

## **Rehabilitation engineering— a growing part of the rehabilitation services\***

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The first objective in creating a better supply of technical aids is to know about the needs of the consumers. This is a sophisticated matter, not least for the handicapped consumers.

Specification of these needs is thus always a complicated process. Interviews with such consumers and systematic observation of their problems in daily life appear to be the best means, but few such investigations have been made, and these often lack necessary details. The statistics about frequency of handicapped groups give only limited guidance.

On the international level, ICTA<sup>1</sup> has done some work in this area, as for example in its publication on need analyses concerning dwelling requirements for different disability groups and requirements of the visually impaired in the environment.

However, the classification of different groups of disabled consumers, based for example, on anthropometric studies, is at present only in a very early stage of development. This is one reason why it is so difficult to quantify the various consumer groups within the handicapped population.

One of the principles for our work at least if we look at the greater perspective, is to integrate the handicapped groups' demands in the relevant goods offered for sale on the market for the ordinary consumer. We have, however, also to face the fact that even among these items there must, of necessity, be some special applications for handicapped persons such as grips for severely rheumatic hands, beds for people with limited ability to move, adapted dwellings for severely handicapped persons. In

these cases it is not enough to create an output of items on the market for the general public, where also the demands of handicapped have been taken into consideration. It is therefore natural to work in parallel with all the other items constructed, tested and produced just for the handicapped consumers. Let us first look at research and development.

### **Research and development (R & D)—where are the resources?**

The R & D concerning technical aids and environmental facilities for handicapped is, as is most R & D, very expensive. The willingness to pay the appropriate costs is limited, especially if the consumer group is very small. One way, perhaps the only one, is through international co-operation.

To develop new aids for deaf-blind persons and other multihandicapped is very expensive especially compared to the number of consumers. But also when the number of consumers is higher, for example hand amputees, there is a need for closer international co-operation. Too much money is spent in isolated places with too little result.

For such co-operation there is a need for some fundamental knowledge. ISPO has a good idea of the resources which are at the disposal of its members through their institutions such as staff, scientific facilities, etc. The source is a register of members meant to be used for identifying specialists and teams for research, evaluation and teaching purposes.

ICTA has a continuous—but not quite systematic and far from complete—registration of institutions involved, showing that these institutions are mostly situated in highly

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<sup>1</sup>International Commission on Technical Aids, Housing and Transportation, a branch of Rehabilitation International.

NORTH AMERICA		
Canada	23	
USA	244	267
SOUTH AMERICA		0
EUROPE		
West Germany	36	
Great Britain	75	
France	12	
The Netherlands	17	
Scandinavia	38	
Others	55	233
AFRICA		4
ASIA		
India	14	
Indonesia	1	
Japan	21	36
AUSTRALASIA		
Australia	16	
New Zealand	5	21

Fig. 1. Distribution of Research and Development institutions—from the ICTA register.

industrialized areas in North America and Europe (Fig. 1). Needless to say all investigations of this type can only give a rough idea of the situation. They are also highly influenced by the location of the investigator. It is supposed that the result would be different if the investigation was made in Moscow or Peking instead of Stockholm.

Attempts to make inventories of planned and ongoing projects are being made by the Smithsonian Science Information Exchange, Inc., Washington, D.C. However, the input of R & D projects in this field to the Smithsonian data base seems to be rather poor.

Other attempts by ICTA are to stimulate different countries to achieve or promote projects of international value. Here may be mentioned as examples a study of airlines and disabled travellers sponsored by the Society and Home for Disabled, Copenhagen, and a study made by the Netherlands Society for Rehabilitation concerning architectural facilities. Simple inventories concerning a certain group of aids on the market are sometimes of value. Such inventories have in the framework of ICTA been made, for example, concerning technical aids for children and on behalf of ICTA by the Department of Health and Social Security, London, concerning electronic environment control systems.

#### Testing and specifications—a key to better technical aids

Rehabilitation International (RI) and its branch ICTA have been aware of the fact that testing and standardization of aids are to some extent of great value.

Testing or evaluation can ensure that the need specifications (standards) are fulfilled. They can give the specifications for producers and others to promote security, reliability and comfort. They can also positively influence the production costs. There are already some national specifications worked out for electric wheelchairs and lifts. On the international level there are standards for hearing aids through IEC (International Electrotechnical Commission).

International standardization is handled by IEC and ISO (International Organization for Standardization). ISO has certain committees where the needs of the handicapped are specially observed. ISO/TC 59 on "Building construction" deals with all questions concerning building. One of the tasks of this committee is to standardize lifts—an extremely important target for ICTA's efforts. ISO/TC 59 has also a special working group, WG 1, which has to take care of the interests of different handicap groups in this connection. ISO/TC 159 "Ergonomics" has the following subcommittees: SC 1 ergonomic guiding principles, SC 2 ergonomic requirements to be met in standards, SC 3 anthropometry and biomechanics, SC 4 signals and controls, SC 5 ergonomics of the physical environments.

RI and ICTA have close co-operation with these technical committees and their branches and have also proposed ISO to take care of standards for wheelchairs, which is planned to be handled in TC 136 on "Furniture" and specially in its subcommittee SC 8 on "Hospital Furniture".

Other ISO committees of interest to the handicapped are, the technical committee TC 145 on "Graphic Symbols" which will handle the symbol of access, TC 22 on "Road Vehicles" and TC 29 on "Small Tools". There are also plans for a TC on Prosthetics and Orthotics in which ISPO will be closely involved.

#### **Information – the beginning and end of rehabilitation technology**

In this survey the necessity of prompt and adequate world-wide information has been stressed in order to ensure that R & D and testing is not carried out in vain. The result of these activities as well as information on new products, new arrangements and new ideas must also be widely disseminated as soon as possible. International congresses like the World Congresses of ISPO and RI are obvious meeting places where these problems are discussed.

Printed publications, conferences and seminars are the means for this part of the programme of both these and other international organizations.

Courses concerning prosthetics and orthotics are continuously being arranged by ISPO and World Rehabilitation Fund. Interbor (International Association of Orthotists) through its

congresses is spreading information in the same field.

Publications which may be mentioned are *Excerpta Medica* Section 19 Rehabilitation and Physical Medicine and Section 27 Biophysics, Bioengineering and Medical Instrumentation, which give a short presentation of most reports and articles printed. This information covers the world literature in this field but unfortunately not until about a year and a half after publication. The list of literature published periodically in the bulletin *Biomedical Engineering*, London, is faster, but does not so completely cover the field and does not give any summary of the contents.

#### **Conclusions**

With these facts as a background we have to develop a programme for a better structure of world resources in this field. That means that we must;

- (a) build models for projects for international co-operation
  - (b) create instruments for mutual information about planned and ongoing projects and about available resources for R & D and testing
  - (c) promote international evaluation, testing and standardization
- and
- (d) structure the international work achieved by different international organizations—such as ISPO, RI/ICTA and others—to the benefit of best use of limited resources everywhere.