

FLORIDA

FLEXIBLES TEILAUTOMATISIERTES ANALYSE

SYSTEM ZUR AUSWERTUNG VON VIDEO-MASSENDATEN

Motivation

Basis

- ♦ Announcement: "Aspects and Counter-Terrorism Measures"
- ♦ Scenario "Fighting terrorism after an attack"
- ♦ Bilateral announcement: Germany / Austria

Starting Position

- ♦ Video data is becoming increasingly important for identifying individuals and for investigating crime
- ♦ Great increase in the number of public and private cameras
- ♦ Massively increasing volume of video data to be analyzed
- ♦ Toulouse and Montauban Case: 35 TB video data, 10,000h video footage
- ♦ Time pressure: Timely content evaluation of video mass data is of considerable importance

Project Goals

Simplifying the work of Investigators

- ♦ Development of a flexible, semi-automated video forensics system
- ♦ Supporting public safety and law enforcement authorities
 - Investigation
 - collection of evidence
 - clearance of cases involving terrorist attacks
- ♦ Application of advanced technologies
- ♦ Improve the efficiency and quality of work for investigators by simplifying
 - research
 - preparation
 - analysis

Consortia

Austrian Project Consortium

- ♦ AIT Austrian Institute of Technology GmbH
- ♦ Bundesministerium für Inneres (Bundespolizei)
- ♦ PKE Electronics AG
- ♦ Lqua - Linzer Institut für qualitative Analysen
- ♦ Research Institute AG & Co KG

German Project Consortium

- ♦ L-1 Identity Solutions AG
- ♦ Fraunhofer- IOSB
- ♦ Philipps-Universität Marburg
- ♦ Universität Konstanz
- ♦ Universität Kassel
- ♦ Universität Tübingen
- ♦ Progilan IT-Logistics GmbH
- ♦ Bundeskriminalamt
- ♦ Bundespolizei

Joint Project

Bilateral group Objective

- ♦ Implementation of legally compliant solutions (demonstrators) for
- Evaluation of video mass data to identify the identity of offenders
- Increase the effectiveness and efficiency of the evaluation

German Objective

- ♦ Focus: Analysis of video data, 3D crime scene reconstruction

Austrian Objective

- ♦ Focus: Evaluation of the audio channel of video data and work on interoperability

Artificial Intelligence

Detecting Objects in Video Frames

For generic object detection convolutional neural networks (CNNs) are used, whereas object detection is seen as a regression problem to spatially separate bounding boxes and associated class probabilities. The used algorithm provides a very general representation of objects because it uses a single neural network that predicts bounding boxes and class

Smart Detection Algorithms

probabilities directly from full images in one evaluation. Each object detection task can be executed in real-time.

Audio Event Detection

- ♦ Pre-selection of relevant videos
- ♦ Example: Terrorist attack with firearms
 - "start investigation with videos where shots are heard"
 - "jump to relevant section in video"

- ♦ Solution Developed
 - Recurrent Convolutional Neural Network
 - Learns temporal relations in audio data
 - Attention and Localisation Layer

