ADOPTION OF DISCRETIONARY PUBLIC INFORMATION SYSTEMS WITH DIGITAL USE PATTERNS
- BARRIERS AND DRIVING FORCES

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Abstract

This article presents a new model, AKAM, for analysing adoption of discretionary, public information systems (PIS) with digital use patterns (such as use or non-use, as opposed to frequency of use, or degree of engaged or compliant use). The model is based on Rogers' innovation diffusion theory (IDT) and Nilsson's user centred access model (UCAM). The model is an alternative to the general technology acceptance model (TAM). The AKAM model (Awareness, Knowledge, Access and Motivation) identifies six prerequisites for use and four management approaches and describes how these are related. To illustrate its applicability, the AKAM model is used to analyse the adoption of a specific module, the YAF-module, in the Swedish Sports Confederation's (SSC) system Swedish Sports Online. We present empirical results that indicate the frequency and importance of the barriers and driving forces as experienced by the YAF module users and the potential YAF module users.

Keywords: Innovation diffusion theory, IDT, user centred access model, UCAM, technology acceptance model, TAM, public information systems, PIS, non profit organisation, NPO, sport association, discretionary information system, barrier.

1. Introduction

Steering the interaction with clients, customers, members and citizens towards the Internet or other electronic media is a goal of many private and public organisations. Incentives have been, and are, used to encourage the use of electronic options over more traditional ways of interacting. Examples are the Swedish tax authorities' campaign, where citizens declaring their taxes electronically receive their tax returns

at an earlier date than those using the traditional paper-based version; leading public transport companies offering lower prices on online bookings; and reduced prices on Internet-purchased products at leading retailers.

From an e-service provider's point of view, different digital alternatives could be competing with each other (e.g. Internet banks) or a monopoly situation could exist where the digital options compete only with the older and established systems (e.g. tax declaration online). The potential and actual success of these channel changes is dependent on the would-be users' access to, attitude towards and knowledge about computers and Internet.

This article presents the Swedish Sports Confederation's (SSC) attempt to digitise the application for the public funding of the Swedish sport associations. The article is based on a large longitudinal study of the implementation of the system "Swedish Sports Online"[1]. However, the scope of the article is limited to the diffusion of the particular module in Swedish Sports Online that makes online applications for public funding of Swedish sport associations possible. The relation and interaction with the implementation of other modules will be discussed but the whole implementation process is outside the scope of this article. Reports presenting other aspects of the implementation process are so far mainly in Swedish [Lundmark and Westelius, 2004; Lundmark and Westelius, 2007]. There is also a chapter in English, dealing with communication aspects of Swedish sport associations [Lundmark and Westelius, 2008].

This study is based on interviews with managers at the SSC, managers at Special Sport Federations within the Confederation and managers at sport associations. Furthermore it is based on a survey yielding 1,437 usable responses. We have also investigated documents such as board meeting protocols and policy documents from the SSC. Another important source of information is exported data from the shared database "The Federation Online". The exported data consists of user logs for the overall use of "The Club Online" and its modules.

To avoid pro-innovation bias, we focus on adopters' and non-adopters' reasons for their course of action. Assessing reasons for adoption and rejection is an important but neglected area in diffusion research [Rogers 2003, p 115].

Drawing on Nilsson's (2006) categorisation of the barriers to the use of public information systems and Rogers' (2003) theory of diffusion of innovations, we develop an alternative model, to the predominant Technology Acceptance Model (TAM), for analysing acceptance of discretionary, web-based information systems and service provider intervention to increase use. Thus, we also address the research tradition in the IS field based on the Technology Acceptance Model [Davis, 1989] and its derivatives [e.g. Venkatesh et al., 2003; Venkatesh and Davis, 2000] and draw somewhat contrary conclusions from these models as compared to what is usually the case in the IS field.

We empirically assess the relative importance of the barriers to use as perceived by the users. We also address the reasons for use empirically. The empirical results are discussed in the light of our model as well as its implications for TAM.

Firstly, we present an overview of the SSC and the background to the project. There then follows a literature review and a discussion culminating in our proposed Awareness, Knowledge, Access and Motivation Model of Public Information Systems Use, the AKAM model. Thereafter, we present the methodology used in the SSC investigation, our empirical results concerning the choice of paper-based or online

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[1] translation from Swedish of "Svenskidrott Online"

application for youth activity funding (YAF), and then use the AKAM model to discuss the YAF module adoption. From this analysis conclusions regarding the characteristics of public information systems use and the applicability of the AKAM model are drawn.

2. The Setting for the Swedish Sports Confederation Study

At the turn of the millennium, the Swedish Sports Confederation started a joint venture with the Norwegian firm, N3sport AS, with the goal of connecting more than 20,000 associations and 3 million members in one system – "Swedish Sports Online". The project used the slogan "More time for sports"[2] and the goal was to make basic administrative processes more efficient and to build a shared communication platform for the Swedish sports movement.

One of the communication applications in Swedish Sports Online is a content management tool potentially providing all associations with an easily managed, simple website. There are areas on the websites that are reserved for centrally managed advertisements. At the initiation of the project, the development of the system was supposed to be financed by these advertisements. However, only a few months after the start of the venture, the dot-com bubble burst [Goldfarb et al., 2006] and this was followed by a general scepticism about IT and Internet marketing. This clearly made these plans untenable, at least in the short term and, in practice, meant a higher monetary investment than planned from the SSC.

The authors have studied the development and implementation of "Swedish Sports Online" since 2003. This article focuses on a particular module (the YAF module) of the system.

This section starts with a presentation of SSC, followed by a description of "Swedish Sports Online" and of youth activity funding (YAF) and the available processes for the application for such funding.

2.1. Studying IS adoption in a large non-profit organisation

The Swedish sports movement is organized in a corporate structure with an umbrella organisation on top called the SSC, the Swedish Sports Confederation. Beneath the SSC, there are 68 organisational elements called Special Sports Federations (SSF), each representing a sport or a group of sports. The SSFs consist of member organisations called sport associations which in turn consist of individuals/members. Thus, the SSC is an organisation formed from organisations which are in turn organisations of people and which in total includes more than 20 000 associations and 3 million members – a third of the Swedish population.

Sports associations vary in size and activity and can be members of one or many SSFs. A substantial part of the work is performed by volunteers. In the year 2000, about 460 000 people had a commission of trust within a Sport association in Sweden [Vogel et al. 2003]. On average, these people spent 14 hours a month working for the association (Ibid).

There are some highly pronounced characteristics of the NPO that set it apart from private sector organisations. These characteristics pose additional challenges to would-be leaders of change [cf. Fiol and O'Connor, 2002]. One such trait is that membership of an NPO is more voluntary-based compared with that of most other

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[2] Translation from Swedish of "Mer tid för idrott"

International Journal of Public Information Systems, vol 2008:2
www.ijpis.net
Page 89

organisations. In terms of I/E-ratios (I=people involved, E=people actually employed) [Hedberg et al., 2000, pp. 16-17], most NPOs would probably rate as extreme imaginary organisations.

NPOs rely heavily on a network of individuals and partner organisations that perform voluntary work and very few are actually employed by the NPO. Individuals work for the NPO because of idealism or a feeling of non-monetary reward. This lack of an employment contract reduces the degree of pressure that management can apply to individuals in the organisation [Simon, 1997/1947]. Hence, the perceived benefits of use to the user of an information system become even more important for its use. An NPO will thus illustrate some adoption factors more clearly than a public- or private-sector organisation.

The fact that the users are, in general, not employed by the organisation makes the situation somewhat similar to company/customer relationships – but not quite; in many customer relationships there is no sense of identity between customer and company, whereas in most NPOs, the spirit of community is an important aspect [Westelius 2006a].

Given these characteristics of NPOs, it is interesting to study an information system venture undertaken in an organisation such as the SSC, both because it concerns a large part of the population and because it highlights adoption mechanisms in a setting where coercion based on hierarchically derived power in the organisation is not a prominent option.

2.2. The application package Swedish Sports Online

The base of the Swedish Sports Online system is called "The Federation Online"[3], which is a database and a user interface and is used mostly by employees in the federations and the SSC. The application used by sport associations is called "The Club Online"[4] and shares the database with The Federation Online. The Club Online could be viewed as consisting of two parts, a content management tool and an administrative part, consisting of modules for specific processes, such as keeping a register of members and licensed players, reporting people holding key commissions of trust to the federation or applying for funding of activities. The Club Online is free for all sport associations that are members of one or more of the 68 federations in the SSC.

At present (2007), 46 of the 68 federations in the SSC use some part of the Swedish Sports Online. But the degree of use varies between federations. Regardless of the federation's participation in Swedish Sports Online, the member associations always have access to the basic modules in The Club Online, although some federations have special modules only applicable to their member associations. If an association wants to activate their instance of The Club Online, they will have to contact the SSC helpdesk in order to obtain a password.

In the Swedish Sports Online, all associations connected to the SSC, their addresses and key managers are registered. The federations not using the system still have to report this information to the SSC in order for the record to be complete. Many federations keep more information about their associations in the system, e.g. e-mail address, web-address, number of members and specific information about members, e.g. ranking, licensing or team association.

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[3] Translation from Swedish of "Förbundet Online"
[4] Translation from Swedish of "Klubben Online"

2.3.   Applying for youth activity funding (YAF)

There are many processes connecting the federations with the associations, e.g. handling licences for participating in official competitions and arranging club competition series. The links are not as strong between the associations and the SSC. However, the system for the public funding of youths' activities is a process where the associations are in direct contact with the SSC. The Swedish state provides funding for associations on the basis of the level of activities for young people between seven and twenty years of age. The funding is distributed by the SSC and the applications are processed by a special department. In this role, the SSC acts as a government authority and is thus bound by the principle of free access to public records.

The funding is allocated based on the number of activities and the number of young participants. The association must keep track of these activities and the participants. Twice a year, they sum these numbers up and submit them in their application for youth activity funding. There are two ways to submit the application. One is via a paper form and postal mail, the other is through a module in The Club Online. However, there are two versions of the online application.

In the old version of the online application, the association has to fill in all the members and all the occasions in which every member has participated and then the system provides a summary that can be submitted to the SSC. The problem with this version is that most associations provide the coaches and other managers with paper lists in order to keep track of their group's or team's activities. Thus the form must then be manually transferred to the online module causing a great deal of extra work for potential adopters. Heeding the criticism, the SSC developed a simplified module with basically the same data as the paper form where the associations could just fill in the sums and submit the application online. The simplified online application was introduced in 2005. However, the old version is still available and optional for both old and new users.

During each time period, a number of randomly drawn associations and associations that for some reason have caused suspicion are requested to submit the logs of their activities and participants, so that the SSC can control the validity of the application. This review is not necessary for the associations using the older version of the online application, since they have already submitted all this data.

Every year about 20,000 applications are processed. An application sent online saves, on average, a few minutes work for the central administration compared to a paper-based application. Thus, if all applications were submitted electronically, the central administration would save approximately one man-year. To encourage the associations to use the online version, the funding is paid two weeks earlier to those submitting their application online.

All the applications are processed by a central unit, however, information and support are provided by the district departments. In the guidelines, it is stated that the district departments should promote online applications. The central unit provides promotional material for further distribution to the associations.

At the association level, the gathering of the application material usually involves several trainers and coaches. However, the formal sending of the application from an association is usually handled by a single individual with great freedom of choice with regards to the use of which channel. The individual sending the application is usually the same person for many years, according to the respondents in the interviews. In the survey sample, the median number of applications sent in by the respondents was nine (indicating that the median time span the people are responsible for the application is 18 periods, which corresponds to nine years).

International Journal of Public Information Systems, vol 2008:2
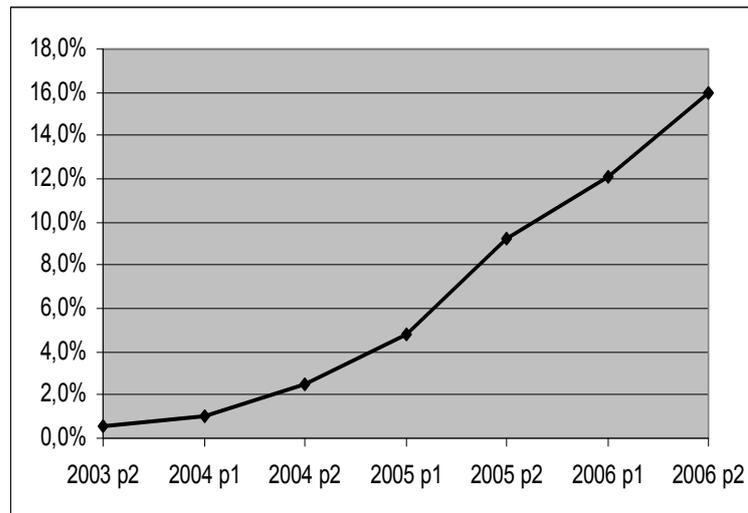www.ijpis.net
Page 91

Figure 1. Proportion of applications submitted online.

