# Acceptance Of Service Oriented Computing: What Do IT Professionals Think?

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## Abstract

*This research aims to identify the critical factors that significantly influence the intention of IT professionals to accept and use the Service Oriented Computing (SOC) paradigm. The study uses an interpretive approach. A series of in-depth exploratory interviews was carried out involving IT experts using or considering using SOC in their professional work yielding interesting insights concerning the process of the acceptance of such a complex paradigm as SOC. These insights were used to formulate an initial SOC acceptance model which includes specific (i.e., first-order) constructs such as applicability, maintainability, technical compatibility or structural flexibility. The research investigating the acceptance and use of tools, technologies and approaches in the IT industry has been less than conclusive up to date. Thus, the current study contributes to the progress towards a substantive view of the IT professionals' individual-level technology acceptance. To the authors' knowledge it is the first study examining the process of individual-level SOC acceptance by senior IT professionals. In addition to that, most studies carried out in this domain have been quantitative in nature - in contract to that the current study uses an interpretive approach.*

*Keywords: Technology acceptance in the IT industry, Service Oriented Computing, acceptance model*

# 1    INTRODUCTION

Service Oriented Computing (SOC) is being proposed as the enabling technological paradigm for future applications in many different areas, e.g., e-Business, e-Government, and e-Science (Burner 2007; Cherbakov et al 2005; Erl 2005; Krafzig, Banke and Slama 2004). In the course of the past few years, SOC has been largely associated with a visionary promise to enable an IT-world where "assembling application components into a network of services that can be loosely coupled to create flexible, dynamic business  processes and agile applications that span organizations and computing platforms" (Papazoglou et al 2007, p.70) becomes a day-to-day reality. However, as shown by a survey by Gartner, Inc. (Scholler 2008) since the beginning of 2008, there has been a dramatic fall in the number of organizations that are planning to adopt Service Oriented Computing for the first time. In 2008, this number decreased by more than one-half (going down from 53% in 2007 to 25% in 2008), while the number of organizations with no plans to adopt SOC has more than doubled (increasing from 6% in 2007 to 16% in 2008). Interestingly, the two major reasons for not accepting and using the Service Oriented Computing paradigm are a lack of skills and expertise held by individual IT professionals involved in the SOC adoption plans and no viable business case in the company (Scholler 2008).

The current study attempts to "shed some light" on the individual-level SOC adoption process.

The study reported in the current paper represents the initial step in a multi-methodological multi-part research work – after formulating an initial SOC acceptance model using exploratory interview-based study (this study is reported in the current paper), the emerging SOC acceptance model was refined using a qualitative case study and subsequently it was empirically validated and formalised using a web-based survey and a quantitative data analysis approach (Partial Least Squares technique).

Since the nature of the acceptance process of IT technologies is very complex we have decided to use an interpretive approach in our initial attempt to elucidate factors influencing the individual-level decisions of IT professionals to accept and use the Service Oriented Computing paradigm. The interview study was carried out in Europe involving senior European IT professionals using or considering to use the SOC in their professional work.

The research carried out in this study is important as it examines issues and concerns surrounding the acceptance and use of technological approaches by individual IT professionals. The research investigating the acceptance and use of tools, technologies and approaches in the IT industry (i.e. by individual IT professionals) has been less than conclusive up to date. In addition to that, most studies carried out in this domain have been quantitative in nature – in contract to that, the current study is an interpretive research work since it attempts to determine, to understand and to categorise the phenomena through the meanings which the participants of the study assign to them (Klein and Myers 1999).

The paper unfolds the following manner. Firstly, the research objectives and motivation of the study are presented. The paper then proceeds with presenting a brief review on the research of individual-level technology acceptance by the IT professionals. Finally, background and procedures of the qualitative study are presented as well as the qualitative data analysis revealing the factors influencing the IT professionals' individual-level SOC acceptance decisions and the relationships among those factors. The paper concludes with a formalisation of an initial SOC acceptance model and with limitations and summary of the research work.

# 2    RESEARCH OBJECTIVES AND MOTIVATION

This study seeks to investigate the individual-level perspective of the "forefront adopters" of SOC (i.e., involved senior IT professionals) and to explore phenomena influencing their decisions related to the acceptance (or non-acceptance) of the Service Oriented Computing paradigm.

Several individual-level studies regarding the acceptance and use of new approaches in the

information technology industry have been done to date addressing the acceptance and use of programming languages, e.g., C (Agarwal and Prasad 2000), specific tools, e.g., Computer Aided Software Engineering (CASE) (Orlikowski 1993), specific techniques, e.g., object-oriented programming (Johnson, Hardgrave, and Doke 1999), and the acceptance and use of specific methodologies, e.g., selected prototyping methodologies (Khalifa and Verner 2000). Some of these studies are concerned with established and proven approaches or technologies (Riemenschneider and Hardgrave 2001), while some are investigating the adoption processes of "late adopters" or "early majority" (Mangalaraj, Mahapatra and Nerur 2009).

