An Overview of EU Programs Related to Conversational/Interactive Systems*

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ABSTRACT

Since 1984, the European Commission has supported projects related to spoken language processing within various programs (particularly ESPRIT, ESPRIT-BRA and TELEMATICS-LANGUAGE ENGINEERING). The projects address various aspects of spoken language processing including basic research, technology development, infrastructure (language resources and evaluation) and applications in different areas (telecommunications, language training, office systems, games, cars, information access and retrieval, banking, aids to the handicapped...).

The next program, the 5th Framework Program is now being prepared, and should unite the activities in the area of Human Language Technology and its components in a single sector. The three sub-areas which have been identified are "Multilinguality", "Natural Interactivity" and "Active Content".

Several on-going projects are addressing the design of conversational systems. Three example applications are: the ESPRIT Mask project which aims to develop a Multimodal-Multimedia Automated Service Kiosk providing access to rail travel information; the LE Arise project which aims to provide similar information via the telephone for the Dutch, French, and Italian railways; and the LE Vodis project whose goal is to develop a vocal interface to enhance the usability and functionality of in-car driver assistance and information services.

INTRODUCTION

In this paper we provide an overview of European Commission Framework programs that have sponsored research in speech processing, highlighting a few examples of on-going projects related to conversational/interactive systems. The European Commission (EC) launched several Framework Programs in the R&D area, each lasting 4 to 5 years: FP1 (1984-1987), with a pilot phase starting in 1983, FP2 (1987-1991), FP3 (1990-1994), FP4 (1994-1998), and it is now preparing the next program, FP5 (1998-2002). The activities in spoken language processing and more generally in Human-Machine communication, may be found mostly

in 2 programs: it initially started within the ESPRIT program, now called the IT (INFORMATION TECHNOLOGY) program, but it was directed, for a large part, starting in FP3, to the TELEMATICS program, with a specific action line on LANGUAGE ENGINEERING. These areas were also present in several other programs of the commission.

THE ESPRIT / IT PROGRAM

The ESPRIT / IT program was managed by DGXIII-A, and is now managed by DGIII in Brussels. The pilot phase of this program started in 1983. The following programs took place until now, with some overlap between the different phases: ESPRIT I (1984-1988), ESPRIT II (1987-1992), ESPRIT III (1990-1994) and ESPRIT IV or IT (1994-1998). Starting in ESPRIT II, a specific sub-program, BRA, aimed at Basic Research (later on called Long-Term Research (LTR)) Actions. As in most EC programs, the projects are selected after a Call for Proposal. They usually include several partners from different countries, and from industry and academia or public research. All projects are for a limited time duration. The underlying policy of the projects is cooperation, not competition, within projects. In general, there is not much cooperation between projects.

We can identify 40 spoken language projects in various areas in successive ESPRIT programs (from 1983 on: 9 in ESPRIT-I; 13 in ESPRIT-II; 10 in ESPRIT-III; 8 in ESPRIT-IV), for different topics related to speech processing:

- *Basic Research in Speech Communication:* **Acts** (High-resolution speech recognition: Auditory/Connectionist Technologies for Speech), **Accor I/II** (Articulatory-acoustic Correlations in Coarticulatory processes: a Cross Language Investigation), **Vox** (Analysis and Synthesis of Speaker Characteristics), **Speech Maps** (Sound-to-Gesture inversion in Speech: Mapping of Action and Perception)

- *Speech Technology Improvements:* **SIP** (Advances algorithms and architectures for Speech and Image

Processing), **Ikaros** (Intelligence and Knowledge-Aided Recognition of Speech), **Sprint** (Speech Processing and Recognition using Integrated Neurocomputing Techniques), **Pygmalion** (Neurocomputing), **Himarnnet** (Study of Hidden Markov models and Neural Networks for robust isolated speech recognition), **Wernicke** (Neural Network Based, Speaker-Independent, Large Vocabulary Speech Recognition), **Sprach** (Speech Recognition Algorithms for Connectionist Hybrids)

- *System Assessment and Evaluation:* **Sam 1/2/A** (Multilingual Speech Input-Output: Assessment Methodology and Standardisation), **449** (Investigation into the Effective Use of Speech at the Human-Machine Interface), **Disc** (Spoken Language Systems and Components - Best Practice Development and Evaluation)