As is shown in the graph, the proportion of applications submitted online is constantly increasing.

2.4. Characteristics of the case

To make it easier for the studied system to be placed in context, the salient characteristics of the system and its context are briefly summarised.

As described above, the YAF module is part of a wider system of modules. It is used by associations that are all part of the NPO SSC. Most associations are themselves NPOs. There are about 10,000 associations applying for YAF every six months. We argue that the YAF module can be considered as a public information system. Furthermore we identified six characteristics of the YAF module. We start with the six characteristics, and then return to the reason for considering the YAF module to be a public information system.

2.4.1. Six characteristics of the YAF module

1) System use is discretionary

The system use is discretionary, but the central administration saves time when applications are sent in via the YAF module instead of via paper and they have therefore created incentives for its use. The decision as to whether or not the system use is mandatory or discretionary has been an important parameter for previous TAM-oriented studies [c.f. Venkatesh et al 2003]. However, whatever means are used, there is always a theoretical possibility to reject adoption [c.f. Westelius and Westelius, 1990]. The use of a system is rarely completely voluntary or completely compulsory; thus some studies have argued that voluntary use should actually be perceived as a scale rather than a Boolean [Moore and Benbasat, 1991].

2) The system is web-based (dispersed and unknown users)

The Swedish Sports Online is web-based and thus the access point is not limited to a particular computer or office. The user is a representative for the organisation but the SSC does not keep a record of the YAF module users. This makes communication

with the specific user rather more difficult; any information must be sent to the association and then forwarded to the person responsible for the YAF application.

3) The system is intended for infrequent use (every 6 months)

The sending of the application occurs infrequently – at most every 6 months. Similar cases have been studied, e.g. tax declaration systems [Hwang, 2000; Wang, 2002; Fu et al., 2006].

4) Digital use pattern (use or non-use, as opposed to frequency of use, or degree of engaged or compliant use)

The association either sends or does not send the application online. The two online versions of the YAF module could possibly be viewed as being degrees of use, but in the eyes of the SSC, what is important is that the association chooses one of the online options instead of the paper-based application. This view turns use into a Boolean instead of a scale, which is usually applied in adoption studies measuring actual use [e.g Straub et al., 1995; Barnett et al., 2007].

5) The service provider is in a monopoly situation

There is no other means of obtaining the public funding other than by using the application methods offered by the SSC. In this respect the setting is similar to that of tax declaration or many organisation-specific systems but is separated from most company/customer relations, e.g Internet banking systems, where many options from many suppliers are available.

6) Moderate change agent power over target group

The SSC is an NPO and the top management is elected democratically. Even though there is an intermediate step (the SSF) between the SSC and the associations, the powerbase is the associations. The work of the SSC is to serve the interests of its associations. A gain in efficiency would not be worth causing substantial discontentment among the associations. Furthermore, communication links between the SSC and the associations are usually weak. Associations are in much more frequent contact with their respective SSF.

2.4.2. The YAF module, a public information system?

In an in-depth analysis of different aspects of public information systems, Sundgren [2005 p 84] states:

> *"The purpose of a public information system is to provide some kind of service or support to a public process, or process involving "the general public" or "society at large". In contrast, a "non-public" or private information system provides services to some rather specific users closely associated with a particular organisation, performing some specific tasks that are often internal to the organisation, e.g. internal administrative processes.*
> *Who is "the general public"? Basically "the public" is a collective of people, e.g. the citizens of a society. We may broaden the concept to also include collectives of other actors, e.g. companies, especially small companies and*

organisations, which may often have needs vis-a-vis public authorities that are similar in nature to the needs of individual people. Thus, for example, both citizens and companies find themselves in situations where they have to perform a particular process (chain of tasks) vis-à-vis one or more authorities in order to obtain some kind of decision, e.g. a permit, a payment, etc."

This places the particular system in the current study as being in an in-between state. One could argue that the system is a private system for the Swedish Sports Confederation targeted at specific users (persons responsible for the YAF applications) within particular associations (sport associations) for an organisation-specific process (distribution of funding within the SSC).

However, one could also argue that it is a public information system, because the SSC acts as a public authority towards a large body of sport associations, distributing public funding and as an authority is bound by the principle of free access to public records.

We would categorise the application in this study as a public information system. We do this because most of the aspects of the studied system apply to public systems rather than private systems. For example, it concerns a very large body of people, use is voluntary and the adoption of the system has many similarities with other unambiguously public information systems, such as online tax-declaration systems.

3. Frame of Reference

In this section, we present previous research on which we base this article. We start with the technology acceptance model (TAM) and its implications. Then we present an alternative approach to the adoption of discretionary, web-based information systems. In an attempt to approach adoption in a somewhat different manner, we draw on Rogers 2003 and Nilsson 2006 in order to develop a model based on barriers to use.

3.1. Innovation diffusion and user adoption in the IS field

Jeyaraj, Rottman, and Lacity [2006] performed an extensive literature review in the IS field, covering 99 articles on IT adoption between 1992 and 2003. Models used in the studied papers include Theory of Reasoned Action [Fishbein and Ajzen, 1975], Innovation Diffusion Theory [Rogers, 1962/1983/1995/2003], Social Cognitive Theory [Bandura, 1986], Technology Acceptance Model (TAM) [Davis, 1989], Theory of Planned Behavior [Ajzen, 1991], Perceived Characteristics of Innovating [Moore and Benbasat, 1991], TAM2 [Venkatesh and Davis, 2000], Unified Theory of Acceptance and Use of Technology [Venkatesh et al., 2003], Diffusion/Implementation Model [Kwon and Zmud, 1987], and Tri-Core Model of IS Innovations [Swanson, 1994].

Jeyaraj et al [2006] found that the two most widely examined theories are Technology Acceptance Model (TAM) [Davis, 1989] and Diffusion of innovations [Rogers, 1962/2003]. TAM is mainly used in studies of individual adoption whereas Rogers' theories are used in both organisational and individual settings [Jeyaraj et al., 2006]. In fact, Rogers' theories are the only ones used extensively in both individual and organisational settings (ibid).

Due to the vast impact of TAM [Lee et al., 2003] we start with a brief review of it and its position within the IS field. Then we present Rogers' [2003] view of innovation diffusion which we use, together with Nilsson [2006], as the foundations

for a model for diffusion and adoption of discretionary web-based systems with a dispersed and partly unknown user group. We then use our model to assess the adoption of the focal system in this study. The results are discussed and compared with the results of TAM studies.

3.2.   The validity of the Technology Acceptance Model (TAM)

Over the last two decades, the Technology Acceptance Model (TAM) has grown to be one of the most used models for technology adoption [Hirschheim, 2007; Jeyaraj et al., 2006]. At present, TAM-related articles have been estimated to constitute about 10% of the journal space in the IS field [Lee et al., 2003]. The basic TAM postulates that most of the variance in Behavioural Intention (BI) to use a system is related to the variance in two independent variables: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Although many studies have added other constructs to the model (for a detailed description, see [Lee et al., 2003]), the basic TAM is appreciated for its parsimony [Plouffe et al., 2001].

According to both the basic TAM and the bulk of its derivatives, the most important criteria for adoption of a technology are Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Usually these two constructs account for about 40% of the variance in Behavioural Intention to use the technology [Lee et al., 2003; Venkatesh and Davis, 2000; Legrisa et al., 2003].

TAM was originally developed for a work situation and has been applied in both discretionary and compulsory settings [e.g. Venkatesh et al., 2003]. However, TAM has also been applied in settings similar to that described in this article [e.g. Hwang, 2000; Fu et al., 2006]. In fact, TAM has been used in a myriad of settings [Lee et al., 2003], which is also in line with Davis original intentions [Davis et al., 1989, p.985]:

> *"The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified."*

It has been suggested that the strive towards a single model for a broad spectrum of systems or use situations is unfortunate and that we need to have different approaches to different systems [e.g. Goodhue, 2007; Benbasat and Barki, 2007].

Despite, or to some extent because of, TAM's popularity much criticism has been directed at it. It has been suggested that TAM diverts attention from more pressing areas [Benbasat and Barki, 2007; Straub and Burton-Jones, 2007], that it is unscientific [Silva, 2007] or that it is skewed by common methods variance (CMV) [Straub and Burton-Jones, 2007], that it has little relevance for practitioners [Lee et al., 2003; Silva, 2007; Lucas et al., 2007] and that it is commonsensical [Silva, 2007].

One of the most salient contributions of TAM is the stress of PU and PEOU. Benbasat and Barki [2007, p.212] expressed this as follows:

> *"After 17 years of research and a large multitude of studies investigating TAM and its many variants, we now know almost to the point of certainty that perceived usefulness (PU) is a very influential belief and that perceived ease of use (PEOU) is an antecedent of PU and an important determinant of use in its own right."*

With that in mind, it is tempting to draw the conclusion that the most important part of the implementation of ISs is the development of the software, making it both easy to use and to be useful. However, PU and PEOU can be affected post development through education, experience and manipulation from the change agent. One must not forget that the perceptions, rather than some objective measure of usefulness and ease of use, are the underlying constructs in TAM.

However, everyone is not as convinced about the seemingly overwhelming evidence for the importance of PU and PEOU as Benbasat and Barki [2007]. Straub and Burton-Jones [2007] point out that potential problems with common method variance (CMV), and the much weaker relationships found in studies measuring use objectively as opposed to the more commonly used measure self-reported use, make the importance of PU and PEOU questionable.

In fact, a previous study has found that when use was measured objectively, the relationships with PU and PEOU respectively were insignificant [Straub et al., 1995]. Another study found that the relation between PU and objectively measured use was insignificant and the relationship between PEOU and objectively measured use was significant but weak (Standardized path coefficient 0.14 sig 0.05) [Barnett et al 2007].

Venkatesh et al. [2003] also measured use objectively. However, they do not present the relationship between PU and objectively measured use or PEOU and objectively measured use. They conclude that the original TAM (with only PU and PEOU as independent variables) accounted for about 36-41% of the variance in behavioural intention (BI), which is in line with the bulk of TAM studies [Lee et al 2003]. Venkatesh et al's [2003] extended model accounted for 70% of the variance in BI. BI in turn accounted for 35-39% of objectively measured use, which is in line with previous studies [Taylor and Todd, 1995].

Furthermore, Szajna [1996] shows that different methods assessing self-reported use yield different results. Thus, although it may sound commonsensical that PU and PEOU are important factors in determining actual system use, this may not be the case. Put another way, it is surprising how much of system use is determined by factors other than PU and PEOU.

In its simplest form, TAM could be seen as a two-factor model where a potential user asks him/her-self what benefits could be attained from use (PU) and at what costs (Perceived difficulty of use – inverted PEOU). This is in line with Nilsson [2006], who discusses driving forces and barriers to use. Potential discrepancies in the model would be attributed to our limited human information processing capabilities [c.f. Simon, 1997/1947, Ch. 5]. This is to a certain degree captured in TAM's choice of perceived usefulness/ease of use rather than the objectively measured usefulness/ease of use. However, these concepts express themselves every time use comes into question and driving forces and barriers might be perceived as being systematically different in a questionnaire situation and a real use situation or even in two different use situations.

The relationship between some form of objective measure of usefulness and perceived usefulness is thus of great interest. Unfortunately, this relationship varies between different settings and the discrepancy between expert assessment and potential adopter assessment is well documented [Rogers, 2003].

3.2.1. Implications for this study

In a setting, where the potential users are dispersed and only indirectly known to the change agent, it would be presumptuous to believe that use only hinges on PU and PEOU; for example, some of the potential users in the sports associations might not

even be aware of the possibility of using the YAF module, while others might not have access to a computer or might be unfamiliar with the Internet. Even with some of the numerous extensions of TAM, we would risk losing important aspects of the users' reasons for use and rejection.

