Information Services

IS

STRATEGY REPORT

Strategic Planning &
Research Advisory

By: T.M. Ciesla
ISRN - 10

May 13, 1994
Rev. 1.0   5/16/94

SELECTING A 4GL DEVELOPMENT TOOL FOR CLIENT/SERVER

The migration to client/server (C/S) with its subsequent need for rapid GUI-based applications development (AD) has introduced a new family of 4GL tools. These tools vary dramatically in their suitability across a wide range of applications requirements. IS must evaluate these tools against the application development environment, the target environment, the application profiles and vendor profile. This **Strategy Report** *outlines the criteria and vendors examined in developing an AD Strategy for Solvay.*

Key Issue
Which Applications Development (AD) tool will most effectively support client/server applications in Solvay Polymers' computing environment?

Assumptions
Leading-edge Client/Server development environments will increasingly migrate from text-based to the visual metaphor for programming.

Throughout SAP implementation and beyond, there will be a requirement to migrate legacy systems and develop 'value-added' Client/Server based packages.

It is highly likely that multiple development tools will be required as the client/server environment matures in the ████ IT infrastructure.

Note 1
The 4 Client/Server Strategies
- Preserve Existing Host Systems
- Downsize Host Systems
- Build New C/S Systems
- Upsize PC System To LAN

INTRODUCTION

To meet the challenge of increased competitive pressure, the Solvay Houston group has established a charter to migrate its computing infrastructure from a host-centric model, running in-house developed applications, to an enterprise-wide client/server computing model using integrated applications. The ████ C/S charter incorporates elements of two of the four commonly utilized Client/Server strategies and shown in Note 1: Build new C/S systems (i.e. the SAP integrated application suite), and Upsize PC System to LAN (proliferation of ████Houston LANs; migration of stand-alone *x*base database's to server-based Oracle systems).

A key subset of a Client/Server strategy, what might be referred to as an 'Application Migration strategy', examines how legacy systems will be incorporated into the new architecture. Experience in the U.S. has shown that a single strategy - either *'re-write all applications to client/server'* or *' stabilize legacy applications until they die a natural death'* - is not adequate. Rather, the technical and functional quality of each application must be accessed, along with a review of appropriate development tools, to determine which system should migrate to client/server.

Success in C/S-based applications development may be defined as using the right tool for the task at hand by not overbuying or underbuying to maximize short term investment. Choosing a 4GL development tool requires exploring an ever growing maze of tool vendors and evaluation criteria. To navigate this maze and select an effective tool, the buyer must understand four key issues: 1) the application profile(s), 2) the target environment, 3) the development environment and 4) the vendor(s) profile.

SELECTION CRITERIA

The *Application Profile* is a composition of the application type (real time, batch, etc.), the constituency - the intended end-user audience (personal, work group, department, enterprise), the programming metaphor (text only, GUI, or a combination), and data/logic complexity, size and security issues.