- *Multilingual Speech-to-Text and Text-to-Speech systems:* **291/860** (Linguistic Analysis of the European Languages), **Polyglot** (Multi-Language Speech-to-Text and Text-to-Speech Systems)

- *Spoken Dialog:* **Palabre** (Integration of Artificial Intelligence, Vocal I/O and Natural Language Dialogue: Application to Directory Services), **Sundial** (Speech Understanding and Dialogue)

- *Speaker Verification:* **Verivox** (Voice variability in Speaker Verification)

- *Robust speech I/O Systems:* **Ars** (Adverse environment Recognition of Speech), **Roars** (Robust Analytical Speech Recognition), **Robust** (Robust Speech Understanding)

- *Speech and the Office Workstation:* **Spin** (Speech Interface at Office Workstation), **Iws** (Intelligent Workstation), **Multiworks** (Multimedia Integrated Workstation)

- *Telecommunication Applications:* **Sunstar** (Integration and Design of Speech Understanding Interfaces), **Freetel** (Enhancement of Hands-Free Telecommunications), **Ovid** (Trial Application of Voice Processing in Automated Banking Services)

- *Computer Aided Education Applications and Language Training:* **Spell I/II** (Interactive Systems for Spoken European Language Training), **Power** (Portable Workstation for Education in Europe)

- *Games:* **Ivory** (Integrated Voice Recognition System)

- *Multimodal dialog for information services applications and Multimedia information processing:* **Intuitive** (Interactive User Interface and Tools for Information in a Visual Environment), **Cats** (Computer Aided Theatrical Score), **Mask** (Multimodal Multimedia Automated Service Kiosk), **Miami** (Multimodal Integration for Advanced Multimedia Interfaces), **Thistl** (Thematic Indexing of Spoken Language)

Apart from those Spoken Language Processing projects, there were also several projects on Natural Language Processing, in different areas:

- *Basic Research in NL Processing:* **Dyana I/II, Dandi, Ideal, Dandelion, Eutrans**

- *Multilingual NL Processing:* **Twb I/II, Intrepid**

- *Interfaces and Dialog:* **Plus, Melissa**

- *Lexicons:* **Multilex, Acquilex I/II**

Impact of ESPRIT **Speech Projects**

In the Fall of 1993, the ESPRIT management carried out a study on the impact of ESPRIT Speech projects, producing an internal report. The results of this study stated that a 126 MEcu effort has been devoted to speech within ESPRIT (total budget, the European Commission funding about 50% of this amount (63 MEcu)). This corresponds roughly to a total of 1,000 Man-Years, over 10 years (1983-1993). It is estimated that this represents about 12% of the total European activity on speech. This means that ESPRIT funded 6% of the total activity, an amount which was considered to be a small share of the total effort. Since then, it is estimated that the ESPRIT program supported speech related projects with an extra 15 MEcu effort.

At that time, 22 projects were completed and 9 of those projects had produced demonstrators. In 1993, 13 industrial companies reported intention to put products on the market, with an extra effort of 18 MEcu. 4 had already put products on the market in 1993 and reported a 2 MEcu income on that year, and all 13 estimated to reach a 100 MEcu income by 1996, while 2 Small and Medium Enterprises (SMEs) were to make 90% of that income. This represents a return of investment of 1.3% by 1993 and 72% by 1996, which was considered to be low.

The reasons for this relatively low performance was analyzed as being due to the fact that no exploitation plans were mentioned in the projects from the beginning, no market investigation was conducted, and the attitude of large industrial groups was more as "technology watch". Since then, large groups quitted the speech scene or still stayed mostly as "technology watch". Those groups are ready to buy elsewhere (illustrating the "not-invented-here syndrome"). The SMEs are more active, for "staying alive" reasons. It was also said that the projects were too much technology-pull, not enough market-push, while speech was still at that time the "cherry on the cake" for many customers.

In the present IT program (1994-1998), Speech and Natural Language Processing is still present (especially technology development within Long Term Research), but not in a specific area. In the Long Term Research, a sub-program on **The Intelligent Information Interfaces** (**I3**) addresses the concepts of a broad population, interacting with information in a Human-centered system. The projects should

address new interfaces and new paradigms. This resulted in the start-up of the **I3Net** network, made up of a small set of founding members, who also gathers representatives from each projects retained by the European Commission in this area. The action is structured into 2 schemata: The **Connected Community** (mostly dealing with Augmented Reality), and **The Inhabited Information Spaces** (addressing the Large scale information systems with broad citizen participation). There are presently 13 on-going projects, addressing many speech related topics, with a strong user-oriented approach: multngual comprehension tools and aids, software agents, multimedia and hypermedia bases access and retrieval, virtual and mixed reality, avatars, multimodal input/output communication.

