

**Francesco Ricci** received a degree in Mathematics (rates 110/110 lode), from Padova University, Italy, with a thesis on “The Laplace-Beltrami Operator on Real Vector Fiber Bundles”. His thesis supervisors were: prof. E. Vesentini (Scuola Normale Superiore, Pisa), prof. V. Cristante (University of Padova). From January '84 to September '86 he was post degree student (“perfezionamento”) in Mathematics at Scuola Normale Superiore, Pisa, Italy.

F. Ricci is currently associate professor in the Faculty of Computer Science, Free University of Bozen-Bolzano, since October 2006. F. Ricci is teaching courses in: database, programming, recommender systems, Internet technologies and mobile services. F. Ricci is currently supervising one researcher, three PhD students and several master students. He has recently graduated four PhD students (three of them received a best paper award for their researches) and thirteen postgraduate students and many undergraduates. He is involved in research projects in the area of Intelligent Information systems and in particular on mobile applications and recommender systems. More specifically his research interests are:

- Recommender Systems: collaborative filtering, hybrid recommender systems, privacy protection and collaborative filtering, case-based recommender systems, mobile recommender systems, context-dependent recommendations, group recommendations.
- User Modeling: distributed UM and cross-technique and cross-domain mediation of UMs, session based (ephemeral) user models, data fusion and user models (in mobile systems).
- Adaptive and Conversational Systems: intelligent question selection, cooperative query relaxation, sequential decision making and intelligent recommender agents, supporting user-to-user negotiations, critique-based conversational systems.
- Case-Based Reasoning: Structured cases representation (trees and graphs), similarity metrics for complex cases, learning similarity metrics, P2P architectures and case retrieval, case-based planning.
- Machine Learning: error correcting output codes, local distance metrics for nearest neighbor classifier, probability based metrics.
- Constraint Based Reasoning: distributed and stochastic algorithms, temporal reasoning, object oriented languages and constrains, applications to manufacturing and planning.
- eCommerce and Tourism: systems for eDestinations, systems for less developed countries, Digital Business Ecosystems, modeling consumer behavior, semantic based data mediation (Harmonise).

He was previously (from 2000 to 2006) senior researcher and the technical director of the eCommerce and Tourism Research Lab (eCTRL) at ITC-irst. eCTRL was aimed at creating a multidisciplinary approach towards ICT and Tourism, and at developing a new generation of web enabled intelligent tools that can be exploited by industry partners. F. Ricci set up this laboratory recruiting people internationally, defining research plans and acquiring grants from funding agencies (mainly, European IST projects). The laboratory was composed of 13 persons (2 staff, 6 researchers, 3 technicians, 1 PhD student).

From 1998 to 2000 he was system architect in the Research and Technology Department (Process and Reuse Technologies) of Sodalìa s.p.a. Sodalìa was a (ISO9001, CMM Level 3) software factory, joint venture of Bell Atlantic Corporation and Telecom Italia, providing advanced telecommunications products, solutions and services to telecommunications companies world-wide.

From 1988 to 1998 F. Ricci was researcher at Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento. He coordinated several research groups such as: Expert System, Knowledge Representation and Reasoning Laboratory, Method for Interactive Planning, Reasoning for Decision Support, Case-Based Reasoning. He obtained funds from EU projects (Esprit, Brite, Sprint), Italian Research Organisations (Enea, CNR), Industry (SGS, Cisa) and Public Institutions (Autonomous Province of Trento) to cover 50% of the total research costs. He initiated new research areas in the institute, such as constraint based reasoning and case-based reasoning. He was also contributing to the development of an office for the development of the industrial relationships.

From 1986 to 1988 F. Ricci was software programmer and analyst in Enichem s.p.a. He designed and developed an expert system for budget control, and several office automation applications with the aid of fourth generation languages on PC and mainframes.

F. Ricci has participated to several international research projects such as: etPackaging (funded by ECCA), European Tourist Destination Portal (funded by European Travel Commission), Harmoten (funded by IST), DieToRecs (Intelligent Recommendation for Tourist Destination Decision Making, funded by IST), Harmonise (funded by, IST), CARICA (Cases Acquisition and Reply In fire Campaigns Ambience, funded by IST), CHARADE (Combining Human Assessment and Reasoning Aids for Decision-making in environmental Emergencies, funded by IST).

Francesco Ricci is the major designer of Trip@dvice, a recommendation technology that has been licensed to a spin-off company (ECTRL Solutions) for industrial exploitation in 2006. F. Ricci is a shareholder of that company. Trip@dvice has been integrated in several tourism web portals, such as [www.visit.europe.com](http://www.visit.europe.com), [www.veneto.to](http://www.veneto.to), [www.atl.biella.it](http://www.atl.biella.it), [www.visitfinland.com](http://www.visitfinland.com).

Francesco Ricci is Senior Research Fellow of National Laboratory for Tourism and eCommerce, University of Temple, Philadelphia (USA). He has been contract professor at University of Trento and Technical University Vienna. He is the author of many scientific publications appeared on international journals and conferences proceedings. F. Ricci has an H-index of 21 (computed with publish or perish August 2011) and received recently four best paper awards:

T. Mahmood, F. Ricci, and A. Venturini. Improving Recommendation Effectiveness by Adapting the Dialogue Strategy in Online Travel Planning. *International Journal of Information Technology and Tourism*, 11 (4):285-302, 2010.

