

# Minutes of PetaMedia SIG1 “Content Distribution” meeting, September 19<sup>th</sup> 2008

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## Participants

Name	Affiliation	Email	SIGs of interest	Main research activity
Touradj Ebrahimi	Ecole Polytechnique Federale de Lausanne (EPFL), MultiMedia Signal Processing Group (MMSPG) CH	Touradj.ebrahimi@epfl.ch	SIG1-2-3-4	Multimedia Signal Processing
Naeem Ramzan	Queen Mary University of London (QMUL), GB	naeem.ramzan@elec.qmul.ac.uk	SIG1	Scalable Video Coding (SVC)
Sebastian Schmiedeke	TU Berlin (TUB), Communication Systems Group, DE	schmiedeke@nue.tu-berlin.de	Personally involved in SIG2, but participating to SIG1 meeting as representative of Engin Kurutepe	Video streaming
Francesca De Simone	Ecole Polytechnique Federale de Lausanne (EPFL), MultiMedia Signal Processing Group (MMSPG) CH	Francesca.desimone@epfl.ch	SIG1-3	Quality of Experience
Frederic Dufaux	Ecole Polytechnique Federale de Lausanne (EPFL), MultiMedia Signal Processing Group (MMSPG) CH	Frederic.dufaux@epfl.ch	SIG1-2-3-4	Multimedia Signal Processing

Jong-Seok Lee	Ecole Polytechnique Federale de Lausanne (EPFL), MultiMedia Signal Processing Group (MMSPG) CH	jong-seok.lee@epfl.ch	SIG1-2-3-4	Multimedia Signal Processing
Marija Uscumlic	Ecole Polytechnique Federale de Lausanne (EPFL), MultiMedia Signal Processing Group (MMSPG) CH	marija.uscumlic@epfl.ch	SIG2-3-4	Multimedia content annotation
Inald Lagendijk	TU Delft (TUD), NL	R.L.Lagendijk@tudelft.nl	SIG1-2-3-4	Signal Processing
Zhije Zhao	Leibniz University Hannover(LUH), DE	zhao@tnt.uni-hannover.de	SIG1	Scalable video coding (SVC)
Laura Elena Raileanu	University of Applied Sciences of Western Switzerland, CH	Laura.Raileanu@heig-vd.ch	SIG2-4	Data mining
Stephane Marchand-Maillet	University of Geneva (UniGE), Viper group, CH	marchand@cui.unige.ch	SIG1-2-3-4	Multimedia information retrieval

### Opening (9:30- 10:14)

- The meeting started with opening talk by Dr. Lee (EPFL) to introduce the proposed agenda and provide an overview of the structure and objectives of the PetaMedia (PEer-to-peer TAGged MEDIA) Network of Excellence and its four Special Interest Groups (SIGs). In particular, this meeting focused on the work planning of SIG1, which refers to the Content Distribution Systems in social/P2P networks and clusters 4 main research topics:
  - secure distribution of contents
  - content adaptation and scalability
  - Quality of Experience
  - resource management and semantic grouping

Dr. Lee also provided an overview of the agenda of the recently organized and upcoming SIGs meetings and next plenary meeting:

- SIG3 (Indexing): 4 September (London)
- SIG1 (Content Distribution): 19 September (Lausanne)
- SIG4 (Social Content Retrieval): 23 September (Delft)
- SIG2 (Processing): 8 October (Berlin)
- Plenary meeting: 20-21 October (Berlin)

- After this general introduction, Prof. Ebrahimi (EPFL) and Prof. Lagendijk (TUD) proposed to plan the outcome of SIG1 meeting as follow:
  - o presentations shown during the meeting will be stored on EPFL wiki until PetaMedia wiki will be on, in order to be shared with all the interested PetaMedia partners.
  - o meeting minutes will circulate through the mailing list first to attendees for comments and updates and then to all members of Petamedia.
  - o a research plan will be identified by defining one or more Mini-Projects (MP) in order to build networking and define concrete goals of the SIG.
  - o feedbacks will be brought to PetaMedia regarding clear identification of:
    - eventual need for expertise not present in the SIG, through proposal of ad-hoc partners.
    - inter-relations and connections of SIG1 with other SIGs, which is not present yet.
- Presentation of participants (affiliated and core partners):

Prof. Inald Lagendijk (TUD, PetaMedia): network coordinator

Prof. Stephane Marchand-Maillet (Viper, UniGE - affiliated member of PetaMedia, member of IM2 Swiss national network): main research expertise in multimedia information retrieval; interested in the activity of SIG1-2-3-4.

PhD student Marija Uscumlic (EPFL – core member of PetaMedia and IM2): main research expertise in multimedia content annotation; interested in the activity of SIG2-3-4.

PhD student Francesca De Simone (EPFL– core member of PetaMedia and IM2): main research expertise in Quality of Experience; interested in the activity of SIG1-3.

