Overview on PCTE Standardization

Germain SAGOLS,
IBM, Vice Chairman of ECMA TC33

IBM AIX CASE EUROPEAN CENTER
06610 La Gaude - France
Tel. 92 11 41 06
Fax. 93 31 60 20

Abstract
This paper outlines the background to the standardisation of PCTE. It briefly covers its origins, current status and future plans as well as an overview of current announced commercial backing and related activities.

ORIGINS - DEVELOPMENT OF THE CONCEPT

PCTE arose out of one of the first CEC sponsored ESPRIT collaborative research projects. ESPRIT Project 32 was formally titled "A Basis for a Portable Common Tool Environment". This original project ran from 1984 until 1986. The participating companies were Bull SA (France), ICL (UK), Olivetti SPA (Italy), Siemens AG (Germany), Nixdorf (Germany) and GEC Research Laboratories (UK).

The formal objectives of the PCTE project were to define the necessary interface specifications and to implement the basic utilities and a working prototype of a portable common tool environment to support tool development. The tool and user interface were to be maintained as public domain documents to ensure common tool portability.

However the work was really aimed at supplementing the UNIX file system at a higher level that would make it easier to achieve data integration and portability of a tool chain that comprised a software development environment.

The project was eventually extended to four years and at the end there were two main deliverables - a C specification (version 1.4) of both the repository interface and the user interface, and a prototype implementation of them.

Many other PCTE related projects were also initiated under the ESPRIT program to both develop PCTE based tools and to extend the technology and its applicability. I shall not detail this work further here, although I do mention the PACT and Alf projects later in this presentation.

Forewords
This paper is directly inherited from a presentation, recently made by Myer W Morron in Japan. Myer has been a great sponsor of PCTE over the last past three years. He has been an active ECMA PCTE Chairman from 1988 to 1991. He is still now very active in promoting the standard over the world.

If you want to contact Myer, here is his address:
Myer W Morron,
Director
European Technical Relations
BNR Europe Ltd,
Concorde Rd,
Maidenhead SL6 4AG
England
Tel: + 44 628 794 594
Fax: +44 628 785 400
E-mail: m.w.morron@bnr.co.uk
BROADENING PCTE SCOPE - DEFENCE FEATURES

In 1986 two events occurred that broadened the scope of PCTE. First, the European NATO nations decided to reconvene the IEPG (Inter European Program Group) Technical Area 13 committee to look at defence software development environment needs. This committee TA 13 decided to adopt the PCTE specifications as the basis for a work program. By then ESPRIT had produced an Ada version of PCTE 1.4 which was called PCTE Ada 1.4. TA 13 set up a team of technical experts to enhance both PCTE 1.4 specifications to meet the needs of the defence community. This involved significant enhancement to its capability as well as the addition of important integrity and security features. IEPG also made PCTE operating system independent. IEPG TA 13 called their set of specifications PCTE+.

In parallel with this, under a CEC initiative, the PCTE Interface Management Board (PIMB) was set up to coordinate the standardisation and promotion of PCTE. One of the prime initial results of the PIMB was the cleaning up of the 1.4 specifications and the production of version 1.5 that included among other things some of the results of the ESPRIT PACT project (PCTE Added Common Tools), which was in some ways a successor project to the original project 32.

IEPG TA 13 adopted PCTE 1.5 as their base for PCTE+ and participated fully in the PIMB work.

PIMB decided that the best method of moving PCTE into a de jure international standard was via ECMA, the European Computer Manufacturers Association that had a good track record of producing high quality technical standards and of submitting them successfully into ISO. Thus in February 1988, ECMA TC33 had its first formal meeting.

STANDARDIZATION - HISTORY AND CURRENT STATUS

ECMA TC33 was chartered to produce standards based on PCTE. It set up two parallel activities - TGEP (the Task Group on ECMA PCTE) to produce the technical standards and - TGRM (the Task Group on the Reference Model) to produce a Reference Model for software development environments. The parent TC33 committee has met twenty times in its four years of existence. The Task Groups also met extensively with the majority of the work being carried out by TGEP.

