



**QLectives – Socially Intelligent Systems for Quality
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Project periodic report

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Period covered: from 1st March 2010 to 28th February 2011

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Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;

The project (tick as appropriate):

- has fully achieved its objectives and technical goals for the period;
- has achieved most of its objectives and technical goals for the period with relatively minor deviations;
- has failed to achieve critical objectives and/or is not at all on schedule.

The public website, if applicable

- is up to date
- is not up to date

To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.

All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: **Prof. Nigel Gilbert**

Date:30...../.....04...../.....2011...

Signature of the scientific representative of the Coordinator



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1 Publishable Summary

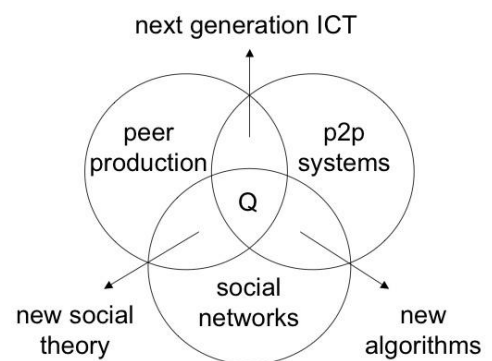
Introduction

QLectives – Socially Intelligent Systems for Quality – is a multidisciplinary research project funded from FP7-COSI-ICT (Project number 231200). Using a complexity perspective, QLectives will understand, experiment with, design and build cooperative socially intelligent ICT systems composed of self-organising peers, that will enable and support emergent “quality collectives” to enhance, for instance, scientific innovation and decentralised media distribution. The QLectives website can be found at www.qlectives.eu.

Objectives

The QLectives project brings together top social modellers, peer-to-peer engineers and physicists to design and deploy next generation self-organising socially intelligent information systems. The project aims to combine three recent trends within information systems:

- **Social networks** - in which people link to others over the Internet to gain value and facilitate collaboration
- **Peer production** - in which people collectively produce informational products and experiences without traditional hierarchies or market incentives
- **Peer-to-Peer systems** - in which software clients running on user machines distribute media and other information without a central server or administrative control

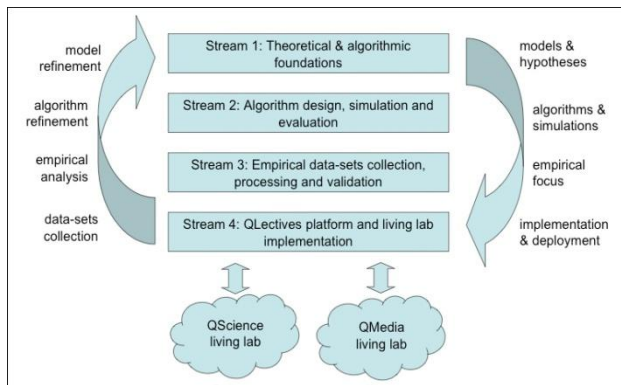


QLectives aims to bring these together to form Quality Collectives, i.e. functional decentralised communities that self-organise and self-maintain for the benefit of the people who comprise them. We aim to generate theory at the social level, design algorithms and deploy prototypes targeted towards two application domains:

- **QMedia** - an interactive peer-to-peer media distribution system (including live streaming), providing fully distributed social filtering and recommendation for quality
- **QScience** - a distributed platform for scientists allowing them to locate or form new communities and use transparent reviewing mechanisms to promote quality

The two applications will be based on two existing user communities comprising several thousand people - so-called "Living labs": the media sharing community tribler.org; and the scientific collaboration forum EconoPhysics.

Work performed in Year 2 and significant results



The QLectives project design is based on a constant interaction of empirical data and theoretical models. The project comprises four streams focussing on theoretical and algorithmic foundations; algorithm design, simulation and evaluation; empirical data collection and analysis; and implementation of findings in the QLectives platform and two living labs. These different research steps are cyclically repeated and refined over the four

year duration of the project.

Stream 1: Theoretical and algorithmic foundations of quality collectives

Two general trends can be observed in Stream 1 during this period; namely integration of modelling approaches and increasing orientation of the theoretical work towards peer-to-peer and scientific environments.

Partners in WP1.1 have kept on developing the different modelling approaches compiled in the collection of significant literature about models and theories of techno-social systems. These approaches range from evolutionary game theory, to hypergraphs and agent-based modelling.

In WP1.2 most efforts have been oriented towards the study of dynamic social impact. In particular, the focus has been put on social entrepreneurship, trust and conflict. The several results achieved in this period should serve as a basis to study similar dynamics in techno-social systems.

In WP1.3 work has focused on developing algorithms and collecting empirical data in order to develop automated methods for evaluating contribution, composition, and similarity of scientific papers and master information abundance.

The work in WP1.4 has mainly focused on dynamics related to quality in scientific collectives (especially concerning QScience). Different approaches have been applied, including analysis of citation behaviour and socio-semantic networks. In parallel to these efforts, an agent-based model of P2P systems (especially relevant for QMedia) has been developed.

Stream 2: Algorithm design, simulation and evaluation

Efforts in Stream 2 continued to focus on the analyses of large-scale empirical data results, which were in turn used for devising and testing new algorithms.

In WP2.1, work concentrated on identifying and translating theoretical models of cooperation formation into algorithms for ICT systems.

In WP2.2, work progressed in empirical analyses of scholar social networks and agent-based tests of collaboration mechanisms based on these networks.

In WP2.3, work began on the protocols in living lab environments and their future deployment (to be completed by month 36).

Stream 3: Empirical datasets collection, processing and validation

The work in Stream 3 focused on two main topics: (i) gathering data and transferring it to common format and (ii) application of hypergraphs approach.

In WP3.1 Data collection and experimentation, a “Living Archive” was created and data from the living labs has been collected to form “batch 1”.

In WP3.2 Data processing and knowledge extraction, all data has been converted to common format and stored in MySQL database.

In WP3.3 Model and algorithm validation and prediction, the hypergraphs approach was used to model the dynamics of scientific communities and FLICKr groups.

Stream 4: QLectives platform and living lab implementation

In Stream 4 the second versions of the QLectives Platform (including the Distributed Permission System), QScience (re-written in Drupal), QMedia (improved usability and indirect reciprocity mechanism) and a complete solution of HQ and spam metadata were delivered.

WP4.1 delivered version 2.0 of the QLectives Platform, centering on one major component, a Distributed Permission System, that implements alone most of the core features needed for the decentralized collectives.

WP4.2 delivered version 2.0 of the QScience living lab, the EconoPhysics Forum (<http://www.unifr.ch/econophysics>). Version 2.0 mainly consisted of re-writing the EconoPhysics Forum in an open-source content-management system, Drupal.

WP 4.3 delivered version 2.0 of the QMedia platform, including the second version of its graphical user interface that improves performance and usability, and an improved version of BarterCast indirect reciprocation mechanism.

WP 4.4, following the development of a generic metadata model, delivered a complete solution with respect to representation, detection, handling and adaptation of high quality and spam metadata, allowing an easy integration of existing metadata sources covering metadata representations of multimedia items, social networks and scientific applications.

