A SECURED SOA MODEL FOR DECENTRALIZED PUBLIC ADMINISTRATION IN DEVELOPING COUNTRIES: APPLICATION ON FAIRGROUND COURT IN CAMEROON

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ABSTRACT
During the last decade, the development of Information and Communication Technologies (ICT) has led the world into a new era of innovative technologies that can provide effective responses to human concerns. In developed countries, the profitability motivation has imposed Service-Oriented Architectures (SOA) in enterprises as a better way to design information systems capable of taking into account inter-organizational cooperation mechanisms while preserving autonomy of the latter. Those Service-Oriented Architectures did not stop at the doors of public administrations. Thus, several specifications have been made to adapt them to the peculiarities of public governance. But these models are not always able to respond effectively to the concerns of governments in developing countries particularly when they are structurally and territorially decentralized. Therefore, we propose a more suitable model to this type of e-governance. We will later see how our model can be more suitable for the organization of remote and secured fairground courts in Cameroon to address constraints related to finance, time and security that these courts currently impose.

Keywords: Public Administration Optimization, Justice Improvement, Fairground Court Management, Developing Countries, SOA, Security.

1. INTRODUCTION
ICT can be regarded as the set of techniques for better access, better treatment and rapid exchange of information. They mainly include computing, audiovisual, multimedia, internet and telecommunication techniques, that allow users to communicate, access, store, manipulate, produce and transmit information in several forms (Wikipedia, 2015). They formally joined the operation mode of the organizations. Both goods productions and services companies use ICT to boost their results by modernizing the management of their Information Systems (IS). This modernization of IT is experiencing a trend supported by the users' requirements. Thus, through the development of ICT, the design and development of computer applications had a significant evolution. Going from procedural programming for re-usability of functions and procedures, we passed to the object-oriented programming (OOP) to take advantage of encapsulation of objects. However, despite the possibility of transporting these objects over the network to break the barriers between the machines, we came up against the problem of compatibility of platforms.
Therefore in order to improve collaboration and especially the quality of exchanges between computer platforms, a new architecture based on the service has emerged: Service-Oriented Architectures (SOA). This paradigm has appeared in a research note from Gartner Group in 1996 (Natis, 2003; Schulte and Natis, 1996), to designate "an architectural style based on the principle of separation of business activity in a series of services". This is a model of application interactions to design software by breaking down business processes into separate services that can be reused independently of the applications to which they belong, and computing platforms on which they are running (Caspersen and DiMare, 2006). The service-oriented architectures are not just a new method, but rather a convergence model of existing methods to a new approach of governance of information systems (IS) (Raymond, 2011).

The disparate and heterogeneous information systems of governments have, for efficiency needs, to interact in accordance with administrative rules. These interactions must cover secure exchange of documents, data and information necessary for the proper functioning of the entire system and of each subsystem. Given the transparency requirements and the autonomy of actors, it is suitable to consider the usage of SOA for the achievement of such goals, thus improving the quality of e-governance.

Developing countries are countries whose economic, political and social structures fail to meet the basic needs of the people especially in the achievement of the Millennium Development Goals (MDGs). They are mainly characterized by massive poverty and low integration into the global economy. The debate on the relevance and contribution of ICT in the development process compared to the basic social infrastructure has found a better balance in the views (Osterwalder, 2003). Indeed, ICTs do not solve the basic social problems arise, but is rather a tool that can facilitate the access, availability and proper functioning of the services responsible to provide the answers to these priority needs of populations in developing countries. Some believe rightly that it is an instrument to facilitate the achievement of the MDGs (POST, 2006) and a better tool for good governance (Bertot et al., 2010).

But despite blazing connectivity, a niche of expanding economic opportunities and endogenous integration based notable local expertise, it remains a real questioning of a more visible social impact of ICT in developing countries especially those in Africa. This problem requires making a diagnosis on the ability to tailor innovative designs to the problems of developing countries especially in their key areas to consider endogenous solutions capable of enhancing consequently the lifestyles of their populations.

Our study will start with a study of existing SOA Models for Public Administration. Then we will propose an architectural model of information systems based on SOA for e-governance in the countries where administration is structurally and territorially decentralized, particularly in developing countries. We will continue by presenting Judiciary Procedures in Cameroon and ICT integration in developing countries. An illustration of our proposal will be focused on improving the Cameroonian judicial system by modernizing the conduct of fairground courts.

