SIDR's research strategy for the future:
Ten years of mechanism-driven knowledge development

SIDR has been around for a little over ten years now. Operations cover several different areas, but have three clear specialisations: a disability research perspective on

- human development and everyday functioning
- communication with particular focus on hearing and deafness
- working life and employment

The goal in the coming years is to consolidate and develop these specialities, while simultaneously promoting the emergence of new ones.

SIDR wishes to optimize the conditions for interdisciplinary research to be able to tackle complex phenomena. Questions relating to functioning, disabilities and impairments must be analyzed using a bio-psycho-social perspective. Such an approach can be seen as somewhat of an international trend. In its strategic plan for 2006–2010, the European Science Foundation highlights the need for interdisciplinary research that involves the medical sciences, social science and humanities, as well as natural science and life sciences (p. 19).

The starting point of this strategic document is the SIDR vision to improve the life of people with disabilities. This vision is in turn based on the UN Convention on the Rights of Persons with Disabilities, which aims to "promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity" (Article 1).

Research strategy
SIDR wants to stimulate the emergence of new cross-level research projects. To achieve this goal, we take our starting point in critical realism, which states that reality can be described and explained at several levels (strata) (e.g. Bhaskar & Danermark, 2006). The ambition of SIDR is to use explanatory mechanisms that tie these levels together. Such explanatory mechanisms is an important step forward and will transcend the descriptive character that has characterised disability research to a great extent so far.

Disabilities and impairments involve many complex phenomena, which cannot be described and explained at only one level. Mechanisms that describe the interaction between the biological, psychological and social levels is what provides the greatest explanatory and applied values. This complexity is also reflected in the biopsychosocial model recommended by the WHO (see Rönnerg, Classon, Danermark & Karlsson, 2012). Interdisciplinary science is a way to find links between the levels. We wish to find these links, and develop more dynamic concepts to describe them.

Vertical and horizontal
Rönnberg (2004) and Rönnberg & Melinder (2007) have described how knowledge development occur in two dimensions; one horizontal and one vertical. The vertical dimension contains studies of mechanisms or concepts that have the potential to link several levels. The horizontal dimension tests the general applicability of mechanisms or concepts, at one or more levels, for example by studying them in different contexts and for people with different forms of impairment.
**Changes over time**

Observations on different explanatory levels can be dynamically related over time and in different environments. Time and timing are central aspects. The time periods studied may vary from milliseconds to decades or centuries. Timing relates to a certain influence yielding different effects at different times and for different individuals; a certain gene can for example have different effects on the individual depending on when it is activated, and a certain social change may have different effects on individuals of different ages.

**A few examples of cross-level research and change over time**

In Klingberg's intervention research on children with ADHD (2002) we find examples of cross-level effects. The starting point here was working memory (WM), a concept used in cognitive research and psychology, which represents an individual’s ability to simultaneously store and process information. In order to improve WM, children received intensive training for 5–6 weeks. The results could be seen through an improved WM, but there was also transfer to other levels. For example, from teacher evaluations, it was noted that the children expressed less motor unrest in the classroom, they were able to concentrate for longer periods of time, and improved their performance in several school subjects. In addition, it was possible to discern with the use of neuroimaging that the brain networks supporting WM displayed significant changes (which also remained after the end of the training period). What has been proven in this type of intervention research is that effects of training a certain mechanism at a psychological level can also be read at a biological level as well as at a social level. The concept of WM thus has an interdisciplinary potential, which has not previously been as tangible as in the Klingberg study.

One concept that includes several levels is working capacity. In working life rehabilitation it is crucial to understand the multidimensionality of the concept. An analysis of this phenomenon requires a holistic approach. It is related to health and functioning as well as environmental factors such as type of task, time and pace. The interaction between individual abilities and labour market’s demands and expectations constitutes the phenomenon. It is also important to take the society’s support systems and other external conditions into consideration. An analysis of this phenomenon must thus include mechanisms on several levels, as well as their interaction.

