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THE REMOTE SERVICES LABORATORY AS A METROLOGY KNOWLEDGE MANAGEMENT INTEGRATOR AND ITS IMPACTS ON SOCIAL RESPONSIBILITY

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Abstract: The demands for qualified metrology consultancy and technical support are increasing exponentially due to the current market conditions. Consumers are more aware of quality issues than ever before, informed by the mass media and supported by organizations of consumer–right defense. Companies are investing in better testing and inspection facilities to bear the development of new products and processes, to maintain the processes operating on target with minimum variance and to segregate non-conforming products before they can reach the hands of the customer. In this scenery, there is a complete collection of free-lance professionals, technology centers and other companies and organizations that provide consultancy and metrology services pushed by the above-mentioned demand. Central LASAR is a remote laboratory that appeared as a channel to normalize these relations. The solution has been tested, showing that the approach is technically and economically feasible for the service suppliers as well as for their customers, including the increasing of social co-responsibility aspects between customers and suppliers.

Keywords: shared databases; on line support; social co-responsibility

1. THE WORLDWIDE SCENE

More and more, sustainable development rules and standards are aimed at the industry and services market. When considering sustainable development supported by the triple bottom line: environment, social and economic [1], social responsibility can be one of the sources of all of these and it is aimed, for example, at Brazilian standardizations [2] and at ISO Committee meetings (ISO 26000 project).

There is a trend to raise social responsibility to enterprise levels only. However, to get real social responsibility we must consider co-responsibilities as well, everybody working together for sustainability, constituting an ethical and transparent relationship between the organization and its chain of relationships: partners, suppliers and customers [1].

In this field, Metrology begins with the promotion of health and safety assurance, production of legal aspects and the environmental impacts measuring and controlling the company's activities.

Added to this, the worldwide market scene has been changing and going through the centralization of customers needs and one-to-one philosophy.

2. RELATIONSHIPS IN METROLOGY

Sometimes, the metrology suppliers' solutions have a limited capability to improve the metrology culture and to satisfy the explicit and implicit needs of their customers, mainly because the relationship between customer and supplier is established in a bi-lateral format. This kind of service facilitates the problems of double entries and the traffic of outdated information. It is clearly that the market needs to work together.

Then, an IT structure is proposed to minimize these gaps, managing the knowledge through an integrated system that provides context platform and solutions for all metrology suppliers. The solution is called Central LASAR [3] (Central of Remote Assistance Associated Laboratories). It is showed in Fig. 1.

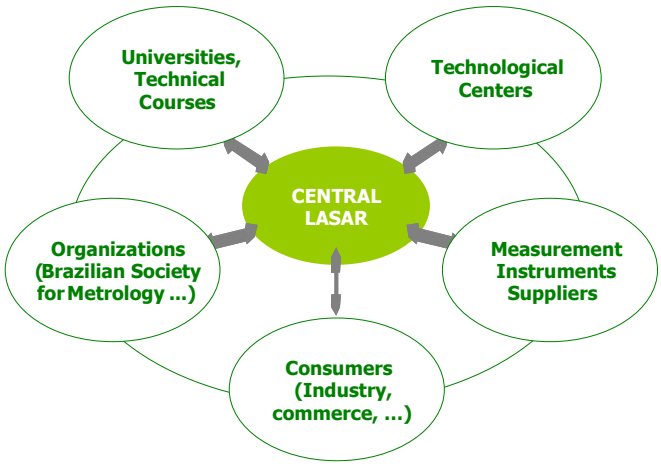


Fig. 1 – Central LASAR platform in the center of metrological knowledge management.

2.1. Customer's analysis

Central LASAR is proposed to connect people and systems, that is to say automatic and semiautomatic algorithms, using Internet.

It is composed of a central platform and shared databases that can manage customer metrological knowledge and the integration among metrological organizations, making easy the Technological Center's support and improving its quality [3].

It means that Central LASAR has two main customers: one side is the technological center and the other, their customers, in this paper, called Final Customers. Universities Courses, Suppliers and Organizations (fig. 2) have a partnership relation with Central LASAR, stimulating and generating new business opportunities.

