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## Low Cost Assistive Technology (AT)

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The development of Assistive Technology (AT) devices has the main objective of increasing, maintaining or improving the functional capacities of people with disabilities in carrying out their daily activities. However, one of the main problems faced in the development of these devices is to understand the real needs of the users and to involve them in this process so that the developed device is actually used and that is effective in helping the user (Cook; Gray 2015; Beigel, 2000).

In the literature, we find works that seeks to understand the needs and perceptions of users, caregivers and family members regarding the use of at (O'neill, *et al.*, 2014, Galway *et al.*, 2013, Alwin, Persson, Krevers, 2013, Scherer, Craddock, Mackeogh, 2011), and others that deal with the techniques that can be used to obtain these data in the development of inclusive products (Dong *et al.*, 2015, Waller *et al.*, 2015; Bühler, 1996).

When dealing with the development of AT for people with physical restrictions, coupled with cognitive restrictions, such as dementia, there is great difficulty in extracting user information that will collaborate in the development of AT devices (Alwin; Persson; Krevers, 2013, Streffing *et al.*, 2011).

The limitations of movements experienced by patients with special needs usually severely affect the performance of activities of daily living and generally compromise the rehabilitation process of these patients.

Farmer *et al.*, (2014) performed a systematic review on the use of AT in upper limb rehabilitation after stroke, and identified that AT devices can aid rehabilitation by bringing benefits in comparison to conventional routine therapy (exercise, stretching and sensory stimulation). The authors also concluded that devices that integrate the various aspects of disability need to be based on basic principles of biophysics and biomechanics needed to restore limb functions due to dysfunctions caused by cognitive and motor sequelae (Farmer, *et al.*, 2014).

In this sense, the use of equipment that helps in understanding the user's needs, at least with regard to physical aspects, can help in the identification and definition of design requirements for Low Cost Assistive Technology. According to Cook and Gray (2015), one of the main informational components in AT device design is the use of effective processes that ensure the identification of real user needs.

Currently the developers wait until the prototype phase to consult the users for financial and time reasons, however, when basic information such as who's the user, what's his needs, capabilities and characteristics is not known, the device is developed under inaccurate information that will lead to errors of development and inadequacy of the product to the user.

In this context, the use of the technological instrumentation associated with the knowledge of physical ergonomics, allows to obtain basic prior information, bringing the prototype of low cost assistive technologies to an ergonomic model ideal and individualized to those with special needs. Performing anthropometric evaluation, as well as defining the physical dysfunctions caused as sequelae of their special needs, would guarantee first of all, more comfort, more safety, greater mobility for day to day activities.

Thus, the movement pattern of these individuals has been studied individually, from the beginning of the planning of low-cost devices (orthoses and prostheses), as an initial requirement of the project, through the protocol evaluation by infrared thermography, electromyography, dynamometry and the capture of movements by inertial power stations (Xsens - MVN), a highly specific and dynamic evaluation of real mobility.

The use of equipment that helps in understanding the biophysical and biomechanical limitations of the patient may represent an advance in the development of AT devices for this public. In addition, regarding the development process of these devices, converting these data into technical design requirements guarantees the achievement of the objectives of the project: a bracing that helps the rehabilitation process, supporting movements and providing safety and improvement of the quality of life for the patient.