# IDENTITY FEDERATION AND THE USE OF ORGANIZATIONAL INTERNET CHANNEL: A STRATEGIC ANALYSIS

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## Abstract

Identity Federation, as a standard of security and identity management systems, appears to be a real market solution, and has been proposed by three alliances or groups: Shibboleth, WS-Federation, and Liberty Alliance. This paper presents a strategic analysis of this new technology by gathering several perceptions and expectations of key Brazilian companies and users.

The identity federation activities were perceived as being capable of granting potential competitive advantage, due to the positive influence on industry structure and on selected strategic objectives. Prospective studies carried out in pre-launch stages of products and services are extremely useful to anticipate problems that are often solved with costly measures taken when the product/service has been launched in the market. In this particular case, this work highlights major weaknesses that should be avoided, once they might hinder the ability to bring "sustainable" advantages and create barriers to new entrants.

# Keywords:

Identity federation, competitiveness, service quality.

## **1. Introduction**

At first, Internet development was based on a strong interaction between information providers and anonymous users. As it evolved, especially with electronic commerce, one of the main emerging challenges was the need to have a "proof of identity" through an "electronic confidence chain" (AberdeenGroup, 2002). This proof of identity allowed different players - such as consumers, providers, buyers and sellers – to interact commercially with confidence, while not losing their privacy or anonymity.

This paper examines strategic and decision support tools that can be used by online companies, so that they may improve their services and find better uses to the Identity Federation Activities in their businesses. For that end, we present an analysis of the Identity Federation Activities both under the light of competitiveness for the participating organizations and of user satisfaction. The following aspects were examined:

a) Comparing perceptions expectations of the surveyed users and companies that are interested in implementing Identity Federation Activities.

b) Check if the use of Identity Federation Activities provides competitive advantage to the participating organizations.

## 2. Identity Federation Activities

Identity Federation Activities are designed to allow the integration of several IDs/logins of one person *into a single identification* on the Internet. Such solution is represented in the market by following three initiatives: Shibboleth, WS-Federation, and Liberty Alliance Project. Such initiatives promote specifications, alternatives and usability of the Identity Federation Activities and are composed by groups (members) of several areas: educational institutions, industry, technological solutions providers, consumers, vendors, etc.

With the 2001 New Economy crisis, and the subsequent reevaluation of Internet businesses, it is suggested that any new technological trend have a strong focus on cost reduction; as a result, they are subject to more strict requirements as to return on investment and justifications in order to become a major technological trend.

A set of activities related to identity federation that are part of the objective, mission or specification of all initiatives mentioned was identified, in order to allow the analysis of expectations and perception of quality by the user, as well as the ability to provide competitive advantages to the participating organizations.

The activities that were identified include:

- **Single Sign-on:** User provides authentication (typing their login and password) just once and, from then on, can have access to Web sites of different organizations that provide online services, as long as they belong to the same Confidence Circle.
- Arrangement of organizations forming a Confidence Circle: In order to unify all Internet IDs into a single person, all involved organization must create a confidence binding. The user must not only trust the organizations involved, but also make sure they are sufficiently committed to manage, send and control their identification.
- User information management and control: This activity involved the "federation" of user identity, during which the identification and some of his/her data in an organization (Web site) are linked to the same user identification in other organization (Web site). This activity is carried out only with the user's approval.

The Liberty Alliance Project (Liberty Alliance Project, 2003b) suggests an architecture for the implementation of the Identity Federation Activities based on the use of the following technologies:

- HTTP redirection (response code 302, according to the HTTP protocol);
- HTTP POST activated by the **Send** button in Web forms;
- JavaScript routines;
- Protocol SOAP (simple object access protocol) Binding (Liberty Alliance Project, 2003c) based on SOAP messages version 1.1, with adaptations in the SAML specification (OASIS, 2003);
- Protocol messages in RPC (*remote procedure call*) transported via SOAP version 1.1.

The architecture suggested in the WS-Federation Specification (IBM et al., 2003) uses functionalities of the Web Services technology, extending the basic aspects listed in WS-

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Policy (IBM et al, 2002b), WS-Security (IBM et al., 2002a), and WS-Trust (IBM et al., 2002c).

