Social and Labour Integration of the Disabled (SLID)

Report of stress condition of disabled workers
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Social and Labour Integration of the Disabled (SLID)

Report of stress condition of disabled workers

THE PROJECT

The concept

Social inclusion of disabled and the achievement of equal opportunities of disadvantaged categories is a central subject in strategies and policies of states. Having the social inclusion of disabled as main and holistic objective, their labour insertion is one of the step and one of the mean to join it; together with the other elements that identify a fully social inclusion (e.g. education, rehabilitation, housing, etc.), the job opportunities represent for disabled one of the main obstacles and, much probably, the first challenge for those involved in inclusion policies. In the definition of occupation strategies and of social inclusion processes of disabled, countries have to consider the opportunities of collaboration and co-operation first of all as an occasion of learning and exchange, as well as a possibility for defining wide-ranging policies, more able to intervene in combating social exclusion and discrimination.

The Objectives

The Overall Objective of SLID project is to impact upon improvement of quality of life of persons with disabilities in target Adriatic territories through development of an effective, innovative and integrated cross-border path of interventions for their social and labour integration. The purpose is to increase the capacities of SLID target territories/communities to respond to the needs of persons with disabilities and creation of sustainable cooperation network paths for social and labour integration as an innovative concept of intervention SLID will offer for consideration for transfer and replication in wider Adriatic basin. The Specific Objectives of SLID have been designed to provide solutions to problems that have been identified as key areas for removal of obstacles in order for the accessibility of social and labour integration of the disabled to be improved.

1. To raise public awareness and stimulate information dissemination and mainstreaming about issues related to people with disabilities and the social model of intervention in order to create the most favourable conditions to their full integration.
2. To build, reinforce and sustain the innovative net-working and cooperation among public bodies and private actors; service providers, disability associations and employers.
3. To design, promote and sustain a Lifelong Learning System Initiatives, VET (Vocational Education Training), able to facilitate the access of the disabled to VET and labour opportunities, thus increasing their employability and competitiveness in the open labour market.
4. To analyse, verify and improve the employability conditions of the disabled in the target Adriatic territories.

Target groups

Beneficiaries are disabled people (physical, psycho and/or sensorial), for whom the access to the equal opportunities in terms of education, training and work are reduced. Target group is made of actors, from public and private field, who will be influenced or who will influence the project realization (Local Authorities, Local Health System, Local and Sectoral Development Agencies, Organisation of the Civic Society, Universities and research Centres, Trade Unions
and Employers’ Associations and Local Entrepreneurial System. SLID is also intended to influence the improvement of capacities of target communities to respond to the needs of persons with disabilities through provision of equal access to rights and opportunities. It is also expected to produce Integrated SLID Recommended Paths for Social and Labour Integration of the Disabled for future reference and potential replication in wider Adriatic basin. Hence, SLID partnerships have been carefully balanced between local and regional governments (3), public institutions (3), private non-profit (4), and profit organizations (1) in order to achieve greater impact on how inter-sector, bottom-up and cross-border cooperation is fostered and facilitated, and sustainability of the project secured.

**Programme components**

SLID is organized in 7 complementary and cross-cutting Work Packages (WP) that will be implemented over the period of 30 months. Project Interventions will focus on following programmatic areas: public awareness, education and employability of persons with disabilities; empowerment of stakeholders; user-friendly and accessible cross-border knowledge base and networks, and recommended paths of interventions for future reference. Respecting CBC principles agreed upon during joint project preparation initiated by DES and Split-Dalmatia County, a joint project management and coordination, staffing and financing will be secured. SLID implementation will be directed, supported and supervised by the LB (Split-Dalmatia County) and two committees: the Management Committee (MC) and the Scientific Committee (SC).

**The WP6**

**WP6 – Development of Innovative Good Practices of Social and Labour Inclusion**

WP6 represents experimental component of the project, where project beneficiaries are provided with an opportunity to test the new initiatives/solutions and actions foreseen to trigger replication of similar actions and to increase positive impact on target groups. […]

The aim of the WP is to test what works and what does not work, to achieve and demonstrate concrete and pragmatic application of insertion models, potentially replicate and transfer as good practice for social and labour insertion of people with disabilities.