THE TELEMATICS PROGRAM

The TELEMATICS program is managed by DGXIII in Luxembourg. It included 13 Sectors such as Information Engineering , Telematics for Libraries, Education and Training, Transport, Urban and rural areas, with a 900 MEcu budget. Within TELEMATICS, several successive programs have been related to Language processing, for a total effort of 120 MEcu from the EC. The **Linguistic Research Engineering** (**LRE**) lasted from 1991 to 1994, with a budget of 24 MEcu coming from the EC. It was followed by an interim **Multilingual Action Plan** program (**MLAP**) (1993-1994), with a 9.5 MEcu budget. The LANGUAGE ENGINEERING program (**LE**) (1994-1998) is now on-going, with a total support of 87 MEcu. Those programs are the follow-up of the Eurotra Machine Translation program, and they now include Spoken language processing. The LE program is application and user oriented, and the idea when it was launched in 1994 was an attempt to make good applications with still imperfect technologies.

In the Linguistic Research and Engineering, MLAP and the on-going Language Engineering programs, 18 projects were related to speech out of a total of 94 projects. It included projects on several R&D areas:

- *Assessment:* **Sqale** (Multilingual Speech Recognizer Quality Evaluation)
- *Spoken Language Resources:* **Eurococosda** (Interface to Cocosda / Speech resources), **Relator** (Repository of Linguistic Resources), **Onomastica** (Multilingual pronunciations dictionary of proper names), **Speechdat-I** (Speech DBs for Telephone applications & Basic Research), **Speechdat-2** (Speech Databases for Creation of Voice Driven Teleservices), **Multext** (Multilingual Text Tools and Corpora)
- *Language Acquisition and Language Training:* **Ilam** (Interactive Language Acquisition through Multimedia Simulated Conversation and Pronunciation), **Recall** (Repairing Errors in Computer Aided Language Learning), **Speak** (Supported Prototype Easy-Access Authoring Keys)
- *Railway Inquiry Systems:* **Mais** (Multilingual Automatic Inquiry System), **Railtel** (Railway Telephone Information Service), **Arise** (Automatic Railway Information)
- *Spoken dialog:* **Access** (Automated Call Center Through Speech Understanding Systems), **Reward** (REal World Applications of Robust Dialogue), **Speedata** (Speech recognition for data-entry applications)
- *Car navigation:* **Vodis** (Advanced Speech technologies for Voice Operated Driver Information Systems)
- *Speaker recognition:* **Cave** (Caller Verification In Banking and Telecommunications)

New Projects

The 4th Call for Proposal was issued on December 1996 (deadline April 1997) with a budget of 24 MEcu. Several projects related to spoken language processing have been pre-selected, and are now in a final negociation phase or have recently started. These are: **Idas**, on automated directory services; **Vodis II** on in-vehicle voice-based access to telematics service; **Isle**, on language learning; **Olive**, on indexing multilingual video archives using speech processing; **Picasso**, on voice authentification for secure service operation; **Speechdat-Car** on language resources for automotive application;, **Mate**, on dialog corpora design and annotation; **Trindi**, on Task Oriented Instructional Dialogue; and **Else**, on Language Engineering systems evaluation.

Coordination across projects

One of the goals of European projects is to improve communication amongst European industrial and research organizations, which is why there are certain requirements for the composition of the project consortiums. In order to enhance the exchange of information among projects, the are concertation meetings where representatives of different projects present the ongoing activities, followed by discussion sessions. The Language Engineering projects covering both written and spoken language processing have been grouped into the following clusters: *Telebusiness* (Access, Arise, Cave, Idas, Picasso, Reward, Trindi), *Public Interest Support* (Aventinus, Hagis, Linguanet, Sensus-Le, Speedata, Tamic-P), *Education and Training* (Isle, Letrac, Recall, Select, Speak), *Information Services* (Ecran, Edito, Eurosearch, Facile, May, Mietta, Mulinex, Multimeteo, Olive, Pop-Eye, Sparkle, Tree, Vodis), *International Business Support* (Apollo, Docstep, Step, Mable, Maits, Multidoc, Otelo, Scarrie, Term-It, Transrouter), *Language Engineering Resources* (Diet, Eagles, Elra, Else, Eurowordnet, Interval, Le-Parole, Lrs-P&P, Mate, Simple, Speechdat,

Speechdat-Car).