In order to protect privacy in federated environments, the WS-Federation specification highlights additional controls involving service attributes that allow the involved parts to have access to the necessary information to authorize data share among themselves and with other parts involved. Besides, in order to facilitate single sign-on, in which multiple identities must be automatically mapped out while keeping some privacy, this specification proposes the optional use of alias services that allow users to have different "aliases" to access different services (resources) or Web site.

As proposed in the Liberty specification (Liberty Alliance Project, 2003a), the WS-Federation specification highlights the need for different information in metadata format: safety policy or Schema and *WSDLs* (Web Services Description Language) of the services available in the environment.

#### 3. The Value Chain on the Internet

According to Porter (2001), the Internet is a technology composed of a set of powerful tools that can be adequately or inadequately used by nearly all industries as part of strategies. In this context, the following issues are considered: Who will capture the benefits created by the Internet? What is of the Internet on industry structure? Will the Internet be able to increase or reduce revenues? How will it impact company strategy? Will the Internet help or impair the organization's ability to obtain sustainable competitive advantage over competitors?

Porter highlights these key issues as a result of the exploratory phase of this environment. He states that today the Internet can be analyzed more clearly. Many of the initial experiences resulted in disaster because they failed to consider the facts and truths that the traditional strategy approach may reveal.

Internet architecture, allied to additional improvement in software architecture and development tools, turned Information Technology (IT) into the most powerful strategic tool. It is much easier to customize an Internet application package considering a unique organizational strategic positioning. By means of a common IT platform encompassing for

the entire value chain, Internet architecture and standards allow the development of integrated and customized standards that reinforce the connections among all activities.

The value chain is a basic tool to understand the influence of IT on organizations. When a company or organization competes in any given industry, it executes activities hat are linked to each other for value creation, for instance, sales force operation, components manufacturing, or product distribution. Additionally, such activities have connection points with the activities performed by suppliers, channels and consumers. The value chain is a model used to identify such activities and analyze how they affect both organizational costs and the value delivered to buyers.

By incorporating common and open sets of communication protocols, Internet technology provides a standard infrastructure – intuitive interface (browser) allowing access information, one that provides easy connectivity, as well.

In order to check how such technological advances ultimately affect the value chain, Porter highlights the evolution of IT in business as five overlapping stages:

- 1. The first TI systems automated discrete transactions, such as order entry and accounting.
- 2. The second stage involved complete automation and functional improvements in individual activities, such as human resources management, sales force operations, and product design.
- 3. The third stage, which is being further accelerated by the Internet, involves the integration of cross-activities, such as sales activities related to order processing. In this stage, systems such as customer relationship management (CRM), supply chain management (SCM), and enterprise resource planning (ERP) are used.
- 4. This fourth stage, which is only beginning, allows the integration of the value chain and the entire value system. That is, the value chain set of a whole industry encompasses the value chains of suppliers, channels and consumers. SCM e CRM are starting to merge, with end-to-end applications, involving consumers, channels, and suppliers with delivery services, procurement and manufacturing processes, for instance.
- 5. In this stage, IT will be used not only to connect the several activities and participants of the value system, but to optimize their work in real time. For instance, product design will be optimized and customized based on input (information) not just from factories and suppliers, but also from consumers.

## 4. Service Quality on the Internet

In order to evaluate service quality, the work of authors Valerie A. Zeithmal, A. Parasuraman, and Leonard L. Berry (1985, 1988 e 1991) will be used. When studying how clients and service providers reevaluate service quality, they have developed a conceptual model to assess service quality and an evaluation tool known as SERVQUAL.

In this context, customers are represented by the Internet users that would be using the identity federation services, while service providers are the organizations that, when forming a "Confidence Arrangement", would be providing such services.

