



PROJECT RESULTS

Advancing European digital cinema



Digital production and projection

Within a few years digital cinema will be available throughout Europe. Images will be digitally projected onto cinema screens rather than via celluloid prints. With digital, films can be securely distributed via satellite, broadband network, disk or tape. The cinema of tomorrow will evolve into a multi-media entertainment centre with new options for live events, advertising, business presentations and interactivity.

Going digital

Faced with a combination of market factors including the poor financial performance of cinemas, saturation of domestic markets, the high cost of international expansion and increased importance of the international box office, Hollywood has finally accepted the concept of digital cinema. Digital distribution and display of feature films is now widely regarded as inevitable and work to define digital production, distribution and display standards has started. The US movie industry is forming commercial alliances to tackle this issue and several study groups are already working on global standards for digital transmission and display. Similar partnerships are essential in Europe.

Benefits for production, distribution and cinemas

Although the USA dominates digital cinema today, the concept has enormous potential benefits for the European film industry, which can be strengthened against greatly increased global competition by:

- Increasing the number of European films made, significantly reducing costs and speeding up time-to-market.
- Widening the market for European films through distribution of multi-lingual versions.
- Significantly reducing multiplication and distribution cost, thus also enabling wider distribution of independent film productions (e.g. in small, 50 to 150-seat community film theatres).
- Creating additional programming opportunities for cinemas (live events, business TV, sport and Internet) and greater scheduling flexibility.
- Offering customers 'premier' display quality, greater choice and extending the number of 'premier' screenings.

The results of the DIGITAL CINEMA project are securing Europe's competitive power in the following sectors:

- **Production:** providing an infrastructure for the transition from 35mm film to digital.
- **Theatres:** providing an integrated solution for introducing digital cinema
- **ICT:** providing a development platform for high-end projection systems, storage systems, compression technology, security and conditional access technology.
- **Film equipment manufacturers:** providing a platform for the transition to digital technology.

A complete digital cinema infrastructure

Within DIGITAL CINEMA, we have defined and developed a system

DIGITAL CINEMA (ITEA 00005)

Partners

Barco Digital Cinema
EVS Digital Cinema
Kinton
Octalis
Philips
Stage Accompany
Sublime Software
FilmLight
University of Derby

Countries involved

Belgium
Germany
Finland
The Netherlands
United Kingdom

Start of the project

June 2001

End of the project

July 2003



PROJECT RESULTS

solution covering all elements of film production, distribution, storage and replay including alternative uses for digital infrastructure.

We studied the complete digital cinema chain, including production, content mastering, colour-management, compression, data storage, security, multilingual sound, subtitling and alternative uses for digital theatres.

Some of the many results achieved in this project:

- We defined an architecture for a complete digital cinema infrastructure based on a network of MPEG-2 servers linked by satellite, IP network or physical distribution.
- All links are protected by appropriate encryption, and a system has been developed to securely distribute conditional access rights tailored to market requirements. With the ability to distribute the rights over the various stages of the chain (production → distribution → central server → play-out server).
- Subtitling was developed at the mastering stage and embedded real-time in the projector.
- For the mastering environment "True-Light" colour management was developed, enabling accurate previewing of digital images on a variety of display devices.
- Film scanning of up to 5k resolution using CCD line technology, suitable for archiving, digital cinema mastering and standard definition mastering was developed by one of our partners.
- Algorithms were developed to embed a watermark in the image during play-out, revealing the origin of unauthorised camcorder copies.
- We developed an additional content distribution mechanism, whereby each value-added data type (e.g. subtitling, advertisements, unique events) is automatically stored in and retrieved from specified databases that contain rights monitoring and billing systems.
- Several servers were specified e.g. the Alfa server for post production (encoding and packaging), the Delta server for distribution, the Solo server for single screen play out, the Plaza (central server) and Focus (play out server) for multiplex play out, and the Omega decoder for decryption, decompression, link encryption, subtitle overlay, audio and automation interfacing. For live event production, the VIVA server was developed, providing the real-time compression, encryption and packaging needed for streaming satellite distribution.
- In the area of Digital Projection and Image Quality Assessment several display and control attributes for the projectors were developed (e.g. built in auto-diagnostic features, an intuitive, touch-panel user interface, and PC control software).
- We merged content at the projector end and solved various localisation issues such as multilingual subtitle generation and multilingual user interfaces.
- For theatre management we established direct control of the projector from the server and created interfaces with theatre automation systems.
- A major achievement was the appointment of several project partners as chairs of the EDCF Technical Topic groups, which identify and categorise European requirements and provide input to the SMPTE DC28 Digital Cinema standardisation committees.

Major project outcomes

Dissemination

- 6 papers
- 31 presentations/demos at events

Exploitation

- 15 new products (1 for internal use, 1 license, 4 OEM, 1 Open Source)
- 3 new services (1 for internal use)
- 3 new systems

Standardisation

- 7 contributions to 4 different standards (AGE, IEEE, MPEG, SMPTE)

Patents

- 1 published
- 1 submitted

ITEA Office

Eindhoven University of Technology Campus Laplace Building 0.04 PO box 513 5600 MB Eindhoven The Netherlands

Tel : +31 40 247 5590
Fax : +31 40 247 5595
Email : itea@itea-office.org
Web : www.itea-office.org

ITEA - Information Technology for European Advancement - is an eight-year strategic pan-European programme for pre-competitive research and development in embedded and distributed software. Our work has major impact on government, academia and business.

ITEA was established in 1999 as a EUREKA strategic cluster programme. We support coordinated national funding submissions, providing the link between those who provide finance, technology and software engineering. We issue annual Calls for Projects, evaluate projects, and help bring research partners together. We are a prominent player in European software development with some 7,000 person-years of R&D invested in the programme so far.

ITEA-labelled projects build crucial middleware and prepare standards, laying the foundations for the next generation of products, systems, appliances and services. Our projects are industry-driven initiatives, involving complementary R&D from at least two companies in two countries. Our programme is open to partners from large industrial companies, small and medium-sized enterprises (SMEs) as well as public research institutes and universities.



Σ! 2023

October 2003