline promotion.

Class	Definition
<b>Performing Online Dissemination</b>	Activity of conducting online promotion
<b>e-Participation Process Archival</b>	Function addressing procedures related to archiving in the <i>e-Participation Library</i> and processing information related to all activities of the closed <i>e-Participation Process</i> .
<b>e-Participation Process Evaluation</b>	Function addressing the evaluation of the <i>e-Participation Process</i> against the defined targets.
<b>Updating e-Participation Library</b>	Activity of updating the <i>e-Participation Library</i> with the outputs and results of the <i>e-Participation Process</i> that can be stored.
<b>Performing Privacy Procedures</b>	Activity of performing privacy procedures, such as anonymisation or disposal, to the <i>e-Participation Process</i> data classified as private, in order to comply with ethical principles or applicable regulations.
<b>Process Data Archival</b>	Activity of archiving <i>e-Participation Process</i> data.
<b>Collecting Participants Feedback</b>	Activity of collecting formal and informal feedback from citizens' concerning all aspects of the <i>e-Participation Process</i> .
<b>Gathering Lessons Learnt</b>	Activity of systematically consolidating lessons learnt so that this information can be stored in the <i>e-Participation Library</i> and be fed into subsequent projects or processes.
<b>Assessing Outputs</b>	Activity of assessing the outputs generated throughout the execution of the <i>e-Participation Process</i> against the initial planning.
<b>Assessing Objectives</b>	Activity of assessing the objectives achieved by the <i>e-Participation Process</i> against the initial planning.
<b>Evaluating Goals</b>	Activity of evaluating the goals achieved by the <i>e-Participation Process</i> against the initial planning.
<b>e-Participation Process Execution</b>	Function addressing the activities related to the execution of the <i>e-Participation Process</i> towards the defined targets.
<b>e-Participation Process Administration</b>	Function addressing the administration activities required to ensure that the <i>e-Participation Process</i> runs according to the defined targets.
<b>Maintaining Content</b>	Activity of continually renovating the process according to the process phases and produced results.
<b>Administrating Users</b>	Activity of administrating users accounts.
<b>Processing Data</b>	Activity of processing collected data to obtain results according to the adopted <i>Participation Method</i> (refer Section 4.3).
<b>Administrating Process</b>	Activity of administrating the process during its execution to ensure that it operates as planned, including transition between phases, handoffs, Inputs/Outputs, exceptions, events and controls.
<b>Publishing Results</b>	Activity of publishing results from the <i>e-Participation Process</i> execution phases.
<b>Executing Voting</b>	Activity of Voting (refer Section 4.3).
<b>Executing</b>	Activity of Polling (refer Section 4.3).

Class	Definition
<b>Polling</b>	
<b>Executing Petitioning</b>	Activity of <i>Petitioning</i> (refer Section 4.3).
<b>Executing Mediation</b>	Activity of <i>Mediation</i> (refer Section 4.3).
<b>Executing Electoring</b>	Activity of <i>Electoring</i> (refer Section 4.3).
<b>Executing Information Provision</b>	Activity of <i>Information Provision</i> (refer Section 4.3).
<b>Executing Discourse</b>	Activity of <i>Discourse</i> (refer Section 4.3).
<b>Executing Deliberation</b>	Activity of <i>Deliberation</i> (refer Section 4.3).
<b>Executing Community Building</b>	Activity of <i>Community Building</i> (refer Section 4.3).
<b>Executing consultation</b>	Activity of <i>Consultation</i> (refer Section 4.3).

Table 8.23 – *ePOSM\_FO*: *e-Participation Process* Classes.

#### 8.7.4.2. Relationships' Definition

The tables below contain the definition of the *ePOSM\_FO* relationships.

##### *ePOSM* Functions Ontology: Top-level

Relationship	Domain & Range	Definition
<b>hasSubFunction</b>	Domain: <i>Function</i> Range: <i>Function</i>	Represents hierarchical containment of Functions. Indicates a <i>Function</i> that contains this <i>Function</i> .
<b>hasActivity</b>	Domain: <i>Function</i> Range: <i>Activity</i>	Indicates an <i>Activity</i> that is carried out by this <i>Function</i> .
<b>isAllocatedTo</b>	Domain: <i>Function</i> Range: <i>Organisation Unit</i>	Indicates the <i>Organisational Unit</i> that is responsible for carrying out this <i>Function</i> .

Table 8.24 – *ePOSM\_FO*: Relationships.

#### 8.7.5. *ePOSM* Roles Ontology

##### 8.7.5.1. Classes' Definition

The tables below contain the definition of the *ePOSM\_RO* classes.

Class	Definition
<b>Role</b>	Set of expected behaviours, prerogatives and obligations featured by an actor (Janusch et al., 2008).
<b>e-Participation Role</b>	Role played with the intent to perform an e-Participation function (refer to Section 4.4.4).

<b>Class</b>	<b>Definition</b>
<b><i>e-Participation Stakeholder Category</i></b>	Category of <i>e-Participation Stakeholder</i> (refer to Section 4.3).
<b><i>Collective Agent</i></b>	Category representing social actors such as NGOs, Citizens' Groups, Political Parties, Lobby groups, Industry, etc.
<b><i>Citizenry</i></b>	Category representing citizens.
<b><i>Governmental Institution</i></b>	Category representing Government, Public Administration and Elected Representatives.
<b><i>e-Participation Process Role</i></b>	Role of performing <i>e-Participation Process Management</i> (refer to Section 4.4.4) functions.
<b><i>ICT Administration Role</i></b>	Role of performing the ICT setup, configuration and support throughout the <i>e-Participation Process</i> lifecycle.
<b><i>Subject Matter Expert Role</i></b>	Role of performing the provision of expertise related to the issues at stake in the process.
<b><i>Policy-maker Role</i></b>	Role of being responsible for taking up the <i>Outputs</i> of the <i>e-Participation Process</i> (refer to Section 4.3).
<b><i>Editorial Management Role</i></b>	Role of performing the management of the process informational content, including preparation, updating, publishing, removal and archival.
<b><i>Moderation Role</i></b>	Role of performing the guidance throughout the process execution, helping the community to generate its purpose, while addressing conflicts and making the necessary interventions.
<b><i>Participant Role</i></b>	Role of performing the contribution to the issue at stake, <i>i.e.</i> the participation itself, during an <i>e-Participation Process</i> .
<b><i>Process Management Role</i></b>	Role of performing the management of the process ensuring that all functions are properly conducted towards the process goals.
<b><i>Participation Analyst Role</i></b>	Role of performing the information processing and elaboration based on the contributions collected during the <i>e-Participation Process</i> execution.
<b><i>Marketing Role</i></b>	Role of performing the promotion the <i>e-Participation Process</i> .
<b><i>e-Participation Governance Role</i></b>	Role of performing <i>e-Participation Governance</i> functions (refer to Section 4.4.4).
<b><i>e-Participation Process Architect Role</i></b>	Role of performing <i>e-Participation Architecture Management</i> functions, including the analysis, design and modelling of <i>e-Participation</i> processes, being responsible for the process inventory and <i>e-Participation Library</i> (refer to Section 4.4.4).
<b><i>e-Participation Technical Architect Role</i></b>	Role of performing <i>e-Participation Architecture Management</i> functions, including the management of the <i>e-Participation</i> software stack, comprising key strategic decisions involving using, acquiring and configuring the technology.
<b><i>e-Participation System Administration Role</i></b>	Role of performing <i>e-Participation Infrastructure Management</i> functions.
<b><i>e-Participation Strategy Lead Role</i></b>	Role of performing the <i>e-Participation Strategic Alignment</i> functions (refer to Section 4.4.4).

Class	Definition
<b><i>e-Participation Programme Management Role</i></b>	Role of performing the <i>e-Participation Delivery Management</i> function (refer to Section 4.4.4).
<b><i>e-Participation Government Sponsor Role</i></b>	Role of performing the sponsorship for the <i>e-Participation Strategic Alignment</i> and <i>e-Participation Funding Management</i> functions (refer to Section 4.4.4).

Table 8.25 – *ePOSM\_RO*: Classes.

### 8.7.5.2. Relationships' Definition

The table below contains the definition of the *ePOSM\_RO* relationships.

Relationship	Domain & Range	Definition
<b><i>hasStakeholder Category</i></b>	Domain: <i>Role</i>  Range: <i>Stakeholder Category</i>	Indicates a Category of a Stakeholder that has a <i>Role</i> .

Table 8.26 – *ePOSM\_RO*: Relationships.

## 8.8. *EPOSM* OWL VERIFICATION

### 8.8.1. Conversion to OWL

#### 8.8.1.1. *ePOSM* Strategy Ontology (*ePOSM\_SO*)

The *ePOSM\_SO* construction and consistency verification results provided by the CMapTools Ontology Editor for exporting to OWL are available in the figure below.

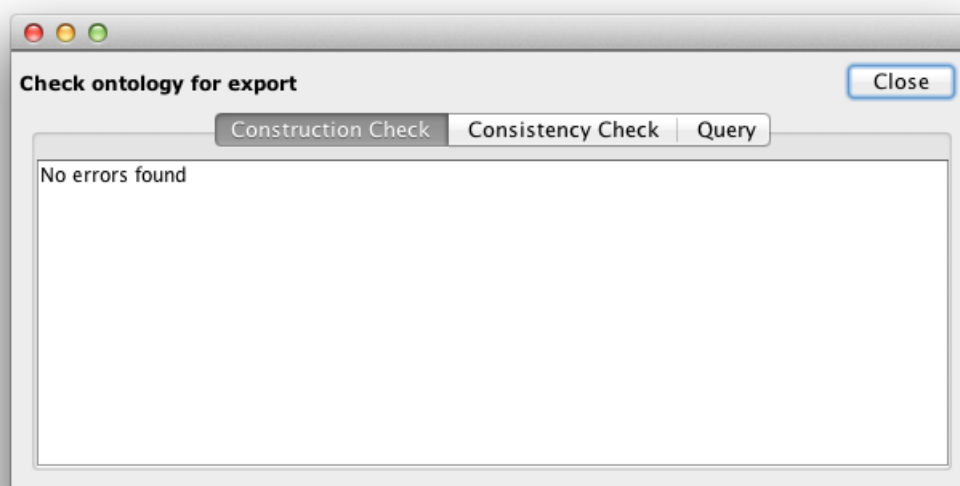


Figure 8.6 – *ePOSM\_SO* Construction Verification.

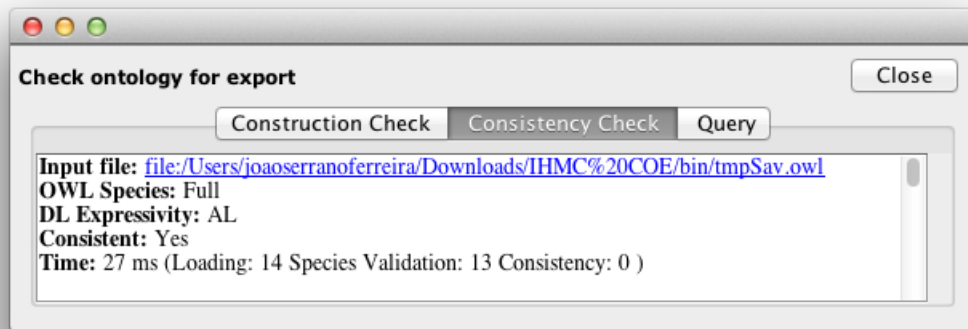


Figure 8.7 – *ePOSM\_SO* Consistency Verification.