W. Trabelsi, N. Wilson, D. Bridge, and F. Ricci. Comparing Approaches to Preference Dominance for Conversational Recommenders. In *Proceedings of the 22th International Conference on Tools with Artificial Intelligence*, October 27-29, 2010, Arras, France.

T. Mahmood, F. Ricci, and A. Venturini Learning Adaptive Recommendation Strategies for Online Travel Planning. In *Information and Communication Technologies in Tourism 2009*, Pages: 149-160, Springer, Wien New York.

S. Berkovsky, T. Kuflik, F. Ricci. Cross-Technique Mediation of User Models, in proceedings of the International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems, Dublin, Ireland, June 21-23, Pages 21-30, 2006.

F. Ricci has been requested to make several invited talks such as (more recent ones):

- Distributed Collaborative Filtering and Adaptive User-to-User Correlation (invited talk), Social Networks, Emerging Communities and Technologies in the WWW, Sardegna Ricerche, Pula (Cagliari, Italy), 7 November 2008
- Introduction to Recommender Systems (Tutorial), Intelligent Information Access IIA08, Cagliari, 9-11 December 2008.
- Adapting to Users in Recommender Systems, (Invited talk) Trends in eCommerce, Technical University Vienna, January 19th, 2009.
- The Context of a recommendation, (Invited talk), Challenge on Context-Aware Movie Recommendation Workshop (CAMRA-2010), in conjunction with RecSys 2010, Barcelona, September 2010.
- Context-Aware Recommender Systems (invited seminar), University of Varazdin, Faculty of Organization and Informatics, June 13, 2011.
- Leveraging Context-Awareness in Tourism Mobile Applications, (Invited talk), International Seminar on New Media Analysis and Strategies for Tourism Marketing Organizations, September 15-16, 2011, Modul University, Vienna.

He has been in the programme committee of many international conferences (UMAP, ECAI, ICCBR, IJCAI, AH, UM, EC-Web, ICML, ECML-PKDD, etc.), he has co-chaired national and international conferences (ENTER2011, CARS09, RecSys08, ICSS06, ENTER05, ICCBR2005, ARS'05, IWCBR98, RPEC'02). Francesco Ricci is in the editorial board of *Information Technology and Tourism Journal* and *User Modeling and User Adapted Interaction*.

F. Ricci is the president of the steering committee of the ACM Conference on Recommender Systems.

## Selected Publications (from 2006)

### Edited Books and Journals

1. Rob Law, Matthias Fuchs, Francesco Ricci (Eds.). Information and Communication Technologies in Tourism 2011, Proceedings of the International Conference in Innsbruck, Austria, January 26-28, 2011. 1st Edition., 2011, XVI, 610 p. 129 illus., Softcover, ISBN: 978-3-7091-0502-3
2. Francesco Ricci, Lior Rokach, Bracha Shapira, Paul B. Kantor (Eds.). Recommender Systems Handbook. 1st Edition. 2011, 845 p. 20 illus., Hardcover, ISBN: 978-0-387-85819-7
3. Pearl Pu, Derek Bridge, Bamshad Mobasher and Francesco Ricci. Proceedings of the 2008 ACM conference on Recommender systems, Lausanne, Switzerland, ACM.
4. Francesco Ricci and Hannes Werthner (eds). Special Issue of the International Journal of Electronic Commerce on Recommender Systems, Volume 11, Number 2, 2006.

### Journal Publications

5. Gedas Adomavicius, Bamshad Mobasher, Francesco Ricci, Alexander Tuzhilin. Context-Aware Recommender Systems. AI Magazine. 2011.
6. Linas Baltrunas, Bernd Ludwig, Stefan Peer, and Francesco Ricci. Context relevance assessment and exploitation in mobile recommender systems. Personal and Ubiquitous Computing. 2011.
7. Walid Trabelsi, Nic Wilson, Derek Bridge, Francesco Ricci. Preference Dominance Reasoning for Conversational Recommender Systems: A Comparison Between a Comparative Preferences and a Sum of Weights Approach. International Journal on Artificial Intelligence Tools. 20(4):591-616. 2011.
8. Francesco Ricci. Mobile Recommender Systems, to be published in, International Journal of Information Technology and Tourism. 12(3), 2011.
9. Fabian Lorenzi, Ana L.C. Bazzan, Mara Abel, Francesco Ricci. Improving recommendations through an assumption-based multiagent approach: An application in the tourism domain. Expert Systems with Applications. 2011.
10. Markus Zanker, Francesco Ricci, Dietmar Jannach, Loren G. Terveen: Measuring the impact of personalization and recommendation on user behaviour. Int. J. Hum.-Comput. Stud. 68(8): 469-471, 2010.
11. Fabiana Lorenzi, Gabriel Baldo, Rafael Costa, Mara Abel, Ana Bazzan, and Francesco Ricci. A Trust Model for Multiagent Recommendations. Journal of Emerging Technologies in Web Intelligence. 2(4):310-318, 2010.
12. Tariq Mahmood, Francesco Ricci, and Adriano Venturini. Improving Recommendation Effectiveness by Adapting the Dialogue Strategy in Online Travel Planning. International Journal of Information Technology and Tourism, 11 (4):285-302, 2010. BEST PAPER of vol. 11 award
13. Shlomo Berkovsky, Tsvi Kuflik, and Francesco Ricci. P2P case storage and retrieval with an unspecified ontology. Artificial Intelligence Review, vol. 28 (3), pp. 227-255, 2007. (published online April 2009)
14. Shlomo Berkovsky, Tsvi Kuflik, and Francesco Ricci. Cross-representation mediation of user models. User Modeling and User-Adapted Interaction, 19(1-2):35-63, 2009.
15. Shlomo Berkovsky, Tsvi Kuflik, and Francesco Ricci. Mediation of user models for enhanced personalization in recommender systems. User Modeling and User-Adapted Interaction, 18(3), 245-286, 2008.
16. Francesco Ricci and Quang Nhat Nguyen, Acquiring and Revising Preferences in a Critique-Based Mobile Recommender System, IEEE Intelligent Systems, 22 (3), 22-29, 2007.
17. Nader Mirzadeh and Francesco Ricci, Cooperative Query Rewriting for Decision Making Support and Recommender Systems, Applied Artificial Intelligence, Volume 21, 1-38, 2007.
18. Francesco Ricci and Hannes Werthner, Recommender Systems, International Journal of Electronic Commerce, 11(2), 5-9, 2006.
19. Hector Munoz-Avila, Francesco Ricci and Robin Burke, The sixth international conference on case-based-reasoning (ICCBRO5), AI Magazine, Volume 27, Number 1, pages 101-102, 2006.

