Technological Accessibility for People with an Intellectual Disability: A model for Organizational Support

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Abstract—**For a few years, technology has created an effective revolution in the field of intervention among people with intellectual disabilities. The use of such technology contributes to social inclusion and participation of the people in their community. Unfortunately, several obstacles are encountered by social services during the implementation of technologies among people with intellectual disabilities. A research with new ideas and new results was conducted with 11 managers in the field of social services to identify their needs and expectations as well as the difficulties they encounter in deploying technology during intervention. This research documents the mechanisms for social services and more specifically the elements that promotes an optimal access to technology. Results have allowed the creation of a management model supporting the application of technology in the field of social services which is called the Multidimensional Model of Organization's Support. The model is based on three fundamental and interrelated dimensions (management, clinical and technical) and 3 parameters (the user profile of a technological innovation, the type of technology and the life cycle of technologies). Preliminary results confirm the importance of providing different forms of support to clinicians in each dimension according to the identified parameters.**

Technological accessibility; intellectual disability; social services; organization

I. TECHNOLOGY AT THE SERVICE OF THE PERSON WITH DISABILITIES

Recent studies have shown that Information and communication technologies (ICT) have the potential to create a revolution in the different ways to assist people with an intellectual disability (ID) and to support them [1]. These technologies serve two major functions, to deputize for certain disabilities of the person and to promote the learning of new skills [2][3][4]. Currently, research results demonstrate the positive impacts of technologies when applied in intervention with people with ID. These technologies allow people to communicate, to have a valuable employment, to have access to independent apartments, to learn, to establish and maintain social contacts, to travel, etc. [4][5][6]. Their use promotes the inclusion of the people in their community and is a crucial determinant associated with social participation. Currently in Canada, these discoveries generate a lot of interest in the field of social services. The use of technology with people with intellectual disabilities is a real innovation for clinicians as far as it allows the development of practices that are more effective. A strong will, therefore, emerges in order to integrate these different technologies to intervention practices in intellectual disability so that more people can enjoy the benefits associated with the use of these technologies. However, the implementation of technology in the social field requires the consideration of a number of essential conditions.

A. Conditions associated with the implementation of technology in the field of social services

Although these technologies can create a revolution in specialized intervention, the social field intervention environments have only very little information on the conditions to be put in place in order to deploy adequately and successfully these different technological solutions. Many managers mistakenly believe that the only layoff technologies in their organization will be associated with an increased use by clinicians [7]. However, a successful and sustainable implementation of technologies requires the consideration of many factors (establishment of a vision on the role of technology, specific goals for implementation, precise evaluation of necessary resources (technical and professional), risk assessment, setting up an effective communication system, etc.) [8][9][10]. Moreover, it is essential to consider the technical characteristics of the technology to deploy, the user profiles and the life cycle of the technology. To effectively implement the technology in their organization, managers should review their management frameworks.

Unfortunately, managers do not have models to guide them in the deployment of technology in their organization. Therefore, the use of technology is achieved by a few clinicians on an individual basis and approaches are mostly "trial and error" procedure type. This approach is unfortunately not viable for a large-scale deployment of technologies in rehabilitation centers. The absence of a framework and guidelines for the management of

technologies used in the social services field is currently the main obstacle to implement the technology in these environments. The social service field should then develop management strategies to ensure efficiency while integrating these technologies without adding a financial burden to develop the practice in a context of fiscal restraint, taking into account the fragility of the process associated with the implementation of technological innovation. Research results shows that if those conditions are not taken into account, the technology will be implemented with a lot of difficulty and it will easily be untended by clinicians.

The paper will first present the qualitative research conducted with managers of rehabilitation centers. In a second section, the model developed by the research team is presented. The 3 dimensions and the 3 parameters are then described. The article concludes by presenting the next steps of the research project. Results and the model are briefly discussed in the conclusion.

II. PERCEPTIONS OF MANAGERS ON THE ROLE OF TECHNOLOGY IN THE FIELD OF SOCIAL SERVICES

In the next subsections we will present the objectives of the research, the method for data collection and results synthesis.

