Need for ICTs Assessment in the Health Sector: A Multidimensional Framework

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Abstract: What are the various impacts of a massive deployment of ICT solutions in the health sector on the objectives of various initiators, investors, and project developers? To get the answer to this question, a robust and multidimensional model needed to be developed to evaluate planned technology projects. This model also had to be of use in making decisions on expanding these technologies. Some authors have presented models based on the HTA (Health Technology Assessment) method which they anticipate completing. This article presents a universal multi-criteria and multidimensional ICT evaluation model: GEMSA, Grille d'Evaluation Multidisciplinaire Santé Autonomie [Multidimensional Evaluation Grid for Health and Autonomy]. The medico-social sector which relies on evaluation procedures to identify needs and determine the means of compensation favourably welcomes this method to refine the available methods. The proposed evaluation framework is based on five specific categories: strategy, technology, quality and usage, organization and economics. Actual tests have been performed to validate the operational value of the grid and to implement indicator measurement.

Key words: ICT, telemedicine, telehealth, evaluation, decision making aid, indicators.

Several services based on information and communication technology (ICT) exist to meet the needs of people in many different situations related to health: people impacted by age, handicaps, and illness; people that surround them such as families, home-care, social workers; healthcare professionals including activities like telehome care, teleconsultation, telemonitoring, etc. e-Health is defined as "a new term needed to describe the combined use of electronic communication and information technology in the health sector […] the use in the health sector of digital data-transmitted, stored and retrieved electronically – for clinical, educational and administrative purposes, both at the local site and at a distance" (MITCHELL, 2000). In France, the legislative situation was originally confined to the characterization of telemedicine defined in article 32 of the law of August 13, 2004, regarding health insurance.

Amendments were adopted within the French HPST law dated July 21, 2009, when article L.6315-1 was added to the public health code. But, what is the value of telehealth for healthcare professionals, patients, companies, and guardians? While companies offer a range of "useful" services and products, demand is low due to lack of proof of the value, usage, motivation, and funding, etc. Even so, decision makers need guarantees to engage resources, especially in a sustainable manner. In order to assist in the decision for developing telehealth, this article proposes to present a global multi-criteria and multidimensional model for evaluating telehealth, called GEMSA (Multidimensional Evaluation Grid for Health and Autonomy). Due to this absence of guarantee and as the level of investments needed for the implementation of large scale ICT projects is important, few of them are assessed. The material on which it is possible to base analysis is scarce: this is a first difficulty to tackle in this paper.

A second difficulty is that to date, an agreed upon evaluation mechanism does not exist that is shared by all stakeholders in the medico-social sector. This absence of a common methodology to assess the results of deploying a technology can certainly be explained by the fact that none of the methodologies used until now was satisfactory or gained consensus. The fact that evaluation mechanisms are now being proposed by the stakeholders, taking part in the sector, has resulted in the use of focused, restrictive methodologies. Those indeed do not take into consideration all of the effects caused by implementing ICT. The most frequent evaluation methodologies in the health sector derive from clinical approaches developed for the pharmaceutical industry. These approaches focus on technical aspects (biological effects being translated in IT technical performances), medical value and medico-economical value. This leads to a situation where data in the literature are poor and not suitable for predictable performance of IT systems. Information concerning the context is missing and the technical system used is poor (CHAUDRY et *al*., 2006). The evaluation of a technology project should integrate not only technical, medico-economic or clinical parameters, but also organizational parameters without forgetting the dimension of usage, as is the case in the others sectors of the economy. Research on this theme should therefore be done by independent and multidisciplinary researchers who understand all the dimensions of evaluating health ICT.

Several reports have presented this need to evaluate this vast area representing telehealth - including telecare, telemonitoring, detection or data

transmission developed for the elderly and handicapped (Alcimed, 2007). The DHOS [1] of the French Ministry of Health recommends "that all new experiments in France must now integrate a confirmed method on the economic viability of this new medical practice" (SIMON & ACKER, 2009).

> "The recognition of telemedicine must go through the generalization of its periodic evaluation in medical-economic terms." (CNOM [2], 2009).

The European Commission "will contribute to development, by 2011, of directives for consistent evaluation of the incidence of telemedicine services, especially their effectiveness and their cost-benefit ratio" (COM 2008 689 - 4/11/2008). The Lasbordes parliamentary mission (LASBORDES, 2009) stated "we are still not able to understand with certainty the medical-economic incidences of telemedicine, with less than 10% of studies having used reliable and precise review of this problem, both in France and overseas", and proposes the establishment of an interministerial delegation for telehealth whose responsibility would be to "participate in the evaluation of the implementation of telehealth on professional practices and the quality of care (with the HAS [3]), as well as on the technical (along with ANSSI [4]), economics and organizational (along with ANAP [5]) aspects and its impact on the cost of Healthcare Insurance (along with CNAMTS [6])".