Client/server 4GLs vary widely in their suitability across various end-user constituencies *(see Note 2)*. Personal application are used by a single user and typically involve small databases. Workgroup applications are shared by groups of 5-10 people on a LAN with relatively small databases. Departmental applications involve a large number of users or even a few concurrent users, with relatively large databases. Enterprise applications involve the highest number of users and transaction volumes (i.e. SAP). For ▬▬▬ the majority of applications to be migrated fit into the *department* category. As seen in Figure 1, the tools that address this constituency are in or near the programming metaphor area determined as ideal by the Gartner Group.
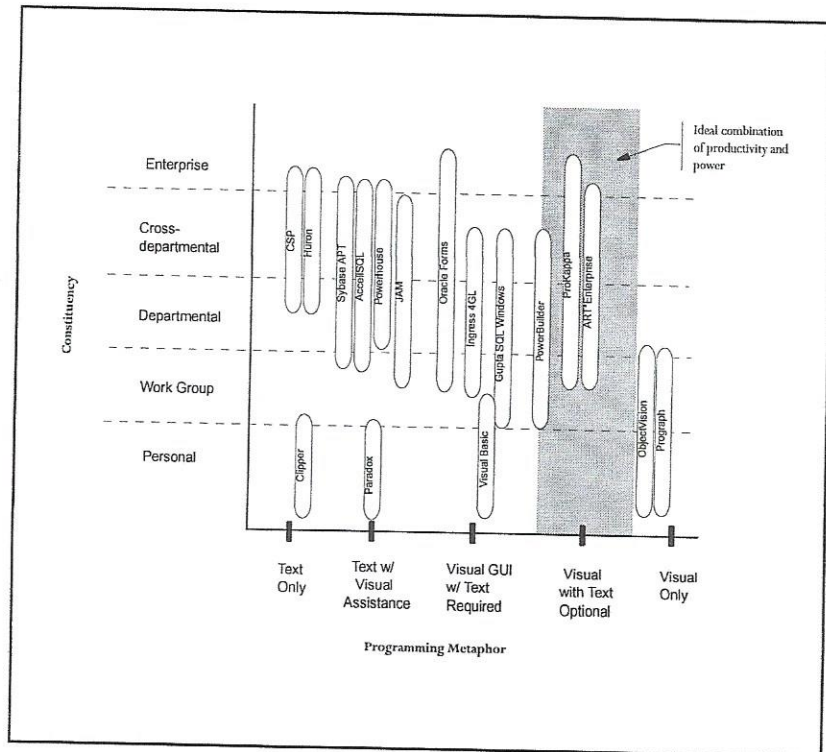
Note 2
Application Types and Sample Tools

- *Personal* - Paradox, Microsofts' Access, Spinacker's Personal Access.
- *Work Group* - Forest& Trees; Gupta SQL Quest.
- *Department/Inter-Department-* Gupta's SQLWindows; PowerSoft's PowerBuilder, Knowledgeware's ObjectView.
- *Enterprise* - Oracle's OracleCase, Anderson's Foundation for Cooperative Processing

Figure 1. *Constituency versus Programming Metaphor*

The *Target Environment* primarily is concerned with platforms, presentation services and databases supported, which are usually pre-existing constraints for many C/S application development efforts. other criteria include portability across platforms, presentation services and databases; and the data access method - how a tool accesses the various databases it supports. Some tools are bundled with their own dedicated RDBMS while other support multiple databases. See Figure 2 for a summary of Solvay's requirements in this area.

The *Development Environment* is comprised of the development tool platform, the repository platform, the repository database management system and the programming metaphor discussed briefly in the Application Profile section. As was seen earlier in Figure 1, C/S development tools display a wide range of programming metaphors, ranging from fully textual 3GLs to ones that focus on visual programming, including the drag-and-drop GUI and visual object browsers.

The *Vendor Profile*. Perhaps the most overlooked, yet important set of criteria relates to the profile of the development tool vendor. A vendors vision - which includes priorities, enhancement strategy, new products and growth plan - must be evaluated when selecting tools to make certain that the vision is complimentary to the user organizations own direction and IT architecture. The vendor's ability to execute this vision is equally important. Other key criteria include customer satisfaction and cost - including development licenses, runtime licenses and maintenance and training.

Key Criteria	Requirements
Application Profile	
Application Type:	Real Time
Constituency :	Department
Target Environment	
Platform:	Windows; Unix; DOS
Presentation Services:	Windows
Database:	Oracle
Development Environment	
Tool Platform:	Unix; OS/2
Repository Platform:	Unix
Repository DBMS:	Oracle
Programming Metaphor:	Graphical 4GL
Vendor Profile:	Visually based, object-oriented tools that leverage all of Windows capabilities.
	Clear migration strategy for advanced Windows releases.

Figure 2. Summary of Key Criteria

EVALUATION APPROACH

An IS team was assembled in April, 1994 with the charter to evaluate and select a 4GL tool within a compressed time frame. Pressure from the impending deployment of SAP dictated that a tool should be selected by June, 1994.