SERVQUAL is a highly valid and reliable multi-item scale, based on the conceptual definition of service, and on the five dimensions included in the survey. It is designed to help companies understand their customers' expectations and perceptions of service quality. With the help of SERVQUAL, 22 questions are answered, tabulated from 1 to 7, separated into two different questionnaires used for evaluating the user's general expectations and the perceptions of service providers. The result was used to detect gaps in company performance in the five dimensions below:

- **Tangibles (questions 1 to 4):** physical facilities, equipment, staff appearance, communication materials, etc.;
- **Reliability** (questions 5 to 9): ability to perform service in a timely and reliable manner, as well as the ability to perform it accurately and consistently;
- **Responsiveness (questions 10 to 13):** willingness to help and respond to customer needs.
- Assurance (questions 14 to 17): ability of staff to inspire confidence and trust;
- Empathy (questions 18 to 22): the extension to which caring, individualized service is provided.

Parasuraman et al. (1985, p.41-50) identified a few factors influencing customers' expectations and tolerance zones, including:

• What customers hear from other customers, that is, word-of-mouth friends, neighbors, acquaintances, and colleagues;

- Individual needs of each customer, considering physical, psychological and social characteristics;
- Individual personal emergency situation, or issues related to initial service;
- The number of alternative the customer has;
- Experience in the use of a service, that is, the customer's previous exposure to the service;
- External communication to service provider, that is, explicit or implicit service promises. It also includes the role of price in the development of the customer's expectations, as well as its influence on his/her buying decision.

The survey found as one of its main conclusions a set of gaps between service quality perceptions and the task associated to providing such services to customers.

The gaps were divided into four classes, all of them related to the executives' perceptions about service quality and the roles associated to service rendering. Moreover, this model links the gaps perceived by the customers on service quality - gap 5 - to internal gaps within the service companies - gaps 1 to 4.

In the current study, due to the exploratory nature of the adoption of identity federation activities, as well as the to the fact that this is a startup technology, with no implemented case in Brazil to serve as benchmark, the evaluation was based on the points related to gap 1: differences between the consumers' expectations and the management perceptions related to such expectations.

Thus, according to the conceptual framework presented, for each side – the customer side and the supplier side – the following considerations are used:

- Supplier (Sample 1) a group composed of companies acting (transactions) on the Internet, with potential to implement Identity Federation activities.
- Customer (Sample 2) a group formed by potential users whose expectations and satisfaction will be evaluated against the service improvement potential.

With the growing popularity of activities and services on the Internet (for instance, ecommerce), the evaluation of customers' perceptions and expectations becomes crucial, specially when most models used for measuring user satisfaction, usually provided and tested by researches are based on traditional business channels and, as such, are no appropriate for the evaluation of services rendered on the Internet.

Considering a website as part of a company and its customers, Iwaarden and Wiele (2002) state that such connection reflects company-wide quality efforts. They also reveal the importance of providing customers with high-quality web sites – since there is no human contact through websites, interaction occurs through technology.

Even as companies try to emulate human interaction through technology, some aspects of human interaction, such as courtesy, friendship, readiness, care, flexibility and clarity can not be replaced by technology (Cox and Dale, 2001).

According to Iwaarden and Wiele (2002), the absence of such aspects should be counterbalanced by better performance on other factors of by excellent performance on "new" Web-specific factors.

Considering each of the five dimensions in the SERVQUAL tool - Tangibles, Reliability, Responsiveness, Assurance, and Empathy – this paper identifies aspects related to the evaluation of services and products on the Internet, as well as aspects related to the activities under study. The "Research Methodology" section highlights the adaptations developed here for the original SERVQUAL tool.

# 5. Dynamic Stability Model

The dynamic stability model (Pine, 1994) was designed as a tool for understanding the competitive landscape as influenced by globalization, no longer supported by the traditional forms of business administration and mass production. Several models for competitive analysis and company support already existed; however, the dynamic stability model established itself as a strategic analysis and positioning tool for a rapidly changing and highly unpredictable environment.

The model was built on a matrix whose dimensions are product and process, which in turn admit common variations: stability and dynamics. The crossing of dimensions and variations result in four categories or production organization: Mass Production, Innovation, Continuous Improvement, and Mass Customization. Each category has its own categories in terms of strategy, organization, automation, information, and market supply. Although the categories are not accurate and its borders are not easily identifiable in practice, they have proved to be highly useful as a reference in decision making processes.