2.2. Quality Aims

Working in a Quality environment, Central LASAR is worried about the possible Customer certifications and quality concepts (specially ISO9000:2000 and ISO/IEC 17025:2005). Considering this, the implementation on certificated companies is possible, and, those ones who do not have any certification become configured to implement one considering the metrology resolved. An example is showed on figure 2.

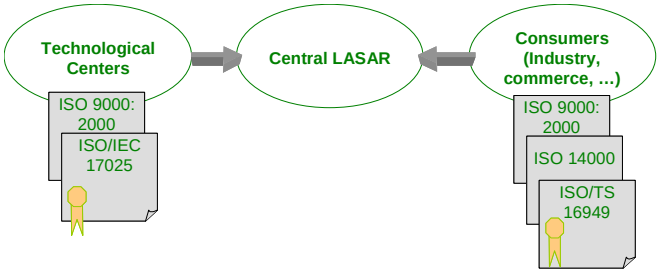


Fig. 2 – Central LASAR quality restrictions.

Central LASAR needs to have a focus in Quality to survive in the market. A research using QFD [4] was done to pinpoint which characteristics a Final Customer is expecting from a Metrology Technological Center (fig. 3). Because of theses results, the expectations of the Technological Center can be aligned with the expectations of the Final Customer, becoming the focus of Central LASAR..

Central LASAR would provide services and solution to reduce costs, such as sharing resources or automatizing procedures, resources training, hierarchy of access, and easier ways to work according to standards.

Regarding the technical issue, Central LASAR works with specialists to guarantee context, update and results quality. The common procedure is to pass the module through two specialists before being included on the Internet.

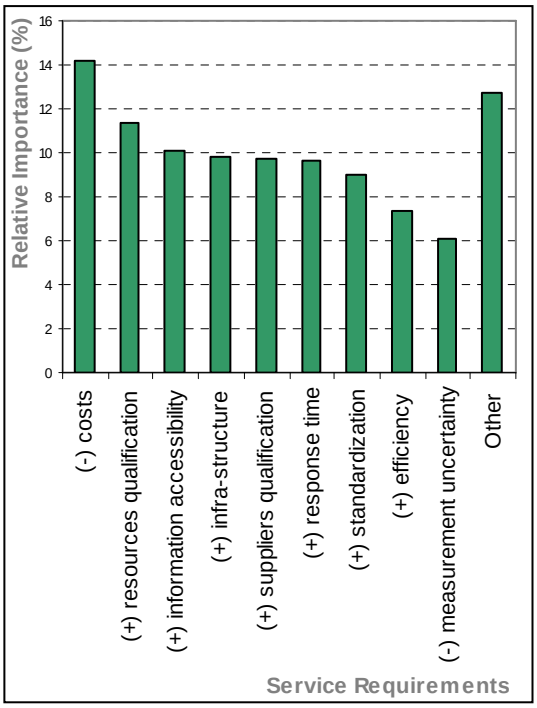


Fig. 3 – Customer expectations.

3. LASAR SERVICES AND THE WEB 2.0

The Central LASAR main characteristic is the modular architecture. It brings differentiation on Central LASAR services offered for different organizations and business sectors, and it becomes easy for updates and new developments.

Using this point of view, Central LASAR services can be divided into two distinct services to the main customers as said [3].

This services segregation are complete, including the visual identity system and the modular components. The Final Customer is looking for a metrological company and the Laboratory is looking for a networking company – it is a focused strategy [5].

3.1. Central LASAR Services for Technological Center

Some of the services are listed bellow:

- On line technical support (for IT and software doubts);
- Users and Customers management – implementing different permissions hierarchy;
- Automatic technical modules management – including the restrictions for each customer;
- Customers monitoring;
- Customer database access – in a security way.

3.2. The Central LASAR services for Final Customers

Using an Ethernet solution, Central LASAR services can be divided into three categories for the final customers:

a) LASAR automatic modules (ex. measurement instrument management, automatic algorithms - including metrological, statistics and educational uses - and an on line calibration certificate traceability);

b) LASAR relationship modules (ex. for commercial proposals, remote metrological database analyses, web chat consulting, voice and video over IP (talking to a specialist) and calibration intervals control);

c) LASAR knowledge management (ex. asked questions controls, articles and general knowledge indexed metrology bibliography, e-marketplaces and data warehouse applications).