2. SOA MODELS FOR PUBLIC ADMINISTRATION

A SOA model is an application design approach built on the concept of service. As the concept of service itself is closely linked to the concept of business process of the

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1 The Millennium Goals for Development (MDG) were established following the Millennium Summit in September 2000. They consist of 8 goals and 21 specific targets whose evolution is measured on the basis of 60 indicators

2 Microsoft Encarta Dictionary 2009
organization, modeling a SOA for goods-producing company cannot be the same as that for a service supply company because the first works for example with essential materials suppliers to its output while the latter, which mainly uses the human resources as main element of its activity, is not subject to this constraint. A specification is also needed when modeling an application based on SOA for public administration compared to those made for private companies. Thus, in the digital governance projects, most states have integrated SOA as a base for modeling their systems. This positioned the specification models so that SOA fit the requirements of public administrations (Strykowski et al., 2010).

![Diagram of SOA Dedicated to Public Administration](Image)

Figure 1: SOA Dedicated to Public Administration Strykowski et al. (2010)

2.1 Components Approach

Built on the key features of the SOA (Erl, 2009), this approach calls for the definition of several essential components for the implementation of a service oriented Information System in public administration. Some propose six components (Strykowski et al., 2010) and other offer architecture divided into three main low level elements (Al-Khanjari et al., 2014) to respond to breaches of certain theoretical and very highly technical approaches.

We can say that these components approaches require a centralized view and overall control of Human and regulatory resources. But for territorially and structurally decentralized administration, these models become inadequate because not allowing defining dynamic local governance capable of imposing new rules to organize some public services. These models do not facilitate the horizontal collaboration between decentralized structures of the same administrative district. Also, they are limited for taking into account the execution level of each service in terms of personal usage which is nevertheless fundamental to the identification and the description of that service.
Thus, we can note the slowness in the communication between services, for each service of an administration should check against a national directory while several administrations may be located in the same area. Imposing them a centralized collaboration would not be a systemic advantage in terms of time during their collaboration. It is therefore inappropriate to conceive a judicial IS putting together central administrations, decentralized structures and territorially decentralized communities and other development partners with this SOA model solely structured on components.

2.2 Conceptual Approach by Service Layers
This approach considers that the applications used in divisions that make up an administration are interdependent web services. Thus, the identification of the service, the services composition and the modeling of their interactions is based on the SOA principles (Das and Patra, 2013). Here, services are classified by level. Some are directly available, others indirectly while some are compound.

![Figure 2: SOA Layered Architecture for Public Administration (Das & Patra, 2013)](image)

However, this approach gives some collaboration freedom between services. It does not seem to take into account the fact that in a public administration, collaboration is not free but constraining. This model also seems less adapted to our public administration information system because it doesn't structure centralized activity traces nevertheless fundamental in said system. But despite their limitations, above architectural models have bases which may be used for a new SOA model suitable for decentralized public administrations.
2.3 Research Question

Our research question is the improvement of services collaboration in a territorially and structurally decentralized public administration, by allowing a vertical and horizontal cooperation amongst the different layers of the organization; and also the possibility of defining dynamic local governance capable of imposing new rules to organize some public services.

3. Research Methodology: Combining the Components and Layer Models

To effectively address the vertical collaboration principles (between structures with hierarchical relationships), horizontal cooperation (between same-level structures), the SOA architecture should combine the components model (Strykowski et al, 2010) and the layer one (Das and Patra, 2013).

3.1 Description of the Solution

Each information system of an administration must be decomposed into service layer and must implement its horizontal collaboration to integrate actions of components that will structure the operation of these services. Thus the operation of each layer will be organized by the SOA components. These latter will allow to locally materialize the rules organizing services, their modeling and management. Data coming from these local treatments will also be locally saved and the transport of messages will be done by a service bus. This model represented by Figure 3 below has the advantage of allowing bringing the analysts close to the place of operation of the service, therefore a certain appropriation of the identification phase of the services that is fundamental in the development focused on SOA. We can also take as advantage the dynamism of such a platform through the rapid update of reforms. It thus allows locally creating and reorganizing some public administrations under the management of autonomous local authorities for each level having its own structuring components. Rapid exchange between same level services is also a remarkable asset.

