

Table of Contents

Resumen en Español.....	16
Resum en Valencià	17
Abstract in English	18
1. Introduction	19
1.1 Background and context of the research (Information about the European Project)	19
1.2 Research Context and Contributions.	19
1.3 Relevance of the study.....	22
1.4 Overview of the thesis structure.	23
2. Objectives of the research	25
2.1 General objective	25
2.2 Specific Objectives	25
3. Hypotheses of research and research questions.....	26
4. Literature Review	27
4.1 Comprehensive review of relevant literature.	27
4.2 Identification of gaps in current knowledge.	30
4.3 Justification for research based on literature.....	31
5. Methodology	32
5.1 Theoretical framework and conceptual model.....	32
5.1.1 Key concepts: Demonstration scenarios, User Journey, and Functionality	33
5.1.2 Objective data: Operational KPIs	34
5.1.3 Subjective data: USI Surveys.....	37
5.2 Calculation of the “Effectiveness”	38
5.2.1 Sensitive profiles.....	39
5.3 Methodological flow diagram.....	40
5.4 Making the method actionable through a Toolbox	42
5.4.1 User engagement Strategy of the study.....	46
6. Application of the model: Results and discussions	47
6.1 Demo sites description.....	47
6.1.1 Athens demo site.....	48
6.1.2 Padua demo site	49
6.1.3 Warsaw demo site.....	50
6.1.4 Liberec demo site.....	51
6.1.5 Osijek demo site.....	52
6.1.6 Barcelona demo site	53
6.2 Results and discussion per each demo site.....	54
6.2.1 Results of Athens demo site.....	54
6.2.3 Results of Padua demo site	61
6.2.4 Results of Warsaw demo site.....	68
6.2.5 Results of Liberec demo site.....	74
6.2.6 Results of Osijek demo site.....	80
6.2.7 Results of the Barcelona demo site.....	84
6.3 Discussion and key findings across all demo sites	90

7. Conclusions.....	95
8. Limitations and future research	97
9. References.....	99
10. Appendix I: User Satisfaction Index (USI) Survey for TSPs	103
11. Appendix II: User Satisfaction Index (USI) Survey for TRAVELERS	108
12. APPENDIX III: Socio-demographic questionnaire for travelers USI surveys.....	120
13. APPENDIX IV: Participant information and consent sheet	123
14. APPENDIX V. Articles published in relation to the Thesis	124
15. APPENDIX VI. Conference papers published in relation to the Thesis.....	126
16. APPENDIX VII. The list of functionalities for travellers and TSPs tested and assessed in IP4MaaS.	126

List of Figures

Figure 1. Thesis Structure.....	24
Figure 2. Thesis Specific Objectives Flowchart	26
Figure 3. Integrated Overview of the Research Methodology	32
Figure 4. Flowchart used to define KPIs.	35
Figure 5. Overview of the assessment methodology of mobility IT solutions.	42
Figure 6. IP4MaaS assessment tools and modules	43
Figure 7. Example of user interface for consent form	45
Figure 8. Example of a user interface for the USIs surveys.....	46
Figure 9. IP4MaaS demos.....	48
Figure 10. Athens demo area	49
Figure 11. Liberec demo region map.....	51
Figure 12. Barcelona demo and its zone.....	53