Expected final results and their potential impact and use

The QLectives project has a significant impact on the research into collaboration and P2P activities. We have started experimenting with different ways of feeding our results into the creation of two examples of how ICT moulds and becomes part of the systems to which it is applied: QScience – currently a web 2.0 application, which might potentially develop into a peer-to-peer application, for facilitating scientific innovation by supporting scientific communities, rating activities for quality to identify potential collaborators, hot spots and breakthroughs, and disseminating the right information to the right peers promptly; and QMedia – a peer-to-peer application for transforming media distribution by dynamically identifying shared interest communities and recommending quality contents to them using streaming media technology. We anticipate an impact on all fields in which the collective quality rating of contents and raters can counter an otherwise unsustainable growth in the digital information age. Potential future long-term impacts are expected in the following areas:

- *Techno-social inclusion:* QMedia currently allows the creation of decentralized channels that broadcast arbitrarily rich media to their subscribers. The evolution of such channels can lead to an appealing alternative for currently prevalent Web-based media-sharing communities, which have inherent scalability limitations.
- *Techno-social operating system:* The current version of the QLectives Platform provides the necessary primitives and functionality for the creation of arbitrary group-based P2P applications. The development of a simple-to-use yet complete platform is a potential major

enabler for the popularization of decentralized techno-social systems among system designers and developers.

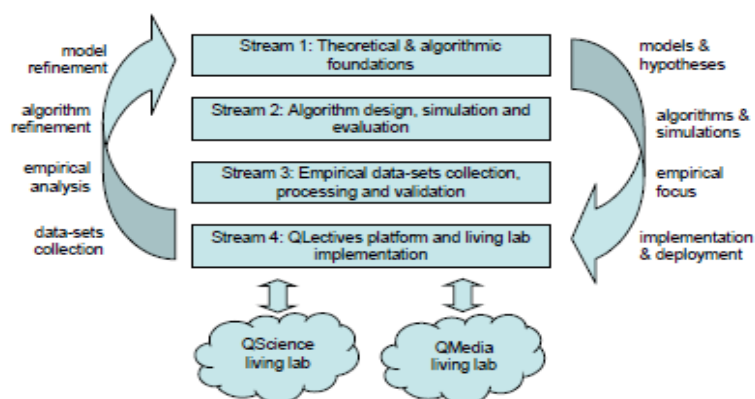
- *Scientific collaboration:* The two main functions to be implemented by the QScience platform are (i) a scientific journal and (ii) a discussion/collaboration forum. As soon as they are both developed and thoroughly tested, potential users outside external to the QLectives project will be contacted in order to receive independent feedback.
- *Group evolution:* The QLectives platform will allow groups to configure their own rules of cooperation, as well as to copy the rules of other groups at the time of the creation of a new group. This will enable group evolution that will eventually accommodate the different requirements of different groups and that facilitates the emergence of novel types of groups.

2 Project objectives for the period

According to the QLectives Work plan, the following objectives should be addressed during Year 2 of the QLectives project. The associated Milestones to be achieved during Year 2 are listed under the relevant objectives.

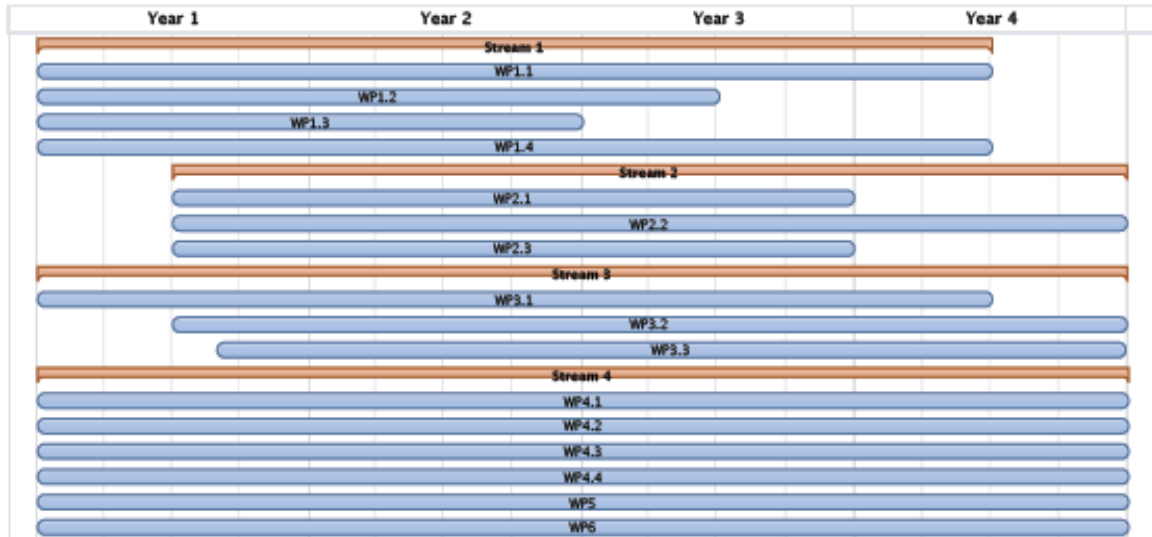
- Understand, experiment with, design and build cooperative socially intelligent ICT systems composed of self-organising peers, that will enable and support emergent “quality collectives” (QLectives). Milestones: M4, M4.1.
- Develop theoretical foundations informed by complex system science, to understand the emergence of cooperation and beneficial social structures from interacting peers as the basis of QLectives models. Milestone: M6.
- Simulate models to show that they are robust in the face of diverse human behaviour and technological failure. Milestone: M6.
- Study simplified models to derive analytically a theory of the macro-level behaviour of such systems. Milestone: M6.
- Develop methods for the translation of the models into deployable algorithms that are effective at large scales and that have predictable macro properties. Milestone: M6.
- Deploy two living lab ICT social application platforms (QScience and QMedia). Milestones: M4, M4.1.
- Collect massive data-sets from the QScience and QMedia living labs (and elsewhere), tracing system behaviour and dynamics. Milestones: M4, M5, M6.
- Apply a scientific approach through rigorous empirical validation, exploration and analysis of data-sets, refining and reformulating models and theories. Revise living lab implementations in light of findings. Repeat this cycle throughout the lifetime of the project. Milestones: M4, M5, M6.
- Maintain an open web-based living archive, of data-sets collected, freely available to other researchers. Milestone: M4.
- Promote an active technology sharing policy by making most of the code available as Open Source.

In order to address the above objectives, the QLectives project is structured into four research streams – characterising it as an integrated project. Each comprises a set of related Work Packages reflecting a particular research approach. The streams support each other but also operate in parallel. The following figure shows a graphical representation of the streams and how they relate to each other.



3 Work progress and achievements during the period

Following the work plan, most work packages started in Month 1; WPs 2.1, 2.2, 2.3 and 3.2 have started in Month 6, and WP 3.3 in Month 8, while WP 1.3 was completed on month 24. The duration of each work package is presented in the following chart.



The month 24 review meeting with the European Commission will take place on 17th March 2011.

