PHAROS – Platform For Search of Audiovisual Resources Across Online Spaces

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Abstract— **As an old lighthouse (PHAROS in ancient Greek) provided a proper navigation tool for people to find their route when lost at sea, in the same way PHAROS will ensure the right way to navigate in the modern enormous information ocean.**

Index Terms— **audiovisual search engines, federation, information retrieval.**

I. MOTIVATION

THE AMOUNT of data available on the web, in organizations and enterprises is multiplying and data is increasingly becoming audiovisual. Search has become the default way of interacting with data and by 2008, 50% of applications are predicted to include a search facility as a primary interface for end users. The ever-increasing data complexity leads to the necessity of a coherent approach to the growing variety of audiovisual formats, standards and tools. Users find themselves overwhelmed by the multitude of new audiovisual search tools, while businesses are at loss for stable direction. Digital data is the greatest value that many organizations possess and the ability to use it, rather than just store it, will be one of the most important aspects of strategy in the coming decade. Access to digital data is the front window and the operational backbone for most organizations. The growth of data volume is rapidly shifting to audiovisual content, yet the technologies that allow processing and retrieval of this content are either mainly experimental, or only vaguely capable of handling true queries and content.

Audiovisual search is therefore one of the major challenges for organizations and businesses today, and search-based technologies which can provide contextually relevant, integrated and scalable access to distributed and heterogeneous collections of information is essential.

II. PROJECT OBJECTIVES AND MISSION

The PHAROS Integrated Project (IP), to be funded from 2007-2009, aims at developing an innovative audiovisual technology platform, which will enable consumers, businesses

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and organizations to unlock the values found in audiovisual content, a platform that will take user and search requirements as key design principles and which will be deeply integrated with user and context technologies. The developed technology will sustain itself in the future by enabling new players to build on top of the platform. To achieve this ambitious task, PHAROS mobilizes 13 strong technological players, research institutions and user groups, all sharing common goals.

The range of scientific innovations will be tied together and consolidated with existing research through intelligent content publication and subscription mechanisms, scalable, flexible and open frameworks for content processing and search that support the full range of content types, enabling them to be deployed through the PHAROS platform. To guide this process, PHAROS has defined 5 objectives that provide the backbone for the organization of the work throughout the project.

Ob1. (Core Technologies) – Develop a **scalable search framework** which lets users search, explore, discover and analyze **contextually-relevant** data which can be **audio-visual, structured** or **unstructured** in origin. A **scalable content refinement framework** will be developed bringing together multilingual transcription, contextual metadata extraction and content-based audio-visual analysis to add **semantic meaning** to audio-visual, structured data in a way that prepares it for information retrieval.

Ob2. (Context and Users Technologies) – Analyze, design and develop the **context and user technologies** taking into account **personalization, trust** and **adaptability.** This will allow a **social audio-visual interaction model** to be integrated into the search engine, rather than using a traditional non-participatory information access model. PHAROS will create user interaction models where live user traffic continually improves the user experience via core primitives such as **social network analysis** and **TrustRank**.

Ob3. (PHAROS Platform) – Ensure the interoperability of the Core Technologies and Context and User Technologies (Ob1 and Ob2 above) in a Service-Oriented Architecture-based a**pplication enablement environment** that will enable **effective deployment of diverse information access solutions incorporating audio-visual** content sources.

Ob4. (Showcase) – An innovative **showcase**, built on the PHAROS Platform, will be used to gather user feedback and validate the PHAROS approach with specific attention to the innovation in PHAROS.

Ob5. (Federation and Impact) – Define a suitable sustainability model with an open, **federating** and aggregating approach, guaranteeing the **replicability** of PHAROS results in a multi-industry scenario.

III. PROGRESS OVER STATE-OF-THE-ART

To achieve these ambitious objectives, PHAROS will extend the state-of-the-art in the areas of core search technologies, as well as context and user technologies.

Regarding core search technologies, both XML search and content-based search are relevant. Previous work has addressed representation and semantic interoperability [6], as well as XML retrieval [4], [8]. Content based retrieval uses features of multimedia objects to facilitate their retrieval. [2], [10] focused exactly on this topic. However, emerging types of search patterns require both XML and content-based search to be integrated and made mature enough for industrial exploitation. PHAROS will extend the state-of-the-art in this area by developing a scalable search platform with advanced query brokering to orchestrate audiovisual information access combining pluggable content-based matching engines and schema agnostic XML based search kernels.

Context and user technologies have been tackled from various points of view: social media [9], [7], spam detection and ranking [3], [5] as well as security, trust and privacy [1]. PHAROS will address all these aspects and more specifically will focus on exploiting user actions and interactions in personal and public spaces to provide advanced and semantically rich recommendations and personalized ranking algorithms. User and community profiles will enable extreme precision for search, and will exploit all kinds of user-generated metadata. Advanced spam detection algorithms, suitable for personalized ranking, will be also provided and new lightweight forms of content protection will be investigated.

IV. THE PHAROS APPROACH

PHAROS distinguishes itself from other audiovisual search solutions by developing a platform which integrates content refinement and content retrieval with user and context technologies. The platform is distributed in nature, providing the much-needed flexibility that enables a wide variety of applications to be built on top of it. The platform allows user and context models as well as content refinement, retrieval and storage to be client or server-based, thus enabling businesses in several verticals to diversify and provide services in one or more of these areas instead of encouraging single players to monopolize the market.

The project is based on a five-layer structure defined to map the general objectives into operational areas. The following diagram depicts the overall structure of the PHAROS implementation plan in terms of "streams" and references to the work-plan activity.
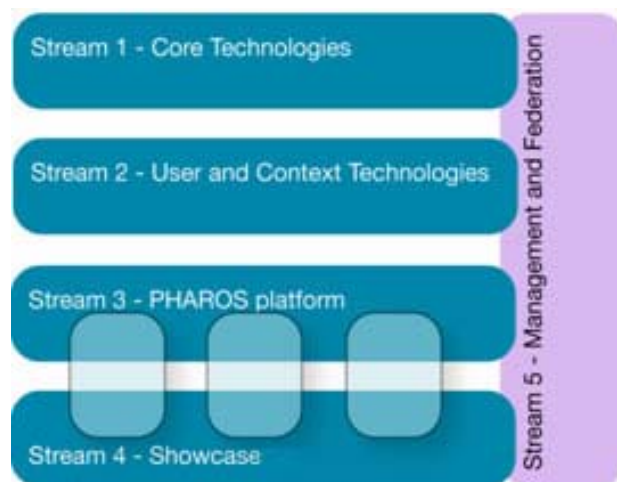
FIG. 1 Structure of PHAROS Implementation Plan

The research and technological development within PHAROS can be described in terms of the work done in Stream 1 (Core Technologies), Stream 2 (User and Context Technologies) and Stream 3 (PHAROS Platform). These streams provide the foundation on which Stream 4 (Showcase) is built. Stream 5 (Management and Federation) ensures the smooth running of the project and oversees its impact in the outside scientific and business world.

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