Network model for service providers at health sector in Brazil – SIBRATEC PRODSAUDA case

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Abstract. The term “network” is been used as a logic solution for complex systems with low resources and many actors. Although, only say that a system will work as a network is not enough. A network must have a strategic planning - as a business - with its own goals and organizational model, low hierarchy and different levels of connection and redundancy. The PRODSAUDA is a metrology laboratories network created in 2010 to share resources and connect technologic service providers on health sector in Brazil. Its progress is linked with the State economy and politics situation that is continuously changing. The network must be flexible to change with it, on its model and the positioning of the netweaving team. Strong ties are kinds of connections that should be motivated because those may bring companies and regulators closer a high level cooperative group of laboratories, creating singular impacts for the system.

1. Introduction – About networks
The creation of a sustainable network is a challenge in nowadays. Considering the evolution of information technology and the rise of business based on social networks, the term “network” has been understood as an adequate solution for complex projects with low resources, complex environments and many actors (public and private, central, local) [1]. Therefore, network concepts are being misapplied, leading to discredit the solution. According to Nohria [2], “this indiscriminate proliferation of the network concept threatens to relegate it to the status of an evocative metaphor, applied so loosely that it ceases to mean anything”.

In this context, to adopt the networks model won't guarantee that the planned objectives for an organization will be consolidated. A ”network organization” must be planned and treated like a business, with its own characteristics, strategic planning, goals, marketing, operation plan and quality assurance. It must consider a network as a complex organization focused on sustainability and continuous improvement.

In Brazil different kinds of laboratory’s networks can be found. In a first approach, the national networks could be classified on:

- National networks for traceability and quality assurance, as the Brazilian Network of Calibration (RBC¹) and the Brazilian Network of Analytical Laboratories (REBLAS²);

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¹ Rede Brasileira de Calibração
² Rede Brasileira de Laboratórios Analíticos em Saúde
• Regional networks, as the Metrologic network of São Paulo (REMESP\textsuperscript{3}) and the Metrologic Network of Rio Grande do Sul (RMRS\textsuperscript{4});
• Similar services networks, as the Brazilian Association for Conformity Assessment (ABRAC);
• Specific sectors service providers’ networks \textsuperscript{[3]}, as METRONET, for Oil and Gas, or PRODSAÚDE, these one the focus of this report.

Considering the complexity of objectives and environments, the application of network concepts must be fully understood and implemented according to the system characteristics. The network's configuration influences directly the nodes controls level and cost. For example, a national network, generally in an “extended star” model, has reasonable control but also high costs of the central node, compared to other model.

1.1. Network Models
The application of a network concept in an environment or challenge should take into account as characteristics more adequate for its full achievement of the goals, varying in structure, connection types, positioning of members, size, density, diversity and quality \textsuperscript{[4]}.

Since the works of Paul Baran\textsuperscript{5} in 1964 \textsuperscript{[8]}, the concepts have been transferred between centralized and distributed networks, as extreme points of a normally network, which is decentralized. However, even this network can assume several different configurations that reduce or increase its redundancy and ability to reach established goals.

Depending on the model, a network can have a high cost of maintaining to keep the central node (such as metrology traceability networks) or a low management cost based on the expectation of a self-operation. Figure 1 presents the networks models, their strengths and challenges.

<table>
<thead>
<tr>
<th>Topology</th>
<th>Location of knowledge</th>
<th>Stronger points</th>
<th>Challenges</th>
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<tr>
<td>Star</td>
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<td>Control over content and peripheral nodes</td>
<td>Exclusive dependency of the central node</td>
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<td>Extended Star</td>
<td>Core e Node</td>
<td>Accompaniment and direct influence in the chain</td>
<td>Need for significant maintenance features</td>
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<td>Line</td>
<td>Node</td>
<td>Strong bilateral relations</td>
<td>Low flexibility and speed</td>
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<tr>
<td>Mesh</td>
<td>Node</td>
<td>Low investment</td>
<td>Generate communication without overloading the system</td>
</tr>
<tr>
<td>Fully connected</td>
<td>Node</td>
<td>Dynamic, flexible and very redundant.</td>
<td>To create it and to Keep it</td>
</tr>
</tbody>
</table>

**Figure 1 - Models, stronger points and challenges of networks [7] [8]**

In the case of an extremely complex environment, with agents not governed by hierarchical structures, the network format must be implemented from stimuli for self-organization, but with netweaving directives, or network animation, that allow the development of the relationships within networks.

In a simple way, according to Granoveter \textsuperscript{[6]}, the relations within a network can be in strong ties or weak ties. Strong ties are those relations of neighbors or kinship, where individuals have similar goals.

\textsuperscript{3} Rede Metrológica do Estado de São Paulo
\textsuperscript{4} Rede Metrológica do Rio Grande do Sul
\textsuperscript{5} Paul Baran is considered one of the main actors of the creation of the Internet. He had an idea, in 1964, of creating a network with a form of a great web.
and perceptions. These strong relationships tend to accentuate over time, creating loops in networks and increasing the ability to exchange, integrate and share knowledge, as well as increasing trust. However, it is in the weak ties that radical innovation is facilitated, as they promote the expansion of horizons and individual growth.

As mentioned by Granoveter [6], "... if two individuals have strong relationships, there is likely to be a superposition in their relationships, and the network as a whole is relatively limited. Thus, it is weak relationships that extend the boundaries of networks, connecting groups that have no links to each other."

The concepts of network format and connection types are central to this article, directly supporting the planning of the PRODSAUNE network.

2. About SIBRATEC and PRODSAUNE Network

The SIBRATEC – Brazilian System of Technology was created by initiative of MCTIC – Science, Technology, Innovation and Communication Department, through Decree No 6.259, 21 November 2007, with the objective of supporting the technology development of Brazilian companies, promoting research and development projects, process and product innovation through technological services and consulting.