Limited time and resources dictated that the team leverage existing outside expertise and evaluations (i.e. Gartner Group, Independent Test Groups, Client/Server seminars) to develop a short list of viable candidates. To further narrow the field, only those vendors' appearing in the 'magic quadrant' ' (the upper right-hand quadrant) of the Gartner Group's AD Vendor Matrix *(See Figure 3)*, were seriously considered, with the inclusion of Knowledgeware's product for comparison *(See Figure 4)*.
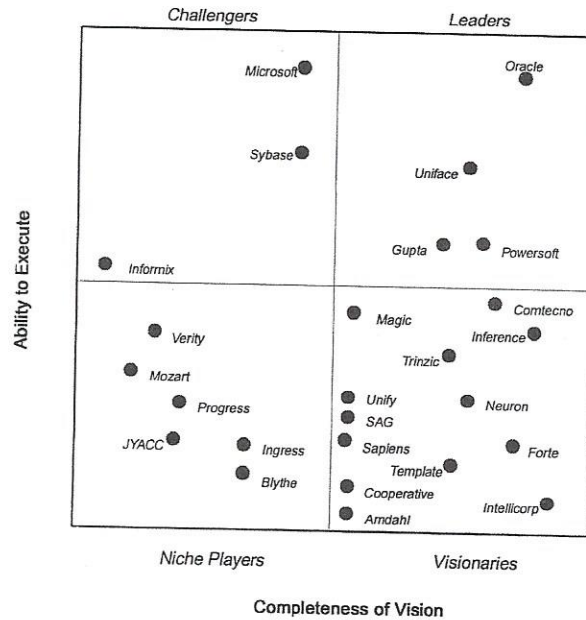

Figure 3. AD Vendor Matrix

Those products judged by the team to exhibit the form and function necessary for ▮▮▮▮▮ environment, in terms of platform, database, data dictionary, GUI leveraging and cost, were further researched. Results of an independent testing group are shown in Figure 5, with Powersoft's PowerBuilder package showing a clear advantage over the other tools. This evaluation agrees with recommendations from SAP and third party consultants.

APPLICATION DEVELOPMENT TOOLS

CRITERIA	VENDORS / TOOLS				
	PowerSoft's *PowerBuilder*	Gupta's *SQLWindows*	Knowledgeware's *ObjectVew*	Uniface's *Uniface*	Oracle's *OracleForms*
Database Included with Product	Watcom	SQLBase Server	Quadbase	None	None
Target Platform	UNIX				
Repository DBM Support: DB2, Sybase, Oracle, Informix	Oracle, Informix, Sybase, SQLServer, SQLBase	Oracle, Informix, Sybase, SQLServer, HP	Oracle, Informix, SQLServer	Oracle, Informix, Sybase, SQLServer, Ingres	Oracle, DB2, TurboImage
Target DBMS	ORACLE				
Presentation Services:: Windows. Motif, Openlook, Multimedia	Windows	Windows	Windows	Windows, Motif, OpenLook, Mac	Windows, Motif, OpenLook, Mac
Windows Tools Support: [OLE, DDE, OBJ, DLL]	DDE, OLE, DLL	DDE, OLE, DLL	DDE, OLE, DLL	None	None
Access Multiple Databases	YES	YES	YES	YES	YES
Compiler/Interpreter	Compiler	Compiler	Compiler	Interpreter	Compiler
Programming Metaphor: "Point&Click, Drap&Drop, 4GL, 3GL	YES	YES	YES	YES	YES
Royalty-free Applications	YES	YES	YES	NO	YES
Programming Expertise:	Windows some SQL, PowerScript	Windows some SQL, SAL	Windows SQL, ViewScript	Windows some SQL,	SQL, PL/SQL
Teamwork Development	YES	YES	YES	YES	YES
Dictionary none, proprietary, portable, single-user, multi-user	Portable	Portable	none	Portable	Portable
3GL versus 4GL	4GL	4GL	4GL	4GL	4GL
Prototyping	Built-in	Built-in	Built-in	Built-in	Add-On
Scalability	End-user tools available	End-user tools available	Developer	End-user tools available	Developer
Vendor Vision	Leader	Leader	Niche	Leader	Leader
Life Cycle Support: Planning, analysis, design, maintenance, version control	Built-in	Built-in	Built-in	Built-in	Add-On
Testing Tools	Built-in	Built-in	Built-in	Built-in	Add-On
Application Constituency Department, Workgroup, Enterprise	WorkGroup InterDepartment	WorkGroup InterDepartment	WorkGroup	WorkGroup InterDepartment	WorkGroup
Price	Suite: $ 3,195	Suite: $3,495	Suite: $2,799	Server Platform: $7,000 Each Seat: $5,000	$1,295