This model proposes the crossing of four categories, classifying enterprises in the following quadrants:

- Mass production companies with stable processes and products. In this quadrant, competitive advantage and profitability are base don cost reduction, obtained by means of the maximum efficiency of the invested capital and trained human resources, in order to reach standards of production.
- **Innovation** companies with dynamic processes and products. In companies of the category, there is a need for constant process innovation, as well as highly-specialized human resources, capable or exploring new ideals, high ability and low commitment to production costs.
- Continuous improvement companies with dynamic processes and stable products. In companies of this category, small chances occur constantly, continuously improving operating performance, as well as process management. Such improvements must be swift and low-cost. Besides, expert must collaborate permanently.
- Mass Customization companies with stable processes and dynamic products. Companies in this category are capable of supplying a large number of customers with a variety of products and innovations; in this case the speed of innovations and products are added to low costs.

In spite of the model's focus on the market turbulence analysis, this study uses the vision provided by the model to observe the ability provided by Identity Federation Activities to companies willing to reinforce strategies related to each quadrant of the Model.

# 6. Research Methodology

Measuring individual and group variables, the questionnaire is the main data collection tool used for the purposes of this research. Existing questionnaires had to be adapted, and new ones had to be developed. We have used a methodology proposed by Richardson (1999). Questionnaires were also developed and used in the Web version based on the principles

highlighted by Dillman (1998). Our intention, thus, is to obtain the benefits mentioned by Gunn (2002), such as cost, agility, and efficiency.

The web version of the questionnaires (in Brazilian Portuguese) can be found at:

- Measuring tool 1 (Sample 1): http://www.jmvinfo.com.br/questestrategia/
- Measuring tool 2 (Sample 2): http://www.jmvinfo.com.br/questexp/

In order to evaluate service improvement potential on the Internet, the SERVQUAL tool was adapted to match specific services involved in the Identity federation Activities (Quintella and Vilela, 2004).

In questions related to competitive evaluation, we have pursued the executives' perceptions about which activities in the value chain could be influenced by the identity federation activities, as well as the potential influence on Industry Structure, considering Porter's Five Forces of Competition (Porter, 1989, 2001): New Market Entrants, Buyer Power, Supplier Power, Threat of Substitute Products, and Competitive Rivalry.

Questions related to the contribution of the Identity Federation Activities to companies' strategic positioning on each of the Product/Process matrix quadrants were based on the model in which Victor and Pine (1993) present the characteristics of "Strategy" and "IT Strategic Alignment" corresponding to each quadrant.

For the sample used for field research, the following aspects were considered:

- Executives responsible for the evaluation of the application of new technologies linked to the Internet by the companies they represent.
- Companies with Web-based transactions, with potential to implement Identity Federation Activities.
- A mixed group of Internet users.

Table 1 presents a distribution of the company areas to which the interviewed executives belong, according to a classification adopted in the questionnaire:

Company Area	Respondents
Engineering and network design	1
Management and strategic planning	6
Internet	1

Marketing	1
Process/product design, and IT	1
IT and Support Systems	10
Sales	1

 Table 1: Company areas to which respondents from Sample 1 belong.

**Source**: The authors.

Table 2 presents a distribution of the job or role of respondents within the company, based on the text obtained by open-ended questions used in the questionnaire:

Job or role of respondents within the company	Respondents
Partner	1
Director	5
Manager	6
Coordinator	1
Supervisor	1
Consultant	2
Analyst	4
Not informed	1

**Table 2**: Sample 1 – Job or role of respondents within the company.**Source**: The authors.

Most respondents are concentrated in the areas of "IT and Support Systems", and "Management and strategic planning". Together, the two areas make up for 76% of the sample. Moreover, from the 16 executives of these two areas, 11 work as Partner, Director, or Manager. Thus, the strategic importance of these two areas for the evaluation of a new technology, combined with the roles performed by the executives within their companies validate the responses obtained, enabling for use in the evaluation a given technology potential to bring strategic advantage to the company.

In order to identify patterns or behavior in responses from Sample 1, they were grouped in two dimensions: 1. industry to which the company belongs; 2. company size, as measured by the number of employees.

