

Application integration: to invade ... or not to invade?

Martin Fincham
Managing Director
Alchemy Computing

Management introduction

A clear sign of technology reaching some degree of maturity is when strict commercial needs start to carry more weight than the wants and preferences of the technologists. In the early adopter phase of every technology adoption lifecycle, one can identify a degree of 'technology for technology's sake'. Two forces drive this:

- *those to whom technology appeals tend to be the pioneers (natural early adopters) — the enthusiasts and visionaries*
- *technology vendors are unsure what works and what does not, and thus a high degree of trial and error effort is consumed finding out.*

As technology reaches the mainstream market, more pragmatic individuals step forward, representing the potential early majority. Not easily swayed by marketing superlatives, these individuals are looking to maturing technologies and how any of these might address a specific problem set, usually associated with opportunities for increased revenue, margin and productivity relating to their people, systems and processes.

In this analysis, Martin Fincham examines how this evolution is influencing the demand for invasive and non-invasive middleware in the Enterprise Application Integration market.

Invasive and non-invasive

A non-invasive integration approach is one which does not require any modifications or additions to existing applications. The basic premise is simply to accept existing application interfaces (every application must have an interface of some kind — for example, a 3270 terminal data stream — otherwise the system cannot be used by human operators). A non-invasive approach accepts that although this foundation is inherently sound for its designed purpose, this may be limited — especially when an existing application needs to be used in ways, or combinations with other applications, for which it was never designed (such as communicating with other systems).

Yet the reality is that most forms of Enterprise Application Integration (EAI) adopt an invasive approach. This requires the integrators to change (invade) the applications. The difficulty is that this change requires modification to the existing application and/or interface which is expensive in terms of development time and skills.

Of course, whether a solution is invasive or non-invasive will depend on what the existing application interfaces are. Past investments created legacy systems with terminal data stream interfaces. Current investments add new application interfaces — for example those using IBM's MQSeries or those associated with ERP packages.

The benefits of the non-invasive approach

The benefits of a non-invasive approach are aligned closely to business benefits. Time is probably the most important.

The key attraction of non-invasive technology is that it achieves the most rapid integration. Mergers and acquisitions, for example, demand rapid integration and assimilation of disparate systems because, in most cases, a large part of the rationale is underpinned by the economies of scale from combining two or more organizations. Although all integration approaches seek to reduce redundancy and duplication in business processes, this can take months (if not years) to achieve with an invasive approach. As in real life, invasions require effort. In contrast, the non-invasive approach uses what already exists.

A second time-based benefit of the non-invasive is reduced time-to-market. In certain sectors, most notably financial services, organizations have

product lifecycles measured in weeks or months. One particular type of trade or option might only be available for a fixed period, after which that financial instrument expires.

Elsewhere, EAI is new and remains chaotic. Business managers are cautious about adopting 'nirvana technologies' — which sound too often to be too good to be true. Instead a step by step integration is preferable — one which delivers tangible benefits quickly. One measure of non-invasive technologies is that they should be capable of being demonstrated in a day. With an invasive approach it can take weeks just to understand the semantics and structure of the existing applications and databases.

Another problem with invasive middleware is that there is often incomplete platform support. Yet the fact is that key business processes may have been implemented on less common platforms — and these still need to be integrated. Invasive middleware often goes so far, but it cannot be used for complete EAI.

In contrast, non-invasive middleware exploits what exists. It knits together what you already have. This is its real advantage as an examination of three phases of integration shows.

Integration Phase I (non-invasive)

The evidence that the middleware market is reaching new levels of maturity can be found by analyzing the explosive growth of non-invasive middleware. Yet the idea of interfacing disparate systems in a non-invasive way — that is to say existing systems are not required to be changed in any way — has been around since the early 1980s.

Back then the most popular implementation method was called screen-scraping. Shortly after IBM published and made available the HLLAPI (High Level Language Applications Programming Interface), the market was awash with screen-scraping tools. Such tools seemed to promise instant integration between the graphical desktop PC and IBM mainframe and AS/400 systems.

