Report for the Evaluation of the FGCS Project

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Introduction

I have attended the FGCS' 92 Conference and have observed most of the demonstrations which were presented. I also attended the FGCS evaluation workshop on June 3. It was my first direct contact with ICOT researchers and with the FGCS Project, although I was somewhat aware of the main research trends and achievements of the project, mainly through reports or published papers.

As my personal background is not directly in the domains of interest of FGCS, I shall focus my comments on the issues related to the exploitation of the results (e.g.: distribution of software, follow-up to the program) rather than on the scientific results themselves.

During its 10 years life-time, ICOT has succeeded into building a very original and efficient *integrated* system which can be used as a basis for intensive symbolic processing applications. Doing this, ICOT has obviously made some highly valuable scientific breakthroughs, recognized as such by the international scientific community. I feel that strong efforts should now be made to capitalize on these scientific and technological results.

Main achievements

As it has been pointed out by most participants to the evaluation workshop, the achievements of the projects are both technical and sociological.

In my opinion the most salient technical results are:

- a very high-performance parallel machine, designed for and around a concurrent logic-based language (KL1), and demonstrated with its complete Operating System, PIMOS.

- an elegant Guarded Horn Clause language, with an efficient implementation.

I must say I have not been so much impressed by the demonstrated applications: even if they are of very high quality, I feel that similar experiments are (or have been) developped elsewhere, on more traditional plateforms. Even if these applications show that the FGCS environment is truly operational and usable, they do not clearly demonstrate the *specific added-value* of the "PIM+PIMOS+KL1+KBMS+GDCC" integrated system. A specific effort should therefore be made to make visible the elegance of code, ease-of-programming, and resulting efficiency obtained through the use of the FGCS development plateform and environment.

The main so-called "sociological" achievements of FGCS Project are:

- ICOT is internationally recognized as a strong research point in Logic Programming, Concurrency and Parallel Architectures, and more generally, Japan is now considered as an important country in computer science. Ten to fifteen years ago, Japan was hardly recognized as a partner in the research community in Computer Science (although some individuals were already quite well-known). It is now obvious that Japan plays a major role in CS-research : ETL, ICOT, NTT Laboratories, Tokyo University, among some others, are well-known abroad. This is probably due, up to a large extent, to the fact that the FGCS Project drew attention of the scientific community to what was happening here.

- FGCS has given credibility to Logic Programming and to artificial intelligence. Before the announcement of FGCS, these domains and the corresponding technologies were considered as pure "research toys" by policy-makers and by the industry.

- FGCS had a major political impact in all western countries. I think for instance that the launching of the ESPRIT program was up to a large extent a European political answer to FGCS. In this respect, FGCS has strongly boosted I.T. R&D all over the world.

- Japan has now some highly-skilled researchers and engineers, who can be considered as top-level experts in the domains of machine architecture, parallel operating systems, logic programming and knowledge-based systems.

Maximizing the benefits of the Project

FGCS has been a major basic research effort. It is the author's view that some decisions have to be taken and some actions have to be launched in order to maximize the benefits of the Project, both for Japan and for the whole scientific community.

The decision to make all the resulting software freely available to third-parties is, of course, a very positive point. It is a clear sign showing the willingness of the Japanese government to support full participation of its research laboratories to the international effort for the progress of knowledge. But in my view, this decision is not sufficient and some additional decisions should be taken to obtain full benefit from the FGCS effort.

This decision will take its full effect only if a large community of users have the possibility to develop applications with the FGCS environment and tools. Existence of a large community of "advanced-users", developing original applications, exchanging information on their experiments, and reporting to ICOT (or its successor) any encountered problem (bug, functional limitation, etc.) will be the most powerful way to convince the I.T. community that FGCS has been a true success.

This will happen only if MITI decides to maintain a strong research team active in the domains of logic programming, parallel architectures and concurrency, theorem proving, etc. The role of this team will be to keep the FGCS environment (KL1+PIMOS+KBMS+-

MGTP+GDCC) alive. To convince foreign organizations to build upon this environment and its associated tools, clear guarantee should be offered that this software will evolve, become more portable, will be ported on various hardware platforms, and will progressively be enriched and modified to stay at the upper level of the state-of-the-art.

The team in charge of these tasks might be located within ICOT or elsewhere (ETL?). This is a purely domestic issue. But it should be clear for all external partners that this team shall exist for at least several years (ten years for instance). The number of external users of FGCS software will be a very clear sign of the success of this team.

I think that the first effort of this team should be to port the "FGCS environment" (KL1, PIMOS,..) on a parallel architecture based on standard off-the-shelf RISC processors. This porting should be used as an opportunity to try to design a portable version of KL1, isolating the machine-dependent part of the compiler. The method for porting KL1 on other machines should be documented in English, to make as easy as possible for other organizations (manufacturers, research organizations) to port KL1. *A formal specification of the semantics of KL1 should also be delivered.* All the efforts should be done to make the porting of KL1 to other machines by external organizations, not only feasible, but even easy.

A second action of this team should be to document in English the higher-level components of the FGCS environment: KBMS, MGTP, GDCC, ... A programmer's guide to KL1 should also be prepared and published. All this documentation should be permanently updated as the software evolves.

If MITI clearly demonstrates its commitment to support the distribution, porting, *and evolution* of the FGCS environment, this software has a reasonable chance to be, in five to ten years from now, a success-story similar to the Unix story of the eighties. Such a thing would definitely make of Tokyo one of the major place of the I.T. R&D for the next decades.

Furthermore, as the basic software could be ported on any machine by any foreign manufacturer, and that applications could be developed by any public or private organization, such a success would not create any political misunderstanding or industrial conflict.

Short Resume of the author

After obtaining master degrees in Data Processing and in Experimental Psychology at Paris University (1972-1973) Alain Michard entered IRIA (former name of INRIA) in 1973, as researcher. His first research activities were in the domain of cognitive science (modeling of reasoning) and of human-factors of user-interfaces.

His PhD Thesis in 1976 was entitled "Analysis and Formal Modeling of Diagnosis Tasks".

Nominated Research Director in 1980, he launched a Project in 1981, dedicated to the study of design methods for user-interface and interactive systems. The author was head of this Project from 1981 to 1990. Main research topics were in the domains of :

- design of on-line context-dependent help systems, with natural-language interface;
- design methodology for graphical user-interface;
- user-interface management systems, and dialog managers.

In 1990, the author joined INRIA's headquarters where he's now in charge of the International Scientific Relations Office for Western Countries. He is also the INRIA correspondent for the European Community R&D Programs.