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L-F Pau

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ABSTRACT AND KEYWORDS	
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PRIVACY MANAGEMENT SERVICE CONTRACTS AS A NEW BUSINESS OPPORTUNITY FOR OPERATORS

L-F Pau, Rotterdam School of management
NL 3000 DR Rotterdam
lpau@rsm.nl

ABSTRACT **Recognizing the importance of privacy management as a business process and a business support process, this paper proposes the use of service level agreements SLA's) around privacy features, including qualitative and quantitative ones. Privacy metrics are defined by both parties with boundary values on each qualitative or qualitative feature . Their distribution is relying on stress distributions used in this field .The use of service level agreements also casts privacy management into a business perspective with benefits and costs to either party in a process. This approach is especially relevant for communications operators as brokers between content owners (individuals, businesses) and enterprise applications ; in this context, the privacy SLA management would be carried out by the operator, while the terms and conditions of the SLA negociation reside with the two external parties .This work was carried out as part of the large EU project PRIME www.prime.project.eu.org . on privacy enhancing technologies .**

1. INTRODUCTION

The economic and business considerations around privacy ,and of privacy of information in particular , have naturally different levels of analysis and enforcement :

-*1:Level of the individual*: who perceives privacy from the psychological ,and sometimes legal points of view

-*2:Level of the economic individual* : who exercises his privacy rights ,especially privacy of information , at the economic and social levels , within an economic framework (meaning eventually but not necessarily for revenue)

-*3:Level of an economic agent* (company, administration) : who interacts with the economic individual whenever he needs a service or product involving that economic agent ; the extent of the interaction however depends on the decisions and perceptions of this economic agent ,as well as on legal aspects

-*4:Level of an economy* made of several economic agents interacting occasionally in economic , social and business terms ,but the nature of whose interactions ultimately depend upon the individual privacy perceptions of the persons affected

In this paper a framework is proposed linking these levels , with an emphasis on the first three . However , due to the focus of this workshop an additional level will be defined ,and allow for discussion :

-5*: Level of a business process* :involving several economic agents and/or economic individuals transacting regularily with each other consciously as part of a business process, and wishing collectively privacy to be upheld vis-a-vis third parties

As economic and business considerations by definition require economic and business value to be defined and transacted upon,it is necessary in this framework to :

-define a process whereby the privacy of the individual or of the business process is reflected by value definitions at the level of the economic individual or business process : the proposal here is to use privacy metrics [10]

-define another process whereby this value can be used in economic or business privacy dependent transactions between the economic individual (or a given business process) and any single economic agent:the proposal here is to use service level agreements (SLA's) between those two which rely in part upon the privacy metrics

-allow for this last process to be so defined that it can be extended for transactions in an economy between several economic agents :the proposal here is to incorporate into the service level agreements added features which are needed for traceability and busines process management ;this condition applies as well for all parties to a given business process wishing Level 5 privacy , as well as for the agreements between any party to that process and third parties .

It should also be stressed that legal aspects are essential,but not addressed here as they may determine the nature of some privacy features (as used for the metrics calculation) as well as limits . Legal aspects obviously also apply to the fulfillment of the transactions between the economic individual and economic agents , directly or indirectly .

Because the understanding of the use of service level agreements in an economy requires some transactions to be defined, a case is has been developped , linking all five levels with an emphasis on he first three levels ,and a reference on issues linked to the fourth level ;for lack of space it is reported in [10] , with both the individual's qualitative perception , the quantitative metrics ,and issues around the handling of the agreement by the economic agent

2. FRAMEWORK AND IMPLEMENTATION OF SLA MANAGEMENT FOR PRIVACY

2.1 Framework

This paper proposes the use of formal SLA's to cover the operational dynamic agreements between a privacy protector on one hand, and an information collector on the other hand, as they apply to the provisioning of privacy enhancement technologies PET (or other methods) through which all information exchange between the two parties must take place. At a framework level, a legal framework agreement may exist applicable to all the SLA's between the two parties. What is also essential is that , through its attributes and structure , the SLA's will also include economic and business provisions matching the extent , configuration and efficiency of the PET's ,. The SLA's may also have to include attributes (such as identification of parties, traceability, cost elements) to allow a sequence of SLA's between a chain of parties to operate with suitable decision and reporting points inside a business process.

In information systems , SLA metrics are often performance-related, and cover system availability or transaction response time. SLA metrics are here assumed to include higher-level service aspects such as privacy attributes, responsiveness, etc.

A set theoretic approach to the determination of privacy is described in [10],focussing on quantitative and qualitative information exchange attributes and derived impact on the SLA parties . Using furthermore the theory of extremes as used e.g. in stress theory , a non-parametric distribution is used, which allows alltogether for a calculation of an equilibrium between a PrivacyProtector and an InformationGatherer ,as well as for the determination and visualization of the acceptable privacy of either party . .Some are wondering why both parties have a privacy boundary ; the PrivacyProtector has an obvious privacy boundary driven by his perceptual and social views, and sometimes established by privacy law; the InformationGatherer also has a privacy boundary vis a vis first each economic individual he is transacting with ,and a total privacy boundary as well in his transactions with other economic agents, often to protect his information and knowledge assets. As a result , privacy metrics with specific features apply also between any economic agents.