The objective is to initiate research on telehealth evaluation tools (from a much wider perspective than just telemedicine): how to evaluate it (considering the heterogeneity of the applications, actions, etc.), what methods to use, what indicators to consider, which stakeholders, what results to expect? The approach can only be qualitative and constructivist because:

- large scale ITC systems in the health sector are scarce;
- no data are available covering the whole domain of ICT value in the health sector;
- even when clinical data exist, they are limited to very specific applications and organizational parameters, which are known to have a

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1 Hospital management and health organization, since become DGOS - Direction générale de l'offre des soins [Healthcare General Management].

2 National Council of Doctors.

3 Higher Health Authority.

4 Agence nationale de la sécurité des systèmes d'information [National Agency for Information System Security].

5 Agence Nationale d'Appui à la Performance [National Performance Support Agency].

6 National Health Insurance Fund for Salaried Employees.

high importance in the clinical field (DIJKSTRA *et al*., 2006). However, the various European states agree about a necessity of assessment in order to lead to a benchmark and a sharing of methods or indicators selection. Therefore, they support initiatives such as those presented in this work.

First, we will show the interest in going from a generally single criteria evaluation to a multi-dimensional evaluation by basing our assumptions on a review of the literature on the proposed models (qualitative approaches). Secondly, we will present the GEMSA tool [7], its advances and prospects.

■ From single criteria evaluation to multidimensional telehealth evaluation

Telehealth evaluation has gone through several stages: the first was technical validation (the 1990's), then medical diagnostics and to a lesser extent economic evaluation (the 2000's). Medico-social sector evaluations covered clinical and financial aspects (reimbursement or not, services rendered or not) but only included one aspect at a time. We have already explained in the introduction the reasons of that (transfer to ITC of approaches developed for the pharmaceutical sector, followed by the sector of medical devices). Our purpose here is a) to mix all of the aspects within an integrated approach as it is needed in real life for decision making; b) to extend the coverage of the evaluation to all other aspects of the ICT value, as they are known in the other sectors of the economy: organizational issues, project management, economical models, use value, to quote but a few. We have been able to define a global methodology which is understandable within the context of the way ICT health/autonomy is evaluated.

First, we would like to present the foundation for health technology evaluation, called the HTA, Health Technology Assessment. Several models using this method have been proposed in literature.

[7] *Grille d'evaluation multidimensionelle en Santé Autonomie* [Multidimensional Evaluation Grid for Health and Autonomy].

Health Technology Assessment framework for a multi-criteria proposal

HTA is defined by the systematic expertise of properties, effects or other impacts of technologies on health (KAZANJIAN & GREEN, 2002): HTA is "a research-based, usage-oriented assessment of relevant available knowledge about problems in connection with the use of technology in relation to health and diseases" (Danish Centre for Health Technology Assessment, 2008). In this context, there were a variety of technologies involved with telehealth as the subject of an HTA because "Health technology is defined broadly as procedures and methods of prevention, diagnostics, treatment, care and rehabilitation, including equipment and medical drugs" (Danish Institute for Health Technology Assessment, 2000). HTA analyzes the various situations where the use of technology has an impact. Four main elements are studied:

- technology,
- patients,
- organization,
- economics.

> "For the purpose of HTA, telemedicine should be regarded in terms of the interaction of the equipment and the information transmitted with the activities of the health care professionals who used telemedicine, and the consequences for patients and others who are their clients " (HAILEY, 1999).

HTA offers a structure for multi-faceted decisions. To evaluate telehealth, it is necessary to take into consideration the complexity of the environment, integrating all stakeholders (doctors, paramedics, patients, hospitals, guardians) and introducing quantitative and qualitative variables one at a time in an evaluation procedure. Along with the criteria of cost and access, other criteria such as quality of care, quality of life, wellbeing, time, effectiveness, etc., should be added (LE GOFF-PRONOST, 2005; LE GOFF-PRONOST & NASSIRI, 2005). This type of approach was recommended by the French Ministry of Health (SIMON & ACKER, 2008) but has not yet been tried. Therefore the objective of this article is to try to complete the work on outcome indicators presented by SCOTT *et al*. (2007) in which the team stated: "A striking aspect of the growing telehealth literature is a lack of consistency between studies in terms of evaluation frameworks used, outcome indicators and measures available and adopted, and tools available and applied" (SCOTT, 2007).