Furthermore, the concepts perceived usefulness and perceived ease of use are not always easy to separate. For example, in this study the respondents want to send in an application with as little effort as possible; thus a useful system is a system that is easy to use. Many studies have also found that the two concepts overlap [Lee et al., 2003; Igbaria et al., 1997].

The setting in this study is organisational in the sense that the YAF module is used by organisations or rather representatives for organisations. However, the representative for the organisation usually has the freedom to choose the medium for submitting the YAF application. Consequently, there is a great similarity between the present setting and most individual adoption settings. Thus a model suitable for studying both individual and organisational adoption is required.

Drawing on Rogers [2003] and Nilsson [2006] we developed an alternative model for analysing adoption. The model is developed theoretically and should be seen as a framework for analysing use of web-based information systems and service provider intervention to increase use.

3.3.   Diffusion according to Rogers

At a societal or community level, successful diffusion of innovations usually follows an S-shaped curve [Rogers, 2003]. This is particularly apparent in communication innovations with network effects, i.e. increasing benefits with growing number of users [Kim and Kim, 2004; Rogers, 2003; Mahler and Rogers, 1999]. The S-shaped development is due to additive effects of increased value with greater use in the community, increased exposure to the innovation with greater use, reduced uncertainty about the effects of use and reduced costs due to economies of scale [Rogers, 2003; Katz and Shapiro, 1994]. In the textbook examples, the adoption slowly grows until a critical mass is reached, and then the spread of the innovation increases exponentially. There are characteristics of innovations affecting the rate of adoption. Rogers [2003] emphasises five attributes:

1) Relative advantage – the degree to which an innovation is perceived as being better than that which it supersedes.
2) Compatibility – the degree to which the innovation is compatible with existing values, experiences and the needs of the adopters.
3) Complexity –how difficult it is perceived to be to use the innovation.
4) Trialability – how much the innovation can be tried and experimented with prior to an adoption decision.
5) Observability – the degree to which use and results of use are visible to others.

The dynamics of innovation diffusion is not only dependent on the characteristics of the innovation but also on the characteristics of the community, e.g. the culture [Maitland, 1999; Rogers, 2003]. Certain characteristics of the community are considered to influence the development of an innovation, e.g. heterophily or homophily [Rogers, 2003], i.e. to what extent the community has a propensity to change or to resist change. Usually this is related to the way opinion leaders in the community can promote an invention (ibid).

Rogers [2003] describes a general innovation-decision process, containing five stages. The stages are:

1) Knowledge – when the adopting unit becomes aware of the innovation, and gains an understanding of how it functions
2) Persuasion – when the adopting unit forms an attitude towards the innovation
3) Decision – engaging in activities that will lead to adoption or rejection
4) Implementation –when the innovation is put into use
5) Confirmation –when the implementation is re-evaluated

However, Rogers [2003] names three types of knowledge: awareness knowledge (whether the adopting unit is aware of the innovation or not), How-to knowledge (Knowledge about how to use the innovation) and principle knowledge (knowledge about underlying principles of the innovation – not necessary for use). Awareness knowledge always comes in the knowledge stage. How-to knowledge and principle knowledge can be gained during the knowledge stage, the persuasion stage and the decision stage. In fact, principle knowledge is perhaps never achieved since it is not necessary for use.

3.3.1.　　　　Limitations to Rogers' framework in the IS field

Rogers' theory of diffusion of innovations is general and not adjusted for the IS field. Some scholars have thus modified Rogers' theories to better suit the IS field [e.g. Moore and Benbasat, 1991]. Parts of the constructs derived from Rogers' framework have also been used in attempts to unify competing theories on user adoption [Venkatesh et al., 2003]. These models focus on the part of Rogers' framework that regards the characteristics of the innovation, the five attributes mentioned above.

In this particular study, the characteristics of the innovation are highly relevant to the potential adopter; but even if the innovation characteristics described by Rogers [2003] are likely to affect a potential adopter's decision, they might not necessarily do so in a conscious way; e.g. trialability might affect adoption rate but the user might not see or name trialability as a reason to use an invention. Rather, trialability will give the potential user a possibility to learn more about the innovation.

Furthermore, we must regard the possibility that some potential adopters are not aware of the possibility to use the YAF module. Thus they might be at the very start of Rogers' adoption process stages. In addition, the general process suggested by Rogers must be adjusted not only to an IT setting but also to this specific case, where Internet access is a prerequisite for use.

3.4.　Internet access

Many innovations or services are not accessible to everyone, e.g. innovations requiring Internet access, which limits the potential penetration to that of Internet users in society. The proportion of people using the Internet is not static but is constantly changing. In fact, the Internet can be studied as an innovation in itself [Maitland, 1999]. One network effect in studying the diffusion of Internet use is the increasing number of services provided via the Internet with increasing numbers of Internet users. Thus there is a reciprocal relationship between the diffusion of Internet services and the Internet in general.

Seen from a single service provider's perspective, the proportion of Internet users would best be seen as a limit that is largely outside the server provider's control, although not static. Having said that, Internet users are not a homogenous group; there

are great differences in the use patterns between experienced users and beginners, between narrowband users and broadband users [Findahl, 2004]. Even these categorisations have a tendency to oversimplify use patterns and Ritter, Powell & Middleton [2004] find four categories even within the group frequent Internet users.

In assessing the proportion of Internet users, an often used gauge is the proportion of the population having access to the Internet at home [Nilsson, 2006]. Usually, certain socio-demographic characteristics are related to Internet use, e.g. people over 55 having a lower rate of use than the younger population, men being somewhat more frequent users than women and people with higher education are more often users than are people with lower education [Vehovar et al., 2006; Statistics Sweden 2004a, 2004b; 2005a].

In Sweden, where the current study is carried out, more then 80% of the population have access to the Internet at home, more than half of the homes have a broadband connection, 70% of the adult population use e-mail and 85 % of the companies with more than 10 employees have a website [Statistics Sweden, 2005a; 2005b; 2006; World Internet Institute 2007].

However, it should be added that Internet access at home is a somewhat approximate measure of Internet use. Some people use the Internet at work, in school or at public access points and consider this sufficient for most services, whereas others have problems getting access to the computer at home due to others in the household using the computer excessively. Thus, Internet access is a fuzzy concept that should best be considered from the user's perspective [Nilsson, 2006].

3.5.   A User Centred Access Model (UCAM)

Nilsson [2006] proposes a user centred access model (UCAM). He divides possible hindrances to access to the Internet and public information systems into five categories and describes them briefly:

Barrier   Description
1) Have   Technical, physical possibility to use
2) Want   Will to use
3) May   Allowed to use
4) Able   Knowledge to use, economical prerequisites
5) Dare   Familiar to use

Furthermore, Nilsson [2006, p.12] states that access barriers can also be divided into two rough categories:

"a) access barriers whose origins are in, or are caused by technical conditions and economic circumstances, more or less out of reach of the single citizen; "

and

"b) access barriers that have their origin in, or are caused by prevailing values and norms in society or in the user's environment or own mind."

Furthermore, Nilsson [2006, p.12] argues:

"... the barriers in the first category [a] are not the major problem in the endeavour towards the 'information society for all'. Of course they cannot be

ignored, as they must also be dealt with while they obstruct the possibilities of using the technology. This statement is based on my firm conviction that the knowledge and skills are available today to remove these access barriers; it is merely a question of money, political ambition and will. The real challenge, when an equal possibility to access is the goal, is to remove the barriers that exist in an individual's own mind, formed by the structures and norms in the social and cultural environment we live in."

Thus, Nilsson [2006] argues that the major challenge is to remove barriers within the individual's own mind. The position is a clear case of pro-innovation bias [Rogers, 2003], in the sense that the goal of our effort is to make everyone a user. The goal of omnipresent Internet access is not shared by everyone [Ritter et al., 2004]. However, for a certain service provider the goal might still be to steer the interaction towards the Internet, as mentioned in the introduction.

3.6.   Hindrances and driving forces in a process perspective

The general adoption process is described by Rogers [2003]. If adoption follows this process, how is it affected by the different hindrances described by Nilsson [2006] above? Would a person without Internet access even consider a particular e-service, or would the process best be studied as adoption of two incremental innovations? Nilsson [2006] studies the hindrances to the use of public information systems (PIS), where the lack of a physical Internet connection is only one hindrance among many. In order to analyse what the main barriers to use of a particular e-service are, we must match the barriers in the particular case with the barriers suggested by Nilsson [2006]. Therefore, we set up a list of prerequisites that have to be fulfilled in order to use the particular service, the YAF module:

1) Be aware of the online application
2) Know how to use computers and the Internet
3) Know how to use the module and the application.
4) Have access to a computer that is connected to the Internet
5) Have access to the PIN-code for the association in question
6) Will to use the module

(2) and (3) are both examples of knowledge where (2) is general knowledge applicable to PIS in general and (3) is the specific knowledge required to complete the specific task for the specific PIS. (4) and (5) are two examples of access prerequisites, the former general and the second specific to the application. Since the unit of adoption is organisations, (6) could stem from more than one individual. In general, the will could be broken down into underlying elements, but the will of the studied unit could be seen as one construct. This would be true as long as the unit behaves as a unit. One can construct situations when a single actor (a part of the unit) acts on its own and defies the formal will of the unit. The analysis of the unit would then have to shift to an analysis of its parts (compare this line of reasoning with Law [1992]). Acknowledging that this might happen, we still construct the model for a situation where the unit does not break up into subunits.

Thus the above prerequisites could be formulated in the model:

A. Awareness (1)
B. Knowledge: general (2) and specific (3)

C. Access: general (4) and specific (5)
D. Motivation (6)

Awareness is left out in Nilsson's [2006] model, while awareness and knowledge would both be placed in Rogers' [2003] knowledge stage. Rogers' [2003] concept of knowledge is threefold and we recognise the differences and relevance of the concepts. However, the latter of Rogers' knowledge concepts – principle knowledge – is not a prerequisite to use. Thus it would not apply to our model. The concept of knowledge is twofold in our categories and is divided into (2) general knowledge and (3) specific knowledge. The concept of access is also twofold above and is divided into (4) general access to the Internet at a suitable place and time and (5) access to the specific service, e.g. through a password or by laws or other rules.

Thus, according to our model, (A) Awareness, (B) Knowledge, (C) Access and (D) Motivation are the prerequisites that must be fulfilled in order for the organisation to complete an application online. There is no specific order of the prerequisites since all must be fulfilled in order for use to occur, although awareness comes before knowledge but not necessarily before access. Awareness can also regress, so that a person might need to be reminded. How use is related to the prerequisites is shown in Figure 2 below. Observe that the size and shape of the ellipses in the figure are arbitrary and not based on the empirical results.
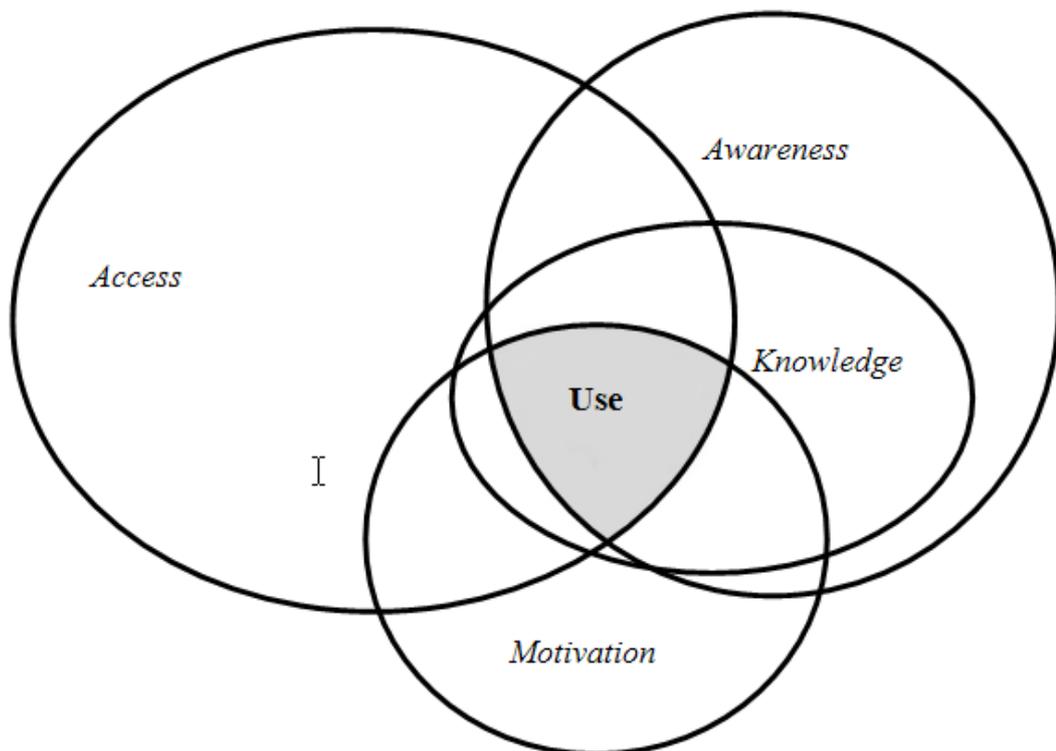
Figure 2. Prerequisites for use.