Figure 4. *Application Development Tool Checklist*

Product Reviews[1]

Criteria	Weightings	PowerBuilder Version 3.0	SQLWindows Version 4.01	ObjectView Version 2.1
Performance				
Setup	100	Excellent	Excellent	N/A
Simple data entry form creation	75	Very God	Very Good	Very Good
Complex data entry form creation	100	Good	Very Good	Good
Data entry	75	Very Good	Very Good	Good
Simple columnar report creation	75	Excellent	Very Good	Poor
Header & detail report creation	75	Excellent	Very Good	N/A
Extensibility	100	Very Good	Very Good	Good
Debugging	75	Very Good	Very Good	Very Good
Other features	75	Excellent	Excellent	Very Good
Documentation	75	Good	Satisfactory	Very Good
Support policies	50	Very Good	Good	Good
Technical support	50	Poor	Satisfactory	Very Good
Value	75	Very Good	Very Good	Satisfactory
				Good
Final Score		**7.8**	**7.5**	**5.1**

Guide To Scores

Excellent= 1.0	Outstanding in all areas
Very Good = 0.75	Meets all essential criteria and offers significant advantages
Good = 0.625	Meets essential criteria and includes some special features
Satisfactory = 0.5	Meets essential criteria
Poor = 0.25	Falls short in essential areas
Unacceptable or N/A = 0.0	Fails to meet minimum standards or lacks this feature

1. Product evaluations done by InfoWorld Magazine

Figure 5. *Final Candidate Reviews*

THE STRATEGY

The 4GL Selection Team recommends PowerSoft's PowerBuilder Enterprise package as the development tool of choice for ▮▮▮▮ Knowledgeware's Objectview was ruled out because of the lack of a data dictionary, which is the engine that drives consistent high-quality development efforts. Uniface was ruled out due to the high cost (and royalty fees for applications), and the interpretive nature of the resulting applications - which run slower than compiler applications. Oracle's product - OracleForms is enigmatic. Oracle's position in the *Magic Box* of Figure 3, is based on their Cooperative Development Environment, (CDE) of which OracleForms is but one member. By itself, OracleForms is not a complete development environment capable of creating robust applications.

Note 3
PowerBuilder & Lotus Notes
In 2Q94, PowerBuilder introduced PowerBuilder Library for Notes, a development tool that brings PowerBuilder object-oriented programming features to Notes.
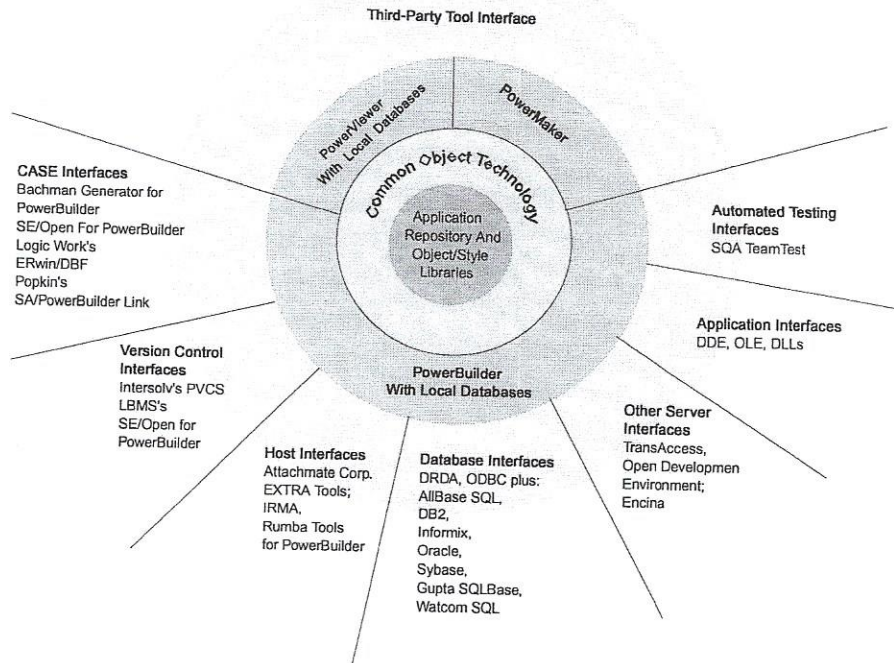
Figure 6. *The PowerBuilder C/S Open Development Environment*