## Papers in Books

20. F. Ricci, L. Rokach, B. Shapira: Introduction to Recommender Systems Handbook. In Ricci, F.; Rokach, L.; Shapira, B.; Kantor, P.B. (Eds.), *Recommender Systems Handbook*. Pages 1-35, 2011.
21. L. Baltrunas and F. Ricci. Item Weighting Techniques for Collaborative Filtering. in *Knowledge Discovery Enhanced with Semantic and Social Information*. Pages 109-126. Springer. 2009.
22. Ricci, F., Nguyen, Q. N., and Averianova, O. Exploiting a map-based interface in conversational recommender systems for mobile travelers. In Sharda, N., editor, *Tourism Informatics: Visual Travel Recommender Systems, Social Communities, and User Interface Design*. Information Science Reference. 2009
23. F. Ricci and A. Venturini.eCTRL Solutions: Trip@dvice Technology. In *eTourism case studies:: management and marketing issues in eTourism (ETourism Case Studies)*. Roman Egger (Editor), Dimitrios Buhalis (Editor). Butterworth-Heinemann, 2008. ISBN-13: 978-0750686679
24. F. Lorenzi and F. Ricci, Case-Based Recommender Systems: a Unifying View, in Bamshad Mobasher and Sarabjot Anand (eds.), *Intelligent Techniques for Web Personalization*, Pages 89-113, Springer Verlag, 2005.
25. Francesco Ricci, Dario Cavada, Nader Mirzadeh, Adriano Venturini, Case-Based Travel Recommendations. In Daniel R. Fesenmaier, Hannes Werthner and Karl Wöber (editors), *Travel Destination Recommendation Systems: Behavioral Foundations and Applications*, pages 67-93, CAB Publishing, 2006.
26. Francesco Ricci, Daniel R. Fesenmaier, Nader Mirzadeh, Hildegard Rumetshofer, Erwin Schaumlechner, Adriano Venturini, Karl Wöber and Andreas Zins, DIETORECS: a Case-Based Travel Advisory System. In Daniel R. Fesenmaier, Hannes Werthner and Karl Wöber (editors), *Travel Destination Recommendation Systems: Behavioral Foundations and Applications*, pages 227-239, CAB Publishing, 2006.
27. Francesco Ricci and Quang Nhat Nguyen, MobyRek: A Conversational Recommender System for On-the-move Travelers. In Daniel R. Fesenmaier, Hannes Werthner and Karl Wöber (editors), *Travel Destination Recommendation Systems: Behavioral Foundations and Applications*, CAB Publishing, 2006.

## Peer Reviewed Conference Publications

28. Linas Baltrunas, Marius Kaminskas, Bernd Ludwig, Omar Moling, Francesco Ricci, Aykan Aydin, Karl-Heinz Lueke, and Roland Schwaiger. InCarMusic: Context-Aware Music Recommendations in a Car. 12th International Conference on Electronic Commerce and Web Technologies - EC-Web 2011. Toulouse, France. August 29 - September 2, 2011: 89-100.
29. Mehdi Elahi, Valdemaras Repsys, and Francesco Ricci. Rating Elicitation Strategies for Collaborative Filtering. 12th International Conference on Electronic Commerce and Web Technologies - EC-Web 2011. Toulouse, France. August 29 - September 2, 2011: 160-171.
30. Mehdi Elahi, Francesco Ricci, Valdemaras Repsys. System-Wide Effectiveness of Active Learning in Collaborative Filtering. International Workshop on Social Web Mining. Co-located with IJCAI, 18 July 2011, Barcelona, Spain.
31. Linas Baltrunas, Bernd Ludwig, Stefan Peer, and Francesco Ricci. Context-Aware Places of Interest Recommendations and Explanations. 1st Workshop on Decision Making and Recommendation Acceptance Issues in Recommender Systems (DEMRA 2011). In conjunction with UMAP 2011. Girona, Spain, 11 July 2011.
32. Floriano Zini and Francesco Ricci. Guiding Patients in the Hospital. 2nd International Workshop on User Modeling and Adaptation for Daily Routines (UMADR).In conjunction with UMAP 2011. Girona, Spain, 11 July 2011.
33. Marius Kaminskas and Francesco Ricci. Location-Adapted Music Recommendation Using Tags. 19th International Conference on User Modeling, Adaptation and Personalization. Girona, Spain, 11-15 July, 2011: 183-194.