The present feeling is that there is still a need to invest in the development of Language Engineering technologies in parallel with applications, as these technologies appear to be still immature.

Other DG XIII Programs

Other Programs managed by DG XIII also address Human-Machine Communication and Human Language Technology:

The **MLIS** (**Multilingual Information Society**) program, started for a duration of 3 years (1997-1999), with a budget of 15 MEcu. The main objective is to bring a technological support to Multilingualism in Europe. It is organized in 3 domains:

- Cooperative service network for European Language Resources
- Exploiting language technology, standards and resources
- Promoting the use of advanced language tools and services in the public sector

The **INFO2000** program is scheduled from 1996 to 1999. The goal is the development of the Multimedia content industry and the use of Multimedia content. **Delta** (now **Education and Training**) concerning Education technologies and applications; **AIM** (now **Health Care**) focusing on Medical applications; and **TIDE** (now **Disabled and Elderly People**) also have supported speech related projects.

Some of the many **TIDE** projects specifically address speech processing aspects, or make use of existing speech technologies, such as **MUSA** (Multilingual Multimedia Speech aid for the hearing and language disabilities), **Stride I/II** (Speech-analytic hearing aids for the profoundly deaf in Europe), **Aladin** (Advanced Language Device for Interaction), **Enabl** (Enabler for access to computer-based vocational tasks with language and speech), **Iseaus** (Speech training for deaf and hearing-impaired people), **Vaess** (Voices, Attitudes and Emotions in Speech Synthesis), **Split** (Multilingual Speech-to-Face Movements Transformation), **Harp** (Autonomous Speech Rehabilitation System for Hearing Impaired People), **Oscar** (Optimal Speech Communication Assistance for Residual Abilities), **As-monc** (Autonomous System for the Mobility Orientation, Navigation and Communication), **Hephaistos** (Home Environment Private Help Assistant for Elderly and Disabled) and **Home-AOM** (Home Applications Optimum Multimedia/Multimodal System for Environment Control). Within the **Transport** (previously **Drive**) program, the **Vasme** project aims at the design and development of a voice-operated VHF automatic on demand information system for ships and vessels.

OTHER EU PROGRAMS

Some spoken language processing projects also were financed in **Race**, now called **ACTS** (Advanced Communication Technologies and Services) program, under different headings:

- Interactive Digital Multimedia Services
- High Speed Networking
- Mobility and Personal Communication Networks
- Intelligence in Networks and service Engineering
- Quality, security and safety of communication services and systems

Several projects dealing with speech can be mentioned such as **IPSNI** (Integration of People with Special Needs by IBC), **Telemarketplace**, **M2VTS** (Multimodal Verification for Teleservices and Security Applications), **Teleshoppe** (Teleshopping services using Virtual Reality and Interactive Multimedia), **Maestro** (Maintenance System Based Telepresence for Remote Operators), **Vidas** (Video Assisted with Audio Coding and Representation), **Mirage** (Manipulation of Images in Real Time for the Creation of Artificially Generated Environments) and **Coven** (Collaborative Virtual Environments).

Transversal programs bring support to the specific programs. Several actions may be found in **HCM/TMR** (Human Capital and Mobility / Training and Mobility of Researchers). The **Erasmus/Socrates** program supports an academic training network in "Phonetics and Speech Communication". This program also allows cooperation actions with the USA. The **PECO**, **INCO-Copernicus** and **IN-TAS** programs finance cooperation with Central and Eastern European and Former Soviet Union countries. The **INCO-DC** program addresses for the cooperation with Developing Countries, such as Mediterranean countries (Maghreb...) and others (India...). Some projects which are already supported in thematic programs may have extension within the PECO programs, directly (**Multext Goes East**), or indirectly (**Babel** (Multilanguage Database) or **Telri** (Trans-European Language Ressources Infrastructure Information).