For the past few years, the term "Service Oriented Computing" has been heavily used across the ICT industry. However, the dramatic decrease in the number of the companies intending to deploy SOC for the first time (see Scholler 2008) with the lack of expertise and knowledge held by individual IT professionals being one of the principle reasons for this tremendous decrease shows clearly that SOC can neither be regarded an established and proven technological approach nor has it currently arrived at a stage of "stable majoritarian acceptance". Thus, studies investigating the individual-level experiences and motivations of "early adopters" (Rogers 1995) might provide valuable insights in the SOC acceptance process and contribute to the understanding of how decisions of acceptance or non-acceptance are made by the individual senior IT professionals involved in the adoption process. This, in turn, might produce several practical implications for management of organisations considering "first-time" deployment of the SOC paradigm.

Frequently, the acceptance and use of new approaches, technologies or paradigms in the information technology industry is perceived as a mandatory decision made at the organisational level (Agarwal and Prasad 2000). However, simply making an organisational-level decision to accept and use an approach such as SOC does not necessarily mean that this paradigm will really be accepted and practically used (e.g., Riemenschneider's et al 2002 study on IT professionals' acceptance of software development methodologies provide similar insights). Similar findings have been also described in the domain of conceptual modelling grammar adoption. Ambler (2004) argues that individual modellers are ultimately the ones that use, and form an opinion about, a modelling grammar and its acceptability. Several prior studies (Khalifa and Verner 2000; Orlikowski 1993) suggest that individual modellers do, in fact, sometimes decide not to use a modelling grammar even if there has been a mandatory organizational decision to use it. The argument that especially at an *early adoption stage,* an *individual* decision on whether or not to accept and use the SOC approach has to be made by every single (senior) IT professional to make an organisational deployment of this particular technological approach truly successful is, thus, an additional motivation for this study.

# 3 REVIEW OF THE RESEARCH ON THE INDIVIDUAL-LEVEL TECHNOLOGY ACCEPTANCE IN THE IT INDUSTRY

There exists extensive, well-grounded and well-accepted research in the domain of the "end-user" individual-level technology acceptance (Rogers 1995; Fishbein and Ajzen 1975; Davis 1989; Davis et al 1989; Moore and Benbasat 1991; Compeau and Higgins 1995; Ajzen 1991; Thompson et al 1991; Venkatesh et al 2003). However, the research in the domain of the IT professionals' individual-level technology acceptance and the progress towards a substantive view of the IT professionals' individual-level technology acceptance has been limited up to date.

While there are some studies (e.g., Mangalaraj, Mahapatra and Nerur 2009) on individual-level acceptance and use of new approaches in the information technology industry which use interpretive/qualitative research methodologies (such as in-depth interviews, qualitative case studies) most of the studies carried out in this area use quantitative methodological approaches. These studies use various theories and frameworks such as the Theory of Planned Behaviour, Technology Acceptance Model, and/or the Model of Triandis as their research basis (Johnson, Hardgrave, and Doke 1999; Khalifa and Verner 2000). Frequently, external factors (such as training) or moderating variables (such as age) are added to the model (Agarwal and Prasad 2000). Selected studies seek to

compare several individual acceptance models in assessing the degree to which these models generalise to the domain under examination (Riemenschneider, Hardgrave, and Davis 2002).

Some of the results produced by studies in the domain of technology acceptance in the IT industry appear to be inconclusive or contradictory. Agarwal and Prasad (2000), for example, studied the acceptance of the C programming language among COBOL programmers. C programming language was used "as a specific example of the broader problem of adopting software development process innovations" (Agarwal and Prasad 2000, p. 295). The context for the study was a large US investment banking organization. The authors stress the urgent necessity "to extend the external validity of prior work [i.e. work on innovation acceptance by the end-users] by investigating the different context represented by an alternative innovation for a dissimilar sample (i.e., software developers rather than end users)" (Agarwal and Prasad 2000, p.296). The acceptance model proposed in this work and the core construct of "user beliefs" appear, however, to be rather a reductionistic synthesis of some major individual-level end-user acceptance models (primarily Theory of Reasoned Action and Technology Acceptance Model) than an targeted approach to the acceptance of technologies from the IT professionals' perspective.