The multi-criteria methodology of decision making (ROY, 1985) helps the final decision maker to make a decision. If the final decision maker is the

State which needs to reflect on the need or not to start actual telehealth projects, the choice will depend on a few actions: expand telemedicine, to not expand it, expand it to several specialties, to several entities, etc. Each decision is harder because each agent has a different perspective. In addition, decisions are influenced by longstanding ignorance of the effects and uncertainty about development.

Decision making tools result in a better choice of action, or to classify the various actions, or only to formalize them in a systematic way. There are several methods. The first consists of coming up with the weighted average of the criteria. The primary problem is in the qualification of weighting. The second is based on utility. The third approach is called upgrading where side by side comparisons are made. The objective is to be able to help the decision maker set priorities. Deeper investigation into the data helps him to review the significance that he had initially attributed to certain criteria more easily. This type of tool also provides the ability to enter into a negotiation by placing into evidence the disagreements between stakeholders (MARESHAL, 2001).

Doctors practicing telemedicine should be able to show to their hospital management that the benefits in terms of healthcare organization are greater than the investment costs in the long term. Doctors can reassure patients by providing much better healthcare, safety, a drop in risky transport, and improved well-being as a part of a different doctor-patient relationship. In terms of applying this evaluation method, it is necessary to make an inventory of all the alternatives, to list the criteria, to propose a weight for each criterion, to make a decision on the value for each criterion and to aggregate these decisions. If you base the performance of alternatives for a given criteria on several indicators, the first problem is how to measure them. Based on this, and the need to avoid a single measurement, we propose a broader health/social ICT evaluation model which is more encompassing of all the dimensions required for any evaluation.

Telemedicine Models proposed in literature

While most evaluation tests are still mono-disciplinary (medical, technical, economic, sociological, etc.), BASHSHUR, in 1995, had already proposed a matrix that compiled the positioning of the various stakeholders (patient,

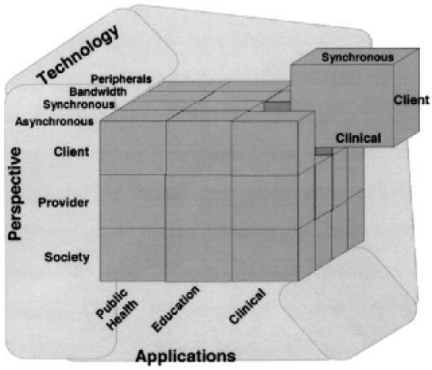
doctor, society) and the objectives of new technologies (specifically telemedicine) at the same time, including access, cost and quality.

Table 1 - BASHSHUR (1995) matrix on telemedicine effects

	Perspective		
Effets	Client	Fournisseur	Société
Accessibilité			
Coût			
Qualité			

Teleheath implementation is based on three major evaluation categories (Table 1), quality, access to care and cost. Ten years later, BASHSHUR (2005) extended his study by proposing a 3 dimensional perspective, a typology of various implemented technological systems (synchronous *vs*. asynchronous, linear *vs*. non-linear, and the type of diagnostic and treatment peripherals, Figure 1).

Figure 1 - Three dimensional model for evaluating telemedicine (BASHSHUR, 2005)



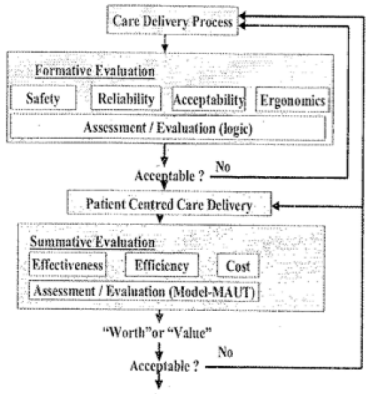
This was combined with the work of the Institute of Medicine (1996), the Australian New Zealand Telehealth Committee (2000) and the National Telehealth Outcome Indicators Project (2007).

HAILEY *et al*. (1999) constructed an evaluation model also inspired by the HTA method. They applied it to telepsychiatry and concluded that the evaluation had to be done locally and therefore it was difficult to generalize the results. In parallel, other authors explained the questions to ask before developing a telemedicine evaluation protocol (LOBLEY, 1996; McINTOSH, 1997) or proposing a set of methodology tools (SICOTTE *et al*., 1998;

CREDES, 2000; Ministry of Employment and Unions, 2001). The essential point (and the main problem) was still to determine the main indicators (management, effectiveness, quality, and usage).

