Cloud Computing
Challenges and Opportunities

May 2012 study synthesis
Objectives
The following **objectives** have been identified:

**To analyze:**  **The current situation and impact**

**To identify:**  **opportunities for growth**

- use and knowledge of cloud among Spanish SME and micro-enterprises
- economic perspectives
- strategic perspectives

**TABLE OF CONTENTS**

1. Concept and current situation
2. Survey of SMEs in Spain
3. Expert opinions
4. Impact Evaluation
5. Best practices
1. Concept and current situation
What is cloud computing?

It is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

NIST (National Institute of Standards and Technology) definition
Features associated with cloud computing

**Ability** to perform functional adjustment according to specific demand

**Ability** to automatically assign computing resources subject to the specific needs of the user

**Invoice** model based on use, which means that cost is subject to use

**Scalability**

**Self-service on-demand**

**Pay per use**

**Multiple users**

**Universal**, continuous and multidevice access

**Unrestricted access**

**It makes it possible** to isolate contracted computing resources offered by the provider from the computing infrastructure of the entity

**Abstraction**
Classification of cloud

**Service**
- **IaaS**
  - PROVISION of infrastructure as a service
- **PaaS**
  - SUPPLY of platforms aimed at development, testing, deployment, hosting or maintenance as a service
- **SaaS**
  - USE of licenses as a service
- **BPaaS**
  - DELIVERY as a service of highly standardized business processes

**Deployment**
- **Hybrid cloud**
  - USE of mixed infrastructure
- **Public Cloud**
  - OFFER of external services of virtualized computing, external to the client
- **Private cloud**
  - DELIVERY of virtualized services, but with internal management and infrastructure
- **Community cloud**
  - DELIVERY of common supply to similar clients

**Actors involved**
- **Provider**
- **Broker**
- **Final customer**

**Enabler**
- HW + SW

**Auditor**
- involved

**Source:** ONTSI
Cloud advantages and challenges

**Advantages**
- Speed and flexibility
- Outsourcing of technological operations
- Improvement in technological management and security
- Ubiquitous access and availability
- Positive impacts on sustainability (green IT) and on the economy

**Challenges**
- Data security and confidentiality
- High level of standardization and technological integration
- Dependence on the provider of the technological services
- Technological amortization
- Service availability
According to IDC, global revenue from cloud services will reach 55,500 million dollars in 2014, with growth rates of nearly 30%. By 2014 the market share will have reached nearly 12%, positioning itself as the main driver in the industry.

"A study published by Gartner identifies Spain as being amongst the thirty leading locations to host externalized services. The main assets of Spain highlighted by Gartner are: reduced costs, knowledge of other languages than Spanish, good IT and transport infrastructure and a strong link with Latin America"

Source: “Worldwide and Regional Public IT Cloud Services 2010-2014 Forecast”, IDC

"Cloud computing saves costs and facilitates SMEs’ access to computing, making it possible for them to compete at the same technological level as large organizations"

Source: “Cloud Computing”, Bankinter Innovation Foundation
2. Survey of SMEs in Spain
45.2% of SMEs have some knowledge of cloud computing

**KNOWLEDGE OF CLOUD COMPUTING SOLUTIONS**

- 20.5% have a perfect knowledge of cloud computing
- 24.7% know some examples or have heard of some examples
- 54.9% do not know cloud computing solutions

*This figure is obtained as a result of adding up the total percentage of companies that have a sound knowledge of cloud computing and those that can mention some examples.*
60.1% of micro-enterprises do not have any knowledge of cloud solutions

Compared to micro-enterprises, SMEs have deeper knowledge of cloud, 28.2 percentage point higher.

Source: ONTSI
21.7% of enterprises that have some knowledge of cloud use cloud-based solutions

There is a high level of satisfaction with cloud technology

There are no significant differences in the use of cloud solutions as regards to company size

Based on: Total number of companies (0 to 249), with websites  
Source: ONTSI
There are no significant differences as to the degree of cloud solution use by company size.