In particular Iselqui, with its devices, is involved in the Act 6.4 – ICT application “Mobile Care Laboratory (Italy)

**Description:**

ISE will implement a pilot related to development of the BSN services, called Mobile Care Laboratory. A simple non-invasive Body Sensor Network will monitor the physical conditions of the disabled workers. The device will be tested on a group of 10 disabled workers who will be provided with monitoring device bracelets with sensors and smart phones. Bracelets will be distributed to a group of selected workers in Eastern Adriatic countries who live in the areas where mobile networks allow reliable communication body sensors network database. Once the trial period is completed, an evaluation of the potential for future utilization of ICT monitoring and controlling will be produced and presented at final SLID CBC conference
The Device

The project was strengthen by the use of an ICT instrument for disadvantaged people monitoring.

ISELQUI provided the ‘wearable-devices’, developing a range of devices (Mobile Care Systems, http://www.mocas.it) characterized by a single point of multi-signal measurement (activity and fall detection, heart rate, temperature, galvanic skin response). Data elaboration and alarm logic are stored in a measurement device that communicates with a personal mobile hub (a mobile phone or Palm or PC) via Bluetooth.

Wearable sensor is a small bracelet, easy to wear and to use. In particular, its simpler configuration can be integrated in a watch. The research and development of Mobile Care Systems devices is partially financed by a national program (598/94 law, Regione Marche), and MoCaLab is used by CEFRIEL (Politecnico di Milano) and Istituto Superiore di Sanità (Italian Health Institute) as a platform for measuring biological parameters.

The monitoring system that SLID used is based on Mobile Care Systems (MoCaS, www.mocas.it) architecture. MoCaS devices have been developed on the basis of a stable and common technology.

MoCaS are a family of devices characterized by a single point of multi-signal measurement (activity and fall detection, heart rate, temperature, galvanic skin response,…).

MoCaS

MoCaS is an intelligent device that works like a complete Body Sensor Network, characterized by a single point of multi-signal measurement (activity detection, heart rate, temperature, galvanic skin response,…).

BSN are networks of wireless devices used for biological signals monitoring.

All signals are collected by a Personal Mobile Hub (PMH), able to elaborate data and transmit them, on the basis of a predefined protocol.

The “traditional” approach of BSN is based on “dumb sensors” only able to collect digital signal that are then elaborated on a PMH.

PMH can be implemented using mobile phones, palms or custom elaboration units. Data collected and elaborated by PMH are finally sent to a call center. MoCaS architecture is innovative respect to traditional BSN networks: it is based on the concept of an intelligent device.
LOGICAL SCHEMA OF BSN

Architecture of the system

PMH is a simple gateway that sends data received via Bluetooth through the communication channel (PSTN, GSM, IP,…). PMH role is limited to the function of hub to external world. Data elaboration and alarm logic are stored in a measurement device. Wearable sensor is a bracelet, easy to wear and to use. The data generated by MoCaS devices are sent to a central server.
A rehabilitation assessment method using MoCaS devices provides detailed information regarding the person undergoing the rehabilitation.

The device is able to monitor the users in different environments (home and workplace) in order to manage emergency situations and to monitor the stress effects of independent life re-introduction.

The target groups chosen for the pilots foreseen in the SLID project, include people in rehabilitation for reasons of mental and physical health, young people un-employed for long-term who have trouble in integrating themselves into society.

Iselqui and MoCaS aim is to offer new technological solutions to improve their quality of life.

They also contribute to standard definitions from a technological (for exchanging information) and methodological (new practices and paths to be followed in the social and health sectors) point of view, based on and in support of the existing standards and procedures.
The pilots

Some important physiological pointers (such as heart rate and electrodermal activity) are been registered during the normal job activity in a group constituted by disabled people comes from different countries in the Adriatic area (Italy, Croatia and Albania).