In addition to the partially contradictory or inconclusive results yielded by the studies carried out in the domain of individual-level technology acceptance and use in the IT industry, it appears that there is a lack of studies aimed at determining important *specific* (i.e., first-order) phenomena positioned under the general (i.e., second-order) constructs of the individual level technology acceptance models used to study the individual-level technology acceptance and use in the IT industry. This study, however, argues that an in-depth understanding of *specific* (rather than general) phenomena influencing IT professionals' decisions to accept and use specific technologies, approaches or paradigms is particularly important when *practical* acceptance of new technologies or paradigms at an *early stage* is considered. Particularly in the view of the tremendous decrease in the number of companies intending to deploy and use the Service Oriented Computing paradigm for the first time (considering the enormous public attention paid to the SOC concept in the past few years) it appears that studies investigating *specific* factors influencing the individual-level IT professionals' acceptance decisions are particularly apt to yield valuable academic as well as practical insights into the acceptance process and provide usable guidelines for companies considering to use the SOC paradigm in the next future.

Accordingly, in an attempt to move towards an initial (at least) SOC acceptance model from the individual perspective of IT professionals, we determined to augment the critical review of the literature with the derived results of a series of qualitative interviews (Klein and Myers 1999) performed with European system development experts who were using or considering to use the SOC approach in their current professional work.

# 4 QUALITATIVE STUDY

## 4.1 Participants of the study

An exploratory interview study was performed with eight European system development experts. Table 1 summarises the demographics of the interviewees:

| NO. | AGE | GENDER | TYPE OF COMPANY | POSITION | YRS OF EXP IN IT |
|-----|-----|--------|-----------------|----------|------------------|
| I1 | 48 | M | commercial | head ICT dept | 21 |
| I2 | 58 | M | commercial | IT consultant | 32 |
| I3 | 32 | M | commercial | IT team leader | 8 |
| I4 | 34 | M | commercial | self-employed | 10 |
| I5 | 35 | M | public admin. | CTO | 12 |
| I6 | 34 | F | public admin. | IT architect | 15 |
| I7 | 28 | F | commercial | systems analyst | 9 |
| I8 | 41 | M | commercial | chief technical architect | 12 |

*Table 1:        Demographics of the interviewees*

All eight participants of the study had substantial practical work experience in the IT industry. All participants possessed at least a Masters Degree (or equivalent) in Information Technology, Computer Science or similar field.

The study used criterion sampling as the "sampling strategy" (Patton 2002, p. 238). As pointed out by Patton (2002) "criterion sampling" is particularly useful for identifying and understanding cases that are information rich. The primary selection criterion was the practical experience with SOC (in particular, different stages of SOC acceptance and use – starting with practically no experience but willingness and readiness to explore the paradigm to a multi-year experience in practically applying the SOC approach).

## 4.2     Interview process

All participants were interviewed individually (one-to-one interviews, one interview with each participant). Before the interview, the participant was briefed about the purpose and background of the study. An interview guide was sent to the interviewees two weeks before the interview. The interviews were recorded and transcribed verbatim. Additional notes were taken during the interview. The interviews lasted between one and three hours, the participants were interviewed outside their usual work environment and outside the usual working hours.

## 4.3     Data analysis

The analysis of the interview data was principally based on two ways of organising and using the material: throughout the entire study we used TWO copies of each of the interview transcripts. One of the copies did not contain any mark-ups, codes, notes or memos, and the second copy was used for the actual data analysis. This approach was used to mitigate a major drawback of qualitative data analysis as described by Wiseman (1979, p.278):

*... a serious problem is sometimes created by the very fact of organizing the material through coding or breaking it up into segments in that this destroys the totality of philosophy as expressed by the interviewee – which is closely related to the major goal of the study.*

The non-marked copy of the interview material was always used to read through specific passages in their original context and in their original state, without being influenced by notes, comments or memos accompanying the interview material.

Analysis of the transcribed interview data (using the second copy, see above) was conducted in three steps.

Step 1   Initial familiarisation with the data material as proposed by Eisenhardt (1989)

Step 2   Data reduction and data display as described by Miles and Huberman (1994)

Step 3   Conclusion drawing and verification (Miles and Huberman 1994)

In the **first step** of the data analysis the complete interview transcripts were read and preliminarily examined several times (using paper-based printouts). Eisenhardt (1989) describes this process as a very critical initial step in the data analysis phase. All comments describing any issues relevant to the SOC acceptance decision of the interviewee were manually highlighted. Besides each highlighted passage a short preliminary description of the issue was noted.

In the **next step** a process of data reduction as proposed by Miles and Huberman (1994) was performed on the interview data. Miles and Huberman (1994, p.45) describe the principle purpose of data reduction as:

*Data reduction refers to the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions.*

Initially, each interview was treated as a separate unit of analysis ("intra-case analysis"). The transcribed data of each interview was carefully read and divided into meaningful analytical units (i.e., segments of the data) and appropriately coded (within the frame of this study, coding is defined as marking the segments of data with coding symbols). To facilitate coding, an *inductive* master code list was jointly developed and used throughout the entire study to code the data.