Exhibit 1 presents the distribution of respondents by industry and number of employees. In this case, since the segmented sample would result in high granularity, the authors have decided to establish a correlation with two ranges of employee headcount: "less than 500" and "more than 500". Thus, in the analysis of the key questions for Sample 1, industry and company size can be correlated.



**Exhibit 1**: Distribution of companies in Sample 1 by segment and number of employees

Source: The authors.

	Men	Women
Age (average)	31.8	29.9
Time of Internet experience (average)	7.8	6.6
Total	14	8
<b>Table 3</b> : Statistics from Sample 2.		

Source: The authors.

## 7. Results

The analysis of the ability of Identity Federation Activities to bring competitive advantage has been applied to executives who perform Internet activities and have the potential to implement them in their own companies or in the recipients of their technology services. The sample, composed of 21 executives, was divided into several market segments: Telecommunications, Financial Services, Technology, Transportation, and Others.

Considering a scale from 0 to 10 and a t-Student confidence interval of 95%, Exhibit 2 show perceptions detected of the potential contribution of identity federation activities to the companies' strategic goals (Porter, 1989). Three of the seven goals reached a score above 5.00: Differentiation, Complement, and New Businesses.



**Exhibit 2**: A Contribution to Porter's Model. **Source**: The authors.

According to Exhibit 3, below, of the nine activities in the Value Chain (Porter, 2001), one can observe scores above 5.00 (on a scale from 0 to 10), and a t-Student confidence interval of 95% in the primary activities of "Marketing & Sales" ( $6.95 \in [5.42; 7.25]$ ) and "Services" ( $6.71 \in [5.81; 7.61]$ ); and in the following support activities: "Company infrastructure" ( $6.33 \in [5.42; 7.25]$ ) and "Technology Development" ( $7.05 \in [6.24; 7.86]$ ).



Exhibit 3: Influence of activities on the value chain.

Source: The authors.

According to Strategy and IT Strategic Alignment characteristics, executives indicated the contribution of activities as represented by the distribution in Exhibit 4.



Exhibit 4: Contribution of activities to Pine's Model.Source: The authors.

In order to evaluate expectations about the potential of the activities under study, a survey was conducted with a discrete group of 22 users; the main requirement was to be familiar with services provided over the Internet. That is, the user must have used some sort of service (on-line purchases, information services, etc) requiring registration for identification purposes (login and password). The executives' perceptions about such expectations are obtained in the same sample where competition questions are being applied.

Table 4 presents the differences between the users' expectations of the contribution of the Identity federation Activities to the improvement of service quality over the Internet and the perceptions of executives of those same expectations. The differences were obtained by grouping 22 responses from SERVQUAL of the two current samples to each of the five dimensions of the Conceptual Model of Service Quality.

		P(tc) bi-caudal	Usuários	Executivos Percepção da	Hiato
Dimensão	tc		Expectativa (1)	expectativa (2)	(1) - (2)
Elementos Tangíveis	2,1583	0,0368	6,034	5,452	0,582
Confiabilidade	1,8262	0,0751	5,482	4,924	0,558
Capacidade de Resposta	0,7591	0,4521	5,443	5,214	0,229
Segurança	-0,4083	0,6852	5,045	5,214	(0,169)
Empatia	1,5081	0,1392	5,836	5,381	0,455

 Table 4: Differences grouped by quality dimensions.

Source: The authors.

The t-Student test was applied over the difference between the two averages, where calculated t (tc) is compared to the t obtained in the Student distribution table, with a confidence index of 95%. The analysis allows us to see that the difference between the expected quality by the user and the executives' perception about the same expectation is higher in the Tangibles and Reliability dimensions. Moreover, there was an inversion of values in the Assurance dimension, in which executives expected a more positive evaluation from users.

The importance of each quality dimension for the Web environment was raised by the users who were interviewed, as shown on Exhibit 5. Please note the higher values assigned to the Reliability (28%) and Assurance (25%) dimensions.