The *ePOSM\_SO* implementation in OWL is available in the figure below.

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  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
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```

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  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#consistsOfSegment">
  <rdfs:range rdf:resource="http://localhost/default#Policy-makingStage"/>
  <rdfs:domain rdf:resource="http://localhost/default#Policy-making"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasImplementation">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationTacticPlan"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationStrategy"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#includesPlanFor">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationProject"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationTacticPlan"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasTargetGroup">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationStakeholder"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationStrategy"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasConstraint">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationConstraint"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationGoal"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasTargetGoal">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationGoal"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationStrategy"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#fulfillsExpectation">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationExpectation"/>

```

```

    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationStrategy"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasQuantification">
    <rdfs:range rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationGoal"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasDescription">
    <rdfs:range rdf:resource="http://localhost/default#ObjectiveDescription"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#isSatisfiedBy">
    <rdfs:range rdf:resource="http://localhost/default#e-ParticipationGoal"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationVision"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#leadsToAdvantage">
    <rdfs:range rdf:resource="http://localhost/default#e-ParticipationAdvantage"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationStrategy"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasThreshold">
    <rdfs:range rdf:resource="http://localhost/default#ObjectiveThreshold"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasMeasure">
    <rdfs:range rdf:resource="http://localhost/default#ObjectiveMeasure"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasDeadline">
    <rdfs:range rdf:resource="http://localhost/default#ObjectiveDeadline"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasPriority">
    <rdfs:range rdf:resource="http://localhost/default#ObjectivePriority"/>
    <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationObjective"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <rdf:Description rdf:about="http://localhost/default#SocialAwarenessExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#QualityExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#SocialCohesionExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#FulfilmentExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#AccountabilityExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#SimplificationExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#ConvenienceExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
  </rdf:Description>
  <rdf:Description rdf:about="http://localhost/default#LegitimacyExpectation">
    <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
  </rdf:Description>

```

```

<rdf:Description rdf:about="http://localhost/default#TransparencyExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#EquityExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#MobilisationExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#InformationExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#TrustExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#ReadinessAdvantage">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationAdvantage"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#InclusionExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#ParticipationExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#CitizenExpectation"/>
</rdf:Description>
<rdf:Description rdf:about="http://localhost/default#EfficiencyExpectation">
  <rdfs:subClassOf rdf:resource="http://localhost/default#GovernmentExpectation"/>
</rdf:Description>
</rdf:RDF>

```

Figure 8.8 – *ePOSM\_SO* OWL file.

### 8.8.1.2. *ePOSM* Organisational Units Ontology (*ePOSM\_OUO*)

The *ePOSM\_OUO* construction and consistency verification results provided by the CMapTools Ontology Editor for exporting to OWL are available in the figure below.

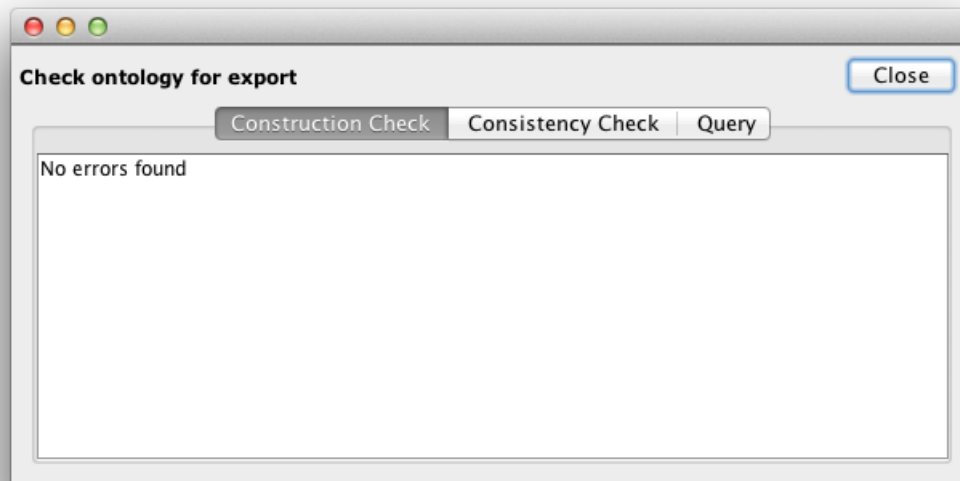


Figure 8.9 – *ePOSM\_OUO* Construction Verification.

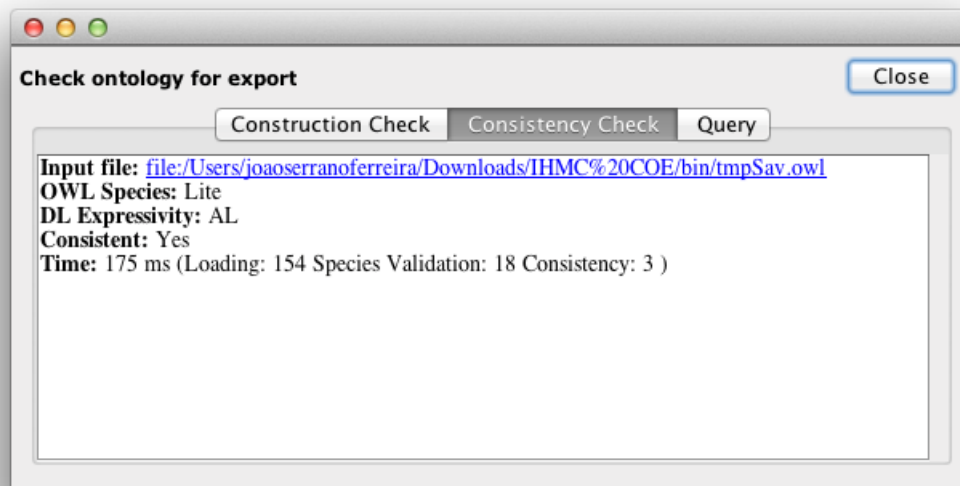


Figure 8.10 – *ePOSM\_OUO* Consistency Verification.

The *ePOSM\_OUO* implementation in OWL is available in the figure below.

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://localhost/default#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
  <owl:Class rdf:about="http://localhost/default#e-ParticipationCentreofStrategy"/>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationStrategyTeam"/>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationArchitectureTeam"/>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationProjectTeam">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#ProjectUnit"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationCoE">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#PermanentOrganisationalUnit"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessTeam">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#TaskUnit"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#ProjectUnit">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#TemporaryOrganisationalUnit"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#OrganisationalUnit"/>
  <owl:Class rdf:about="http://localhost/default#TaskUnit">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#TemporaryOrganisationalUnit"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationCentreofDelivery"/>
```

```

<owl:Class rdf:about="http://localhost/default#TemporaryOrganisationalUnit">
  <rdfs:subClassOf rdf:resource="http://localhost/default#OrganisationalUnit"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationExecutiveTeam"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationCentreofInfrastructure"/>
<owl:Class rdf:about="http://localhost/default#PermanentOrganisationalUnit">
  <rdfs:subClassOf rdf:resource="http://localhost/default#OrganisationalUnit"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#CommitteeUnit">
  <rdfs:subClassOf rdf:resource="http://localhost/default#TemporaryOrganisationalUnit"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationEvaluationCommitte">
  <rdfs:subClassOf rdf:resource="http://localhost/default#CommitteeUnit"/>
</owl:Class>
<owl:ObjectProperty rdf:about="http://localhost/default#hasSubUnit">
  <rdfs:range rdf:resource="http://localhost/default#e-
ParticipationCentreofInfrastructure"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationCoE"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#isAssignedBy">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationCentreofStrategy"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationEvaluationCommitte"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
</rdf:RDF>

```

Figure 8.11 – *ePOSM\_OUO* OWL file.

### 8.8.1.3. *ePOSM* Functions Ontology (*ePOSM\_FO*)

The *ePOSM\_FO* construction and consistency verification results provided by the CMapTools Ontology Editor for exporting to OWL are available in the figure below.

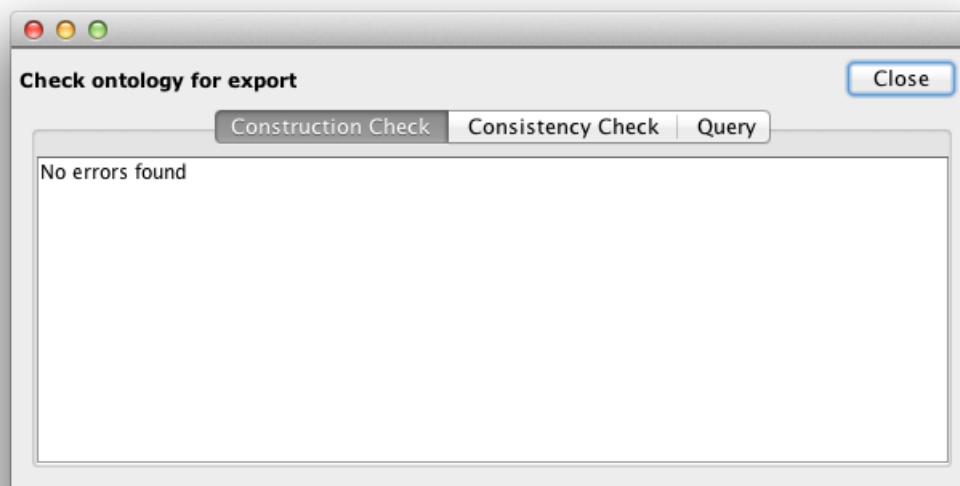


Figure 8.12 – *ePOSM\_FO* Construction Verification.



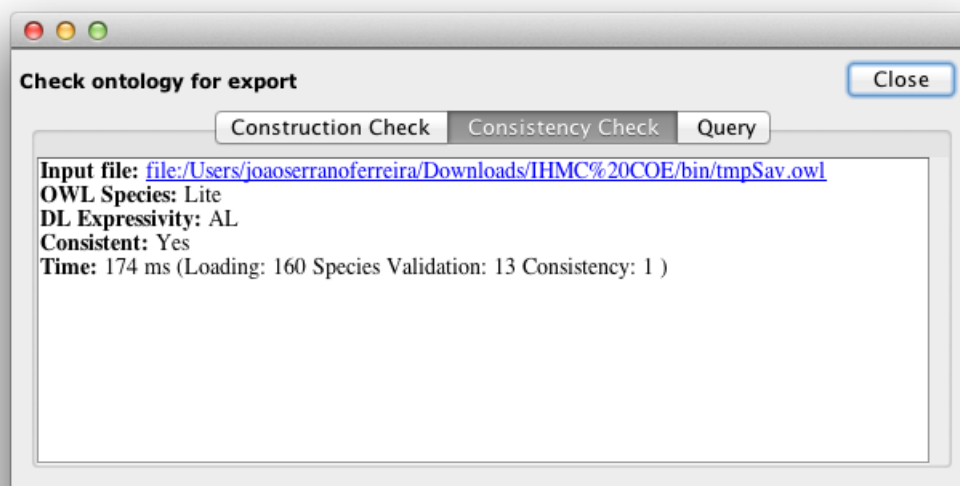


Figure 8.13 – *ePOSM\_FO* Consistency Verification.