Stream 1: Theoretical and algorithmic foundations

Stream 1 produces models, theories, and simulation algorithms based on existing and novel complexity approaches that capture both human agent behaviour, and social and collective structures. Specifically it focuses on the emergence of trust and cooperative behaviour and the emergent social structures that incentivise such behaviour. This task is being developed in two phases. First, a class of models and simulations are produced, related to the common functions required in the living lab applications (QScience and QMedia): community evaluation and recommendations for assessing information content quality. Second, hypotheses from our models are elaborated to be empirically tested against our living lab and other collected datasets. Models will be adapted to meet the empirical evidence.

In the second year of QLectives Stream 1 has focused on integrating modelling approaches and on bringing together the work and research conducted among partners. Significant concrete results have already been achieved in the four WPs, including public dissemination and publications.

WP1.1 Theory of complex techno-social collectives

Contributing partners

UniS, ETH Zurich, UniFr, UWAR, CNRS

Objectives for WP 1.1

- Develop analytically tractable agent-based models to study the influence of typical characteristics of complex social systems on phenomena such as the emergence, evolution, and decay of social communities
- Extend agent-based models to represent the essential features of complex techno-social systems.
- Derive implications for the improvement of efficiency, stability and resilience of techno-social collectives

Progress towards objectives

While there was no deliverable due during the second year of the project, the QLectives partners have continued to work on the development of different modelling approaches, including evolutionary game theory, hypergraphs and agent-based modelling.

Significant results

An evolutionary game-theoretical approach has been adopted to study social norms and social phenomena involving cooperation or conflict. Theoretical implications of using hypergraphs in network analysis have been explored, more concretely trying to understanding how the use of hypergraphs is likely to affect observed and observable patterns, mostly using through random hypergraph models.

Publications

Cazabet, R., Amblard, F. and Hanachi, C. (2010) *Detection of overlapping communities in dynamical social networks*. In Proceedings of the IEEE International Conference on Social Computing (*IEEE SocialCom*) 2010, pp. 309-314.

Helbing, D., Szolnoki, A., Perc, M. and Szabó, G. (2010) Punish, but not too hard: how costly punishment spreads in the spatial public goods game *New J. Phys.* 12, 083005

Helbing, D., Szolnoki, A., Perc, M. and Szabó, G. (2010) Defector-accelerated cooperativeness and punishment in public goods games with mutations. *Physical Review E*, 81(5), 057104.

Helbing, D., Szolnoki, A., Perc, M. and Szabó, G. (2010) Evolutionary establishment of moral and double moral standards through spatial interactions. *PLoS Computational Biology*, 6(4), e1000758.

Helbing, D. and Lozano, S. (2010) Phase transitions to cooperation in the prisoner's dilemma. *Physical Review E*, 81(5), 057102.

Tabourier, L., Roth, C. and Cointet, J.-P. (submitted) *Generating constrained random graphs using multiple edge switches*. Paper submitted to ACM JEA Journal of Experimental Algorithmics.

WP1.2 Complexity models of trust networks

Contributing partners

UniS, ETH Zurich, UniFr, UWAR

Objectives for WP1.2

- Review, compare and identify shortcomings of existing complexity models of agency for techno-social systems
- Develop algorithmically specified novel agency models tuned for techno-social communities
- Develop “informational division of labour” interaction scenarios and games
- Apply and tune psychologically plausible “dynamic social impact theory” for techno-social communities

Progress towards objectives

Work towards these objectives was developed along three lines; namely, social entrepreneurship, laboratory experiments on trust, and the influence of conflict on trust. Research on social entrepreneurs focused on their personal traits and strategies they use to induce social change and build up social capital. An experimental setting (called “Game of Trust”) was designed and performed in a laboratory to study the effect of the possibility of choosing an interaction partner on the readiness to express trust. Regarding the influence of conflict on trust, further analyses have led to a new way of classifying conflict, which can be either strategic (that can be solved by negotiation) or hostile (connected with a loss of complexity and often leading to direct, violent confrontation).

Significant results

The most significant results in each one of the three lines of work are:

- Research on social entrepreneurship was carried out and completed: the specific personality traits were identified and compared between groups of social entrepreneurs or leading social activists, and with the average sample of the society. A specific questionnaire was developed and verified in pilot studies. Additionally the hypotheses related to the methods used by social entrepreneurs for building social capital were verified and confirmed in a qualitative research. Moreover field research was carried out revealing that social entrepreneurs are able to change people’s mindsets through building sustainable social networks (see Zablocka-Bursa, 2010). Another stream of research revealed the innovative methods used by social entrepreneurs for approaching conflict situations (based on case studies) (see Praszkie, Nowak and Coleman, 2010).
- The first experiment on the “Game of Trust” aimed at the verification of the hypothesis that the possibility of choosing an interaction partner has an effect on the readiness to express trust. The study consisted of a simple economic game, where one could decide about the division of money between him/herself and another person. The interaction partner was either chosen randomly, or a person could choose a partner from a list, or be chosen by someone else. The preliminary analysis showed that the possibility of choosing a partner has the biggest influence on the level of trust.

- The work on influence of conflict on trust was continued. New analyses led to changing the theory. In the former version conflict was described as either constructive or destructive – this distinction was changed to strategic vs. hostile. Strategic conflict is based on the incompatibility of goals and can be resolved by the way of negotiation whereas hostile conflict is connected with loss of complexity and often leads to direct confrontation. An article describing the new theory is in preparation.

Publications

Praszkier, R. and Nowak, A. (2011) *Social Entrepreneurship: Theory and Practice*. New York: Cambridge University Press (*in preparation*).

Praszkier, R., Nowak, A. and Coleman, P. (2010) Social Entrepreneurs and Constructive Change: The Wisdom of Circumventing Conflict. *Peace and Conflict*. 16, pp. 1–22.

Zablocka-Bursa, A. (2010) *Social change developed by social entrepreneurs*. Unpublished doctoral dissertation, Institute for Social Studies. Warsaw: University of Warsaw.

WP1.3 Theory of quality emergence in complex systems

Contributing partners

UniS, ETH Zurich, UniFr, UWAR

Objectives of WP 1.3

- Developing agent-based models for self-consistent estimates of quality
- Proposing and investigating effective approaches to quality signaling
- Deriving implications for quality signaling in real applications

Progress towards objectives

Several results have been achieved towards these objectives. Work overall has focused on developing algorithms and collecting empirical data in order to develop automated methods for evaluating contribution, composition, and similarity of papers and master information abundance. These new developments were extensively tested on citation data provided by the American Physical Society. Empirical studies have been conducted addressing the emergence of standards of quality in both general and scientific contexts. In the initial empirical study, groups of several individuals were instructed to rank order a set of pictures with respect to quality. Three groups of students were asked to rate a set of pictures. Their interaction has been recorded on video and the conversation was transcribed in preparation for a full analysis.

In the scientific context, an online survey was conducted and that is being enhanced with the collection and analysis of data from weblogs, journal web pages and interviews with scientists. Efforts have been made to understand the social dynamics of quality evaluations and chat conversations.

Significant results

Work during this period concentrated on co-ordinating results for Deliverable D1.3.2. Of particular importance are: the improvement of a social recommendation process resulting in enhanced spreading of high quality content (Cimini et al., 2011) and the extensive empirical study on the understanding of quality in science (Gill et al., 2010).