**USE OF CLOUD COMPUTING SOLUTIONS BY COMPANY SIZE**

- **Never used cloud solutions**
  - From 0 to 9: 77.4%
  - From 10 to 249: 77.5%
- **Currently using cloud solutions**
  - From 0 to 9: 22.2%
  - From 10 to 249: 20.1%
- **Used cloud solutions in the past but does not currently use it**
  - From 0 to 9: 0.4%
  - From 10 to 249: 2.5%

Based on: Total number of companies (0 to 249) with websites that have some knowledge of cloud.
**IaaS** is the most commonly used service model

**Characteristics of Cloud Computing Solutions Used**

- **76.1%**
  - Use of some solution
  - **IaaS**
- **50.6%**
  - Use of some solution
  - **SaaS**
- **18.8%**
  - Use of some solution
  - **PaaS**

**Storage service is the most used IaaS solution (68.5%)**

16.7% of the total number of enterprises use CRM solutions based on SaaS

DBMS solutions (Database Management Systems) stand out

Source: ONTSI

Based on: Total number of companies using cloud with websites
Private Cloud is the deployment type most commonly used.

**Characteristics of Cloud Computing Solutions Used**

- **Environments controlled by the organization**: Private Cloud (59.9%)
- **Focused on niches**: Community Cloud (1.7%), Hybrid Cloud (13.9%), Public Cloud (33.8%)
- **Often in larger companies**: Private Cloud
- **Higher levels of elasticity and scalability**: Public Cloud

Based on: Total number of companies using cloud, with websites
Source: ONTSI
47.4% of companies using cloud use cross-cutting solutions

BUSINESS PROCESSES WITH HIGHER CLOUD SOLUTION INTEGRATION

- The whole company: 47.4%
- Commercial and sales: 34.7%
- Productive aspects: 18.2%
- Finance management: 11.7%
- Human resources: 8.9%
- Innovation: 8.2%
- Other areas: 6.6%
- Did not know or failed to respond: 2.3%

Source: ONTSI
Higher flexibility and scalability of cloud are the main reasons for adopting the technology

MAIN REASONS FOR ADOPTING THE TECHNOLOGY

- **Greater flexibility and scalability of technology management resources**: 66.5%
- **Possibility of access from any device connected to Internet**: 43.1%
- **Modernization of business and management processes**: 39.9%
- **Avoid capital expenditure on investment in technology systems**: 36.9%
- **Increase computing capacity and business performance**: 23.3%

Source: ONTSI
The main benefits perceived have to do with time and costs

PERCEIVED BENEFITS DERIVED FROM USE OF CLOUD COMPUTING APPLICATIONS OR SYSTEMS IN THE COMPANY

- **70.6%**
  - TIME saving

- **63.4%**
  - COST saving

- **29.6%**
  - REDEFINITION of internal management

- **28%**
  - PRODUCTS and services

- **16.4%**
  - ORGANIZATION of internal staff

- **4.6%**
  - OTHER

**48.5%**

IMPROVEMENT of productivity in general

Based on: Total number of companies using cloud, with websites

Source: ONTSI
More than half of the micro-enterprises consider productivity improvement as a benefit.

**PERCEIVED BENEFITS DERIVED FROM USE OF CLOUD COMPUTING APPLICATIONS OR SYSTEMS IN THE COMPANY, BY COMPANY SIZE**

- **Time saving**: 55.0% vs. 76.2%
- **Cost saving**: 64.0% vs. 63.2%
- **Improvement on productivity**: 42.2% vs. 50.7%

**Time saving** is perceived above all in small enterprises.

**Companies with 10 to 249 employees** perceive slightly higher cost savings.

*Three first benefits mentioned*

Source: ONTSI
76.2 %* of SMEs using cloud are generally satisfied

25.9% are generally very satisfied with the provider and/or providers

Only 1.6% of SMEs declared not being generally satisfied or rather dissatisfied with providers

*It includes responses from companies that have declared being very or quite satisfied

Source: ONTSI
More than 75% of SMEs using cloud expressed a high level of satisfaction with quality of support and maintenance service.