Audio Similarity Retrieval

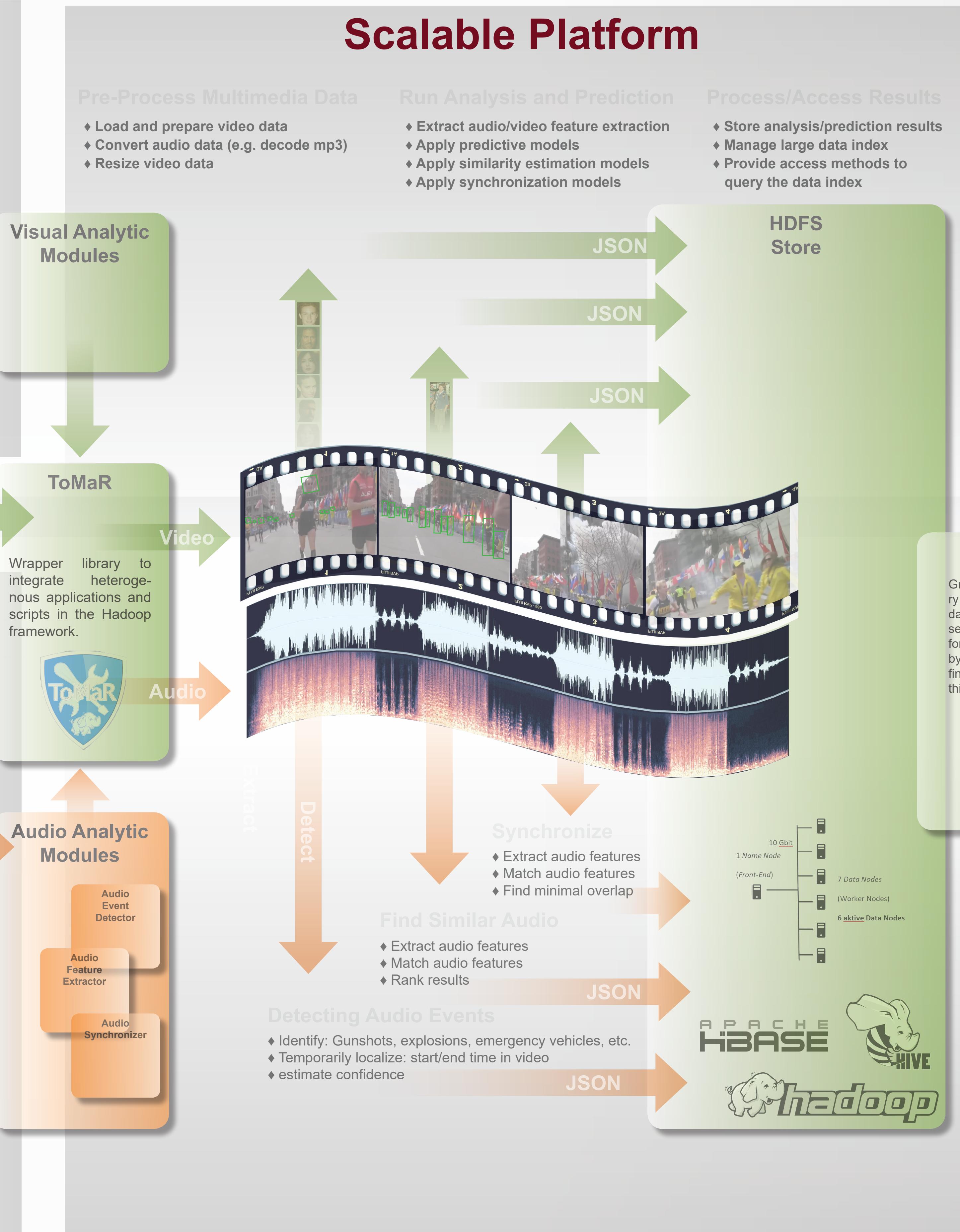
- ♦ Searching for videos with similar audio-content
- ♦ Examples: Suspect unidentifiable
 - "mark the relevant section (e.g. police siren)"
 - Result: similar sounding video segments

- ♦ Solution Developed
 - Recurrent Convolutional Neural Network
 - Learns temporal relations in audio data
 - Attention and Localisation Layer

Audio Synchronization

- ♦ In case time that time information of video is unreliable
- ♦ Synchronize video by audio content

