Project Esculape

The purpose of this project is to develop a system to collect and verify in real-time statistical indicators using Internet and JAVA. Statistics from pilot countries (**CCE**/**NIS)** to be transferred to international organizations will be selected and classified together with standard indicators.

The system should be able to collect and verify statistical indicators in the following domains: Population dynamics, nutrition, infectious agents, genetic evolution and adaptation, physical environment, social and economical environment, education and life style, medical care, diseases. These domains are often referred to as the variables of public health. The indicators are the statistical indicators used in the following International Organizations: UN, World Bank, IMF, OECD, FAO, ILO, WHO, WMO, UNIDO, UNESCO, OMC, EUROSTAT.

The general objectives are:

- To create a simple and secure system to collect and verify, in real time, statistical data from countries to international organizations. We will use internet and advanced technologies like JAVA, CORBA, and artificial intelligence.
- To help developing countries learn about the standard indicators used in international organizations to measure, among others, economic, social, and health evolution by creating a classification for these indicators and an internet accessible knowledge base.
- To lower transfer cost of statistics from countries to international organizations.
- To simplify, in the future, statistical data integration in the given subjects by creating a codification of standard indicators.
- To speed up statistical knowledge diffusion by developing a real-time collection methodology using Internet and artificial intelligence.
- To simplify the work of researchers, economists, epidemiologists, consultants, etc. by identifying, locating, and classifying all standard indicators available for their research.

We propose to create an international classification (codification) of standard indicators and to gather knowledge, independent of countries, on these indicators. This codification will guide us in codifying the specific selected country indicators which we want to collect with the system. The resulting codification will help create our system which consists of two main parts: a contribution system and a control system. The contribution interface will allow statisticians to enter data relative to the indicators they want to send to the international organizations, and will format and secure a proper message before sending it to various control systems located in target international organizations. The control system will decode the message and check the accuracy of the statistics sent. It will acknowledge the sender of its decision. If the data is correct, it will be forwarded to the local databases. If not, an error message will be sent back to the sender and a special procedure will take place.

I Present state of knowledge in the proposed research field (one page)

As the project is linked to several research topics, we present a brief overview of the current state of knowledge in each area including ways to collect statistical data, harmonization process and data integration, and public health variables.

IA. Technical ways to collect statistical data.

A large number of methods are used by international organizations to collect national data, from simple paper sheets to complicated network applications using standard EDI messages. To obtain a good quality data international organizations like Eurostat recommend centralizing the data at the national level, verifying it and then putting it in a system which will format the proper EDI messages before sending them via a computer network to the international organizations. Since sometimes the same data is needed in different organizations like Eurostat, the OECD, IMF or World Bank, a specific organization has been set up in order to have the work done only once in the country of origin. For example, Eurostat can send data that it has collected to the OECD which in turn can integrate them, and then send a wider range of data to other organizations in the USA.

IB. Data integration, statistical harmonization process, international standard indicators classification.

In an unpublished article, ? Presentation of a system to collect and distribute statistical indicators... ?, 1997, Pierre Genevier compares the problem of collecting financial rates to the problem of collecting statistical data. He recommends creating a codification of all standard indicators and a knowledge base for these indicators in order to design a unique real-time collection system, based on internet, for all international organizations, and to facilitate data transfer and integration. He also describes solutions which have already been implemented in financial markets to different subproblems.

EBES EEG6-Statistics, a group of expert in the field, which defined several EDIFACT norms to transfer statistical data, described in their ? GESMES/ECOSER User guide 1995 ? (Eurostat), the following future processes of harmonization for economical data:
1) Recommendation of a list of standard indicators
2) Standardization of concepts, names, and calculation methods
3) Unique codification and identification of this concepts
4) Agreement on responsible organization for the maintenance of indicators
We agree on these recommendations, but in order to improve integration of data between different domains, we suggest going beyond the sphere of economical data and applying the same recommendations to a greater number of topics.
We recall two important steps in the harmonization process: ICD, International Classification of Diseases, (end of last century) and SNA, System of National Accounting, (1993).

C. Public health variables.

A series of articles published in the Oxford Textbook of Public Health, (1991), describe the different relations between the above listed domains and public health. Here we cite just the titles of the articles. William Brass, ? Population dynamics ?. J.S. Garrow, ? Nutrition ?. A. S. Monto, G. I. Higashi, et C. F. Marrs, ? Infectious Agents ?. A. Allison, ? Genetic evolution and adaptation ?. Michio Hashimoto, ? Physical environment ?. Nicky Hart, ? The social and economic environment and human health ?. Lawrence green and Denise Simons-Morton, ? Education and life style ?. M. Hobbs et K. Jamrozik, ? Medical care and Public health ?.

A classification and database of indicators related to public health have been implemented at the OECD, by the Health Politics unit. The number of indicators studied is about 800, limited to OECD member countries.

•II Objectives of the proposed research

Description of the research objectives, use measurable (quantitative) terms as far as possible.

IA. General Objectives

The general objectives are:

- To create a simple and secure system to collect and verify, in real time, statistical data from countries to international organizations. The system will be based on the internet and advanced technologies JAVA, CORBA, and artificial intelligence.
- To help developing countries learn about the standard indicators used in international organizations to measure among others, economic, social, and health evolution by creating a classification for these indicators and an internet accessible knowledge base.
- To lower transfer cost of statistics from countries to International organizations.
- To simplify, in the future, statistical data integration in the given subjects by creating a codification of standard indicators.
- To speed up statistical knowledge diffusion by developing a real-time collection methodology using Internet and artificial intelligence.
- To simplify the work of researchers, economists, epidemiologists, consultants, etc. by identifying, locating, and classifying all standard indicators available for their research.

IB. Scientific and technical objectives.

lThe scientific objectives are:

- To create a methodology (and an associated pilot system for CCE/NIS partner countries) to collect and verify, in real-time, statistical indicators. The real-time collection is made possible with Internet, its associated technologies, and artificial intelligence.
- To create a unique codification or international classification (code and list) of all statistical standard indicators in the given subjects which are used in international organizations - including both industrialized and developing country indicators - and a knowledge base for these indicators.

Researchers often refer to the above listed domains as the variables of public health. However, we will not limit our classification to indicators which have a known relation to public health. We will classify all indicators used in every domain.

lThe technical objective, - in the ever changing Internet environment, is:

- To develop a system which is independent of country and international organization information systems, platforms, and database systems, and can collect any kind of statistical data and ‘metadata’.

We want to use, as much as possible, advanced technologies, international standards and norms like EDI, 3-tier architecture, middleware CORBA, and JAVA.

•III Significance of the proposed research cooperation

•*A. Description of the contribution to fundamental or applied science.*

The contribution to fundamental sciences such as demography, economy, nutrition, geography, medicine, sociology is difficult to quantify. However, we estimate that identifying, locating, classifying all standard indicators and making knowledge for these indicators available will simplify the research work of all scientists in the given fields, making this a significant contribution to these fundamental sciences.
The contribution to the field of computer science and in particular information systems is also significant, although similar systems have already been implemented in the private sector at very high cost. Private networks, like the Reuters network, have given us the possibility of creating such information systems. Now with the use of internet and its associated technologies, we can design and implement a world wide information system at a very low cost. Exploitation costs are also very low because transfer is 'free' with internet.

IB. Relationship to the underlying themes.