Publications

Cimini, G., Medo, M., Zhou, T., Wei, D. and Zhang, Y.-C. (2011) Heterogeneity, quality and reputation in an adaptive recommendation model, accepted by *EPJ B*.

Gill, A. J., Xenitidou, M. and Gilbert, N. (2010) *Understanding quality in science: A proposal and exploration*. In Proceedings of the 2nd International Workshop on Quality in Techno-Social Systems, Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems 2010 (SASO 2010), Budapest, 28th September, pp. 2-7.

Abstract available from: <http://www.st.ewi.tudelft.nl/qteso/GillXenitidouGilbert2010-QTESO.pdf>

Gualdi, S., Medo, M. and Zhang, Y.-C. (2011) Random walks on directed acyclic networks. (to be submitted to *Physical Review Letters*).

Liu, W. and Lü, L. (2010) Link prediction based on local random walk. *EPL* 89:58007.

Lü, L., Jin, C.-H. and Zhou, T. (2009) Similarity index based on local paths for link prediction of complex networks. *Physical Review E*, 80:046122.

Mehl, M. and Gill, A. J. (2010) Computerized Content Analysis. In Gosling, S., and Johnson, J. (eds.) *Advanced Methods for Behavioral Research on the Internet*. Washington DC: American Psychological Association Publications.

Nowak, A., Samson, K. Lisiecka and K. Ziembowicz, M. (under revision) Lovely weather, isn't it? On social dynamics of quality judgment. *Mind & Society*.

Scissors, L., Gill, A. J., Geraghty, K. and Gergle, D. (2010) *Trust through Text: Examining Linguistic Similarity and Trust in Text Chat*. In Proceedings of the 11th Annual Meeting of the Society for Personality and Social Psychology, Las Vegas, NV, January 2010.

Wei, D., Zhou, T., Cimini, G., Wu, P., Liu, W. and Zhang, Y.-C. (under review) Effective Mechanism for Social Recommendation of News. *Physica A*.

D1.3.2 Social quality selection in science and media

WP1.4 Modelling the dynamics of quality collectives (UniS)

Contributing partners

UniS, ETH Zurich, UWAR, CNRS

Objectives of WP1.4

- Understand the dynamics of quality collectives using agent-based models: how they emerge, consolidate and decline
- Create an abstract model of the dynamics of quality collectives
- Apply this model to understanding the dynamics of quality collectives observed in the QScience and QMedia living labs

Progress towards objectives

During this period there has been an increasing analysis and modelling effort focused on quality group dynamics in scientific and P2P contexts. Besides contributing directly to the first objective above, this work will be used in the following months as a basis to address related dynamics observed in QScience and QMedia.

Significant results

Regarding quality dynamics in the scientific context, bibliometric data has been analyzed to uncover certain citation dynamics such as the interplay between reputation and citation boosts. Besides, alongside the theoretical exploration in WP1.1, hypergraphs' approach has been used to analyse the intertwinement between social and semantic aspects of group formation, which is a topic likely to shed light on the relationship between various notions of quality and underlying social structural patterns. Finally the analysis of an online game computer simulation of quality game showed that they are not the innovators, but other individuals sitting in their first order neighbourhoods, that gains the most.

Additionally a prototype of agent-based model of P2P networks has been completed, and it is pending subsequent validation against data from the Living Archive and experimentation with alternative motivational schemes.

Publications

Chen, C.-C. and Padilla, P. (2010) *A multi-level study of free-loading in dynamic groups: The importance of initial network topology*. In Proceedings of the IEEE International Conference on Intelligent Networking and Collaborative Systems (InCoS) 2010.

Chen, C.-C. and Roth, C. (2010). *Motivations and constraints to member engagement in Flickr groups*. In Proceedings of the 2nd International Workshop on Quality in Techno-Social Systems, Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems 2010 (SASO 2010), Budapest,

28th September.

Cointet, J.-P. and Roth, C. (2010) *Local circles, local topics: structural and semantic proximity in blog networks*. In Proceedings of the 4th Intl AAAI Conf on Weblogs and Social Media, Washington, DC, 23–26 May.

Mazloumian, A., Helbing, D., Eom, Y.-H., Lozano, S. and Fortunato, S. (under review) How citation boosts promote scientific paradigm shifts and Nobel Prizes. *PLoS ONE*.

Taraborelli, D. and Ciampaglia G. L. (2010) *Beyond notability. Collective deliberation on content inclusion in Wikipedia*. In Proceedings of the 2nd International Workshop on Quality in Techno-Social Systems, Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems 2010 (SASO 2010), Budapest, 28th September.

Taramasco, C., Cointet, J.-P. and Roth, C. (2010) Academic team formation as evolving hypergraphs. *Scientometrics*, 85(3), pp. 721–740.

Stream 2: Algorithm design, simulation and evaluation

Based on the high-level models, theories, and simulations developed in Stream 1, Stream 2 translates these to algorithm designs that can be implemented and deployed in our living labs. The resulting deployable algorithms need to factor in practical aspects such as the efficient storage/recall of data and other engineering constraints. This stream focuses on two distinct ways of importing insights from Stream 1 models into algorithms. Firstly, by using the models of human agent motivations it is possible to test (in simulation) the effectiveness of the proposed QLectives platform algorithms. Secondly, by identifying desirable emergent properties, it is possible to base algorithms and protocols directly on complex systems models, even when these may have been designed to model human systems.

In the second year, Stream 2 has focused on translation of successful ideas developed previously in Stream 1 to effective algorithms which are ready to be deployed in real environments (living labs).

WP2.1 Algorithms for the emergence of cooperation

Contributing partners

TUD, ETH Zurich, USZ, UniFr

Objectives for WP2.1

- Translate novel theoretical models of cooperation formation into algorithms for ICT
- Simulate the performance of these algorithms under realistic assumptions based on target applications
- Incorporate human agent behaviour models
- Propose algorithms for implementation and deployment in Stream 4

Progress towards objectives

In order to achieve the planned ends, work was structured into a series of steps:

1. Identify *areas for target applications* that would benefit from increased cooperation.
2. Select *appropriate user models* which may capture the behaviour of users within such application areas.
3. Determine the possible collective mechanisms that can promote cooperation within the application areas for the given user models.
4. Design *appropriate protocols*, that could be deployed, that instantiate the collective mechanisms.

Significant results

Work during this period concentrated on identifying and translating theoretical models of cooperation formation into algorithms for ICT systems drawing on the review of models from deliverable D1.1.1, and the proposed applications of those models given in D2.1.1. The focus has been on the QMedia application domain in this phase of QLectives work and particularly BitTorrent related issues. The main achievements during this period were:

- _ Summarise published work which examines potential improvements to a deployed distributed indirect reciprocity mechanism;
- _ Give an overview of on-going work which applies an evolutionary inspired tournament approach to automatically assess the quality of a space of BitTorrentlike sharing protocols;
- _ Summarise published work which presents a detailed analysis of the relationship between performance and equality within the direct reciprocity mechanism of BitTorrent;

These are described in detail in Deliverable D2.1.2, while implementation issues are addresses in D4.3.2.