The implementation of this system should be based on a collaborative development platform specifically geared towards modernizing the judicial system (Xu et al., 2007). This will facilitate the understanding of the different actors taking into account their different profiles.

3.2 Security Model for the Proposed ICT Approach

Justice in a country is a very critical service. Any confidential justice information should never fall into the hands of ill-intentioned people, because they give critical information about the judiciary system and procedures. No information should be introduced or modified in the system by unauthorized persons. So a real and efficient security model for the proposed solution shall be made available, in order to ensure Confidentiality, Integrity and Availability of exchanged information.

The different services present in the model proposed in this paper will be designed and available as web services. Because of its nature (loosely-coupled connections) and its use of open access (HTTP), SOA adds a new set of requirements to the security landscape. Many companies rely on the Secure Socket Layer (SSL) protocol to protect access to SOA deployments. SSL provides authentication, confidentiality and message integrity. However, when the data is not "in transit", the data is not protected, which makes the environment vulnerable to attacks in multi-step transactions. As a result, there is a need to address more specific SOA security challenges by relying on additional, application-level security. Application-level security is defined mainly by industry standards. We will present in this section the SOA Security Vulnerabilities, the way we address them, and describe the key standards in providing secure SOA deployments using web services.
3.2.1 SOA Security Standard Topology

Security standards are implemented in non-XML frameworks at the transport level, and in XML frameworks at the application level, as shown in the figure 4 below (Chanliau, 2008).

These different security levels will be implemented using the following security technologies:
- Confidentiality, Integrity, Authenticity: XML Encryption, XML Signature;
1. **Transport-Level Security:**
Secure Socket Layer (SSL), otherwise known as Transport Layer Security (TLS), the officially standardized version of SSL provided by the Internet Engineering Task Force (IETF), is the most widely used transport-level data-communication protocol providing:
- Authentication: the communication is established between two trusted parties;
- Confidentiality: the data exchanged is encrypted;
- Message Integrity: the data is checked for possible corruption;
- Secure key exchange between client and server;

SSL can be used in three modes:

i. No authentication: Neither the client nor the server authenticates itself to the other. No certificates are sent or exchanged. In this case, only confidentiality (encryption/decryption) is used;

ii. One-way authentication (server authentication): Only the server authenticates itself to the client. The server sends the client a certificate verifying that the server is authentic. This is typically the approach used for Internet transactions such as on-line banking;

iii. Two-way authentication (bilateral authentication): Both client and server authenticate themselves to each other by sending certificates to each other. This approach is necessary to prevent attacks from occurring between a proxy and a web service endpoint. For example, two-way authentication could be used between Oracle Web Services Manager's Gateway and a remote web service;

SSL uses a combination of secret-key and public-key cryptography to secure communications. SSL traffic uses secret keys for encryption and decryption, and the exchange of public keys is used for mutual authentication of the parties involved in the communication.

2. **Application-Level Security**
XML Frameworks Most WS-* specifications started as proprietary industry initiatives. Some of these specifications (e.g., WS-Security, WS-Trust, WS-Policy) have been transferred over to standards bodies such as the Organization for the Advancement of Structured Information Standards (OASIS) or the World Wide Web Consortium (W3C). WS-* specifications often depend on each other, for example, WS-Policy is used in conjunction with WS-Security. WS-* specifications also leverage non-WS-* specifications. For example, WS-Security uses XML Encryption (Confidentiality) and XML Signature (Integrity, Authenticity).

3.2.2 SOA Security Vulnerabilities and Mitigations
The main critical vulnerabilities that can be introduced by Web Services (NSA, 2014)(Shreeraj, 2007; Ramarao and Prasad, 2008) the way they will be addressed in our model are listed in the Table 1 below:
Table 1: SOA Security Vulnerabilities and Mitigations