The project is related to the following underlying themes of this year's call for proposal:
- It contributes to the involvement of CCE/NIS in the Global Information Society because the idea of the project is to create one system for all international organizations using the global network Internet. The system will be developed by CCE/NIS partners.
- It follows the recommendations of the September 1996 EU/CCE Prague action plan, which describe the importance of developing the capability of exchanging data with other administrations. The system will facilitate the exchange of data with international organizations, but it could also be used within the country to exchange statistical data.
- A great deal of knowledge on statistical indicators will be gathered. This knowledge will then be stored and made available through Internet for all researchers. Therefore, we will work on the development of a research network.
- The specific topics for this year 'Information Access' and 'Interface' are also part of the project. We will facilitate access to 'metadata' and will develop a contribution interface.
- We also have in our consortium the industry participation, with SMEs in Poland and EU.

IC. Justify why the project should be financed.

We believe the project should be financed because it will be useful for international and national organizations which exchange statistical indicators. It will also be useful to a large number of scientists who will be able to refer to the knowledge we had gathered.
Many data collection techniques are used by international organizations, but most of the advanced techniques are reserved for specific indicators which are collected more often (mostly economical data). Here we will give an advanced collection technique to departments or organizations which must collect their data by diskette or e-mail.
The cooperation of international organizations to acquire some of the knowledge and information on indicators would facilitate our work, since the EU (or at least member countries) is part of every organization mentioned, we believe that the EU financing and the objective of the project designed to simplify the transfer of data would justify the cooperation we suggest.

ID. Highlight the innovative research aspects.

- The creation of a list and codification of standard indicators for all organizations, countries, and given domains is an innovation which will facilitate statistical data transfer and integration world wide.

- The use of Internet and its associated technologies allows us to create a unique system for all national and international organizations. A unique input could lead to several output messages, for example, the same data could be sent to different international organizations or even another entity of the national producer on intranets. This will be an innovation and alternative to some present solutions which consists of sending data to a specific organization which sends it to other organizations. As mentioned earlier, Eurostat transmits data to OECD which in turn transmits it to USA.

•IV Scientific and technical description

•*A. Thorough description of methodology to be used should be given as regards the general technical approach, experimental techniques, software, tools, and equipment to be used.*

The approach

The global approach which consists of creating a general classification or codification for all international organizations and countries is justified by the use of the global internet network. Every organization is linked by the same network, Internet, therefore if we use this network as the primary technology for our information system, we can create a unique system for all organizations. This means that we can develop a system for a larger number of users, and thereby obtain a better cost/user ratio. Communication costs are lower with Internet, and some Internet technologies are still cheaper like browsers, for example.
The use of an expert system to verify data in real time allows us to speed up processing of the information. Often data is first centralized to be verified within the country and then formatted before being transferred. The expert system will allow us to eliminate the time consuming verification phase.

Sub-projects

The project has 3 sub-projects:

1) The creation of the international classification (list and codification) of standard indicators for all countries, international organizations and listed domains, the gathering of knowledge, independent from countries, on these indicators, and the codification of specific country indicators to be transferred to international organization and the gathering of knowledge on these indicators.

2) The design and implementation of an expert system to control the accuracy of incoming data. Expert rules and knowledge will be stored in two knowledge bases, one on standard indicators and one on selected indicators which are collected in specific partner countries. The control system will use the two knowledge bases containing rules given by specialists.

3) The design and implementation of a unique contribution interface to enter all types of statistical indicators using JAVA and Internet. The design of a transfer and security system.

The requirements

As statisticians often work with spreadsheets (like Excel) or databases, it is essential to develop a user-friendly interface which allows drag and drop, copy/paste, DDE link from spreadsheet to interface. The interface will create a message depending on the type of the indicators. It will crypt (secure) the message and send it to several control systems placed in

various international organizations. The control system will decode the message, control accuracy of data and send back an acknowledgment (good or bad depending on the expert system decision). Few other functions should be handled by the interface.

Classification of indicators and acquisition of knowledge

To create the codification and to gather knowledge we will:

- Make a list of industrialized and developing country indicators used by international organizations.
- Identify standard indicators, types of indicators, and calculation methodology.
- Identify, if applicable, similar indicators with different names, intermediate indicators used to calculate standard indicators, indictors with the same name but different meanings.
- Create a list and codification of all standard indicators for all countries and domains listed (estimation < 10000).
- Attach to the list the main knowledge on this indicators independent of countries.
- Simultaneously, make a list of selected country indicators which international organizations would like to collect with the system, and which we want to include in our pilot system, differentiate standard and intermediate indicators, and codify them in relation to the standard indicators codification. Gather main knowledge on this indicators.

To acquire knowledge we will use a large variety of sources: interview with experts, books, research reports, technical reports, project sponsors, end users, operational managers, conference proceedings, case libraries, reference manuals.

Main technologies

Architecture 3-Tier.

This architecture 3-Tier is more appropriate than the client/server architecture for our problem because the logic of the expert system is very complex and because we want to create an evolvable systems. It brings us many advantages:

- Separation between the IHM and the process.
- Possibility to support client JAVA and non-JAVA.
- The possibility to change database technologies or servers without changes on client.
- A better control of performance, because the servers are easier to upgrade than the client, and because we can control communication between client and server.
- Strong possibility reuse of specific objects

This architecture 3-tier offers also these advantages with internet:

- Better performance due to a faster protocol than Http or ODBC, and an IHM lighter, because we leave the logic on the sever.
- A better security handling, because the server has no restriction due to security rules of the applets and the server can control the access to databases.
- A lower administration cost.

JAVA.

The language JAVA is chosen because it is a WEB technology which brings many advantages:

- The portability of source code, bytecode, and OS/hardware.
- The compatibility (Java Compatibility Kit, 100% Pure Java).
- A warranty against evolution of technology.
- Can also be used on proprietary machines.

CORBA.

We propose to use CORBA because it is defined by the OMG (More than 700 members). It is the standard for interoperability of objects:

- Supports different language.
- Supports different platforms.
- and network communication.

Corba makes no difference between local or distant objects.

UML.

UML is often referred to as the method which will replace the Booch, OOSE, and OMT, or as a synthesis of these methods. It is now being presented to the OMG group for standardization.

EDI.

Several standard messages for statistical data (CUSDEC/INTAT, GESMES, CLASET, RDRMES) have been designed by different groups to normalize transfer of data between organizations. We want to make use of, as much as possible, the structure of these messages.

Tools and equipment

We will need a special tool for the expert system. The choice of this tool will be made after the specification. To program the interface we can choose from various systems. At this point, we prefer Visibroker for JAVA, CORBA 2.0 ORB, over Microsoft solutions or other ORBs.

We will also buy two NT stations, and a visio-conference system for each partner. These equipment expenditures are mentioned in the A2 costs list.

I B. A workplan clearly describing the scientific input of each partner should be included. This input should be complementary and reflect effective cooperation.

In this section, we split the main tasks of each partner, starting with the three EU partners who will work on the classification and knowledge acquisition in close relation with international organizations. The three CCE/NIS partners will work on the implementation of the different systems.

Partner 1. Pierre Genevier , France, EU

1) Would be in charge, with partner, 2 and 3, of creating the list and codification (or classification international) of standard indicators. He would be responsible, in particular, for the study of indicators produced by the following organizations: OECD, FAO, WHO, UNESCO.

2) Would also participate in the specifications and design of the sub-systems contribution interface and expert system with partners 4, 5 and 6.

3) Would acquire knowledge about standard indicators and selected indicators produced and received by its given organizations.

4) Would test knowledge and assist users of its given organizations in the first phase of exploitation.