Publications

Delaviz, R., Andrade, N. and Pouwelse, J.A. (2010) *Improving Accuracy and Coverage in an Internet-Deployed Reputation Mechanism*. In Proceedings of IEEE International Conference on Peer-to-Peer Computing, Delft, The Netherlands, 1-9.

Delaviz, R., Andrade, N., Epema, D.H.J, and Pouwelse, J.A (2010). Improved Accuracy and Coverage in the BarterCast Reputation Mechanism. In Proceedings of the 16th Conference of the Advanced School for Computing and Imaging, Veldhoven, The Netherlands, 1-8.

Jia, A.L., D'Acunto, L., Meulpolder, M, Pouwelse, J.A, and Epema, D.H.J, (2011). BitTorrent's Dilemma: Enhancing Reciprocity or Reducing Inequity. In the IEEE Consumer Communications and Networking Conference (CCNC '11), Las Vegas, Nevada, USA, January 9-12, 2011.

Rahman, R., Hales, D., Vinko, T., Pouwelse, J.A. and Sips, H. (2010) *No more crash or crunch: sustainable credit dynamics in a P2P community*. In Proceedings of International Conference on High Performance Computing & Simulation, Caen, France, pp. 332-340.

D2.1.2 Fundamental algorithms for sustaining cooperation in realistic environments

WP2.2 Algorithms for the emergence of collectives

Contributing partners

UniS, TUD, ETH Zurich, USZ, UniFr, IRT

Objectives for WP2.2

- Develop algorithms for detection and reinforcement of collectives
- Test the performance of the proposed algorithms by simulations
- Provide a basis for efficiently distributed implementation of the proposed algorithms

Progress towards objectives

While the only deliverable of this WP is due only in month 48, in year two we already did substantial preparatory work on mechanisms of social recommendation (with emphasis on the use of social recommendation in scientific contexts) and on scholar social networks in general.

Significant results

Properties of social recommendation have been studied by means of agent-based modelling. In particular, we studied the robustness of this kind of recommendation algorithms to noise (unintentional wrong evaluations) and malicious users (spammers). We considered the possibility of improving the recommendation performance by introducing reputation to the recommendation model and showed that doing so helps to build a system resistant to spammers.

Work on a plugin for simple and user-friendly visualisation of scientific collaborations is in progress.

Publications

Cimini, G., Medo, M., Zhou, T., Wei, D. and Zhang, Y.-C. (2010) Heterogeneity, quality and reputation in an adaptive recommendation model, accepted by *EPJ B*.

Wei, D., Zhou, T., Cimini, G., Wu, P., Liu, W. and Zhang, Y.-C. (under review) Effective Mechanism for Social Recommendation of News. *Physica A*.

WP2.3 Algorithms for trusted and quality rankings

Contributing partners

TUD, ETH Zurich, USZ, UniFr, CNRS, IRT

Objectives for WP2.3

- Design algorithms for exploiting partial trust and rating information
- Design fully distributed robust implementations of these algorithms
- Help integrating designed algorithms into the living lab platforms

Progress towards objectives

Progress in this WP was made in various directions. We extensively studied and compared so-called iterative-filtering algorithms where quality values of objects and rating powers of users are estimated in an iterative and inter-dependent way. These algorithms were tested on various real datasets containing quality evaluations which were obtained from various well-known websites (such as Amazon.com or Netflix.com).

We studied citation data provided by the American Physical Society and showed that the citation structure itself can be used to detect seminal papers (those that launched their own branches of research and/or had substantial impact on future developments). Our concept based on random walks on networks can be also used to generally quantify influence of one network's node on another (e.g., to measure the influence which paper A had on paper B).

While the studied algorithms were always considered with emphasis on their practical applicability, their distributed implementations are yet to be obtained.

Significant results

The framework of random walks on directed acyclic networks (which can be used to represent, for example, scientific citation data) and its use in quantifying mutual influence of nodes, detecting important nodes, and measuring node similarity.

Publications

Csernai, K., Jelasity, M., Pouwelse, J. and Vinkó, T. (2011) *Modeling unconnectable peers in private BitTorrent communities*. In Proceedings of MSOP2P 2011. IEEE Computer Society. In Proceedings of the 19th Euromicro Conference on Parallel, Distributed and Network-Based Processing (PDP'11), pp. 582–589, Ayia Napa, Cyprus, 2011. IEEE Computer Society. MSOP2P special track. (doi:10.1109/PDP.2011.21)

Jelasity, M., Bilicki, V. and Kasza, M. (2011) *Modeling network-level impacts of P2P flows*. In Proceedings of MSOP2P 2011. IEEE Computer Society In Proceedings of the 19th Euromicro Conference on Parallel, Distributed and Network-Based Processing (PDP'11), pp. 590–594, Ayia Napa, Cyprus, 2011. IEEE Computer Society. MSOP2P special track. (doi:10.1109/PDP.2011.9)

Ormándi, R., Hegedűs, I., Csernai, K. and Jelasity, M. (2010) *Towards inferring ratings from user behavior in BitTorrent communities*. In Proceedings of the 6th International Workshop on

Collaborative Peer-to-Peer Systems (COPS) at WETICE'10, pp. 217–222. IEEE Computer Society, 2010. Best Paper Award. ([doi:10.1109/WETICE.2010.41](https://doi.org/10.1109/WETICE.2010.41))

Ormándi, R., Hegedűs, I., Farkas, R. and Jelasity, M. (2010) *Novel balanced feature representation for Wikipedia vandalism detection task*. In CLEF 2010 Labs and Workshops. <http://clef2010.org/index.php?page=pages/proceedings.php>.

Ormándi, R., Hegedűs, I. and Jelasity, M. (2010) *Overlay management for fully distributed user-based collaborative filtering*. In Pasqua D'Ambra, Mario Guarracino, and Domenico Talia, (Eds.), Euro-Par 2010, volume 6271 of *Lecture Notes in Computer Science*, Springer-Verlag, pp. 446–457. ([doi:10.1007/978-3-642-15277-1_43](https://doi.org/10.1007/978-3-642-15277-1_43))

Jelasity, M. (2010) *Algorithms for Fully Distributed Techno-Social Systems*. PerAda Summer School, Budapest, Hungary, 22nd September 2010.

Stream 3: Empirical datasets collection, processing and validation

The task of Stream 3 is to gather hypotheses (informed by work from Stream 1 and Stream 2) and data-sets from the QLectives platform implementations of the living labs (Stream 4) in order to test models and validate algorithms. First, by contrasting theoretical models with the real systems' behaviour, characterising the level and limits of prediction possible with the given models and suggesting empirically based reformulations. Second, by providing guidelines for implementation derived from the study of models. Stream 3 contribution to the understanding of social mechanisms will lead to robust quality-emergence in P2P and Web2.0 systems.

The second year of Stream 3 was devoted to creating a "Living-Archive", as well as to collecting and analysing data from the living labs. The current version of QLectives 'living-archive' as described in deliverable D3.1.1 (Techno-social *living-archive* with massive datasets from living labs and other sources) was implemented. It is described in the report for completion of the deliverable D3.1.1.