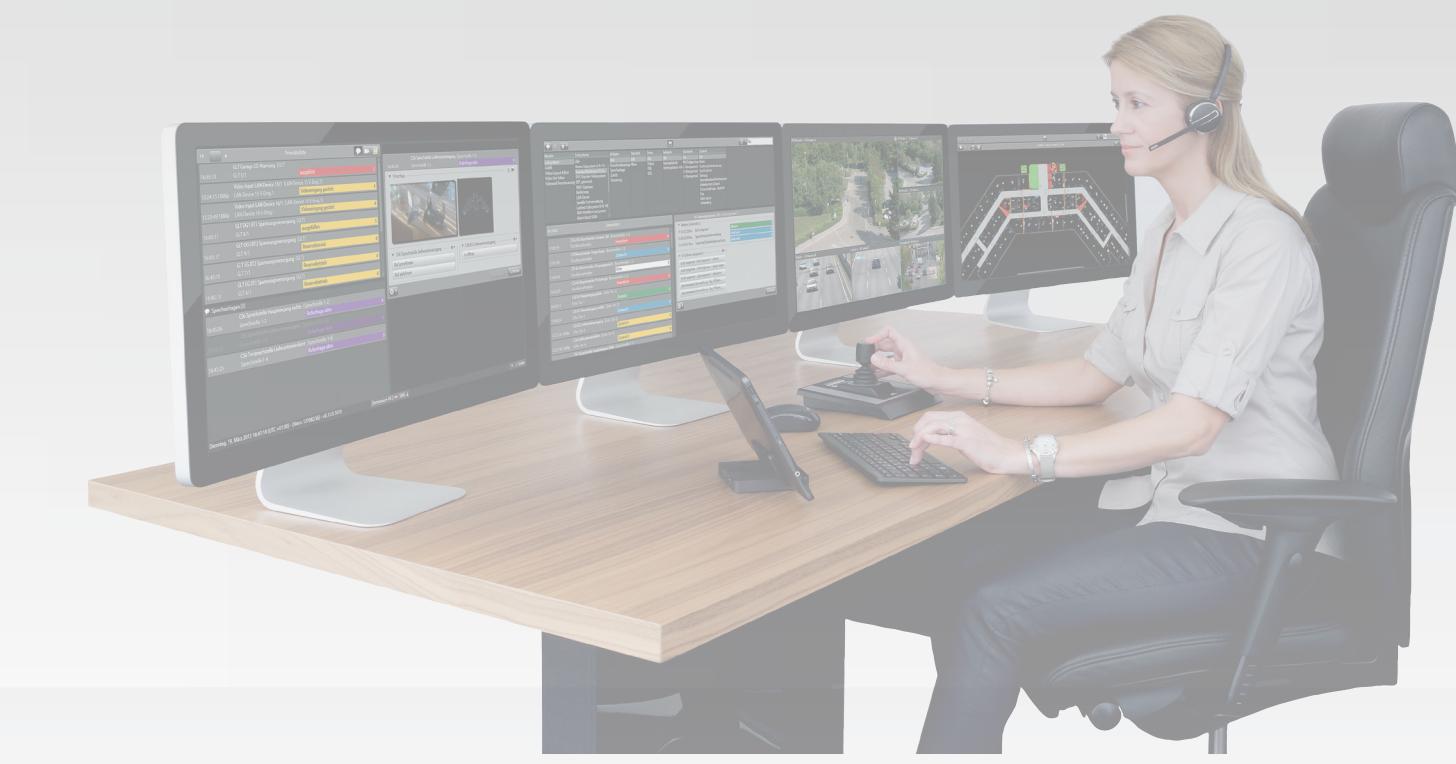
- ♦ Solution Developed
 - Temporal alignment by minimal overlap of extracted features