The *ePOSM\_FO* implementation in OWL is available in the figures below.

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://localhost/default#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:j.0="http://localhost/default#Project"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
  <owl:Class rdf:about="http://localhost/default#ProjectManagement">
    <rdfs:subClassOf>
      <owl:Class rdf:about="http://localhost/default#Function"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#Activity"/>
  <owl:Class rdf:about="http://localhost/default#OrganisationalUnit"/>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationGovernance">
    <rdfs:subClassOf rdf:resource="http://localhost/default#Function"/>
  </owl:Class>
  <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessManagement">
    <rdfs:subClassOf rdf:resource="http://localhost/default#Function"/>
  </owl:Class>
  <owl:ObjectProperty rdf:about="http://localhost/default#hasActivity">
    <rdfs:range rdf:resource="http://localhost/default#Activity"/>
    <rdfs:domain rdf:resource="http://localhost/default#Function"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:about="http://localhost/default#isAllocatedTo">
    <rdfs:range rdf:resource="http://localhost/default#OrganisationalUnit"/>
    <rdfs:domain rdf:resource="http://localhost/default#Function"/>
    <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
  </owl:ObjectProperty>
  <j.0:Management rdf:about="http://localhost/default#e-ParticipationProjectManagement"/>
</rdf:RDF>
```

Figure 8.14 – *ePOSM\_OUO* Top-level view OWL file.

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://localhost/default#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:j.0="http://localhost/default#Project"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
```

```

    xmlns="http://localhost/default#"
    xmlns:owl="http://www.w3.org/2002/07/owl#"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
    xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<owl:Class rdf:about="http://localhost/default#e-ParticipationStrategyTeam"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationStakeholdersAwareness"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationMeansDefinition"/>
<owl:Class rdf:about="http://localhost/default#PlanningResults"/>
<owl:Class rdf:about="http://localhost/default#SegmentingStakeholders"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessGovernance"/>
<owl:Class rdf:about="http://localhost/default#Evaluatinge-Involvement"/>
<owl:Class rdf:about="http://localhost/default#DefiningVision"/>
<owl:Class
rdf:about="http://localhost/default#ManagingCivicParticipationMethodsRepository"/>
<owl:Class rdf:about="http://localhost/default#AdoptingStandards"/>
<owl:Class rdf:about="http://localhost/default#PrescribingImprovement"/>
<owl:Class rdf:about="http://localhost/default#Auditinge-ParticipationICT"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationInfrastructureManagement"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationArchitectureTeam"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationEndsDefinition"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationSocialEvaluation"/>
<owl:Class rdf:about="http://localhost/default#Evaluatinge-Empowerment"/>
<owl:Class rdf:about="http://localhost/default#ManagingCompliance"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationEvaluation"/>
<owl:Class rdf:about="http://localhost/default#ManagingTacticPlanCosts"/>
<owl:Class rdf:about="http://localhost/default#ManagingAvailability"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationLibraryManagement"/>
<owl:Class rdf:about="http://localhost/default#StaffingProjects"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipaitonSecurityManagement"/>
<owl:Class rdf:about="http://localhost/default#Evaluatinge-Informing"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationDeliveryMethodology"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationGovernance"/>
<owl:Class rdf:about="http://localhost/default#MonitoringProjects"/>
<owl:Class rdf:about="http://localhost/default#Evaluatinge-Collaboration"/>
<owl:Class rdf:about="http://localhost/default#DisclosingPublicSectorInformation"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingProposal"/>
<owl:Class rdf:about="http://localhost/default#AssessingRelations"/>
<owl:Class rdf:about="http://localhost/default#ProvidingFeedback"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingSocialMedia"/>
<owl:Class rdf:about="http://localhost/default#CollectingProposal"/>
<owl:Class rdf:about="http://localhost/default#ManagingConfidentiality"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationPoliticalEvaluation"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationCentreofInfrastructure"/>
<owl:Class rdf:about="http://localhost/default#PlanningTactic"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationDeliveryManagement"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingOutreach"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingMobilityTechnology"/>
<owl:Class rdf:about="http://localhost/default#ManagingScalability"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProposalsManagement"/>
<owl:Class rdf:about="http://localhost/default#e-participationProgrammeManagement"/>
<owl:Class rdf:about="http://localhost/default#PlanningCapacity"/>
<owl:Class rdf:about="http://localhost/default#AssessingNeeds"/>
<owl:Class rdf:about="http://localhost/default#IdentifyingStakeholders"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationEvaluationCommittee"/>
<owl:Class rdf:about="http://localhost/default#ManagingGovernanceCosts"/>
<owl:Class rdf:about="http://localhost/default#BudgetingGovernance"/>
<owl:Class rdf:about="http://localhost/default#DefiningStaffingModel"/>
<owl:Class rdf:about="http://localhost/default#Policy-makingProcessInventory"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationStakeholdersEngagement"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationFundingPlanning"/>
<owl:Class rdf:about="http://localhost/default#DefiningLifecycleModel"/>
<owl:Class rdf:about="http://localhost/default#CommunicatingParticipatoryMethods"/>
<owl:Class rdf:about="http://localhost/default#CommunicatingPolicyProcesses"/>
<owl:Class rdf:about="http://localhost/default#DefiningImplementationPlan"/>
<owl:Class rdf:about="http://localhost/default#Deployinge-ParticipationICT"/>
<owl:Class rdf:about="http://localhost/default#DiscoveringPolicy-makingProcesses"/>

```

```

<owl:Class rdf:about="http://localhost/default#e-ParticipationStakeholdersAnalysis"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationCentreofDelivery"/>
<owl:Class rdf:about="http://localhost/default#Communicatinge-ParticipationTools"/>
<owl:Class rdf:about="http://localhost/default#AssessingBarriers"/>
<owl:Class rdf:about="http://localhost/default#DefiningFundingModel"/>
<owl:Class rdf:about="http://localhost/default#ProvidingTraining"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationExecutiveTeam"/>
<owl:Class rdf:about="http://localhost/default#ManagingComplianceRepository"/>
<owl:Class rdf:about="http://localhost/default#ModellingPolicy-makingProcesses"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationCoE"/>
<owl:Class rdf:about="http://localhost/default#ManagingIntegrity"/>
<owl:Class rdf:about="http://localhost/default#Evaluatinge-Consultation"/>
<owl:Class rdf:about="http://localhost/default#ManagingRoles"/>
<owl:Class rdf:about="http://localhost/default#BudgetingTacticPlan"/>
<owl:Class rdf:about="http://localhost/default#IdentifyingConstraints"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationICTGovernance"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationCostManagement"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationTechnicalEvaluation"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingOrganisationalFrameworks"/>
<owl:Class rdf:about="http://localhost/default#SupportingProcessAdministration"/>
<owl:Class rdf:about="http://localhost/default#SupportingProcessParticipants"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingOpenGovernmentData"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingLegalFrameworks"/>
<owl:Class rdf:about="http://localhost/default#TestingProcesses"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationSolutionsSupport"/>
<owl:Class rdf:about="http://localhost/default#AssessingDrivers"/>
<owl:Class rdf:about="http://localhost/default#DefiningMethodologies"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingChannels"/>
<owl:Class rdf:about="http://localhost/default#ManagingChanges"/>
<owl:Class rdf:about="http://localhost/default#CommunicatingParticipationValues"/>
<owl:Class rdf:about="http://localhost/default#UpdatingBacklog"/>
<owl:Class rdf:about="http://localhost/default#DesigningICT"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationArchitectureManagement"/>
<owl:Class rdf:about="http://localhost/default#ModellingProcesses"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationFundingManagement"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingPlatforms"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationStrategicAlignment"/>
<owl:Class rdf:about="http://localhost/default#DefiningStrategy"/>
<owl:Class rdf:about="http://localhost/default#Communicatinge-ParticipationInitiatives"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessImprovement"/>
<owl:Class rdf:about="http://localhost/default#AnalysingPolicy-makingProcesses"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationScalabilityManagement"/>
<owl:Class rdf:about="http://localhost/default#Managinge-ParticipationProcessRepository"/>
<owl:ObjectProperty rdf:about="http://localhost/default#hasSubFunction">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationFundingPlanning"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationFundingManagement"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasActivity">
  <rdfs:range rdf:resource="http://localhost/default#ManagingAvailability"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationSecurityManagement"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#isAllocatedTo">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationStrategyTeam"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-
ParticipationStakeholdersEngagement"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
</rdf:RDF>

```

Figure 8.15 – ePOSM\_OUO Governance Function OWL file

```

<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://localhost/default#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"

```

```

    xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
    xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<owl:Class rdf:about="http://localhost/default#DefiningDisseminationPhases"/>
<owl:Class rdf:about="http://localhost/default#DefiningGeographicalSpan"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessImplementation"/>
<owl:Class rdf:about="http://localhost/default#Defininge-ParticipationLevel"/>
<owl:Class rdf:about="http://localhost/default#DefiningProcessObjectives"/>
<owl:Class rdf:about="http://localhost/default#ExecutingDeliberation"/>
<owl:Class rdf:about="http://localhost/default#IntegratingPolicyCycleStage"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringExceptionHandling"/>
<owl:Class rdf:about="http://localhost/default#ProvidingBackgroundInformation"/>
<owl:Class rdf:about="http://localhost/default#RecruitingParticipants"/>
<owl:Class rdf:about="http://localhost/default#DefiningICTChannels"/>
<owl:Class rdf:about="http://localhost/default#RecruitingAnalysts"/>
<owl:Class rdf:about="http://localhost/default#InstantiatingReferenceProcess"/>
<owl:Class rdf:about="http://localhost/default#AssessingOutputs"/>
<owl:Class rdf:about="http://localhost/default#DefiningOfflineChannels"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringRoles"/>
<owl:Class rdf:about="http://localhost/default#RecruitingSubjectMatterExpert"/>
<owl:Class rdf:about="http://localhost/default#DefiningICTTools"/>
<owl:Class rdf:about="http://localhost/default#PreparingParticipationInstructions"/>
<owl:Class rdf:about="http://localhost/default#GatheringLessonsLearnt"/>
<owl:Class rdf:about="http://localhost/default#ExecutingElectoring"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessContentSetup"/>
<owl:Class rdf:about="http://localhost/default#ExecutingDiscourse"/>
<owl:Class rdf:about="http://localhost/default#ArchivingData"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessResourcesDefinition"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessContextualAwareness"/>
<owl:Class rdf:about="http://localhost/default#RecruitingPolicy-makers"/>
<owl:Class rdf:about="http://localhost/default#DefiningProcessOutputs"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringEvents"/>
<owl:Class rdf:about="http://localhost/default#ExecutingInformationProvision"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessICTSetup"/>
<owl:Class rdf:about="http://localhost/default#EvaluatingGoals"/>
<owl:Class rdf:about="http://localhost/default#IntegratingOfflineChannels"/>
<owl:Class rdf:about="http://localhost/default#e-
ParticipationProcessDisseminationExecution"/>
<owl:Class rdf:about="http://localhost/default#ExecutingMediation"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringOutputs"/>
<owl:Class rdf:about="http://localhost/default#ExecutingConsultation"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessTargetsDefinition"/>
<owl:Class rdf:about="http://localhost/default#UnderstandingRegulations"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessScopeDefinition"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessArchival"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringControls"/>
<owl:Class rdf:about="http://localhost/default#ProvidingRegulationsReferences"/>
<owl:Class rdf:about="http://localhost/default#PreparingGoalsDescription"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessManagement"/>
<owl:Class rdf:about="http://localhost/default#PerformingOnlineDissemination"/>
<owl:Class rdf:about="http://localhost/default#UnderstandingLearntLessons"/>
<owl:Class rdf:about="http://localhost/default#ExecutingVoting"/>
<owl:Class rdf:about="http://localhost/default#ExecutingCommunityBuilding"/>
<owl:Class rdf:about="http://localhost/default#AdministatingUsers"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessSetup"/>
<owl:Class rdf:about="http://localhost/default#IntegratingBottom-upInitiatives"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessTeam"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringProcessPhases"/>
<owl:Class rdf:about="http://localhost/default#UnderstandingBottom-upInitiatives"/>
<owl:Class rdf:about="http://localhost/default#AdministatingProcess"/>
<owl:Class rdf:about="http://localhost/default#UnderstandingPrivacyConstraints"/>
<owl:Class rdf:about="http://localhost/default#DefiningProcessGoals"/>
<owl:Class rdf:about="http://localhost/default#Updatinge-ParticipationLibrary"/>
<owl:Class rdf:about="http://localhost/default#RecruitingITStaff"/>
<owl:Class rdf:about="http://localhost/default#PerformingOfflineDissemination"/>
<owl:Class rdf:about="http://localhost/default#RecruitingMarketeters"/>