In FP4, a new transversal Thematic Call Workprogramme aims at promoting pluridisciplinary actions, which are trans-domain and trans-program (IT, ACTS, Telematics...). It contains 4 different topics: IT for Mobility, Electronic Commerce, Information Access & Interfaces, and Learning & Training in Industry. Another transversal action is the Educational Multimedia Joint Call. It gathers expertise from different participants which may already be in different programs, and may get support from specific programs (Telematics, IT or Targeted Socio-Economic Research (TSER)), but also from Education (Socrates), Training (Leonardo da

Vinci), or Trans-European Networks (TEN-Telecom) programs.

Several actions, partly supported by the EC (within the ESPRIT or Telematics programs), aimed at installing a permanent R&D infrastructure in different areas: Scientific Association (**ESCA**, the European Speech Communication Association, founded in 1988), Laboratories Networking (**Elsnet**, the European Language and Speech Network, founded in 1991), Standards (**Eagles**, an Expert Advisory Group on Language Engineering Standards) and Language Resources (**ELRA**, the European Language Resources Association, founded in 1995).

5TH FRAMEWORK PROGRAM (FP5)

In the present proposal for the Fifth Framework Program FP5 (1998-2002), now under discussion, the topics of speech and natural language processing are very well represented. This FP will change dramatically from the previous ones as it will include a much smaller number of programs. It will be organized in 3 main thematic programs, one of them being directly related to Human-Machine Communication:

1. Unlocking the resources of the living world and the ecosystem
2. **Creating a User-Friendly Information Society**
3. Promoting competitive and sustainable growth

and 3 Horizontal programs:

1. International cooperation
2. Innovation and SMEs
3. Human potential

The total budget for this program requested to the European Parliament for FP5 is 16.3 BEcu.

Human Language Technologies appear as one of the 4 topics (together with *Electronic publishing*, *Education and training* and *Information access*) under the "Multimedia Content and Tools" heading of the **Creating a User-Friendly Information Society** program.

Language technologies are also included along with other communication modalities under the "Essential technologies and infrastructure" and "Visionary Research" headings of the same program.

The Human Language Technologies action include 3 major challenges: i) Adding multilinguality to information and communication systems, ii) Providing natural interactivity, including multimodal dialogs and iii) enabling active digital content, including multimedia data. For meeting those 3 challenges, it will address in parallel both "Technology development and research", and "Validation and applications", with transversal actions on focused take-up (such as technology transfer to multiple languages or market watch

and intelligence), infrastructural means (such as language resources or evaluation and assessment) and accompanying measures (such as international cooperation or (transdisciplinary) skills development and mobility).

SELECTED PROJECT OVERVIEWS

LE projects: http://www2.echo.lu/langeng/en/rtd.html
ESPRIT   projects:
http://apollo.cordis.lu/cordis/EN_PROJl_search.html

Mask

The aim of the ESPRIT-3 Multimodal-Multimedia Automated Service Kiosk (MASK) project (1994-1997) is to pave the way for more advanced public service applications by user interfaces employing multimodal, multimedia input and output. The project has analyzed the technological requirements in the context of users and the tasks they perform in carrying out travel enquiries. The kiosk is expected to improve the effectiveness of such services by enabling interaction through the coordinated use of multimodal inputs (speech and touch) and multimedia output (sound, video, text, and graphics) and in doing so create the opportunity for new public services. Vocal input is managed by a spoken language system, which aims to provide a natural interface between the user and the computer through the use of simple and natural dialogs. The MASK prototype information kiosk is currently undergoing user trials in the Gare St. Lazare in Paris.

The project partners are MORS, a company involved in automatic distributors (coordinator, F), SNCF, the French National Railway (F), LIMSI, a CNRS laboratory (F), and UCL, a university (UK).

http://www.limsi.fr/Recherche/TLP/mask.html

Thisl

The aim of the ESPRIT-4 Thematic Indexing of Spoken Language (Thisl) project (1997-2000) is to demonstrate the feasibility of integrating state of the art Natural Language Processing and Large Vocabulary Continuous Speech Recognition technologies for multimedia information retrieval via spoken language. There are many potential industrial applications for real-time, content-based access to audio and video data, such as demonstrated in the CMU Informedia 'News-on-demand' project.