Partner 2. MetaDynamics Ltd, England, EU

1) Would be in charge, with partner 1 and 3 of creating the list and codification (or classification international) of standard indicators. He would be responsible in particular for

the study of indicators produced by the following organizations World Bank, IMF, UNIDO, OMC.
2) Would participate in the specifications and design of the sub-systems transfer and expert system with partners 4, 5 and 6.
3) Would acquire knowledge about standard indicators and selected indicators produced or received by its given organizations.
4) Would test knowledge and assist users of its given organizations in the first phase of exploitation.

Partner 3. Aristotle University, Greece, EU
1) Would be in charge with partner 1 and 2 of creating the list and codification (or classification international) of standard indicators. He would be responsible in particular for the study of indicators produced by the following organizations UN, EUROSTAT, ILO, WMO.
2) Would participate in the specifications and design of the sub-system security and expert system with partner 4, 5 and 6.
3) Would acquire knowledge about standard indicators and selected indicators produced or received by its given organizations. Would be specially in charge of charge of the gathering of knowledge on selected country indicators to be collected with the system. (Partner 3 will put three years in the project in comparison with one year for 1 and 2).
4) Would test knowledge and assist users of its given organizations in first phase of exploitation.

Partner 4. Arkus Electronics, Poland
1) Would be in charge of designing and implementing the expert system (standard and selected country indicators) which controls incoming data. This includes the inference engine, various interfaces, the cache system to receive data, and the knowledge bases on indicators.
2) Would assist users in the first phase of exploitation.

Partner 5. Y University of Rousse, Bulgaria, Scientific coordinator.
1) Would be in charge of designing and implementing the contribution interface using JAVA. Several possible masks depending of the type of indicators and metadata to be entered would be developed, as well as specific functions (drag and drop, DDE links, copy/paste, etc.).
2) Would be in charge of designing the transfer and security systems, i.e. designing the security architecture (firewalls), choosing cryptographic systems, implementing the structure of message to be used for different indicators and metadata as well as appropriate protocols.
3) Would assist users in the first phase of exploitation.

Partner 6. Institute for Informatics and Automation Problems, National Academy of Sciences, Armenia.
1) Would write specifications of the different sub-systems, the control system, the contribution interface, and security and transfer systems.
2) Would participate in the analysis and design phase of these systems with partners 5 and 4.
3) Would test the different applications.
4) Would adapt the interface to the country.

•V Organization and management

•*A. Description of how the action will be organized and managed.*

Partners 1, 2 and 3, responsible for the sub-project 1(classification), will be in frequent contact with international organizations, and therefore, they will assist partner 6 for the specifications of the systems. They will conduct a user needs assessment. Aristotle University will work also on the selected country indicators which should be collected at first by the system. Aristotle University team will collect the specific knowledge for these indicators.
Partner 4, responsible for the sub-project 2 (control system), will work closely with partner 5, responsible for sub-project 3 (contribution).
Partner 6, responsible for the specifications of all systems, will act as technical project leader and assist partners, 4 and 5 in the analysis and design of the systems, as well as the testing. He will liaise with various normalization groups to make sure that the system conforms to international standard norms.

As coordination is a very important part of the project, a significant part of the budget is reserved for traveling. Every international organization will be visited at least once within the three years of the project. On-site discussion and visits with end users, managers and experts will also take place.
We will agree on a set of indicators that should be transferred by the system (not more than 20 000 at first for all organizations) and on a set of basic requirements for both the contribution and control systems. The work associated with the requirements should not exceed the work time allocated for the project. We have planned enough time to implement a feasible and friendly user solution (pilot system).

The acquisition of knowledge on standard and selected statistical indicators will be done in cooperation with the information bureau, statistics division, and specific users of each international organizations. The amount of knowledge we could gather being almost infinite, we will also have to agree on a reasonable amount of knowledge to be acquired.
Eu partners will be in frequent contact with users. As they are responsible for knowledge acquisition, they will have to transmit the knowledge gained during their work to CCE/NIS partners who will then create an appropriate system.
Possible synergy between the work of certain international organizations and our work should be identified as soon as possible for the mutual benefit of all parties concerned.

A monthly report will be written by a different partner every month to ensure effective communication. This report will contain follow-up on the work done, will justify eventual delays with respect to the planning. All communications will be issued in English.
Scientific exchange will take place during the coordination meeting. All partners will be responsible for presenting the technological evolution in their research field. These exchanges are particularly important in an environment like Internet where new technologies continuously arise.

Four coordination meetings are planned where each partner will present a summary of the work done. These meetings will take place after 6 , 12, 21, and 30 months. The dates and places will be determined according to the partner schedules.
Work meetings may take place between partners if needed. This will depend on the attribution of specific tasks. The training of users will be done by the partners.

Work meetings will take place every fifteen days through a visio-conference system using Internet. The visio-conferences will also facilitate communication and allows unplanned meetings on special topics.

IB. The relevant experience and the role of the coordinator.

The coordinator has several years experience in the fields of software development, information systems and statistics. For the past few years, he has conducted the research which motivates the project, found the partners and set up the project proposal.
He will organize coordination meetings, will be in contact with the European commission, and oversee project progress.

IC. A timetable (with a bar chart diagram) describing the scheduling of tasks should be included.

See on the previous page, diagram 1.

ID. Describe the cooperation activities with reference to each participant and the method of financial transaction.

Cooperation activities are the following. CCE/NIS partner will develop a system for international organizations. These same international organizations will cooperate by giving some of their knowledge to make the system more efficient. EU partners will act as an interface between CCE/NIS and international organizations. They will have frequent contact with both sides and should understand the needs and limits associated with both functions. These cooperative activities would be financed by the European Commission.
The three CCE/NIS partners will also have to cooperate actively with each other because the two systems are linked and they must follow standard international recommendations. Partner 6 in charge of specification will answer for the quality of the system.
The three EU partners will also have to cooperate with each other to produce the international classification of standard indicators, to identify same indicators used in different organizations, and to combine their research.

As far as the financial transactions are concerned, we plan to have a special bank account in ECU for the project which would allow us to follow the spending more accurately. The European Commission could transfer the project money to this account and then the money would be dispersed to the partners. Labor costs could be paid out twice a year, while specific spending, like equipment would be withdrawn when needed. The project coordinator will maintain a project expenses book. Every six months, a summary of expenses would be prepared and discussed with the EU coordinator.

•VI Expected results

Indicate the results and achievements which are expected and mention the ways how the project activities and results will be disseminated, including foreseen seminars and publications.

The real-time statistical indicators collection system

The first expected result is to have a system to collect statistical data. Since we will work with the main international organizations, they will be informed of our project and the expected result. The contribution interface will be translated to the various languages used in CCE/NIS region at first.

The international classification of standard indicators

The second result is to have a classification and knowledge on standard indicators. We will disseminate these results through internet by creating an internet interface to our expert system. This system will be given to the body responsible for coordinating statistical work between international organizations. More knowledge can be gathered and the control system efficiency can be improved through accompanying measures or additional projects.

Finally, we should write several papers, one concerning the entire project, and one for each sub-project.

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Professional Experience

Dow Jones Telerate France, Paris 96
Worked on contribution problems. (project 'Focus France')

Reuters AG, Munich, Germany 94-96
Worked on the project Dedis (Hypobank, Munich) for the development of RIDS (Reuters Internal Dealing System) and KOUGAR (Cross rates calculator and rates server) applications.

Department of Essonne, Evry, France 91-93
Coordinated several projects.

Schwarzkopf, Poitiers, France 89-91
Responsible for applications in marketing, sales, accounting, logistics, finance, purchasing. Managed the data processing team.

Schwarzkopf, Paris 87-89
Preparation of monthly marketing and sales statistics.