But this programmatic interface (to a 3270 or 5250 terminal data stream) proved disappointing. In strategic IT terms it added up to little more than 'putting lipstick on the pig'. Screen-scraping was effective for placing a Windows-like user interface on character-based systems. But it proved unsuit-

able as a platform for building connected, integrated and distributed applications. One consequence was that the concept of using the terminal data stream (as a non-invasive interface to legacy systems) was dismissed as a real solution by user and vendor organizations alike.

Integration II (invasive)

Then came a second generation of integration offerings. These rejected the limitations of screen-scraping and went to the opposite extreme. Invasive integration methods were introduced under the guises of:

- **the Remote Procedure Call (RPC)**
- **distributed transaction processing**
- **messaging and queuing.**

All three, in their different ways, focused on the delivery of the quality of service required for distributed, mission critical applications — specifically high performance, reliability and availability. But there was a price.

Invasive integration methods almost always dictate a substantial custom engineering effort, either by your own IT development staff or (more typically) by a systems integrator or consulting firm. It is relevant to note that many of the so-called ‘middleware product vendors’ who proffer an invasive approach consistently derive more than 50% of their revenues from services. While helping and advising customers with implementations is always desirable, it is also reasonable to ask why so much help is required if the ‘product’ is as complete and as functional as advertised.

Put another way, if your local hardware store charged you 50% again on the price of a hammer just to show you how to bang nails into a wall, you would question the design and completeness of the tool. You may choose to outsource your entire DIY project — and thus expect a large services bill; but you still expect to be able to use the tool you bought without needing additional services support.

At root, the base problem with invasive integration was, and is, that it is just too time consuming and unwieldy to facilitate rapid application integration. Whilst the IT industry at large recognizes the need for flexibility in a constantly changing world, it is

guilty of encouraging organizations to embark on complex infrastructure projects which last years. In almost every case, the selected technology is superseded before it even makes it into production — long before the business can extract value from its investment.

Where invasive integration fails

For example, at a conference in Frankfurt last year, delegates heard from a manager at a large telecommunications company responsible for its middleware strategy. He described how his company had spent seven years building an infrastructure for distributed applications based on DCE. No sooner was this new plumbing in place and functioning, than the IT industry ‘walked-away’ from this ‘standard’ and embraced the next ‘big thing’.

Listening to his description one could see that the project was a technical success. But, without broad industry support, the benefits of adopting such a standard could not be fully realized.

This tendency to adopt and drop ‘what is fashionable’ left a bitter taste in the mouths of end users. Furthermore, it is clear from talking to others with similar experiences that a case of ‘once bitten, twice shy’ is emerging. Bypassing or overcoming such reactions is critical if middleware, and the delivery of working application integration, are to realize their full potential. This will be measured in terms of delivering results to end users.

Indeed, many of today’s pretenders to the EAI crown rely on complete corporate standardization to facilitate inter-application communication. This approach of ‘normalizing’ all communications to a common standard is directly analogous to the panaceas for:

- **normalizing data (so far found to be impractical)**
- **standardizing human communication.**

In 1887, the world was promised harmony in global communication: if every person would give up their native language and adopt Esperanto, language barriers would be a thing of the past. While both objectives were technically feasible, the reality was that such a change necessitated a mass migration. It was impossible to manage. While a few early adopters — always keen to try something new — jumped on the Esperanto bandwagon it

was never adopted by enough people to achieve critical mass and fulfil its potential. Of course, such fragmentation usually only serves to introduce yet another ‘protocol’ into the world, thus compounding the very communications problem that it was invented to solve. The management of large-scale change is just as difficult in 1999 or 2000 as it was in 1887.

Given the scale and complexity of today’s information systems, few have the inclination, time, money or resources to simply start-over again. In short, the lowest common denominator approach looks good on the white board, but is totally impractical for the real world.