In particular, in each disabled person, it is been confirmed that the electrodermal activity is the most sensible and fast pointer in response to the stimuli comes from the job environment.

Skin conductance, also known as galvanic skin response (GSR), electrodermal response (EDR), psychogalvanic reflex (PGR), skin conductance response (SCR) or skin conductance level (SCL), is a method of measuring the electrical conductance of the skin, which varies with its moisture level. This is of interest because the skin conductance is used as an indication of psychological or physiological arousal. Therefore, if the sympathetic branch of the autonomic nervous system is highly aroused, then sweat gland activity will also increase, which in turn increases skin conductance. In this way, skin conductance can be used as a measure of emotional and sympathetic responses. There has been a long history of electrodermal activity research, most of it dealing with spontaneous fluctuations or reactions to stimuli.

The data collected and analyzed during these pilots are part of a project based on the research and optimization of disabled workers. This project, founded by UE, is called SLID “Social and Labour Integration of the Disabled”.

The data are reported to 25 persons: 4 in Italy, 10 in Croatia and 11 in Albania

For each country the disabled people are selected and comes from an association oriented of their labour insertion.

Among these 25 persons there are: 9 female and 16 male, all of them are between 25 and 62 years old.

The data are reported according the privacy law, in fact the data collected by each person is stored using an anonymous method. Each person is called with a capital letter and a number: capital letter is used for a Country (I=Italy, C=Croatia and A=Albania) while the number is used as progressive number to identify the person (for example I3 is the Italian disabled person with the identification number=3). The correspondence of number and the right identity of the disabled person is written in a reserved register, which belongs to each association.

Each pilot is 5 days long and two different pilots are separated by two weeks for technical issues.

To study the most significant data, the criteria used are: to collect the physiological information, to analyze the most complete information and, then, to analyze the most homogeneous information among the different persons

Physiological Data

Stress is a person's response to a stressor such as an environmental condition or a stimulus. Stress is a body's way to react to a challenge. According to the stressful event, the body's way to respond to stress is by sympathetic nervous system activation which results in the fight-or-flight response. Stress typically describes a negative condition or a positive condition that can have an impact on a person's mental and physical well-being.

The answer to the stress depends on the people: same stimuli don't cause the same reaction in different people or different stress conditions can cause same answer in different people.

A example it's possible that the same stress is well allowed to some person but it becomes pathological and create disorders and illness. Furthermore it can happen the opposite thing: a stimulus characterized by an high stress in someone is well allowed thanks to an higher own resistance or thanks to some adapted self-control techniques (not repressive)
That means that an organism follows a well defined biological schema but it’s able to modulate the entity and the level of answer to stress, when it’s put stress upon itself again and again (Timio, 1980).

In some person when the muscular tension decreases, the skin conductance decreases ad well: this is pondered as arousal index. In fact electrodermal response (EDR) is well known as important parameter to provide important information about emotional status of a person. For this reason we can consider that a its fast grown is an unfailing index of anxiousness

In a letdown condition it’s registered as an increase of temperature while when the electrodermal activity decreases it’s registered an increase of temperature ((GSR-TEMP are tie-in in inverse way) . In fact if the muscle tone decreases the electrodermal activity decreases because a higher vasodilatation bring an increase of external temperature

The indexes of psychophysical status are Heart Rate (HR) and Galvanic Skin Response (GSR).

They are tie-in strongly with the activity of autonomic nervous system (orthosympathetic and sympathetic nervous system) and they provide important information about automatic reactions to internal and external stimuli, these reactions are non controlled by the willingness of person [Greenfield and Sternback, 1998; Boucsein and Ottmann, 1996].

Furthermore these indexes are quite easy to measure through not invasive methods without limit the job activity [Fig. 1 e 2].

During the pilots, all the physiological registrations have had a standard duration: they were 4-8 hours long, according the duration of job activities of each disable person. The heart rate (HR) was measured by a bracelet (MoCas device) worn around the left wrist. The sensor records the oscillations of blood flow (and therefore cardiac contractions) thanks to an IR source and to a photodetector placed on the wrist .An evaluation of galvanic skin response (GSR) is made through a measure of skin conductance between two electrodes placed always on bracelet wrist level and it provides information about the activity of sweat glands, which reflects changes in the subject's psycho-emotional status joint to the level of attention [W. Boucsein, 1992].