```

```

<owl:Class rdf:about="http://localhost/default#e-
ParticipationProcessDisseminationPreparation"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessInitiation"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringProcessRules"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessExecution"/>
<owl:Class rdf:about="http://localhost/default#ExecutingPolling"/>
<owl:Class rdf:about="http://localhost/default#UnderstandingPolicyCycle"/>
<owl:Class rdf:about="http://localhost/default#PerformingSecurityProcedures"/>
<owl:Class rdf:about="http://localhost/default#AssessingObjectives"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessAdministration"/>
<owl:Class rdf:about="http://localhost/default#DefiningOnlineChannels"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessDissemination"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessClosure"/>
<owl:Class rdf:about="http://localhost/default#DefiningParticipationMethod"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringHandoffs"/>
<owl:Class rdf:about="http://localhost/default#RecruitingContentProviders"/>
<owl:Class rdf:about="http://localhost/default#CollectingParticipantsFeedback"/>
<owl:Class rdf:about="http://localhost/default#RecruitingSocialActors"/>
<owl:Class rdf:about="http://localhost/default#AssigningOrganisationalUnits"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessIntegration"/>
<owl:Class rdf:about="http://localhost/default#DefiningOfflineResources"/>
<owl:Class rdf:about="http://localhost/default#PreparingTopicstoAddress"/>
<owl:Class rdf:about="http://localhost/default#ConfiguringProcessInputs"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessEvaluation"/>
<owl:Class rdf:about="http://localhost/default#PreparingProcessDescription"/>
<owl:Class rdf:about="http://localhost/default#PreparingDisseminationMaterials"/>
<owl:Class rdf:about="http://localhost/default#PublishingResults"/>
<owl:Class rdf:about="http://localhost/default#DefiningDisseminationStrategy"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessStaffing"/>
<owl:Class rdf:about="http://localhost/default#MaintainingContent"/>
<owl:Class rdf:about="http://localhost/default#ProcessingData"/>
<owl:Class rdf:about="http://localhost/default#ExecutingPetitioning"/>
<owl:Class rdf:about="http://localhost/default#FormulatingSubject"/>
<owl:Class rdf:about="http://localhost/default#RecruitingModerators"/>
<owl:ObjectProperty rdf:about="http://localhost/default#hasSubFunction">
  <rdfs:range rdf:resource="http://localhost/default#e-
ParticipationProcessDisseminationExecution"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationProcessDissemination"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#hasActivity">
  <rdfs:range rdf:resource="http://localhost/default#EvaluatingGoals"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationProcessEvaluation"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#isAllocatedTo">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationProcessTeam"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationProcessManagement"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
</rdf:RDF>

```

Figure 8.16 – *ePOSM\_OUO Process Management Function* OWL file

#### 8.8.1.4. *ePOSM* Roles Ontology (*ePOSM\_RO*)

The *ePOSM\_RO* construction and consistency verification results provided by the CMapTools Ontology Editor for exporting to OWL are available in the figure below.

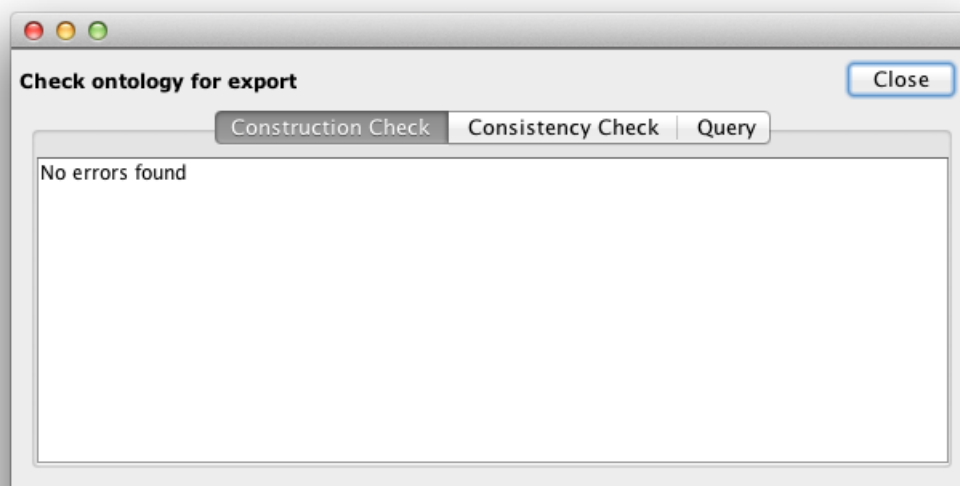


Figure 8.17 – *ePOSM\_RO* Construction Verification.

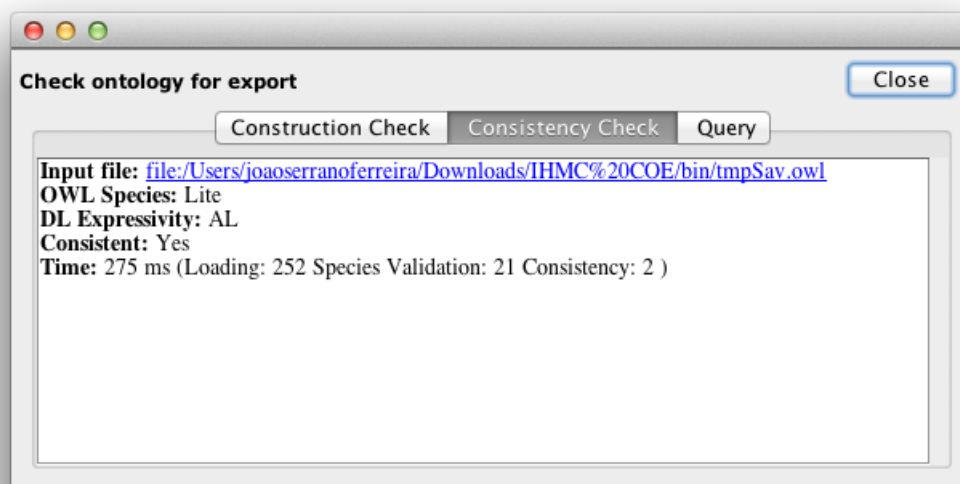


Figure 8.18 – *ePOSM\_RO* Consistency Verification.

The *ePOSM\_RO* implementation in OWL is available in the figure below.

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns="http://localhost/default#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:daml="http://www.daml.org/2001/03/daml+oil#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
```

```

<owl:Class rdf:about="http://localhost/default#ParticipantRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationStakeholderCategory">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#StakeholderCategory"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#GovernmentalInstitution">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-
ParticipationStakeholderCategory"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationGovernance"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationStrategyLeadRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationGovernanceRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationGovernanceRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#SubjectMatterExpertRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#ParticipationAnalystRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#Citizenry">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-
ParticipationStakeholderCategory"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#MarketingRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProgrammeManagementRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationGovernanceRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#Role"/>
<owl:Class rdf:about="http://localhost/default#ICTAdministrationRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationTechnicalArchitectRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationGovernanceRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#ProcessManagementRole">
  <rdfs:subClassOf>
    <owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationSystemAdministrationRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationGovernanceRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationFunction"/>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessRole">
  <rdfs:subClassOf>

```

