

**DEMONSTRATION OF THE POWER OF STABLE:
DEVELOPMENT OF STATISTICAL APPLICATIONS
USING A NEW VISUAL PROGRAMMING ENVIRONMENT**

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The European Commission funded the project STABLE in 1997. The objective of STABLE was to construct statistical software using a visual environment called IRIS Explorer. The STABLE system is an integration of an existing application building system, IRIS Explorer, and an existing widely used statistical software system, GENSTAT. This system will join two basic characteristics that will make it flexible and competitive: on one hand, the easy interaction that provides a visual programming environment with the user along with useful visualisation facilities; on the other hand the ability to produce tailored end-user applications.

In order to prove the potential of STABLE in building tailored end-user software, as well as to provide feedback to the STABLE developers, three very diverse and challenging industrial applications were chosen. From these cases several different demonstrators were build and used, so the system has been studied under several situations. The main characteristics of STABLE are described by Ford et al. (1998).

Challenges of STABLE project

There is a need in the industry for tailored system, the reasons are the following ones:

- The need to increase the application of statistical methods in industry and service organisations is growing up, as well as the need of applications that would be easy to programme and use.
- The need to have detailed statistical analysis performed quickly by end-user in Industry without much programming.
- Adapt the interface to the appropriate terminology of the end-user.

from aluminium by impact extrusion. This technique is being used by Cebal Entec on the plant that it has in Badalona.

The Specifications of Cebal Entec

From the common study realised by UPC (Polytechnical University of Catalonia) and Cebal Entec it was agreed that the application required should be able to solve designs of factorial experiments as well as fractional factorial with factors at two levels [Prat et al. (1997)]. Replicates and blocks should be allowed. From that point an application has been build using the available statistical modules.

The demonstrator will consist of different subsets of modules, the main groups to consider are those ones:

- *Section of the design*: initial menu is displayed, a design can be defined or imported from a file, this part takes care of all initial variables.
- *Entry of experimental data*: allows the user to enter the experimental data values collected and place them along with the initial design, all in the same structure.
- *First results and transformations*: shows all relevant information about the initial data (exploratory data analysis) and it has the option to perform different data transformations.
- *Selection of a model*: based in previous information and graphics, allows the user to select the right model to be displayed in the Anova table, deciding which variables to include and which ones not to. The system is dynamic so the user can either analyse and modify the conditions at the same time.
- *Final graphics and results*: from the previous analyses, the user should arrive to a conclusion. This can be evaluated in depth with the final information displayed by the programme. Sometimes the conclusion could be that more experimentation should be done.

How do we create a Demonstrator?

The first step in the general process for the development of the demonstrators is the production of the specifications of the system. This was done following the structure provided in an internal STABLE document [the Guidelines showed in Prat and Catot (1997)] and obtained after an analysis of the user needs and the study of the original possibilities of GENSTAT [NAG (1999)] and NAG library [NAG (1995)].

These Guidelines recommend starting the specifications of each demonstrator with a general description of the major functions and components of the demonstrator. The description of the problem to be solved and the needs of the organisation must be clear, as well as the formulation of the conceptual model of the new solution. Finally a detai-

ties of the system. One of the advantages of using the IRIS Explorer software was that apart from the statistical modules, it has a complete library with a lot of modules related to different subjects, so this makes a lot more powerful the system. Professional graphical display was done with almost non expertise in previous programming. The system is very intuitive. Another important aspect of the software was to verify that the interface is easily removable, having the possibility to modify or remove it in order to adapt to the end user requirements.

Software and hardware requirements. Licences

IRIS Explorer software runs under Windows NT. In order to run the system at a rational speed it must be installed under Pentium processors at a recommended speed of 200 MHz.

A licence for the use of STABLE system, which includes IRIS EXPLORER and the reengineered modules of GENSTAT and NAG library, can be obtained contacting NAG-The Numerical Algorithms Group Ltd at Wilkinson House, Jordan Hill Road, Oxford, OX2 8DR, England [Phone +44 (0) 1865 511245; fax +44 (0) 1865 310139].

References

- Craig, P. (1997). *Implementing a statistical data type in IRIS Explorer*. The Numerical Algorithms Group Ltd.
- Ford, B. et al. (1998). «STABLE: A programming visual environment for the development of statistical applications», in *Proceedings of New Tools and Technologies in Statistics 1998, Sorrento*. Contributed Paper
- NAG (1995). *IRIS Explorer User's Guide*. The Numerical Algorithms Group Ltd.
- NAG (1999). *GENSTAT 5*. The Numerical Algorithms Group Ltd. (see website in: www.nag.co.uk/stats)
- Payne, R.W. and Harding, S.A. (1997). *Data Structures for STABLE*. Rothamsted Experimental Station.
- Prat, A., X. Tort-Martorell, P. Grima y L. Pozueta (1997). *Métodos estadísticos, control y mejora de la calidad*. First Edition, Edicions UPC.
- Prat, A. and Catot, J.M. (1997). «Guidelines for the Specifications of a Demonstrator. STABLE Project». *Internal document*. Statistics Department and Operational Research, UPC. June 1997.