

Service Oriented Architecture

Insights from the Front Line

July 2006

KEY FINDINGS

Experience-hardened practitioners are beginning to emerge from early SOA activity

While the level of knowledge and experience of Service Oriented Architecture (SOA) is still highly variable within the IT professional community, a solid core of experience and expertise is beginning to form. Around one in ten of the 1,332 respondents in a recent online research study declared themselves as having extensive in-depth SOA expertise. These "expert practitioners" typically come from organisations that have completed or are going through one or more SOA related initiatives, and their feedback provides useful insights for the community as a whole.

Expert practitioners say the benefits are there if you get past the buzzword soup

As with many developing areas of the IT industry, it can sometimes be a challenge to translate buzzwords and marketing messages into real-world practicality. Expert practitioners who have been through this process, however, can talk knowledgeably about these practicalities. Furthermore, they confirm significant benefits can be gained from SOA adoption through the simplification of systems integration, an increase in software engineering efficiency, and an ability to map IT systems onto the business more effectively to achieve better ongoing alignment of activities.

Cost savings are a pull, but the bigger drivers of SOA investment are value based

The practical benefits highlighted above are confirmed to translate to cost savings arising from the more efficient delivery of IT. Expert practitioners, however, say the ability to respond more rapidly and flexibly to business needs and to better enable business innovation are more important drivers.

Starting small is OK, but if you don't have an overall plan, then get one

Those with more knowledge and experience of SOA advocate the parallel approach of defining an over-arching strategy and adoption plan, while simultaneously initiating discrete deliverable projects to develop skills and expertise, provide "early wins", and refine the higher level plan iteratively over time. As SOA is about getting elements of the business and IT big picture working together more coherently, the benefits are hard to achieve through purely ad hoc or opportunistic activity.

Senior level buy-in is critical, but explaining SOA to executives can be a challenge

While experienced adopters tell us the centre of gravity for an SOA initiative should be firmly in the business domain, SOA concepts are most commonly articulated in IT systems terms, which is often an impediment to gaining senior manager buy-in. Many are of the opinion that developing language to articulate IT concepts to non-IT people is only part of the answer. More success can be achieved by focussing on business needs and illustrating through practical real world examples how SOA helps to meet them. It is more about IT people learning the language of business than vice versa.

Overall, SOA is an evolutionary concept, not some risky new technology

The overwhelming sentiment from the study is that SOA is not some radical new way of doing things; nor is it a new technology, or a technology of any kind, for that matter. SOA is simply a natural evolution of the way in which the enlightened have been delivering IT for many years.



The research upon which this report is based was designed on an independent basis by Freeform Dynamics and interpreted in collaboration with Macehiter Ward-Dutton. Feedback was gathered from 1,332 IT and business professionals during the study, which was sponsored by IBM.



Introduction

Service Oriented Architecture, commonly referred to as SOA, has a lot to live up to. IT industry vendors, analysts and other commentators have variously positioned it as everything from a silver bullet to solve the World's systems integration problems to a way of achieving the ultimate level of alignment between IT and the business.

In this report, we consider the results of a research study completed in June 2006, within which feedback was gathered from IT and business professionals working in mainstream businesses. The results reveal an interesting mix of findings, corroborating some of the things we commonly hear from vendors and analysts, but challenging others.

More importantly, the feedback we received during the study provides valuable lessons for those looking to explore or exploit the potential of SOA, and as with all Freeform Dynamics reports, we have tried to keep our treatment of the subject down-to-earth and practical, rather than theoretical or evangelical.

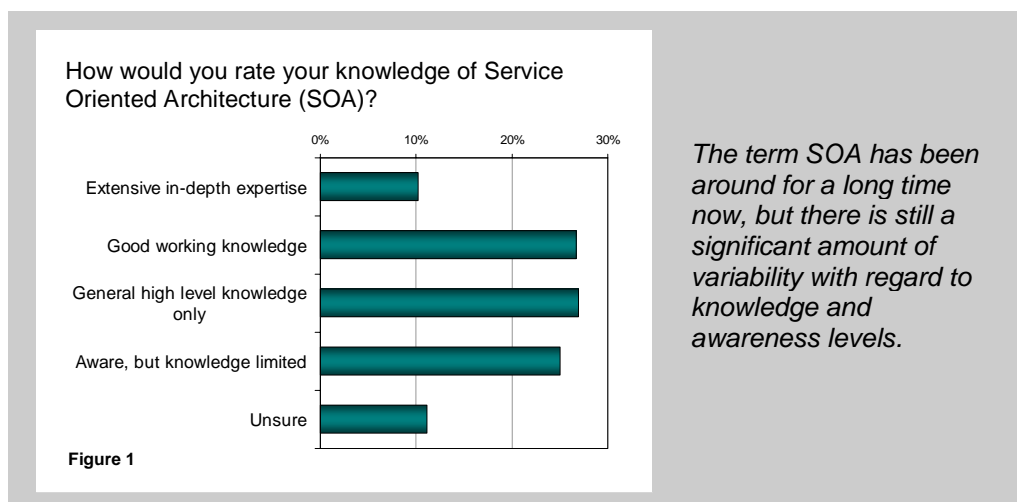
About the Research

The research was conducted online via a Web based questionnaire, which attracted 1,332 responses. A breakdown of respondents in terms of their job function, geographic location and type of organisation for which they work is presented in Appendix A. In summary, the sample is made up of predominantly UK and USA based IT management, architects and other IT professionals, with a 10% representation from business people, collectively coming from a broad cross section of industries and company sizes.

While the study was sponsored by IBM, all design, analysis and reporting has been carried out independently by Freeform Dynamics in collaboration with Macehiter Ward-Dutton.

Mainstream Knowledge and Understanding

One of the first areas investigated during the study was the level of knowledge and understanding of SOA among mainstream IT and business professionals. The results tell us that while there is a good level of overall awareness, the depth of SOA knowledge and understanding varies quite a bit (Figure 1).



From a geographic perspective, knowledge levels are marginally higher in the USA compared to the UK, but the difference is not great, so these two markets are at similar levels and would appear to be moving forward at a similar pace.

By contrast, significant differences are observed in relation to organisation size, with knowledge levels in larger enterprises higher than in their smaller counterparts (Figure 2).

How would you rate your knowledge of Service Oriented Architecture (SOA)?

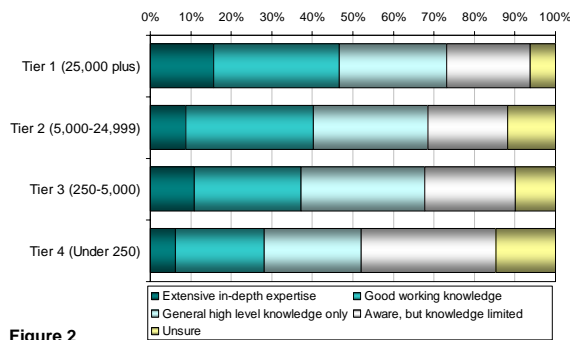


Figure 2

Larger organisations with extensive and complex IT infrastructures arguably stand to gain more from SOA, so are more receptive. Direct sales activity from major vendors will also have boosted awareness in the higher end of the market.