**It includes responses from companies that have declared being very or quite satisfied**
The main concern is related to **security and confidentiality**

**MAIN EXISTING CONCERNS AS REGARDS CLOUDS USE**

- **Other reasons**: 4.1%
- **None**: 5.5%
- **Variable non-controlled costs**: 8.8%
- **Difficulty of migration**: 10.2%
- **Responsibility of the provider**: 13.2%
- **Doubts about availability**: 17.2%
- **Dependence on provider**: 18%
- **Loss of control of processes**: 20.8%
- **Security and confidentiality**: 55.2%

*Source: ONTSI*
Lack of knowledge about the benefits of the technology is the main barrier to entry

Main barriers that have to do with cost, by order of importance are the following:

- **Budget restrictions**: 63.1%
- **High costs related to recruitment**: 30.5%
- **Dependence on the provider**: 24.9%
- **Doubts about availability**: 18.2%
- **Responsibility of the provider**: 17.8%
- **Difficulty of migration**: 14.2%
- **Cost factor**: 4.3%

Source: ONTSI
Interesting facts:

01. Enterprises using cloud computing declare that the performance level of providers is optimal.

02. Lack of sufficient knowledge about the technical and economical benefits of this new technological model along with the costs arising from initial recruitment largely explain the high percentage of SMEs that do not use cloud computing.

03. 16.1% of SMEs that are aware of the existence of the technology but do not use it have expressed their intention of using it in the future.

04. 63.4% of enterprises using cloud would recommend the use of the technology without any reservation to enterprises with similar characteristics.

Source: ONTSI
Data sheet: Survey of SMEs in Spain

Quantitative methodology

Scope

- The scope of the investigation includes micro-enterprises (0 to 9 employees) and SMEs (10 to 249 employees) with websites of some type located in the whole national territory.

Sample size

- Global sample size comprises 1,700 enterprises:
  - 0 to 9 employees: 1,413 (83.1%)
  - 10 to 249 employees: 287 (16.9%)

Compiling information technique

- To compile the information, an online survey methodology has been applied, through a Web ad-hoc application and after previous telephone contact.

Margin of error

- Margin of error for the 1,700 surveys is ± 2.37% under most unfavorable statistic conditions (p=q=0.5), with 95% degree of confidence.

Work in the field

- Information has been compiled during October and November 2011.
3. Expert opinions
Experts from cloud providers

**Perceived advantages:**
- A new cost model is possible
- It allows enterprises with restricted budgets to have access to new services
- It eliminates commitments and barriers to entry making it possible to link technology costs to revenue

**Perceived barriers:**
- Lack of common legal framework
- Loss of control and dependence by clients
- Deep ignorance in the market about what it is and the advantages it offers
- The development of SaaS services is very dependant on the capacity of telecommunication networks

Source: ONTSI
Experts from large client businesses

Perceived advantages:
- cost model without infrastructure amortization
- it facilitates immediate launch of projects.
- it facilitates focused and business oriented ICT
- it facilitates access to new services

Perceived barriers:
- growing dependency on the provider
- privacy and legal requirement problems
- possibility of losing control over the technology, but above all, over the corporate processes

Source: ONTSI
Experts from the Public Administration

Many public entities are currently carrying out a previous phase of reflection and prospect.

Perceived advantages:
- cost savings
- avoiding duplication
- development of teleworking
- shared services consolidation

Perceived barriers:
- integration and interoperability problems
- uncertainty about performance
- "locked-in" effect with providers

Source: ONTSI
4. Impact Evaluation
Estimated impact* of cloud in Spain for 2012

**Gross Domestic Product (GDP)**

- Generation of 3,049 million euro

**Employment**

- Job creation of 65,000 jobs in 2012

**Public Treasury**

- Total return of 678 million euro

*Methodology based on macroeconomic input-output tables.

Source: Obtained from the Economic Impact Model developed by Deloitte
Environmental impact of cloud

Reduction in CO₂ emissions

- Small deployments ≈ 100 users: 90%
- Average deployments ≈ 1,000 users: 60-90%
- Large deployments ≈ 10,000 users: 30-60%

Source: Accenture
Social impact of cloud

Mobile service universalization

Spread of the Internet and creation of links to the web in mobile devices.
Office universalization.
Mobile access.

Virtual storage

Storaged data in remote servers.
Price reduction for online storage.
Information managers allow the user to expand hard disc storage capacity.

Applications in the cloud

Improvement in competitiveness and device offer.
Online service supply.

Interconnectivity and Social Networks

Source: Deloitte
5. Best practices
To have access to all the information concerning studies and indicators:

Observatory Website:

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