Integration III — non-invasive (again)

Today, powerful non-invasive tools are available for EAI projects. They combine the convenience of non-invasive application integration, with the high quality of service required for mission-critical applications. You can find a tool to fit any style of technical architecture style; from 2- and 3-tier Windows applications to Web-based systems.

Possible non-invasive solutions are shown in Figure 4.1. At the high-end, for example, MitemView — from MITEM Corporation — couples an asynchronous message processing system with an event driven communications framework to provide real time application integration. Whereas previous attempts at using the terminal data stream relied on the processing of ‘screens’, MitemView enables legacy applications — which have no formal message structure — to communicate in a message-oriented way. True to the non-invasive mantra, this happens without modifying the legacy application.

An alternative invasive approach would be a technology like IBM’s MQSeries. The effect is similar but the time and cost involved are very different.

As well as providing a high quality of service and flexible deployment options, these tools use standard development languages — such as Microsoft Visual Basic and Sybase PowerBuilder — to construct the integration control logic. Some also support integration with a very broad range of legacy mainframe and mid-range systems, providing great scope and flexibility.

- CNT (Enterprise/Access)
- Computer Associates (OPAL)
- Intelligent Environments (Amazon)
- MITEM (MitemView)
- NEON/CAI (CL/7)

Figure 4.1: Leading non-invasive vendors (products)

Choosing between invasive vs. non-invasive

One can debate the relative merits of invasive vs. non-invasive integration ad infinitum. However, analysis shows that there are numerous integration projects — and thus a large segment of the EAI market — which can only be approached in a non-invasive way.

Such influencing factors can be grouped into:

- the technical ones
- the commercial ones.

Technical factors

The most commonly found factors which incline the choice towards the selection of a non-invasive solution include:

- **your organization does not own some or all of the systems which need to be integrated; your systems may be controlled by other departments, subsidiaries, trading partners, government agencies, out-sourcers, etc. (you cannot easily invade others)**
- **you do not own, have access or rights to access, the original source code; this applies irrespective of whether the software is a package sourced from a third party or whether it is an application written 10+ years ago where the source is missing; furthermore, with the relentless move from bespoke application development to buying-in packages, this factor will appear increasingly**

- you do not have the network infrastructure to support invasive integration methods; networks originally designed for low-bandwidth terminal data — for example 9600bps modem connections — can be easily swamped by new data types
- your organization does not know how its target systems are architected; poor, inadequate or missing documentation is a constant problem (the original developers have left the company or, in some cases, have ‘shuffled off this mortal coil’)
- your target system is mothballed, in a support and maintenance state
- you have incomplete platform support provided by your invasive middleware vendors (is there a server-side CORBA or DCOM component for every host platform with which you need to integrate?)
- Year 2000 and EMU compliance projects are preventing direct (invasive) modifications to existing applications
- your target application provides shared services (you cannot modify for one group of users without adversely affecting others).

Commercial factors

Commercial factors pushing for adoption of non-invasive tools are much more varied, both in their impact and consequences. For example, mergers and acquisitions demand rapid integration and assimilation of disparate systems:

- management cannot start to realise the expected economies of scale until systems are integrated, therefore time really is money
- customers (and suppliers) cannot obtain seamless service until such systems are integrated.

With so many recent examples of mergers and acquisitions — from Chrysler/Mercedes, Travellers Group/Citibank, Wells Fargo/Norwest, BP/Amoco/ARCO, etc. — nothing appears inviolate. The questions are — will your organisation be next,

and are you prepared for the changes that would come?

Another commercial factor which is assuming ever greater significance is that increasingly small windows of opportunity are creating competitive advantage. Again, time is money. Non-invasive techniques mean swift results, at a lower cost.

A variant of this occurs if your organization is in a fast-moving business segment which:

- requires constant, incremental delivery of new capabilities
- has little time for lengthy, 6+ month projects and must keep its systems closely aligned with rapidly changing market requirements.

There is not the time or resource to try an invasive approach. A non-invasive one will be both faster and safer.