Work by SICOTTE (1998) proposed an evaluation in five steps: analysis of implementation, interviews, effects, presentation, and strategy. DECHANT (1996) offered another method by breaking down the evaluation into steps based on various aspects of the technology used. This method identifies, at each step, the technological changes to propose to reach fixed objectives. CRAMP & CARSON (2003) flowcharted the evaluation process for implementing telemedicine in two steps (Figure 2). In the first step, they evaluated the care process using a conventional approach to evaluating a technology. In the second step, the authors took into consideration subjective and intangible values such as the doctor's acceptance and patient satisfaction. "Indeed, there are so many factors and activities to be considered that is only possible to assess an innovative technology and its particular worth or value within a formal framework which can yield findings that are relevant not only to policy makers and practitioners, but also to patients and other stakeholder" CRAMP & CARSON (2003).

Figure 2 - Process for telemedicine evaluation according to CRAMP & CARSON (2003)



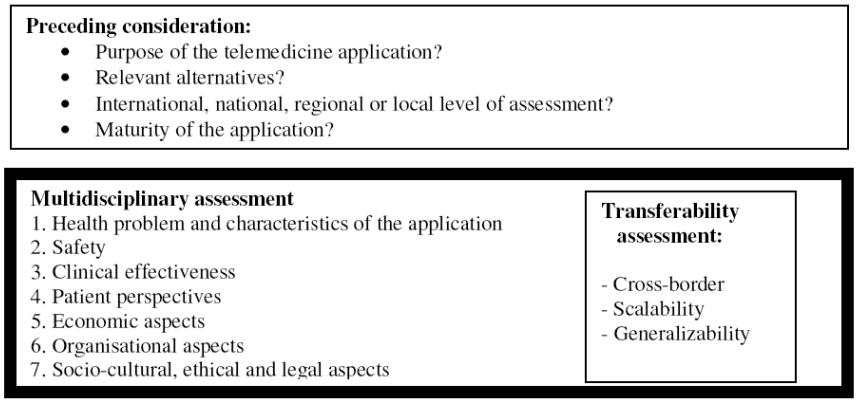
The National Telehealth Outcomes Indicators Project (SCOTT *et al*., 2007) and the Telehealth Supplementary Criteria developed by the Canadian Council on Health Services Accreditation (Canadian Council on Health Services Accreditation, 2006) tried from their end to propose a national telemedicine list of indicators. Four areas were studied: quality, access, acceptability and cost.

An attempt is currently ongoing in Europe through the "MethoTelemed" project. It offers an overall telemedicine evaluation tool (new model for assessment of telemedicine – MAST) (MedCom & Norwegian Centre for Integrated Care and Telemedicine, 2010).

> "The main outcomes of the project are proposed methodologies to guide academic endeavours as well as policy decisions".

It also uses the Health Technology Assessment as the starting point for its research. The defined evaluation criteria cover seven general areas (Figure 3): problems with health, safety, effectiveness, patient perspectives, economic aspects, organizational aspects, sociocultural aspects, ethics and legal.

Figure 3 - MAST Framework
(MedCom & Norwegian Centre for Integrated Care and Telemedicine, 2010)



As the authors stated before, no one was able to validate the proposed models quantitatively. In fact, telemedicine is based on experiments of limited duration, in particular contexts. Today, the specificity of these experiments does not allow generalization or comparisons. That's why a new European project has been set up as a result of MAST called "Renewing Health", Regions of Europe working together for health, whose purpose is to define an evaluation protocol and a set of indicators common with the will to validate it in different regions of Europe.

They offer a multi-criteria analysis database without defining it or proposing and without measuring various indicators, the outcomes to reach and reference values. We will expand this research by proposing another type of representational graph (radars) to more quickly approach a global value for telehealth projects.

■ Proposal for a global evaluation framework

We propose an original and multi-dimensional evaluation framework whose objective is to identify the value of ICTs for the medico-social sector and their value add compared to more traditional practices or the lack of any care or services. First, we will clarify the methodology used. Secondly, we will present the evaluation framework, then its objectives and status. Then, we will conduct an inventory of the problems encountered for finalizing the proposed process. Finally, as this matrix is in the test and usage phase with several stakeholders, we can present the status of its testing.

Methodology

We started with a review of the literature on evaluation tests performed (LE GOFF-PRONOST, 2003). As a result we decided to develop a new, integrative, qualitative approach. This approach is based on a) written material available in the field, and b) qualitative semi-structured interviews.

Concerning the first source, we selected as basic documentation the texts of all evaluations recommendations published in France by the public authorities (12 documents, each between 10 and 50 pages) completed by the recent European 1st AAL call. As we were looking for new dimensions to be evaluated, we did not encode this material with predefined categories coming from existing models. Such an approach would have levelled the risk of circularity consisting in the belief that we have validated a theoretical model with the material whereas the material has been formatted so that it corresponds to the model (AYACHE & DUMEZ, 2011). The results took the form of a list of items supposed to be related with the value of projects in the ITC for Health field (PICARD, 2009a).