Prof. Touradj Ebrahimi (EPFL – core member of PetaMedia and IM2), Petamedia Swiss network coordinator and deputy director of IM2

Dr. Frederic Dufaux (EPFL – core member of PetaMedia and IM2), Petamedia Swiss network member and senior researcher at Multimedia Signal Processing Group

Prof. Laura Elena Raileanu (University of Applied Sciences of Western Switzerland, external participant interested in opportunity of collaboration with SIG2-4 in a project dedicated to “use of data mining to better exploit interaction user-tags-resources”): main research expertise in data mining; interested in the activity of SIG2-4.

Dr. Naeem Ramzan (QMUL, core member of PetaMedia): main research expertise in scalable video coding and its applications; interested in the activity of SIG1.

PhD student Sebastian Schmiedeke (TUB - core member of PetaMedia): personally involved in the activity of SIG2 (video scene classification) but here as representative of TUB interests in SG1 and TUB expertise in video streaming over P2P network.

PhD student Zhijie Zhao (LUH - affiliated partner of PetaMedia): main research expertise in scalable video coding; interested in the activity of SIG1.

### **Coffee break (10:15- 10:50)**

### **Presentations and discussion (10:50-13:30)**

Short presentations were shown by some of the participants in order to present their research activities and identify common interests and possible cooperations within the PetaMedia NoE (not only within SIG1 but also in other SIGs of the network):

- **Stephane Marchand-Maillet (UniGE):** the main research topics of the Viper Group are: multimedia content (i.e. textual, visual and audio content) processing and characterization, with

particular attention to the multi-modal fusion modelling; information indexing and retrieval; content description, with an interest in collaborative content enrichment which could be a strong linking topic with some of the activities carried out within the PetaMedia NoE. The Viper Group is coordinating the IM2.MCA (Multimodal Content Abstraction) Swiss national Network of Excellence. The main objective of IM2.MCA is the fully automatic or computer-aided manual enrichment of multimedia documents, like registrations of meetings, with multimodal metadata. Mining, indexing, retrieval, and management of this content (meeting data: video, documents, audio) based on the analysis of human-to-human communication, are also research challenges of IM2.MCA.

What can PetaMedia bring to IM2.MCA and vice versa? Since PetaMedia has access to a real P2P network and social community (i.e. Tribler), sharing with IM2.MCA the users' and network data collected through the real network would be very useful. The analysis of data usage and users' interactions in the real scenario could be used to study and develop innovative approaches for semantic information distribution. The Viper group is working on latent-based propagation models for spreading of annotations based on data-user interaction study. Up to now, artificial data has been used for this study, but the model could be improved and enriched having access to real data.

Discussion:

- Dr. Lee asked information upon the database used for Viper's study.

Answer: The group has developed a research demo, but does not have access to real distributed data. Having access to "flicker-like data" (i.e. PetaMedia Tribler data) could be very useful. Also, having access to additional information describing the data-user interaction, like those related to the Quality of Experience, could be interesting.

- Prof. Ebrahimi underlined connections with the research interests of some PhD students of MMSG at EPFL on: image/video duplicate detection and object duplicate detection (PhD student Peter Vajda); multimedia content annotation and extraction of semantic parts like image Region of Interest extraction (PhD student Marija Uscumlic).
- Prof. Marchand-Maillet explained that a connection between the Viper group and the "P2P component" of PetaMedia (Tribler) already started, and a concrete interaction with Tribler can happen by inserting prototypes in Tribler, assuming that robust code is provided to them. A discussion started upon the need for academic partners with expertise in P2P to be involved in PetaMedia. Prof. Marchand-Maillet suggested some groups with this expertise: Prof. Andreas Henrich (<http://www.uni-bamberg.de/minf/team/henrich/>) and Dr. Wolfgang Müller (<http://www.uni-bamberg.de/?id=5904>; [http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/m/M=uuml=ller\\_0002:Wolfgang.html](http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/m/M=uuml=ller_0002:Wolfgang.html)), University of Bamberg, Germany. Prof. Lagendijk suggested to establish contact with the European network "P2Pnext" in order to identify how they can take benefit from PetaMedia and vice versa.

➔ **Action Point:** The network needs academic partners with expertise in P2P. A P2P workshop (“P2P in distribution and P2P in indexing”) will be organized by SIG1 at Petamedia General Meeting in Berlin, involving people from the European network P2Pnext.

- **Francesca De Simone (EPFL):** Francesca presented an overview of her work on objective visual Quality Assessment (QA) related to: rate-distortion performance evaluation of still pictures coding algorithms by mean of objective quality metrics which have access to both the original and the compressed signal (i.e. Full-Reference quality metrics); development of an objective metric for the QA of color pictures; development of an objective metric for the real time QA of video sequences in videoconferencing scenario (i.e. No-Reference metric, because there is no access to the original signal). Her future research will involve the study of models for the audio-visual objective QA. The connection with the activities of SIG1 is clear, in terms of automatic objective evaluation of visual and audio-visual quality and optimal allocation of resources in P2P environment.