Clemson university 85-87
Taught mathematics to 1st and 2nd year students.

Education

81-82 **Northwestern State University** (Louisiana, USA)
83-85 Bachelor of Science in Mathematics and Computer Sciences.
Member of the Phi Kappa Phi honor society.

82-83 Military service.

85-87 **Clemson University** (South Carolina, USA)
Master of Science in Mathematical Sciences.

91-92 **Conservatoire National Des Arts et Métiers** (Paris)
Business Classes: Financial analysis, financial products and markets, long and short term financing.

Languages and Publications

French: Native language.
English: Fluent.
German: Working knowledge.
Co-authored two articles on a scheduling problem in American journals, 1989 and 1991. Researched (1993-1997) and wrote an article (unpublished) on a statistical data integration problem 1997. Project proposal to the INCO-COPERNICUS program.

MetaDynamics Ltd, England.

MetaDynamics is committed to assisting organizations in reaching their maximum advantage. We specialize in the analysis of complex operational problems and provide solutions which increase the efficiency and effectiveness of operations. To do this, we tackle problem areas through a scientific approach known as Operational Research.

MetaDynamics, through its international world class professionals, provides the best skills, the latest information systems to handle the most complex problems, and the training required to enable our clients to use the Operational Research Team's unique solutions to maximize their advantage.

MetaDynamics specializes in maximizing the efficiency and effectiveness of operations within organizations. It achieves this through its exclusive team of specialists - the Operational Research Team - who are professionals in providing optimal solutions to the client/client company.

MetaDynamics:
Undertakes initial investigations into the functional area which is under-performing as well as a complete review of other areas which may be affected - thereby assisting management with the formulation of the problem.

Designs the proposed solution method given the quantitative and qualitative constraints and subjective elements involved.

Provides, if required, the relevant information systems technology which will produce the most advantageous solution, manage the new system and thereby enable the client to continue achieving the desired results.

Advises the client on implementation and maintenance of the solution.

MetaDynamics provides a wide spectrum of services, some of which include:
•Advanced Statistical Analysis
•Risk Analysis and the Management of Risk
•Combinatorial Optimization
•Corporate Restructuring
•Decision Analysis & Resource Allocation Analysis
•Material Requirements Planning
•Production Planning
•Advanced Stock Control
•Analysis & Design of Information Systems
•Computerised Operations Simulations
•Strategic Consulting & Problem Structuring
•Software Design
•Financial Portfolio Optimization
•Forecasting
•Software Engineering
•Neural Networks & Artificial Intelligence

Researcher assigned to the project.

Phokion S. Georgiou BBA MSc
Director

Education & Professional Experience

Mr. Georgiou's education spanned three continents, culminating with a Bachelor in Business Administration from the University of Missouri and a Master of Science degree in Operational Research from the London School of Economics.
In 1988 he took up residency in London and began a successful career which focused on analyzing, designing and managing processes of change within large corporations, namely Hilton International, General Electric, the Government of The United Kingdom and Grand Metropolitan.
His work tackled a broad spectrum of corporate and organizational needs some of which included the design of efficiency indicators, the effective turnaround of problematic joint ventures, and the assessment of corporate cultures and their effectiveness on shareholder value. He is currently involved in enhancing the Decision and Organizational Processes of the London Metropolitan Police.
Whilst maintaining full time employment, Mr. Georgiou graduated in 1993 with top results from the University of London's Qualifying Course in Operational Research and was offered a place on the Masters program at the London School of Economics. He graduated from the LSE in 1995 with an MSc in Operational Research, specializing in strategic approaches to problem solving, namely System Dynamics and Problem Structuring Methods. He also specializes in Experimental Design, Advanced Statistical Analysis, Spreadsheet Modeling and Database Design. Mr. Georgiou's extensive project management skills have been used successfully in organizing European, national and commercial projects. Mr. Georgiou maintains strong links with the LSE. He lectures at the School in Operational Research as well as participates in research/consultancy projects. He is a member of the Operational Research Society, the international body at the forefront of Operational Research applications, and is also involved in designing Internet Web Sites to further the dissemination of Operational Research. He speaks several European languages and has lived throughout Africa, Europe and the United States.

In 1996, Mr. Georgiou formed MetaDynamics.

Aristotle University, Greece.

The Aristotle University of Thessaloniki is the largest University of Greece. Our expert team comprises of statisticians, economists, mathematicians information systems analysts and experts in the business restructuring area. We have provided consultancy services to a large number of small and medium enterprises in Greece and developed our training activities to a large extent.

The Aristotle University of Thessaloniki (AUTH) during the last six years has started with considerable success a very ambitious informatics and communication development program facing problems such as introduction, acceptance and development of new technologies. The objective is to achieve the maximum positive influence towards the change of social and economic structure.

The Economics and Business Administration Department of the University has as basic aim the study of strategic and financial problems that are concerning most of the industry sector in Greece. Some of the academic staff have a recognized consulting reputation and they are often confronted with problems of this nature.

The Highway Engineering Laboratory has a primary orientation the study of transport related problems. The majority of the scientific staff is planners or engineers. The Laboratory co-operates with various Greek and foreign organizations in studies and research projects in Greece and abroad.

b) Consultancy to Industry

For many years the Aristotle University of Thessaloniki has worked closely with many sectors of Industry and Commerce to mutual benefit. This has often taken the form of joint research projects. However, the University also provides consultancy to Industry and Commerce, making its expert staff and specialist facilities available on a commercial basis.
A consultancy contract can involve a feasibility study, new product development, optimization and cost reduction, problem solving, modeling and technology transfer. Contracts can vary in size. They can range from a major study involving all stages of analysis, design and manufacture and perhaps involving several people for a year or more, to running a specialist bespoke course for a single company lasting one week. A contract can be as small as one person working for half a day providing expert advice.
All the departments can act this way, however some of them have taken the step of creating special units (Laboratories, Centers) and contact points. Many of these units have been in operation for well over ten years and have considerable experience of working with industry and commerce and have an excellent reputation with their customers. Some of them have been recognized as Centers of Excellence.

Researchers assigned to the project.

Professor Grigorios Tsagas

Born 1 9 3 5, V l a s t i, K o z a n i, Greece.
Married, name of wife Julie.
Four children, Dianna, Sandy, Georgina, Mark.

E d u c a t i o n

1963-1965 Ph.D. with top honors (Differential Geometry), Aristotle University of Thessaloniki, Thessaloniki. Greece.
1955-1960 Diploma in Mathematics with top honors. Aristotle University of Thessaloniki, Thessaloniki, Greece.

E m p l o y m e n t

1976-now Full Professor, Department of Mathematics, School of Technology, University of Thessaloniki, Thessaloniki, Greece (elected unanimous).
1970-1975 Full Professor, Department of Mathematics, University of Patras, Greece (elected unanimous).
1969-1970 Research Associate, Department of Mathematics, University of Bonn, Germany.
1968-1969 Lecturer, Department of Mathematics, University of Thessaloniki, Thessaloniki, Greece.
1966-1968 Research Associate, Department of Mathematics, University of California Berkeley, California, U.S.A.
1963-1966 Teaching and Research Assistant, Department of Mathematics, University of Thessaloniki, Thessaloniki, Greece.

E u r o p e a n p r o j e c t s e x p e r i e n c e

1997 onwards Coordinator of the of the INTAS European Union sponsored project: ?Concurrent heuristics in data analysis and prediction?. This operational research project involves the cooperation between Greece, UK, Spain, Russia and Armenia. 1997 onwards Partner in the MEDCAMPUS European Commission Initiative. This European Union programme involves U.K., Greece, Turkey and Cyprus and deals with the training of local authorities on financial and political decisions.