Thus, step 2 of the data analysis was principally concerned with identifying, labelling and categorising phenomena found in the text. Essentially, each segment of the interview material was read in search of the answer to the repeated question "What is this passage, sentence, line or section about? What exactly is the interviewee referring to here?" Generally, the labels attached to the phenomena discovered in the text were nouns or verbs – such as "business process", "leader", "risk", "restrict", "responsibility" etc. In addition to those steps, during the data analysis we also searched for properties of these "labels" (usually expressed as adjectives) – for example, the concept of "leader" might be associated with issues such as influence, pressure, capacities, authority etc.

An example analysis is outlined below.

*Example start* ------------------------------------------------------------------------------------------------------

The following passage is extracted from one of the interviews (the labels in the parentheses are coding symbols used within the frame of this particular passage):

*Basically, I believe that the idea of SOC is not necessarily new (ORIG) because there have always been attempts to encapsulate functionality (ENCAP) in order to provide a specific service and to make this service easily accessible (ENCAP) from outside. Initially functional components encapsulating some simple functionalities, later more complex components exposing complex services. CORBA, DCOM, ActiveX, (COMPADV) all these things. Some useful, some not so useful. ... Yes, it depends ... But it is all about making selected functionalities reusable. Every experienced (EXP) developer will tell you that. And SOC just borrows ideas from everywhere and rearranges them. Complexity (COMPL) goes up, of course, but the basic idea is still the same – you simply want to encapsulate a functionality and make it easily accessible and reusable since you are fed up with wasting your time and duplicating (EFF) one and the same functionality in endless different back-end and front-end systems.*

One issue which is discussed in this passage is *FUNCTIONALITY*. Implied in the interview text is that the interviewee views functionalities as having certain properties – functionalities can be of *DIFFERENT COMPLEXITY* (degree of complexity). Complexity of functionalities has a time dimension – complexity *INCREASES CONSTANTLY* (but not decreases). The passage speaks about a specific type of functionalities – those which can be *ENCAPSULATED* (suitability for encapsulation). The association of functionalities with encapsulation gives the functionalities their specific context-bound properties. Encapsulated functionalities become *REUSABLE* and *ACCESSIBLE* (degree of reusability and ease of accessibility). Encapsulated functionality becomes a *SERVICE*. *DIFFERENT TECHNOLOGICAL APPROACHES* (suitability and effectiveness of each approach) are used to encapsulate functionalities. The perception of the suitability and effectiveness of each approach is moderated by *EXPERIENCE*. Encapsulation of functionalities is done to *INCREASE PERFORMANCE* and *EFFICIENCY* (actual increase vs. assumed increase). Moreover, encapsulation of functionalities is an *ONGOING ATTEMPT* (time dimension) in software engineering.

Thus, the above passage might be summarised (Miles and Huberman 1994) as: *"Using SOC or other technological approaches, functionalities of different (and increasing) complexity can be encapsulated to provide reusable and accessible services and to increase the work efficiency of IT professionals creating software."*

The passage implies several potential relationships.

Under *conditions* where multiple implementations of the same functionality is being perceived as too burdensome encapsulation of functionalities (i.e., creating services) is viewed as a potential way of

reducing the workload associated with the duplication of functionalities.

The degree of the workload reduction is potentially associated with the complexity of the functionality which will be encapsulated – the more complex the encapsulated functionality the great the reduction of the workload.

The complexity of functionality developer might determine the technological approach used to encapsulate this functionality.

Experience of the individual IT professional *moderates* the perception of the suitability and effectiveness of the selected technological approach.

The *consequences* of encapsulating functionalities may not be the reduction of the workload and gain of efficiency to the desired degree but it represents a technique which can be used to tackle the issue of increasing workload originating from creating multiple instances of one and the same functionality in different systems.

The coding and analysis of potential relationships are finalised with an appropriate data display (Miles and Huberman 1994):

| LABEL | PROPERTIES | RELATIONSHIPS | MODERATION |
|---|---|---|---|
| Functionality | Increasingly complex | Increasing complexity requires encapsulation | Moderated by experience of the individual IT professional |
| | Encapsulable | Encapsulated functionality becomes a service | |
| Service | Accessible | A service has to be easily accessible from "outside" to be reusable. | |
| | Reusable | Reusability of services increases work efficiency and work performance of an IT professional | |
| Technological approach | Suitable | Some technological approaches are more suitable for turning functionalities into services (i.e. encapsulating functionalities) | Moderated by experience of the individual IT professional |
| | Effective | Technological approaches are used to decrease the workload associated with the implementation of multiple instances of the same functionality. | Moderated by experience of the individual IT professional |

*Table 2:       Data display – example*

*Example end ----------------------------------------------------------------------------------------------------*

The example illustrated the principal steps and techniques followed throughout the entire data material in the second step. This process was continued until all available interview data was completely segmented and coded.