Motivation can occur prior to knowledge; in fact we argue that motivation is likely to be important in learning about the innovation and in later using the innovation. Motivation can also precede awareness, e.g. when a person seeks information about possible e-services for a certain process. In extreme cases, motivation to use a specific service could be sufficient reason for a potential user to acquire both general access

and general knowledge. This is, however, unlikely for a system such as that in our setting.

In general, Rogers' innovation attributes would affect the process at different stages and different prerequisites in our model. The relation between Rogers' suggested innovation attributes and the prerequisites found in this study are shown in Figure 3.

The ellipses represent Rogers' innovation attributes and the boxes represent prerequisites for use. The lines indicate which of these concepts from the two models interact.

Figure 3. The relation between innovation attributes and prerequisites for use.

The greater the general access, general knowledge, specific access and specific knowledge a potential user has, the greater the innovation's compatibility in Rogers' terms. General and specific access and general knowledge would facilitate the innovation's trialability for a potential user. Greater trialability would in turn assist the user to develop specific knowledge regarding the use of the innovation.

Greater general knowledge would *reduce* the perceived complexity of the innovation in the eyes of the potential user, while greater complexity would call for more specific knowledge to be able to handle the application.

The higher the relative advantage and the observability of a useful innovation, the higher the motivation to use it could be expected to be. High observability is also likely to increase the potential users' awareness of the innovation. The link between observability and motivation indicates that if someone sees others using the innovation and sees the results of the use they will be more likely to want to use it themselves, provided that the results are positive.

3.7. Summary of relationships between the three models

Table 1 below shows where the different specific prerequisites apply in the model presented by Nilsson [2006], Rogers [2003] and the one proposed in this article. The labels in the cells correspond to the labels of the barrier category in Nilsson [2006], the label of the process stage in Rogers [2003] and the label of the prerequisite stage in our model.

Table 1. Comparison of three models for user adoption.

Criterion	Nilsson [2006]	Rogers [2003]	Lundmark, Westelius & Saraste
1) Be aware of the online application	Not included	Knowledge	Awareness
2) Know how to use computers and the Internet	Able, Dare	Knowledge, Persuasion, Decision	Knowledge
3) Know how to use the module and the application	Able, Dare	Knowledge, Persuasion, Decision	Knowledge
4) Have access to a computer that is connected to the Internet	Have	Not included	Access
5) Have access to the PIN-code for the association in Question	May	Knowledge, Persuasion, Decision	Access
6) Will to use the module	Want, Dare	Decision, Implementation, Confirmation	Motivation

As indicated in the table, the prerequisites comprising our model can occur, be fulfilled or be applicable in different stages of Rogers' [2003] diffusion adoption process. However, in Table 1, one could obtain the impression that Rogers disregards such relevant aspects as whether the potential adopter has Internet access. This is not the case. These aspects are considered in Rogers' attributes of the innovation (described above). Thus, having access to the Internet would affect the attribute compatibility. Nilsson's model, on the other hand, does not cover the Awareness stage used in our model. His model appears to start when a potential user is already aware of the specific online application. However, from a provider perspective, achieving awareness among potential users is an important and non-trivial task, and is thus included in our model.

3.8. Management approaches in order to increase use

In order to increase use, a service provider can rebuild or change the innovation, thus changing the attributes of the innovation. Such an attempt could affect the prerequisites as discussed above. However, if the innovation is invariant, then the service provider has to focus on promoting the existing innovation. Furthermore, one has to bear in mind that once changes to the innovation have been undertaken, the service provider would again be in a situation where a given innovation has to be

promoted. Changes would have to be communicated, new specific knowledge might be required and specific access might be temporarily affected if upgrades necessitate server down-time.

Nilsson [2006] briefly mentions three approaches to increasing the use of a given system: facilitate, encourage and compel. In our view, these three approaches focus on different prerequisites in our model. Facilitate focuses primarily on specific access and specific knowledge, e.g. through providing support or reducing the server down-time. Facilitate could also focus on general access or general knowledge, but in the case of PIS this would imply vast resources. Thus, it is not likely that a single service provider would focus on such prerequisites in the case of a PIS. However, in a more narrow setting, e.g. in a private business, it is possible to affect both general access and general knowledge with limited means; it could be reasonable for a company to provide the employees – the would-be users – with Internet access and training, but this would not generally be feasible for a public agency or an NPO to provide the general public with Internet access and training. There are also examples of similar settings to that in this study where the change agent has attempted to influence general access [Westelius, 2006a], but that was at a very early stage of the adoption of the Internet.

Encourage focuses on motivation, e.g. through incentives. Compel is also focused on motivation in the sense that, as stated earlier, there is always a theoretical possibility to reject adoption and in practice, voluntariness could be perceived as a scale rather than a Boolean. Thus, one could say that the difference between encourage and compel is that encourage means attempting to make the benefits associated with adopting the system more attractive, whereas compel is attempting to make the alternative courses of action less attractive.

Facilitate, encourage and compel, the three approaches to increasing adoption, cover all of the manageable prerequisites but awareness. Although the other approaches could lead to awareness, it is not their focus. Thus we have added one approach that focuses on the awareness criterion. We call it inform. These four approaches are not mutually exclusive; most measures would include more than one approach. In fact, even one single measure undertaken by the service provider could include all of the approaches, e.g. in this case, sending the sport associations information about the YAF module including promotional material, a manual and information about the abolishing of the paper-based process would include all four approaches.

Thus, there are two different categories of approaches for increasing use of a PIS: changing the system and promoting the system. These approaches affect the prerequisites for use in different ways, and approaches from both categories could be combined. However, the remainder of this article will focus on the promotion of a given system.

3.9. The AKAM Model

Above, we have discussed how the adoption process as described by Rogers [2003] is interlinked with the prerequisites for the use of a PIS, in this case the use of the YAF module by the Swedish sport associations. The discussion leads to our formulation of a general model for PIS use. This model is built on prerequisites that must be fulfilled in order for use to occur. These prerequisites are inspired by Nilsson's [2006] access barriers and linked to different stages in Rogers' process model. We have also discussed different approaches to increase the use of a PIS and the prerequisites that they focus on. A graphic presentation of the model is presented in Figure 4. It shows

how the different prerequisites and management approaches to promote the application interact.
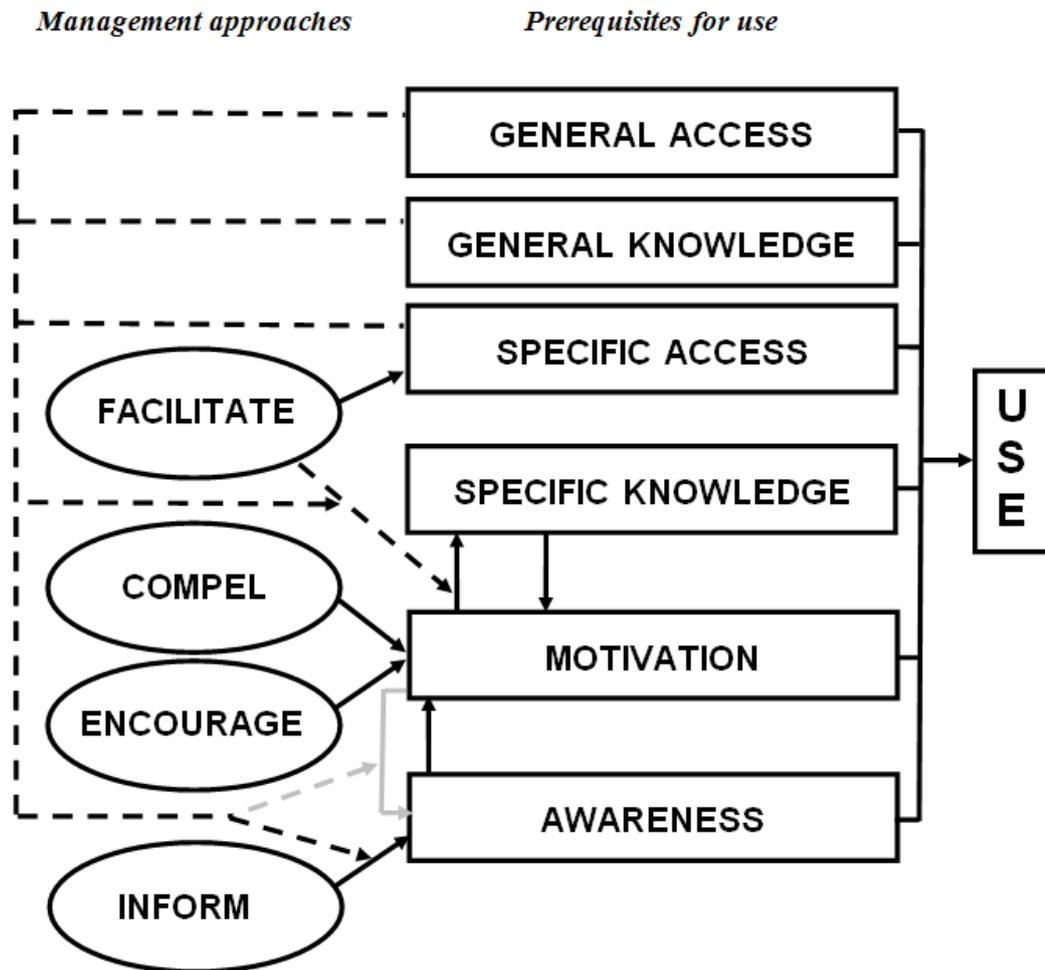
The ellipses represent management approaches to promote an innovation and the boxes represent prerequisites for use to occur. The solid arrows indicate causal relationships and the broken-line arrows indicate an influence on the causal relationships. The grey arrows indicate potential but unlikely relations.

Figure 4. The AKAM Model. Awareness, Knowledge,
Access and Motivation Model of Public Information System Use.

Notice that, in the AKAM model, there are no arrows from any management approach to either general knowledge or general access because they are not manageable in this setting. However, in other settings the service provider might be able to facilitate these prerequisites. Furthermore, the broken-line arrow between Facilitate and the arrow between Motivation and Specific Knowledge indicates that a service provider can never "create" knowledge in a person but only facilitate the learning process (e.g. through manuals or support). Thus, motivation is not only important for use, it is also crucial in the acquisition of knowledge.

If a person has General Access, General Knowledge and Specific Access it is easier to reach the person with information regarding the system (e.g. through the www or e-mail). Furthermore, if those three prerequisites are fulfilled, it is easier for the person to learn how to use the innovation (e.g. it makes experimental use

possible). Thus, these three combined have an influence on both the awareness process and the learning process (shown in the model via the broken-line arrows).

According to Nilsson [2006], general access would not account for the main hindrances to use; they would be associated with knowledge and motivation. However, Nilsson does not include the awareness side of the barriers. Thus, given that the adopting unit is aware of the innovation, we predict that the main experienced hindrances to the use of the YAF module would occur in the prerequisites Knowledge and Motivation.