1996 Co-ordinator of the EU-sponsored "Business Administration" training programme for Greek immigrants from the ex-Soviet Union. 1995

a)Partner in the MEDCAMPUS European Commission Initiative. This European Union programme involves U.K., Greece, Turkey and Cyprus and deals with the training of local authorities on financial and political decisions.

b)Co-ordinator of the EU-sponsored "PROJECT MANAGEMENT" training programme.

c)Co-ordinator of the EU-sponsored "Use of information technology in graphical environment" training programme.

1992-1993 Co-ordinator of the following EU-sponsored training programmes:

a)"Econometrics, Mathematics of Operational Research and Systems Analysis with the use of Information Technology".

b)"Training of unemployed women in Business Administration".

c)"Training of personnel in order to cope with the problems of the old-age".

d)"Co-operation between Enterprises and Universities: Training in CAD-CAM and business administration"

e)"Graduate training in Business Administration, Marketing, Economics and how to organise and manage effectively small and medium enterprises".

1991-1992 Co-ordinator of the EU - sponsored programme "Econometrics, Mathematics of Operational Research and Systems Analysis with the use of Information Technology".

A w a r d s

1. Visiting Professor, University of Thessalia, Volos, Greece, 1990-1993.
2. Visiting Professor, University of Dortmund, Germany, 1986-1987.
3. Visiting Research Fellow, University of Melbourne, Australia, July-October 1984.
4. Visiting Professor, University of Thrace, Xanthi, Greece, 1975-1977.
5. Visiting Mathematician, Department of Mathematics, University of California, Berkeley, California, U.S.A September-October 1974.
6. Visiting Professor, University of Minnesota, Minneapolis. July-August 1974.
7. Research Associate, University of Bonn, Germany, 1969-1970.
8. N.A.T.O. Research fellowship, Berkeley, California, U.S.A. 1966-1968.

R e f e r e e

1. Bulletin of the Greek Mathematical Society.
2. Mathematica Balkanica.
3. Proceedings of the American Mathematical Society.

M e m b e r s h i p

1. American Mathematical Society.
2. Greek Mathematical Society.
3. Tensor Society

R e v i e w e r

1. Mathematical Reviews
2. Zentralblatt fur Mathematik

O f f i c i a l P o s i t i o n s

1. Member of the Research Committee of A.U.T.
2. Member of the Senate for the New Technical University of Crete, 1977-1981.
3. Dean of the School of Technology, University of Thessaloniki, 1979-1980.
4. Senator of the University of Thessaloniki, 1978-1979.

P u b l i c a t i o n s

1. 210 Scientific papers.
2. 32 Scientific books.

Other University activities

1. Invited and participated in more than 150 University Congresses and gave conference talk.
2. Supervised 16 Doctor degrees (Ph.D's) Thesis and participated as an examiner to others (3 of them abroad).
3. Editor of International Conferences's Proceedings.

Journal Editor

1. Algebras, Groups and Geometries.

Congress Organizer

1. International workshops a) "Differential Geometry, Global Analysis and Lie Algebras" and b) Mathematics and Aristoteles, Thessaloniki 1997
2. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1996.
3. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1995.
4. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1994.
5. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1993.
6. International workshop "Differential Geometry and Global Analysis", Thessaloniki 1992.
7. International workshop "Lie Groups, Lie Algebras and their Applications", Thessaloniki 1991.
8. International Congress by UNESKO "Applications of Mathematics in Socio-Economic Development", Thessaloniki 1980.
9. International Congress by UNESKO "Applied Mathematics" Thessaloniki 1976.
10. International Congress to the Honour of Professor Karatheodori, Athens 1972.
11. International Mathematical Congress in Patra, Greece 1971.

Proceedings

1. International workshops a) "Differential Geometry, Global Analysis and Lie Algebras" and b) Mathematics and Aristoteles, Thessaloniki 1997
2. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1996.
3. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1995.
4. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1994.
5. International workshop "Differential Geometry, Global Analysis and Lie Algebras", Thessaloniki 1993.
6. International Congress in "Applications ofMathematics in Socio-Economic Development", Thessaloniki 1980.
7. International Congress in "Applied Mathematics", Thessaloniki 1976.
8. International Congress to the Honour of Professor Karatheodori, 1972.

Spyros Kiartzis Research Associate

SPYROS J. KIARTZIS
Dipl. Electr. Engineer
(December 1996)

10 Arionos Str.
543 51 Thessaloniki
email: kiartzis@amphipolis.ee.auth.gr

PERSONAL DATA
Date of Birth 29 January 1969
Place of Birth Thessaloniki, Greece
Family Status Single
Citizenship Greek

EDUCATION
1987-1992 Aristotle University of Thessaloniki, Diploma in Electrical Engineering. (GPA = 7.2 / 10.0).
Summer 1988 Summer School on Chaos and Nonlinear Dynamic Systems, Aegean University, Samos.
October 1992 Ph.D. Candidate in Dept. of Electrical and Computer Engineering, Aristotle University of Thessaloniki. Dissertation Title: "Artificial Intelligence Applications in Power Systems". Directed byProf. A. G. Bakirtzis.
March 1992 Student in Department of Economics, School of Law and Economics, Aristotle University of Thessaloniki.

EMPLOYMENT HISTORY
? research associate, Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, funded research topic "Short Term Load Forecasting using Neural Networks and Fuzzy Neural Networks", co-sponsored by the PPC and the Greek Secretary General of Research and Technology, (10/92 - present).
? working as professional engineer in the private sector, (11/92 -present).
? lecturer at the 2nd I.E.K. of Thessaloniki, (2/93 - 7/95).
? participated in engineering design and project management team under Prof. P. Dokopoulos, advising the "METON. - THESSALIKI. - NORTH HELLAS.
- N. KAMATAKIS" Consortium for the construction of "Thessaloniki Sewage Treatment Plant", (8 - 11/95).

TEACHING EXPERIENCE
At Aristotle Univ.:teaching assistant for the courses of Electrical Economy, Power Systems Fundamentals, Power Systems Analysis and Artificial Intelligence Applications.
At 2nd I.E.K. :lecturer on topics of industrial applications, control and measurements, circuit theory, electric machines and power electronics theory.

PUBLICATIONS 16 papers

Konstantinos Kanellopoulos Research Associate

4, G. Konstantinidi Street
Marital Status: Single
546 40 Thessaloniki, Nationality: Greek
GREECE
Mother tongue: Greek
tel: +30_31_821-328
Other languages: English , German

Date of birth: 21/04/1969
E-mail: kanelo@vergina.eng.auth.gr
Place of birth: Thessaloniki, Greece
Military status: Financial Second Lieutenant of the Reserve

WORK EXPERIENCE / AFFILIATIONS

1. Aristotle University of Thessaloniki, Greece. School of Technology, Division of Mathematics Currently Project Consultant under the supervision of Professor G. Tsagas. Work involvement as a consultant in the following projects:
a) Reinforcement of the research infrastructure of the Aristotle University. Contract agreement: September 1 1996 - August 31 1997.
b) INTAS project ?Concurrent heuristics in data analysis and prediction?.
2. Educational Center of the Aristotle University of Thessaloniki. Lecturer in "Business Administration". September - December 1996.
3. Export Credit Guarantee Department, Harbour Exchange Square, Docklands, London: Responsible for assessing the financial performance criteria under which the Export Credits Guarantee Department is charged by the U.K. Minister of Industry and Commerce to operate. June 1995 - September 1995.
4. Hellenic Army (Financial Services), Thessaloniki, Greece. Responsible for the approval of money distribution to six military units in Northern Greece. Co-responsible for the auditing of the finance department annual budget. January1993 - September 1994.