This project follows up on the research developed in the ESPRIT-BR Wernicke project and the ESPRIT-LTR Sprach project, which involved many of the project partners. The Thisl partners are Sheffield University (C,UK), British Broadcasting Corporation (UK), Faculté Polytechnique de Mons (B), SoftSound (UK), Thomson-CSF (F), IDIAP (CH).

http://tcts.fpms.ac.be

Disc

The DISC project (ESPRIT-LTR Concerted Action), which started in June 1997, aims to produce a detailed, integrated set of development and evaluation methods and procedures for spoken language dialogue systems (SLDSs). Although SLDSs have attracted interest in many countries and laboratories, their design often draws on expertise that has come with experience and is difficult to codify. This in turn limits commercial applications of SLDSs since it can be difficult to estimate the development cost and time, as well as usability and quality. At the current time there are no commonly used standards with which potential customers or users of SLDSs of can assess and compare the quality of systems.

DISC will contribute towards establishing dialogue engineering as a sub-discipline of software engineering. To do so, DISC is studying the current development and evaluation practices of a wide set of state-of-the-art spoken language dialogue systems, to identify positive aspects and deficiencies. The project will then develop, test and disseminate a first detailed reference model of best practice procedures and methods, and a toolbox of associated concepts/guidelines and software tools.

To assist the project meet its objectives, the project has formed an Advisory Panel (DAP), which will be kept informed about DISC progress and will provide valuable feedback, and if interested can provide access to SLDS products or prototypes. Interested parties are welcome to join the DAP.

The partners in DISC are MIP, Odense University (C,DK), LIMSI-CNRS (F), IMS, Univ. Stuttgart (DE), KTH (SE), Vocalis (UK), Daimler-Benz (DE), and EL-SNET (NL).

http://www.elsnet.org/disc

Arise

The LE-3 ARISE project, a follow-up project of two LE-MLAP projects MAIS and RAILTEL started in October 1996. The goal of the Arise project is to develop automatic train schedule enquiry services which are able to handle the majority of routine enquires. In Europe there are over 200 million calls per year to railway information centers, of which about 20% are unable to be answered due to the lack of human operators. Thus, there is a strong demand from the public transportation operators to apply existing or near-term technological solutions to handle routine schedule information requests.

The project consortium, includes representatives of the user organizations, that is the railways in the Netherlands (NS), France (SNCF) and Italy (FS), as well as technology and service providers, research institutions and system integrators. While there are common goals to develop easy-to-

use, well-accepted information services, the different language environments have somewhat different objectives and requirements. For example, in the Netherlands there is close coordination with the ongoing VIOS project, and in Italy, large scale integrated user trials are underway in the FS call center in Milan.

As a whole, the consortium is exploring many aspects of service design including user needs, marked analysis and potential, integration and coordination with existing services, technology requirements and improvements needed, speech recognition and understanding, dialog strategies, assessment of component technologies and overall service quality.

The Arise partners are NS (C,NL), FS (IT), LTV (IT), SNCF (F), CSELT (IT), Saritel (IT), KPN (NL), KUN (NL), LIMSI-CNRS (F), Vecsys (F), Philips (DE), IRIT (F), RWTH (DE).

http://www2.echo.lu/langeng/en/le3/arise/arise.html

Vodis

The LE-1 Vodis project (1995-1998) is a leading-edge application project to develop enabling technologies for voice-operated human-machine interfaces for use in automobiles. Vocal interfaces are expected to both improve usability by enabling naturally spoken information access, and to improve safety by reducing distraction on the part of the driver. A demonstrator is under development using a Voice Control Unit in coordination with a commercially available state-of-the-art driver information system (BERLIN RCM303A from Bosch), that integrates a navigation computer, traffic-messaging, mobile telephone and standard audio equipment. The main research areas addressed are speech recognition in noisy environments, natural language understanding, and dialog modules. In addition to the directed approach, a more ambitious spoken language interface is being developed.

The project partners are Bosch (C,DE), Volkswagen (DE), Renault (F), PSA (F), Lernout & Hauspie (BE), RWTH (DE), U. Karlsruhe (DE), IPO (NL), INESC (PT). A follow-up project Vodis-II was shortlisted in the last call.

http://www2.echo.lu/langeng/en/le1/vodis/vodis.html
http://werner.ira.uka.de/VODIS/

Access

The LE-1 ACCeSS project (1996-1998) is investigating the service and technological requirements for automated call centers for insurance applications, reducing costs and processing delays. The project is using advanced speech recognition, natural language understanding and dialogue technology, as well as character recognition for automatic form processing. Two demonstrators are under development to deal with *Contract Specification* - clarification of contract

details and response to routine enquiries, and *Damage Assessment* for cars.