34. Linas Baltrunas, Bernd Ludwig, Stefan Peer, Francesco Ricci. Context-Aware Places of Interest Recommendations for Mobile Users. 14th International Conference on Human-Computer Interaction. Hilton Orlando Bonnet Creek, Orlando, Florida, USA, 9 -14 July 2011: 531-540.
35. Patrick Lamber, Bernd Ludwig, Francesco Ricci, Floriano Zini, and Manfred Mitterer. Message-Based Patient Guidance in Day-Hospital. 12th IEEE International Conference on Mobile Data Management. 6-9 June, 2011, Luleå, Sweden.
36. Linas Baltrunas, Bernd Ludwig, Francesco Ricci. Context relevance assessment for recommender systems. Intelligent User Interfaces. Palo Alto, CA, 13-16 February 2011: 287-290.
37. Walid Trabelsi, Nic Wilson, Derek Bridge, and Francesco Ricci. Comparing Approaches to Preference Dominance for Conversational Recommenders. In Proceedings of the 22th International Conference on Tools with Artificial Intelligence, Arras, France, October 27-29, 2010: 113-120. BEST PAPER AWARD
38. Linas Baltrunas, Tadas Makcinskas, and Francesco Ricci. Group Recommendations with Rank Aggregation and Collaborative Filtering. In Proceedings of the Fourth ACM Conference on Recommender Systems (Barcelona, Spain, September 26 - 30, 2010). RecSys '10. ACM, New York, NY, 119-126.
39. Linas Baltrunas, Marius Kaminskas, Francesco Ricci, Lior Rokach, Bracha Shapira, Karl/Heinz Luke. Best Usage Context Prediction for Music Tracks. In Proceedings of the 2nd Workshop on Context Aware Recommender Systems. September 26, 2010, Barcelona, Spain.
40. Fabiana Lorenzi, Francesco Ricci, Mara Abel, and Ana L. C. Bazzan. Assumption-Based Reasoning for Multiagent Case-Based Recommender Systems. FLAIRS Conference 2010. AAAI Press.
41. Alexander Felfernig, Monika Schubert and Monika Mandl, Francesco Ricci, Walid Maalej. Recommendation and Decision Technologies For Requirements Engineering. Second International Workshop on Recommendation Systems for Software Engineering, RSSE 2010, May 4, 2010. Co-located with ICSE 2010, Cape Town International Convention Centre (CTICC), Cape Town, South Africa.
42. Linas Baltrunas, Francesco Ricci. Context-Dependent Recommendations with Items Splitting. IIR 2010, Italian Information Retrieval Workshop, Proceedings of the First Italian Information Retrieval Workshop, pages 71-75, Padua, Italy, January 27-28, 2010.
43. Sabine Schneider, Francesco Ricci, Adriano Venturini, and Elena Not. Usability Guidelines for WAP-based Travel Planning Tools. In Information and Communication Technologies in Tourism 2010, pages 125-136, Springer, Wien Ney York.
44. Baltrunas, L. and Ricci, F. Context-based splitting of item ratings in collaborative filtering. In Proceedings of the Third ACM Conference on Recommender Systems (New York, New York, USA, October 23 - 25, 2009). RecSys '09. ACM, New York, NY, 245-248.
45. Baltrunas, L. and Ricci, F. Context-Dependent Items Generation in Collaborative Filtering. In Adomavicius, G., Ricci, F., editors, Proceedings of the 2009 Workshop on Context-Aware Recommender Systems, October 22-25, New York, USA.
46. Kaminskas, M. and Ricci, F. Matching points of interest with music. In Orio, N., Rauber, A., and Rizo, D., editors, Workshop on Exploring Musical Information Spaces 2009, in conjunction with the 13th European Conference on Digital Libraries (ECDL 2009), pages 68-73, October 1-2, 2009, Corfu, Greece.
47. Lamber, P., Girardello, A., Ricci, F., and Mitterer, M. Mobiday: a personalized context-aware mobile service for day hospital workflow support. In Grasso, F. and Paris, C., editors, Proceedings of the AIME09 International Workshop on: Personalization for e-Health, pages 15--19, July 19, 2009. Verona, Italy.
48. Tariq Mahmood and Francesco Ricci. Improving recommender systems with adaptive conversational strategies. In Proceedings of the 20th ACM Conference on Hypertext and Hypermedia (Torino, Italy, June 29 - July 01, 2009). HT '09. ACM, New York, NY, 73-82.
49. Marius Kaminskas, Francesco Ricci. Augmenting Points of Interest Recommendations with Music. SIAM SDM Workshop on Multimedia Data Mining, in conjunction with SIAM Data Mining Conference (SDM 2009), April 30 - May 2, 2009. John Ascuaga's Nugget-Sparks, Nevada.
50. Tariq Mahmood, Francesco Ricci, and Adriano Venturini. Learning Adaptive Recommendation Strategies for Online Travel Planning. In Information and Communication Technologies in Tourism 2009, Pages: 149-160, Springer, Wien Ney York. Best paper award