We will highlight other such differences between groups as we go through the remainder of this report, and one of the most revealing comparisons we will focus on is the way feedback differs between expert SOA practitioners and the general population. By expert practitioners, we mean the 10% of respondents who declared themselves as having “extensive in-depth expertise”, as illustrated previously in Figure 1.

As an example of such a comparison, expert practitioners are not surprisingly much more confident about the definition of SOA than the general population (Figure 3).

In your own mind, how clear is the definition of SOA?

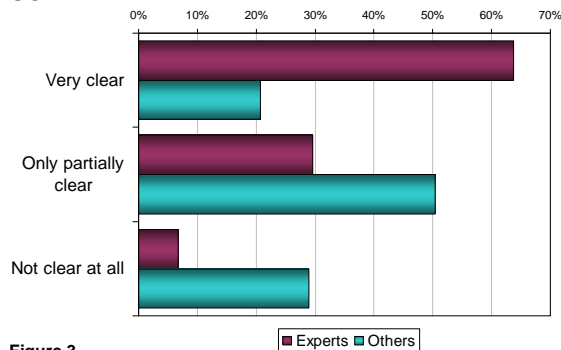


Figure 3

The IT and business community is still on a learning curve with regard to SOA.

As we can see, however, many are still not completely clear about the definition of SOA, so it is worth exploring this topic a little more before continuing.

Definition of SOA

A quick search of the Web will reveal a variety of definitions of Service Oriented Architecture. Here are some examples that popped up on the first page of results from a Google search at the time of writing this report:

A service-oriented architecture is a collection of services that communicate with each other. The services are self-contained and do not depend on the context or state of the other service. They work within a distributed-systems architecture.

Source: <http://www.dmreview.com/resources/glossary.cfm>

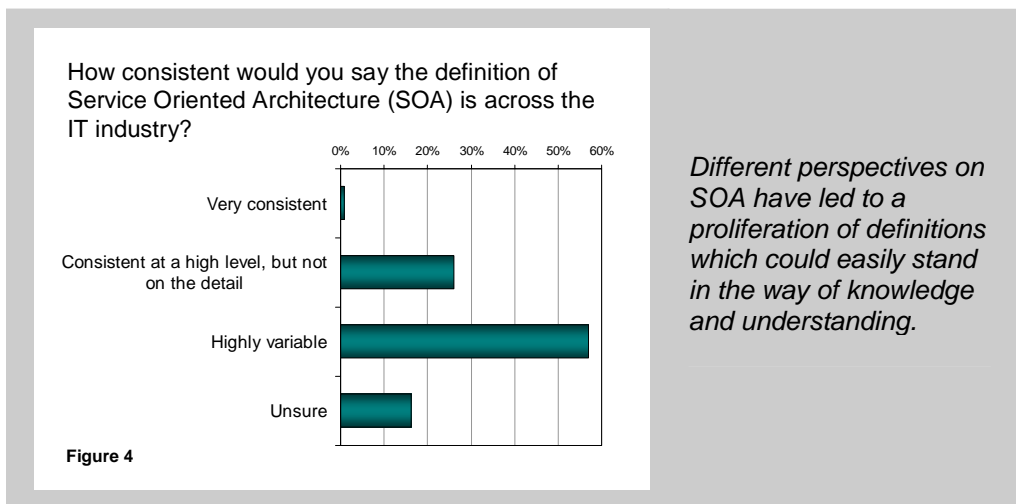
SOA is an architectural style that encourages the creation of loosely coupled business services. Loosely coupled services that are interoperable and technology-agnostic enable business flexibility. An SOA solution consists of a composite set of business services that realize an end-to-end business process.

Source: http://weblogs.java.net/blog/johnreynolds/archive/2005/01/the_soa_elevato.html

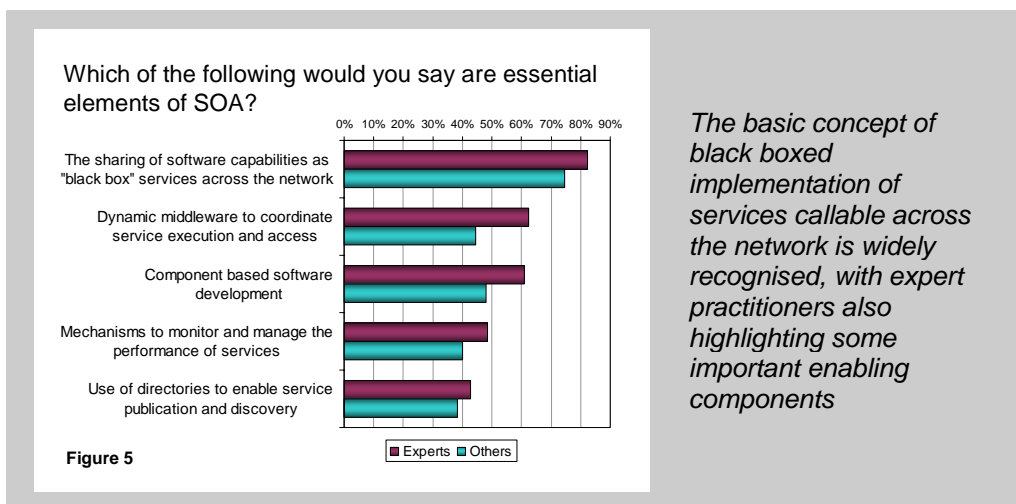
In computing, the term Service-Oriented Architecture (SOA) expresses a perspective of software architecture that defines the use of services to support the requirements of software users. In an SOA environment, nodes on a network make resources available to other participants in the network as independent services that the participants access in a standardized way. Most definitions of SOA identify the use of Web services (e.g., using SOAP or REST) in its implementation. However, one can implement SOA using any service-based technology.

Source: http://en.wikipedia.org/wiki/Service-oriented_architecture

Definitions of SOA at this level are pretty consistent as we can see. When we look at the next level of detail or implementation practicalities, however, descriptions start to diverge as different aspects of SOA are emphasised or de-emphasised depending on the perspective being taken. Some will focus on software engineering, for example, others on deployment and operations, and yet more on the role of SOA in achieving IT business alignment. While the associated definitions may well all be valid, the resulting inconsistency can easily stand in the way of clear understanding (Figure 4).



Rather than focus on the merits or otherwise of individual definitions, we took a slightly different tack during the research when trying to determine what people understood SOA to be about. We broke out some of the individual components of various definitions that exist and asked respondents to tell us which they considered to be essential elements of SOA (Figure 5).