In the tables 1 and 2 are showed two typical signals of heart rate (HR) and skin impedance (GSR) registered during different pilots sessions.
The Pilot in Italy.

On 25/02/2013, the Social Cooperative Opera (ex Zanzibar), in association with the ISELQUI partner, has started the MOCA ISE 6.4 experimentation.

Results in Italy.

All people have enthusiastically welcomed the bracelet above all with the prospect to know the results on their status of health, although it had been their explained that the device was not provided any kind of medical exams.

Example:

![Graphs showing GSR, Stress Module, Stress index, and HR data over time.]

Conclusions

The pilot done in Italy, even if with a few persons and for a week, can already indicate that the factors of anxiety, have multiplied in people with disabilities if they are put in work environments that increase stimuli with the external environment. Instead, while they are like at home if they are working in collaboration with other disabled people in order to share their responsibility.

The Pilot in Croatia.

The pilot was done in Split in particular in DES, an association offering employment to many disabled people in the Split area.

DES is a compound occupying 11.000 m2 and is organized in 7 working units /departments:
Vocational training and rehabilitation centre, Carton manufacturing, Silk-screen printing, Printing and book-binding, Restaurant and catering, Clothing manufacturing, Management and Administration.

At the beginning the most part of disabled people confirmed the enthusiasm and interest to participate to the pilot. But for internal technical reasons for the SLID project it had to select a shirt number of persons. So there was been a selection in the DES, with the help of the other Croatian institution and, after a long process, only a group of 14 persons was chose as potential participant in the pilot.
Results in Croatia

Example:

Conclusions

The pilot done in Croatia with 10 participants shows more information than the pilot in Italy (with only 4 participants) and it shows a common item: people are relaxed during the break and during the last day of the week (thinking of Saturday and Sunday!!!). Maybe Friday, as the last day before the weekend past at home, diverts them and improves their mood. People working in places such as warehouse, cartoon production, cleaning, are more stressed than others working in different departments (such as commercial office, dressing production). This is an interesting item underlined among participants of the target group in the Croatian pilots. Someone, even if he works less, are stressed by their physical disability: they are used to walk in the different departments without self control.

The pilot in Albania.

With regards to the selection procedures for participants in the MOCA trial, ADRF has been sharing and consulting with DES and Iselqui, this communication was intensified in February and March 2013. As Des was implementing this experiment two weeks prior to ADRF, a lot of exchange of info with DES assisted to clarify any uncertainty that was still within ADRF and also the selected disabled people that agreed to participate. The idea was to select participants from different disability categories/diagnoses, different group ages taking into consideration also gender issues. Out of initially 14 disabled individuals that were selected and had agreed to participate, only 11 finally participated (8 male and 3 female) belonging mainly to the category of blind and physically disabled people. Information sessions were organized with participants and agreement and consent papers were signed with all of them prior to the conduct of MOCA.

MOCA was conducted in Albania the last week of March 2013. The expert that was involved by ISELQUI worked closely with a local staff of ADRF who also assisted with interpreting from Italian into Albanian and vice versa. The trial period went all very well and every individual is looking forward to findings of this experiment. The trial in Tirana was in different job placements in the city area.
Results in Albania

Example:

Conclusions

The pilot in Albania has underlined how some types of works caused a lot of stress: two examples of these works are call centre receptionist and handiwork in the wheelchair factory. In particular these status of stress are longer in the receptionist working in a call centre.

It’s interesting to see that the same type of work of receptionist but that is not involved in continuously (like in World Vision) brings a higher status of physical and mental tranquillity.

Like in Croatia, in Albania all the participants are less stressed at the end of the week. However this aspect is less marked than in Croatia, where the mental disabilities are more than the physical disabilities if you compare the Croatian pilot and the Albanian pilot.
Final Results

An important factor in rehabilitation is the affectivity, lived in various job situations, that communicates to the people new sensations allowing them a greater emotional involvement.