4. Methodology of the SSC investigation

The SSC study is based on several parts using different instruments: interviews with managers at the SSC, managers at three Special Sport Federations within the SSC and managers at sport associations within these three sports; a survey distributed by e-mail to association representatives within the three sports, yielding 1340 responses with a response rate of 65%; a postal survey to other associations within the population, yielding 237 responses, a 79 % response rate; document analysis of protocols from board meetings and internal management documents from the SSC; and analysis of database logs showing use of the general application package Sport Online and the specific YAF module. The material presented in this article covers only part of the study. Additionally, aspects of system use other than those pertinent to this article have been assessed during interviews, surveys and document and database log analysis.

Initially, interviews were made with managers within the SSC and SSF in order to identify three SSFs with different management approaches and adoption rates of the system. Then, telephone interviews were conducted with sport associations; the objective was twofold. Firstly, they were conducted in an exploratory manner in order to develop questions for further structured telephone interviews. Secondly, we developed questions for the questionnaire used in the Internet and paper-based survey. The main purpose of the structured interviews was to assess sport associations' work with their register of members (not to be presented in this article), but it also served the purpose of a pilot for the questions used in the web and postal surveys.

4.1. The survey

During the autumn of 2006 we distributed surveys regarding YAF applications to sport associations connected to the Swedish Orienteering Federation, the Swedish Equestrian Federation and the Swedish Football Association[5] that had applied for YAF for the autumn of 2006. These three federations were chosen because they had different management approaches to the system Swedish Sports Online and also different adoption rates and use patterns. These different approaches will not be presented in depth in this article. The surveys were distributed via postal mail and e-mail. This was done in order to check for potential skewed responses due to the medium. The part of the survey presented in this article focused on the reasons for the choice of process – Internet-based or paper-based YAF application.

During the exploratory interviews, with people responsible for YAF and other people with a commission of trust in the sport associations, we formulated a list of reasons for choosing each process for YAF application.

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[5] The Swedish Football Association is a Special Sports Federation (SSF), although the English name might suggest otherwise.

In formulating the questions, we also considered interviews with IT-managers at the federations and the SSC. The questions were then tested in interviews with 10 associations in the target group. The questions were modified to clarify some questions and then validated in interviews with 5 associations. The test sample was not included in the final sample.

Furthermore, 30 associations were contacted for telephone interviews regarding the management of their member register. The Equestrian associations were primarily targeted, since one part of the interview focused on the use of another module within The Club Online of particular interest to the Equestrian associations (not presented in this paper). One to three people were interviewed per association. 25 Equestrian associations, three Orienteering associations and two Football associations were contacted. One Equestrian association did not want to participate, giving a response rate of 97%. During these 29 interviews the survey questions were further validated. The questions were identical to those used in the survey but permitted more room for discussion and for checking the respondents' interpretations of the questions. These interviews were not included in the statistical analysis presented here but some qualitative results will be presented.

4.1.1.   Sample and non-response analysis

The sample contained randomly chosen associations that had applied for YAF (regardless of whether they used the Internet or paper-based application) for the period autumn 2005, with an application date of spring 2006, and had not participated in the previous interviews.

Since the studied innovation was an online system, we sent the surveys by e-mail to one group of recipients and by postal mail to another group. The reason for using paper-based surveys despite this involving greater expense and being more time consuming to distribute and gather was that we wanted to assess potential differences due to the medium used to distribute and gather the surveys. We chose to use the more expensive method for only two federations, The Swedish Orienteering Federation and the Swedish Equestrian Federation, since this was deemed to be sufficient to obtain an indication of any potential differences.

In total, the web survey was sent to 2 054 associations[6]. The table below shows the number of sent, returned and valid responses within the three associations.

Table 2. Response rate for the web survey.

Association	Sent	Error message	Successfully sent	Responses	Response frequency Successfully sent	Response frequency total
Equestrian	353	20	333	262	79%	74%
Orienteering	171	2	169	120	71%	70%
Football	1 530	224	1 306	958	73%	63%

In total, the postal survey was sent to 300 associations. None were returned to sender.

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[6] It was sent to 1 530 of 2 300 football associations, 171 of 350 orienteering associations and 353 of 650 equestrian associations. Note that another 100 orienteering associations and 200 equestrian associations received a postal survey.

Table 3. Response rate for the postal survey.

Association	Sent	Responses	Response frequency
Equestrian	200	153	77%
Orienteering	100	84	84%

Thus the response rate was high for both the web survey and the postal survey. In total, 1 577 responses were obtained. 52 responses were returned from persons who had not completed a YAF application, 88 surveys contained contradictions and were deemed unusable, leaving 1 437 responses coded for statistical analysis. The contradictions were logically impossible combinations of answers such as the respondent stating that he/she had never used the YAF module in the Club Online while, in response to a later question, stating that he/she had used it for three applications.

Comparing the proportion of associations using the online application in the survey with the proportion in reality gave an over-representation of online users for the total sample, but the results varied with both federation and survey type. In the table below, 100% represents a perfect match with reality; a number less than 100% indicates an under-representation of associations using the online applications and vice versa for values higher than 100%.

Table 4. Representation of applications submitted online.

Federation	Web survey	Postal survey	Total
Equestrian	129%	87%	113%
Orienteering	98%	78%	89%
Football	161%	Not applicable	161%

The differences between the web survey and the postal survey shown in Table 4 are statistically significant (Mann-Whitney U sig 0.003).

To check for differences between the respondents in the web survey and the postal survey, we analysed the following parameters between the two groups for each federation respectively: age, sex, Internet use, time active in the association, number of applications made, awareness about The Club Online, experienced signals from central administration about YAF application medium, and the importance of YAF to the association. There were no statistical differences in these parameters apart from one – the orienteering associations answering the web survey were more frequent Internet users than were the orienteering associations answering the postal survey (Mann-Whitney U sig 0.031).

In general, the Internet use was high for both the postal survey respondents and the web survey respondents.

Table 5. Internet use among respondents.

Survey	Daily	Every week	Every Month	More seldom	This is the first time/never
Web	76%	21%	0%	3%	1%
Paper	60%	28%	3%	2%	8%
Total	69%	24%	1%	2%	4%

When comparisons are made between the associations from the three federations, the respondents using the application in The Club Online are compared to each other and those using the paper-based application compared to each other, if nothing else is specifically stated. Furthermore, when comparisons are made between Football associations and the other two associations, only the web survey samples are used. In a comparison between the Orienteering and Equestrian associations, the number of responses through the mail survey is weighted to constitute an equal proportion of web survey and postal survey respondents.

5. Results From the SSC Investigation

5.1. Internet and Club Online use among respondents

Most YAF applicants are frequent Internet users. Over 80% use the Internet daily and 95% use it more than once a week. There is a difference between online applicants and paper applicants. Among applicants using paper, 91% use the Internet more than once a week. The corresponding proportion for the online applicants is 99%. Compared with the population in general, where 80% use the Internet more than once a week, both paper and online applicants are more frequent Internet users than the average Swede.

92% of the respondents for Equestrian associations are women. Among orienteering and football associations the respondents were mostly men (67 and 68% respectively). The median age was 43 for Equestrian association respondents and 49 and 50 for Orienteering and Football association respondents. The median membership time in the association is 10 years for Equestrian, 21 for orienteering and 15 for football association respondents. The median number of YAF applications is almost the same for all respondents, 8-10 times.

Generally, those who had started using the YAF module intended to continue doing so. This is in line with the behaviour over the last periods; about 90% of the associations applying via the YAF module for one period continue in the same manner for the following period.

This paper will not focus on the differences among the associations. However it should be mentioned that the percentage of applications online varies considerably between the associations. Equestrian associations had the highest proportion of online applications with 33% just prior to the questionnaire and 39% during the following period. The corresponding numbers are 23%/32% for Orienteering associations and 9%/12% for football associations. The corresponding figures for all applications within the SCC are 12%/16%.

The use of the YAF module does not follow the patterns of other Club Online use, where Orienteering associations are the most active both regarding the number of actions in the system and the average number of modules used by the respondents. These differences will be explored in a later article.

5.2. Reasons for using a paper-based application

The general picture as predicted by Nilsson [2006] regarding the future use of PIS has already been realised. The hindrances to use were neither primarily physical access to the Internet, nor technical problems; only 7% of the respondents mentioned these problems as the most important. Instead, the main hindrances appear to be motivation and knowledge. The results are presented in Table 6 below[7].

In Table 6, the columns "Some effect" and "Most important effect" contain the numbers for all respondents (postal survey and e-mail survey combined). There were no statistically significant differences regarding the most important reasons between postal survey respondents and web survey respondents.

The column "Some effect" contains all unfulfilled prerequisites that affected the respondent's choice. The categories consist of the proportion of the respondents stating any of the unfulfilled prerequisites in the category as affecting their choice. Thus, the sums for the categories do not correspond to the sum of the specific unfulfilled prerequisites. The other columns consist only of the most important factor per respondent; they are mutually exclusive and the proportions in the categories correspond to the sum of the proportions of the unfulfilled prerequisites. Thus, here the unfulfilled prerequisites sum up to the categories, and the categories sum up to 100% (the rounding of the numbers explains marginal deviations from 100%).

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[7] The percentages in the table are the proportions of respondents that have chosen an option from a predefined set of fixed responses. One could also state personal reasons in a free-text comment field. Most free-text responses fit into one of the above standard responses. The proportion of free-text answers that did not fit into a predefined answer was less than a percent of the total number of responses. Examples of other reasons that were mentioned are:
"We have another system for YAF administration."
"The municipality requires another means of accounting for YAF accounts."
"The association does not use the Club Online tool at all."
Also, one group was not aware of the new simplified web form for YAF but was only aware of the more complex older version where all attendants for all events had to be registered.

Table 6. Reasons for using the paper-based YAF application.

Reasons for using the paper-based YAF application (categorized by unfulfilled prerequisites)	Some effect	Most important effect
Access	**58%**	**18%**
Did not have login credentials	45%	11%
Did not have access to the Internet	12%	3%
Technical difficulties of some sort	23%	4%
Awareness	**32%**	**13%**
Was not aware of that you could use Club Online	32%	13%
Knowledge	**64%**	**21%**
Did not have time to learn Club Online	61%	18%
Cannot use computers or Internet	13%	3%
Motivation	**85%**	**48%**
Did not feel like learning Club Online	26%	2%
Old habit	70%	26%
Felt that the central administration preferred paper applications	14%	1%
Someone else in the club wanted the paper application to be used	13%	3%
Assessed the paper form to be the most convenient way of applying	*53%*	*14%*
Do not trust the Internet or Paper application feels safer	*20%*	*2%*

As can be seen in the column "Some effect" of Table 6, there are many hindrances affecting the respondent's choice. Only 14% considered the most important reason to be that the paper-based process is more convenient, whereas 54% of those using the Internet-based process stated that the most important reason for their choice was that the Internet-based process was more convenient. However, 53% of the respondents using the paper-based process considered their choice to be the most convenient, even if this convenience was not the primary reason for choosing the paper-based process; the corresponding number for respondents using the Internet-based process was 89% (see Table 7).

5.3. Reasons for using the YAF module

As noted above, the majority of Club Online users use the YAF module because they find it more convenient than the paper application. More than 50% claim this to be the

most important reason for using Club Online, although there are many factors influencing their choices (see Table 7[8]). It is interesting to note that 72% stated "Curiosity about how it works". Thus, online reporting is still viewed as a novelty, and an interesting one. (No one stated curiosity about how the paper-based reporting works as a reason for using it rather than the YAF module.)

Table 7. Reasons for using the YAF module.

Reasons for using the Club Online for YAF application	"Most important effect"	"Some effect"
Assessed using the Club Online to be the most convenient way of applying	54%	89%
Felt that the Club Online was a more reliable way of applying	12%	66%
Felt that the central administration preferred paper Club Online applications	9%	60%
Affected by the incentive that the association will receive its funding earlier if application is made using Club Online	8%	50%
Sent the application at the last minute	7%	34%
Curiosity about how it works	6%	72%
Someone else in the association wanted the Club Online to be used	2%	13%
Did not know that paper application was available	2%	8%

5.4. Signals from the central administration

The respondents were asked which application method they considered as being the promoted option. There is a difference in perception between the respondents who use the YAF module and those submitting a paper-based application. The results are presented in Table 8 below.

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[8] The percentages in the table are the proportions of respondents that have chosen an option from a predefined set of fixed responses. One could also state personal reasons in a free-text comment field. Most free-text responses fit into one of the above responses. Examples of other reasons that were mentioned are:

"All club members can 'see' that the application has been submitted. This gives me a feeling of order and control."

