Based on previous work, like the event-based data model and the research report on sentiment propagation, the TU Berlin has developed a toolset for the automatic analysis of sentiment propagation in online social networks. This detection system for dissemination patterns can be used to analyze social networks regarding the presence and dissemination of sentiments or emotions. The tool incorporates a selection of custom network metrics and is characterized by a high degree of flexibility in terms of supported data types, applicable analysis filters and the definition of different sentiment types.

**GEMIUS SA Online Research Agency**

A sentiment detection tool, originally developed for the English language, was adapted for the Polish language by Gemius SA. The tool was used to classify 10 million tweets from Polish Twitter from the year 2012. Performanced analyses covered relations between sentiment and weather, day of the week and time of day. Important sport events have been also reflected by sentiment changes in the studied data set. Segmentation of Twitter users by their dominating sentiment has revealed a significant shift towards positive emotions.

**CYBEREMOTIONS Consortium**

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More information at www.cyberemotions.eu

**Collective Emotions in Cyberspace**

EU FP7 funded IP project, Grant agreement no. 231323

CYBEREMOTIONS was an EU Large Scale Integrating Project in the 7th Framework Programme in the FET ICT domain, Theme 3 Science of complex systems for socially intelligent ICT. The Project started in January 2009 and ended in May 2013. It involved nearly 40 scientists from Austria, Germany, Great Britain, Poland, Slovenia, and Switzerland.

"No need to get emotional about it" is a response often heard when trying to calm someone down. But the fact is, we do need to get emotional. Emotions are the backbone of social life; they enable us to react quickly in dangerous situations; they create the group experience of a football crowd, a pop concert, or a historical event. Emotions are part of the human experience.

With information technology occupying such a central part in all our lives, it is important to ask whether there are emotions in cyberspace too. Since cyberspace is just another human space, it is bound to have an emotional context. However, it possesses special features that make social interactions between people different from those taking place in the offline world.

The main objectives of CYBEREMOTIONS were to understand the role of collective emotions in creating, forming and breaking up of ICT mediated communities and to prepare the background for next generations of emotionally-intelligent ICT services. Project Partners collected large amounts of data on emotions in e-communities as well as behavioral and psychophysiological data on emotions evoked by on-line discussions, developed data-driven models of cyberemotions, and created emotion-detection and -expression related software.

CYBEREMOTIONS succeeded in all domains of its activity. Data collected in the Project from blogs, forums, portals, IRC, channels, Twitter, and MySpace are ranked among “the 70 Online Databases that Define Our Planet”. Also several experimental setups provided a microscopic view on affective processes associated with reading and writing contents on the Internet giving clues as to how emotions propagate. Our SentiStrength program is considered one of the most advanced tools in sentiment detection. Theoretical models based on an active agents approach, complex networks and stochastic processes are able to describe several phenomena of emotional dynamics in social groups, communicating via the Internet. Outputs of the project can be used for creating new affective dialog systems as interactive tools, as well as semi-automated simulations of facial expression via a user’s 3D avatar that can facilitate the process of the online affective communication. The project delivered network visualization tools for effective demonstrations of emotional contagion processes in social networks. And last but not least, our industrial partner provided diverse opportunities of business commercialization.

This leaflet presents selected project results from its fourth and final year. More detailed information about the project’s activity can be found at http://www.cyberemotions.eu
**WP1 Warsaw University of Technology**

Emotional Phase Transitions

WUT aimed at the creation of physically-embedded microscopic laws of users’ behaviors during emotional online discussions. Our approach enabled the design of data-driven simple models where dynamics imitates observed facts. We have shown that an emotional discussion can follow different scenarios, such as equilibration of emotional probabilities (Fig. a), due to entropy growth or appearance of a stable homogeneous phase as a result of attractive affects (Fig. b).

![Graphs a and b](image)

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**WP2 Ecole Polytechnique Fédérale de Lausanne**

Virtual Reality

The immersive crowd visualization software can manage the real time animation of the 3D chat system across platforms through the integration with UNITY 3D. A new linear model of facial expression has been proposed to map a VAD emotional state into the activation of 12 antagonist Action Units (based on the Facial Action Coding System). The model can also be exploited to deliver asymmetric facial expression for conveying some complex emotional feelings (conflicting and/or hidden emotions due to social conventions). An experiment has been conducted (Fig.) to assess its potential for both basic and complex emotions.

![Image](image)

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**WP3 University of Wolverhampton**

Cyberemetrics and Sentiments Analysis

During the project, the Wolverhampton team collected social web data and developed and evaluated a range of sentiment analysis programs for different types of sentiment analysis. These programs read social web texts or product reviews and estimate the strength or polarity of any sentiments expressed in them. The team has sold copies of one of its programs, SentiStrength, to users from three continents, with its largest user being Yahoo!. SentiStrength was also used as part of a project to light up the Olympics with Sentiment displays on the London Eye.

![Image](image)

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**WP4 Austrian Research Institute for AI**

Affective Dialog System

The affective dialog system was developed and applied for studying emotions and social processes in natural language based online communication. A series of experiments demonstrated its capability to conduct realistic and enjoyable dialogs comparable to a human and to establish an emotional connection with users in short interactions. Users’ ratings of the system and the influence of interactions on users’ self-reported emotional states confirmed with the applied affective profile, i.e.: positive, negative and neutral. The analyses of interaction patterns demonstrated an ability to realize fine-grained communication scenarios such as social sharing of emotions.

![Image](image)

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**WP5 ETH Zurich**

Agent Based Models of Emotions

The models developed in the CYBEREMOTIONS project are integrated within a modeling framework for collective emotions. This framework allows the comparison of the results found in different online communities, and provides a connection to support these models with psychological experiments. We applied this framework to the analysis of Open Source Software communities, finding collective emotional events that motivate users to leave the community. This analysis shows how a collective emotions can help but also threaten collaboration in online communities.

![Image](image)

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**WP6 Jozef Stefan Institute**

Complex Networks Approach to Techno-Social Interactions

Self-organized dynamics in online chats led to user associations that persist for a long time, making a variety of online social network. Chat Bots interacting with users can utilize the network and the fractal nature of processes to propagate positive/negative emotion messages and polarize channel mood, agent-based modeling reveals.

![Image](image)

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**WP7 Jacobs University Bremen**

Emotional Reaction and Interaction Assessment

Jacobs University has collected a large corpus of subjective, behavioural, and physiological data from over 300 participants across multiple laboratory studies. We investigated online emotions in the context of reading and writing about emotional contents as well as interacting online dyads, and finally multi-user interactions involving actively participating artificial chat systems developed at OFAI. Our findings support the notion that emotions can travel from person to person and seem to be moderated by psychological constructs, such as relevance or social relationships, but they do not depend on them.