Frequently managements do not want to ‘bet the business’ on some new ‘standard’. Doubts are raised about ‘backing the wrong horse’ or worrying about whether key trading partners (or competition) are about to back another horse. On broader fronts, internal political inertia and caution can significantly inhibit progress:

- perhaps division heads — concerned with fiefdoms — resist the wholesale change and corporate standardisation which invasive integration methods dictate
- middleware — and potential business benefits — is argued to be ‘relatively unproven’ or, the converse, approval for large-scale investment cannot be authorized until the benefits are proven.

The reality is that offering a non-invasive approach is more likely to win support than raising the risks of the invasive.

When is invasive non-invasive?

If, today, a middleware tools vendor required that you have (say) MQSeries installed to be able to use its product, that could be regarded as invasive. The choice is not there. You have may MQSeries-enabled a few of your applications, but probably not all of them.

However, if you have already completely MQSeries-enabled your applications — and the tool you use supports that interface — then the solution can be regarded as non-invasive. The determination between invasive and non-invasive is simply one of ‘what are the existing application interfaces, and can we accommodate them?’ Application interfaces change constantly, so invasive and non-invasive are merely instances in time.

The key to long-term success, however, is to choose tools that seamlessly can adapt to past, present and future application interfaces. What the current market experience tells us is that no single application or middleware interface is ever likely to ‘win’ (as in domineer) what users need for enterprise application integration. (Sorry CORBA, DCOM, EJB, MQSeries, etc.)

Lessons to be learned

Firstly, anyone undertaking an integration project needs to understand the business problem they are trying to solve. Without question there is a law of diminishing return. IT managers need to deploy quickly the 20% of the technology that delivers 80% of the value. If this is true of any IT project, it is especially so for those which facilitate application integration.

Experience shows that you should seek to extend the reach and life of your key assets first. Key assets are those IT systems which run the 75% of business processes and store 80% of corporate data: mainframes. Therefore, most enterprise application integration projects are likely to involve these.

In contrast, too much time and money is being invested in relatively unproved technologies — such as CORBA, COM+ and EJB which are being applied to the 25% and 20% less significant activities. Although these technologies have a role to play, they simply do not adequately address legacy integration. It sounds good to ‘wrap’ a legacy system in a CORBA object. But try it. It requires a huge effort. Placing too much emphasis on these types of technology is concentrating too much technology investment on just 20% of the business value.

Never forget that careers are short. Put another way — you always need a quick win. IT managers can win friends in the boardroom by demonstrat-

ing a quick return. Leverage an existing asset to bring tangible benefits. Then use this first middleware success as a catalyst to build confidence for future projects.

Conversely, do not be misled by immature technology that you read about when you are sitting on an aeroplane (the so-called ‘Airline University’ syndrome). You will have to live with your choice of technology long after industry-watchers have moved on to evangelize about their next favorite ‘toy of the moment’.

Finally, do not expect to escape organizational politics. It is totally unrealistic to expect a large organization to standardize on any middleware product that spans different:

- departments
- skill sets
- technologies
- agendas.

The net of all this is, do not standardize the technology. Instead, standardize the user experience. Use middleware that enables the different lines of business to retain their autonomy while corporately delivering a single modus operandi. Today this is more likely to be non-invasive than invasive.

Management conclusion

Ultimately, whether a solution is invasive or non-invasive is merely a factor of what the existing application interfaces are:

- *past investments have created legacy systems with terminal data stream interfaces*
- *current investments include adding new application interfaces, like IBM’s MQSeries, or indeed replacing legacy systems with ERP packages.*

On this basis, in the next millennium, end users will increasingly demand support for MQSeries and ERP interfaces plus legacy interfaces (for these rarely disappear).

The key to long-term success is going to lie in choosing middleware tools which can seamlessly adapt to past, present and future application interfaces. This is what lies at the root of the attraction of non-invasive middleware.

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Subscription Centre

St Swithun's Gate
Kingsgate Road
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England
Telephone: +44 1962 878333
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Email and Internet

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