

**THE NATIONAL INSTITUTE FOR MARINE RESEARCH AND  
DEVELOPMENT „GRIGORE ANTIPA”  
IT & C**

**IT&C - NECESSARY SUPPORT ENTITY**

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15 years ago, the presentation at the XXV<sup>th</sup> Anniversary started with a quote on computer activity fashionable in the '90s: "Who will not know to use computers will be illiterate in 2000". The utterances of one of the great mathematicians of the modern world, perhaps the greatest in Romania, seem now more significant:

*"Mathematics is the future Latin mandatory for all scientists. Precisely because the mathematics allows maximum speed of movement of scientific ideas."*

*"Everything that is correct thinking is math or is likely to mathematization."*

Moisil Grigore (1906-1973)

During the 40-year history of institutional research entity IRCM / NIMRD celebrated now, research articles were always the sweet taste of curiosity, the salty-bitter sea flavour wrapped by breeze, the strong smell of seaweed thrown ashore and colour from red-orange bloom to dark gray sky reflected in water, passing, rarely, by intense green or blue transparent waves swaying under immaculate cyan air they met at horizon.

Whether water samples were taken from surface or deep, or are "bitten" mud or sand on the bottom that hides the lives of interesting creatures, or other creatures are gathered from three-dimensional liquid, whether research approach aims other activities, all those who follow, supervise, monitor, study, investigate the Black Sea empire at a time or other in personal or global history can and should leave all the treasures they had access to followers. But in moments of confession words prove too fade, or too little or not always quite so skilfully chosen to describe what you see with the naked eye or microscope, what you tasted, smelled, touched, measured in the wonderful adventure of knowledge. Then another language comes to the rescue, in apparent disagreement with deep feelings caused by revelations of

the senses, but it offers the compensation, the revelation of scientific truths whose discovery we made our smaller or greater contribution, a revelation expressed through figures, graphs, tables and formulas that talk about themselves, about involvement efforts, the importance of scientific approaches, about the extent of our evolution as individuals and researchers.

This language, the only capable of such performance, is that of the sophisticated equipment - the latest – dedicated to storage, processing and interpretation of data and then of the results, the only allowing us to leave behind a sharper, more accurate and more coherent objective image of the world. Exclusively mathematical - friendly or not by this attribute - the language we refer (*"Mathematics is a language and a science"* Lucian Blaga - 1895-1961) has been, already a long time, indispensable to any institution that is concerned, any that actually do research, due to its multiple applicability and valuable performances. Abstract mathematical tools are particularly useful in solving specific problems (*"God used beautiful mathematics in Creating the World"* P.A.M. Dirac - 1902 to 1984) in various fields, where science come first.

Applied mathematics is of paramount importance in statistics, whose mathematical formulation is expressed specifically in probability theory. Statisticians (working on research projects) "create data that makes sense" by sampling / extraction / measurement or randomized experiments - design measurements / experiments characterizing statistical analysis before data being acquired. When you consider experimental data or analyze data from observational studies, statistics "gives meaning to data" using modelling and inference theory, by selecting and estimating the model; the estimated models and predictions arising from these can / should be tested on new data.

Operationalization in that area was extremely laborious and turned easy on the long road from style and parchment, by the abacus and calculator with four or more tasks to computer net now. Today computational mathematics proposes methods for solving problems beyond human capacity. Numerical analysis is using ideas from functional analysis and approximation theory, including the study of errors and meshing. Other areas of computational mathematics field concerns formal and symbolic calculation.

It should be noted that in IRCM - currently NIMRD - there were concerns about computer and information technology since the late 70s, when thousands of punched cards were carried to and from the County or Navy Computer Centre by a team of enthusiastic physicists. The facilities of quick and assured accurate calculations became fascinating after application of complex statistical processing, harmonic analysis a.s.o. on data sets, so appeared also attempts of modelling and simulation.

Jump generated by installation in 1986 of an institute minicalculator I-102F in the implementation of a DBMS and database creation on fishing – by CTCE specialists - led to the multiplication of tasks: accounting software, bibliographic database type, complex programs data processing, etc... Obviously, seemed to have occurred the moment for elaboration of medium-term development plans, but that reversed soon; the post-revolutionary access to information, the first PCs, the development of first databases and colleagues desire for absolute confidentiality of data ... have not been previewed and planned. Then the years 1994 and 1995 have generated major changes:

- acquiring hardware and software through international programs (NATO, UNEP)
- access to commercial software development (dBase, FoxPro), which allowed the creation of own applications for the institute needs as well as software for text editing, spreadsheets, etc... (Microsoft Office)
- Internet access, completion of the first internal network and creation and operation of the first e-mail server (1995) (communication and documentation being facilitated by email and then the network search using the forgotten Lynx and the - now old - browser Netscape)
- accelerated learning and adapting to new operating systems and new programming languages,
- creation and operation of the institution's Web server 1995-1996 (among the first in the country!) important way of dissemination,
- assistance / expertise in more hardware and software purchases,
- provision of services - email, internet access, advice – to other institutions and also support the colleagues researchers new equipment and using these techniques, and participation by peculiar themes to the research effort.