**Exhibit 5**: Importance of Quality Dimensions. **Source**: The authors.

This, the dispersion chart below (Exhibit 6) shows the general importance assigned by users (Sample 2) to the dimensions of quality of Internet services with the values obtained from the average expectations of the same users about the possibility of the activities under analysis contribute to the companies in the requirements associated to the same quality dimensions.



**Exhibit 6**: Importance *versus* Expectations over Quality Dimensions. **Source**: The authors.

Considering a similar distribution of the importance level of 20% for each dimension of quality, this 20% value was used as the cut-off point for defining the scale as high importance (over 20%) and low importance (under 20%). For the expectation axis, the 1 to 7 Likert scale used for data collection was considered; 4.00 is the average cut-off point to define high expectations (higher than 4.00) and low expectations (lower than 4.00).

Thus, it was seen that the dimensions Reliability, Assurance, and Tangibles were all placed on the "High Importance - High Expectation" quadrant, and the dimensions Responsiveness and Empathy were located in the "Low Importance - High Expectations" quadrant. That is, users assign to each one of the dimensions high expectations that the activities under study will contribute to the improvement of related quality issues.

Figure 7 shows the same values assigned for importance and expectations, considering only the quadrants related to high expectation. For an analysis of relative positions, the average expectation (5.56) was considered the cut-off point for the X axis.



Exhibit 7: Importance *versus* Expectations on Quality Dimensions in Relative Scale.Source: The authors.

It should be noted that although Assurance is the second most important dimension, it was assigned the lower users' average expectation. Another important point for analysis is the reliability dimension, which was assigned the highest importance, but expectation scores (5.48) were below average (5.56) for the dimensions examined in this study

## 8. Conclusions

The activities under study were perceived as having potential for obtaining competitive advantage through positive influence on the industry structure because, of the seven strategic goals used as assumptions for obtaining competitive advantage, it can be stated that the activities under study contributed to following strategic goals, which scored higher than 5 on a scale from 0 to 10, with a 95% confidence index: "Differentiation", "Complement", and "New Business".

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It is suggested that the "Substitution" strategic goal has not been positively evaluated due to the fear of competing services or products resulting from the proliferation of new technologies on the Internet environment; moreover, the "Barriers to Entry" strategic goal has not been positively evaluated because of the degree of uncertainty and swift change prevailing on the Internet – reinforcing Porter's statement (2001) that it is hard to maintain proprietary Internet applications, protecting them against new entrants.

Once this research focuses on services that might be provided by companies through the use of technological practices of the Activities under study, it reinforces the idea that the businesses that can be created or improved with such Activities do not allow the "imprisonment" of technology itself; therefore, there is a fear that related technologies might be used by competitors, as well, at a later time. This proposition does not invalidate the potential of Identity Federation Activities to bring competitive advantage; it serves, though, as a basis for rejecting the claim that such advantage is "sustainable".

Some conclusions were also obtained about the analysis of the perceptions about strategic goals when grouped by segments in which the companies operate. Such conclusions are summarized in Exhibit 5:

	Segment with	
Strategic Goal	Highest Score	Suggested Conclusions
Barriers to Entry and	Transportation	This segment uses Internet technology to provide
Cost of Change		services to other companies; as a result, the adequate
		use of technologies in extranets (used as a service
		channel to other companies) can increase its customer
		base, creating barriers to new entrants.
		This segment is not focused on this technology;
		therefore, it is expected that competitors will not be
		very dynamic in the selection and use of new
		technological services, making competitive
		advantage more sustainable.
Cost Reduction	Financial Services	Financial institutions are major implementers of
		technology for the reduction of operational costs.
		Thus, this situation is not only coherent with the
		reality of this market segment, but also confirms the
		strategic importance of the activities under study, for
		they go to the heart of the needs of the financial
		services industry as a whole.
Complement	Telecommunications	The interest of the telecommunications industry in
		the Activities under study for achieving this strategic
		goal is probably related to the expansion of the
		industry in Brazil which, in recent few years (after
		privatization) led to the emergence of numerous other
		businesses and services, as well as new partnerships
		aimed at providing additional and complementary
		services.
		That is, for this segment, Identity Federation
		Activities do bring competitive advantage, once they
		allow, through this strategic goal, continuous added
		services that are able to make room for customer base
		loyalty.