Task Group on ECMA PCTE

Several important decisions were made by TC33. First it was decided to base ECMA PCTE on PCTE+ version 3 as produced by IEPG TA 13. In addition to adopting the valuable work, this also prevented any divergence in the PCTE world. Secondly, on direction of TC33, the PCTE user interface specification was dropped and the X specification adopted as the portability level. Finally TC33 accepted the TGEP suggestion that the form of ECMA PCTE would be as an abstract specification with separate language bindings. This eliminated the problems of having the entire specification in each language and ensured compatibility. It was the decision to completely rewrite PCTE as an abstract specification that took so long but also resulted in a high quality specification.

The following standards have resulted from this work and are available -

1. December 1990 ECMA 149 PCTE Abstract Specification
2. June 1991 ECMA 158 PCTE C Language Binding
3. December 1991 ECMA 162 PCTE Ada Language Binding

Task Group on the Reference Model

It was realised early on that many different industrial groups and formal standards bodies were addressing subjects that were related to our activities. However it was difficult to assess how they were related. As we did not wish to duplicate other work unnecessarily, we decided that the production of a reference model and mapping the various activities on to it, was the best way to determine how they related to our work. This resulted in the production of ECMA Technical Report 55 and its formal adoption by ECMA in December 1990.

This has proven to be extremely valuable in understanding what we ourselves were doing and enabling us to explain it externally and to relate it to other activities. The reference model has been widely used and was adopted by the US National Institute of Standards and Technology. We have worked together with NIST for the past year and recently jointly
adopted an updated version of the reference model. This was approved by ECMA in December 1991 as ECMA Technical Report 55 version 2 and is available from ECMA.

**STANDARDIZATION - FUTURE PLANS**

We are currently following several tracks in evolving PCTE. I shall deal with each separately -

**ISO JTC1 Standardisation**

It is our intention to invoke the ISO fast track procedure in June 1992, so PCTE will become a Draft International Standard in early July 1992. This should lead to PCTE becoming an International Standard in 1993. For the past six months we have been circulating copies of the ECMA PCTE standards to various JTC1 committees such as SC7 and SC22 and National Standards bodies for informal reactions. A workshop is being arranged with JTC1 for this Spring to answer any questions on PCTE.

**Maintenance of ECMA PCTE**

There is an ongoing activity within TGEP to maintain the standards. This is a combination of responding to queries and making corrections and clarifications as needed. These are accumulated in an errata list. In particular the IEPG TA 13 committee has a major ongoing assessment program that has, and will continue to, generate comments that must be addressed.

It is our current intention to rerelease ECMA 149, the Abstract Specification in June this year with all errata to date. We do not foresee any substantive functional changes at this stage.

**C++ Language Binding**

Work is already underway in producing this binding. It is made difficult by the lack of real consensus on how best to use C++ as the technology is relatively new. But it is hoped to have completed the work by December 1992.

**Version 3 of Reference Model**

It has been agreed with NIST that a third version of the Reference Model will be produced in collaboration. This will extend the coverage of the model and feed back further experience gained by the ongoing mapping exercises.

**Other Discussed Activities**

The following is a non-exhaustive list of other work that is felt necessary but is not yet formally committed.

**CDIF Collaboration**

PCTE lacks an interchange mechanism between repositories. These could be between different PCTE installations or between a PCTE installation and a proprietary repository. CDIF seems to be the best method available at present and is closely compatible with PCTE.

**Standard Schema Library**

One of the major benefits provided by PCTE is the ability to create standard schemas for objects. The creation of such a library would be of immense value to the software engineering community. During 1992 some attempts will be made to encourage various bodies to publish their own schemas.

**Object Oriented Tools Interface**

It is felt that the use of object oriented design methods could be facilitated on PCTE by the provision of higher level facilities. Some different groups are looking at how this could be best achieved.