51. Gytis Tumas, and Francesco Ricci. Personalized Mobile City Transport Advisory System. In Information and Communication Technologies in Tourism 2009, Pages: 173-184, Springer, Wien Ney York.
52. Olga Averjanova, Francesco Ricci, and Quang Nhat Nguyen. Map-based Interaction with a Conversational Mobile Recommender System, The Second International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies, UBICOMM 2008, September 29 - October 4, Valencia, Spain. Page(s):212 - 218
53. Q. Nhat Nguyen and F. Ricci. Conversational Case-Based Recommendations Exploiting a Structured Case Model. In Advances in Case-Based Reasoning, 9th European Conference, ECCBR 2008, Trier, Germany, September 1-4, 2008. pages 400-414.
54. Mahmood, T. and Ricci, F. Adapting the interaction state model in conversational recommender systems. In Proceedings of the 10th international Conference on Electronic Commerce (Innsbruck, Austria, August 19 - 22, 2008). ICEC '08, vol. 342. ACM, New York, NY, 1-10.
55. Linas Baltrunas and Francesco Ricci. Locally Adaptive Neighborhood Selection for Collaborative Filtering Recommendations, in Proceedings of Adaptive Hypermedia and Adaptive Web-Based Systems (AH 2008), pages 22-31.
56. Lorenzi, F., Correa, F. A.C., Bazzan, A. L.C., Abel, M., and Ricci, F. A multiagent recommender system with task agent specialization. The Tenth International Workshop on Agent Mediated Electronic Commerce (AMEC 2008) - in conjunction with AAMAS-2008 (the Seventh International Joint Conference on Autonomous Agents and Multiagent Systems, May 13, 2008. Estoril, Portugal.
57. T. Mahmood, F. Ricci, A. Venturini, and W. Höpken. Adaptive Recommender Systems for Travel Planning. In Information and Communication Technologies in Tourism 2008, proceedings of ENTER 2008 International Conference, Innsbruck, Springer verlag.
58. Q. Nhat Nguyen and F. Ricci. Long-Term and Session-Specific User Preferences in a Mobile Recommender System, ACM International Conference on Intelligent User Interfaces 2008 - IUI2008, Maspalomas, Gran Canaria, Spain, January 13-16, 2008.
59. Q. Nhat Nguyen and F. Ricci. Replaying live-user interactions in the off-line evaluation of critique-based mobile recommendations. In ACM Recommender Systems 2007, October 19-20, 2007, Minneapolis, Minnesota, USA, Pages 81-88, 2007. ACM.
60. D. Bridge and F. Ricci. Supporting product selection with query editing recommendations. In ACM Recommender Systems 2007, October 19-20, 2007, Minneapolis, Minnesota, USA, Pages 65-72, 2007. ACM.
61. S. Berkovsky, Y. Eytani, T. Kuflik, and F. Ricci. Enhancing privacy and preserving accuracy of a distributed collaborative filtering. In ACM Recommender Systems 2007, October 19-20, 2007, Minneapolis, Minnesota, USA, Page 9-16, 2007. ACM.
62. S. Berkovsky, T. Kuflik, and F. Ricci. Distributed collaborative filtering with domain specialization. In ACM Recommender Systems 2007, October 19-20, 2007, Minneapolis, Minnesota, USA, Pages 33-40, 2007. ACM.
63. Tariq Mahmood and Francesco Ricci. Towards Learning User-Adaptive State Models in a Conversational Recommender System. In Proceedings of 15th Workshop on Adaptivity and User Modeling in Interactive Systems, Halle, Germany, 24.-26.9.2007. ISBN 978-3-86010-907-6
64. Francesco Ricci and Tariq Mahmood. Learning and adaptivity in interactive recommender systems. In Proceedings of the Ninth International Conference on Electronic Commerce (ICEC 07), University of Minnesota, Minneapolis, MN, US, August 19-22, Pages 75-84, 2007.
65. Shlomo Berkovsky, Tsvi Kuflik, Francesco Ricci. Cross-Domain Mediation in Collaborative Filtering, UM 2007, 11th International Conference on User Modeling, Corfu, Greece, 25-29 June, 2007.
66. Shlomo Berkovsky, Lora Aroyo, Dominik Heckmann, Geert-Jan Houben, Alexander Kröner, Tsvi Kuflik, Francesco Ricci. Providing Context-Aware Personalization through Cross-Context Reasoning of User Modeling Data, UbiDeUM'2007 - International Workshop on Ubiquitous and Decentralized User Modeling, at UM 2007, 11th International Conference on User Modeling, Corfu, Greece, 25-29 June, 2007.
67. Shlomo Berkovsky, Nikita Borisov, Yaniv Eytani, Tsvi Kuflik, Francesco Ricci. Examining Users' Attitude towards Privacy Preserving Collaborative Filtering, Workshop on Data Mining for User Modeling, UM 2007, 11th International Conference on User Modeling, Corfu, Greece, 25-29 June, 2007.