It should be stressed first that even if the individual does not intend, for a specific type of privacy , to engage into economic agreements , the privacy metrics [10] are still very useful to give an analytical framework to his rational and irrational decisions .In other words , this framework , while useable in economic and business contexts, may not be applicable in some application fields which fundamentally appeal most to perceptual or social issues .

2.2 Implementation

Quality of Service in relation to Business is becoming a major concern for enterprises world-wide,and a number of international professional organizations are looking at the area with the intent of defining implementation standards for it. Notably, these include The Open Group and the TeleManagement Forum. These two organizations have combined to prepare an SLA Management

Handbook [8, 9]. The SLA implementations done on the basis of the concepts of the previous Sections complement and extend the concepts discussed in the handbook [8], particularly with regard to privacy management, automated monitoring and reporting.

3. PRIVACY AND FLEXIBILITY

This Section discusses the management and flexibility of privacy SLA's as formalized and implemented as stated in Section 3 above . It starts with the privacy management concepts , to explain the flexibility definitions and results

3.1 Common reactive Privacy Management Approach

The conventional way of managing service is to measure QoS/Privacy and determine whether the requirements were met. This means that a problem (if any) is detected and reacted to after the event.
This approach presents problems for everybody, for instance :

- For a *Customer (Information gatherer)*: Deterioration of service cannot be prevented. Problems must happen, to trigger a corrective action. In the worst cases, on-going conduct of business may suffer.
- For a *Supplier (Privacy protector)*: Penalties (frequently specified in modern SLAs) cannot be avoided. In the worst cases, business continuation becomes problematic.

3.2 Suggested Predictive Approach

By contrast, in this paper we propose to rely on predicting the result of QoS/Privacy compliance in advance. It should then becomepossible to take a corrective action before a problem actually occurs, thus eliminating it or, at least, minimizing its impact. This approach avoids the problems associated with the reactive approach:

- For a *Customer (Information gatherer)*: Deterioration of service may be prevented and business conduct optimized.
- For a *Supplier (Privacy protector)*: SLA Penalties may be avoided and prospects for the business continuation improved.

For any Privacy Objective that has been defined over a specified service period, the value of the current privacy metric can be calculated for any elapsed sub-interval of the service period. Conversely the required value of the privacy metric for the remainder of the service period can also be calculated, such that the overall privacy metric for the full service period meets the privacy objective. These two facts provide a basis for issuing predictive alerts that can be presented in a GUI interface.

An example of a predictive function within the context of an SLA metric of privacy is the compliance with boundaries, also called privacy envelope ([10]). The purpose of an objective function is to calculate the remainder SLA metric value that is required in order to meet the SLA objective by the end of the service period. The remainder SLA metric value can be the surface between the actual privacy feature values outer surface, and the surface made of the thresholds.