**Heterogeneous Distribution Standard**

The original PCTE project failed to produce a distribution standard. So currently such interfaces are implementation dependent. It is important that one is adopted as the PCTE interface and incorporated into implementations.
Conformance Testing Facility

Both the European Commission and the Defence Community see the need for a conformance testing facility. Discussions are underway on how this could best be achieved.

Fine Grained Data Handling

PCTE implementations do not handle fine grained data efficiently. If it is required to directly access fine grained objects the best current way is to implement PCTE as a two tier data base. It is under discussion as to whether this could be supported some other way within the standard.

Process Support

It is becoming clear that the whole software development function is facilitated by having not only an explicit development process, but also having the environment enact this process. Another ESPRIT project called Alf has just completed. Alf added process support facilities to a PCTE environment. Defining such additional functionality such as a process modelling language and process execution facilities and interfaces needs to be examined.

EXPLOITATION - COMMERCIAL ACTIVITIES

This can be discussed under several headings. These vary from PCTE supplier to end user.

Platform Supplier Support for PCTE

All the major Unix platform suppliers have announced support for PCTE. They include IBM, Hewlett-Packard, Sun, Bull and DEC. Bull, IBM and Hewlett-Packard in particular have made major commitments to PCTE.

PCTE Implementations

For a while, there was only one PCTE implementation on the market. This situation is now rapidly changing. The following have been publically announced.

- The original implementation that was derived from the PCTE project is Gie Emeraude's Emeraude version 12. It is currently available on a wide range of hardware and variants of Unix. It is not fully up to the level of ECMA PCTE but is beyond PCTE 1.5. It is being upgraded to full ECMA PCTE.

- Verilog announced the availability of their implementation on both Unix and VMS late in 1991.

- Heuristic Systems of India demonstrated a version of PCTE in 1991 and intend to release a full ECMA PCTE implementation.

- Object Design of the US announced in early 1991 that they were looking for investors in their planned implementation on their own DB system.

- SD Scicon of the UK as part of the IEPG TA 13 team are implementing PCTE on VMS with a view to releasing a product.

Other activities are also known to be underway but no external announcements have been made.

PCTE Based Environments

Many integrated toolsets are available or are under development. They include the following -

- The EAST toolset produced by SFGL of Paris in conjunction with several other companies under a European Eureka project.

- The Enterprise 2 toolset produced by Thomson Syseca of France aimed at the Defence Industry.

- The Bull Hyperweb environment.

- CAP Sema Concerto toolset ported to PCTE.

- The IEPG TA 13 toolsets produced by two separate European teams.
Tool Supplier Interests

Several major tool suppliers have expressed interest or are actively involved in the PCTE scene. These include CADRE, IDE Inc, Mark V Systems, IPSYS of the UK, as well as others such as Mentor Graphics etc.

Other Major Interests

Two of the three STARS contractors working for US DARPA program have announced that they will base their work on PCTE. They are IBM Federal Systems and Unisys Defence Systems.

Also the US NIST have announced that they "propose to use the ECMA PCTE specification as the basis for the development of an integrated set of ISEE PTI standards."

Several prominent international companies with large software development activities are already planning to adopt PCTE bases as suitable tool sets become available. Several of those are for example in the telecommunications industry.

TO WHOM IS PCTE IMPORTANT AND WHY?

PCTE itself is only of direct value to the environment builder. But it is potentially of enormous value to both the tool supplier and the end user.

The tool supplier does not need to divert large effort into providing a repository as well as all the standard tools to provide an integrated set. He can concentrate on his own added value tools. He also has a much broader potential market without expensive porting and integration.

The end user will see all the benefits of Open Systems. By using tools based on an Open Standard he is not confined to a single supplier of either tools or of his platform. The more sophisticated user can easily integrate his own specific proprietary tools into his environment without the expense of developing and maintaining his entire tool set.

The levelling of the playing field for both the tool supplier and the end user will bring significant efficiency to everyone's benefit. The industry can then concentrate on further higher value investment and raise the standard and quality of software systems world wide.