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insecure Communications:</td>
<td>Attackers can steal or modify information if not protected while in transit. We use the latest versions of SSL or TLS to protect the content of messages in point to point transactions. Requiring mutual authentication between the client and server raises the level of trust before processing messages and generally decreases the attack surface of the service. Web Services allow for messages to be routed through multiple intermediaries; one of the intermediaries may terminate the SSL or TLS connection so the message may not be protected between all of the intermediaries. In these architectures, use end to end security mechanisms like XML Encryption, XML Signature, and SAML assertions (Security Assertion Markup Language). End to end XML security mechanisms are complicated and the implementation must be reviewed and tested to ensure the protection is adequate.</td>
</tr>
<tr>
<td>Insufficient Authentication:</td>
<td>Web Services that perform sensitive functions should require authentication. For any sensitive transaction, each request should be associated with an authenticated identity and each service or data provided should be associated with authorization rules. Passwords are typically not appropriate with these technologies. Instead, use PKI, multi factor authentication, or the newer XML security based technologies like XML Signature and SAML.</td>
</tr>
<tr>
<td>Insecure Configuration:</td>
<td>Web Services typically run on exposed, public facing servers, outside an organization's security perimeter. Mistakes in configurations and patch management of these servers can be catastrophic. Whenever possible, separate Web Applications from Web Services by hosting each on different servers or ports. Because Web Services can be accessible to unauthenticated users, systems administrators must understand all configuration options and be diligent with configuration management and patch management. The configuration files of the different services should be encrypted and managed by a configuration files securer as described here (Moukouop et al., 2015).</td>
</tr>
<tr>
<td>Replay Attack Flaws:</td>
<td>Protecting a message against modification does not stop an attacker from replaying the message to a server to invoke actions multiple times. Clients can include signed timestamps in the messages and servers can implement time windows. In addition to signed timestamps, clients can include signed unique message identifiers (nonces) so servers can implement message tracking (sometimes called a nonce pool) to keep track of the unique messages that have already been processed.</td>
</tr>
</tbody>
</table>

4. Fairground Court in Cameroon

Justice is seen as an essential public service in all States, It ensures sovereignty missions (Cameroun, 1996) of the States. Through its missions, it is the main instrument of protection of human rights and safety of goods and individuals. But its effectiveness and credibility are often challenged in developing countries like Cameroon (USA, 2012) especially because of:

1. Delays in court proceedings due to the lack of judiciary courts available as shown in Table 2;
2. The questionable quality of documents established there (marital status, criminal record, certificate of nationality, etc.).

Fairground courts are courts in which a judicial administration moves out its floor to make...
justice. The question is how can we, from the lodging of appeals to the verdict, reduce expenses related to fairground courts in developing countries like Cameroon? To answer this question, we should first master the organization of judicial procedures in Cameroon.

4.1 Judiciary Procedures in Cameroon

Justice is part of the sovereign institutions. It is rendered in the name of the Cameroonian people, the judicial power is assumed by the Supreme Court, appeal court and ordinary courts. The justice missions are achieved through these various entities and others actors of the judicial police. There are several types of courts: military courts, special courts and ordinary courts. Among the common law courts are distinguished high instances courts that cover one or more departments, first instances courts that cover one or more districts. The Table 2 provides details on the institutional coverage of justice in Cameroon (INS, 2014).

There are several ways to seek justice. One can make an appeal through auxiliaries such as the gendarmerie and the police. One can also enter the court through a direct citation. When the judge is seized, he instructs when necessary an investigation of officers of the judicial police. The results of this investigation are returned back to the judge. After the investigation, courts are held to listen to parties during public debates. Each party is allowed to have a lawyer, and when it cannot afford for one, the state assigns one for its defense. Following these discussions, the judgment is passed by the judge. The judgment may be criminal or civil. And in a case or the other, many public administrations are involved in the execution of the court decision.

We observe that the judicial system involves several public and private actors. Each of these actors has accurate responsibilities and a special role in the functioning of the judicial system. Lack of human resources, precisely magistrates, contributes to prison overcrowding. Indeed, the number of prisoners awaiting trial in Cameroon in 2013 accounted for 63 percent of total prison population estimated at 27,000 prisoners (INS, 2014).

4.2 Fairground Court Purpose

Fairground courts in Cameroon are governed by Law No. 2006/015 of 29th December 2006 on judicial organization [National Assembly, 2006]. The purpose of fairground court is to bring close citizens and the judiciary system to deal with difficulties related to the scarcity of financial resources that they face to organize the courts. They are important in a developing country like Cameroon where the rate poverty is high, mainly affecting rural areas and where citizens are not always capable of ensuring their transportation costs and those of their witnesses to meet the requirements of justice. But despite this desire for closer judicial and citizens, the financial problem remains. First because the appeals must always be submitted to the prosecution level. Also, when the judiciary system is moving, the related costs of this mobility are supported by the state. Beyond these financial aspects, it also remains the ordinary problem of dematerialization of procedures for better archiving and acceleration of exchanges between the different actors of this system.