IT team - born 2000 from the old Computing Office - continued steadily:

- \* to support and develop the ITC core occurred before 1980
- \* to make further studies and independent research or to sustain others' activities using computer expertise
- \* to assist (hardware / software) users in the institute.

Thus, only during 2000-2005 period the IT team:

- completed documentation, study and implementation of free GIS GRASS, generating an initial field expertise, developed by:

- establishing a data fund through geo-referencing maps and raster maps and making vector maps, developed later – 2008, 2009 – by whole coast corrected photo maps
  - implementation of applications for access points and monitoring parameters based on the demarcation of the area and the time desired;
  - production of thematic maps based on interpolation values of monitoring points;
- contributed significantly to the implementation of EU Directive in 2850, by:
- study, adaptation, implementation and put in operation (including other institutions) of GIS MARPLOT (NOAA / EPA) and generation of thematic maps;
  - study, adaptation, implementation and put in operation (including other institutions, including the Ministry of Environment) a system to forecast spatial-temporal evolution of oil spilled into the marine environment - DOGS+CATS+Gnome+GnomeAnalyst model and associated programs ADIOS2, SpillTool, Trocs, ConversionCalc, TrajCalc, BoomCalc, Trilogy, and so on. NIMRD involvement in the national response to marine pollution, national and international exercises, workshops and seminars generated a high level of expertise;
  - implementation and operation (including other institutions) of the European database EasiView 12.

The maintenance of action capacity (scientific and technical support) in the field led after to documentation and study in taking, processing and interpreting of satellite remote sensing data, including study and implementation of programs SeaDas, ERDAS and test use. It should be noted here that NIMRD IT team is Romanian point of contact for EGEMP (European Group of Experts on Satellite Monitoring and Assessment of Sea-based Oil Pollution).

These are only some of the remarkable results of the team (only three members) in the period cited.

Moreover, the accelerated development of ICT systems after 2000 imposed:

- \* a greater attention to technical support (hardware and software) for users;
- \* replace internal network with a higher speed one and obtain a secure connection for high-speed Internet service provider;

- \* documentation and study of specific programs to support the acquisition and subsequent implementation into internal network (CEDAS - for morpho-dynamic studies, Sintact, and then Lex for easy access to laws and regulations, etc.);
- \* intranet creation of a dedicated Windows server for data processing (Golden Software Surfer 8, MS Office - Excel, Word -, statistical processing programs);
- \* develop institution's Web server and server / web pages, database, FTP, etc. separated, imposed by international projects involving NIMRD (including pages with Oceanographic Forecast northwest Black Sea carried out in the Institute);
- \* insurance (and support) to access online libraries permits held by the INID ANELIS project;
- \* transition to e-mail service based on telnet (ssh later) and bread at an affordable email service web mail through SquirrelMail application, developed under the GPL;
- \* implementation of a national time service to synchronize the growing number of servers and services required for projects involving NIMRD;
- \* .....

Obviously this list of directions and requirements and up-dating or adaptation occurring apace in this e-Romania is too large to be detailed. In this context one of the most difficult tasks, essential (and defining) the existence of IT team is forecast future development, planning and preparation based on its continuing documentation / information in the field.

Recently was developed a hardware-software integration wish plan, expected to integrate whole IT into a single modern item, easy to manage multiple facilities, including virtualization and were made some small steps. Then, through MADICO Project (219 Project "Capacity Building NIMRD operational and administrative management by improving communications infrastructure network "Code SMIS - NSRF 2763, no. Ctr. 37/11.05.2009, POS-CCE, Axis 2, O.2.2.4.) the wish plan was made entirely in terms of hardware and operating systems this year; it was also facilitated the start of implementation work for ISO 27001 Information Security Management.

Elements of the current strategic vision concerns:

- Greater integration into the European and computer-world information circuit, through greater involvement in international

projects, contribution to global distributed databases and mainly, a major effort in the construction of CNDOM (National Centre for Oceanographic Data Environment)

- Developing an intranet server type WEB-2.0/3.0 Science 2.0 (knowledge-net: because *Ipsa Scientia potestas Est* /knowledge is power/ Sir Francis Bacon, 1561-1626, *Meditationes Sacrae. The Hæresibus*, 1597) characterized by participation, dynamic content, metadata, standards and scalability that will facilitate the development and implementation of an online circulation system of internal documents and a system of online collaborative work for each project .

The immediate future plans are expected to complete the integration of new hardware and services, a system/software for automatic acquisition of useful satellite and environment data from Internet and their synthesis into Intranet and, yes, if anyone has new or interesting ideas, we get with thanks and recognition of paternity.

"If a Man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts he shall end in certainties" (Sir Francis Bacon), so young scientist should doubt ("dubito ergo cogito") everything, the older ones, even the science mainstream and should study, criticize, think, tear down (if have) and build instead, create and above all, give ideas and results to followers to built after.

## **Bibliography**

Studies and researches - IRCM / NIMRD 1980-2010