 Ioyalty.

 Table 5: Conclusions about strategic goals achieved by segment.

Source: The authors.

According to the executives, the Activities under study make a large contribution to strategic characteristics such as "Development of a new or unique product/service in the market", as well as IT strategic alignment characteristics such as "the design of communication and information systems and information that support incremental and constant change", helping to position the organization both in the "Innovation" and in the "Continuous Improvement" quadrants of Pine's Model. Considering the product/process matrix, such result reflects what Internet technologies may provide when one considers a dynamic process environment in organizations.

It is suggested that the greater gap between the perceptions and expectations related to the Tangibles dimension (easy handling, presentation, storage and update of the identity information) may have resulted from a more careful attitude of the executives regarding user satisfaction on the Internet. That is, this careful position is the confirmation that the current trend, to which the executives are subject, is to demand first sound justification in order to consider valid a convergent wave of technology (AberdeenGroup, 2002).

The Assurance dimension achieved not only the lowest average but also the smallest gap between expectation and perceptions, showing a real concern, prevailing among users and executives, requiring this specific dimension of quality from a technology involving the use of highly confidential private information.

In the Assurance dimension, too, the highest score on the item related to the ability of transmitting confidence through certification companies suggests that this dimension of quality can benefit from the use of additional technologies, such as digital certification, which are currently being used on the Internet.

Also in the Assurance dimension, the low score achieved on the item related to the ability to avoid the inadequate spread of information might be related to issues regarding increasingly common issues about the mischievous use of information through virus-carrying email messages, spam, and so on. This dimension is probably being directly affected by the results of such abusive practices generated by everyday Internet use. Thus, both the companies developing technologies embedded in the Activities under study and the companies that might implement such Activities in their Internet business units must be aware of a potential correlation between expectations of this quality dimension and the overall occurrence of abusive practices on the Internet.

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When examining the importance of each dimension, the highest scores were obtained in the Confidence and Assurance dimensions, reinforce the significance assigned to a technology involving the use of highly confidential private information.

Considering the analyses about importance *versus* expectations assigned by users to each quality dimension, all dimensions were assigned high expectations (higher than 4.00, the average for the scale adopted). However, the Reliability, Assurance, and Tangibles dimensions were assigned high importance by the same users. It is suggested, then, that the "High Importance – High Expectations" matrix quadrant receives more attention from executives during the implementation and promotion of Identity Federation Activities in their businesses. That is, in this case, if the perception about services rendered does not match the expectations, the consequences can be rather negative, once the same users have assigned high importance level to those dimensions of quality.

In the analysis of the relative distribution of quality dimensions in the axes Importance and Expectations, the Reliability and Assurance dimensions stand out, with the highest scores for importance and expectations below the overall average (5.56). Thus, in this perspective, the two dimensions provide opportunities for companies willing to increase the perception of service improvement when promoting and implementing Identity Federation Activities that include the quality requirements related to such dimensions (Quintella and Vilela, 2006).

Based on the analysis presented here, Exhibit 6 presents a summary of the responses obtained to Porter's (2001) questions for the Internet channel, applied to the potential of Identity Federation Activities.

	Identity Federation Activities
Who will capture the benefits created by the	Benefit and facilitate users experience by
Internet?	means of single sign-on and e the supply of
	related or supplementary services.
What is the impact of the Internet on industry	Strengthen strategic goals, such as
structure?	"Differentiation", "Complement" and "New
	Business".
Will the Internet be able to increase or reduce	Allow revenue increase through new
revenues?	businesses or partnership that might
	supplement products or service supply.
How will it impact company strategy?	Allow the development of a new or unique
	product/service and aid in the design of
	communication and information systems and
	information that support incremental and
	constant change
Will the Internet help or impair the company's	Bring competitive advantage; nonetheless,
ability to obtain sustained advantage over their	because this technology can be replicated,
competitors?	such advantage might not be "sustainable".

**Table 6**: Porter's questions applied to identity federation.

Source: The authors.

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