3.3. The Measurement Instrument Management

Based on intensive research on all the possible data that can be stored on any generic instrument and those characteristics that can be used in the future, (for statistics or advanced searches, for example), a database model was constructed. This modedel is called the Measurement Instrument Management, and stands out from the other services offered. Central LASAR uses this database as the center of all data and, due to this configuration, calibration certificates or statistical procedures, such as MSA and PMAP, can be easily anchored, as demonstrated in figure 4. Creating relations amongst all the characteristics and data, it becomes easy to create different studies, such as the behavior of a specific group of measurement instrument.

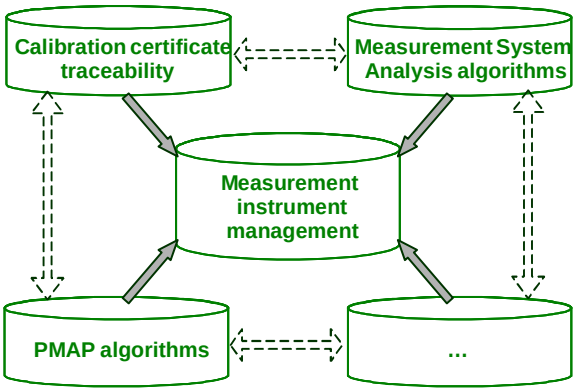


Fig. 4 – Databases relationship.

3.4. Central LASAR is Web 2.0

The core competencies of a Web 2.0 business can be listed as seven principles [6]:

- Services, not packaged software, with cost-effective scalability;
- Control over unique, hard-to-recreate data sources that get richer as more people use them;
- Trusting users as co-developers;
- Harnessing collective intelligence;
- Leveraging the long tail through customer self-service;
- Software above the level of a single device;
- Lightweight user interfaces, development models, and business models.

The development of Central LASAR solutions follows the Web 2.0 principles, where applications are increased with users information, adding value to their own data into a social place. It becomes much more useful.

3.5. Services Modularization

Using the Web 2.0 concepts, Central LASAR keeps the main characteristic on modular architecture. It brings differentiation on Central LASAR services offered for different organizations and business sectors [5]. When Laboratories or Technological Centers offer the remote assistance to their customers, they can choose the modules that will be displayed for each one, depending on his expectations and focus.

Another advantage of this configuration is the simplicity and agility on updates and new developments, for example, a new version of an international standard.

3.6. Project security management

Almost all metrology information generated by the system has customer's rights. Due to it, neither Central LASAR nor Technological Center (as the associated laboratory) can support these databases. The configuration proposed is demonstrated in Fig. 5.

Central LASAR only keeps general database information, as measurement units and the relationship among then (as converter), while the technological center keeps the technical modules database and the relationship logs. All other data must be construct on the final customer own database, making Central LASAR a metadata manager.

All the system runs on a SSL (Secure Sockets Layer) platform, through https protocol, using a 1024 bits RSA Algorithm. More than this, to guarantee the confidentiality of information traffic, all data is pre-coded through MIME base 64 algorithm, transforming the data in an illegible chars sequence [7].

The users management is one of the most important sectors, selecting some access levels as manager or only reader, differentiated by Laboratories or Final Customers.

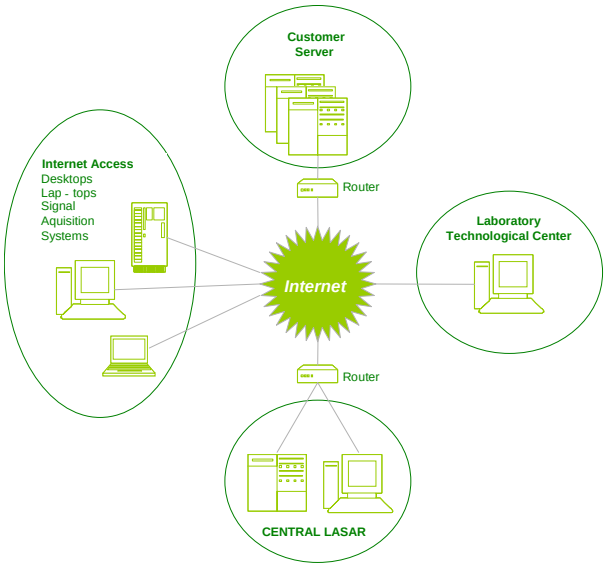


Fig. 5 – Central LASAR quality restrictions.