68. Hannes Werthner, Hans Robert Hansen, and Francesco Ricci. Recommender systems. In 40th Hawaii International International Conference on Systems Science (HICSS-40 2007), page 167, 3-6 January 2007, Waikoloa, Big Island, HI, USA, 2007. IEEE Computer Society.
69. Shlomo Berkovsky, Lora Aroyo, Dominik Heckmann, Geert-Jan Houben, Alexander Kröner, Tsvi Kufli1, Francesco Ricci. Predicting User Experiences through Cross-Context Reasoning, Proceedings of 4th Workshop on Adaptivity and User Modeling in Interactive Systems, ABIS 06, Hildesheim, Germany, 9-11 October 2006.
70. Pavel Bekkerman, Sarit Kraus and Francesco Ricci. Applying cooperative negotiation methodology to group recommendation problem, ECAI Workshop on Recommender systems, Riva del Garda, August 28-29. 2006.
71. Francesco Ricci and Tariq Mahmood. Learning and Adaptivity in Interactive Recommender Systems, ECAI Workshop on Recommender systems, Riva del Garda, August 28-29. 2006.
72. Adriano Venturini and Francesco Ricci. Applying Trip@dvice Recommendation Technology to www.visiteurope.com, European Conference on Artificial Intelligence, 4th Prestigious Applications of Intelligent Systems (PAIS-2006), The 17th European Conference on Artificial Intelligence, Riva del Garda, Italy / Aug 28th - Sept 1st, Pages 607-611, 2006.
73. Shlomo Berkovsky , Dan Goldwasser, Tsvi Kuflik1 and Francesco Ricci. Identifying Inter-Domain Similarities through Content-Based Analysis of Hierarchical Web-Directories, The 17th European Conference on Artificial Intelligence, Riva del Garda, Italy / Aug 28th - Sept 1st, 2006.
74. Shlomo Berkovsky, Tsvi Kuflik, Francesco Ricci. Enhancing Privacy while Preserving Accuracy of the Collaborative Filtering, ECAI Workshop on Recommender Systems, Riva del Garda, August 28-29. 2006. Pages 49-53.
75. Shlomo Berkovsky, Tsvi Kuflik, Francesco Ricci. "Cross-Technique Mediation of User Models", in proceedings of the International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems, Dublin, Ireland, June 21-23, Pages 21-30, 2006. Best Paper Award
76. Shlomo Berkovsky, Yaniv Eytani, Tsvi Kuflik, and Francesco Ricci. Hierarchical neighborhood topology for privacy enhanced collaborative filtering. In CHI 2006 Workshop on Privacy-Enhanced Personalization, Montreal, April 22 2006.
77. Francesco Ricci and René T. A. Wietsma. Product Reviews in Travel Decision Making, Information and Communication Technologies in Tourism 2006, Pages 296-307, Proceedings of the International Conference in Lausanne, Switzerland, 2006. Springer Verlag.

### **More Recent Research Projects**

#### *1) SIPAI Proactive Information Access Systems (June 2011- May 2013)*

This project aims at developing new preference prediction technologies for building proactive recommender systems. Standard recommender systems work in pull mode: the user is supposed to ask (pull) for a recommendation and therefore is required to enter information about his preferences, needs and constraints. A new kind of recommender systems are instead *pushing* the user with recommendations, when the user is in a contextual state that the system considers as suitable for that suggestions. For instance, when a user traveling in a region and passing by an interesting archeological site the system may suggest to visit it if that matches the user profile learned by the system. The specific aim of this project is to develop techniques that can identify the best set of data that are required from a user to deliver relevant recommendations to that user and for improving the system performance in the future. These techniques rely on Active Learning methodologies and we will study their application to the preference data sets managed by a recommender system. The ultimate goal is to identify the information, to be asked to the user, that is more useful for the system to deliver relevant information but that the user is also capable to provide, hence minimizing the cost of the preference elicitation process for the user. We will develop a system prototype of a mobile service that will provide push based recommendations for places of interest and events in South Tirol. Funding 43.077 Euro. Funding Agency: Autonomous Province Bozen-Bolzano.

Partners: Davide Montesin (Sinfonet K.G.m.b.H./scr), Neil Rubens (University of Electro-Communications

Tokyo, Japan)

*2) RECOM Recommendation trends and roadmap (February 2010 - February 2011)*

This project aims at defining the next functional steps towards an information relevance platform to be used by a Deutsche Telekom spinoff, Yoochoose. It is aimed at comparing recommendation technologies through benchmarks. It is also aimed at defining a set of metadata as they represent a critical factor for providing recommendations. The specific objectives are: identification of contact points to other fields like information search and user profile management; tools, equipment and data sets for benchmarking recommendation results; best practice documentation about the influence of new functions, settings of the system and metadata quality; cooperation towards a metadata architecture plus best practices for Entertainment applications. In a second phase, we will design and test a system that can deliver music recommendations for a group of user based on the contextual situation of the group. The reference scenario is in car entertainment; the passengers will be recommended with music that is adapted to the car location, i.e., to the nearby points of interest, the time, and the user mood. In particular, the specific objectives of this second phase are: analyze DT requirements related to the personalization of music tracks for a group of users and for location-based music services; identify appropriate techniques for addressing these context-aware requirements; design and develop appropriate algorithms based on previous results developed in FUB on context-aware recommendations; test the proposed techniques and prototypes on a set of data provided by DT. Funding: 51.353 Euro - Funding agency: Deutsche Telekom

Partners: prof. Bracha Shapira and Lior Rokach (Ben Gurion University, Israel).