Most of our respondents put a high degree of focus on the basic SOA premise of black boxing system capabilities to form encapsulated services that are callable across the network, which is encouraging as this particular principle is fundamental to the whole SOA concept.

From that point onwards, different respondents in the general population pick up on different combinations of elements, though expert practitioners particularly highlight a couple of practical implementation aspects of SOA – a component based approach to software engineering and the importance of dynamic middleware to coordinate service execution in an SOA environment.

Again, this is encouraging, as it is important to understand the impact of SOA in the areas of both software engineering and deployment. With regard to the latter, middleware is not only important to manage messaging and coordination between components, it is also necessary to deal with performance and quality of service requirements.

There is the interesting consideration here that while a component may originally have been deployed in a particular context to serve a particular purpose, the services it delivers may subsequently be consumed in totally different ways. This is best illustrated by an example, e.g. a component originally conceived to provide sales order creation services to support a low-volume clerical application could easily be overwhelmed if it is later invoked by a high-volume online store system. Effective monitoring and/or dynamic workload balancing are therefore important to SOA.

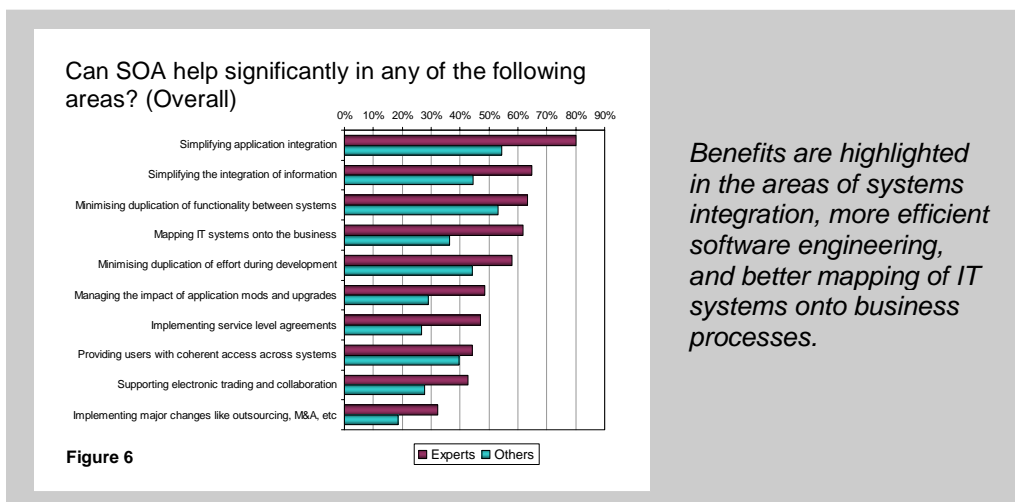
Having said this, it is interesting to see that mechanisms for monitoring and managing the performance of services are lower down the list on Figure 5. This is likely to be a reflection of the limited scale to which SOA has been deployed among early adopters, which is something we shall look at a little later. As activity scales up, we would anticipate monitoring and dynamic management to move higher up the agenda as its importance becomes better appreciated.

The picture we see in Figure 5 is thus a reflection of current perceptions based on experience and knowledge to date. As such, it may not be fully in sync with the view of some of the larger vendors with broad solution portfolios who are thinking and planning holistically one or two steps ahead. Of course the view is also likely to be at odds with vendors that have more narrow offerings, as it is common for niche vendors to frame everything with their particular product or service at the centre of things, which can lead to SOA definitions being skewed accordingly.

Some of the questions we have raised here are addressed when we look more at implementation practicalities later in this document. In the meantime, however, it is appropriate to take time out to consider why an organisation would want to consider SOA adoption in the first place.

Benefits of SOA

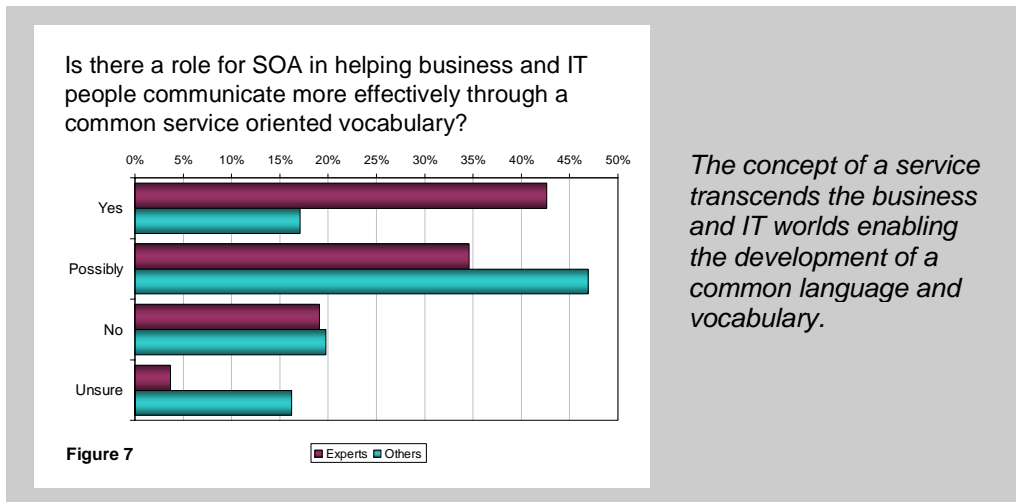
The theory says that redefining infrastructures based on a service oriented approach with standard interfaces between components should lead to benefits in the area of systems integration, and our expert practitioners confirm that such benefits are real (Figure 6).



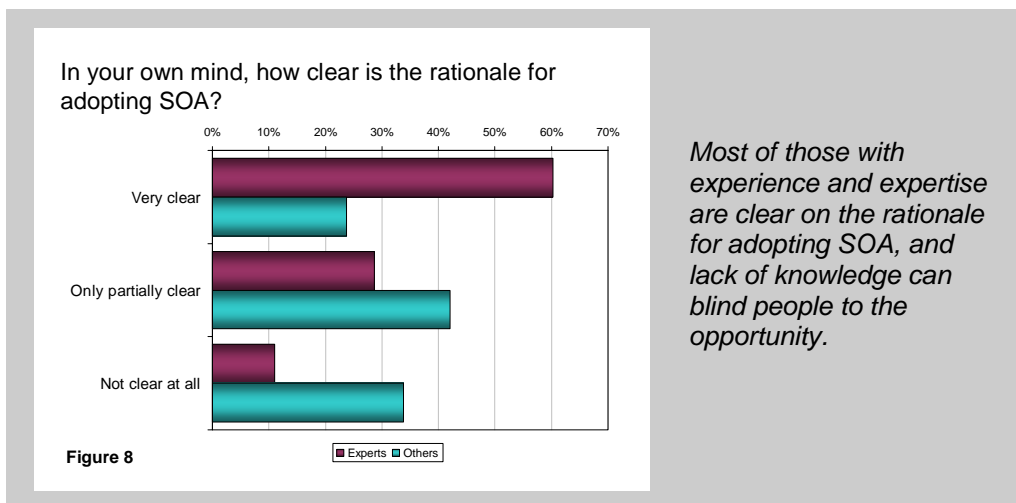
With so many organisations having to contend with fragmented applications and databases, it is also significant that expert practitioners highlight the role of SOA in simplifying the integration of information. Benefits to do with application development and maintenance, specifically the minimisation of redundant functionality between systems and the reduction of duplication of effort during the development process, confirms the positive impact SOA can have on IT service delivery.