As noted by Miles and Huberman (1994, p.11):

*Data reduction is not something separate from analysis. It is part of analysis. The researcher's decisions – which data chunks to code and which to pull out, which evolving story to tell – are all analytic choices. Data reduction is a form of analysis that sharpens, sorts, focuses, discards, and organizes data in such a way that "final" conclusions can be drawn and verified.*

While being guided to a certain extent by the critical review of the technology acceptance and use literature, the data reduction process was certainly not constrained by it from discovering new phenomena (Eisenhardt 1989). The data reduction was constantly accompanied by the data display (i.e., organising the results of the analysis in spreadsheets and tables). Finally, we retained one spreadsheet per interview.

Step 2 was followed by the **final step** of the data analysis ("conclusion drawing and verification"). This step was primarily concerned with linking similar topics from all interviews into "themes", conceptually labelling these themes (i.e., constructs), grouping these constructs and discovering any moderating relationships in the data. All eight spreadsheets resulting from the interview analysis were integrated into one single matrix to facilitate cross-checking and linking of similar themes. Several topics mentioned only by one or two interviewees were dropped and not considered when extracting the final set of "themes". Table 3 presents the retained major "themes" identified as relevant to the acceptance and use of Service Oriented Computing:

| NO | LABEL | DESCRIPTION |
|---|---|---|
| Theme 1 | Applicability | SOC is a relatively "restrictive" respectively "selective" approach – not many business processes are suitable to be implemented or exposed as services. |
| Theme 2 | Pressure | SOC is associated with pressure. Implementation of SOC solutions involves at least two partners ("service provider" and "service consumer"). Either the "service provider" or "service consumer" will frequently be in the position to exert pressure on the partner to use the SOC approach even against its initial intentions. |
| Theme 3 | Expected risk | SOC is associated with a high implementation risk. |
| Theme 4 | Complexity | SOC is associated with complex, time, and resource consuming implementations. |
| Theme 5 | The strategic role of IT | The acceptance and use of SOC will depend highly on the presence of influential IT personnel in an organisation. |
| Theme 6 | Structural flexibility of the organisation | The acceptance and use of SOC will depend on the flexibility of the decision-making process in an organisation. |
| Theme 7 | Dependency on partners | The SOC will require the "service-consuming" partner to depend of the "service-providing" partner to a high degree potentially. |
| Theme 8 | Trust in partners | Trust between partners will contribute to a successful implementation of SOC based solutions. |
| Theme 9 | Results demonstrability | It is difficult to demonstrate the advantages of SOC in a short period of time. |
| Theme 10 | Comparative advantage | In many cases a "work-around" implementing a customisable framework unifying old (and functioning) solutions is preferred to a new SOC-based solution. |
| Theme 11 | Practical implementation examples | The knowledge regarding practical implementations of SOC based solutions is unsystematic and hardly accessible. |
| Theme 12 | Technical compatibility | SOC solutions will be implemented if sufficient compatibility with existing systems and applications can be achieved. |
| Theme 13 | Technical experience | To implement sustainable SOC solutions people with considerable technical experience will be needed. |

*Table 3:        Major themes identified as relevant to the acceptance and use of SOC*

Table 4 outlines the relationship between the interviewees and the themes (x indicates that the respective theme was substantively discussed by the interviewee):

| THEME | I1 | I2 | I3 | I4 | I5 | I6 | I7 | I8 |
|---|---|---|---|---|---|---|---|---|
| Theme 1 | x | x | x | x | x | x | | x |
| Theme 2 | x | x | x | x | x | x | | |
| Theme 3 | x | x | | x | | | | |
| Theme 4 | x | x | x | x | x | x | x | |
| Theme 5 | x | | x | x | x | x | x | x |
| Theme 6 | x | x | x | x | | | x | |
| Theme 7 | x | x | x | x | x | x | | x |
| Theme 8 | x | | x | | x | x | x | x |
| Theme 9 | x | x | | x | x | x | | x |
| Theme 10 | | x | x | x | x | | x | |
| Theme 11 | x | x | x | x | x | | x | |
| Theme 12 | x | | x | x | x | x | x | |
| Theme 13 | x | x | x | x | x | x | x | x |

*Table 4:        Themes and interviewees*

Based on the analysis of contextual conditions present in the data theme 13 ("Technical experience") was finally determined to act as moderating variable rather than representing distinct and discrete theme. To determine this moderating effect we followed a procedure suggested by Strauss and Corbin (1998). We carefully reviewed all passages of the interviews carrying the label "experience" (EXP) and determined if the experience was representing a "specific condition" which made the interviewed IT professionals to respond to specific issues through actions or interactions in a diversified manner depending on the level of the experience.