```

    <owl:Class rdf:about="http://localhost/default#e-ParticipationRole"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#CollectiveAgent">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-
ParticipationStakeholderCategory"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationGovernmentSponsorRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationGovernanceRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#Role"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#ModerationRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationProcessRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessArchitectRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationGovernanceRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#Policy-makerRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationProcessRole"/>
</owl:Class>
<owl:Class rdf:about="http://localhost/default#e-ParticipationProcessManagement"/>
<owl:Class rdf:about="http://localhost/default#EditorialManagementRole">
  <rdfs:subClassOf rdf:resource="http://localhost/default#e-ParticipationProcessRole"/>
</owl:Class>
<owl:ObjectProperty rdf:about="http://localhost/default#hasStakeholderCategory">
  <rdfs:range rdf:resource="http://localhost/default#StakeholderCategory"/>
  <rdfs:domain rdf:resource="http://localhost/default#Role"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:about="http://localhost/default#IsPerformedBy">
  <rdfs:range rdf:resource="http://localhost/default#e-ParticipationRole"/>
  <rdfs:domain rdf:resource="http://localhost/default#e-ParticipationFunction"/>
  <rdf:type rdf:resource="http://www.w3.org/1999/02/22-rdf-syntax-ns#Property"/>
</owl:ObjectProperty>
</rdf:RDF>

```

Figure 8.19 – *ePOSM\_RO* OWL file.

## 8.8.2. ConsVISor Consistency Checking

The *ePOSM* consistency checking using ConsVISor is available in Figure 8.20, showing the tool GUI and the input ontology serialized in OWL, and Figure 8.21, including the resulting HTML report.



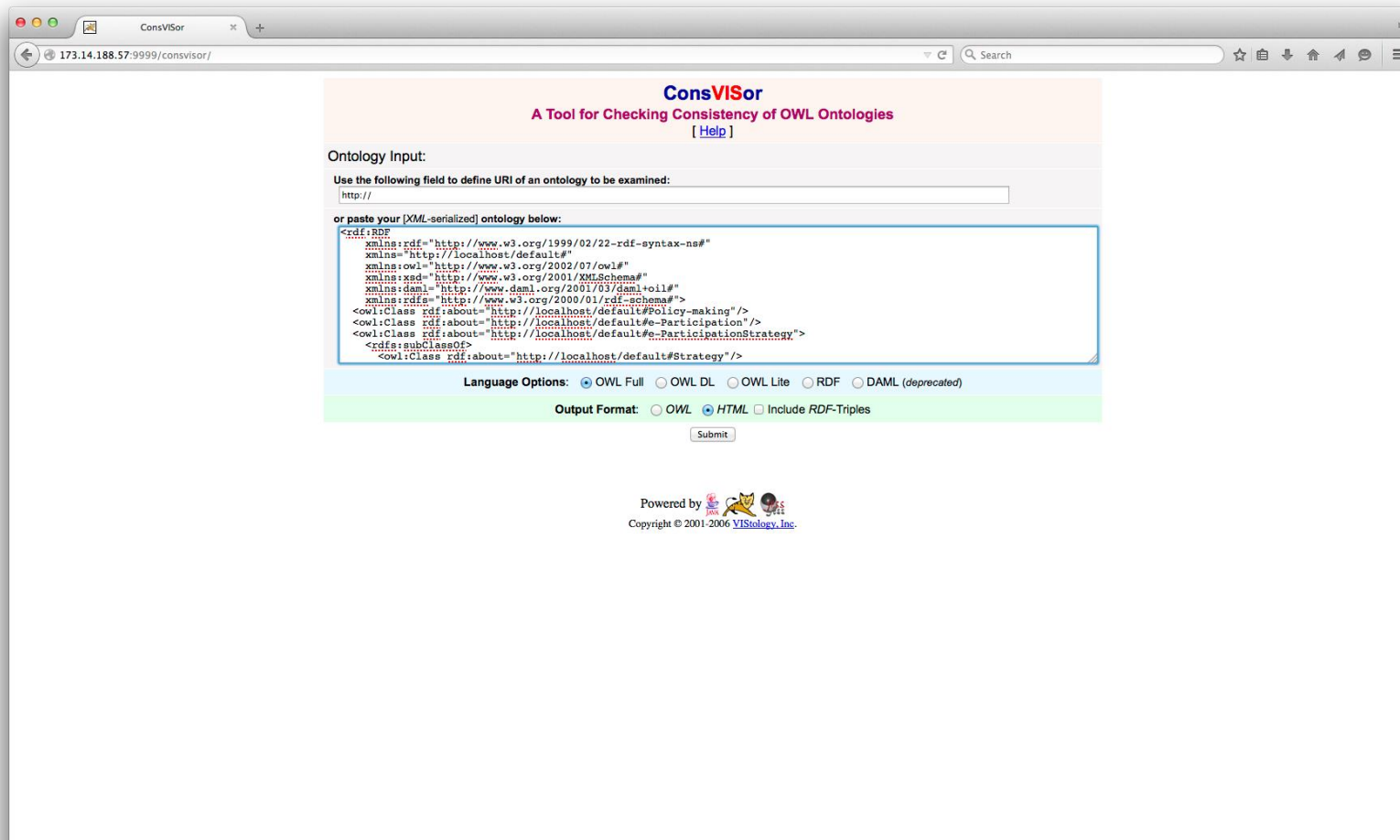


Figure 8.20 – ConsVISor input in OWL.

ConsVISor Output

173.14.188.57:9999/consvisor/webcons

**ConsVISor Report**  
A service of [Versatile Information Systems, Inc.](#)

For Your Ontology

Consistency Verification Summary			
<b>Test Outcome:</b> The result of the consistency check of uri://anonymous1 at level full is: <b>Consistent!</b>			
<a href="#">Messages</a>			
Info	Warn	Error	Fatal
No info messages!	No warning messages!	No error messages!	No fatal error messages!

Consistency Verification Detail	
Resource Locations Are Shown in Brackets[row.col]	

Figure 8.21 – ConsVISor outpt in HTML format.

### 8.8.3. Import from Protégé

The *ePOSM* was imported from Protégé for consistency checking. The figures below include examples of different views of the *ePOSM* sub-ontologies.

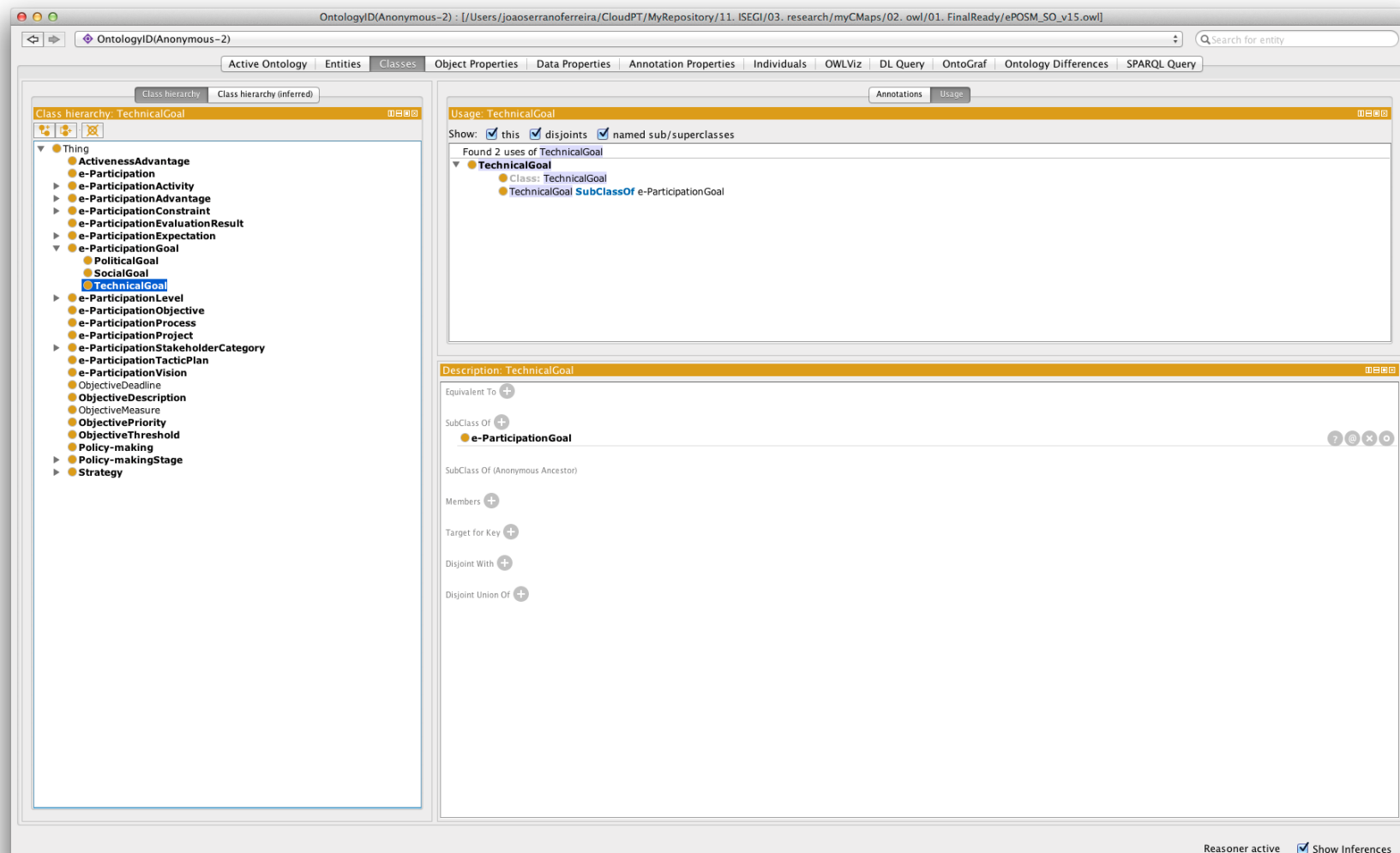


Figure 8.22 – *ePOSM\_SO* classes view.

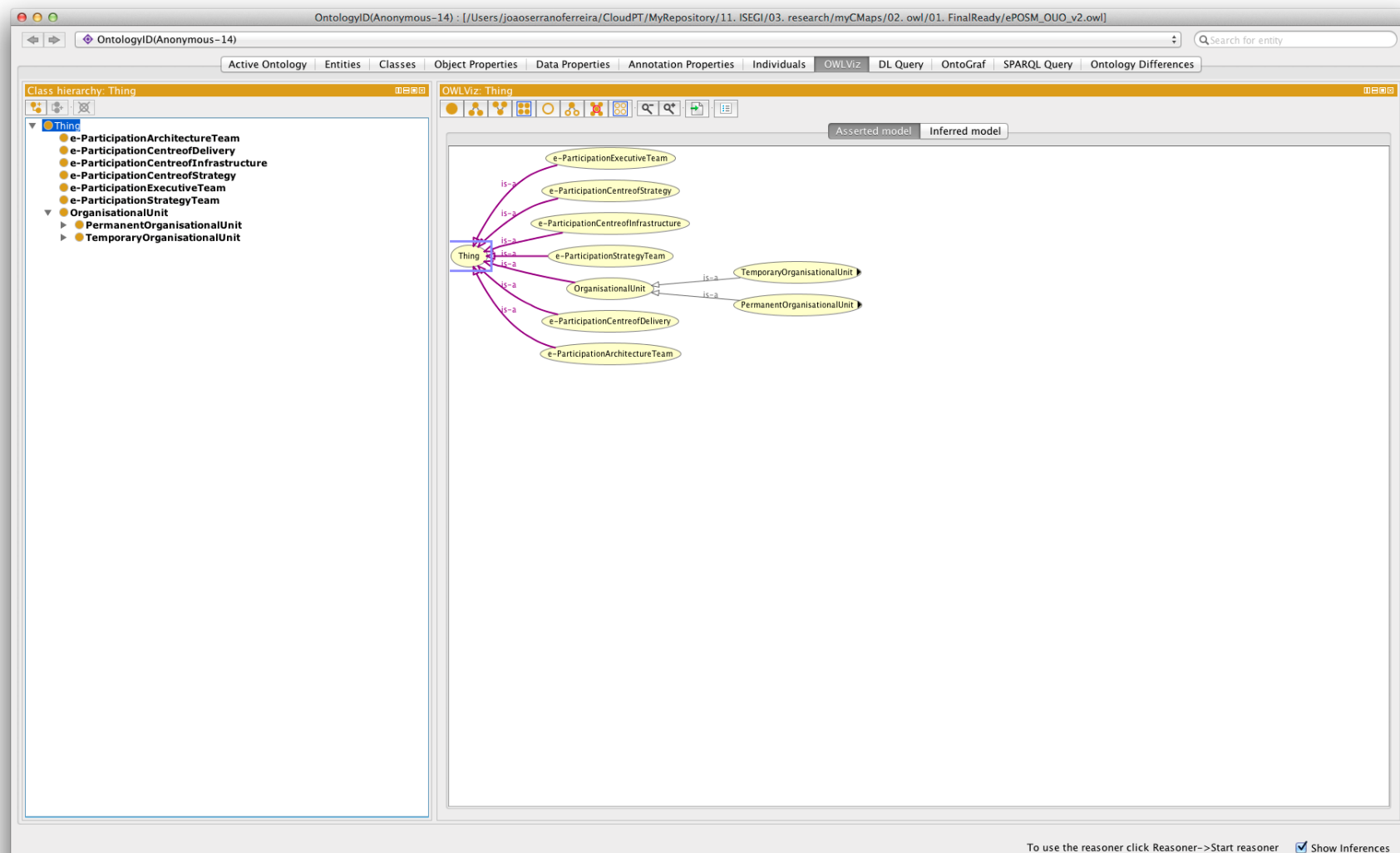


Figure 8.23 – *ePOSM\_OUO* OWL visualisation.

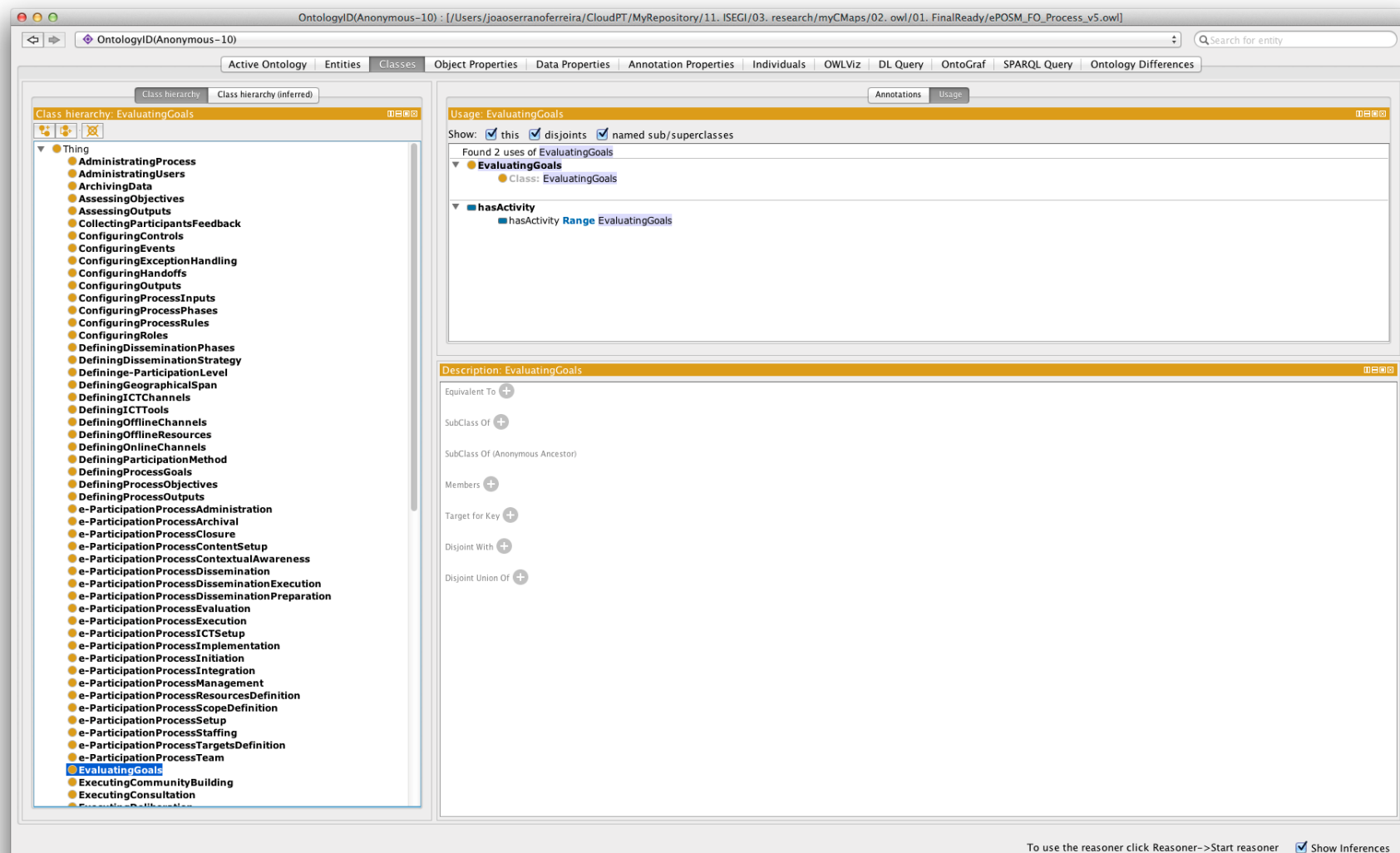


Figure 8.24 – *ePOS*<sub>FO</sub> classes view.

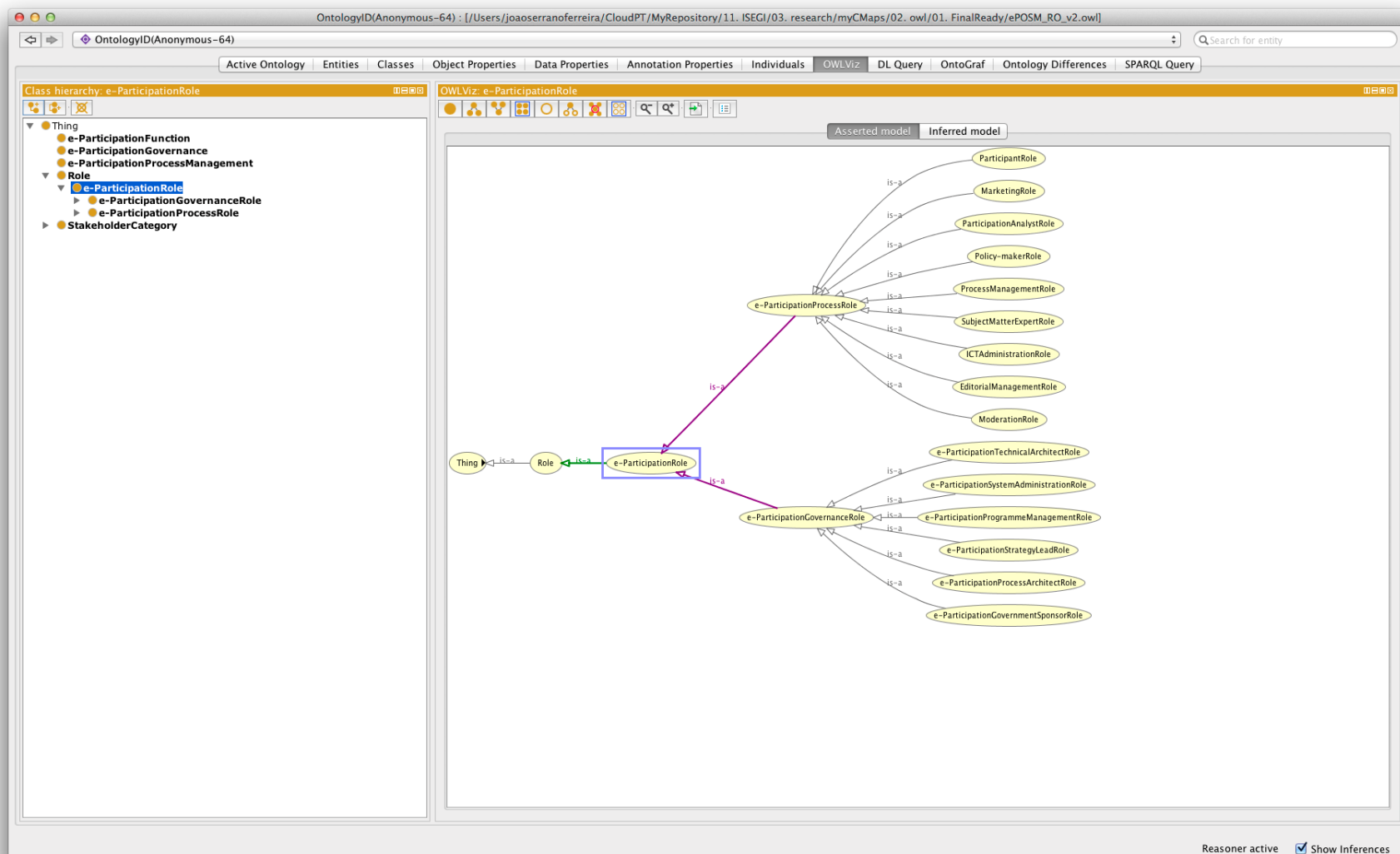


Figure 8.25 – *ePOSM\_RO* OWL visualisation.

## 8.8.4. Competency Verification

### 8.8.4.1. ePOSM Strategy Ontology (ePOSM\_SO) Competency Verification

The tables below include the ePOSM\_SO competency verification.

**CQ1.1** What is the basis of the e-Participation goals?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation</i>	<i>e-Participation</i> <b>hasVision</b>
<u>Target:</u> <i>e-Participation Goal</i>	<i>e-Participation Vision</i> <b>isSatisfiedBy</b>

Table 8.27 – Competency Verification: CQ1.1.

**CQ1.2** What defines the e-Participation strategy?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Strategy</i>	<i>e-Participation Strategy</i> <b>hasStrategyType</b>
	<i>e-Participation Strategy</i> <b>leadsToAdvantage</b>
<u>Target:</u> <i>e-Participation Level</i>	<i>e-Participation Strategy</i> <b>hasTargetMarket</b>
<i>e-Participation Goal</i>	<i>e-Participation Strategy</i> <b>fulfillsExpectation</b>
<i>e-Participation Advantage</i>	<i>e-Participation Strategy</i> <b>hasTargetGroup</b>
<i>Policy-making</i>	<i>e-Participation Strategy</i> <b>hasGoal</b>
<i>e-Participation Expectation</i>	
<i>e-Participation Stakeholder</i>	

Table 8.28 – Competency Verification: CQ1.2.

**CQ1.3** What are the e-Participation implementation constraints?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation</i>	<i>e-Participation</i> <b>hasVision</b>
	<i>e-Participation Vision</i> <b>hasGoal</b>
<u>Target:</u> <i>e-Participation Constraint</i>	<i>e-Participation Goal</i> <b>hasConstraint</b>

Table 8.29 – Competency Verification: CQ1.3.

**CQ1.4** What are the e-Participation quantifiable objectives?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation</i>	<i>e-Participation</i> <b>hasStrategy</b>
	<i>e-Participation Strategy</i> <b>hasTargetGoal</b>
<u>Target:</u> <i>Objective Description</i>	<i>Goal</i> <b>hasQuantification</b>
<i>Objective Priority</i>	<i>e-Participation Objective</i> <b>hasDescription</b>
<i>Objective Deadline</i>	<i>e-Participation Objective</i> <b>hasPriority</b>
<i>Objective Threshold</i>	<i>e-Participation Objective</i> <b>hasDeadline</b>
	<i>e-Participation Objective</i> <b>hasThreshold</b>

Table 8.30 – Competency Verification: CQ1.4.



---

**CQ1.5** What is the advancement of the e-Participation strategic goals?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Strategy</i>	<i>e-Participation Strategy</i> <b>hasGoal</b>
<u>Target:</u> <i>Objective Measure</i>	<i>e-Participation Goal</i> <b>hasQuantification</b> <i>e-Participation Objective</i> <b>hasMeasurement</b>

---

Table 8.31 – Competency Verification: CQ1.5.

---

**CQ1.6** What types of activities are covered by the e-Participation strategy?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Strategy</i>	<i>e-Participation Strategy</i> <b>hasTargetMarket</b> <i>Policy-making</i> <b>involvesActivity</b>
<u>Target:</u> <i>Activity Type</i>	

---

Table 8.32 – Competency Verification: CQ1.6.

---

**CQ1.7** What stages of policy-making are covered by the e-Participation strategy?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Strategy</i>	<i>e-Participation Strategy</i> <b>hasTargetMarket</b> <i>Policy-making</i> <b>consistsOfSegment</b>
<u>Target:</u> <i>Policy-making Stage</i>	

---

Table 8.33 – Competency Verification: CQ1.7.

---

**CQ1.8** How is the e-Participation strategy implemented?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Strategy</i>	<i>e-Participation Strategy</i> <b>hasImplementation</b> <i>e-Participation Tactic Plan</i> <b>includesPlanFor</b>
<u>Target:</u> <i>e-Participation Project</i> <i>e-Participation Process</i>	

---

Table 8.34 – Competency Verification: CQ1.8.

---

**8.8.4.2. ePOSM Organisational Units Ontology (ePOSM\_OUO) Competency Verification**

The tables below include the ePOSM\_OUO competency verification.

---

**CQ2.1** Which organisational units are permanently allocated to e-Participation functions?

Key Concepts	Relationships
<u>Source:</u> <i>Organisational Unit</i>	<i>Organisational Unit</i> <b>are</b> <i>Permanent Organisational Unit</i> <b>are</b>