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3 According to UNDP, the poverty rate has stagnated between 2001 (40.2 percent) and 2007 (39.9 percent) and 55 percent of poor live in rural areas
Table 2: Situation of Some Justice Indicators in Cameroon Related to Structures in 2013 by Region According to the Minister of Justice

<table>
<thead>
<tr>
<th>Regions</th>
<th>Number of units for 100,000 bns inmates</th>
<th>Average FCU/DIS</th>
<th>Number of high instances courts</th>
<th>Average HIC/DEPT</th>
<th>Number of appeal courts</th>
<th>Number of functional prisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adamaoua</td>
<td>2</td>
<td>5</td>
<td>0.24</td>
<td>5</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Centre</td>
<td>2</td>
<td>11</td>
<td>0.16</td>
<td>10</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Est</td>
<td>3</td>
<td>4</td>
<td>0.12</td>
<td>4</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Extrêmesord</td>
<td>1</td>
<td>6</td>
<td>0.13</td>
<td>6</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Littoral</td>
<td>2</td>
<td>6</td>
<td>0.18</td>
<td>4</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Nord</td>
<td>1</td>
<td>2</td>
<td>0.19</td>
<td>4</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Nord-Ouest</td>
<td>2</td>
<td>9</td>
<td>0.26</td>
<td>7</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Ouest</td>
<td>2</td>
<td>8</td>
<td>0.20</td>
<td>7</td>
<td>0.88</td>
<td>1</td>
</tr>
<tr>
<td>Sud</td>
<td>4</td>
<td>6</td>
<td>0.21</td>
<td>4</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>Sudouest</td>
<td>2</td>
<td>10</td>
<td>0.32</td>
<td>6</td>
<td>1.00</td>
<td>1</td>
</tr>
<tr>
<td>All</td>
<td>2</td>
<td>69</td>
<td>0.19</td>
<td>57</td>
<td>0.98</td>
<td>10</td>
</tr>
</tbody>
</table>

5. E-READINESS IN DEVELOPING COUNTRIES

E-Readiness (electronic readiness) is a measure of the degree to which a country, nation or economy may be ready, willing or prepared to obtain benefits which arise from information and communication technologies (Dada, 2006). It is not wise to promote the integration of ICT in developing countries without evaluating the human, material and policies of these countries to welcome them and derive sufficient benefit. Our study focusing will first scrutinize the behavior of individuals related to the use of ICT before analyzing structural integration of these technologies by the various Key sectors, with particular emphasis on the ability of accepting environments on different planes socio-cultural and infrastructural (Dada, 2006).

5.1 Internet Connectivity

Generally, as highlighted in the e-Transform Africa report (World Bank, 2012) in most developing countries including Africa, people have integrated the use of ICT in their daily lifestyles. Internet is a very powerful communication means through social networks putting together much of the population including youth (Halewood and Kenny, 2007). Globally 3.2 billion people are using the Internet of which 2 billion are from developing countries. ICTs will play an even more significant role in the future development agenda and in achieving future sustainable development goals as the world moves faster and faster towards a digital society (Sanou, 2015).

5.2 Smartphones Availability

Whether in cities or in campaigns, use of mobile phones is widespread. In Cameroon, for example, there are about nearly 17 million subscribers out of a total population estimated at 22 million according to the Telecommunications Regulatory Agency (ART), and a lot of those subscribers have smartphones. The profitability and economic development of enterprises engaged in the telecommunications sector are not all surprising as the ranks they occupy in the economic landscape (Jeune Afrique, 2015). Some Telephony operators designed electronic financial transactions platforms. Other operations are also offered to remote clients, in order to reduce the time or the means necessary for their achievements.

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4 A joint report from the African Development Bank and the World Bank with the support of the African Union on ICTs in Africa in 2012
This principle is essential and should have a structural expansion.

5.3 ICT in Public Administration

It is necessary to emphasize that the mental integration of technological innovation is the result of a set of National ICT policies initiated by government campaigns stating that: "Is illiterate in this twenty-first century the one here who does not know to use a computer" (Farrell and Isaacs, 2007). Through these policies, training campaigns for extension and more or less structured ICT engineering training are made in universities, in public and private schools. Communal Tele-centers are created in fairground areas to allow people living in rural or less developed areas to have access to basic ICT services.