A. Research goal

The goal of this research is to develop and implement a business model guiding the implementation of technological innovation in Rehabilitation Centers for Intellectual Disabilities. This research is done in three phases. Phase 1 (2010-2011). Develop the management model based on interviews conducted with managers from Rehabilitation Centre for Intellectual Disabilities. Phase 2 (2012-2013). Implement the model through a pilot test in two Rehabilitation Centers for Intellectual Disabilities. Phase 3 (2012-2014). Documenting the implementation of the model and assess the impact of the technology use by the clinicians.

B. Method of Phase 1.

The paper presents the results of the first phase. This phase was carried out in two stages. First, interviews were conducted with managers. In a second step, a model was developed from the results obtained.

C. Interviews with managers

Our team conducted a survey with 11 executives from five Rehabilitation Centers for Intellectual Disabilities [11]. The purpose of these was to develop a managing model tailored to these fields of intervention. The research participants are managers who hold senior executive positions. On average, they were occupying this position for 2 years. However, they had in average 19.5 years of experience within their organization. The research used a convenience sampling. Telephone interviews of 25 to 40 minutes were conducted during summer of 2011 and winter of 2012. The interview had two major themes: the role of the technology in the organization and the conditions to be put in place to promote the implementation of technologies.

In order to fully explore the perceptions of senior executives, a qualitative approach was preferred. From the verbatim transcription, a thematic analysis was conducted. This form of analysis consisted at "proceed systematically in the identification, grouping, and, alternatively, discursive examination of topics in a corpus" [12]. The thematic analysis allowed us to identify relevant themes that were related to the objectives of our research and to document the importance of certain themes in our data corpus [12]. Analyses were performed using the software QSR N'Vivo 8 [13].

D. Main results obtained from the managers.

In general, senior managers have a positive perception of the potential of technology, but find that the implementation within their organization is still in its infancy. They identify problems in three dimensions: technological, clinical and management.

When considering the technological aspect, managers report that they are having inadequate knowledge of all the technology products available. Similarly, they are in lack of the equipment that is necessary (devices, incompatible computer systems). The choices to be made on the preferred technologies are also a problem, since they do not have accurate assessment of the potential of each technology to support clinical interventions. The clinical support for the staff on the technological dimension is also a major difficulty.

In terms of management, managers are finding that technology deployment within their organization is not done consistently and without a real structured action plan. Thus, they realize that they do not have a clear vision on the role of technology in their organization or specific goals of implementation. In addition, they operate in a context of fiscal restraint, which does not favor the investments in the technological dimension.

When considering the clinical aspect, managers realize that they do not have in their organization, clinical staff with the skills needed to implement and to use effectively various technologies. Moreover, there is only a small amount of training available to them on this dimension. Similarly, the social field has an insufficient number of professionals in order to explore possible avenues with technology.

Consequently, managers also report the need to structure the implementation of technologies in relation to these three dimensions. Furthermore, it appears necessary to define guidelines for the selection and purchase of technologies. Adequate support for clinical staff on the technological dimension is also majorly needed. Finally, managers want the technology implementation in their organization to be accompanied by an ongoing evaluation of the whole process.

E. Developing the management model

The first phase of the study made it possible to highlight some aspects to consider while implementing these technologies in those organizations. Consequently, these elements have permitted us to propose a multidimensional model of organizations for the implementation of supporting technologies. As mentioned earlier, managers had no

management structure in order to support technology deployment. The contribution of the research is to develop a customized model from an analysis of the situations faced by the professional in the social field services that works with developmental disabilities. The construction of this model was also the achieved by a literature review on the conditions to be deployed to ensure a successful implementation of technological innovation. The contribution of the model is the fact that it considers theories in all the dimensions such as marketing, management, information technology and intervention. The model is then located at the confluence of these disciplines. More precisely, it responds to the concerns of managers who recommend intervention in terms of clinical, technological and management aspect. The following sections present the dimensions of the model developed during the first phase.

