



Information Security in Business Intelligence based on Cloud: A Survey of Key Issues and the Premises of a Proposal

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They respond to the **growing needs of communication and business collaboration**.

Cloud allows organizations concentrate in business goals by delegating the management of the physical machines and/or processing application to a cloud provider.

“Business process workflows delivered through BPaaS solutions will require higher visibility and much higher integration as the extent of the decoupling of business process components increases”. [Gartner Report, 2012]

SOA aims at system integration.

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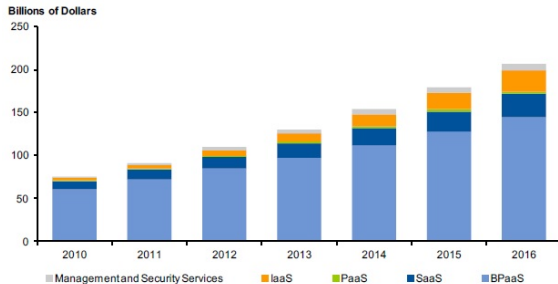
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Cloud Perspective

BPaaS accounting for about 77% of the total end-user spending on public cloud services.



Source: Gartner (August 2012)

Figure : Market size by Segment, 2010 - 2016

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Cloud Perspective

“The slower-growth segment of BPaaS will provide higher-margin opportunities for providers that can map business consultancy competencies to BPaaS opportunities” [Gartner Report, 2012]

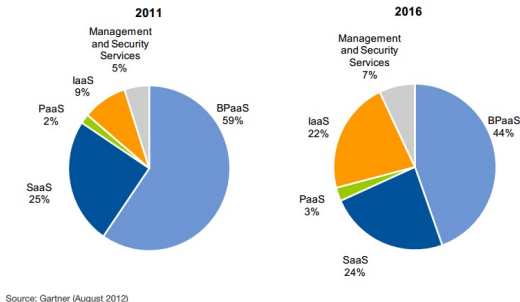


Figure : Relative Share of the Public Cloud Services Market by Segment

Security aspects are one of the greatest issues that restrain the cloud adoption.

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Problems in the cloud related to BPaaS

- ▶ It is difficult to establish a chain of accountability
- ▶ The cloud user has no direct control over the process and data
- ▶ Legal aspects in transborder data
- ▶ Lack of standard can hamper interoperability
- ▶ Cloud user's fear that the data may be manipulated by another cloud user
- ▶ Information reuse (ex. derived data, data aggregation, data mining, re-purposing, info. collected by the cloud provider)

Problem Statement

The lack of trustworthiness in partners (their process and data manipulation) creates information security issues, which joined to traditional risk presented in distributed environment restrain the widely adoption of BPaaS and SOA.

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Interrelated Areas

Society

“Technology built without taking into consideration a human impact is bound to fail” [Morrow, Susan (2011) Data Security in the Cloud]

Legislation

- ▶ Laws applied in cases of transborder data
 - ▶ PATRIOT ACT, Directive 95/46/EC, Directive 2010/87/EC
- ▶ Laws are known but are not applied to real scenarios.
 - ▶ Real cases found on Federal Trade Commission Web page (Google, ChoicePoint Inc., SONY BMG)

Organization

- ▶ Training
- ▶ Clearly define org chart, primary assets, monetize assets.

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Interorganizational Workflows

It is a hard task to integrate workflows from different organizations.

Proposed Approaches

- ▶ **“Smart” UDDI:** It implements a message interceptor. It is able to know everything about the system [Pulier, E. et al, 2006].
- ▶ **Intelligent Agent:** It is able to supervise and recover from exceptions [Leitao, E., 2007].
- ▶ **Autonomy:** A design approach leading each partner autonomy based on Petri Nets [Van Der Aalst, W.M.P., 2003].
- ▶ **Workflow view:** Each entity expose only a public view of the whole workflow [Eder, J., 2011].
- ▶ **ISO 27010:** Policy, methods, controls and processes considered in interorganizational data sharing [ISO/IEC, 2012].

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Private contracts should involve technical details about data protection, data security and functional and nonfunctional characteristics.

QoS implies to define security requirements.

Proposed Approaches

- ▶ **Integration of QoS in the Wf:** It involves quantitative metrics [Cardoso, J., 2002].
- ▶ **Negotiation:** Contracting Wf from multiple services [Van Dijk, A., 2003].
- ▶ **Methodological approach:** It defines SLA life-cycle [Bose, S., 2011].

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Definition

A system is accountable if faults can be reliably detected and each fault can be undeniable linked to one or more nodes. [Heaberlen, A., 2010][Yao, J., 2010]

Proposed Approaches

- ▶ **Attached logs:** Who, why and how the data is processed [Ringelstein, C., 2007].
- ▶ **Accountability as a Service:** Modify the original BPEL document by inserting invoke tags [Yao, J., 2010].
- ▶ **Tamper evident logs:** It allows SLA check compliance [Heaberlen, A., 2010].
- ▶ **Holistic Approach:** A4Cloud Project (Ongoing...) [Pearson, S., 2012].

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- ▶ Taking into account penalties, it is need to ensure that the log is not modified and reliable data is recorded.
- ▶ Not every single activity should be recorded in the log.
- ▶ Tools for detecting in which node data was corrupted.
- ▶ Techniques to avoid unauthorized access to the log - traditional authorization and authentication techniques.
- ▶ Til now, BLA, BSLA and UC are not included in private contracts [Guidara, I. et al, 2012].
- ▶ Clearly define what *Quality of Service* means.
- ▶ Consider dynamics workflows in terms of partners, activities and actions.

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We propose tackle information security and accountability from an **usage control approach**.

The proposed approach intents the use of the **OrBAC's family models** (Multi-OrBAC, TOrBAC and Multi-Trust OrBAC). We pretend to merge an access control model, an usage control model and security politics.

Quality of service defined in the security policies.

Model Driven Engineering to define an interaction model, security model and supervision model.

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Questions?



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MERCI / THANKS

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