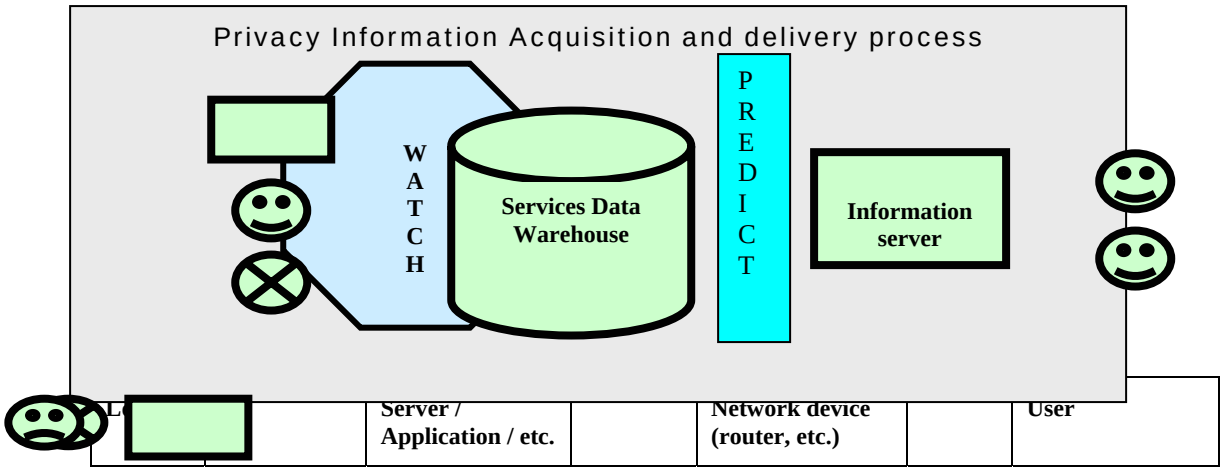

Figure 1 :Three *asynchronous* loops for privacy information

3.3 Results and user reaction

It is a fact ,as highlighted in the PRIME project, that the issue of privacy or not overshadows others .If privacy is accepted, and then if the context and supporting tools (such as privacy metrics, privacy SLA's,and privacy enhancing technologies) are accepted also , then only flexibility in these tools and concepts becomes an issue. For example, if no privacy SLAs are signed ,the resulting business processes (B2B and B2C) may appear leaner of contractual obligations, but the legal risks are also vastly enhanced each time the process involves information sharing . The target users - organizations and individuals mature enough and large enough to be interested in privacy are likely to have complex environments, with many suppliers and/or customers, variety of software and hardware platforms, applications and SLAs. In order to cater to all these requirements, utmost flexibility is necessary.
From the point of view of the regulators and information protection bodies , the absence of transparent privacy SLA's (or privacy agreements) raises the likelihood for any customer (or customer association) to complain about privacy disruption. In PRIME it has been shown through the deployment cases , that signing an SLA provides more privacy to consumers but does not renders the business process so inflexible that even these consumers may not want the resulting service ;the fundamental reason of this moderate acception , is that the privacy negociation process provides an unique opportunity for a business and a consumer to interact , and to learn or explain . Even if the consumer just signs a standard privacy SLA or privacy agreement, this very act enhances his trust in the business acting responsibly ,even if he knows enforcement will inflexible and cumbersome.

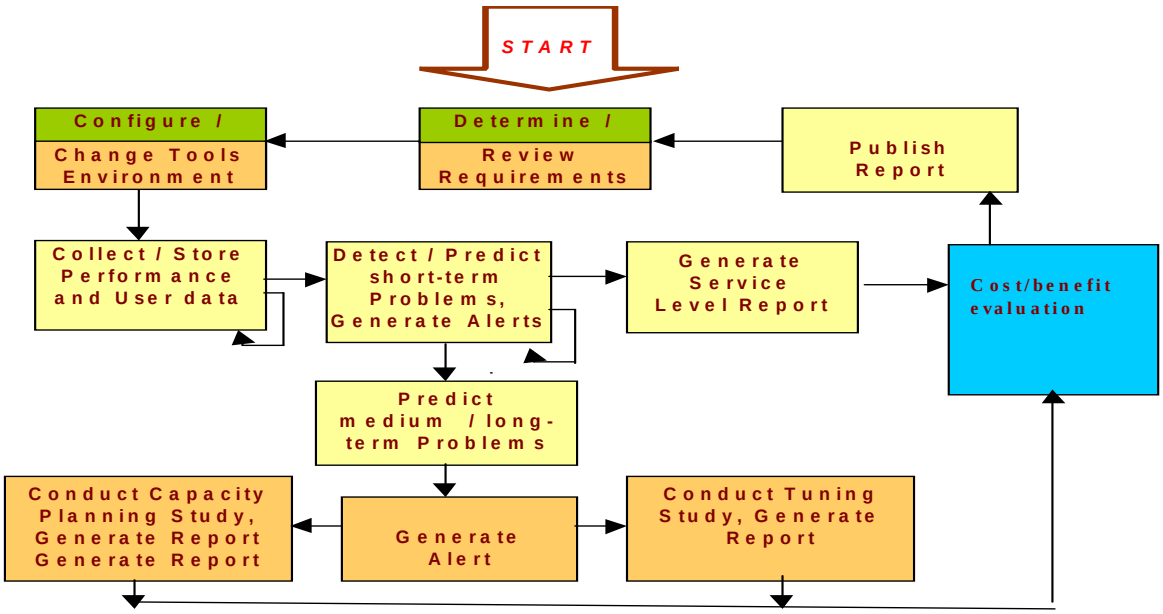

Figure 2 : Privacy Management process

3.4 Implementations in the communications industry

It results from the above analysis that whereas the communications industry sofar has viewed privacy regulations and the compliance processes as cost items, they can eventually be turned into revenue items if the privacy SLA management is carried out by the operators on behalf of private or enterprise users when they exchange private information . This new attitude in turn will benefit society at large as there will be a motivation by operators to pefom in this space ! Whereas operators where this research has had impact cannot all be disclosed, Deutsche Telekom has published reports about the privacy management platform T-Identity protector their own enteprise division T-Systems Enterprise Services Gmbh , has developped for use by the fixed access, mobile access and Internet access divisions [14].

CONCLUSION, CRITICISM , APPLICATIONS AND ECONOMIC IMPACT

Regarding prototype development ,two types can be suggested from the analysis above .The first would be for privacy metrics in specific user contexts ,especially to elicit context dependencies and common elements ;the author has already done work on privacy and business models in location based systems , complinat with the OMA private usage profiles , which should be expanded into other areas . The second type should be SLA implementations in UML (with code generation) in some commercial domains ,where a linkage with the PRIME developped privacy enhancing technologies will be of special interest .

Finally , this paper recognizes that privacy SLA's business value does not extend to all domains, while conversely there are application domains where their introduction would be a major incentive scheme to unleash controlled information and business interactions . To difficult areas belong health privacy ,and some security information. To the realistic areas belong telecommunications and mobile services, transport , information services , and logistics ; some calculation cases and even implementations are underway in some of these last areas .

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