STREAMS

Solutions for Peer-to-Peer Real-Time Social Web
(2010–2013)

Kick-off Meeting, November 29-30th, 2010

Overview
Solutions for Peer-to-Peer Real-Time Social Web

Real-time

- real-time editing (Etherpad, Google Wave, etc.)
- real-time propagation (Twitter, Google Buzz, etc.)

Social web

- social networks (Facebook, Flickr, etc.)
- collaborative systems (git, etc.)

Peer-to-peer Motivations

- No more central authority (trust/privacy),
- Sharing of cost (community hosting),
- Scalability, robustness, reliability, availability, etc.

Participants

- SCORE team, University of Nancy, LORIA
- REGAL project-team, INRIA Paris - Rocquecourt, LIP6
- CASSIS project-team, INRIA Nancy - Grand Est, LORIA
- ASAP project-team, University of Rennes 1, IRISA
- XWiki SAS
- GDD team, Université de Nantes, LINA

Project Coordination [Task 1]
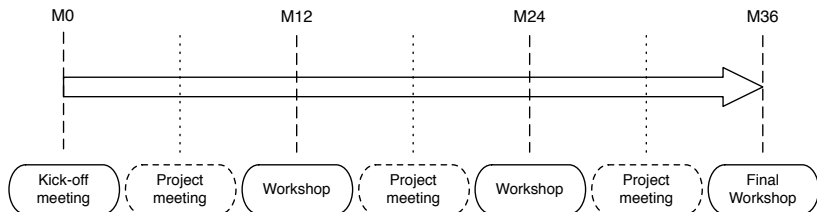Goals and Objectives

Steering committee:

- Gérald Oster (SCORE)
- Marc Shapiro (REGAL)
- Achour Mostéfaoui (ASAP)
- Michaël Rusinowtich (CASSIS)
- Fabio Mancinelli (XWIKI)

Goals:

- technical coordination
- supervision of administrative progress
- review and assessment of produced deliverables

Project Coordination [Task 1]
Work Plan

Deliverables

D1.1	*Kick-off meeting*	M0 ✓
D1.2	*Website*	M3 ✓
D1.3	*Consortium agreement*	M12
D1.4	*First workshop*	M12
D1.5	*Second workshop*	M24
D1.6	*Final open workshop*	M36

Requirements & Infrastructure [Task 2]
Goals and Objectives

Collect:

- user requirements (scenario, execution traces)
- technical requirements (theoretical and technical constraints)

Definition of suitable peer-to-peer infrastructure for:

- large-scale,
- real-time,
- social,
- web applications.

Requirements & Infrastructure [Task 2]
Issues, Investigations, Ideas, etc.

Requirements

- Instrument XWiki platform
- Collect traces (common traces format/store)

Architecture

Push vs. Pull

- Pull is the basic principle of the (current) Web
- Push is faster but more expensive

Push/Pull on peer-to-peer

- Hub on top of structured network?
- Gossip-based solutions?
- Social network graph as an peer-to-peer overlay?

Requirements & Infrastructure [Task 2]
Work Plan

Involvement

Asap (leader)	Score	Regal	Cassis	XWiki
18 p x m	12 p x m	0 p x m	6 p x m	9 p x m

Deliverables

D2.1	*Requirements for peer-to-peer real-time social applications*	M12
D2.2	*Peer-to-peer socially-aware network architecture and real-time gossiping protocols*	M18

Efficient Replication & Consistency Maintenance [Task 3]
Goals and Objectives

Design suitable and efficient replication/consistency
maintenance algorithms for:

- real-time collaboration
- peer-to-peer constraints

Comparison of:

- Operational transformation approaches (OT)
- Commutative replicated data types (CRDT)

Extension to support:

- real-time (fine grained editing)
- structured data

Efficient Replication & Consistency Maintenance [Task 3]
Issues, Investigations, Ideas, etc.

Granularity

- Comparison of OT/CRDT approaches
- Dynamic granularity (multi-grained algorithms)

Structured data

- Constraints/Invariant

Conflicts

Telex

- Study suitability
- Might be used as a common framework.

Efficient Replication & Consistency Maintenance [Task 3]
Work Plan

Involvement

Score (leader)	Regal	Asap	Cassis	XWiki
22 p x m	6 p x m	14 p x m	8 p x m	2 p x m

Deliverables

D3.1	*Design of real-time consistency maintenance algorithms and adaptation of Telex for real-time*	M20
D3.2	*Study of conflicts and design of novel algorithms for structured data*	M32

Security & Privacy [Task 4]
Goals and Objectives

- Design optimistic access control mechanism:
  Balance collaboration/access control to shared objects:
  - Making shared objects available to all who need them
  - Ensure availability only to users with proper autorisation
- Design usage control mechanism:
  Analyse violation of data privacy due to data disclosure to
  malicious peers

Security & Privacy [Task 4]
Issues, Investigations, Ideas, etc.

Optimistic access control

- How can data be securely replicated between users to avoid information leakage?
- Suitability of this kind of access control method

Usage control

- Audit-based compliance control where obligations are checked a-posteriori
- Trust management mechanisms

Common work

- Formalising the two approaches (interaction with task 3)
- Testing/Evaluating using peer-to-peer simulators
- Combining proposed solutions

Security & Privacy [Task 4]
Work Plan

Involvement

Cassis (leader)	Score	Regal	Asap	XWiki
29 p x m	19 p x m	0 p x m	0 p x m	2 p x m

Deliverables

D4.1	*Access control specification, design and prototype*	M24
D4.2	*Usage control specification, design and prototype*	M24
D4.3	*Combination of access and usage control solutions*	M32

Experimentations & Performance Analysis [Task 5]
Goals and Objectives

Theoretical evaluations:

- space and time complexity
- communication complexity

Practical evaluations:

- simulation (Grid'5000, PeerSim, etc.)
- against real traces (XWiki and other collaborative applications)

Experimentations & Performance Analysis [Task 5]
Issues, Investigations, Ideas, etc.

Design and collection of traces

- No real-time editing traces exist
- No concurrent editing traces available
- What about traces for access/usage control?
- What about other real-time applications?

Experimentations, simulations

- Common framework for OT/CRDT/...

Experimentations & Performance Analysis [Task 5]
Work Plan

Involvement

XWiki (leader)	Score	Regal	Asap	Cassis
15 p x m	14 p x m	8 p x m	8 p x m	8 p x m

Deliverables

D5.1	*Theoretical evaluation results of proposed solutions*	M24
D5.2	*Practical experimentation results of proposed solutions*	M32
D5.3	*Practical experimentation results of the integrated solution*	M36

Related Projects
Potential synergies

ConcoRDanT project (ANR)

Coordinator: Marc Shapiro

`http://concordant.lip6.fr/`

Kolflow project (ANR)

Coordinator: Pascal Molli

Gossple project (ERC Grant)

Principal Investigator: Anne-Marie Kermarrec

`http://www.gossple.fr/`

Wiki3.0

`http://wiki30.xwikisas.com/`

Summary
Discussions

- Innovative but very risky project (as mentioned by ANR)
- Lot of potential synergies with other projects
- Open question:
    - any applications? any demonstrators?