In WP 3.3 the work has started on applying the hypergraphs theory to describe group dynamics. In this approach social groups are treated as sets called hyperlinks. In contrast with classic social network analysis, hyperlinks do not have internal structure and can connect to each other by the way of n-dimensional intersections. In the CNRS team this theory has been used to model scientific collaborations and FLICKr groups.

WP3.1 Data collection and experimentation

Contributing partners

UniS, TUD, ETH Zurich, UWAR, CNRS

Objectives for WP3.1

- collecting massive empirical datasets obtained from the two living labs, peer-to-peer systems, social media websites and/or academic paper archives, social rating and bookmarking sites
- creating an open "living archive" of empirical data for researchers to use
- collecting data from specially designed web experiments

Progress towards objectives

Data availability is a key aspect in QLectives, since it drives the project's workflow, organized along the closed cycle formed by the four streams (Models and hypothesis; algorithms and simulations; empirical focus; implementation and deployment). This makes a requirement to have a common and standardized repository of datasets for all partners to share. The "Living- archive" is aimed to fulfil such a requirement. During this period a series of datasets were explored in terms of gathering and assessing the data for batch 1 of the living archive.

Significant results

The version of the Data Archive containing the “batch 1” databases has been created and can be found at http://www.qlectives.eu/wiki/index.php/Batch_1.

From the implementation viewpoint, the “Living-Archive” is a part of Qlectives’ Wiki (http://www.qlectives.eu/wiki/index.php/Data_Archive), and is hosted by University of Surrey. It is organized along batches of data (from Batch 0 to, eventually, Batch 3). Batch 0 is an initial collection of data, contributed by partners in the Consortium from previous projects. The other batches (from Batch 1 to Batch 3) will include the data corresponding to each one of the loops in the ever-improving cycle on which Qlectives’ workflow is based.

The “Living-Archive” contains, to date, 12 datasets (8 of them corresponding to Batch 0, and the other 4 to Batch 1).

Regarding future data-collection from Qlectives’ living labs, in the short and mid-term the labs should be used directly to collect users’ behaviour data (e.g. before and after the introduction of a certain social functionality in a platform to evaluate their reaction). In a longer term, they could serve as the support for a wide variety of social scientific experiments (in a similar way that physical laboratories support ‘traditional’ behavioural experiments).

In addition, as the next steps in the development of Qlectives’ living labs get clearer (i.e. as roadmaps are being refined), new platforms become more likely to be considered for data collection within the project. This includes, for instance, Living Science (<http://www.livingscience.ethz.ch/>) and QJournal (see QScience’s roadmap: <http://www.qlectives.eu/wiki/index.php/QScienceRoadMap>).

These are described in detail in Deliverable D3.1.1.

Publications

D3.1.1 Techno-social *living-archive* with massive datasets from living labs and other sources

WP3.2 Data processing and knowledge extraction

Contributing partners

UniS, TUD, ETH Zurich, UWAR, CNRS, IRT

Objectives for WP3.2

- Summarise and extract measures and statistics from the datasets gathered in WP3.1 in a way that will be relevant and convenient for the work of WP3.3
- Characterise the datasets in order to discover previously unexpected patterns, using data-mining and other techniques
- Produce a detailed listing of failures or inefficiencies on existing peer production websites

Progress towards objectives

- It was agreed to use MySQL as a way of homogenising datasets from very different sources (like in the case of Batch 0).
- It was also agreed to define a common metadata specification. Taking into account the Archive particularities, DDI 2.1 (Data Documentation Initiative) was the solution finally selected.

Significant results

All datasets in Batch 0 have been converted to a common meta-data format in order to facilitate its usage by all partners and potential external users.

Publications

The deliverables for this work package are due in months 36 (D3.2.1) and 48 (D3.2.2), so while work has started on it since month 6 no publications directly related to the work package have as yet been produced.

WP3.3 Model and algorithm validation and prediction (CNRS)

Contributing partners

UniS, ETH Zurich, CNRS

Objectives for WP3.3

- Use data collected and processed in WP 3.1 and WP3.2 to test hypotheses drawn from the theories developed in WP1.1 and the model and algorithms developed in WP2.2 and WP2.3.
- Use data in conjunction with validated models to make predictions about the structure and dynamics of quality collectives

Progress towards objectives

The possibilities of using hypergraphs to describe group dynamics were discussed during meeting between CNRS and UWAR (see section 5.3). Plans were made to develop a set of social measures that could be applied to hyperlinks.

Several papers were submitted by the CNRS team regarding the possibility of modeling collectives using hypergraphic structures. Structural and semantic determinants of the formation of scientific collectives were explored. It was also shown using the models of formation of random hypergraphs, that several patterns typical of traditional social networks may actually be explained by simple underlying hypergraphic processes.

The research on FLICKr groups showed the distinction between active content contribution and passive social contribution to groups and showed that there is often a negative relationship between the two.

Significant results

The results of WP3.3 have been presented in invited seminars, workshops and seminars (see Publications below).

Publications

Chen, C.-C. and Roth, C. (2010). *Motivations and constraints to member engagement in Flickr groups*. In Proceedings of the 2nd International Workshop on Quality in Techno-Social Systems, Fourth IEEE International Conference on Self-Adaptive and Self-Organizing Systems 2010 (SASO 2010), Budapest, 28th September.

Roth, C. (2010) *Academic teams: evolving hypergraphs*. Invited seminar at UT Federica Santa Maria, Santiago, Chile, November 2010.

Taramasco, C., Cointet, J.-P. and Roth, C. (2010) *Evolving hypergraphs to appraise academic team formation processes*. Communication at Sunbelt XXX Intl Conf Social Networks, Riva del Garda, July 2010.

Stream 4: QLectives platform and living lab implementation

The aim of this stream is to produce a deployed Web and Peer-to-Peer infrastructure platform with generic functions for supporting QLectives communities. More precisely, it aims to develop components that are deployable over the infrastructure to provide the specific functions required by the two application domains of QScience and QMedia. In each case mechanisms are applied that promote and facilitate the growth of quality communities (putting the right users together) and the quality of disseminated informational items within the communities (passing the right information to the right people). QScience is currently based on a deployed Web2.0 infrastructure and QMedia is based on a deployed P2P infrastructure. In the following, we give a detailed description of the achievements for each work package separately.

WP4.1 Peer-to-peer platform - P2P-Qual

Contributing partners

TUD, USZ, IRT

Objectives for WP4.1

- Produce a re-usable Peer-to-Peer (P2P) platform infrastructure which facilitates peer-production
- Craft a zero-server architecture with unbounded scalability, fault tolerance, and high availability
- Provide generic functions and services required by the QScience and QMedia living lab
- Implement the world's first zero-server social network system
- Implement complexity-science inspired techno-social networking fabric primitives:
 - QFlow: augment P2P transfers of information with audit trail of quality indicators
 - BWCurrency: Transform P2P bandwidth into a transferable currency
 - P2PWidgets: run-time deployable code units which extend the platform
- Provide algorithm deployment for Stream 2 and implement collection functions for Stream 3

Progress towards objectives

This Work Package delivered version 2.0 of the QLectives platform. The aim of the QLectives Platform is to combine social networking, facilitation of quality and scalable peer-to-peer (P2P) technology into a next generation peer-production platform. This platform can serve as the basis for the implementation of multiple peer-to-peer systems, and consists of several components which are continuously refined using input from other work packages. In the second version of the QLectives Platform, the work has been centered on the development of one major component that implements alone most of the core features needed for the decentralized collectives envisioned in QLectives. This component is the Distributed Permission System, which TUD named Dispersy.