*3) Analytical Services for Medical Data Warehouse – MOBAS (January 2008 - December 2011)*

In this project we focus on the exploitation of mobile and ubiquitous computing techniques in the hospital and eHealth scenarios. In particular, when a patient is visiting a day hospital for periodical examinations, analysis, and treatments, executes a set of activities ideally organized in well-defined workflows. However, the hospital is a highly dynamic environment and for this reason the waiting times between the activities in the workflow and even their actual sequence are often scarcely predictable. Therefore, it is important to timely inform the patients about their next activity, where it takes place, and when it starts, but also inform the user about other important aspects of their therapy, such as side effects, or to monitor their psychological status. In this research project we aim at designing and implementing novel mobile services, which are integrated in the hospital information system, that support patients and clinicians in the day hospital scenario and their follow up at home. We will design a message-posting algorithm for keeping in touch with the patient that uses context-aware rules elicited from the clinicians, or mined by observing previous interactions, to decide the time and content of the guidance messages that are pushed to the patient's device. More in general we want to enhance the effectiveness of the communication flow between the patients and the physicians by exploring the usage of several interaction channel, including mobile devices, personalized web sites and large screens. Funding: 125.000 Euro - Funding agency: Autonomous province of Bozen-Bolzano.

Partners: Ciro Cattuto (ISI Foundation, Torino) prof. Manfred Mitterer (Merano hospital), EDP Progetti Bolzano, prof. Bernard Holzner (Innsbruck University).

*4) Real-Time Recommendation Revision and Explanation for a Network of Mobile Users – ReRex (February 2009 - December 2010)*

The aim of this project is to advance the state of the art in recommender systems developing an effective methodology for supporting users in context-dependent real-time revision of personalized and contextualized recommendations. We have focused mostly on the methodological aspect of context-dependent recommendations, and on testing the proposed techniques on a mobile application. We have developed three basic techniques: context dependent item weighting, context-dependent similarity adaptation and item splitting, context dependent and real-time user interfaces adaptation. We have developed a data collection methodology for acquiring in-context ratings for items. We have also developed a mobile application (ReRex): a context-aware iPhone-based recommender system for tourists.

The system was developed in three steps: first the relevance of several important contextual factors were measured; then in-context ratings were acquired for a population of users; and finally a mobile application (ReRex), running on an iPhone, was designed, implemented and tested in a live users experiment. This application provides context-aware recommendations, visualizes them, and offers explanations for the proposed POIs. The recommendation list is updated as any contextual factor changes, hence supporting the replanning of the visit. Funding: 25.000 Euro - Funding agency: FUB.

Partners: prof. Gedas Adomavicius (University of Minnesota, USA), Xavier Amatrian (Telefonica R&D), and prof. Robin Burke (DePaul University, USA).

*5) Adaptive Data Processing and Analysis Techniques in eGovernment - ADAPTe (January 2007 - December 2009)*

Conversational recommender systems support a structured human-computer interaction in order to assist online users in important online activities such as travel planning. In this project we have studied the effects and advantages of a novel recommendation methodology based on Machine Learning techniques (Reinforcement Learning) that allows conversational systems to autonomously improve an initial strategy in order to learn a new one that is more effective and efficient. We applied and tested our approach within a prototype of an online travel recommender system in collaboration with the Austrian Tourism portal (Austria.info). We have shown that the learned strategy adapts its actions to the served users and deviates from a rigid initial strategy. More importantly, we show that the optimal strategy is able to assist online tourists in acquiring their goals more efficiently than the initial strategy. It can be used by the system designer to understand the limitations of an existing interaction design and guide him in the adoption of a new one that is capable to improve customer relationship, the usage of their web site, and the conversion rate of their online users. Funding: 40.554 Euro - Funding agency: FUB

Partners: prof. Derek Bridge (University College Cork, Ireland) and prof. Wolfram Hoepken (Director of the Tourism Competence Center Austria, ECCA).

*6) etPackaging (November 2006 - March 2008)*

The objective of this project is to analyze and design a process for a dynamic bundling of tourism services, taking into consideration the requirements of all involved parties (customer, supplier and intermediary). Here, the integration of supplier-initiated and customer-initiated product bundles into one bundling process as well as the personalization of the bundling process is of high importance.

The research activities conducted by FUB aim at designing, implementing and testing learning techniques for the adaptation of system behavior to user responses to system actions. System actions may be recommendations, requests for user preferences, or display of personalized information. To achieve these goals we shall first adjust and install recommender and search engine functionality on the main Austrian tourism web site. Then we shall design and initiate a series of experiments to analyze the users' behavior vis-à-vis systematically varied system response. This will require the definition of a new model for interaction state representation and its implementation. Then we shall incorporate alternative methods of statistical learning into the test system. These methods will include Reinforcement Learning approaches to learning dialogue strategies and Bayesian methods to represent and reason on user preferences. I'm the principal investigator at FUB. Funding: 49.911 Euro. Funding Agency: : ECCA eTourism competence center Austria (Austria).