One example of the importance of time and timing is a study of the development of stress sensitivity and severe behavioural disorders in children (Loman & Gunnar, 2010). Children living their first years with custodians who are unpredictable and rarely sensitive in their interaction with the child are more likely to develop both behavioural disorders and physical stress reactions. These can also be read as neurophysiological structures in the stress systems of the brain. Equivalent changes will not be seen if the child only experiences difficulties interacting later in life.

Another example of studies of change over time that involves concepts applicable on several levels are studies of engagement. Children with developmental delays who attend preschools where they are often involved in motivating play with playmates and staff for longer periods of time later show a greater engagement in school and better achievement in school (Aydogan, 2012).
**Methodology**

The methodological consequence of a mechanism-driven perspective is that researchers must have the expertise to apply investigative methods from different disciplines. Different methods may need to be used at different levels, and be combined in order to understand the interaction between levels. The most important thing is that researchers express the limitations involved and acknowledge the potential of the methods involved. Longitudinal studies and intervention studies constitute particularly important tools for testing and evaluating these mechanisms.

Methodologically, the previously reference to working memory training studies represents an initiative focusing on a central mechanism on one level, but with natural links to other levels. Epidemiological studies often note that a phenomenon may have several interacting causes.

**Sometimes, the overall effect of several different influences or causes is the most interesting.**

The synergy effect can sometimes be the same, despite having different combinations of causes, i.e. there is equifinality. Children and young people with different diagnoses can for example have the same profile in terms of everyday function (Almqvist & Granlund, 2005). In other cases, there is instead multifinality, i.e. the same causes may lead to different effects, depending on the individual and the context. To give an example, the same intervention with time aids can have different effects on different individuals, despite them displaying the same problems prior to the intervention (Janeslätt et al, submitted).

In summary, SIDR wants to increase the use of experimental studies, longitudinal studies, intervention studies and causal statistical modelling of connections in large databases (from neuroimaging data to social indicators such as inclusion) as well as registers for different illnesses, impairments or disabilities. Well-developed case studies are also important. Longitudinal qualitative methods intended to draw causal conclusions should also be applied (Kazi, 2003). In-depth interviews over time can provide knowledge of how different types of mechanisms act in real-life situations.

**Joint future research initiatives**

In order to develop a mechanism-driven perspective, SIDR wants to stimulate research on development from a lifetime perspective, among other ways through longitudinal studies. It is notable that the research on children and elderly people with functional impairments in Sweden is represented in relatively few studies (Rönnberg, Claesson, Danermark & Karlsson, 2012). An investment in longitudinal studies would contribute to providing SIDR a national and international profile. Thus, we want to promote the creation of longitudinal databases within SIDR, where we add joint test data from different groups (e.g., relating to inclusion, social recognition, depression, intelligence) to increase the possibilities of horizontal comparisons. Vertical comparisons can be facilitated by analysing test data in cross-level matrices, in which various forms of data, such as biological data, tests and self-estimations, are combined. In actual research projects, these data should also be combined with data from other registers, e.g., population registers or quality registers.

To this end, SIDR should develop larger common test and survey batteries (in which test descriptions, testing procedures, test variables, citation etc. are standardised) as well as a basis for the contents of rows and columns in cross-level matrices. Development of this kind of measures is currently underway at the Linnaeus Centre HEAD Graduate School in regard to testing procedures for deaf people and people with hearing impairments, in Örebro in regard to working life, and in Jönköping in regard to children in need of special support and participation in everyday life activities.
Practical consequences and goal achievement:

1. Stimulate the establishment of new SIDR research groups for research on new questions.

   *Proposed measures: Make joint SIDR applications to generate funds for new clusters/centres, or for research on new databases.*

   *Goal achievement: Three applications per year, in which more than one of the SIDR universities are involved. Certain applications should take a longitudinal approach. Two new interdisciplinary centres within a 10-year period.*

2. In order to achieve new research groups, it is of the utmost importance that recent doctoral graduates receive support from SIDR to apply for external funding and develop international collaborations.