Significant results

Dispersy, the core element of QLectives platform v2.0 is the result of factoring out and advancing the common functionality implemented for all collectives-related aspects of QLectives Platform and QMedia version 1.0. This module provides the necessary primitives to implement functionalities for decentralized groups that share a robust, secure, and scalable set of messages and permissions.

Dispersy's core functionality is to enable the creation of communities. A community in Dispersy shares a set of messages known to all of its members, and a set of permissions implemented by the members.

The Dispersy core has been implemented in the following set of features:

- Encoding messages from the internal message format to on-the-wire bytes.
- Decoding messages from the on-the-wire bytes to the internal message format.
- Delaying an incoming message when a previous message is missing. Once the required missing messages are retrieved using a dispersy-sequence-request the delayed message is processed.
- Delaying incoming messages when a public key is missing to properly verify the message content. Once the missing key is retrieved using a dispersy-identity-request the delayed message is processed.
- Triggers can be used to obtain a callback whenever the footprint of an incoming message matches a given regular expression. This is usually used to wait, and provide a timeout, for a response message.
- Routing information is gathered through dispersy-routing-request and dispersy-routing-response messages. Consequently, this information is used to disseminate the public address of each member using a dispersy-identity message.
- Periodically one or more addresses will be chosen and an attempt will be made to obtain new messages using a dispersy-sync message.

It is expected that porting current modules to rely on Dispersy as well as implementing future functionality using this module will greatly improve the quality of QMedia and QLectives Platform.

Publications

Halkes, G. P. and Pouwelse, J. (2010) *Verifiable Encryption for P2P Block Exchange*. In Proceedings of the IEEE Conference on Peer-to-Peer Computing (P2P'10), pp. 65-68.

D.4.1.2 QLectives Platform v2

WP4.2 Scientific innovation living lab – QScience

Contributing partners

UniS, TUD, ETH Zurich, USZ, UniFr, IRT

Objectives for WP4.2

- Create a platform to support scientific quality and creativity through proactively linking scientists with shared interests and quality assessments
- Support rapid formation of new scientific communities with rapid consensus on quality and significance of publications and other scientific resources
- Grow social capital through reliable reputation and trust mechanisms and thus improve scientific productivity - share tasks, reduce re-invention
- Collect data from the system for analysis in Stream 3

Progress towards objectives

This Work Package delivered version 2.0 of the QScience platform. In the second year of QLectives, the emphasis was on rewriting the Econophysics Forum in an open-source content-management system, Drupal. The vision for QScience has been improved shifting its focus to easy creation of its new instances and a common platform allowing for comparison of their performance. The goal is to create conditions for rapid IT-facilitated evolution of instances. The first steps towards the practical implementation of these ideas has been made by agreeing on the core functionality, necessary data structures, access rights, supported algorithms and implementation issues.

Significant results

This year a decision was reached to use a content management system (CMS) as the platform for development of the EconoPhysics Forum as well as for QScience v2, v3, and v4. The evaluation process that brought to this conclusion consisted of going through the following steps:

1. Do we need to refactor the EconoPhysics Forum code?
2. Shall we use an existing CMS?
3. Which CMS fits best our needs?

Considering with the stage of functionalities that we would like to offer in QScience and the current stage of the EconoPhysics Forum code base, we decided that a CMS could actually help our development. From the existing popular CMSs we have chosen Drupal (See <http://drupal.org> for more information) which is an open source content management platform powering millions of websites and applications. It's built, used, and supported by an active and diverse community of people around the world. Most functions of the current EconoPhysics forum have been implemented in its new Drupal version.

The second important decision that was made in the second year concerned the concept of QScience. This concept has crystallized and now relies on creating suitable conditions for evolution of individual instances of QScience. Similarly as in biological populations, this "evolution" would be facilitated by three main processes:

1. Replication, which in our case would be represented by creating new instances of QScience where

it should be possible to copy settings of an existing instance, hence allowing for replication of instances.

2. Variation, which in our case would be represented by the possibility to modify the settings.

3. Evaluation, which in our case would be represented by a central QScience site providing overview of existing instances and their performance characteristics.

To enhance the evolutionary process, all three processes need to be carefully prepared to made easy for the users to access and use them (for example, by offering the possibility to host new instances on our servers or by preparing a set of predefined instances that would cover typical user needs).

These are described in detail in Deliverable D4.2.2.

Publications

D4.2.2 QScience living lab v2 (Web2.0)

WP4.3 Media distribution living lab - QMedia

Contributing partners

TUD, USZ, IRT

Objectives for WP4.3

- Create an experimental next-generation user centric and social media distribution platform (QMedia)
- Build upon the P2P-Qual platform and offer seamless download and streaming of open media content
- Provide social networking functionality allowing users to freely share media with friends and contacts
- Self-organise, through detection of taste similarity and user rating systems, groups of similar peers
- Implement social tools allowing users to create a shared viewing experience
- Promote the discovery of high quality open content by integrating the WP4.4 quality meta-data system
- This work package deals with the development of the QLectives Platform

Progress towards objectives

This Work Package delivered version 2.0 of the QMedia platform. Version 2.0 of the QMedia software is an extension to and a purpose-built version of Tribler. Tribler is an open-source media-sharing client with an existing user base. Moreover, QMedia is based on the QLectives Platform version 2.0, described in QLectives Deliverable D.4.3.2.

The changes brought into QMedia since version 1.0, released in Month 12 of QLectives are the following:

- *A second version of QMedia's graphical user interface* that improves its performance and usability, and incorporates feedback from users and project partners;
- *Version 2.0 of QMedia's indirect reciprocation mechanism, Bartercast*, incorporating the input from Stream 2 of this project on the need for improved information dissemination.

A preliminary version of QMedia version 2.0 has been released in December 2010. This version of the software, named Tribler 5.3 was downloaded more than 15,000 times since its publication.

Significant results

QMedia version 2.0

Significant changes have been made in the codebase of QMedia, which are as follows:

- In the previous version, the 'Sharing Reputation' control as shown right from the search box, was confusing. Most users did not understand what that represents. Redesign of the 'Sharing Reputation' control has been made, which is now shown in a status bar located at the bottom of the screen.
- Custom controls were used instead of the native ones included in users' operating system. However, although custom controls allow for a distinctive GUI, it also causes confusion to

many users.

- Porting controls to use native components from different operating systems and to rely on a minimum common set of components required a rewrite of roughly 90% of all GUI-related code.
- Instead of re-using a single list, the channel view used a different list control. This required users to learn one unnecessary variant of another control. The new channels panel now uses the same list control as the search results, but with different columns. There are different categories allowing users to filter the available channels, and the actual contents for each category are also displayed. For each channel, the name, latest update, popularity (the number of users who have marked it as one of their favorites), and number of torrent is shown.
- Finally, the settings page did not show any structure. Different types of settings are shown together.