To analyze the level of integration of ICT in a society, it is important to make this assessment on services having an impact on its various key sectors. The latter are generally those underlying the MDGs. These sectors include education, health and the different structures fighting against poverty. The MDGs challenge requires many actors including the State, public administration secular, decentralized local authorities, public and private companies, associations and citizens. In each of these structures, the use of ICT including computer equipment for typing, printings, communication and internal and external exchanges are permanent. Exchanges of documents and information between them are done through emails. Concerning exchanges between institutions and citizens, there is a requirement of physical presence even in cases where it may seem dispensable.

Having done this, some countries have designed modern information systems resolving the difficulties of people moving, with the introduction of digital governance despite the debates it raised (Lee and Huang, 2014). This e-governance facilitating transactions between structures and citizens has penetrated even private companies. All companies and private or state institutions should, when they need to cooperate, materialize this cooperation through the interoperability of their information systems.

According to the importance of this ICT environment it's suitable to consider how to use them to modernize fairground courts in developing countries like Cameroon for example.

6. APPLICATION OF THE MODEL TO FAIRGROUND COURTS

The judicial system of Cameroon is complex and involves administrative services with specific missions (government, general delegation to national security, national gendarmerie, judicial, administrative tribunals courts, judicial tribunals, Court of Appeal, Supreme Court, special tribunals, etc…) and various profiles (magistrates, police officers, gendarmes, soldiers, prison guards, municipal magistrates, politicians, ordinary citizens etc…). The lack of speed in the operation of this system and the dubious quality of some documents established therein are due to cumbersome trade information between its various actors.

Each actor of the judicial system yet has an autonomous information system. In a report named "A framework for Justice Information Sharing: Service Oriented Architecture", the Global Justice Information Sharing Initiative Advisory Committee\(^5\) supported that any member of the justice community can access the information they need it, in a form that is useful, regardless of the location of data (Oracle, 2008). Thus disparate and heterogeneous systems have, for efficiency needs, to interact in accordance with administrative rules. These interactions must cover secure exchange of documents, data and information necessary for the proper functioning of the entire system and of each subsystem. Given the transparency requirements in transactions and the autonomy of actors, it is required to consider the

\(^5\) An advisory body to the US attorney general, the assistant US attorney general, and the US office of Justice Program that was create to promote issues related to the exchange of justice information
establishment of a judiciary information system based on the Service Oriented Architecture (SOA) in Cameroon.

Applied to fairground courts, ICT through SOA can allow judges to do justice from court without having to move. Our solution can also enable the citizen to sue without having to go to the prosecutor. So we propose a collaboration of the information systems of the different actors involved from communities to departments where the courthouse is located.

6.1 Description
The proposed SOA architecture provides a portal through which users can directly interact with the system to file a complaint or appeal. He can also submit it in a brigade or a police station stating whether it is a direct citation. When it is validated, it is forwarded to the judge of the competent public prosecutor's department through collaboration between information systems of those security forces and public prosecutor's department through the implemented SOA for this purpose. Upon receipt, the judge may instruct an inquiry enforcement of its riding skills through the system if it considers it needs more elements to judge the matter in debates. The Reports of these surveys are returned to him through the application. These Reports can also be made through the individual data of the concerned lying in different information systems of the town halls, police and solicited administrations by simple service collaboration. The accused and the witnesses are then notified by SMS or email if their contacts are available, otherwise emissaries are sent to them. They can then make their statements in the system. If they do not have the means to do so on the platform, they can then go to the competent authorities which may then record their statements before saving them on the platform. The judge can then consult the various depositions, ask questions to the concerned and receive responses similarly. All documents transmitted over the platform can only be accessed by people with the permissions to access them.

All interactions between these different services are done from the model described above. Administrations at departmental level collaborate relatively to the mechanisms defined at their level. The interactions between prosecutors and communal services are organized according to the regulatory mechanisms. The communal services interact to give satisfaction to the judicial authority's requests according to the rules prescribed in hierarchical and communal level. Thus, when the debates are scheduled, a room is furnished locally for welcome litigants with a teleconference device that will allow communication with judges located in their office arranged for the occasion to the public prosecutor's department. This audience takes place at the local level in the presence of relevant administrative authorities and police forces that can give effect to all the decisions of judges.