EDUCATION

1994-1995: University of London, London School of Economics and Political Science (L.S.E.): Master of Science, in "Operational Research and Information Systems"
1988-1992: Aristotle University of Thessaloniki, Greece, School of Science, Department of Mathematics. BSc in Mathematics. Final Grade: (8.45 out of 10). Awarded 3 scholarships from the National Scholarship Foundation during the first 3 years of undergraduate studies.

PROFESSIONAL TRAINING

1. Greek Military School of Officers, Centre of Training for war materials and maintenance and Centre for training in Economics 23/11/92 until 6/6/93 Experience through practice: in (Central Treasury of the Army) 7/6/1993 until 23/10/1994.
2. Greek Productivity Centre. September 1992 - November 1992. Topic: "Object Oriented Programming with Pascal and C++"
3. Ruprecht-Karls Universität, Heidelberg, Germany. Summer 1991, Internationaler Ferienkurs für Deutsche Sprache und Kultur.

PUBLICATIONS / RESEARCH WORK 5

Charalambos Spathis, Research Associate

ADDRESS: Home: 17, A. Symeonidou Str., 546 39 Thessaloniki Greece, Tel.: (031) 849416
Office: Aristotle's University, Department of Economics Division of Business ?dministratiïn 540 06 Thessaloniki, Greece Tel.: (031) 996465, Fax: (031) 996452
PERSONAL DATA: Married, three children
Date of Birth: 17/ 11 / 1960
Nationality: Greek

EDUCATION
1996 : Ph. D. Aristotle's University of ? Thessaloniki, Greece, Department of Economics, Division of Business Administration, Major Field: Management Accounting.
1995: M.A. Aristotle's University of Thessaloniki, Greece, Department of Economics, Division of Business Administration, Major Field: Managerial Economics.
1993: Diploma in Professional and Technical Education, School of Thessaloniki (SELETE).
1988: B. Sc. Aristotle's University of Thessaloniki, Greece, Department of Economics, Division ïf Business Administratiïn, Major Field: Economics.
1984: Diplïma in Accounting, technical Education Institution

PROFESSIONAL ACTIVITIES
1984 -1991 :HELLENIC STEEL Co., Accounting and Costing Departments
1991 - today: AGELINA" A. PAPAKONSTANTINOY INDUSTRY S.A., Accounting Department.
1988 - today: Auditor and Financial Cïnsõltant in various enterprises
1992 - today: Co-ordinator in various feasibility Studies and Investments Proposals

ACADEMIC AND OTHER EXPERIENCE
1990 - today: Research Assistant and Instructor of Financial and ?anagement Accounting, Auditing, Computerised Accounting in Aristotle's University of Thessaloniki, Greece, Department of Economics, Division of Business Administration
1992 - today: Assistant Professor of Accounting in Technical Education Institution Thessaloniki
1995 -1996: Teacher of Economics in High School Thessaloniki
1991 - today: Professor- of Accounting, Cost Accounting, Auditing, Taxation, in Private Educational Institution of Thessaloniki
1992 - today: lnstructor of Business ?lanning, Computerised Accounting in European Training Programs
1993 -1994: Instructor of Taxation and Auditing in Greek National Centre ïf Public ?anagement Thessaloniki

LANGUAGES
English, German.

PUBLICATIONS 3 papers

Arkus Electronics

History

1995-1997**IT project coordination and realization**
In last two years the company cooperated in realization of several IT projects for industry.

It was necessary for the projects goals to provide knowledge on different subjects like **artificial intelligence**, **data analysis and visualization**, **Internet**, etc.1994**Establishing two software departments**

*Dynamic growth of the company was started with its first software department, focusing on design and implementation of Artificial Intelligence based systems. In the same year Virtual Reality department was distinguished.*1993

Cooperation with Technical University of Wroclaw
Initially, Arkus Electronics was founded by two Technical University graduates: Jaros?aw Adamczyk and Pawel Klonecki. They decided to continue close cooperation with the Univesisty in the field of Artificial Intelligence.Activities

The goal

Arkus Electronics's goal is to provide the latest solutions in the fields of **computer aided management**, **production** and **computer technology**. The company continuously extends its software experience into different fields of programming like *industry process monitoring*, *finance systems*, *Internet solutions*.**The European Dimension**

Starting from late 1994, the company established closer contacts with several EU institutions and companies. One of the results is „The European Information Technology Prize Winner 1996" award.**Education and promotion of Artificial Intelligence**
In the meantime Arkus Electronics has been frequently present at international software fairs (CEBIT'95, CEBIT'96, CEBIT'97, SYSTEMS'96), where the company used to the ideas concerning Artificial Intelligence - especially Artificial Neural Networks, Genetic Algorithms and Expert Systems.Achievements

AI PROBLEMS**Neural Network Simulator Orka v3.0 awarded The European IT Prize'97 Winner in Brussels**VIRTUAL REALITY**Project coordination & realization for PepsiCo Int. Detailed Information**

Company name**Arkus Electronics**Executives**Jaroslaw Adamczyk president**
Pawel Klonecki vice-president Business premises**50-123 Wroclaw, ul. Olawska 2, , Poland**
tel. (+4871) 34 888 81, (+4871) 72 57 65 e-mail: arkus@arkus.wroc.pl

Number of Employees 45

Researchers assigned to the project.

Jaroslaw Adamczyk
Company: **Arkus Electronics**
Tel.: (+48 71) 343-88-81, e-mail: jarek@arkus.wroc.pl

Present Tasks

Since 1995**Project Consultant**
Reviewing and assistance in evaluation of software projects and prototypes in the field of Multimedia and Virtual Reality. Since 1994**Management Director of software company**
Coordination and business assistance software projects realization.Main Past Professional Experience

*1994-1996**Associated researcher***
*Researcher in Technical Cybernetic Institute at Wroclaw Technical University in domain of Transputer and DSP systems.1992-1994**Management and coordination***
*Organization of Workshops in the field of micro-processor systems under supervision of Connecticut State University.*1989-1991

Micro-processor system designer
Designer and analyzer of micro-processor and micro-controller systems. Memberships

Since 1995**PANC (Polish association for networking and computerization)**
Consultant in the field of „IT Applications". Since 1995**Research Team (Wroclaw Technical University)**
Consultancy, reviewing and technical assistance in scientific projects realization in the field of Multimedia and Virtual Reality. Since 1993**Arkus Electronics, Poland**
Permanent member of president body of Arkus Electronics.Achievements and Publications

European IT Prize'96Participation in coordination of „Orka" project realization (Neural Network Simulator awarded The European IT Prize'96 Winner).Pepsi-cola InternationalCoordination of Virtual Reality advertisement project. The realization included software and hardware solutions.Conference in Johannesburg'97Delegate for The EU - South Africa Electronics Business Forum, Supported by the European Commission.Who's Who of ProfessionalsSelection for inclusion in the 1997 edition of International Who's Who issued by AmericanOrka 4.0 ManualCoordination and participation in creation of the manual for GA and ANN computing.Virtual CityReviewing and coordination of multimedia project for municipality of Wroclaw.