4. THE CENTRAL LASAR PROTOTYPE

A beta-prototype of the proposed IT solution has been tested.

Sceneries have been created using company's interview methods and resulting on an accelerated tests results [3].

Some of then:

1 – The customer bought a new measurement instrument and wants to know how he can enter the related characteristics.

2 – Who can define some attributes as uncertainty and instrument ranges in the industry?

3 – The director ordered the calibration intervals increased due to cost reduction. What is the procedure? And what about the consequences?

4 – Questions about the possibility of changing a measurement instrument to be used on a certain task and the consequences of doing this?

5 – On line chat about a new technical module and about the e-learning courses that are linked with them.

6 – The industry receives non-conformity about a work piece from its customer. Treat the problem through LASAR.

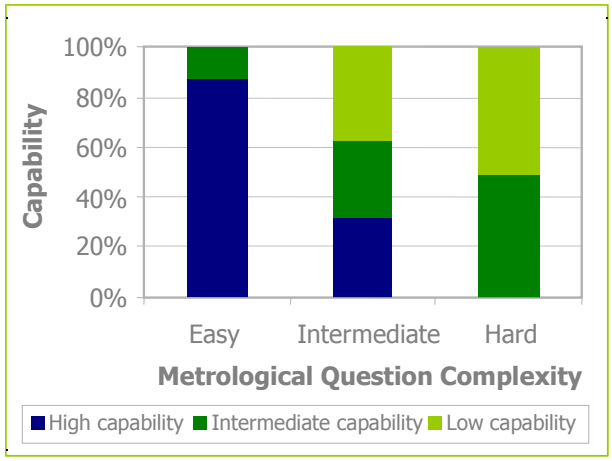
7 – About fixing work pieces and influences on measurement during the production. How they can improve the quality on the results.

8 – There are new measurement units they do not know about. What is the correct and cheapest position on this task?

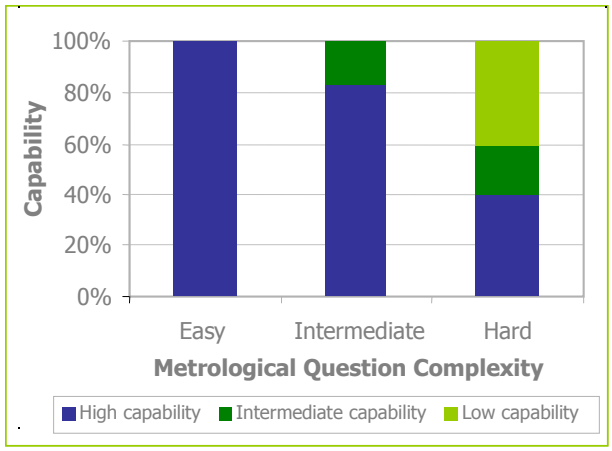
Related to this, some punctual doubts was inserted, as vocabulary, quality systems, environmental influences, calibrations intervals, work piece cleaning, metrology optimization and cost reduction.

Some results are expressed through the three graphics bellow (Fig. 6 – a, b and c). The graph on figure 6 – (a) and (b) expressed the difference between the Final Customer using only Central LASAR Automatic Modules (as Self Service) and using these Modules and an On Line Technical Support. The increased on high capability to answer questions demonstrated by LASAR has came from the real time supporting provide for LASAR due to the industry database sharing and multi-media interfaces (web chats, voice and video over IP).