6.2 Validation of the Model
Fairground courts currently pose many problems of costs, time and risks while travelling. The model proposed here has aimed to bring a fairground court to a normal one through the contribution of ICT; we have therefore proposed SOA architecture for communication between the various services of a decentralized public administration and having decentralized structures, enabling a remote fairground court.

6.2.1 Cost
The organization of those fairground courts in Cameroon requires the displacement of several justice officials to the area concerned by the audience: a judge, a prosecutor, a clerk and possibly an interpreter if necessary. These courts are usually done in three steps: individual audition where the prosecution and the plaintiffs audit their witnesses, the audition of witnesses of the other party, and a re-check followed by the establishment of guilt. The daily mission expenses for the interpreter and clerk amounted to $26 each; those of the judge and
the prosecutor vary between $43 and $69 based on their grades. Thus, daily expenses for a fairground court may be valued at $190. These courts are held in a period of up to two weeks, which would total the costs of a mission to $2,660.

In the model proposed here it is no more necessary for the judiciary to move to remote areas for holding the audience. Complainants and witnesses also no longer need to travel to deposit remedies; all this is done on the platform. Only a technician must move to install the device for teleconference, and some members of the penitential administration of the community to make applicable any criminal justice decision. The annual number of fairground courts in Cameroon is about 1000; thus the amount saved annually by the system proposed here would be $2,660,000. This amount saved for four years could allow the construction of a reference hospital.

6.2.2 Delay
More defendants are awaiting trial within six months for single tickets, five years for ordinary crimes and twenty years for crimes. These delays are sometimes lengthened following the magistrates deficit that can judge those affairs. This will no more be the case with the proposed system. Furthermore, communication and requests processing time are significantly reduced since all information is immediately accessible on the platform.

6.2.3 Risks
The de-materialization of documents and confidentiality of information provided by the security policy implemented for the architecture proposed here allow significantly limiting the risks associated with travel with physical documents. The risks associated with travels of persons and materials are also eliminated.

Thus, we show that a fairground court conducted through ICT by the model proposed here implicitly can correspond to a normal and classical court. This solution will correspond to a Next-Generation Justice Information System that was compared to Traditional Justice Information Systems in paper (Oracle, 2008), as shown in the table 2. However, the results of this study have been presented to the Cameroon Ministry of Justice. If validated, this will then make the object of an implementation project.

<table>
<thead>
<tr>
<th>Next-Generation Justice Information Systems</th>
<th>Traditional Justice Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built for change and cross-jurisdictional use</td>
<td>Built for performance and siloed use</td>
</tr>
<tr>
<td>Composite applications</td>
<td>Application silos</td>
</tr>
<tr>
<td>Loosely coupled</td>
<td>Tightly coupled</td>
</tr>
<tr>
<td>Business process driven</td>
<td>Application function driven</td>
</tr>
<tr>
<td>Ingrained collaboration</td>
<td>Difficult collaboration</td>
</tr>
<tr>
<td>Real-time and batch electronic data sharing</td>
<td>Offline and paper-based data sharing</td>
</tr>
<tr>
<td>Heterogeneous horizontal integration</td>
<td>Homogeneous vertical integration</td>
</tr>
</tbody>
</table>

Table 3: Next-Generation Justice Information Systems and Traditional Ones (Oracle, 2008)
7. **CONCLUSION AND PERSPECTIVES**

The possibilities offered by SOA models in the context of inter-organizational cooperation of information systems may allow a better federation of existing disparate and heterogeneous systems in different public administrations in Developing Countries. But given the structurally and territorially decentralized nature of administration in some developing countries such as Cameroon, it appeared important to propose a SOA model suitable to this legal and administrative reality. Our proposed SOA model, combining the Components SOA model approach and the Layer one, is suitable to this administrative structure and can modernize the Cameroonian judicial system especially in the organization of remote fairground courts, by providing answers to problems of cost, time and risks arising when these courts are organized in a conventional manner. This solution can also bring transparency, promptness, thus the credibility of the judiciary system. However, the modernization of the judicial system could not be limited only by the usage of SOA in the organization of fairground courts. The design of a global judicial system based on these techniques is required to facilitate collaboration and exchange between the multiple actors of this system.

8. **REFERENCES**