The extracted "themes" (i.e., constructs) were finally related to existing research on technology acceptance and use. The constructs were grouped and moderating relationships were fixed. Table 5 presents the results of the last step of the data analysis:

| LABEL OF THE GROUP | CORRESPONDING CONSTRUCTS | MODERATING VARIABLE |
|---|---|---|
| Performance expectancy | Results demonstrability | No evidence |
| | Comparative advantage | No evidence |
| | Expected risk | No evidence |
| Effort expectancy | Applicability | Experience |
| | Complexity | Experience |
| | Technical compatibility | Experience |
| Social influence | (Coercive) pressure | Experience |
| | Dependency on partners | Experience |
| | Trust in partners | Experience |
| Facilitating conditions | Practical implementation examples | Experience |
| | The strategic role of IT | Experience |
| | Structural flexibility of the organisation | Experience |

*Table 5:        Grouping of constructs*

Considering the results of data analysis as a whole, Figure 1 represents the emerging initial SOC acceptance model:
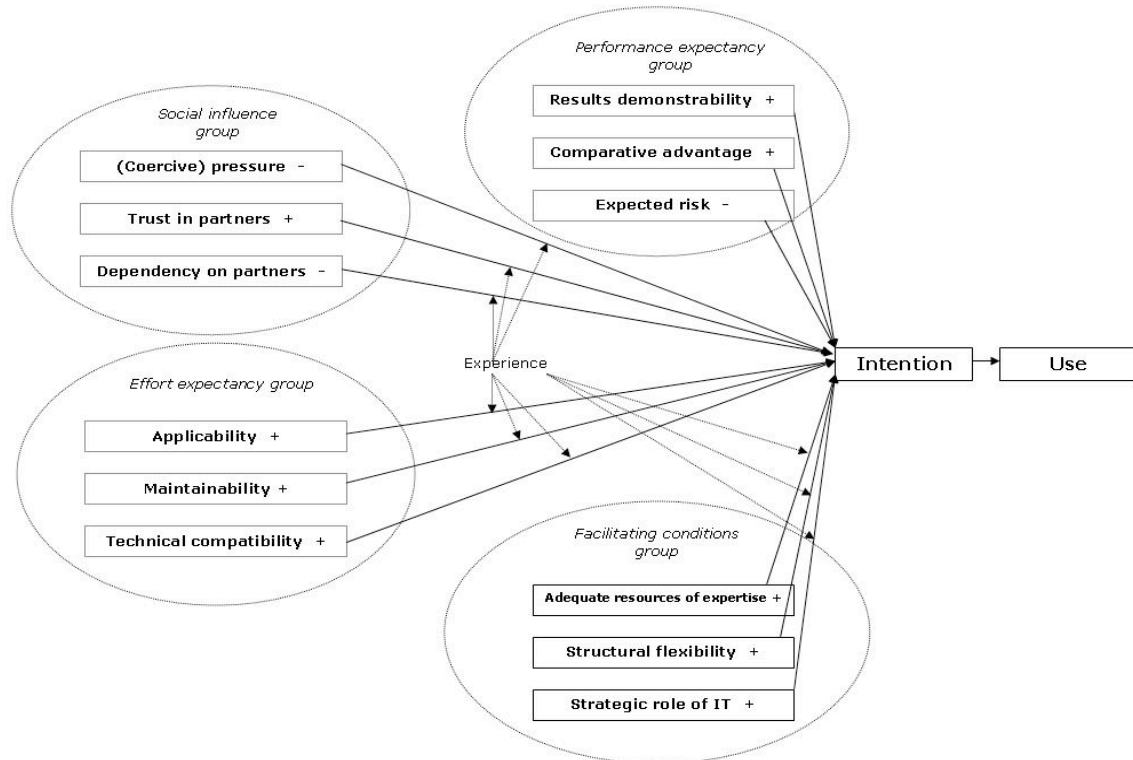
*Figure 1:      Initial SOC acceptance model*

# 5      DISCUSSION OF THE RESULTS

*Facilitating conditions group*

In the context of SOC acceptance and use, two interesting constructs – structural flexibility of an organisation and strategic role of IT – were found to contribute to the IT professionals' intentions to accept and use SOC.

In the IS literature, the importance of integrating IT and business strategy has been extensively discussed pointing out that IT affects firm strategies and that strategies have IT implications (Henderson and Venkatraman 1993; Quinn and Baily 1994; Feeny and Wilcocks 1998). McKenney (1995) examines how companies that had accepted an IT innovation had developed clear visions about the role of IT and the connections between IT and their core objectives and propositions.

