DANAE
(Dynamic and Distributed Adaptation of scalable multimedia content in a context-Aware Environment)

http://danae.rd.francetelecom.com/

Project reference : IST-1-507113
Contract type : STREP
Start date : 1/01/2004
End date : 31/06/2006
Project duration : 30 months
Total budget : 7.9M€ (including partners’ contributions)
Action lines : Networked Audiovisual Systems and home platforms

Project Co-ordinator : Mr. Alexandre Cotarmanac’h
France Telecom R&D
38-40 rue du Général Leclerc
92794 Issy les Moulineaux CEDEX 9
FRANCE
Tel : +33 (0)1 45 29 89 95
Tel : +33 (0)6 74 83 87 77
Fax : +33(0)1 45 29 45 37
alexandre.cotarmanach@francetelecom.com

Number of partners : 11

Main objectives :

DANAE proposes to address the dynamic and distributed adaptation of scalable multimedia content in a context aware environment.

The objectives of DANAE are to specify, develop, integrate and validate in a realistic testbed a complete framework (with servers, network devices and terminals) for context-aware, dynamic and flexible media adaptation, delivery and consumption, able to provide end-to-end quality of multimedia service at a minimal cost to the end-user. An application will be specifically developed and implemented on a demonstrator, to illustrate the pioneering service concepts and features made possible by the Project.

The work will cover: (i) the definition of scalable media formats with their associated meta-data which provide, among others, information on coding, online processing, intuitive content access, etc., (ii) the adaptation of scalable media resources to the session context in a framework supporting dynamic and distributed adaptations, as well as global optimization of fully featured multimedia scenes comprising multiple resource types, i.e. not only single media adaptation as is presently the case, but fully featured multimedia scene adaptation through global optimization of audio, video, 2D graphics, 2D/3D virtual characters all together and (iii) the transport and delivery of multimedia content to the end-user. The specific constraints introduced by the multiplicity of networks and terminals that may be involved in a communication session will be considered for the design of error resilient and efficient coding schemes. Efficiency is meant in terms of both bitrate and required processing power in the player. The inter-relationship of content adaptation and scalability with Digital Rights Management (DRM) and charging issues – namely Service Tracking – will also be explored.
To these ends, the project will focus on two technical areas with, in each, a limited set of key objectives:

1. **Advanced MPEG-21 Chain:**
   - Development of an advanced MPEG-21 architecture focusing on end-to-end QoS support, personalization and DIA (Digital Item Adaptation) as well as DIP (Digital Item Processing);
   - Development of context-aware, dynamic and distributed service adaptation schemes and techniques;
   - Integration of features and tools available from MPEG-4 and MPEG-7 into the currently developed MPEG-21 framework;
   - Implementation of MPEG-21 peers:
     - Implementation of MPEG-21 server,
     - Implementation of MPEG-21 client,
     - Implementation of MPEG-21 proxy.

2. **MPEG Scalable Codecs with emphasis on Video:**
   - Development and contribution to standardization of a compression-efficient wavelet-based scalable video codec amenable to fine granular stream adaptation in resolution and quality;
   - Development of error resilience mechanisms applicable to various types of media;
   - Development of enhancements to existing audio, 2D graphics and 2D/3D virtual characters, in terms of adaptability to session context.

Development of media-specific adaptation tools and integration of codecs in the MPEG-21 chain.

**Technical approach:**

After specification and development of the key building blocks and implementing the novel concepts and technical features, all individual developments will be integrated, tested and technically validated in a centralized end-to-end test-bed. Potential new business models will be analyzed that would allow assessment of the commercial viability of the new services. In parallel develop an application heavily drawing on the new technical possibilities opened by DANAE will be developed. This application will be integrated in the value chain and used to demonstrate the new technical features and service concepts.

**Key issues:**

- Scalability
- Adaptation (Dynamic and Distributed)
- QoS
- Error-resilience
- Context-Awareness

**Expected impact:**

The technology development proposed in DANAE will enable the advent of a new class of interactive audiovisual services which will help in optimizing the overall end-user experience by providing the best service quality for a given context. In addition to increased end-user QoS, content and service providers will also benefit from reduced cost in providing the service: Instead of generating the content multiple times to match the requirements of different networks, terminals and user preferences, content only has to be produced once and can be adapted to the needs of the single use.

Being based on open international standards such services can interoperate with 3rd parties’ standard-compliant solutions. In this sense the results of the DANAE project are expected to have a ripple effect encouraging innovative services throughout and for the European market.

DANAE will be an outstanding opportunity for Europe to regroup and coordinate the efforts of major European contributors to the MPEG 21 & MPEG-21 video and audio standardization activities. The Project will thus foster the consolidation of the leading role Europe and project partners have achieved in the aforementioned standards bodies.