"I don't have to run around chasing signatures"

"According to the guidelines, we have to use the Club Online"

"I don't have to write letters and mail them"

Table 8. Perceived signals from the central administration regarding YAF application.

Type of user	Paper form application is preferred	Have not noticed any signals regarding preferred method of application	Club Online is preferred
Paper	20%	47%	33%
Club Online	3%	23%	74%

They were also asked what they believed was the most convenient application method from the central administration perspective, see Table 9.

Table 9. Beliefs about the consequences of using the YAF module.

I believe that my use of the YAF module will reduce the administrative work at central administration				
Type of user	Fully disagree	Partly disagree	Neutral	Partly agree	Fully agree
Paper	1%	2%	19%	29%	49%
Club Online	0%	0%	2%	10%	88%

Interestingly, the respondents' perceptions of which option would be the easiest to administer for the central administration differ from the perception of which option is being promoted. Very few believe that the central administration would not save time if applications were electronic. However, the degree of conviction that it saves time differs considerably between those reporting on paper and those reporting electronically.

Generally, two thirds of the respondents who believed the central administration was sending signals about preferring paper applications still believed that the central administration saved work in receiving online applications as compared to paper-based applications. Reasons stated for this paradoxical view during the telephone interview included that, judging by the material received regarding YAF application and contacts with support staff, one was led to believe that the paper-based option was preferred. For example, a couple of respondents claimed that the support staff had recommended them to use the paper option.

5.5. Use clustering

Applicants using at least one other module in the Club Online are almost four times as likely to have sent an application via the YAF module as are applicants not using any other module (38% as compared with 10 %, Mann-Whitney sig. 0.000). There is also a significant correlation between the number of other modules used and the use of the YAF module (Spearman's rho 0.343, sig. 0.000). However, the effect of experience with more modules appears to vanish after two, as seen in Figure 5.

International Journal of Public Information Systems, vol 2008:2
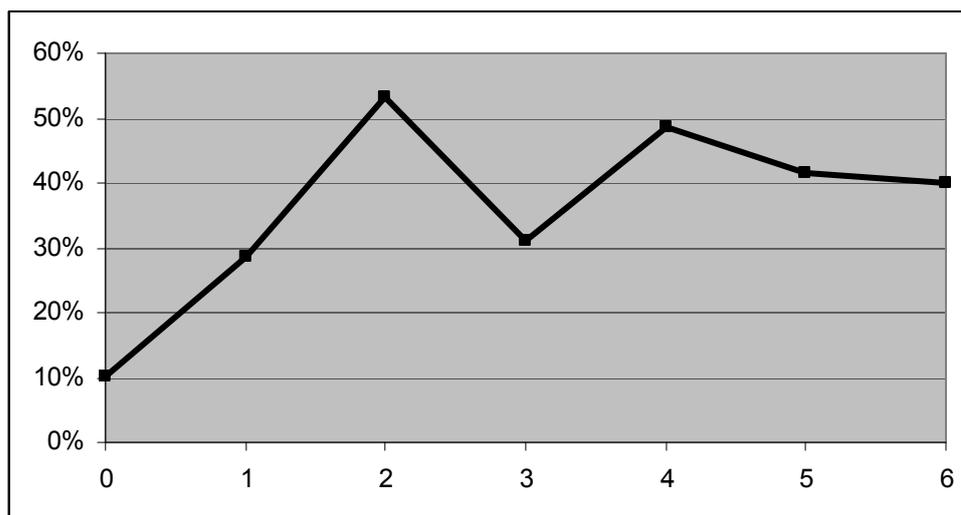www.ijpis.net
Page 113

Figure 5. The proportion of YAF module users as a function of the number of other modules used.

Although the differences between the different federations do not form the main point in this article, it seems appropriate to remind the reader about the differences between the federations regarding the percentage using the YAF module. Although the Orienteering associations use the Club Online considerably more in general, they have a significantly lower use of the YAF module as compared with the Equestrian associations. However, using other modules correlates positively with YAF module use for associations of all federations respectively.

There is also a relation between the number of other modules the respondents use and the perception that the respondent did not have time to learn how to use the YAF module. The respondents stating "time to learn" being a barrier had on average experience from 30% less other modules than those not reporting time to learn as a barrier (0.55 and 0.78 T-test sig. 0.000). The corresponding measure for the barrier "did not have access to password" is 38% (0.48 and 0.78 T-test sig. 0.000). For the barrier "was not aware of the possibility to use the YAF module" the corresponding measure is 44% (0.42 and 0.74 T-test sig. 0.000). Thus, using other modules reduced the probability that the applicant did not have access to the password for the YAF module or that the applicant was not aware of the possibility of using the YAF module.

6. Discussion

In this section we first discuss the AKAM model and how it relates to IS research in general and specifically to Rogers [2003] and Nilsson [2006]. A discussion then follows concerning the management approaches and the prerequisites presented in the model, both in theoretical terms and in the light of the empirical material from our interviews and surveys. Thereafter, we briefly reflect on the empirical material regarding the users' perceptions about the central administration's attitude and the relation between YAF module use and the use of other modules in Swedish Sports Online. Finally we discuss the implication of this study for TAM.

6.1. The AKAM Model

In the IS field, there have been different approaches to studying the interaction between organisations and IT. One can have the outlook that certain parameters affect a dependent variable and more (or less) of the parameters will mean more (or less) of the dependent variable. Another approach would be concerned with necessary and sufficient conditions [c.f. Markus and Robey, 1988]. This research is an example of the latter. We have formulated six necessary conditions which together are sufficient for use to occur.

The AKAM model is based on the assumption that if all the prerequisites are met, then use should follow. However, it only takes a failure in meeting one of the perquisites for use not to occur. The basic rationale behind the model is that there has to be a driving force and no sufficiently strong barriers to counter it, for use to occur. There are six types of prerequisites of which one is a driving force (Motivation) and five are barriers. To some extent, much of the driving force, motivation, can compensate for a little less in a barrier. For example, if a person is very motivated to use the YAF module, then he/she might use a computer at a friends' place to send in the application if his/her Internet connection is not working, whereas the normal criterion for physical access to the Internet would be connection at home [Nilsson, 2006]. However, compensating for an unfulfilled prerequisite by focusing on the lowering of barriers is not possible; for example, if a potential user is not aware of the YAF module, a better user manual would not make him use the YAF module. Thus, the general picture is that for use to occur, each prerequisite must meet some minimum standard.

Thus the AKAM model indicates that adoption of a specific administrative module in a system also follows the pattern of organisational adoption of innovations of a more complicated character. Thus, a number of factors influence successful implementation, and failure in only one or two dramatically increases the risk of failure [Lucas et al., 2007]. However, individual (or unit) adoption hinges on other factors than for organisational implementation. These factors are most likely interlinked. For example, top management commitment is seen as a prerequisite in IS implementation [Sarker and Lee, 2003]. This will then influence management measures, which in turn will influence the barriers and driving forces involved in the process.

The AKAM model of user adoption is developed for the specific setting of public information systems use of the type encountered in the YAF module study. The model focuses on prerequisites for use of discretionary web-based systems where change agents have limited power over the potential users. The model does not cover every aspect of the user's situation but focuses on the prerequisites for use. Thus, many aspects, e.g. user principle knowledge [Rogers, 2003], are not included in the model. We do not argue that principle knowledge is irrelevant but it is by definition not a prerequisite. However, principle knowledge could affect motivation both positively and negatively. For example, knowing what kind of encryption is being used for a service might affect the attitude towards the system in both a positive and negative direction. Thus we would argue that it could conceivably affect motivation. However, in this study we did not find any examples of principle knowledge playing a notable role for motivation.

The model is developed based on the general model for innovation adoption [Rogers, 2003] and Nilsson's [2006] User Centred Access Model (UCAM). It differs from Rogers' model of adoption by focusing on prerequisites from an individual's perspective where use is contingent on factors such as Internet access or general

knowledge about computers. Nilsson, on the other hand, provides a model for analysing barriers to Internet access for personal use. Even though his model for access could be applicable to a specific public information system, it serves better in analysing general access to the Internet than access to a specific system. One reason for this is that it omits awareness of the application. Seen from a general perspective, the proportion of people oblivious of the Internet is insignificant (at least in a Swedish context). However, every single service provider will have to put considerable effort into making the potential users aware of the specific applications they offer.

Our model clearly divides the hindrances associated with general access (general access and general knowledge) from the hindrances associated with the specific application (awareness, specific access and specific knowledge). Furthermore, our model focuses on prerequisites containing both barriers and driving forces rather than focusing only on barriers. Nilsson [2006] specifically states that there is a difference in kind between driving forces and barriers and that a lack of a driving force should not be considered a barrier; for example, some people consider the need of their children for the Internet as a driving force to acquiring an Internet connection but not having children should not be seen as a barrier. However, his UCAM focuses exclusively on barriers. This difference - the focus on both barriers and driving forces as compared to barriers only - might be due more to semantics than a reflection with regards to what the models cover and do not cover, since some of the barriers in the UCAM would be considered a lack of driving forces in our AKAM model, e.g. when the user does not consider the application useful. However, we believe semantics are important; words influence how we experience the world. In our model, we want to emphasise the balancing of driving forces and barriers – that motivation can be thwarted by barriers.

One could argue that only one category, motivation, for all possible driving forces is too parsimonious. As we have stated earlier, properties of the innovation might affect motivation, e.g. relative advantage and observability [Rogers, 2003] or perceived usefulness [Davis, 1989]. There are also other types of sources for motivation; in this study we find economic incentives, social incentives (the will to comply with the central administration's or other club members' wishes), curiosity, and ignorance of other possible options. The latter should perhaps be seen as a barrier to use of the paper-based process. Thus, there are different sources of driving forces, and future research might find it useful to break motivation down into sub-constructs, even though we did not see it as necessary at this stage.

Regarding the management approaches to increasing use of the system, the main difference between Nilsson's [2006] UCAM and our AKAM model is that the AKAM model specifies which management approaches affects which prerequisites. The influences are illustrated above, in Figure 4. We have also added *inform* as a management approach. Inform can, on its own, be an effective measure if awareness is low but the other prerequisites are met for many in the target group. Inform is also often an important complement to any other approach.

There is much in Rogers [2003] regarding the promotion of an existing innovation that is not included in the AKAM model. In fact, our model says little about how to promote the system. The contribution of the model is the conceptual distinction between the different approaches. Furthermore, Rogers' attributes of the innovation should be seen as an important complement to the model. The management approaches included in the AKAM model only focus on promoting an existing system, while Rogers' attributes of the innovation are useful tools for analysing the conception of the system. If the decision point is before development,

the two models should be combined in order to analyse the effects on each prerequisite. In Figure 3 above, we have modelled how our prerequisites could be combined with Rogers' attributes of the innovation.

In the next section we discuss the different management approaches in the AKAM model, and in the following section, the prerequisites, with examples from the Swedish Sports Confederation YAF module use.

6.1.1. Management approaches in theory and practice

The AKAM model contains four management approaches to increasing use of the system: inform, facilitate, encourage and compel. Before we discuss these approaches we will look at the general rationale for promoting online systems over older manual systems.

The YAF module in the Club Online is a step towards more efficient administration of the YAF, at least from a central perspective. The basic rationale is that instead of applicants filling in a paper and sending it by post and administrative staff opening the application, identifying the association and typing it into the computer system, the applicants could fill in the application directly into the computer system. Such elimination of intermediate data-handling process steps is also the rationale behind many other attempts to digitise processes.

At first glance, it may seem a straightforward solution to make the online application the only option, in order to save time for the central administration. That would be a valid argument, provided that it involved the same amount of effort for the applicants (compare Pareto efficiency). However, many applicants are not indifferent to using the digital process over the paper-based. In order to increase user satisfaction, several methods might be required [Hwang, 2000].

The applicants favouring the digital process constitute no obstacle to the service provider's intention but the applicants favouring the paper-based process do. Theoretically, the value gained centrally could be used to encourage the applicants who would prefer the paper-based option to instead use the online version. Two cases can help clarify the dynamics:

Case 1: Provided that the preferred option and the level of resistance to the other option remain constant over time and provided that the incentive must be equal for all users and not customised depending on the level of resistance, the potential positive effects of an incentive would be contingent on the proportion of voluntary users and the level of resistance among those favouring the paper-based option. In this case one would either have a long-term constant incentive or no incentive at all.