We converted this list into a questionnaire, to gather information from parts interested in this value. The questionnaire has been published in a "Guide de documentation des projets TIC et Santé", Appendix 2 of a CGIET Report (PICARD, 2009b)

We hold then the interviews with about fifty telehealth developers with various perspectives (companies, regulators, patient associations, etc.) to list the various perspectives on the value of a telehealth project. In a qualitative approach, we need to select a sample of actors, representative in terms of diversity, and also using recent technological solutions. The

recruitment was made on a voluntary basis, information having been disseminated through contacts with representative professional organizations. We have made the assumption that the responses to the questionnaire are selected and formulated in a generic fashion with the help of a few experts. It could be used for an overview of global project evaluations. All it took was to find a structure for the questionnaire, developed based on various pertinent disciplines.

This resulted in the first indicators matrix which was done by a research team of five people: a doctor, a generalist engineer with experience in telemedicine and telehealth, an internationally renowned hospital doctor expert in telehealth; a medical specialty expert in quality and healthcare evaluation, especially patient health system relationships; an economist expert in economic evaluation of telehealth and its usage; and finally an engineer expert in organization with a good understanding of the health-social sector. The resulting work was finally put before the expertise of a public health doctor, an epidemiologist, a manager specializing in social services and an investor in social projects.

Each disciplinary area was therefore associated with a set of (sub) categories (five or six depending on the area). The final objective was to be able to give a value (eventually subjective, assessed by the evaluator) to each variable in each category and thus derive a "visual" score. We based it on multi-criteria decision making methods where various evaluation scales were used (varying from 0 to 5 or 0 to 3) compared to a category or a reference. The tool makes it possible to classify various comparison alternatives as a function of a set of criteria and sub-criteria. The evaluation of these criteria depends on the type of perspective taken into consideration. Therefore, this method provides an overall view of the study results while considering the impact of a telehealth network on all of its users.

Proposing an evaluation framework

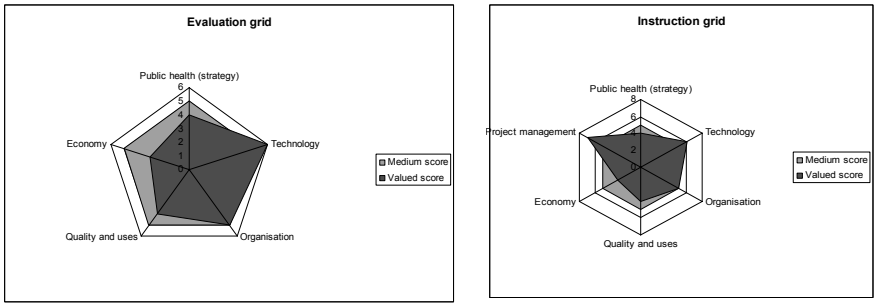
A proposal from experts, supported by on-site tests (located in various French regions : Lyon area, Franche-Comté, Rhône-Alpes, etc.) and validated by an institute from the Ministry of Health, made it possible to develop the general evaluation framework, which is now presented in the form of two radar graphs (Figure 4):

- the first graph is for an instruction grid whose objective is evaluation before projects go out for bidding on a project so that a decision can be made on resource allocation;
- the second graph is for an evaluation grid after a project starts, to review it at all stages of a project (start (T0 phase), during execution, and at the end of a project).

The two radar graphs have five general categories:
- Strategy: "How and what will the project contribute to resolving a clearly identified public policy in the health and social fields? ";
- Technology, technological and industrial expertise: "The type and extent of innovation brought by the solution, are they defined, understood, in accordance with professional and standard requirements, and is the developer of the solution credible and able to implement and deploy the solution? ";
- Organization: "What are the benefits of the solution to the overall functioning of the users within the framework of their missions?"
- Quality: "Does the service rendered by the solution to professionals and patients and their support groups have the characteristics required in terms of quality, usefulness, and satisfaction with meeting their fundamental needs?"
- Economics: "Is the project economically viable and does it generate new economic activity? ".

In the instruction grid, we add another dimension:
- Project management: "Is the project under control with regard to its expected goals? (consistent with the objectives, pertinence in terms of project management)".

Figure 4 - Evaluation grid and instruction grid



During site visits, it became apparent that, before any instruction, we had to have an overall view of the projects to be evaluated. This is why we felt it

was necessary to propose a "project description" for each project. It is the first useful document in the process, which demonstrates the usefulness of the project, the people involved, an action plan, project time management and a quantitative view of the project.