III.   MULTIDIMENSIONAL MODEL OF ORGANIZATION'S SUPPORT

The proposed model allows implementing all the conditions that will support a successful deployment of technology in an organization providing services to people with intellectual disabilities. This model takes into account three dimensions that needs to be consider in order to ensure a successful implementation of technologies named as: 1. The clinical dimension, 2. The management dimension and 3. The technical dimension. These three dimensions are constantly interacting with each other. The proposed model allows to coordinate the actions of all the key actors involved. It also formalizes the role of a techno-clinical counselor whose primary mandate is to coordinate the implementation of technologies taking into account these three dimensions. The purpose of the implementation process is to make the organizations autonomous when integrating different technologies to intervention practices in intellectual disability.

A.   The management dimension

In terms of management, the model allows the organization to define a vision of the role of technology with people with disabilities and to implement the various processes necessary to maintain this vision. Thus, it allows to structure the ongoing integration of technological innovation within the organization. In order to achieve this goal, it promotes the establishment of a management structure that allows the evaluation, planning and reallocation of human, financial and technical resources that are necessary. The developed management tools allow managers to quickly assess the potential of technology, to make strategic choices while purchasing these technologies and to optimize the use of available computing resources.

B.   The clinical dimension

Clinically, the model takes into account the contribution that technology can have on the quality of life and social participation of the people. It promotes the development of clinical intervention process that takes into consideration the technologies that are available. It has a structuring effect

since it promotes a synergistic work with all the actors involved in order to develop and implement strategies to support the appropriation of technological innovations that consider the type of user, the type of technology, the life cycle of the technological innovation and time of appropriation. These support strategies can take the form of community of practice, communication tools, group of practice analysis, training, consultations, etc.. Thus, the model allows to set up boundaries so that the Organization can, independently and continuously, develop and adapt strategies of intervention according to the various types of technologies available.

C.   The technical dimension

Technically, the model takes into account different technological parameters that must be considered in order to use technology in an effectively way. It also structures the ongoing and individualized support that must be offered to people who use technology in a clinical intervention perspective. This support guides managers during the budget planning and purchasing of computer equipment to support the intervention. The technical dimension also provides a constant update of the technology and a rapid replacement in case of broken hardware. These two elements are essential in order to prevent technical reasons that could lead to a cessation of the services provided to the people using technology in their daily lives which could have serious consequences for people with intellectual disabilities. Finally, the model formalizes procedures that facilitate testing, the use and loan of computer equipment to support the intervention.

D.   The 3 parameters of the Multidimensional Model of Organization's Support

To effectively support actors working on these three levels, three parameters are considered: the type of technology, the user profiles and the life cycle of technologies. The user profile of a person influences his use of technology, but also his interest to make it accessible to others. Similarly, the type of technology modulates the energy that needs to be deployed in order to make the technology available to people. Finally, the life cycle of technology can target the times when the promotion of a technology must be achieved and when it should be abandoned. These parameters allows to modulate the type of support that will be offered: (communication, training, coaching the purpose and use, practice analysis, etc.).

Fig. 1 shows that in the context of the technologies deployment in an organization providing services to people with intellectual disabilities, the complexity lies in the establishment of a process taking into account not only the three parameters but also the dynamic process between them (adapted from Berkowitz et al. [14]). The establishment of a supporting targeted process is then the preferred solution. On one side, we should avoid putting into the hands of reluctant clinicians (minority appart) technologies that are radically changing their intervention process (long learning technologies); in those situations, technologies without a
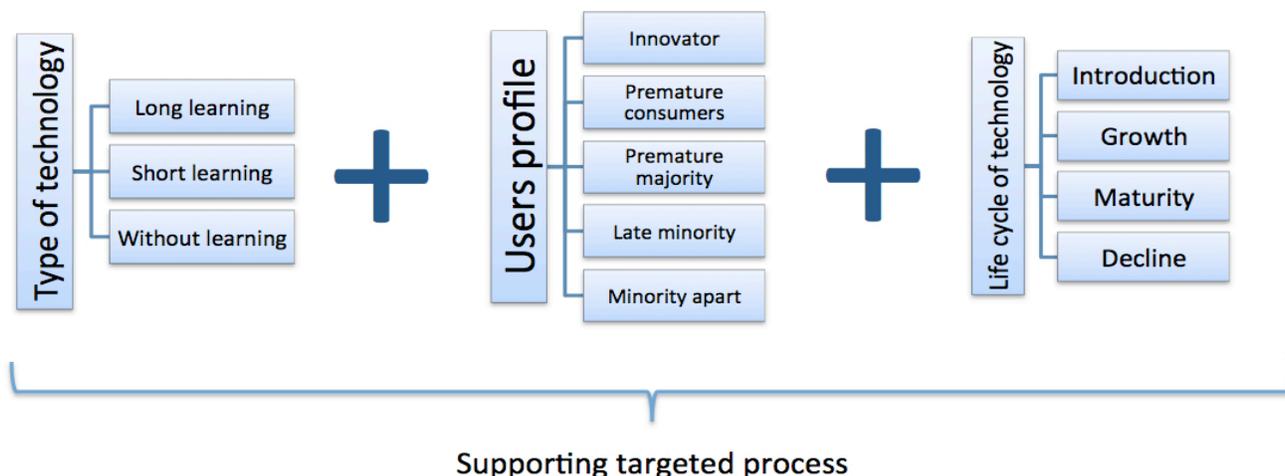
Figure 1.   Multidimensional Model of Organization's Support