Case 2: Provided that the effort involved in using the digital process is being reduced with practice, thus making the initial use associated with more effort than the well-known paper-based process, although for further use the digital process would be the preferred option, incentives should be based on the learning curve. If the applicant does not include the potential future reduction in effort using the digital process in his/her decision making, he/she would not start to use the system. Thus, the service provider could use an initial temporary incentive at a greater cost than the immediate gain, lifting the applicants over the threshold of first-time use.

According to these cases there are two types of incentives: relatively high short-term incentives to make people try the application, or long-term compensation for the extra effort. Another way of viewing this would be to regard it as an incentive to learn or an

incentive to use the system. This could be seen in the AKAM model in that motivation is involved in both learning and use. The focus of the incentive would depend on the relative resistance in the two processes – learning and using.

Consequently, the use-patterns in a general case will develop very differently depending on the relative effort connected with the digital application and the learning curve. These parameters may also vary between users or user groups. Thus, the cases that would best describe the dynamics of a specific case would vary between systems.

Positive incentives have been discussed in the preceding sections: rewarding use (or learning), which would be a case of the *encourage* approach in the AKAM model. However, the relative benefits associated with choosing the paper-based application process instead of the online version could also be affected by punishing the use of the paper-based version, e.g. placing a fee on paper-based applications. That would be an example of the management approach *compel* in the AKAM model. This approach would typically lead to costs in the sport associations rather than in the central administration.

However, the idea of punishing the use of the paper-based application process was met with strong scepticism among the respondents. People who used the paper-based version were, not surprisingly, very negative to such an approach, but even those using the YAF module were often sceptical. Strictly monetarily, using positive incentives in order to promote use of the YAF module would be equivalent to having a fee on non-use, since the money comes from or goes to Youth Activity Funding anyway.: However, the different approaches gave rise to very different emotional responses, in line with that which could be expected from the difference in perception of gains and losses demonstrated by Tversky and Kahneman [1981].

There are yet two management approaches in the AKAM model – *inform* and *facilitate*. Whereas inform is focused on making the available options known to the users, facilitate is focused on making use easier, e.g. through removing access problems such as server downtime or improving the process for retrieving forgotten passwords. Facilitate could also be to attempt to make the learning process easier (e.g. providing user support or a user manual) and would then complement a learning incentive.

Inform would be an important part of most other approaches; incentives will not affect use unless the potential users are aware of them and support would not help users if potential users do not know how to get it. However, informing is a process that comes at a cost and this cost should be considered in cost/benefit analysis of any other management approach where informing is a part.

The empirical results show that the instance of encouragement used in this case, an economic incentive, had a positive effect despite the incentive being relatively weak (The associations get their funding two weeks earlier if they use the digital process). The incentive is not particularly focused on first time users and has been the same for a few years. Thus, it has more of the permanent incentive characteristics, corresponding to Case 1 above). 8% of the users claim that the incentive was the most important reason for using the YAF module and 50% said it affected their choice. Even though there was an incentive to use the YAF module, lack of motivation was the most frequently mentioned reason for not using the YAF module.

A third of the respondents were not aware of the YAF module, indicating that an initiative to inform could remove barriers for some users. However, only about 40% of those who were not aware of the innovation stated that it was the most important reason for using the paper-based application process. Thus, even if everyone is made aware of the application, this measure alone would only turn less than 11% of the

population into new users (calculated approximately from the overall ratio 20% users and 80% non-users; a third of non-users not aware, and 40% of these considering their non-awareness the largest obstacle). Although this would amount to a 50% increase in use, the large majority (70%) would still be non-users.

In this specific case, it seems that any management approach on its own would have rather limited success in increasing the YAF module use; there are significant problems in all of the manageable prerequisites. In the next section we will discuss each prerequisite in turn.

6.1.2. Prerequisites in theory and practice

The general picture is that most people using the YAF module did so because it was perceived as the most convenient option. Non-users, on the other hand, more often referred to the learning threshold: for example, they stated that they did not have sufficient time to learn the new system or that their actions were based on "old habit". Physical access and general knowledge did constitute important barriers for some respondents; however this group was relatively small. This might be a true picture for many discretionary, web-based administrative systems. It is, for example, in line with the Swedish tax authorities' surveys [2004] concerning reasons for using and not using the Internet-based tax declaration[9].

Awareness is one of the most important barriers; a third of the respondents using the paper-based application process stated that they were not aware of the YAF module. This indicates how difficult it is to inform such a large and dispersed body of organisations. Informing requires resources and consequently competes with other organisational processes for these resources. Use of other modules in the system has a positive influence on awareness but does not imply awareness. Among those using other modules, more than a fifth were not aware of the YAF module.

There is no significant correlation between the Internet habits of the respondent and the awareness of the YAF module. This could be a consequence of the Internet not being the primary channel for informing the associations about the YAF module. There is information about YAF online but e-mail is not used as a direct channel between the central administration and the associations in promoting the YAF module. However, there is a weak correlation between the overall awareness about the Club Online and Internet habits (Spearman's rho 0.128 sig. 0.000)[10].

General Knowledge; 13% of the respondents stated that a lack of general knowledge was an obstacle to use. It is interesting to note that 8% of the people using the Internet on a daily basis still experienced insufficient general knowledge. As an explanation for this, some people in the interview mentioned that they used the Internet at work for very specific tasks but had limited knowledge about other areas of use. Thus, even frequent Internet users might not have the required levels of general knowledge for starting to use relatively simple applications on their own. Furthermore, the separation between "able" and "dare" in the UCAM [Nilsson, 2006] might be warranted, in the sense that many of these respondents might have had the required knowledge but lack confidence. Both able and dare are gathered under the

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[9] This material is not published, but the documents are public and can be acquired from the Swedish tax authorities. Most frequently mentioned reason to use the online declaration system was convenient [translation of "smidigt/enkelt/praktiskt"] (76%); reasons to use the paper-based version were much more diverse, with physical access as the most frequently mentioned barrier (18%) followed by Old habit [translation of "Gammal vana"] (13%) and "paper-based option is the most convenient" [translation of smidigast] (13%).

[10] The Internet habits were measured using a scale ranging from daily to never.

label general knowledge in our model, but when addressing barriers associated with general knowledge, it could be important to be mindful of these two underlying categories.

Furthermore, the fact that some people use specific applications, without considering themselves as having the required general knowledge, questions the placement of general knowledge as a prerequisite. A user could obviously use some applications with what they feel is minimal general knowledge. However, we argue that in a case such as this, where users are dispersed and relatively anonymous, it is difficult to make people with very low levels of general knowledge use the application.

General knowledge could be expected to rise as a consequence of the increasing use of IT in society. However, the existence of general knowledge depends on what bases are actually shared. General knowledge in this context could be how to use the QWERTY keyboard or knowing that most applications have an Archive button in the upper left corner under which save options are hidden. These are just conventions and if a system does not comply with standards, then general knowledge might work against system use. Multiple standards could pose design problems for the developers. The level of presupposed general knowledge might also affect the effectiveness of facilitating measures, such as manuals. A manual presupposing too much or too little knowledge will lead to reduced usability. Consequently heterogeneous groups, likely to characterise public information systems, also pose a challenge to change agents [Rogers, 2003]. Thus, the distinction between general and specific knowledge can sometimes be somewhat fuzzy.

Specific Knowledge in this case is experienced as a major barrier for non users. 61% stated that time to learn the new system was a barrier and 18% stated it was the most important barrier to use. Interestingly, among the users, almost 70% thought it was easier to learn how to use the YAF module than they had expected, indicating that users might overestimate the difficulties and that this overestimation deters them from trying. This should be seen in the light of previous research, which found support for potential users being worse equipped to assess the *ease of use* than in assessing the *usefulness* of a system of which they have little experience [Davis and Venkatesh, 2004].

Furthermore, as indicated in the graphical AKAM model, acquiring specific knowledge requires some motivation from the potential user. A service provider can make the module conform as much as possible to standards and provide professional manuals, support and/or training, but first time use will always be associated with some extra effort from the user. However, lowering the entry barriers in this fashion also lowers the exit barriers; switching to other applications also following these standards will be easy. Conversely, if users become used to a system that does not comply with standards, the barriers to switching to another system will be higher. In the YAF module case, the service provider is in a monopoly situation and consequently does not have to worry about users switching to other competing applications; the only competition comes from the paper-based version.

General access would not always best be seen as an Internet connection at home. In this case, when the applicant acts on the behalf of an association, the preferred Internet access point could be elsewhere. Some respondents mentioned that the club office did not have a connection, or had a connection that was too slow and although they had a connection at home, they did not want to bring their work there. Others mentioned that they used the connection at their regular workplace for sending the YAF application. Yet others stated that the connection at home was the preferred

connection. Thus the preferred access point varies and depends both on the specific task and on personal preferences. Some respondents (12%) reported general access as a barrier to use, but only 3% considered it to be the most important reason. Considering that well over 90% of the respondents used the Internet more than once a week, while 4% had never used it, there are thus both people who feel that their actual Internet access is not suitable for the use of this public information system and those who feel that although they have never used the Internet before, that is not the primary reason for not using this particular public information system.

There was also a small group (4%) stating that technical problems were the most important reason. The problems mentioned in the interviews were mostly connected with problems with their computer or Internet connection and not with the YAF module. However, we cannot be certain about what proportion of these technical problems regarded general access and what proportion regarded specific access.

General access could, like general knowledge, be expected to rise. Connectivity is already high in Sweden, but the average bandwidth is growing steadily, with the effect that service providers might design systems for ever faster connections, still leaving general access as a potential barrier [Lundmark and Westelius, 2007]. There is also (as between general and specific knowledge) a somewhat fuzzy boundary between general and specific access. For example, it is not clear how the barrier should be categorised if the respondent lacks certain software necessary for use. This would have to be decided from case to case depending on whether the software would be best seen as particular to the specific application or more generally required for many services.

Specific access is in this case restricted by a password. Not having access to the password was a very frequently mentioned problem among non users in our survey. 11% stated it was the most important barrier to using the YAF module. This is not surprising. Previous research has shown that web-users have on average 6.5 passwords, each of which is shared with on average 3.9 sites [Florêncio and Herley, 2007]. In total, the average user has 25 web-based accounts requiring passwords, and types in 8 passwords per day (ibid). Furthermore, Florêncio & Herley (ibid) estimate that at least 1.5% of Yahoo users forget their password each month.

Forgotten passwords pose additional challenges since there must be processes to redistribute or reset them. Forgotten passwords can be distributed by e-mail, but addresses could change or access be cut off (e.g. hotmail accounts become inaccessible if they are not accessed with a certain frequency). In this particular case, the password is sent to the association administrator's e-mail address. Thus, if someone else is the YAF module user, he or she must then contact the administrator. Furthermore, the only way to get the password sent by e-mail is through contact with the support staff, and thus the possibility is limited by opening hours for the support call centre.

Specific access can also be limited by server crashes or planned stops for maintenance. Some respondents considered technical problems to be a barrier. As mentioned above, we do not know to what extent these problems referred to client or server problems.

Motivation is a wide concept that represents all driving forces. In this setting, were use patterns are digital, motivation need only be sufficient for use. In other settings, it can be important to have engaged users who can act in accordance with more fuzzy intentions, e.g. submitting rich data to an information system, where neither "engaged" nor "rich" is a Boolean. In such settings, there could be a need to break both motivation and use down into several subgroups.

Users of the YAF module almost exclusively use driving forces as reasons for using the module, the exception being "I did not know one could send in the application on paper" or "I completed the application at the last minute". These two reasons could be seen as barriers to using the paper-based application rather than being driving forces for the YAF module. However they are not seen as important reasons by most respondents. Thus, the general picture is that motivation is by far the most important reason for use of the YAF module and particularly the usefulness of the module either phrased as "convenience" (54%) or "reliability" (12%).

Motivational reasons are also stated as being the most important reason for many paper applicants (48%). However, for them the usefulness of their choice is generally not stated as the most important reasons ("most convenient way to apply" 14% and "most reliable way to apply" 2%). Partly this could be a result of beliefs about IT in contemporary society, where IT is associated with efficiency. It could also reflect an inclination to find a politically correct answer in the sense that many respondents perceived the digital process as being the favoured option and therefore seeking more acceptable reasons for not complying with central administration wishes. However, the fact, that "old habit" was both the most frequently mentioned single reason and the reason considered the most important among non YAF module users, shows that less socially desirable answers were common.