   *Proposed measures: Give courses in how to become an “expert” in writing disability research applications, develop supervision forums and seminar series held by post docs and provide opportunities to make international contacts.*

   *Goal achievement: Application courses and seminar series given annually. SIDR is regularly visited by foreign researchers.*

3. There are several reasons to keep building on the methodological expertise already available at SIDR, in consideration of the plans to process larger data sets longitudinally. This applies for example to experimental neuroimaging, where we can collect large data sets through modern technologies such as MEG and fMRI, and, using such measurement devices, generate thousands of data points with high temporal resolution. This also applies to the registers available with the Swedish Social Insurance Agency and Statistics Sweden, which provide information from a longitudinal perspective on the living conditions of people with impairments.

   The data registers that are available can be used for multi-level analysis and to monitor individuals over time. In a similar way, we should use qualitative methods to monitor individuals over time, for example in the form of life-course studies.

   *Proposed measures: Coordinate and develop analytical skills within SIDR, offer doctoral students and researchers within SIDR methodological support.*

   *Goal achievement: A few employees of SIDR have parts of their positions assigned to this purpose (equivalent to two full-time positions).*

4. Due to the discussion on various test batteries and joint databases, establish a joint SIDR instrument pool.

   *Proposed measures: Survey of instruments used within SIDR. Establishment of an instrument pool.*

   *Goal achievement: Survey completed within a year and the instrument pool established within two.*
Graduate education: changes, clarifications
Our future graduate education is to be founded on interdisciplinary disability research science. It should be based on a mechanism-focused theory and methodology. It is of the greatest importance that applicants to our graduate programme are well aware of this foundation.

The senior researchers who supervise the doctoral students shall also acquire this knowledge and be part of the intellectual environment at SIDR. This places demands on the supervisors to actively promote the research ethos of SIDR in their supervision. The responsibilities of the supervisor (and co-supervisor) include active participation in the supervisory college. The responsibilities and obligations of each supervisor are regulated by agreement.

Proposed measures: Expand educational measures for the SIDR supervisors in terms of interdisciplinary science, disability research and methodology. Establishment of a formal agreement between SIDR and the supervisor.

Goal achievement: Educational measures implemented regularly (once per year). Formal agreement between SIDR and the supervisors have been entered before the end of 2014.

The third-cycle programme includes two types of courses: compulsory and elective. The aim of the compulsory courses is to provide the doctoral student with the metatheoretical, theoretical and methodological tools to take in disability research as an interdisciplinary subject. These courses are given in the form of an introductory course of 22.5 credits, which includes the theoretical part, as well as a methodology course of 7.5 credits.

The elective courses are chosen by the doctoral student in consultation with the supervisors. SIDR is to regularly offer a number of such courses.

Proposed measures: SIDR strives to ensure that the requirements regarding the number of credits given respectively for courses and thesis work are the same at the three universities (courses 60 credits, thesis work 180 credits).

Goal achievement: The universities have such a common study plan as of 2015.

International relations
Establishing and maintaining international relations is a natural part of the SIDR operation. Such relations are to be reported to those active within SIDR, so that they can benefit a greater number. International relations may serve multiple purposes. One important task of the SIDR is to create the conditions for multi-centre studies, gaining access to broad databases, starting international projects and for attracting guest researchers to SIDR.

Within the third-cycle programme, one important aim is to make it possible for doctoral students at SIDR to study at a foreign university or research institute. It is also important to encourage foreign assignments for senior researchers. Finally, it is important to attract guest lecturers and foreign doctoral students to SIDR.

Proposed measures: Joint measures to recruit guest lecturers who contribute to all the universities. Encourage doctoral students to complete part of their third-cycle studies at a foreign university, both through the planning of research and through special applications for network support.

Goal achievement: At least three doctoral students per year conduct part of their education at a foreign university.
Summary
In summary, the strategy is based on the fact that research on functioning, disability and impairment involve complex phenomena, the nature of which can be described and explained only by using a multilevel bio-psycho-social approach. It is the interaction between the biological, psychological, and social levels that provides the greatest explanatory and applicatory values. The requirement for cross-level research requires that

- Research in terms of explanations ties together phenomena and levels horizontally and vertically.
- Research combines multiple research methods and initiatives to obtain synergy effects.
- Research is mechanism-driven, longitudinal approach are prioritized.
- Theories and methods based on a biopsychosocial perspective are highlighted in the third-cycle programme and supervisor training.

International networking with an interdisciplinary approach is encouraged.