*Partners:* ECCA eTourism competence center Austria (Austria), TRC tourism research center Krems (Austria), Österreich Werbung (Austria), Free University of Bozen-Bolzano (Italy), WU Wien (Austria).

*7) European Tourist Destination Portal – <http://etd.ec3.at> - (April 2004 to October 2005)*

This new initiative is aimed at designing and developing a unique access point to all European National

Travel Organizations web sites. This new multilingual (En, Fr, Ge, It, Sp and Pt ) web site will bring a better visibility to Europe as a unique and composite destination, and will provide a quicker search tool to select the most suitable information. The portal content will be extracted from the NTOs web sites and data bases, and it will be integrated in the portal using the Harmonise semantic data-reconciliation tool. The user will be supported by the portal through a wide range of services, including, trip planning and product/service recommendation. The project is coordinated by EC3 (A), and the other partners are: TISCover (A), Siemens (A), Lixto (A) and ITC-irst (I). Overall budget 1.9 MEuro (equal to funding), and ITC-irst budget is 193.800 Euro. Funding agency: EU.

I participated to the preparation of the proposal and now I'm participating to the project as member of the Advisory Board.

8) *HarmoTen* – <http://www.harmo-ten.info> – eTEN C510828 – (May 2004 – October 2005)

This project is a follow up of a previous project (Harmonise). The technologies developed in Harmonise, will here validated in 11 case studies in different European countries. This will enable us to further improve and engineer the technology and to design a viable business model for the service (data reconciliation and interoperability infrastructure). HarmoTen is funded by the EU, in the eTen programme. The project coordinator is EC3 (A), and the other partners are: IFITT (A), Umbria Region (I), Consorzio Pisa Ricerche (I), ITC-irst (I). The overall budget is 829.836 Euro. ITC-irst budget is 21.600 Euro. Funding agency: EU.

I participated to the preparation of the proposal and now I'm participating to the project as ITC-irst responsible.

9) *DieToRecs* - <http://dietorecs.itc.it> – IST-2000-29474 (July 2001 to May 2004)

This project is aimed at developing and validating a recommender system for tourist destination decision-making. The DieToRecs recommender system provides an interactive web-based tool capable of supporting the structured process of selecting a tourist destination and bundling a personalised trip plan. DieToRecs accesses and integrates, by using a mediator architecture, data managed by two existing tourist web portals (trentino.to tiscover.com). DieToRecs recommender was designed as an adaptive system, i.e., capable to adapt the dialogue process and the suggested products/services as it learns about the user. System learning and adaptation was performed at each session level (short term) and collecting a memory of previous supported human/computer recommendation sessions. The dialogue is driven by an explicit model of the tourist destination selection. DieToRecs supports product aggregation for a given destination, letting the user to build a personalised dynamic package. Key technologies: XML, OLAP, Case-Based Reasoning, Adaptive User Interfaces, Web and Data Integration Architectures. I'm the Project Director and eCTRL is working in partnership with: TISCover A.G.(A); University of Vienna (A), University of Urbana Champaign (USA), APT Trentino (I). Budget 1.5 Meuro. Funding agency: EU.

I prepared the project proposal and coordinated the whole project as principal investigator.

10) *eCommerce and Tourism* – <http://ectrl.itc.it> (Jul. 2000 to Feb. 2004)

This was the strategic and foundational project of the laboratory. The objective was to create a multidisciplinary approach towards IT and Tourism (in partnership between ITC-irst and University of Trento) and build up in Trento an international point of reference for IT&T. In the short term we have developed a new generation of web enabled intelligent tools (recommendation technologies) and built some real working prototypes (web based travel destination decision aid system and a mobile recommender system for service selection). In partnership with the Azienda di Promozione Turistica del Trentino we have developed a recommender system for touristic products/services information selection and travel planning. Seven researchers worked on this project. A first system prototype, called NutKing, has been available since 2002. NutKing is accessible at <http://itr.itc.it>. NutKing supports high user interactivity, exploiting intelligent query refinement and products scoring, learning preferences from past user interactions (collaborative filtering). A plan for economic exploitation of the technology is underway, and a new company is going to be established as a spin off. Budget 1.9 Meuro. Funding agency: EU.

I participated to the preparation of the project proposal and coordinated the ITC-irst unit as principal investigator.

11) *Harmonise* - <http://www.harmonise.org> - IST-2000-29329 (July 2001 to July 2003)

Although standardisation initiatives (based on XML) have a long history in the field of tourism, with different levels of adoption and usage, the intended broad harmonisation of electronic markets has never been reached, due to the lack of flexibility and extensibility.

Harmonise set up a co-ordinated initiative at European level, which has brought:

- Support a consensus process of the main European key actors, that composes an enlarged task force on Tourism Standards and interoperability;
- Identification of a minimal set of concepts as a starting point for a mediating tourism reference model;
- A software tool, based on ontology and semantic web technologies, that supports a reconciliation process that allows the different partners to keep their specific ontology, data structure and formats, and at the same time carry out an effective interaction among them.

Our laboratory is the co-ordinating partner . The other partners are: IFITT (A), EC3 (A), Link (P), ICEP (P), T6 (I), CNR (I). Budget 1.9Meuro. ITC-irst budget was 338.891 Euro. Funding agency: EU.

I supervised the work of the ITC-irst researchers involved in the project (two).