As mentioned earlier, the economic incentive affected the choices of some users but there is also another factor affecting some users – the will to act in accordance with the central administration's wishes. 60% stated that the wish of the central administration affected their choice and 9% considered it to be the most important reason. This is striking, because the applicants have very little contact with the central administration. Possibly, politically correct answers have boosted these numbers. However, the numbers are not unrealistic, considering that all respondents to some extent are already doing voluntary work in an NPO and that the purpose of the YAF process actually is to apply for funding.

Curiosity and its opposite "old habit" both affect people's choices. Curiosity influenced 72% of the YAF module users to try the YAF module and 6% considered it to be the most important reason. "Old habit" is the strongest inhibitor, with 70% stating it affected their course of action and 26% stating it as the most important reason not to use the YAF module.

According to Rogers [2003], curiosity would be a stronger driving force for early adopters than for the early majority. Since the different federations have different levels of adoption, we could expect to see some differences regarding the frequency of curiosity as a driving force. However, in this sample there are no significant differences between the federations regarding curiosity as a driving force. A possible explanation for this could be that the federations have different cultures and they also followed different managerial approaches.

6.2.   Perceptions of the central administration's attitude

Not only is there some dispersion regarding which application method the respondents perceive as being the promoted method but there also appear to be systematic differences in perception between YAF module users and those using the paper-based application. The respondents using the paper-based application perceive, to a much higher extent, that the paper-based application is the promoted method by the central administration than do the respondents using the YAF module (20% versus 3%). One explanation could be that the associations are actually affected by the signals they receive from the central administration and act accordingly. Another explanation

might be co-variations with other variables, for example that the applicants using other modules in the Club Online are more often exposed to promotion material for the YAF module and more often use the YAF module. However, Internet use in general does not increase the awareness of the YAF module. Selective perception can also play a role – the respondents notice that which confirms their choices.

Judging by the policy documents, it is clear that the YAF module should be the promoted method. However, the SSC is a large organisation and different people in the administration convey somewhat different attitudes to the associations. Different districts work differently, which is clearly visible as different districts have varying levels of the overall Club Online use and also YAF module adoption. Furthermore, associations' preferences for different communication channels can affect the perceived attitude. It is most likely that all the proposed explanations contribute to the result.

6.3. Use Clustering

The people using other modules in the Club Online generally experience lower learning barriers to using the YAF module, have less problems attaining the password and are better informed about the YAF module. This is not surprising. Rather, the emphasis should be placed on the fact that although people have experience from other modules they are still not necessarily aware of all the modules in the system, they have learning barriers to learning new modules and they might not possess an adequate password for the task or they might have forgotten it [c.f. Florêncio and Herley, 2007]. This also further underlines the notion that physical access is not the same as use [Nilsson, 2006] – in fact, use of one module does not guarantee use of another module in the same system even if the module is highly applicable.

6.4. TAM vs. AKAM Model

The criticism directed at the Technology Acceptance Model (TAM) by Benbasat & Barki [2007], regarding problems involved in using the same constructs for very different settings, is supported by the various different driving forces and barriers reported both here and in Nilsson [2006]. For example, if the economic incentives for using the system had been stronger, more people would most certainly have reported the incentive as being the reason for their use of the system. Thus, reasons similar to the TAM constructs Perceived Usefulness (PU) and Perceived Ease Of Use (PEOU) would have been less important.

However, this would only be true in a setting such as this one, where use patterns are digital (no use or use). In another setting (e.g. with use ranging from little to much or from compliant use to engaged) one could argue that a very strong incentive would create the equivalent of a compulsory system where the users who do not see the benefits of the problem apply minimum effort in obtaining the incentive, whereas users who consider the system more useful use the system more actively (compare with Herzberg's hygiene factors [Herzberg, 1968]). Although TAM has been tested in both discretionary and compulsory settings with comparable results [Venkatesh, 2003], the applicability of TAM could be questioned when incentives are used in a discretionary setting or the use patterns are digital in a compulsory setting. Thus, the variance in the dependent variable can be an important factor for the applicability of TAM.

This suggests another limitation for studies elaborating on TAM constructs; they only test how much of the variance in behavioural intention (BI) could be explained by variance in the underlying constructs. Thus, if a construct has no variance it will

not have a significant effect on BI. To clarify with an example: if a system has a PU ranging from 4-7 on a Likert scale and the respondents stating a 4 never used the system, while increasing likelihood of use was associated with higher PU, this would most likely give a good explanatory power in a test. However, the same would be true if the respondents' answers had the corresponding characteristics but ranged from 1-4 on the same Likert scale. Thus, in one case the attitudes range from neutral to very positive and in the other case the attitudes range from very negative to neutral, while still yielding the same explanatory power. Would the conclusion that PU is the most important construct explaining BI still be the most obvious? The answer would probably be that, at least in the setting where most users are dissatisfied, something else has affected their intentions.

The benefits of the AKAM model as compared with TAM are that the AKAM model focuses on prerequisites that must be fulfilled for use to occur instead of attempting to explain how the variance in intention to use a system will vary according to a set number of constructs. Some prerequisites could be very important, but fulfilled for most users in a certain setting and thus not affect the variance of intention to use or actual use of the system.

We argue that, despite TAM's aspiration to being a general model for technology acceptance, it is a model that is valid under certain conditions. If all the people in the population are aware of the system, have the same access to the system, have the same education in using the system and no special managerial approaches to increasing motivation (e.g. incentives) have been applied, then PU and PEOU are the best predictors of the intention to use the system. The AKAM model recognises perceived usefulness and perceived ease of use as driving forces but it does not exclude, and in fact highlights, other ways of creating motivation.

TAM would suggest that it is not possible to make people use a system that is not perceived as useful to them. However, this study indicates that some people feel that the central administration's wishes or economic incentives were more important than the convenience of the system. System changes are usually introduced to make a process more efficient, but, as pointed out by TAM, this is not always how it is perceived. Furthermore, as indicated by our study, there are situations where the system change will facilitate the processes for some at the expense of others. Process re-engineering is thus important for technology acceptance. When a new technology is implemented, the processes involved will usually also change characteristics [Markus, 2004]. The acceptance of (or resistance to) the technology is intertwined with the acceptance of (or resistance to) the process change [Westelius, 2006a, 2006b]. Some changes might make the actual working processes lengthier for some groups and save work for others [Lundmark and Westelius, 2008] or the system might make the initial work more extensive but save work in the future; e.g. documentation procedures often prove to have this characteristic. Thus, in practice a change agent can work for a solution that will result in more work or more complex processes for certain groups, making system changes with the characteristics of the Case 1 in section 6.1.1 a very real option. This aspect is not considered in TAM.

In this specific case, the introduced technology does not really change the type or content of the information that is exchanged in the application process. There is, of course, a change in the process if you write on paper or on a computer but it is basically the same information that is being processed. Thus, in this case, the change in process is almost exclusively connected with the computerisation of the process and not due to any conceptual process re-engineering. The acceptance in this case is consequently a pure acceptance of technology and not new ways of working (apart

from using a computer, and possibly as a result of the work having to take place at a new location). Even though this case did not test our model in a setting where the process was significantly changed, we argue that our model would be applicable even in such a setting.

TAM has a point in focusing not on usefulness but on perceived usefulness, making the discrepancy between change agents' and users' perceptions an important factor. Even though this discrepancy was one of the main drivers behind TAM [Benbasat and Barki, 2007] it is not highlighted by TAM, and has not been explored properly in TAM studies, and studies using other approaches have pointed out a lack of regard for user perceptions as a problem [e.g. Sannes, 1996; Hwang and Thorn, 1999; Rogers, 2003; Westelius and Edenius, 2006].

The results in this study lend support to the idea that perceived usefulness and perceived learning barriers, which could be seen as related to ease of use, are important factors influencing use. This could be seen as a support for the basic ideas of TAM. However, this study also shows that a number of other factors can affect use. The most important factors influencing use can vary from case to case. As stated above, we agree with Benbasat and Barki [2007] that TAM is too static and, also fails to recognise the necessity of having different constructs in different settings. However, we are not convinced of the necessity of having just one model for the acceptance of technology. The model developed in this paper is specific to discretionary, web-based information systems with digital use patterns, although the basic idea behind the model could probably also be used in other settings.

7. Conclusion

We first summarise our conclusions concerning the applicability of our proposed AKAM model (Awareness, Knowledge, Access and Motivation), and then point out some limitations and the need for further research.

7.1. The applicability of the AKAM model

This study formulates a model for analysing use of public information systems (PISs) that are characterised by:

1) System use being discretionary
2) The system being web-based (dispersed and unknown users)[11]
3) The system being intended for infrequent use (every 6 months)
4) Digital use pattern (use or no use, as opposed to frequency of use, or degree of engaged or compliant use)
5) The service provider being in a monopoly situation
6) Moderate change agent power over target group

We present a new model (see graphical presentation in Figure 4) based on 6 prerequisites for use: one driving force (Motivation) and five categories of barriers (Awareness, General Knowledge, Specific Knowledge, General Access and Specific access).

As Nilsson [2006] predicted with reference to the future barriers to use of PIS in general, the main barrier to the use of this PIS is not physical access. In fact, not even general knowledge about computers and Internet are frequent barriers to use of the studied PIS. However, both physical access and general knowledge constitute barriers

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[11] This characteristic is valid for most PIS

International Journal of Public Information Systems, vol 2008:2
www.ijpis.net
Page 125

for a small proportion of Swedes and even frequent Internet users can experience inadequate general knowledge. This underlines the importance of studying user behaviour regarding specific PISs rather than PISs in general. The UCAM [Nilsson, 2006] contributes with a nuanced description of possible barriers to Internet use in general but it may be too general for analysing a specific PIS. From a service provider's point of view, awareness of the specific PIS and knowledge about it are highly relevant to the analysis, and are thus included in the AKAM model.

The empirical results show the great importance of the prerequisites Motivation and Specific Knowledge. The single most important reason not to use the Internet-based alternative for the application for youth activity funding was "Old habit". Even though many respondents do not consider the paper-based alternative to be the most efficient way to apply for YAF, they still remain with the well-tried method of application due to uncertainties associated with first-time use of a computerised application module. Inspired by Granovetter [1973], we term this tendency of remaining with the old behaviour *the strength of weak barriers*. That is, we see many users who have access to the Internet, use it frequently and are aware of the YAF module, but still choose the ingrained way of applying. This shows the importance, not only of motivation to use a new service, but also motivation to learn how to use the service. Motivation has to be sufficiently strong for both of these processes.

The AKAM model emphasizes the importance of fulfilling all prerequisites for use. Thus, the management approaches to increasing use must be balanced and it is important to take measures to improve the situation in all prerequisites or to analyse where the bottleneck is located.

Using this approach is an alternative approach to the commonly used TAM. We built a model presupposing that for use to occur there must be a driving force. The results show that perceived usefulness can indeed be this driving force as predicted by TAM. However, it will not necessarily lead to use; several barriers can prevent use. Thus, in a setting such as that studied in this case, the AKAM model is a better analytical tool than TAM.

7.2. Limitations and implications for future research

The focus of the empirical study is on reasons for using either an online application process or a paper-based application process. Using interviews and surveys to gather the empirical material limits the possibilities of catching reasons not conscious to respondents. We also risk skewed answers towards what are logically sound or politically correct post hoc constructions [Straub and Burton-Jones, 2007], such as stating that one finds a system one is using useful.

Furthermore, the results presented here lack an important aspect, a lack also common in most TAM research; it focuses on perceptions and not on objective measures. We did follow up on the actual use of the system as compared to behavioural intention. However, the complete set of statistics was not available at the time of writing. Thus, the interesting topic of the relation between intentions and actual actions will be the focus of a later article. We also want to underline the importance of more research on actual use and the discrepancy between actual use and perceived use or intended use. These aspects of adoption are interesting in their own right but they might also shed new light on much previous research [Straub et al., 1995; Szajna, 1996; Barnett et al., 2007].

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International Journal of Public Information Systems, vol 2008:2
www.ijpis.net
Page 127

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www.ijpis.net
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