SIBRATEC supports the creation of networks of institutions, and was structured in three distinct components [1] according to the resolution of its Steering Committee:

1. Innovation Centers - thematic networks formed by P & D institutions with the objective of generating knowledge until the prototype phase, which are intended to promote radical or incremental innovations.

2. Technological Services Networks - formed by laboratories with accredited services, thematically organized, with the objective of supporting the infrastructure and extension of accreditation scopes, support to regulatory structures and conformity assessment systems.

3. Technological Extension Networks - organized by state of the federation, focuses on the solution of small bottlenecks in technological management, product adaptation and improvement of the production of micro, small and medium enterprises.

The PRODSAUNE, a service providers network on health sector in Brazil, was the second network created from SIBRATEC, in 2010, integrating 17 institutions connected from their measurements and tests laboratories, in four different subjects on the sector: Implants, prostheses and surgical instruments; Electro-medical equipment; Dialysis supplies; and Medical supplies.

It is important to consider that other health-related sectors were already being addressed in other networks, such as blood and hemoderivative laboratories, for example. In addition, the system provided a cross-network capability from its ties, when a member participates in several other related networks, such as the Network of Transformed Plastics, Mechanical Manufacturing or Electronic Products and Devices, for example.

Due to diversity of subjects, at the first moment the PRODSAUNE was created using the extended star model, with a coordinator node on a central point, connected to the fund raiser, and sub coordinator for each thematic, connecting the labs on the tips (Figure 2).
However, the dependence of the central node, in addition to not having enough human resources and funds to provide the animation at all levels, drove the network to an overloaded situation, showing that the extended star model was inefficient for that moment.

3. The reorganization of PRODSAÚDE network’s model.
In 2015, Brazil entered into a new economic and political crisis scenario. The funds have become scarce and the revision of the models was critical. Based on this, there is a need to revise PRODSAÚDE's proposed coordination and operating model.

The PRODSAÚDE model was revised based on network theories. Then three new recommendations was created:
- 1st – Focus on the animation of strong ties, maintaining or increasing the sub divisions.
- 2nd – Decentralization of operation activities and the connection with the fund management.
- 3rd – Implementation of quality management system to motivate weak ties focused on innovation and improvement of the health sector.

It means, the sub networks were kept and, initially, the strong ties were stimulated between similar institutions on the network, reducing the sub coordinator control level, which becomes an organizer. The information starts to come from each node, through an internet based system, for everyone on the network, or closed on sub networks, creating new groups based on their interests and work motivations. The fund bureaucratic activities were simplified and the coordinator could focus on the “netweaving” activities. The network redundancy increased expressively, and the central node cannot monitor all the activities anymore, but collect the results at the end.

The resources began to be addressed to those who submitted proposals aligned with the strategic needs of the network and the country's development, according to SIBRATEC's precepts. This meritocracy of the groupings, besides the economic crisis of the country, stimulated a race for the remaining resources and a new animation of the network, creating internal competition and demanding the last directive: implementation of the system of quality management of the network.

With the quality management system, the activities are executed according to procedures, bringing transparency and smoothness to the processes of resources utilization, to the network purposes and its contracting processes. The members’ trust in management - now decentralized - depends directly on this tool.

As well as all the action in a complex system, the stimulus does not act equally in all the members, when it was perceived an evasion of some nodes of the network. The way of a new stimulus to the
system, passes through the value analysis of the network. The integration of stakeholders at different levels: other private and public laboratories, companies, government agents and associations, for example, become accepted in the network - each in its own role.

The interaction of integrated institutions and laboratories, disputing internal resources, is now turning to the approximation of competencies with the demands in the market. The characteristic of the health sector was translated into a strategic positioning of market focus for the network, since many of the services offered were simply not recognized as useful by the current Brazilian market. Resources once destined to the acquisition of infrastructure or services to increase laboratory quality were redirected to activities - for example - training of professionals in industries and other laboratories in Brazil with the creation of the "PRODSAÚDE Academy".

The strong ties between laboratories were then stimulated by constant and regular on-line meetings (instead of sporadic face-to-face meetings), with solution goals and targeted issues. The problems are categorized for the actions in network directed to the precompetitive approach of the laboratories, in actions of support to the national normalization and qualification of the consumer market of services, for example. Figure 3 illustrated this evolution of PRODSAÚDE configurations.

4. The future of the network
The rise of network redundancy made PRODSAÚDE starts to grow up with new laboratories and create new types of members: governmental agencies, associations and even companies. The combination of expectative brings new complexities as weak ties [6], considering new resource fonts and the access to the market. The laboratory motivation is increasing as far as it grows the number of customers and regulators connected, as market pull.

It is expected, in this sense, that these disturbances in the original model spontaneously create new clusters, with specific focus, that can use multiple sources of development. In the same direction, previously obvious groupings can be dissolved without affecting the system. Redundancy grows from these groupings and creates new weak ties that, over time, can become strong bonds from new business models.

With the approach among the stakeholders of the sector, the network should seek thematic for the development of all. The increase in the perceived value of the network members will - certainly - be the development of the metrology consumer market and conformity assessment. In order to deal with the issues from the prior knowledge of the companies and to seek evolution, in the concept of the Market Pull, it is necessary to change the focus of laboratories working in the health sector, sharing their contributions in time and resource for the improvement of quality with training and the evolution of companies.

A proposed theme, for example, is the positioning of laboratories as inductors of advanced manufacturing. The discourse of the past (better measurement uncertainty, accredited quality,...) is directed towards the competitiveness of companies.

Figure 3 - Evolution of PRODSAÚDE model.
References