It is also interesting to see the prominence given to more effective mapping of IT systems onto the business, which is another theoretical benefit of SOA that is corroborated by the research. Clearly, it is much easier to map a collection of services onto business processes than it is to map the functionality of a traditional monolithic application. The increased precision and flexibility in this area is particularly relevant in a dynamic environment in which business processes frequently change.

Related to this, we have clear indications that focusing on the concept of a service, which transcends both the systems and business worlds, can break through the language barriers that often stand in the way of effective communication between IT and the business (Figure 7).



If we look again at the last few findings, it is evident that a common theme has emerged. Those with more experience and knowledge of SOA tend to understand and appreciate the benefits much more than the general population. It is therefore not surprising that the rationale for adopting SOA is very clear to most of these individuals (Figure 8).

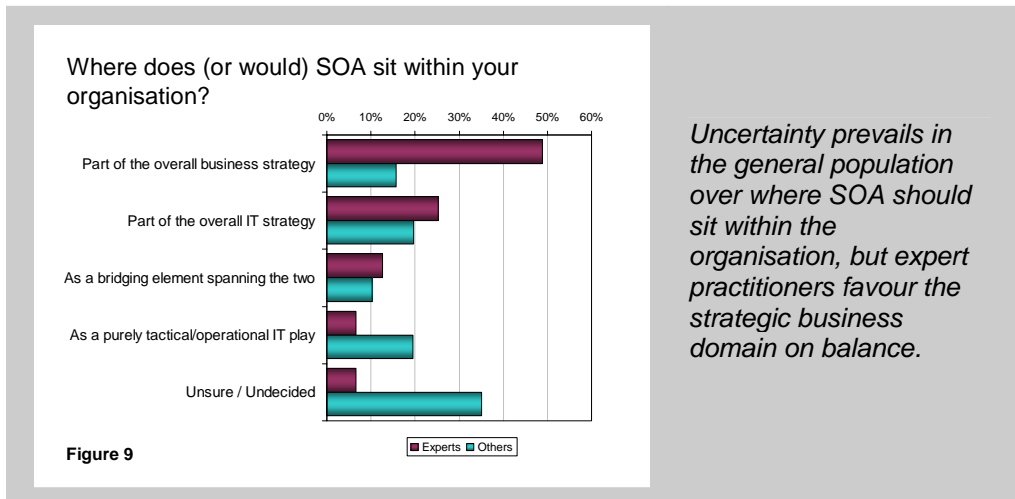


At the other end of the spectrum, the reasons for adopting SOA still elude one in three of the general population. This may, of course, be because there is genuinely no business case to be

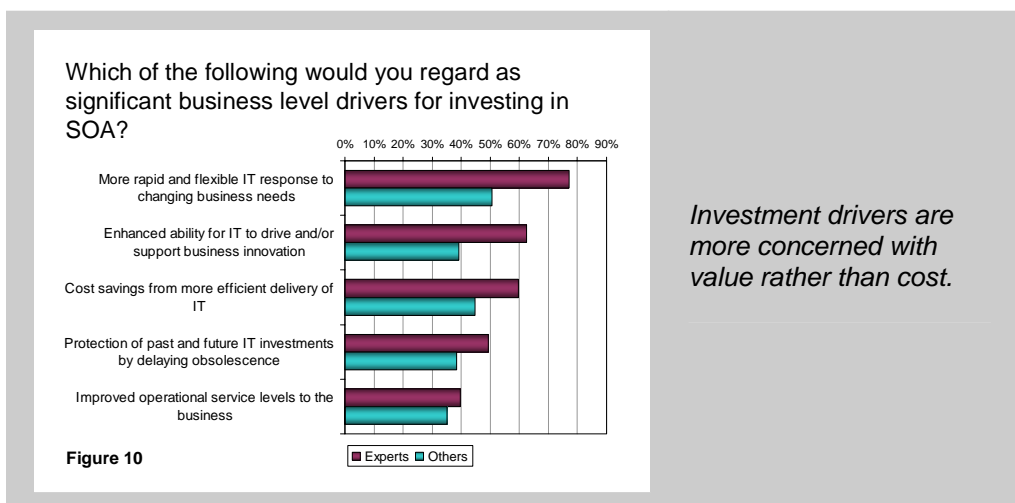
made in some environments. However, when we consider the variation in knowledge and understanding previously observed, together with the positive sentiments of expert practitioners, a more likely explanation is that a good number of organisations are simply not aware of the potential business benefits SOA can deliver. But benefits in the areas we have been discussing are only part of the equation. We must also consider the practicalities of securing the necessary investment.

Investment Practicalities

Probably one of the biggest debates in relation to SOA is whether its adoption should be driven as a business initiative or an IT initiative. While this debate continues among the general population, where there is no consensus on the answer to this question, expert practitioners are very much inclined to put SOA into the business strategy camp (Figure 9).

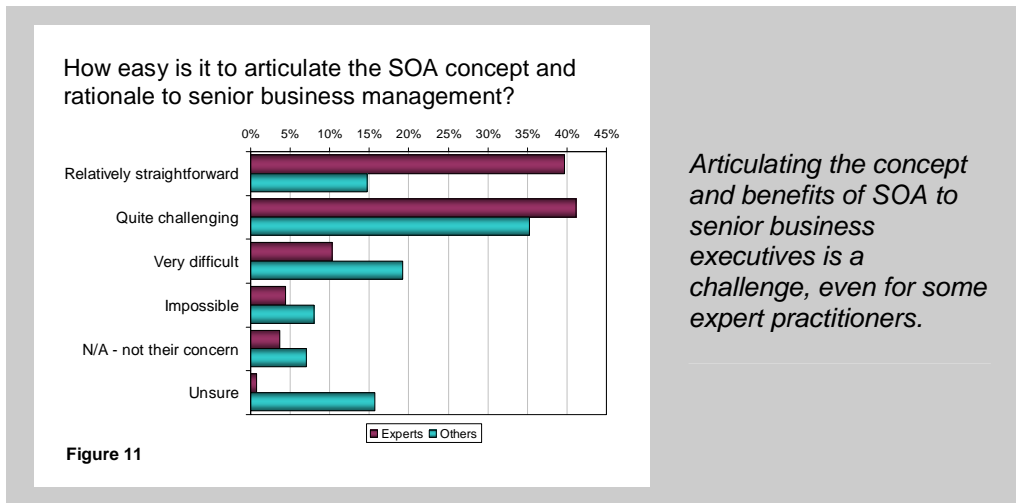


The reason for this emphasis becomes clear when we look at drivers for investment at a business level. The view of expert practitioners is that SOA is not just about cost savings and the more efficient delivery of IT services. More important in their minds is the significant positive impact on the IT department's ability to respond rapidly and flexibly to changing business needs. Going hand-in-hand with this, is the enhanced ability to help drive and/or support business innovation, e.g. new business models, new ways of delivering products and services, new ways of taking advantage of market opportunities, and so on (Figure 10).