The structural flexibility of an organisation is primarily associated with the IT-related decision-making process in an organisation. This situation can, however, be easily understood when considering the main principles of the SOC approach. Two basic principles of SOC are **abstraction** and **generalisation**. Implementing, for example, a Web Service which represents a specific business process requires abstraction and generalisation of this business process. The implemented Web Service represents a "universally" valid and sole (at least within the frame of a specific organisation) reference to this business process and it has to be used by all applications requiring access to this particular business process. Designing such a "universally" valid reference to a business process means that certain decisions regarding the representation of this business process have to be made. How fast and how efficient such decisions can be made depends on the structural flexibility of an organisation (i.e., on the efficiency of its decision-making processes).

It is interesting that in the context of this study, the level of influence IT decision makers have in an organisation was strongly (positively) associated with the intention to accept and use the SOC paradigm.

*Social factors group*

Interesting insights appear in relation to the social factors group. Two different types of coercive pressure emerged as important external influences – pressure from internal organisational structures and pressure from external entities (e.g., business partners, customers).

The acceptance and use of new technologies or tools under mandatory conditions (i.e., under pressure exerted by internal organisational entities) has been examined by several studies with similar results (e.g., Riemenschneider, Hardgrave, and Davis 2002) – if the tool, technique or methodology is not regarded useful, applicable and meaningful by individual IT professionals involved in the deployment, its prospects for successful organisational deployment will usually be severely undermined. The current study supports these findings.

In the context of acceptance of Service Oriented Computing, a different scenario was also extensively discussed by the interviewees, viz., a scenario of pressures from external entities such as business partners or corporate customers.

From an institutional theory perspective, coercive power has two primary driving forces – pressure from other organizations controlling required resources and cultural expectations from the larger society (DiMaggio and Powell 1983, Mizruchi and Fein 1999). In this scenario the interviewees obviously referred to the first driving force – other organisations – which indicates that mandatory acceptance of specific technologies and approaches due to external coercive pressures seems to be a serious issue. (In this context, the opposite situation was also mentioned by the interviewees. Obviously, it is frequently the case that an implementation of innovative and sound cross-enterprise solutions is blocked by influential business partners who are anything but interested in changing the *status quo* through accepting and using new technologies or techniques.) The coercive pressure construct included in the model comprises both types of pressure – internal and external – and is negatively associated with the intentions of IT professionals to accept and use the SOC paradigm.

Trust and dependency were two important issues emerging within the social influence construct group. Contrary to our expectations, both constructs – trust and dependency – emerged within the context of interpersonal rather than technical issues. Trust in partners (and not trust in the new technology) and dependency on partners (and not dependency on the new technology) were two highly interrelated, but clearly distinguishable variables. While the feeling of having trustworthy partners positively influenced the intention of IT professionals to accept and use the SOC paradigm, the degree of potential dependency on partners caused exactly the opposite effect.

*Performance expectancy group*

With regard to performance expectancy, two of the constructs included in this group are well-known in the context of research on information technology acceptance, viz., results demonstrability and comparative (relative) advantage.

Results demonstrability (a variable which is positively associated with the intention to accept and use the SOC paradigm) can be defined "as the tangibility of the results of using the innovation including their observability and communicability" (Moore and Benbasat 1991 p.203)). Comparative (relative) advantage is the "degree to which an idea is perceived as being better than the idea it supercedes" (Rogers 1995, p.212).

The issue was mentioned relatively frequently in all eight interviews - if there are solutions which are working and accepted by the majority of IT professionals why should they be exchanged for different solutions based on an approach the advantages of which are not demonstrable in an easy way?

As far as results demonstrability is concerned five of the interviewees stressed that it would be relatively difficult to obtain any financial means to implement new SOC-based solutions because the results of such systems and solutions are not as easily demonstrable as, for example, the necessity to install new anti-virus software or to make upgrade to firewall software in an enterprise (examples mentioned by the interviewee 1).

Finally, expected risk means the overall business risk (financial, organisational, human resource-related) associated with the SOC-based system and application implementations.

*Effort expectancy group*

Technical compatibility refers to the degree of compatibility SOC-based solutions and systems are capable of having with existing solutions and applications (issues such as possibility of incremental implementations, migration of assets, leverage of existing assets which positively contribute to the IT professionals' intentions to accept and use the SOC approach), and complexity is the "degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers 1995, p.242).

In the context of this study, applicability refers to the extent to which business processes of a specific organisation are suitable to be implemented as services. The more business processes of a specific organisation are regarded suitable for this specific approach the higher the probability that this approach will be accepted and used by the IT professionals of this particular organisation.