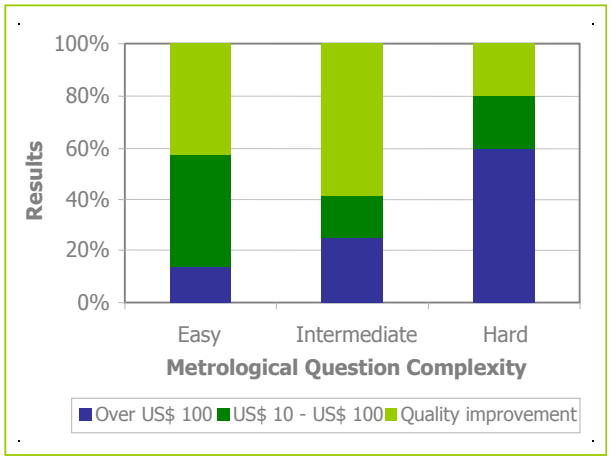
About the financial point of view, figure 6 – (c) demonstrates the relation between question complexity and financial results, and the real importance on using the complete LASAR solution. Other interesting result as some questions on low level of complexity (easy questions) can get high financial result, and a hard (high complexity) question do not guarantee a good financial return result.



(a) Industry capability on solving metrological questions using only LASAR automatic modules.



(b) Industry capability on solving metrological questions using LASAR automatic modules with an on line technical consulting



(c) Industry financial results on LASAR using compared to questions complexity

Fig. 6 – LASAR results [2].

5. THE CENTRAL LASAR CUSTOMERS ADVANTAGES

The Central LASAR application results must be divided into its customers to the best comprehension.

For Final Customers:

- Metrology management following international standards (calibration intervals, traceability and description);
- Possible use and manage of statistical algorithms to measurement instruments control and qualify;
- Increase of metrological culture inside the companies;
- Low Costs and high quality Metrology assistance;
- Metrological quality costs easily identified

For Technological Centers and their Laboratories:

- Customer fidelity increase;
- Technical resources shar es (reducing customer manager costs);
- Easily incoming previsions through Central LASAR reports;
- Customer Assistance cost reduction due to IP telephony implementation.

For Society

- Improvement in products metrological quality, exploring basic aspects as security and users health;

The solution has been tested connecting CERTI (as a Technological Center) with their customers, showing that the approach is technically and economically feasible for all the different sizes of companies.

Customers have been getting very good impressions from the market, including other customers auditing and third part auditing.

5. CONCLUSION

One of the challenges in sustainable development is the incorporation of principles that can make new processes to do business adapted to this point of view. More than this, it must enclose all the existing systems, including Metrology and process control, available to the market. The Central LASAR is an excellent chance for the implementation of a management integrated system of the suppliers chain, and combining it with the modern communication technologies on Internet. This philosophy can also be expanded beyond Metrology, for other economc sectors in accordance with the companies needs.

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REFERENCES

[1] T. R. Ursini, C. Sekiguchi “Desenvolvimento Sustentável e Responsabilidade Social: Rumo à Terceira Geração de Normas ISO”, to appear in Collection: “Uniemp Inovação – inovação e Responsabilidade Social”, Uniemp Institute, São Paulo, SP, 2nd Vol, 2004

[2] ABNT – Associação Brasileira de Normas Técnicas NBR 16001 - Responsabilidade Social – Sistema de Gestão – Requisitos. Rio de Janeiro, 26 p. 2000.

[3] A. L. M. Oliveira, “Implantação de um Laboratório Associado de Serviços e Assessoramento Remotos como Ferramenta de Disseminação e Orientação Metrológica”, *UFSC*, post graduation dissertation, pp. 1-91, 2005.

[4] L. F. M. Ribeiro, “Inovação da assistência metrológica industrial através de serviços e assessoramento remoto”, *UFSC* post graduation tese, pp. 1-209, 2005.

[5] G. W. Treese, L. C. Stewart, “Designing Systems for Internet Commerce”, 1st ed., *Ed. Addison-Wesley Longman*, pp 1-375, 1998.

[6] T. O'REILLY, “What is Web 2.0”, http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=5, accessed on 2006, Feb, 10th.

[7] Netscape Coorporation, “SSL 3.0 Specification”. http://wp.netscape.com/eng/ssl3/. accessed on 2006, Feb, 10th.