Finally, the grids that we are proposing should be mainly self-evaluation grids, available to the project manager and/or project developer to better evaluate the project opportunities that he wants to demonstrate or of a project already in progress but whose evaluation results require redirection based on the expected objectives.

The work was organized into four stages, as in the case of a company's self-evaluation:

- the first stage involved the selection and formulation of questions;
- the second stage involved asking these questions;
- analyzing the responses was the third stage
- finally, the fourth and last stage was for conclusions and follow up - generally a date and objectives for a new evaluation.

The manager presided over the gathering an evaluation committee to validate the work and ensure the mobilization of the necessary resources. In terms of applying this evaluation method, we took an inventory of all the alternatives, listed the criteria, proposed a weight for each criteria, decided on the value for each criteria and aggregated these decisions.

Operations and consistency

The grid's objective is to detail the answers for the five categories to ensure proper consideration of concerns regarding each area. For each indicator, we proposed to identify an outcome indicator, including its value in the current phase, as well as a target outcome. To understand the results, we also proposed to highlight the resulting process quality indicator and its result

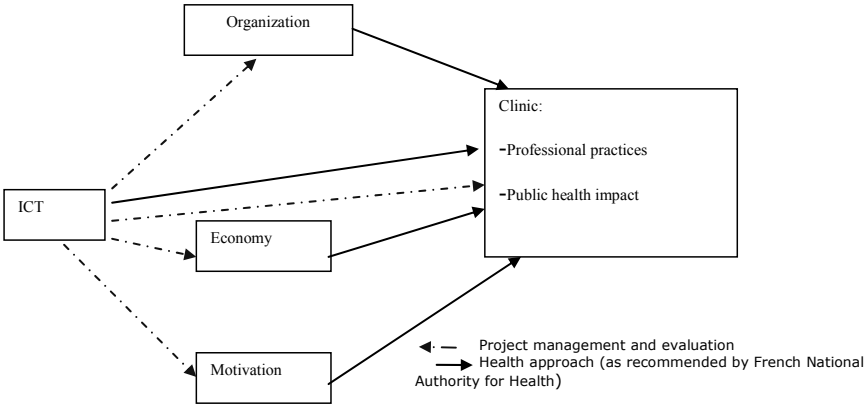
In terms of indicators, we thought about the manner in which to define the measurement criteria. We chose between:

- measurable criteria; but you had to be able to define a reference value or a range from a specification that only an expert could validate;
- qualitative criteria represented by scales that made it possible to position the projects by streamlining note taking and weighing; therefore we chose self-evaluation tools.

The tool was made operational and will be computerized. We have a very strong first version (number of basic questions) which seems complex but has proven adaptable to the type of project involved. We discuss hereafter how the identification of indicators took benefit of existing evaluation approaches: the ICT evaluation and medico-economic approaches respectively. In traditional approaches to evaluating ICT projects, which we classify as "management" approaches, the project itself comes first. Evaluation includes an appreciation of its impact on the socio-technical systems in which it is inserted. It refers also to project management and the confidence accorded to the team in charge of finishing the project (competence, experience): organization, stakeholder benefits, economic viability, change in professional practices and contribution to the strategy of the owner. The impact of the project in clinical terms is outside the scope of this type of approach.

In contrast, in medico-economic approaches, this last aspect is central and takes the form of a demonstration of the project's contribution to improving public health and professional practice performance. This criterion is essential. Technology is one of the levers to reach the expected results. Other levers include the healthcare organization, professional practice improvement and economic measures: rates, remuneration of professionals, cost of tools. But the indirect benefits of technologies, the optimization that they can bring to these levels, such as collective organizational economic or practical plans are not taken into consideration. These approaches generally are not able to ensure that the levers impacting these aspects (organization and rates, for example) are effectively implemented. We propose to take benefit of these two approaches in combining them, as shown in Figure 5.

Figure 5 - Comparison of the approach for economic evaluation, by practice, recognized by healthcare authorities



The analysis and measurement of the contribution of an ICT project to improving public health and professional practices extend to the indirect effects resulting from organizational changes and new uses of technologies as a result of the project, as well as the economic impacts: productivity, efficiency of personnel and the organization.