*Experience*

As far as the moderating variable of experience is concerned the data material provides many examples for the influence of experience in the process of acceptance and use of SOC. Interviewee 2, for example, notes:

*I believe that the entire secret of success lays in the fact that I publish only services which I have used in my own applications and solutions. This is a matter of experience.*

Interviewee 3 when speaking about the issue of complexity and the process of interface definition notes (and, again, the moderating role of experience becomes very clear):

*If I think now beyond the boundaries of a single company then I define an interface but I define this interface the way I need it and not the customer. I define the interface, which parameters I need to calculate this thing, but I don't think about what the customer really needs. This is exactly the most exciting about all this issue, why so many web services which are presently offered fail on the market. Because they think from the perspective of the web service and refuse to change the perspective. There is simply not sufficient experience.*

While discussing the viability of SOC interviewee 2 expresses his personal view to SOC the following way, making clear the moderating role of experience in establishing this view:

*Basically, I believe that the idea of SOC is not necessarily new because there have been always attempts to encapsulate functionality in order to provide a specific service and to make this service easily accessible from outside. Initially functional components encapsulating some simple functionalities, later more complex components exposing complex services. CORBA, DCOM, ActiveX, all these things. Some useful, some not so useful. ... Yes, it depends ... But it is all about making selected functionalities reusable. Every experienced developer will tell you that.*

# 6    LIMITATIONS OF THE STUDY

There are some limitations specific to the study reported in this paper. The study focused on elucidating specific phenomena (i.e., first-level factors) which influence IT professionals' individual-level decisions to accept and use the Service Oriented Computing paradigm in their professional work. The interview study involved only European IT experts. Thus, some aspects of this study might be only relevant to European IT professionals and organisations operating in Europe.

Since the study involved only eight senior IT professionals the empirical base on the study is small. However, the intent of this project was not to replicate other studies undertaken in the field of technology adoption, but to "shed some targeted light" on the individual-level process of how IT professionals form their intentions to accept and use such a complex technological paradigm as Service Oriented Computing. An in-depth interview study involving eight senior IT experts with highly diverse backgrounds and highly diverse experiences was, thus, deemed to be suitable for

producing the desired results.

As in common with all studies using qualitative methodological approaches (including exploratory open-ended interviews) the analysis and subsequent categorisation of the data depend on the understanding and subjective perceptions of the researchers. However, we purposely selected the interpretive approach since it is an approach enabling the categories, patterns and relationships in the data to fully emerge without being constrained by a predetermined theoretical framework or model.

# 7 CONCLUSION AND SUMMARY OF THE STUDY

In general, this study yields several interesting insights concerning process of the acceptance and use of such a complex approach as Service Oriented Computing. These insights were used to formulate an initial SOC acceptance model.

The findings of the current study provide a number of implications concerning the process of individual-level acceptance of SOC. In theoretical hindsight, this research work broadens the understanding how senior IT professionals directly involved in practical implementation decisions in an organisation form their intention to use a complex technological approach.

In practical hindsight, this research work might provide inputs for the management of companies intending to accept and use the SOC approach. Despite the obvious industry agreement on the SOC adoption it seems that many IT leaders are still unclear about the technical, organisational and financial prerequisites for SOC-based system implementation. Moreover, there seems to be a lot of unrealistic expectations on what type of problems SOC is capable to address in an organisation. This has led to certain "disillusionment" in organisations with regard to the SOC adoption. As mentioned earlier, since the beginning of 2008, there has been a dramatic fall in the number of organizations that are planning to adopt Service Oriented Computing for the first time with lack of expertise and lack of viable business case being some of the main reasons for this drop. The findings of the study clearly show that the senior IT professionals consider the "applicability" of the SOC approach (i.e., a clear and viable business case) as one of the major factors influencing their adoption decisions. Thus, embarking onto an SOC-driven strategy without a clear business case will result in disillusion and SOC adoption resistance. Similarly, the current study also points out the importance of the technical prerequisites for the SOC adoption intentions ("technical compatibility"). The study suggests evaluating carefully the current technical landscape and environment of the organisation to determine its ability to respond positively to an SOC-based system design and architecting approach. And, finally, the current study also clearly stresses the importance of organisational prerequisites (in particular, availability of suitable expertise and human resources) for the adoption of the SOC approach. If the senior IT professionals feel that the organisation is not sufficiently equipped with the necessary expertise and the necessary human power needed to effectively implement SOC-based initiatives they might be very reluctant in adopting the SOC paradigm in their professional work.

We have made particular efforts to make our exploratory study reality-based. The value of this type of approach consists in exploring what IT professionals really think of an approach such as SOC and what particular problems and issues they are facing when confronted with a "paradigm" like SOC. As Benbasat and Zmud (1999) stress, the relevance of information systems research is being questioned by the IT community at large, and only reality-based research is apt to contribute to a higher degree of relevance of information systems research for the practitioners working in the IT industry.

However, further research work is needed in this specific domain to progress towards a substantive view of individual-level technology acceptance in the IT industry.

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