Education

*1987-1992**Technical University of Wroclaw***
*Study at Informatics Department. M.Sc. thesis on Virtual Reality area: „Ergonomic modeling of car cockpits”.*1983-1987

Secondary school
Four year college - specialization mathematics and Informatics

Languages:

EnglishGood skilled, written and spoken.PolishNative language

Marcin Biliñski

Company: **Arkus Electronics**

Education

*1989-1995**Technical University of Wroclaw***
*Study at Electronics Department , specialisation in Informatics. MSc thesis on AI area „The use of Genetic Algorithms in Neural Networks teaching process”1992/93**T.E.I. Technical Educational Institute (Thessalonike, Greece)***
*During study on Technical University of Wroclaw half year study abroad. Study on Automation and Informatics.*1985-1989

Secondary school (XIV LO in Wroclaw named Belgian Polonia)
Four year college - speciality mathematics and InformaticsJobs

from 1.01.1994**Arkus Electronics**, Wroclaw

Working as a programmer, software designer and finally project manager. Among others participating in designing and realization of „Orka ” project (Neural Network Simulator awarded The European IT Prize’96 Winner). Specialist in filed of genetic and evolutionary algorithms.from 1.02.1996**Technical University of Wroclaw**

Working as a lecturer at Technical Cybernetic Institute and as a scientific staff in the team dealing with „*Evolutionary processes and behavior of small populations*”.01.08.1993-31.12.1993**Baza, Wroclaw**

Working as designer of micro-controller and microprocessor systems. Professional experiences

AI problems:Neural Networks, Expert systems, Evolutionary algorithmsKnowledge representation:Object oriented representation, Relational databasesProgramming languages:C/C++, Pascal, JavaOperational Systems:Windows 3.1/95/NTLanguages: EnglishGood skilled, written and spoken.GermanBasic level of knowledge.

Pawel Klonecki

Company: **Arkus Electronics**

Present Tasks

Since 1995**Project Technical Manager**
Reviewing and assistance in technical evaluation of software projects and prototypes. Realization and coordination of projects from the field of AI technologies.Since 1994**Scientific Staff**

Assistance as a scientific staff and consultant in Institute of Control and Systems Engineering at Wroc?aw Technical University.Main Past Professional Experience

*1995-1996**Management Director***
*Coordination and business assistance in Virtual Reality projects realization.*1994-1995***Researcher***
*Research under supervision of Prof. Adam Nobis in the field of social and economic simulations.1992-1994**Researcher***
*Research and sub-projects realization under supervision of Prof. Zdzislaw Bubnicki in the field of efficient algorithms and tools design for parallel architectures.*1989-1991

Developer

Analyzer and programmer of Operating Systems for Mainframes and Super Computers. Memberships

Since 1993**Arkus Electronics**, Poland

Permanent member of president body of Arkus Electronics.Since 1996**PANC (Polish Association for Networking and Computerization)**

Consultant in the field of „Software Technologies". Since 1994**Research Team (Wroclaw Technical University)**

Consultancy, reviewing and technical assistance in scientific projects realization in the field of AI.Achievements and Publications

European IT Prize'96

WinnerParticipation in designing and realization of „Orka " project (Neural Network Simulator awarded The European IT Prize'96 Winner) Kwartalnik Elektroniki i Telekomunikacji 1992**Finite difference method application to microstrip transmission lines** XI International Conference on System Science 1992**Genetic algorithms in optimization problems**Journal of Empirical Text Research 1994**Simulation der Selbstorganisation kultureller Prozesse**Studium Generale – Universitis Wratislaviensis 1995**Artificial Culture - simulationEducation**

*1989-1992**Technical University of Wroclaw***
Study at Informatics Department. M.Sc. thesis on „AI methods in multi-level

*recognition".*1985-1990***Technical University of Wroclaw***
*Study at Electronics Department. M.Sc. thesis on „Numerical methods in telecommunication".*1981-1985

SECONDARY SCHOOL
FOUR YEAR COLLEGE - SPECIALIZATION MATHEMATICS
LANGUAGES: ENGLISHGOOD WRITTEN AND SPOKENPOLISHNATIVE LANGUAGE

University of Rousse, Bulgaria.

1.1. Although the University of Rousse was founded as strictly specialised at the beginning, it had a high national meaning because only at Rousse agricultural machine and electroengineers were educated. The foundation of HMEI Varna, HMEI Gabrovo and the subsidiary of the Sofia University in Plovdiv narrowed its national importance. At present the University of Rousse is a typical regional university because 50-80% of the students come from the region of Rousse. This tendency will last for a long time because of the existing economic crisis.

This fact shows the necessity of diversification of education so that the needs of the region are satisfied. This is partially done by developing of the specialities agriculture, law, business and management, pedagogic, kinesitherapy and European Studies. What follows is a urgent necessity of stabilising the faculties where these specialities are being developed.

1.2. The city of Rousse is situated in a rich agricultural region and the only faculty of Mechanisation of Agriculture (FMA) exists since 40 years at the University of Rousse. Concerning the changes in economy and partly in agriculture, the faculties have to be re-oriented to the new realities enlarging the activities and renewing the teaching method. The FMA is the only faculty that depends on the fundamental changes. Taking this into consideration, this faculty has to be entirely changed.

1.3. However ranked on the third place, this statement and the conclusions drawn from it are of vital importance for the University of Rousse. The city is not only the centre of a rural region but there used to be much industry here as well. Regression causes the decrease in the number of factories and, of course, there is no need of engineers. That is why the main conclusion for the University of Rousse is to preserve the engineering facilities and the highly qualified people working there.

1.4. The University of Rousse has worked closely and has supported methodologically for a long time the three colleges in Silistra, Jambol and Razgrad. These institutes have to merge, having in mind the terms of the law for higher education which postpones the bachelors degree. It is necessary to gain experience and to be assisted by the West European countries that traditionally develop this degree.

1.5. Thanks basically to the active co-operation with British universities within the TEMPUS Scheme, two specialities referring to the BEng degree already exist at the University of Rousse. They are the Information Technologies, the Integrated Engineering .

Researchers assigned to the project.

Emil Ivanov Gizdarski, Ph.D., Senior lecturer

EDUCATION

1994 Ph.D. in Computer Engineering, Technical university of Sofia
1987 M.Sc. in Computer Science, University of Rousse
1986 B.Sc. in Computer Engineering, University of Rousse

WORK EXPERIENCE

1996 Vice head of research
1995 Senior lecturer Dept. of CS., University of Rousse
1992-1995 Lecturer Dept. of CS, University of Rousse
1989-1992 Assistant Professor Dept. of CS, University of Rousse
1987-1989 Research Student ISIB, University of Rousse

INTERNATIONAL EXPERIENCE

TEMPUS IMG-10-13-93
TEMPUS S_JEP 11392 "Restructuring Degree Courses in Computing"

CURRENT RESEARCH INTERESTS

fault-tolerant systems; CAD, CAM, EDA, object oriented programming

Ognian Zdravkov Topalov, M.Sc, Lecturer

EDUCATION

1988 M.Sc. University of Rousse, Computer Systems Department

WORK EXPERIENCE

1996-1998 Visiting research in University of Pusan, Korea
1991 Lecturer, Dept. of CS., University of Rousse
1988-1991 Assistant professor , University of Rousse, Computer Systems Department

INTERNATIONAL EXPERIENCE

TEMPUS S_JEP 07653 "Inter-University Center for Modern Educational Technologies"
TEMPUS S_JEP 11392 "Restructuring Degree Courses in Computing"

INTERESTS AND ACTIVITIES

Artificial intelligence, Neurone networks, Object Oriented Programming

Assembler, Pascal, Visual C++, Java, Visual Basic and Delphi program languages.