<u>Target:</u> <i>e-Participation CoE</i>	<i>e-Participation Governance</i> <b>isAllocatedTo</b>

---

Table 8.35 – Competency Verification: CQ2.1.

---

**CQ2.2** How are the e-Participation permanent organisational units structured?

Key Concepts	Relationships
<u>Source:</u> <i>Permanent Organisational Unit</i>	<i>Organisational Unit</i> <b>are</b> <i>Permanent Organisational Unit</i> <b>are</b>
<u>Target:</u> <i>e-Participation Centre of Infrastructure</i> <i>e-Participation Centre</i>	<i>e-Participation CoE</i> <b>hasSubUnit</b> <i>e-Participation Centre of Strategy</i> <b>hasSubUnit</b>

of Delivery  
e-Participation Centre of Strategy  
e-Participation Executive Team  
e-Participation Strategy Team  
e-Participation Architecture Team

Table 8.36 – Competency Verification: CQ2.2.

**CQ2.3** Which organisational units are temporarily allocated to e-Participation functions?

Key Concepts	Relationships
<u>Source:</u> Organisational Unit	Organisational Unit <b>are</b> Temporary Organisational Unit <b>are</b>
<u>Target:</u> e-Participation Project Team e-Participation Evaluation Committee e-Participation Process Team	Project Unit <b>are</b> Committee Unit <b>are</b> Task Unit <b>are</b> e-Participation Governance <b>hasSubFunction</b> e-Participation Evaluation <b>isAllocatedTo</b> e-Participation Process Management <b>isAllocatedTo</b>

Table 8.37 – Competency Verification: CQ2.3.

**CQ2.4** How are temporary organisational units assigned to e-Participation functions?

Key Concepts	Relationships
<u>Source:</u> Temporary Organisational Unit	Temporary Organisational Unit <b>are</b> Project Unit <b>are</b>
<u>Target:</u> e-Participation Centre of Delivery e-Participation Centre of Strategy	Committee Unit <b>are</b> Task Unit <b>are</b> e-Participation Project Team <b>isAssignedBy</b> e-Participation Evaluation Committee <b>isAssignedBy</b> e-Participation Process Team <b>isAssignedBy</b>

Table 8.38 – Competency Verification: CQ2.4.

### 8.8.4.3. ePOSM Functions Ontology (ePOSM\_FO) Competency Verification

The tables below include the ePOSM\_FO competency verification.

**CQ3.1** What are the functional areas governing e-Participation?

Key Concepts	Relationships
<u>Source:</u> e-Participation Governance	e-Participation Governance <b>hasSubFunction</b> e-Participation Architecture Management <b>hasSubFunction</b> e-Participation Delivery Management <b>hasSubFunction</b> e-Participation Evaluation <b>hasSubFunction</b> e-Participation Funding Management <b>hasSubFunction</b> e-Participation Infrastructure Management <b>hasSubFunction</b> e-Participation Stakeholders Engagement <b>hasSubFunction</b> e-Participation Strategic Alignment <b>hasSubFunction</b>
<u>Target:</u> e-Participation Architecture Management e-Participation Process Governance e-Participation Process Improvement Policy-making Process Inventory e-Participation Delivery Management e-Participation Delivery Methodology e-participation Programme Management e-Participation Solutions Support e-Participation Evaluation e-Participation Political Evaluation e-Participation Social Evaluation e-Participation Technical Evaluation e-Participation Funding Management e-Participation Cost Management e-Participation Funding Planning e-Participation Infrastructure Management e-Participation Scalability Management e-Participation Security Management e-Participation ICT Governance e-Participation Stakeholders Engagement	

e-Participation Proposals Management  
e-Participation Stakeholders Analysis  
e-Participation Stakeholders Awareness  
e-Participation Strategic Alignment  
e-Participation Ends Definition  
e-Participation Means Definition

Table 8.39 – Competency Verification: CQ3.1.

**CQ3.2** What are the activities performed to govern e-Participation?

Key Concepts	Relationships
<b>Source:</b>	<i>e-Participation Governance</i> <b>hasSubFunction</b>
<i>e-Participation Governance</i>	<i>e-Participation Architecture Management</i> <b>hasSubFunction</b>
	<i>e-Participation Delivery Management</i> <b>hasSubFunction</b>
	<i>e-Participation Evaluation</i> <b>hasSubFunction</b>
<b>Target:</b>	<i>e-Participation Funding Management</i> <b>hasSubFunction</b>
<i>Managing Civic Participation Methods Repository</i>	<i>e-Participation Infrastructure Management</i> <b>hasSubFunction</b>
<i>Managing Compliance Repository</i>	<i>e-Participation Stakeholders Engagement</i> <b>hasSubFunction</b>
<i>Managing e-Participation Process Repository</i>	<i>e-Participation Strategic Alignment</i> <b>hasSubFunction</b>
<i>Adopting Standards</i>	<i>e-Participation Architecture Management</i> <b>hasActivity</b>
<i>Defining Methodologies</i>	<i>e-Participation Process Governance</i> <b>hasActivity</b>
<i>Managing Changes</i>	<i>e-Participation Process Improvement</i> <b>hasActivity</b>
<i>Managing Compliance</i>	<i>Policy-making Process Inventory</i> <b>hasActivity</b>
<i>Managing Roles</i>	<i>e-Participation Delivery Management</i> <b>hasActivity</b>
<i>Defining Implementation Plan</i>	<i>e-Participation Delivery Methodology</i> <b>hasActivity</b>
<i>Designing ICT</i>	<i>e-Participation Programme Management</i> <b>hasActivity</b>
<i>Modelling Processes</i>	<i>e-Participation Solutions Support</i> <b>hasActivity</b>
<i>Testing Processes</i>	<i>e-Participation Evaluation</i> <b>hasActivity</b>
<i>Analysing Policy-making Processes</i>	<i>e-Participation Political Evaluation</i> <b>hasActivity</b>
<i>Discovering Policy-making Processes</i>	<i>e-Participation Social Evaluation</i> <b>hasActivity</b>
<i>Modelling Policy-making Processes</i>	<i>e-Participation Technical Evaluation</i> <b>hasActivity</b>
<i>Prescribing Improvement</i>	<i>e-Participation Funding Management</i> <b>hasActivity</b>
<i>Defining Lifecycle Model</i>	<i>e-Participation Cost Management</i> <b>hasActivity</b>
<i>Defining Staffing Model</i>	<i>e-Participation Funding Planning</i> <b>hasActivity</b>
<i>Monitoring Projects</i>	<i>e-Participation Infrastructure Management</i> <b>hasActivity</b>
<i>Staffing Projects</i>	<i>e-Participation Scalability Management</i> <b>hasActivity</b>
<i>Supporting Process Administration</i>	<i>e-Participation Security Management</i> <b>hasActivity</b>
<i>Supporting Process Participants</i>	<i>e-Participation ICT Governance</i> <b>hasActivity</b>
<i>Evaluating Channels</i>	<i>e-Participation Stakeholders Engagement</i> <b>hasActivity</b>
<i>Evaluating Legal Frameworks</i>	<i>e-Participation Proposals Management</i> <b>hasActivity</b>
<i>Evaluating Organisational Frameworks</i>	<i>e-Participation Stakeholders Analysis</i> <b>hasActivity</b>
<i>Evaluating Outreach</i>	<i>e-Participation Stakeholders Awareness</i> <b>hasActivity</b>
<i>Evaluating e-Collaboration</i>	<i>e-Participation Strategic Alignment</i> <b>hasActivity</b>
<i>Evaluating e-Consultation</i>	<i>e-Participation Ends Definition</i> <b>hasActivity</b>
<i>Evaluating e-Empowerment</i>	<i>e-Participation Means Definition</i> <b>hasActivity</b>
<i>Evaluating e-Informing</i>	
<i>Evaluating e-Involvement</i>	
<i>Evaluating Mobility Technology</i>	
<i>Evaluating Open Government Data</i>	
<i>Evaluating Platforms</i>	
<i>Evaluating Social Media</i>	
<i>Managing Governance Costs</i>	
<i>Managing Tactic Plan Costs</i>	
<i>Budgeting Governance</i>	
<i>Budgeting Tactic Plan</i>	