learning process will be favored (e.g., a software available online). Conversely, clinicians with an innovative profile will be attracted to more complex technologies (long learning) and have an interest in the technologies that requires a longer period of exploration or appropriation (eg iPad).

On the other hand, the field of technological innovation is an area of development at "high speed". The products are often replaced by new ones and life cycle of technological innovation is well known, as shown in the last component of the model, and it is essential to consider this fact. In the introductory phase, the technology reaches the market and the growth phase is then associated with the increasing presence of the product. During the maturity phase, the technology is used by many people who have integrated it into their lifestyle. In the decline phase, the technology is often replaced by a new product more powerful and more efficient. Schilling and Thérin (2006) [15] estimate the lifetime of a technological innovation (introduction to decline) to less than 5 years. In the field of social services, it means that the exploration phase and the training must take place in the growth phase. The application of the technology with the users must absolutely take place early in the maturity phase. This cycle needs to be performed again with a new technology during the declining phase of the first. The success is partly determined by a crucial strategic planning common to the managers and clinicians. Moreover, the life cycle of technology needs to be considered for people with intellectual disabilities, since it is necessary to establish specific procedures to ensure maximum stability against different types of intervention proposed.

E.   Phases 2 and 3 (2012-2014)

The team is currently conducting Phase 2 by doing the implementation of the model in two rehabilitation centers. The validation of the management model is associated with a strategy of an action research in order to evaluate each step of the process (on-going evaluation process over two years to ensure a readjustment of the ways of supporting as needed). Indicators are then evaluated based on four pivotal concepts: 1) the level of ownership of the technological innovation through experimentation, 2) the impacts on intervention practices, 3) learning achievement regarding the technological innovation, and 4) the knowledge transfer and the impact of multipliers agents in the organization. At the end of the process, the tools for evaluating indicators will be reusable across all the organizations wanting to integrate the technological innovation. This ongoing evaluation of the process is carried out with clinicians and managers.

IV.   CONCLUSION

In the last few years, the social work field had to face a massive influx of the implementation of supporting technologies used for diverse intervention with people with an ID. For these people, the impacts of these technologies on their lives are considerable. This research conducted with 11 managers demonstrated the importance of promoting the multidimensional implantation, taking into account three fundamental elements. This research has then allowed developing a model supporting the implementation of technologies in these environments. This model takes into account the clinical dimension (user profiles, the type and the life cycle of the technology), the technological dimension (support and up-to-date computing equipment) and the management dimension (assessment, planning, risk management and optimization). This model ensures that the organization remains master of the work process and it supports the key players in the development of new expertise. The model finally ensures a sustainable and successful implementation of technologies in support of the intervention. The model is a first step in the midst of social services allowing the efficiently implementation of the technology. This model will not only overcome the obstacles identified but it will also ensure an optimal use of technologies by people with intellectual disabilities. These

technologies will then have the effect of promoting social participation of the people and to reduce the negative impacts associated with digital exclusion of persons with disabilities.

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