BarterCast version 2.0

Research on the coverage and accuracy of Bartercast as deployed in QMedia version 1.0 have found that for QMedia version 2.0 it is necessary that Bartercast has more aggressive data dissemination, and that peers in the network should disseminate third-party information. These requirements called for major changes in Bartercast code. The need for such changes and the development of Dispersy was motivated by and also eventually benefited the distributed permission module implemented in QLectives Platform version 2.0. The new version of Bartercast is, in the lingo of the Dispersy Framework, a Dispersy Community, called the Barter Community. The purpose of this community is to distribute enough information to allow nodes to determine the reputation of other nodes in the system.

Publications

D4.3.2 QMedia v2

WP4.4 Quality search and discovery

Contributing partners

TUD, USZ, IRT

Objectives for WP4.4

- Bring public service broadcasting quality commitment to the YouTube and BitTorrent generation of media distribution
- Explore ways for sharing quality meta-data from, and with, public broadcasters
- Give users the ability to rate, moderate, annotate and recommend contents themselves
- Allow for easy “injection” of existing open meta-data sources (i.e. inter-operate with open standards)
- Increase quality by reducing spam, incorrect or malicious meta-data via application of novel mechanisms from Stream 1 and 2.
- Hence create a global distributed self-organising high quality Electronic Programme Guide (EPG)

Progress towards objectives

During this period, the work in WP 4.4 focused on the evaluation of metadata. In high quality – related environments, such as the Qlectives application area, metadata plays a key role when it comes to search and discovery of content, in particular for so-called “User Generated Content (UGC)” corresponding metadata. To ensure incorruptible high quality search results, means are needed to evaluate the trustworthiness of the metadata elements.

Based on the generic metadata model (D4.4.1) developed in year 1 and within the scope of D4.4.2, IRT and USZ designed and tested algorithms for detection and handling of high quality metadata and spam metadata. The solution is based on self-learning algorithms - analogous to email-junk filters – allowing for a classification, respectively prediction of the quality of each metadata record. Thanks to the generic approach by deploying self-learning algorithms in conjunction with features in combination with abstraction layers for implementers, a high degree of flexibility has been achieved, allowing for alteration of functionality and identification of use-cases on application layers. The developed solution was synchronised among partners in a sub-group meeting at the consortium meeting in Zurich (June 2010), and afterwards reported back to the consortium.

IRT performed editorial and implementation work towards the software and report parts of deliverable D4.4.2. After intensive testing of the algorithms by making use of metadata sources of IRT’s associated public broadcasters as well as metadata sources for User Generated Content metadata (YouTube metadata integration solution from IRT), further refinement of the algorithms took place, and deliverable D4.4.2 has been finalised and sent to the commission in month 18.

Additionally, IRT launched work towards implementation and integration guidelines for the results of the preceding deliverables, being part of Deliverable D4.4.3 “Implementation / integration guidelines for HQ-MD in QMedia v2”. The document describes how the results of Deliverables D4.4.1 and D4.4.2 are intended to be realised within a client implementation, QMedia respectively. It deals with specific aspects of the complete metadata integration and implementation effort – covering the Generic Metadata Model, the Self-learning Algorithms for detection & evaluation of metadata quality, Peer-to-Peer specific aspects and guidelines concerning the visual representation of Metadata quality (UI). The document also contains a set of possible usage scenarios that could be

realised based on the work of WP4.4.

D4.4.3 has been delivered to the commission in month 24.

Significant results

As part of D4.4.2 and D4.4.3 the following results were produced:

Two approaches were combined for detecting and handling high quality metadata and spam metadata. Both solutions are based on self-learning algorithms - analogous to email-junk filters – allowing for a classification, respectively prediction of the quality of each metadata record. The solutions presented are generic and based also on preceding work within this work package, namely the generic metadata model (D4.4.1). Thanks to the generic approach by deploying self-learning algorithms in conjunction with features, a high degree of flexibility has been achieved, allowing for alteration of functionality and identification of use-cases on application layers chosen at later stages within the project - following the QLectives concept of several empirical cycles during the project period.

The first part of our solution consists of the algorithms managing static metadata. This approach is particularly targeted on initial (static) metadata, which has not been (or never will be) changed since its first publication. The second part of our solution concerns the handling of dynamic metadata, by evaluating modifications on and different versions of metadata, especially to detect malicious, destructive editions by users.

The detection and handling of HQ metadata and spam metadata are crucial for high quality search results. The implementation/ integration guidelines are one move forward to such a high quality P2P-system. These have been presented (D4.4.3) depicting how the results of the preceding work of WP4.4 can be realised in the QMedia client application. The guidelines cover specific aspects of the complete metadata integration and implementation effort - starting with the Generic Metadata Model, followed by the Self-learning Algorithms for detection & evaluation of metadata quality, afterwards taking into account Peer-to-Peer specific aspects, and finally the visual representation of Metadata quality (UI). Also, a set of possible usage scenarios that could be realised based upon the work of WP4.4 have been sketched out.

Publications

D4.4.2 Algorithms for detecting and handling High Quality MetaData (HQ-MD) and spam metadata

D4.4.3 Implementation / integration guidelines for HQ-MD in QMedia v2

4 Deliverable and milestone tables

The following table lists the deliverables which have been delivered during the second twelve months of the project.

Del. No.	Deliverable name	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I	Delivered (yes/no)	Actual/ delivery date (month)
D1.3.2	Social quality selection in science and media	UF	R	PU	24	Yes	24
D2.1.2	Fundamental algorithms for sustaining cooperation in realistic environments	TUD	R	PU	24	Yes	24
D3.1.1	Techno-social "living-archive" with massive datasets from living labs and other sources	ETH Zurich	R+O	PU	18	Yes	18
D4.1.2	QLectives platform v2	TUD	P	PU	24	Yes	24
D4.2.2	QScience v2 (Web2.0)	UF	P	PU	24	Yes	24
D4.3.2	QMedia v2	TUD	P	PU	24	Yes	24
D4.4.2	Algorithms for detecting and handling High Quality MetaData (HQ-MD) and spam metadata	IRT	R	PU	18	Yes	18
D4.4.3	Implementation / integration guidelines for HQ-MD in QMedia v2	IRT	R+P	PU	24	Yes	24
D5.4	Report on dissemination activities	UniS	R	PU	24	Yes	24
D6.2	Annual report	UniS	R	PU	24	Yes	24

Table 1: Deliverables

The following table lists the milestones which have been delivered during the second twelve months of the project.

Milestone	Milestone name	WP number	Lead beneficiary	Delivery date from Annex 1	Achieved (Yes/No)	Actual achievement date
M4	Completion of data collection (batch 1)	WP3.1, WP4.2, WP4.3	ETH Zurich	18	Yes	31.08.2010
M4.1	Viability, design and trial for P2P QScience alpha version	WP4.2	TUD	20	Yes	31.10.2010
M5	Completion of data processing and analysis (batch 1)	WP3.2, WP3.3	CNRS	21	Yes	30.11.2010
M6	Theory and algorithm reformulation (batch 1)	All WP's in Stream 1 and 2	UniS	24	Yes	28.02.2010

Table 2: Milestones