The ACCeSS consortium is composed of Daimler-Benz (C,DE), Daimler Aerospace (DE), TELLIT Direkt (DE), Knowledge S.A. (GR), Interamerican Insurance (GR), and Wire Communications Laboratory (GR). As security is an important consideration, the consortium is in close contact with the Cave project, investigating speaker verification technology. A new LE-4 project **Idas** will build upon the technology developed in ACCeSS.

http://www2.echo.lu/langeng/en/le1/access/access.html
http://www.wcl.ee.upatras.gr/access/access.htm

Cave

Cave is an LE-1 project which started in 1995 and has a duration of 24 months. The consortium has studied the user requirements and potential market for Speaker Verification technology in telephone-based services. Currently there are many telephone services available, but with minimal, if any user security (typicall PIN numbers). Speaker verification technologyy can offer non-intrusive security for many such services.

The CAVE consortium consists of industrial partners: PTT Telecom BV (NL), Union Bank (CH), Vocalis (UK), Telia (SE) and research/academic partners: KUN (NL), KTH (SE), ENST (F). Under LE-4, the **Picasso** project (Pioneering Caller Authentication for Secure Service Operation) is a follow-up project to Cave.

http://www2.echo.lu/langeng/en/le1/cave/cave.html
http://www.ptt-telecom.nl/cave

Home-AOM

The TIDE Home-AOM project (1997-1999) aims to development of an intelligent multimodal and multimedia user interface for remote control for a wide range of electronic home devices, both from within the home and remotely via a mobile phone. The interface will incorporate advanced technologies in natural spoken language processing and gesture recognition to provide elderly and disabled users new dimensions of freedom. The project builds upon the achievements of the Hephaistos (TIDE-T1004) project. A careful analysis of user needs and daily tasks for the targeted user populations, and has been carried out taking into consideration the capabilities offered by the new modalities.

A long term, continuous assessment (running continuously for one year) will be carried out in three test sites in France, Germany and Greece to determine the usability and acceptance of the HOME interface.

The consoriium has 11 partners: TRUTh (C,G), IAT, U. Stuttgart (DE), UNIDO, U. Dortmund (DE), OCT (ES), Vecsys (F), LIMSI (F), Thomson-MM (F), LIMSI-CNRS (F), AIRTEL (ES), INT (F), Zeltron (I).

http://www.swt.iao.fhg.de/home/index.html

CONCLUSIONS

A large effort has been devoted by the European Union to R&D in Spoken Language Processing. The return of investment is still low, but it has boosted the European Speech R&D community. During the successive programs, there has been a shift in the focus of attention from technology to research, to applications, and then to users, and speech projects may be found in several sectors. Project durations are typically 2-3 years, after which a new project can be proposed if there is an appropriate call for the topic. As a result there can be a lack of continutity which can be frustrating for partners, as the EC funding is very important for many research groups both for financial and contact reasons.

Although several actions resulted in the set-up of several permanent bodies, the infrastructure for Language Resources has only been installed recently, and there is not yet an infrastructure for technology evaluation. The articulation with European national programs is still weak in most cases, while it appears that the multilingual nature of Europe is of crucial importance and would justify the development of technologies allowing for multilingual communication and information handling, in many different application areas. For the future, it seems that the various aspects related to Human Language Processing will be covered in a single integrated program, including research, technology and application development, together with the setting and use of a permanent infrastructure (including language resources, systems evaluation or training and mobility).

REFERENCES

More information on the EU programs may be found at the following EC servers:
All EC programs, CORDIS Server
    http://www.cordis.lu/
Telematics program, I*M Server
    http://www.echo.lu/
ESPRIT/IT program
    http://www.cordis.lu/esprit/home.html
Language Engineering
    http://www2.echo.lu/langeng/en/lehome.html

J. Mariani, "Advanced Speech Technologies in the ESPRIT program," in K. Varghese, S. Pfleger, J.P. Lefevre eds., *Advanced Speech Applications*, Springer Verlag, 1994.

J. Mariani, (1997) "Spoken Language Processing and Human-Machine Communication in the European Union Programmes," in G. Varile ed, *Eurospeech'97 EU Speech Projects Day report*.
http://www.anite-systems.lu/lenew/euspch97/report.html