<i>Defining Funding Model</i>	
<i>Managing Scalability</i>	
<i>Planning Capacity</i>	
<i>Managing Availability</i>	
<i>Managing Confidentiality</i>	
<i>Managing Integrity</i>	
<i>Auditing e-Participation ICT</i>	
<i>Deploying e-Participation ICT</i>	
<i>Collecting Proposal</i>	
<i>Evaluating Proposal</i>	
<i>Providing Feedback</i>	
<i>Updating Backlog</i>	
<i>Assessing Barriers</i>	
<i>Assessing Drivers</i>	
<i>Assessing Needs</i>	

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**CQ3.2** What are the activities performed to govern e-Participation?**Key Concepts****Relationships**

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Assessing Relations  
Identifying Stakeholders  
Segmenting Stakeholders  
Communicating e-Participation Initiatives  
Communicating e-Participation Tools  
Communicating Participation Values  
Communicating Participatory Methods  
Communicating Policy Processes  
Disclosing Public Sector Information  
Providing Training  
Defining Vision  
Identifying Constraints  
Planning Results  
Defining Strategy  
Planning Tactic

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Table 8.40 – Competency Verification: CQ3.2.

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**CQ3.3** What are the functional areas executing e-Participation processes?**Key Concepts****Relationships**Source:

e-Participation Process Management

Target:

e-Participation Process Closure  
e-Participation Process Archival  
e-Participation Process Evaluation  
e-Participation Process Dissemination  
e-Participation Process Dissemination Execution  
e-Participation Process Dissemination Preparation  
e-Participation Process Implementation  
e-Participation Process Administration  
e-Participation Process Execution  
e-Participation Process Initiation  
e-Participation Process Contextual Awareness  
e-Participation Process Scope Definition  
e-Participation Process Staffing  
e-Participation Process Targets Definition  
e-Participation Process Resources Definition  
e-Participation Process Setup  
e-Participation Process Content Setup  
e-Participation Process ICT Setup  
e-Participation Process Integration

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e-Participation Process Management **hasSubFunction**  
e-Participation Process Closure **hasSubFunction**  
e-Participation Process Dissemination **hasSubFunction**  
e-Participation Process Implementation **hasSubFunction**  
e-Participation Process Initiation **hasSubFunction**  
e-Participation Process Setup **hasSubFunction**

Table 8.41 – Competency Verification: CQ3.3.

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**CQ3.4** What are the activities performed to execute e-Participation processes?**Key Concepts****Relationships**Source:

e-Participation Process Management

Target:

Archiving Data  
Performing Security Procedures  
Updating e-Participation Library  
Assessing Objectives  
Assessing Outputs  
Collecting Participants Feedback  
Evaluating Goals  
Gathering Lessons Learnt  
Performing Offline Dissemination  
Performing Online Dissemination  
Defining Dissemination Phases

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e-Participation Process Management **hasSubFunction**  
e-Participation Process Closure **hasSubFunction**  
e-Participation Process Archival **hasSubFunction**  
e-Participation Process Evaluation **hasSubFunction**  
e-Participation Process Dissemination **hasSubFunction**  
e-Participation Process Dissemination Execution **hasSubFunction**  
e-Participation Process Dissemination Preparation **hasSubFunction**  
e-Participation Process Implementation **hasSubFunction**  
e-Participation Process Administration **hasSubFunction**  
e-Participation Process Execution **hasSubFunction**  
e-Participation Process Initiation **hasSubFunction**  
e-Participation Process Contextual Awareness **hasSubFunction**  
e-Participation Process Scope Definition **hasSubFunction**

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**CQ3.4** What are the activities performed to execute e-Participation processes?

Key Concepts	Relationships
Defining Dissemination Strategy	e-Participation Process Staffing <b>hasSubFunction</b>
Defining Offline Channels	e-Participation Process Targets Definition <b>hasSubFunction</b>
Defining Online Channels	e-Participation Process Resources Definition <b>hasSubFunction</b>
Preparing Dissemination Materials	e-Participation Process Setup <b>hasSubFunction</b>
Administrating Process	e-Participation Process Content Setup <b>hasSubFunction</b>
Administrating Users	e-Participation Process ICT Setup <b>hasSubFunction</b>
Processing Data	e-Participation Process Integration <b>hasSubFunction</b>
Publishing Results	
Executing Community Building	
Executing Consultation	
Executing Deliberation	
Executing Discourse	
Executing Electoring	
Executing Information Provision	
Executing Mediation	
Executing Petitioning	
Executing Polling	
Executing Voting	
Understanding Bottom-up Initiatives	
Understanding Learnt Lessons	
Understanding Policy Cycle	
Understanding Privacy Constraints	
Understanding Regulations	
Defining e-Participation Level	
Defining Geographical Span	
Defining Participation Method	
Formulating Subject	
Assigning Organisational Units	
Recruiting Analysts	
Recruiting Content Providers	
Recruiting IT Staff	
Recruiting Marketeers	
Recruiting Moderators	
Recruiting Participants	
Recruiting Policy-makers	
Recruiting Social Actors	
Recruiting Subject Matter Expert	
Defining Process Goals	
Defining Process Objectives	
Defining Process Outputs	
Defining ICT Channels	
Defining ICT Tools	
Defining Offline Resources	
Preparing Goals Description	
Preparing Participation Instructions	
Preparing Process Description	
Preparing Topics to Address	
Providing Background Information	
Providing Regulations References	
Configuring Controls	
Configuring Events	
Configuring Exception Handling	
Configuring Handoffs	
Configuring Outputs	
Configuring Process Inputs	
Configuring Process Phases	
Configuring Process Rules	
Configuring Roles	
Instantiating Reference Process	
Integrating Bottom-up Initiatives	
Integrating Offline Channels	
Integrating Policy Cycle Stage	

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Table 8.42 – Competency Verification: CQ3.4.

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**CQ3.5** Which Organisational Units are allocated to the e-Participation governance functions?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Governance</i>	<i>e-Participation Governance</i> <b>hasSubFunction</b> <i>e-Participation Architecture Management</i> <b>isAllocatedTo</b> <i>e-Participation Delivery Management</i> <b>isAllocatedTo</b> <i>e-Participation Evaluation</i> <b>isAllocatedTo</b> <i>e-Participation Funding Management</i> <b>isAllocatedTo</b> <i>e-Participation Infrastructure Management</i> <b>isAllocatedTo</b> <i>e-Participation Stakeholders Engagement</i> <b>isAllocatedTo</b> <i>e-Participation Strategic Alignment</i> <b>isAllocatedTo</b>
<u>Target:</u> <i>e-Participation Architecture Team</i> <i>e-Participation Centre of Delivery</i> <i>e-Participation Evaluation Committee</i> <i>e-Participation Executive Team</i> <i>e-Participation Centre of Infrastructure</i> <i>e-Participation Strategy Team</i> <i>e-Participation Strategy Team</i>	