Problems encountered

The multi-disciplinary evaluation grid design presented has encountered two main challenges:

- While it is possible to develop a pertinent questionnaire for the interviews to cover concerns of the stakeholders (owner, project manager, users - healthcare professionals, patients - technical managers, managers, investors), it is more difficult to provide the scales to generate an objective measurement of the results obtained. The fields of scientific knowledge provide consistent and relatively complete rendering of the interviews. But the scales are most often defective. This problem was avoided in our approach by introducing qualitative appraisal scales - beneficiary judgment and "expert" appraisals. This method is akin to the self-evaluation methods of organizations such as those proposed by standards bodies for evaluating companies, specifically the EFQM method (European Foundation for Quality Management) and ISO9000 series. The concept at this level is that if research developed in various scientific fields, in particular in the heath and autonomy sector, can be broken down into new scales, these new scales will eventually substitute for the subjective scales proposed.

- A second issue concerns project diversity. This requires developing a significant number of questions to cover all the possible cases. For example, for the "strategy" category, which covers the question of the contribution of the project to public policy, a questionnaire must be developed for successively asking about the impact of the project on its various policies: public health, autonomy assistance, social policy, medico-economic value, etc. The same complexity is found in other evaluation categories. For the "organization" category, for example, questions must cover healthcare establishment projects as well as projects for cooperation between establishments or between general practitioners and the hospital. This results in a broad evaluation grid which could potentially be difficult to use.

The way to improve this situation would be to propose a project typology, covering the most frequent cases. Each type would then be associated to a

particular profile extracted from the grid, simpler and directly pertinent to the case being studied. This goal was made part of the initial study specifications. However, there was no way to achieve this goal because the sheer number of cases that would have had to have been considered in the generic grid was too large due to the diversity of the projects in this sector. These types should eventually be identified as going along using the grid. This work should be the subject of new research.

GEMSA, as an enlargement of the HTA framework

One of the main objectives of the European Union is not only to improve but also to share evaluation methods all around Europe. This would lead rapidly to abundant and robust data at European level, for the benefits of European doctors, scientists and Industry. The HTA method is the reference in terms of medico-economic studies. We can see in table 2 that GEMSA and HTA models are not to far away from each others: Organisational and economic aspects are discussed in the same way. The axis strategy of GEMSA encompasses all aspects of public health, clinical outcomes and more global aspects (regulations, ethic ...). GEMSA grid goes beyond the notion of safety for the technology part and includes interoperability issues, standards, reliability ... One advantage of the GEMSA grid is the ability to conduct the evaluation for any points of view. Therefore, the patient's aspects are related to their quality of life, but also their satisfaction, care quality ... that exists in "patient perspective" of HTA. However, it seems important to show the concept of use to clarify the concept of acceptability.

MAST project adapts precisely the theoretical framework and the various criteria of HTA. It is the most recent work concerned with Health ICTs. The MAST toolkit proposes a list of adjusted outcome measures. But no link is proposed between indicators and research fields able to bring new responses to evaluation questions. MAST is also short for tackling investigation tools, which are present in GEMSA and not referred to in MAST. So we propose to see MAST as a first step toward a broader methodology like GEMSA. But to make it happen, it is still necessary to match indicators from both approaches. It will then be possible to expect a complete methodology and at the same time to start to gather immediately structured data issued from different fields of experience. Furthermore, GEMSA goes beyond medico-economical aspects and tackles issues like project management, field management, operations, technology management, to quote but a few.

Table 2 - Reconciliation between GEMSA and HTA core model

Criteria of HTA / ***GEMSA***	*Health problem and characteristics of the application*	*Safety*	*Clinical effectiveness*	*Patient perspectives*	*Economic aspects*	*Organizational aspects*	*Socio-cultural, ethical and legal aspects*
Strategy	X		X				X
Technology		X					
Organization						X	
Quality and usage				X (patient experienced quality)			
Economic aspects					X		

Applications of GEMSA

The GEMSA instruction grid was used as part of a recent national public request for projects covering home-bound chronic illness. The resulting appraisal revealed a general need, by industry, service providers and hospitals alike, to better define the problem of home-bound health and autonomy in all its dimensions and to better understand the medico-social sector and its ecosystem, to understand the needs of patients, families and friends and professionals. In addition, it appears that even companies and services, including the largest ones, need to better understand the contributing value of other industries with whom they are not accustomed to work.

Currently, a reference center in France is using the grid to complete an evaluation file for common strategic initiatives for the scientific committee. They retained the six categories, including considering project management as one of the categories. Some subcategories were included for each category. The evaluators must comment on 5 per category. The range is 5 = excellent, 4 = very good, 3 = good, 2 = fair, 1 = mediocre, 0 = eliminate. Each note is accompanied by a comment. "Organization" and "Economics" categories have a weight of 1/2 while the other categories have a weight of 1.

The instruction grid resounded in particular with regional development agencies wanting to support innovative initiatives but also wanting to be consistent. The instruction grid became a useful tool to the extent that it identified valid criteria for making choices in the medico-social sector.