Summary

The predictability of software development and the reliability of the resulting software will affect the whole world during the next ten years. Tremendous improvements have been made in hardware engineering during the last twenty five years, but not so in software. The tools and methods have not changed fundamentally.

Software engineering will only really be "engineering" when there is a proper theoretical basis and practitioners have a proper set of tools and proven components. PCTE will not provide all of this, but it will offer the ability for common tools to be made available and will also assist in the development of proper software component libraries.

The PCTE program has seen more than seven hundred and fifty man years of effort invested by Companies, Academic Institutions as well as Governments. Estimates of investment to date of nearly a quarter of a Billion Dollars will not be wide of the mark. The results are now coming on to the market. I believe it will have a major impact on the industry during the next five years.

PCTE has a broad consensus of support, especially in the systems and software engineering arena. All the major international computer and telecommunication companies have supported the work.

PCTE was conceived and evolved in Europe but its focus is now moving across the Atlantic, I hope that as a result of this week, it will also start spreading across the Pacific.
Annex: Points of Contact

The following organisations are involved in various aspects of the Standardisation and Exploitation of PCTE. The points of contact are as indicated.

PCTE Interface Management Board (PIMB)

This group was formed by an initiative of the CEC DG XIII to aid the adoption of PCTE. It initiated the ECMA standardisation process and now meets several times a year to exchange information on PCTE, to coordinate the promotion of PCTE and to discuss its future evolution. It publishes a quarterly newsletter that is available currently free of charge. Membership of PIMB is open to any organisation or group with an interest in PCTE. Further information can be obtained from the secretary or chairman of PIMB. They are -

Chairman of PIMB - Francois Salle
Eucis,
46 rue de la Paroisse
78000 Versailles,
France
Tel: +33 1 3950 8012
Fax: +33 1 3951 6914

Secretary of PIMB - Werner Wohlschlegel
CEC DG XIII,
31 Avenue du Beaulieu
Brussels, B-1160
Belgium,
Tel: +32 2236 8109
Fax: +32 2236 8364

Copies of the PCTE Newsletter can be obtained from the publisher -

Newsletter publisher - Jean-Claude Rault,
EC2,
289-287 rue de la Garene
92000 Nanterre
France
Tel: +33 1 4780 7000
Fax: +33 1 4780 6629

ECMA Standardisation

ECMA is the European Computer Manufacturers Association. It is active in many areas of computer related standards. Membership is open to any company that is active in the European Computer market.

Associate membership is also available for companies that do not meet the full membership criteria. Many US and Japanese owned companies are active in ECMA.

Copies of published ECMA PCTE standards and Technical Reports can be obtained free of charge from ECMA in Geneva as can further information on ECMA itself. They are - ECMA 149, ECMA 158, ECMA 162 and TR/55. See text for details.

ECMA address is - ECMA Secretariat,
114 Rue du Rhone,
CH-1204 Geneva,
Switzerland,
Tel: +41 22 735 3634
Fax: +41 22 786 5231

ECMA Technical Committee 33 - PCTE

Within the ECMA organisation TC33 is responsible for development and maintenance of the PCTE standard. Information on meetings for ECMA members and related technical matters can be addressed to the TC33 officers or the convenors of its two Task Groups.

Chairman ECMA TC33 - Dr Ray Crispin,
Hewlett-Packard Labs,
Filton Rd,
Stoke Gifford,
Bristol BS12 6GZ,
England
Tel: +44 272 799 910
Fax: +44 272 228 003

Vice Chairman TC33 - G Sagols,
IBM France Dept 3315,
Le Plan du Bois,
Convenor of TGEP - John Dawes,
ICL,
Eskdale Rd,
Winnersh,
Wokingham RG11 5TT,
England
Tel: +44 734 693 131

Convenor of TGRM - Hugh Davis,
ICL,
Eskdale Rd,
Winnersh,
Wokingham RG11 5TT,
England
Tel: +44 734 693 131