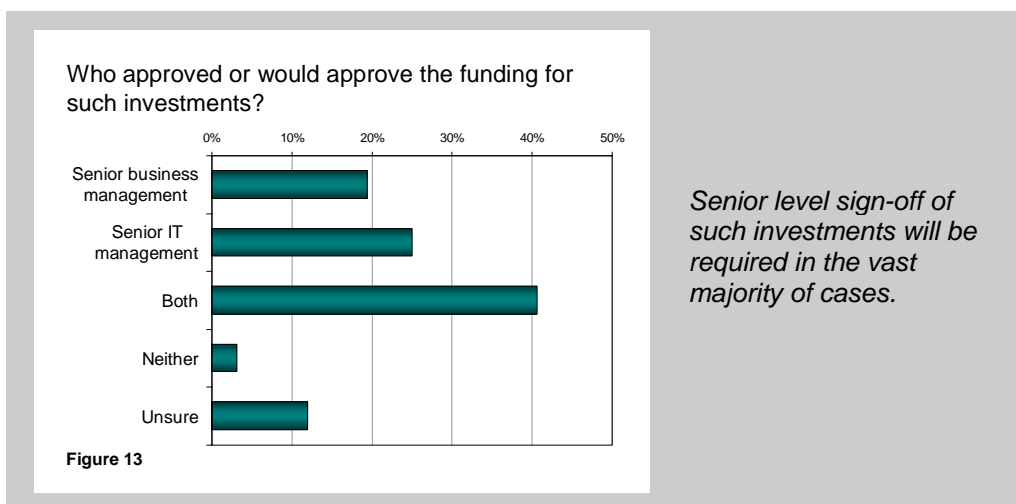
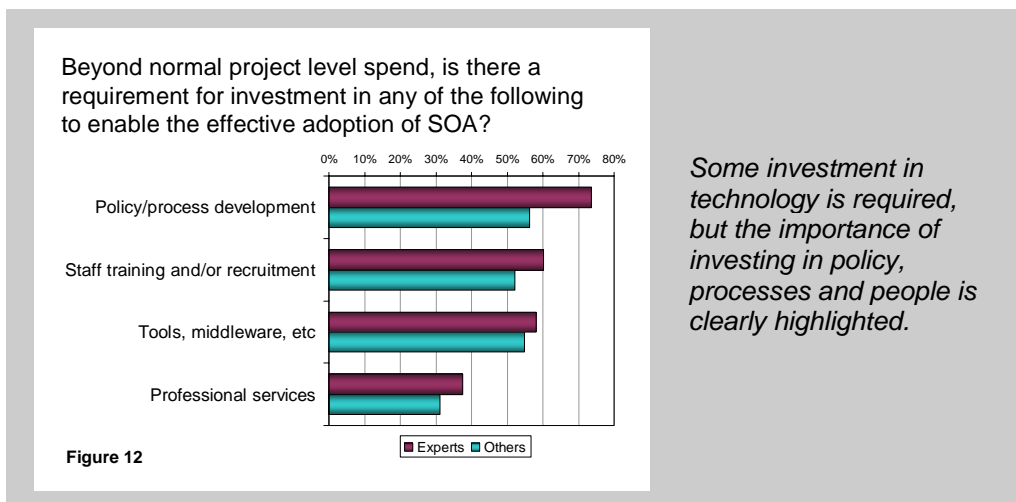


It is thus evident that the drivers for SOA are mostly concerned with the creation of business value.

Given this, we would expect the benefits of SOA to resonate very strongly with business executives. The problem is, however, that the majority of even expert practitioners do not find it easy to articulate the SOA concept and rationale to their business leaders (Figure 11).



This is a potential blocker to moving forward, as SOA adoption typically requires investment beyond project level spend, which will often require senior manager sign off (Figures 12 and 13).



Fortunately, many of those who participated in the study have been kind enough to provide us with some guidance on the question of how to explain SOA and the benefits associated with it to an executive audience.

One of the most common pieces of advice is to avoid the trap of trying to explain the underlying technology and systems related concepts in the first instance, and focus on the business impact of SOA, e.g.

“Focus on what SOA can do for business performance, not on how the technology works”.

“Don't even attempt to articulate IT concepts as being business friendly. Start with business concepts and explain how these drive or are enabled / simplified through the adoption of SOA”.

“Speak to your audience in their own terms: accountants in savings, IT in systems integration, management in business processes”.

Some highlight the need for having the discussion in the context of the organisation's own business rather than in an abstract sense, e.g.

“Discuss SOA in the context of existing company issues/concerns/deficiencies (include financial, time, quality, inefficiencies) to back up the justification to adopt. Pick an initial problem area to illustrate how SOA could help - reinforcing the need”.

“Make a firm map of current implementations, especially overlap of functionality. Be sure to highlight build and deployment issues that cost a great deal of money, and the turnaround time for IT (lack of agility) with current tightly-coupled systems”.

Others suggest the use of analogies to get some of the basics across, e.g.

“Explain it like fast food delivery. There may be fifteen people in the back making different kinds of food, but all you need to know about is how to talk to the person at the cash register”.

“Explaining it as a pick-and-mix concept (while ignoring middleware) seems to get the basic idea over. Then provide a set of 'if this changes' or 'what if' situations to justify middleware”.

One respondent provided a piece of advice that we could not agree with more:

“Remember that SOA is not technology. It is a way of utilising technology to better map services to business needs and hopefully more highly utilise IT assets”.