Table 8.43 – Competency Verification: CQ3.5.

**CQ3.6** Which Organisational Units are allocated to the e-Participation process management functions?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Process Management</i>	<i>e-Participation Process Management</i> <b>isAllocatedTo</b>
<u>Target:</u> <i>e-Participation Process Team</i>	

Table 8.44 – Competency Verification: CQ3.6.

#### 8.8.4.4. *ePOSM* Roles Ontology (*ePOSM\_RO*) Competency Verification

The tables below include the *ePOSM\_RO* competency verification.

**CQ4.1** Which roles are used in the e-Participation Process?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Role</i> <i>e-Participation Process Management</i>	<i>e-Participation Role</i> <b>are</b> <i>e-Participation Process Management</i> <b>IsPerformedBy</b> <i>e-Participation Process Role</i> <b>are</b>
<u>Target:</u> <i>Marketing Role</i> <i>Editorial Management Role</i> <i>Participation Analyst Role</i> <i>Process Management Role</i> <i>Moderation Role</i> <i>Participant Role</i> <i>Subject Matter Expert Role</i> <i>ICT Administration Role</i> <i>Policy-maker Role</i>	

Table 8.45 – Competency Verification: CQ4.1.

**CQ4.2** Which roles are used to govern e-Participation?

Key Concepts	Relationships
<u>Source:</u> <i>e-Participation Role</i>	<i>e-Participation Role</i> <b>are</b> <i>e-Participation Governance</i> <b>IsPerformedBy</b> <i>e-Participation Governance Role</i> <b>are</b>
<u>Target:</u> <i>e-Participation Government Sponsor Role</i> <i>e-Participation Process Architect Role</i> <i>e-Participation Programme Management Role</i> <i>e-Participation Strategy Lead Role</i>	

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*e-Participation Technical Architect Role*  
*e-Participation System Administration Role*

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Table 8.46 – Competency Verification: CQ4.2.

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**CQ4.2** Which stakeholders' groups play e-Participation roles?

**Key Concepts**

**Relationships**

Source:

*e-Participation Role*

*e-Participation Role* **has** *StakeholderCategory*

*e-Participation Stakeholder Category* **are**

Target:

*Governmental Institution*

*Collective Agent*

*Citizenry*

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Table 8.47 – Competency Verification: CQ4.3.

## 8.9. EPOS<sub>M</sub> VALIDATION

### 8.9.1. Domain-space Coverage Validation

The domain-space coverage validation is available in Table 8.48.

Author	Description	Concepts	Covered?
Slaviero et al. (2011)	Ontology to support the deployment of e-Participation environments	Actor	Yes: <i>ePOS<sub>M</sub>_RO</i>
		ICT	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Participation Method	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Participation Area	Yes: <i>ePOS<sub>M</sub>_SO</i>
		Participation Level	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Phase	Yes: <i>ePOS<sub>M</sub>_FO</i>
Kalampokis et al.(2008)	Domain Model for e-Participation	Stakeholder	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_RO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Role	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Owner/Initiator	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Moderator/Facilitator	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Decision Makers	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Channel	Yes: <i>ePOS<sub>M</sub>_FO</i>
		e-Participation tool	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Technology	No
		Tool category	No
		Outcome	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Policy Cycle stage	Yes: <i>ePOS<sub>M</sub>_SO</i> , <i>ePOS<sub>M</sub>_FO</i>
		e-Participation process	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Participation Activity	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Scope	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Participation Level	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Participation Area	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Participation Technique	Yes: <i>ePOS<sub>M</sub>_FO</i>
Macintosh (2004)	Characterising E-Participation in Policy-Making	Level of Participation	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Stage in Decision-making	Yes: <i>ePOS<sub>M</sub>_SO</i> , <i>ePOS<sub>M</sub>_FO</i>
		Actors	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Technologies Used	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Rules of engagement	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Duration & sustainability	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Resources and Promotion	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Evaluation and Outcomes	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Critical factors for success	Yes: <i>ePOS<sub>M</sub>_SO</i>
Wimmer (2007)	Ontology for an e-Participation virtual resource centre	Actors	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Aspects of Success	Yes: <i>ePOS<sub>M</sub>_SO</i>
		e-Participation Areas	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Level of Participation	Yes: <i>ePOS<sub>M</sub>_FO</i> ; <i>ePOS<sub>M</sub>_SO</i>
		Policy Lifecycle	Yes: <i>ePOS<sub>M</sub>_SO</i>
		Projects	Yes: <i>ePOS<sub>M</sub>_FO</i>
		Research Disciplines	No
		Research Type	No
		Type of Activities	Yes: <i>ePOS<sub>M</sub>_FO</i>
Porwol et al. (2014)	A Semantic Model for e-Participation –	Actor	Yes: <i>ePOS<sub>M</sub>_RO</i>
		Adoption	Yes: <i>ePOS<sub>M</sub>_FO</i>



Author	Description	Concepts	Covered?
	Detailed	Communication Type	No
	Conceptualisation	Cost	Yes: <i>ePOSM_FO</i>
	and Ontology	Deliberation Aim	Yes: <i>ePOSM_FO</i>
		Deliberation End Time	Yes: <i>ePOSM_FO</i>
		Deliberation Result	Yes: <i>ePOSM_FO</i>
		Deliberation Start Time	Yes: <i>ePOSM_FO</i>
		Discussion Monitoring	Yes: <i>ePOSM_FO</i>
		Discussion Summary	Yes: <i>ePOSM_FO</i>
		Dissemination	Yes: <i>ePOSM_FO</i>
		End Time	Yes: <i>ePOSM_FO</i>
		Engagement Level	Yes: <i>ePOSM_FO</i> ; <i>ePOSM_SO</i>
		e-Participation Channels	Yes: <i>ePOSM_FO</i>
		Evaluation Measure	Yes: <i>ePOSM_FO</i>
		Execution Procedure	Yes: <i>ePOSM_FO</i>
		Funding	Yes: <i>ePOSM_FO</i>
		Goal	Yes: <i>ePOSM_FO</i>
		Instrument	Yes: <i>ePOSM_FO</i>
		Management	Yes: <i>ePOSM_FO</i>
		Performance	Yes: <i>ePOSM_FO</i>
		Platform Maintenance	Yes: <i>ePOSM_FO</i>
		Policy-making Handle	Yes: <i>ePOSM_FO</i>
		Ranking	Yes: <i>ePOSM_FO</i>
		Result	Yes: <i>ePOSM_FO</i>
		Stakeholder	Yes: <i>ePOSM_RO</i> ; <i>ePOSM_SO</i>
		Stakeholder Motivation	Yes: <i>ePOSM_SO</i>
		Strategy	
		Start Time	Yes: <i>ePOSM_FO</i>
		Technical Performance	Yes: <i>ePOSM_FO</i>
		Technical Performance Measure	Yes: <i>ePOSM_FO</i>
		Tool	Yes: <i>ePOSM_FO</i>
		Topic	Yes: <i>ePOSM_FO</i>

Table 8.48 – *ePOSM* domain coverage analysis.

An abstract graphic consisting of a series of horizontal bars of varying lengths, stacked vertically. The bars alternate between a dark grey color and a bright lime green color. The bars are arranged in a staggered fashion, creating a sense of depth and movement. The overall composition is minimalist and modern.

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