Tsvetozar Stefanov Georgiev, M.Sc, Lecturerc

EDUCATION
1990 M.Sc. University of Rousse, Computer Systems Department

WORK EXPERIENCE
1997 Lecturer, University of Rousse, Computer Systems Department
1995-1997 Assistant professor , University of Rousse, Computer Systems Department
1991-1995 Research assistant, University of Rousse, Institute of Scientific Development

INTERNATIONAL EXPERIENCE
TEMPUS S_JEP 07653 “Inter-University Center for Modern Educational Technologies”
TEMPUS S_JEP 09349 “Inter-University Foreign Language Training Network”
TEMPUS S_JEP 11392 “Restructuring Degree Courses in Computing”

INTERESTS AND ACTIVITIES
Object Oriented Programming, Industrial Automation, Multimedia Application Development

Assembler, Pascal, Visual Basic, Delphi and OpenScript program languages.

Orlin Dimitrov Mirchev, M.Sc

EDUCATION
1987 M.Sc. Technival University of Sofia, Dept. of Computer science

WORK EXPERIENCE
1995 NOVELL 4.1 Administrator & System supervisor, UNION BANK, Rousse
1994-1995 Leader of SOFTWARE DEPARTMENT, Bank High Sys Ltd., Sofia
1990-1994 Leader of SOFTWARE DEPARTMENT, Delta Instruments Ltd. Sofia
1987-1990 Assistant professor , TU of Sofia, Dept. of ELECTRICAL MEASURING

INTERNATIONAL EXPERIENCE
UNIDO Project “Automatic meteorological system & databases”

INTERESTS AND ACTIVITIES
Database for IBM PC based systems, CAD/CAM Applications,
Industrial software Industrial remote control systems,
Communications, Network Supervising
Pascal, C/C++,

Institute for Informatics and Automation Problems
National Academy of Sciences and Yerevan State University
Republic of Armenia

The Institute was established in 1957. It has a number of divisions with a total number of about 186 people employed (among them researchers - 116, D. Sc - 10, Cand. Sc. - 50).

For many decades the Institute carried out fundamental investigations in the areas of Informatics and Computer Science and Intelligence Systems Design on base of these investigations. Besides the Institute is engaged in training of high-leveled specialists in these areas. All divisions teach students and postgraduates as well as have their own research projects. In the last years we have started studying and the development of new Programming Intelligent Tools on base of mathematics - grounded methods. Currently the Institute acts as the Internet Provider of the Scientific Network of Armenia including many research organizations and universities.

Current investigations are in the field of:
* Discrete Mathematics, Modeling and Optimization
* Coding Theory and Information Theory
* Mathematical Logic and Theory of Algorithms
* Automaton Theory and Industrial Systems
* Artificial Intelligence and Management Support Systems
* Pattern Recognition and Image Analysis
* Software Engineering, Distributed Information Systems

International contacts

Important research and development projects have been initiated in cooperation with: Research Institute of Automation and Computer Sciences of Hungarian Academy of Sciences since 1975 and Technical University of Darmstadt, Germany since 1990.

The Institute collaborates successfully with the University of Osaka, Japan, University of Tampere, Finland, Computer Center of Academy of Sciences of Russia, National Technical University of Athens, Greece.

Besides it participates in a number of cooperative projects with EIATCS, NATO Science Division and INTAS.

Address: P.Sevak 1, 375014 Yerevan,
Armenia, tel: 28-58-12, http://ipia.sci.am
C2.1. A brief Curriculum Vitae of the principal scientific staff involved in the proposal

Researchers assigned to the project.

1. Yuri H. Shoukourian, Prof., Dr.□

Society Membership
Full Member of the Armenian Academy of Sciences.
Member of the Informatics Committee of the Russian Academy of Sciences.
Member of the Software Committee of the Russian Academy of Sciences.
Member of the European Association of Theoretical Computer Science.
Correspondent of Central&Eastern European Initiatives Committee of IEEE Computer Society.

EDUCATION
Candidate of Phys.- Mathematical Sciences in Mathematical Cybernetics Institute of Cybernetics of Ukrainian Academy of Sciences, Kiev, 1968.
Thesis: On the optimization of automaton with terminal state.

Doctor of Technical Sciences in Software Engineering, Institute of Cybernetics of Ukrainian Academy of Sciences Kiev, Ukraine, 1982.
Thesis: Automata-based methods of analysis and optimization in the computer aided design for microprogramming structure.

EMPLOYMENT

1980-1986	Yerevan Institute of Mathematical Machines, Chief of the Department of the Software Engineering.
1986 - present	Institute for Informatics and Automation Problems of Armenian National Academy of Sciences, Yerevan. Director, Head of the Department of CAD and Automata Theory.
1985 - present	Yerevan State University. Professor.□
1995 - present	Vice-President of Armenian National Academy of Sciences

RESEARCH INTERESTS
Theory: Automata theory, theoretical programming, computer aided design.
Software Engineering: Programming languages, microprogramming, parallel computation.

MAIN ACHIEVEMENTS

1. Development of techniques for optimization of the speed of discrete converters (d.c. is a system consisting of two interacting components - automata with terminal state and information environment) in the class of equivalence to with respect operator semigroup over information environment. Proof of solvability of optimization problem for new classes d.c. Development of (decision) table program model and the method optimization by means of acyclic partition automata.
2. Development of formal models for microprogramming processors and methods for their verification (system of the full functional tests,

correctness, generation of the diagnostic tests). Development of the testing technique for programs on the base of specification language.

3. Development of methods for parallelization automata via compaction outputs, which are elements of free commutative semigroups and investigation of decision problems for languages processes in oriented graphs.

APPLIED RESEARCH

1. Program system for simulation of the microprogramming processors, microcode generation, PC program for verification of logical circuits and microprogramm scheduling
2. CAD system for main-frame and minicomputers, which have been design in the Yerevan Institute of Mathematical Machines.
3. Extension of multitasking operation system for fault-tolerant minicomputer complex.
4. Radiomodems fragment for Armenian scientific network for the link with INTERNET.

PROJECTS□

1. Participant in INTAS project number INTAS-93-1702 "Efficient Symbolic Computing" in collaboration with 10 other universities from the European Union and 8 institutions from the former Soviet Union.
2. Participant in NATO project for telecommunications development in Armenia.

2. Ms. Hasmik Ghazaryan

Senior Researcher, Laboratory of Discrete Analysis & Modeling Technologies,
Institute for Informatics and Automation Problems,
National Academy of Sciences, Yerevan State University,
P.Sevak Str.,1, 375044, Yerevan, Armenia,
Tel.: +3742 283170.

M.Sc. - 1993, Computer Center AS, Yerevan,
Mathematics, Diploma - 1990, Yerevan State University.

Main field: Software Engineering. Other fields: Logic, Combinatorics.
Current research interests: Information acquisition and analysis.

Number of papers in refereed journals: 5,
Number of communications to scientific meetings: 4.

3. Mr. Koriun Markaryan

Senior Researcher, Laboratory of Discrete Analysis & Modeling Technologies,

Institute for Informatics and Automation Problems,
National Academy of Sciences, Yerevan State University,
P.Sevak Str.,1, 375044, Yerevan, Armenia,
Tel.: +3742 283170, Fax.: +3742 285812

M.Sc. - 1995, Computer Center AS, Yerevan,
Mathematics, Diploma - 1992, Yerevan State University.

Main field: Data Bases. Other fields: Software Engineering.
Current research interests: Management Support Systems.

Number of papers in refereed journals: 3,
Number of communications to scientific meetings: 2.

4. Ms. Irina Arsenyan (Akopova)

Senior Researcher, Laboratory of Discrete Analysis & Modeling Technologies,

Institute for Informatics and Automation Problems,
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