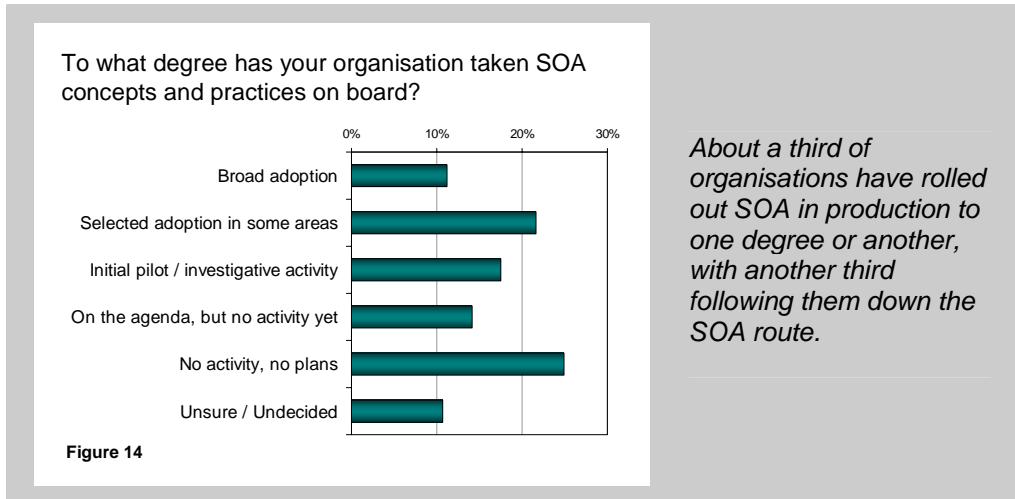
This last comment is particularly relevant in the context of the earlier discussion of the way in which IT vendors often position SOA. Not only is such positioning inconsistent as we have seen, but it often focuses way too much on enabling technology, in many cases creating the impression that SOA is, in fact, a technology in its own right. If SOA is positioned to senior management as a more effective way of unlocking the business advantage that technology and automation offer, the messages are much more likely to hit the mark.

In some ways, this is counterintuitive, as it would appear that we are asking senior management to support investment in something that is an intangible. However, one of the most common criticisms of IT departments is that they consume significant amounts of cash but do not deliver results as efficiently, quickly and flexibly as business people would like (see report “Aligning IT with the Business”, January 2006, available from www.freeformdynamics.com). Asking for support to introduce a new way of working that has been conceived to directly address these common complaints will actually sound more attractive to many executive decision makers than a proposal to just buy more “stuff”.

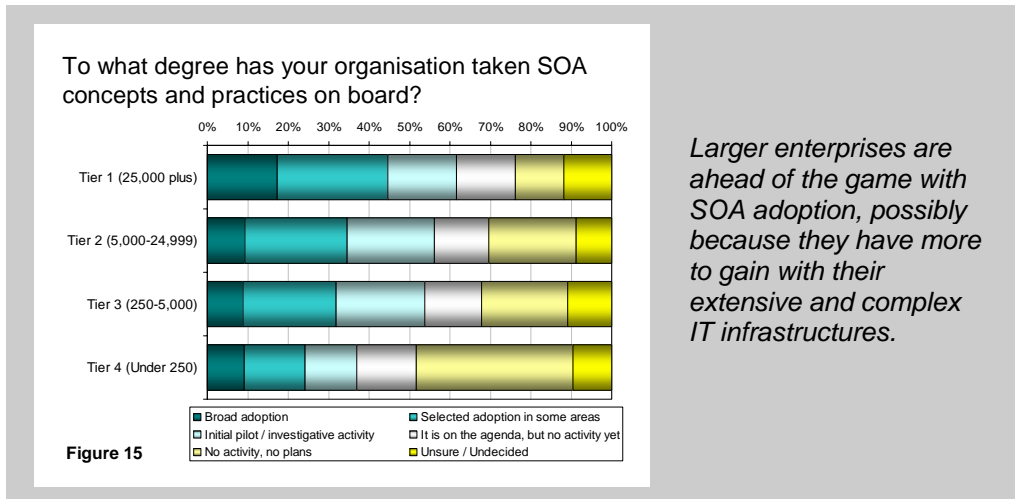
So, according to those with experience, SOA tackles a range of historical problems associated with the delivery of IT, giving rise to tangible benefits that should be attractive to business executives if we explain it appropriately. But how many organisations are actually taking it on board and how?

Take-up and Adoption Practicalities

Across our sample, approximately a third of organisations have some form of production level activity involving SOA, with just over 10% alluding to broad adoption. If we add into the mix those who are piloting, investigating or have SOA on the agenda, two thirds of the organisations from which feedback was gathered would appear to be heading down the SOA route (Figure 14).

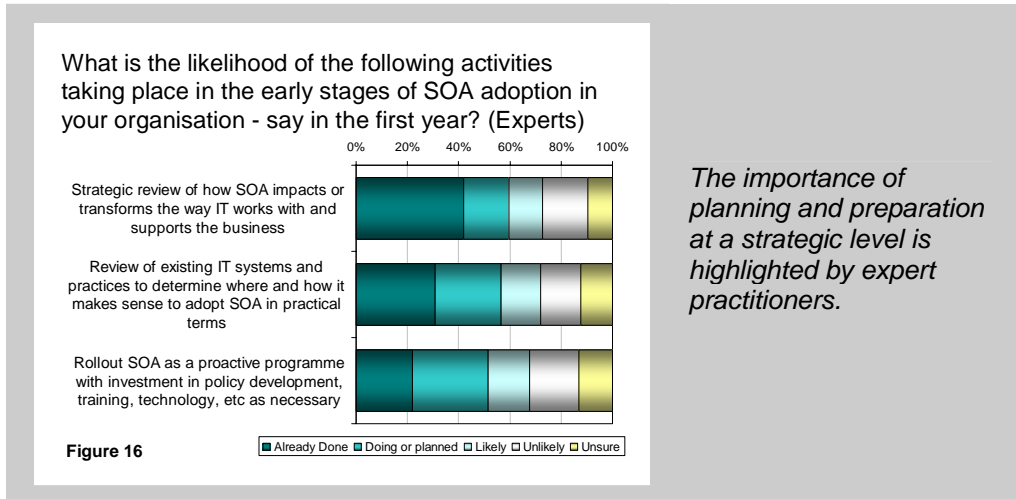


We need to be careful not to regard this as an absolute indication of the level of activity as a whole as the self-selection associated with online surveys means those with more interest in SOA are likely to be over-represented. Nevertheless, we can continue to make legitimate comparisons, which reveal, for example, the expected difference in activity by company size (Figure 15).



Looking at this picture, it is easy to focus in on the fact that large enterprises are almost twice as likely to be active with SOA as smaller organisations at the other end of the spectrum. However, noting that a quarter of those small organisations are already active with SOA underlines the broad applicability of the approach. SOA as a concept is equally as valid for organisations with tens of applications as it is for their larger counterparts with hundreds or thousands, even though the latter may have a more pronounced need.