It must be combined with other members of the Oracle family (i.e. Oracle Reports, Oracle Graphics, Oracle Froms Generator, etc.) to create fully functional applications. This is reflected in its low cost compared to the other 4GL tools. In addtion, the lack of Windows support is considered a fatal flaw by the evaluation team. Finally, while Gupta's SQLWindows rates a close second in the reviews shown in Figure 5 and provides template-based application development, PowerBuilder remains overall the best value in this class of 4GL development tools.

The 'fit and finish' of PowerSoft's programs, the polished user interfaces, ability to create small .EXE files, should be the envy of the Gupta development team. Tight integration with Windows applications and full compatibility with Windows OLE, DDE and DLL are considered to be a critical requirements. Support from third party vendors makes simplifies interface issues for other tools and services *(See Figure 6)* Other pivotal features are highlighted below:

- PowerBuilder's applications are tightly integrated with Microsoft's MAPI, allowing applications to send and receive messages using any MAPI compliant mail system (i.e ▮▮▮▮ LAN E-Mail package - Microsoft Mail).

- The powerful inheritance feature at the window level - a new windows based on an existing window inherits its style, events, functions, structures, variables, controls, and scripts.

- Direct interfaces to the major Rdatabase engines.

- Scalability of product family: PowerBuilder for IS developers, PowerMaker for power-users, and PowerView for users wanting to create ad-hoc queries.

- Ability to deploy PowerBuilder-PowerMaker applications as a single .EXE file is useful for distributing applications to machines that are not licensed for one or the other.

- Availability of training facilities in the Houston area.

One concern of the evaluation team was the requirement to learn yet another programming language - PowerBuilder uses PowerScript - a proprietary language. However, PowerBuilder's closest competitor, Gupta's SQLWindows development environment - TeamWindows - was judged as a complex environment with a long learning curve by the independent evaluators. PowerBuilder's distant competitor - KnowledgeWare's ObjectView, was quickly eliminated by its lack of a data dictionary.
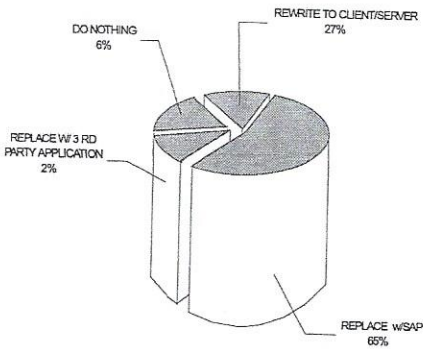
THE BUSINESS CASE

As companies evolve to leverage the benefits of integrated applications, the IT infrastructure must migrate away from the host-centric model to the more open client/server environment. A key component of implementing an integrated application such as SAP is possessing the proper AD tools to migrate legacy applications not addressed by SAP (*See Figure 7*).

▮▮▮▮ current business AD environment is based on a combination of 3GLs - Cobol and Transact - and a host-centric 4GL - Powerhouse. These tools are incapable of creating GUI-based applications which leverage the functions of Windows and support a client/server environment.

While building a case for selecting one 4GL tool over another is complicated and in some ways subjective, PowerSoft's accepted position as a leader in this industry, along with the company's strong vision and proven ability to implement releases to remain current with the evolving applications environment, positions PowerBuilder as a superior product.

Figure 7.
Legacy Application Migration

NOTE:
The percentages shown above are 'best-guess' estimates, based on current limited knowledge of SAP's fit into Solvay's environment.

THE COST

To guarantee stability of existing Oracle-based applications, the 4GL team determined that a separate platform was required for development exercises with the PowerSoft suite of products. This 4GL initiative is therefore burdened with the cost of an appropriate LAN server and operating system (*See Figure 8*).