Discussion:

- Prof. Lagendijk and Prof. Marchand-Maillet underlined possible connections of this research with other SIGs of PetaMedia (i.e. SIG3), based on the idea of using quality tags and quality metric for content classification, indexing, retrieval, etc. Another interesting point of connection with the activity of SIG3 could be in the implicit collection and study of subjective QoE perception from the analysis of user-content interaction.
- **Sebastian Schmiedeke (TUB):** Sebastian presented a general overview of the activities carried out at TUB in the PetaMedia framework (sprite coding for video; multiple-description coding of speech; video summarization; camera motion characterization; automated segmentation; 2D to 3D conversion; text detection and recognition on video; video scene classification; usability test of tagging tools; image search engine; spam detection in social bookmarking systems). Then he presented Engin Kurutepe’s work at TUB on streaming of multi-view video over P2P networks with low start-up delay. The proposed network protocol and topology have been described and results showing the network performance have been presented.

Discussion:

- Prof. Lagendijk underlined that an interesting application of this work could be in investigating how this P2P network structure can help in building a social collaborative network.
- Prof. Ebrahimi emphasized the connection between this research and the research on Quality of Service system on P2P network.
- **Zhijie Zhao (LUH):** Zhijie presented an overview of Ms. Nguyen’s work at LUH on robust video streaming system using H264/Scalable Video Coding. The proposed SVC streaming system includes a low complexity error concealment strategy, an adaptive error protection method and available bandwidth estimation and is suitable for providing video streaming services to users with different display sizes and different available bandwidths.

Discussion:

- Prof. Ebrahimi underlined the connection between this work, the one of TUB, and EPFL research on Quality Assessment is clear. Prof. Lagendijk emphasized as the critical need is to identify a strong connection between this field of interest and the other SIGs of PetaMedia. Dr. Ramzan proposed the idea of linking the content scalability to the presence of tags: since fast preview of multimedia content are usually needed in the P2P scenario, apart from video summarization techniques, tag-driven scalability methods could be investigated.
- Prof. Lagendijk raised another challenge related to SIG1 work, concerning multimedia content allocation in the P2P network: assuming that the content is not completely distributed in the network, where is this content stored?
- **Dr. Naeem Ramzan (QMUL):** Dr. Ramzan presented the research of the MultiMedia and Vision research group (MMV) on Scalable Video Coding (SVC). The proposed method is a content-driven SVC with flexible architecture. Performance results of the proposed approach for surveillance application have been shown.

Discussion:

- Prof. Ebrahimi underlined again the existence of clear connection between this work and previous presentations: synergy between QMUL (scalability), TUB (P2P network capacity issues), LUH (error concealment), EPFL (QoE), and P2P community (Tribler people and P2Pnext) needs to be organized so that a concrete plan for collaboration is presented at the upcoming plenary meeting in TUB and first research results can be produced by February 2009 in time for the first annual review of the project.

### **Conclusive discussion (14:00-14:40)**

Prof. Ebrahimi led the conclusive discussion which aimed at summarizing, as SGI1 activities, the action points identified during the session of presentations:

- **ACTIVITY1:** one Mini Project (MP) on “Video Streaming over P2P network” has been identified. This is a research activity with limited duration (19<sup>th</sup> September 2008 – 28<sup>th</sup> February 2009) involving several partners (QMUL - contact person: Dr. Ramzan; TUB - contact person: Engin Kurutepe; LUH – contact person: Zhijie Zhao; EPFL – contact person: Francesca De Simone; TUD/P2Pnext – contact person: Pouwelse). Starting from the idea of using Tribler as main platform, objectives of this MP are:
  - the identification of an innovative and solid content distribution system, including features of scalability, error resiliency, and strategies for streaming optimization and QoS monitoring. In close contact with the “P2Pnext” experts, the goal of this MP is to find the most suitable video format for P2P streaming by analyzing and comparing the performance of different solutions, as:
    - Scalable coding (expertise in QMUL and LUH)
    - Multiple description coding (is there such expertise in PetaMedia?)
    - Codec-independent scalable coding (expertise in EPFL)

- the definition of benchmark data to test the performance of the proposed approach and prove its efficiency;
- the creation of a dataset of multimedia content to test the system;
- the identification of committed partners and clear definition of their roles.

Precise milestones and deliverables deadlines will be identified and presented at the next general meeting in TUB. The committed partners will start the discussion via email exchanges in order to produce a document with the complete plan of the MP to be presented at the next general meeting in TUB.

Responsible: Dr. Naeem Ramzan, QMUL (to be confirmed)

- ACTIVITY 2: SIG1 will organize a workshop on P2P distribution and indexing.

Responsible: Engin Kurutepe, TUB

- ACTIVITY 3: SIG1 will produce a white paper on the role of Content Distribution in PetaMedia in order to identify strong connections with the other SIGs. In particular two main topics will be discussed:

- Tag-driven scalability and quality
- What is the need in the P2P scenario? Where is the content? Are the resources centralized or distributed?

Responsible: Dr. Jong-Seok Lee, EPFL