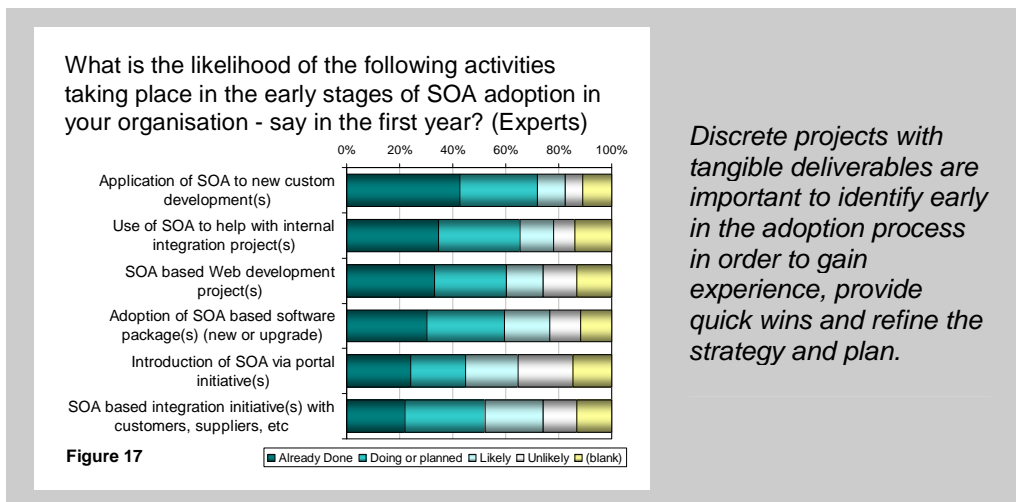
In terms of adoption practicalities, we have chosen to home in on the expert practitioners group, as the picture we get from the general population is relatively patchy and inconsistent. When we take this approach, we find that those in the more committed and knowledgeable subset are typically working their way through a variety of proactive top-down adoption activities (Figure 16).



The importance of planning and preparation at a strategic level is highlighted by expert practitioners.

It is undoubtedly no coincidence that the ranking of these activities in terms of progress reflects the logical sequence we would expect organisations to go through. By way of clarification, however, it is clear from the study that these top-down activities in relation to SOA adoption are not the same as the kind of business process re-engineering or ERP implementation mega-projects that we saw in the 1990s. Organisations are taking a much more iterative approach with SOA, defining an initial loose strategy that is firmed up as knowledge is gained.

This very pragmatic approach is confirmed when we look at the types of project level activity that typically take place alongside strategic activity within the first year of SOA adoption (Figure 17).



Discrete projects with tangible deliverables are important to identify early in the adoption process in order to gain experience, provide quick wins and refine the strategy and plan.

There are a couple of lessons we can learn from this. Firstly, it is not necessary, indeed it is not advisable, to implement SOA in a "big bang" fashion. As one of our respondents put it:

"The bite in SOA can be the initial investment, which is the hurdle you have to overcome, but much of it can be iteratively implemented".

The trick, as with the introduction of so many other strategic transformation initiatives, is to strike a balance between defining the bigger picture strategy and the longer term goals, while moving forward with discrete manageable projects that allow practical experience to be gained and quick wins to be delivered in order to keep stakeholders happy and interested.

The need for a balanced holistic approach is clear from the critical success factors highlighted by our expert practitioners (Figure 18).

Pulling it all together, which of the following would you regard as critical to the success of SOA within your organisation (past or future)?

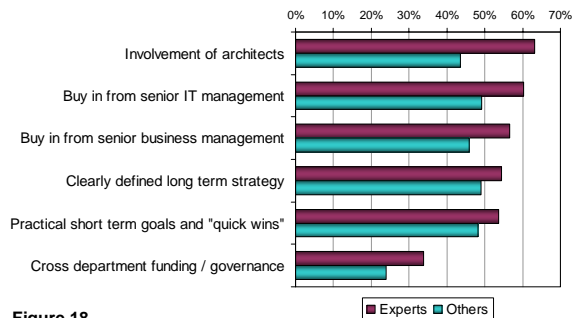


Figure 18

Many different elements need to be aligned and coordinated for successful adoption of SOA.

Clearly, aligning all these factors can be difficult and this, along with a number of other challenges are identified by many of the respondents through comments such as:

"Making disparate groups understand how a SOA can make it easier for other divisions as well".

"Changing funding models to support shared services rather than one-off projects. Establishing governance structures".

"Mainly political issues. SOA is a leveller and threatens people who like to build little empires in an organization".

"Overcoming the inertia that exists in an organisation and finding pragmatic steps to initiate a SOA transformation".

"Lack of agreement of what SOA is. Lack of vision by vendors who see it as just XML client-server".

"Dealing with the confusing messages from vendors".

"Keeping the faith and avoiding the buzzword soup".

These last points bring us back to the issue we discussed right at the beginning of knowledge and understanding being highly variable. All things being considered, this remains the biggest challenge (Figure 19).

Have there been or do you anticipate particular challenges in any of the following areas within your organisation?



Figure 19

Knowledge and understanding remains the most prominent challenge.

Discussion and Conclusion

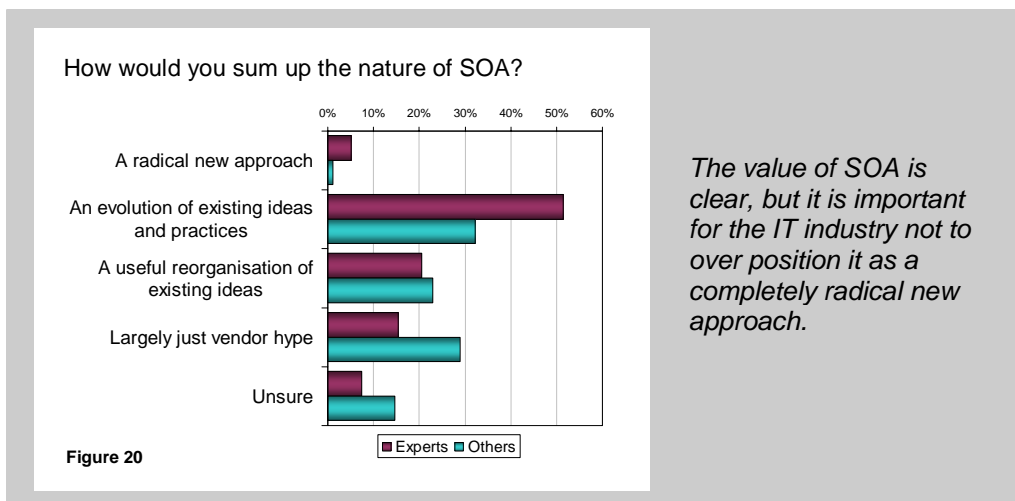
Deploying information technology effectively to support modern businesses is more of a challenge today than it has ever been. The rate of change on both sides of the equation has accelerated significantly in recent years. The business environment has become much more fast-moving and complex, and so too has the technology landscape at both an industry and individual organisation level.