ITEM	COST
Oracle Server Hardware [1]	$11,000
Oracle License	$ 8,299
PowerSoft's PowerBuilder Enterprise Edition	$ 4,000 [2,3]
PowerSoft's PowerMaker Software	$ 400 [3,4]
PowerSoft's PowerView Software	$ 200 [4,5]
PowerBuilder Training (#PB00005)	$ 6,000 [6]
	$ 29,899 [7]

1. System Configuration: Pentium processor, 32MB RAM, 2- 1 GB Hard Drives, SuperVGA Monitor, CD-ROM, NIC, Windows-NT operating System.
2. Represents aggrement with PowerSoft to purchase four copies of the Enterprise package at a special offering of $995, due to seminar attendance by Polymer's and Interox employees. PowerSoft restrictions allow for a maximum of four copies to the Solvay group. Additional copies are priced at $3,195.
3. Special pricing offer is good until May 31, 1994
4. Represents two copies at $199 special price offer.
5. Represents two copies at $99 special price offer.
6. Represents four attendees to the 4 day introductory class at $1,500 per employee. If training is purchased with software, the training cost is discounted to $1,250.
7. Tax not included.

Figure 8.   4GL Pilot Costs

The prices indicated in Figure 8 for the PowerSoft products reflect discount pricing good through May 31, 1994. Additional copies beyond the four discounted copies of PowerBuilder Enterprise are available for the standard purchase price of $3,195 per developer. It is unknown at this time how many copies of PowerBuilder will be required. It is also unknown how many copies of PowerMaker and PowerView would likely be distributed to the user community. While the team postulates a handful of PowerMaker users and a limited distribution of PowerView, the purchase of two initial copies of each is recommended before the May 31st. deadline. This takes advantage of the pricing discounts and provides evaluation copies for the IS staff and selected users.

BOTTOM LINE

It is important that a 4GL development tool be made available to the ▮▮▮▮application developers well in advance of the legacy migration initiative. All of the 4GL packages discussed have a steep learning curve; conservative estimates by PowerSoft indicate a minimum six-month training period to achieve proficiency. This learning curve is compounded by the scope of the paradigm shift being experienced by the ▮▮▮▮ applications staff - migration from a host-centric, hierarchical database/Cobol based development environment, to a Windows-based, relational database, client/server environment.

To expedite a benefit the business processes, a list of development candidates is show in Figure 9 to leverage this early training. For a pilot project, a small utility type application is recommended. Currently, the IS staff receives an ascii file from CICC for 'Approved For Sale' information on a weekly basis. This file is transformed to a Lotus file format for the ▮▮▮▮ AR clerk. The proposed project is to develop a small application that will perform this multi-stage transformation by clicking on a Windows icon.

Note 4
4GL Team Members:
W. Cesak
T. Ciesla
J. McKneely
A. Tam

CANDIDATE DEVELOPMENT PROJECTS[1]

PROJECT	LEGACY / NEW	CONSITUENCY
Additive Supplier Database	New	Workgroup
Competitive Resins	PC-based, xbase legacy	Workgroup
Electronic Forms Repository [2] (LAN and/or Lotus Notes based)	New	Enterprise
Electronic Scheduling System (Rooms, Travel, Visits,etc.)	New	InterDepartment
ISO Audit Tracker	PC-based, xbase legacy	InterDepartment
LIMS	Mini-based legacy	Enterprise
LOC	PC-based, xbase legacy	InterDepartment
MVATTS	PC-based legacy	WorkGroup
Rate & Route	HP-based legacy	InterDepartment
Small Quantity Distributors	New	WorkGroup
SOS (Customer Complaint System)	PC-based Legacy System	InterDepartment

1. This is not a comprehensive listing of potential projects, and is based on preliminary knowledge of SAP R/3 capabilities.
2. Developed through PowerBuilder Library for Notes.

Figure 9. *Potential PowerBuilder Projects*

As in-house developers gain experience with the Powerbuilder environment more complex legacy systems will begin migration to the C/S environment. At that point, it is likely that additional development tools - such as C++ (a 3GL) - will be required to develop some of the more sophisticated program components, not addressed by the new 4GL family of tools.

Advanced training in PowerBuilder, GUI design and C++ for a core group of developers should be factored into future budgeting strategies.