It was first used by an economical cluster (collection of companies) located in the center of France to identify criteria for categorizing projects received. The five categories of the grid were retained, and from these five categories, three subcategories were chosen. In the end, each subcategory was given 3 points with a weight of 1. A second application of the instruction grid was formulated by a center for innovation in health and autonomy. The objective was to be able to issue requests for projects and identify those to keep according to a set of predefined criteria. The GEMSA grid was also used to generate a GAP grid, where five categories were used. Within the categories, sub-themes were identified and for each of these themes there were four possible levels of responses:

- Level 0: theme not covered
- Level 1: put forth / covered / present/ identified
- Level 2: positioned / considered / measured / formalized
- Level 3: analyzed / discussed / validated by recognized methods.

Currently, the GEMSA evaluation grid has also been tested as part of a European project, Interreg IVP "Sudoe" where the evaluation of telemedicine projects is a specific task in the specification. This project established a committee of evaluators by region. They are looking for a dynamic evaluation model that monitors projects at regular intervals. It required each evaluator to select three subcategories in each of five GEMSA categories which appeared to them to be the most pertinent. Then, during a joint seminar, the evaluation committee agreed on a common set of fifteen subcategories which became the point of departure from which each one was free to complete all or part of the other pertinent complementary subcategories. To our great surprise, the evaluators converged on the same set of subcategories. Therefore, no matter which culture, type of telemedicine involved (the project covered teleconsultation, tele-expertise, telemonitoring), which type of telemedicine (in retirement homes, hospitals, at home, call centers) or medical field (psychiatry, gerontology, radiology, ophthalmology, dermatology, etc.), the framework of the grid gave them an operation approach to evaluations and guaranteed a common practice, eventually leading to a comparison of evaluation results.

This work led us to validate the pertinence of the five proposed categories (strategy/public health, technology, organization, quality and usage and economics) to the extent where all the ICT impacts are taken into consideration for all stakeholders. There is a certain consistency between reviewing all these categories together and studying each individually, which provides pertinent information to the decision maker to help in generating an overall view of the project.

These applications of the grid by various authorities will allow them to have a visibility and an inventory of existing projects.

■ Conclusion

In the domain of ICT for health, policy makers, project managers, scientists, clinicians, express a need for an overall evaluation framework. This has now become necessary to make the best choices in terms of adopting technology, validating effective uses, and involving stakeholders. Stakeholders are considered in the evaluation process and guarantee actual value add. Unfortunately, although scientific papers on this topic are relatively numerous, large-scale realizations are rare and few data are available. Even when they exist, they are limited to one or two domains (per example "clinic" and "user acceptability" or "functionality" and "clinic"). There is often a lack of information about the context of the measurement and links with other domains ("technical description" or "organizational characteristics", per example). Literary analysis is very often limited to one or few scientific domains.

The proposed evaluation framework discussed in this paper can be a way to tackle this issue. It is based on multi-disciplinary analysis, taking into consideration all stakeholders points of view. The tool is based on several scientific methods that go beyond just the field of health economics, covering management, engineering, ergonomics, social sciences, medical science, etc. The question it contains has been formulated using existing specifications with the assistance of real-life project managers. The next step is now to use this framework to grasp data from the field in such a way that they are comparable. These data will be then valuable and exploited with a consistent, strong, quantitative approach, what is today impossible.

This tool is now being directly used for selecting projects (instruction grid) and has been used in a national request for projects. As for the evaluation grid, we have a large set of questions that can be asked, covering several cases. The first value of this set of questions, as reported by the users, is that its helps as a "check list" so that no important issue related to the value of their project can be forgotten. This is particularly valuable for the domain "organization" as for the domain "quality" where the expectation of professionals or patients is taken into account beyond the purely clinical dimension - as has been the case in ITC medical projects until now. The

second step for progressing here is to elaborate new scales for proposed indicators as much as needed. It seems to us indeed that the measurement of pertinent criteria is an iterative process where at first an intuitive evaluation may be proposed, then converted using qualitative scales. Validating existing projects provides quantitative measurement, validated by experts.

The consistent desire for a method for evaluating health and autonomy ICTs at the national level supports this overall proposal and, despite its complexity, should result in a shared and dynamic tool. Some European projects have recently joined this effort. Our expectation is to gather soon a significant number of ITC Health projects at an international level. We could then be able to stabilize rapidly a list of agreed major questions and indicators and to collect consistent data. We believe that this should be done at once on the whole scope of the grid. This would avoid bias related to invisible influences of forgotten factors or insufficient description of selected domains.

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