With so many moving and changing parts, traditional methods of designing and delivering IT are struggling to keep up. An application designed today based on architectures conceived 15 or 20 years ago could easily be out of date by the time it is developed and rolled out. And once delivered, despite the best efforts of maintenance engineers, traditionally architected systems continue to drift out of line with business processes over time, until one day they are replaced and the cycle starts all over again.

Many enlightened companies spotted that this approach was unsustainable a long time ago, especially given the way the world was changing. For many years now, such organisations have been designing and building systems in a distributed componentised manner to introduce the necessary level of robustness and flexibility required to properly keep up with a constantly changing business. In the early days, this was dependent on handcrafting the way in which components worked together. This then evolved into more standards-based approaches such as CORBA, which eased the way in which distributed systems communicated with each other, allowing the principles of loose coupling and simplified integration to be applied more broadly.

All of this learning and experience has been brought together today and wrapped up in the approach we know as SOA, which refines and extends many of the early concepts in the area of distributed systems. The big difference is that the enabling technologies and standards required to realise the vision have now come of age, and the general approach has broad acceptance across the IT industry. Most of the major vendors of development tools, middleware and packaged applications, for example, have either delivered an SOA version of their offerings or are committed to doing so.

The problem is that IT vendors, consulting houses and industry analysts have in many cases over-positioned SOA, and this in turn has led to a degree of cynicism in some parts of the IT and business community, with nearly 30% believing that SOA is largely just vendor hype (Figure 20).



The good thing is that while very few people agree with those who would position SOA as a radical new approach, most of those with experience do see it as a positive evolution or reorganisation of existing concepts, ideas and practices. As we have seen throughout this report, there is also a clear confirmation that adoption of SOA actually does lead to significant incremental benefit at both a systems and business level.

The challenge for the IT industry now is to propagate this knowledge and appreciation to a much broader audience, along the way trying to avoid the temptation of drifting too far from core SOA concepts and rationale when positioning specific offerings. As the centre of gravity in terms of knowledge and experience today lies within the IT domain, any help that suppliers can provide to their customers to assist in internal education, particularly of senior management, will accelerate the process. This kind of support will help customers in their continued drive to deliver incremental value from IT, as well as encouraging the general development of the market for SOA related products and services.

Meanwhile, we urge those out there who are trying to work out if, or how, to take SOA on board to avoid the distraction of conflicting and confusing messages and hype. If a supplier is describing SOA in pure technology terms, for example, or trying to introduce new terminology that is obviously just for marketing purposes (e.g. SOA 2.0 to ride on the back of the Web 2.0 bandwagon), then beware. The bottom line is that the basic concepts of SOA are really quite simple, and if they are considered in a business context, their relevance will generally be very apparent in most situations.

And if your organisation has started down the SOA route and things are not progressing as quickly or as smoothly as you think they should, don't give up. Getting architects, developers, IT management, business management and senior executives aligned, is hard, but as this comment from one of our respondents illustrates, you are not alone:

"We are already moving forward with SOA - it just takes a bit of time to get everybody moving forward in the same direction".

We would like to finish by expressing our thanks to all of those who participated in this study. Your feedback has provided invaluable insights and guidance to your peers across the industry.

Sample Composition

Sample by Geography

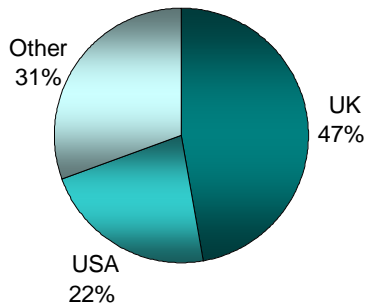


Figure 21

The study was conducted online in English so the bias is very much towards the UK and USA.

Sample by Industry Group

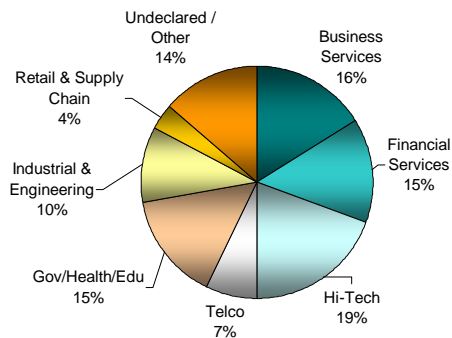


Figure 22

A good cross section of industries was represented in the study, with a slight bias towards the hi-tech sector.

Sample by Size (Number of Employees)

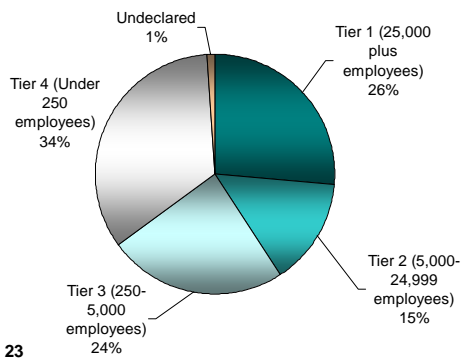


Figure 23

The study included significant representation from organisations of all sizes.

Sample by Job Function

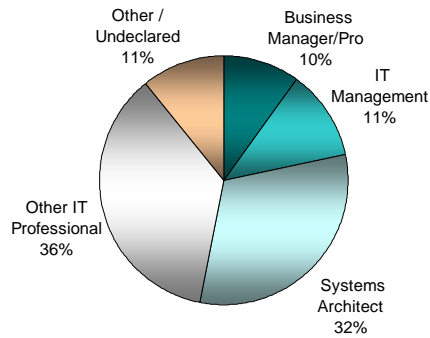


Figure 24

Respondents were predominantly IT professionals, with a strong representation from systems architects.

Experts versus Others

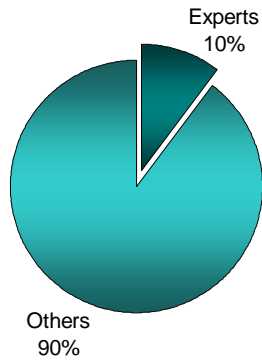


Figure 25

Much of the analysis in this report refers to “expert practitioners”. This group represents 10% of the overall sample.

A Note on Methodology

Information was gathered during this study via a Web based questionnaire, promoted to a broad cross section of IT and business professionals through a variety of means. Participation in the study was based on self-selection, i.e. the questionnaire was not directed at specific individuals in the same way as would occur with telephone interviewing. This means the sample is likely to be skewed towards those with an interest in and/or knowledge of SOA, who are more likely to respond. This bias in no way undermines the validity of comparing different groups within the sample, e.g. those from larger organisations versus those from smaller ones, those with experience versus those without, etc. It does, however, mean that absolute percentages relating the level of knowledge and activity are probably an over estimation of the true levels in the population as a whole. Attention has been drawn to this limitation in the commentary where relevant. Finally, we should note that responses were provided anonymously and segmentation is based on information volunteered by the respondents themselves.

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