One of the components of the affectivity is the “aggression”: well a work can allow the person with mental disability to express its aggressiveness in a socially accepted way and so he will be able to learn a self-control of his aggressiveness.

The work allows the disabled person to gain a growing autonomy and offers numerous opportunities for socialization, intended as social integration in a broader environment, where there are the conditions for new and stimulating human contacts that allow the person to express themselves and compare even outside of his world.

However the work they are assigned and not chosen and it may be more deleterious than good in his rehabilitation, especially if the contact with the outside world is much broader than you can bear: some examples are when the main wish of them is to arrive at the end of the week or to plan extra coffee break without any control.

For people with physical disability you must reflect on physical frustration comes from a mechanical work or from a call centre where they have very few breaks compared to the receptionist or radio speaker or employer.

It’s more important to assess most appropriate tasks for each disabled people, possibly modifying some production segments or even creating a new specific task/function for the disabled.

The main conclusion of this study is that the differences among individuals with the same status of mood: in fact their physiological responses to stimuli during work are very substantial, and may vary significantly, for the same individual, in a short period of time (days).

That conclusion, obtained from a pilot survey on a relatively small and homogeneous sample, should apply to more numerous and heterogeneous populations giving the same result with high probability.

Whilst this puts into question the true effectiveness of any stress prevention strategy firmly based on averages of individual psycho-physiological parameters, this put in evidence the great importance of stress and the definitions of its thresholds, that are very difficult to use in a study with a rigorous methodology.

Among them, especially the correlation between environmental and personal variables, and, within the latter, the interactions between psychological factors (subjective) and physiological (objective), are more important. In fact they are relevant to determine the quality of the responses to the stimuli with increasing intensity and duration.

More conclusive solutions to these problems will come from an expansion of the data base available and then further refinement of analytical techniques, according to the approach here described.
Appendix A

GSR chart analysis

The “galvanic skin conductivity” data recorded using MOCA bracelets have been examined with a software that implements the algorithm illustrated in the document [1]. That algorithm consists of the following steps:

- consider an interval of 4 minutes in the captured data
- detect the startles in the interval
- calculate frequency (number of startles per minute in the interval considered)
- calculate the magnitude medium value of the startles in the interval
- compare the values calculated with the stress classification matrix

From these elements we can establish if there has been stress in the interval. Extending this procedure to the entire capture we can draw the stress chart.

Following is an example of GSR, startles frequency and startles medium amplitude captured in about ten hours:
Startles magnitude diagram

Average amplitude
in the interval considered (4 minutes)
value $\times 10^{-4}$ uSiemens

Time

Colors table used to encode the stress type

A.1 Startle definition
Startle is the response of the skin to a stimulus that may be in the external environment (e.g. light, sound) or in the internal environment (e.g. emotion).

In the picture we can, according to [1], define:

- SM as startle amplitude
- SD startle duration

GSR response uSiemens

Time
With these definitions and using the algorithm [1] we can calculate the startles frequency and the medium amplitude values, then get a stress indication from the stress classification matrix.

### A.2 Stress classification matrix

The stress classification matrix used in the algorithm can be outlined as follows:

<table>
<thead>
<tr>
<th>Startle medium amplitude value</th>
<th>M3</th>
<th>M2</th>
<th>M1</th>
<th>M0</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>physical stress</td>
<td>physical stress</td>
<td>psychological stress</td>
<td>psychophysical stress</td>
</tr>
<tr>
<td>F0</td>
<td>F1</td>
<td>F2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Startle frequency**

The values of the startle frequency used are:
- F0 = 0 startles / minute
- F1 = 3 startles / minute
- F2 = 6 startles / minute

The values of the startle magnitude used are:
- M0 = 0 startles / minute
- M1 = 1000 * 10^{-4} uSiemens
- M2 = 6000 * 10^{-4} uSiemens
- M3 = 8000 * 10^{-4} uSiemens
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   at the
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