User Interface

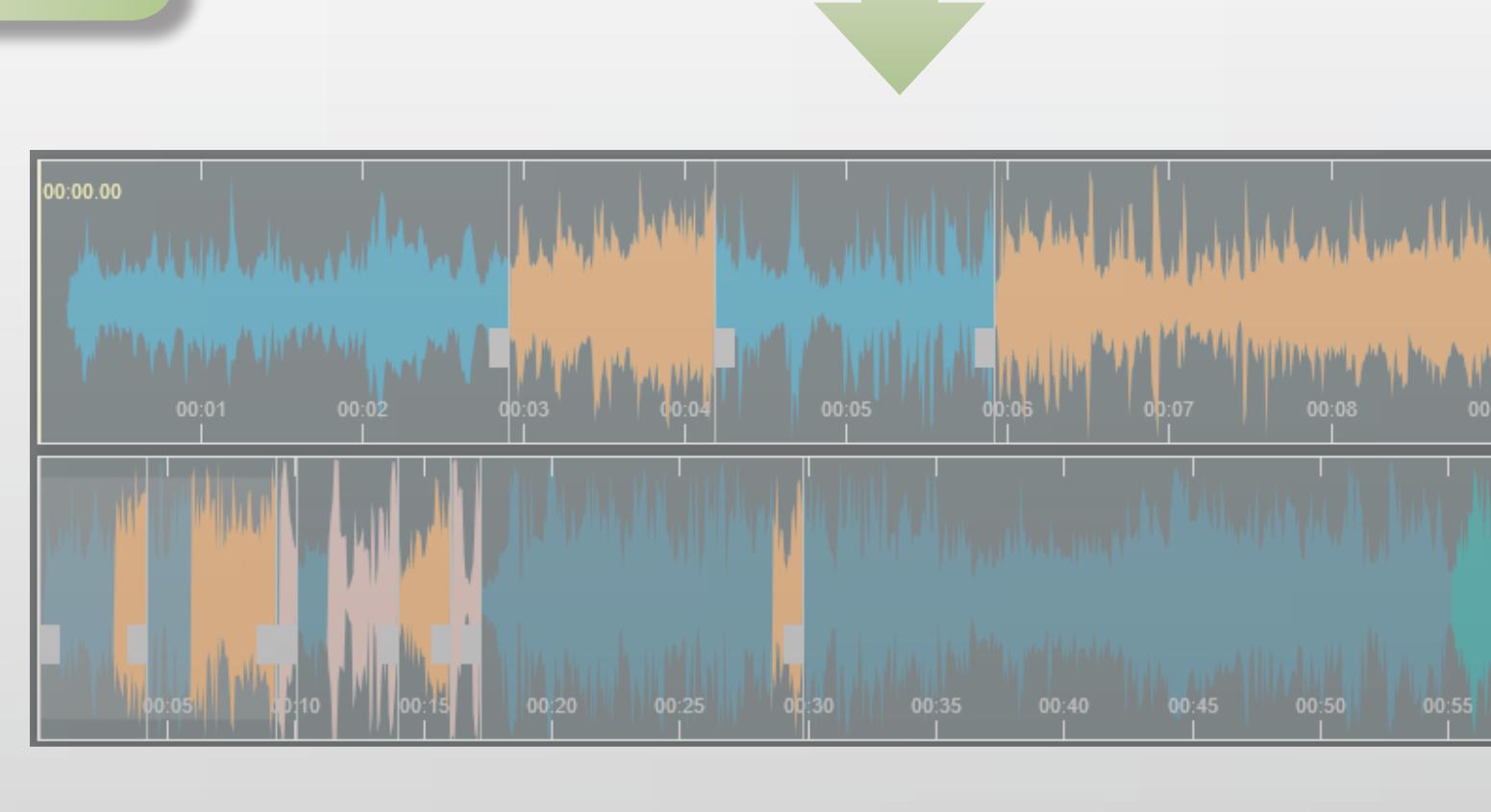
AVASYS

- ♦ Flexible platform by partner PKE
- ♦ Modular system for video surveillance and access control
- ♦ multi-screen concept
- ♦ AVASYS uses GraphQL interface to query the data index



GraphQL

GraphQL is a query language for the data store, and a server-side runtime for executing queries by using a pre-defined type system for this data.



Incident Data

Data Sources

- ♦ CCTV cameras (public/private)
- ♦ Bystander videos (e.g. mobile phones)

Upload Platform

- ♦ Related Project
- ♦ the population uploads notes (photos, videos, documents) of events into an upload platform



Focus: Technology

Austrian Tasks

- ♦ Implementation demonstrator
- ♦ Tracking generic objects
- ♦ Analyze audio signals for acoustic event recognition and video synchronization
- ♦ Work on interoperability (module and data exchange)
- ♦ Focus: audio, interoperability

German Tasks

- ♦ Implement Demonstrator (basis MVI)
- ♦ Detection/recognition of objects of predefined classes
- ♦ Identity Resolution
- ♦ Spatio-temporal 3D reconstruction of crime scenes
- ♦ Interactive exploration of the reconstructed scene and metadata
- ♦ Focus: Spectrum of new analysis modules

Focus: Law

Austrian Tasks

- ♦ Analysis of legal aspects in the Austrian legal area
- ♦ Evaluation of the demonstrator regarding compliance with legal aspects
- ♦ Preparation of a legal comparison Germany - Austria (with German partner)

German Tasks

- ♦ Analysis of the legal framework for data collection and evaluation
- ♦ Legal terms, Requirements
 - Handling video data from different sources
 - Data exchange in individual cases
- ♦ Creation of joint composite files for cross-border cooperation
- ♦ Preparation of a legal comparison Germany - Austria (with Austrian partner)

Focus: Ethics

Austrian Tasks

- ♦ Analysis of the ethical and social discourse along selected attacks
- ♦ Combining the knowledge gained with the planned technological solution
- ♦ Exchange of work results

German Tasks

- ♦ Definition Exception state that analyzes the application framework of the technology
- ♦ Analysis of possible dual-use problems of developed solutions
- ♦ Analyze ethically relevant differences between preventive and forensic scenarios
- ♦ Development of a catalog of "Points to Consider" to the ethical use of technology

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