List of Tables

Table 1. The final list of measurable operational KPIs.....	36
Table 2. Origin and destination of User Journeys in the IP4MaaS project	40
Table 3. Identifying the application of each data analysis modules on travelers and TSPs	43
Table 4. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Athens demo site.....	54
Table 5. Global weights of travelers in AHP (Athens).	55
Table 6. Global weights of TSPs in AHP (Athens).....	56
Table 7. Analysis of the correlation level between each pair of variables for the Athens demo site (regression analysis).	56
Table 8. Top second-level benefits according to BN analysis in the Athens demo site.....	57
Table 9. Significant socio-demographic variables and their associated factors among the top 10 variables in the ANOVA test (Athens).....	57
Table 10. Values of the top 10 sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Athens demo site	58
Table 11. Values of the top 10 sets (functionality, TSP) regarding USI TSPs in the Athens demo site.	59
Table 12. Values of the top 10 sets (Profile, Functionality, TSP) in terms of effectiveness in Athens (travelers’ functionalities).....	59
Table 13. Values of the top 10 variables in terms of effectiveness in Athens (TSPs functionalities).	60
Table 14. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Padua demo site.	61
Table 15. Global weights of travelers in AHP (Padua).....	61
Table 16. Global weights of TSPs in AHP (Padua).	62
Table 17. Analysis of the correlation level between each pair of variables for the case of the Padua demo site (regression analysis).....	63
Table 18. Top second-level benefits according to BN analysis in the Padua demo site	63
Table 19. Significant socio-demographic variables and their associated factors among the top 10 variables in the ANOVA test (Padua).	64
Table 20. Values of the top 10 sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Padua demo site	64
Table 21. Values of the top five sets (functionality, TSP) regarding USI TSPs in the Padua demo site.	65
Table 22. Values of the top 10 sets (Profile, Functionality, TSP) in terms of effectiveness in Padua (traveler’s functionalities).	66
Table 23. Values of the top five variables in terms of effectiveness in the Padua (TSPs functionalities).	67
Table 24. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Warsaw demo site.	68
Table 25. Global weights of travelers in AHP (Warsaw).....	68
Table 26. Global weights of TSPs in AHP (Warsaw).	69
Table 27. Analysis of the correlation level between each pair of variables for the case of the Warsaw demo site (regression analysis).	69
Table 28. Top second-level benefits according to BN analysis in the Warsaw demo site	70
Table 29. Significant socio-demographic variables and their associated factors among the top 10 variables in the ANOVA test (Warsaw).	70
Table 30. Values of the top 10 sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Warsaw demo site	71
Table 31. Values of the top 10 sets (Profile, Functionality, TSP) in terms of effectiveness in Warsaw (traveler’s functionalities).....	72

Table 32. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Liberec demo site.....	74
Table 33. Global weights of travelers in AHP (Liberec).	74
Table 34. Analysis of the correlation level between each pair of variables for the case of the Liberec demo site (regression analysis).....	75
Table 35. Top second-level benefits according to BN analysis in the Liberec demo site.....	75
Table 36. Significant socio-demographic variables and their associated factors among the top 10 variables in the ANOVA test (Liberec).....	76
Table 37. Values of the top 10 sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Liberec demo site.....	77
Table 38. Values of the top 10 sets (Profile, Functionality, TSP) in terms of effectiveness in Liberec (traveler’s functionalities).....	78
Table 39. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Osijek demo site.	80
Table 40. Global weights of travelers in AHP (Osijek).	80
Table 41. Analysis of the correlation level between each pair of variables for the case of the Osijek demo site (regression analysis).	81
Table 42. Top second-level benefits according to BN analysis in the Osijek demo site	81
Table 43. Significant socio-demographic variables and their associated factors among the top 10 variables in the ANOVA test (Osijek).	82
Table 44. Values of the top five sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Osijek demo site.....	83
Table 45. Values of the top five sets (Profile, Functionality, TSP) in terms of effectiveness in Osijek (traveler’s functionalities).....	84
Table 46. The final list of “J” Innovative technologies or functionalities considers “K” as TSP which offers each functionality for the Barcelona demo site.....	85
Table 47. Global weights of travelers in AHP (Barcelona).	85
Table 48. Global weights of TSPs in AHP (Barcelona).	86
Table 49. Analysis of the correlation level between each pair of variables for the case of the Barcelona demo site (regression analysis).....	86
Table 50. Top second-level benefits according to BN analysis in the Barcelona demo site.....	87
Table 51. Values of the top 10 sets (Profiles, Functionality, TSP) regarding the USI Traveler in the Barcelona demo site.....	87
Table 52. Values of the top sets (functionality, TSP) regarding USI TSPs in the Barcelona demo site	88
Table 53. Values of the top 10 sets (Profile, Functionality, TSP) in terms of effectiveness in Barcelona (traveler’s functionalities).....	89
Table 54. Value of the variables in terms of effectiveness in Barcelona (TSPs functionalities).	90
Table 55. Top three factors in each IP4MaaS demo site according to BN analysis.	93
Table 56. The average value of effectiveness in all demo sites.	94