This paper reports on a preliminary analysis of interviews conducted with Swedish ergonomists (SE). The study is using the theme of ‘tools’ to explore how ergonomists work on a daily basis. It was found that SEs often practice ergonomics as part of a ‘treatment’ process. Most SEs use their professional judgement when assessing and complement this with checklists, pictures and questionnaires. More sophisticated quantitative tools are less used. SEs who are internal employees, rather than external service providers, seem to be more able to participate in new design activities and to engage in follow-up on changes. SE’s ‘patient’ focus may pose a challenge to participating in design processes where stakeholders tend to have a ‘systems’ focus. This research is currently being extended to include Canadian ergonomists as well as industrial engineers in both countries.

**Key words:** human factors tools, ergonomic evaluation, design, ergonomics practice
INTRODUCTION

Overview
The results presented in this paper are based on a Swedish project that aims to support integration of ergonomics into an organisation’s work system design process in order to reduce risk to employee health, increase productivity and improve quality. The project was directed towards the interaction between an organization and its ergonomics specialists. In Sweden, ergonomics practitioners come predominantly from either occupational health and safety clinics belonging to the organization, or from external consultancies. Practitioners have, however, been criticised for their low degree of integration within organizations or with clients, which has, in turn, led to low impact of ergonomic efforts. To better grasp this interaction, we studied current practice of ergonomists using interviews. We use the issue of ‘tools’ and tool use as a platform to study how ergonomists do their work. This knowledge may support both improvements in professional practice as well as the development of tools that better support the application of ergonomics in the workplace. A parallel study is currently underway in Canada.

Ergonomic Roles in Sweden
In Sweden, the title of ‘ergonomist’ is unprotected; however, while anyone may claim to be an ergonomist, there is a pattern amongst those who do. For instance, the majority of practitioners function within an internal Worker Health Centre (WHC); they are primarily educated as physiotherapists (licensed) with additional studies in ergonomics; they are expected to be knowledgeable in medicine and technology; and they work in the areas of rehabilitation and prevention (Grundell and Rassner, 2006). Some ergonomists work as external consultants. Conversely, the title of ‘European Ergonomist’ (Eur.Erg.) is protected, administered by the Centre for Registration of European Ergonomists (CREE). In Sweden, 33 ergonomists have been licensed (see www.eurerg.org). These practitioners have proven that they possess competence within the fields of medicine and technology, have experience of practical preventive actions, and have committed themselves to working within the IEA definition of ergonomics (see www.iea.cc/browse.php?contID=what_is_ergonomics).

In recent years there has been a growing focus toward client orientation within WHCs. As a result, the role of professionals within WHCs is increasingly discussed in terms of the position taken with respect to the customer. Two positions are identified: that of the ‘expert’ and the ‘consultant’. An expert role involves taking ownership of a problem and solving it for the client. A consultative role is characterized by asking relevant questions and encouraging the client to identify problems and suggest solutions, inviting the client to a participatory process, thus building the client’s own ability to deal with its problems (Birgersdotter, Schmidt et al. 2004; Ekiöf 2004). Traditionally, the relationship at WHCs is that of the patient/expert. It is considered a difficult and sometimes even emotional shift for an ergonomist to transition from an expert to a consultative role (Axelsson 1992, Antonsson and Schmidt 2003).

Aim of the study
To deepen our understanding of how ergonomists work, a series of semi-structured interviews with practicing ergonomists was conducted to study their working processes, ‘tool’ usage and how the resulting information is used and received at client organisations.

There are a large number of methods, tools and instruments an ergonomist may use (Neumann 2006). Depending on the assignment, these may range from tape measures and stopwatches to quality management or computer simulation systems. For the sake of simplicity, in this paper we use the generic term ‘tool’ to describe these various technologies.
Traditionally, Swedish ergonomists seem to prefer questionnaires and checklists and rely mainly on observation and professional skill when performing their tasks (Nordlander 2006).

**METHOD**

In total, 123 invitations were sent by e-mail and 44 by surface mail to members of the Ergonomics Society of Sweden. The target group comprised practising ergonomists working in preventive tasks among client companies. Excluded were members known to belong to universities, research institutes and agencies. After a period of time, a second invitation was mailed asking those who had not answered why they had chosen not to do so. In total, 23 indicated interest in participating; while, 21 cited a lack of time, 33 reported work tasks that put them outside the stated target group, and 15 cited other reasons.

Amongst those who volunteered to be interviewed, 17 participants were chosen and 15 interviews were conducted, two were not possible to reach during the interview period. Of these, seven belonged to embedded WHCs, six to external WHCs, two to consultancies. Participants included eight women and seven men; their average age was 52 years.

Telephone interviews followed a semi-structured format with nearly 30 questions asked, lasting approximately one hour. All interviews were recorded and transcribed for detailed analysis which is currently ongoing.

**PRELIMINARY RESULTS**

These preliminary results are based on a review of the Swedish transcripts. Results from the interviews reveal that many clinics do not distinguish between physiotherapy and preventive ergonomics. Many ergonomists share their time between rehabilitation and workplace visits but generally stay focused on individuals and their present problems and needs. Some clinics separate rehabilitation and preventive ergonomics with some ergonomists focusing on workplace development and formative efforts and others on individual rehabilitation and individual adaptation of workstations and work methods. Their data is usually gathered by observation or video recording and discussions with personnel at the worksite, sometimes complemented by questionnaires. Some ergonomists give suggestions to actions or improvements as a consequence of the analysis, while others make a point of developing suggestions together with the personnel. To some ergonomists, the intervention ends up as an education for the personnel and they like to see this as a preventive action. A report is always produced at the end of an intervention and considerable effort is put into formulation and design. Some, but it seems that only a few, get the opportunity to do follow-ups to check if the recommendations have had any effects and to do corrections.

**Tools**

Interviewed ergonomists regard themselves as experts, employing their expertise as the prime tool in their work. Many claim the client is only interested in their help as a short and fast contribution to solve an imminent problem. Others have the possibility of involvement on a larger scale and use a larger number of tools. These include the following:

- **Camera.** Digital cameras and videos are often used to complement observation in analysis of risks and to communicate observations back to the client. Sometimes video, such as VIDAR, is used in more structured analysis. This tool is often used as a means to help a client’s personnel to reflect and suggest improvements.

- **Checklists.** Most ergonomists seem to use different types of checklists to support their expert assessments. Many different types exist, some even contain simple formulas for
calculations. Some ergonomists also develop their own checklists based on professional experience.

- **Questionnaires.** There are also a large variety of questionnaires in use, some developed by ergonomists themselves. Other more common and popular ones include those developed by the Nordic Council of Ministers and one developed by Prevent called ‘The Ergonomics Thermometer’.

- **Equipment.** This includes devices such as a tape measure, pulse watch, force gauge.

- **Other.** It seems to be uncommon that the ergonomists get the possibility or have the urge to use more complicated and time-consuming tools. However, some of those mentioned were: EMG (electromyography); tools developed at Volvo and SAAB called FMEA (Failure Mode Effects Analysis) and BUMS (Swedish: Biomechanical evaluation method SAAB) respectively, which are slowly spreading outside of these companies; the ‘hand tool box’ developed at the former Swedish National Institute of Working Life; and, a showroom for exposing good examples for client personnel.

**Ergonomic Practice**
Participants mentioned the following tasks as part of their work:

- **Rehabilitation.** Ergonomists with a physiotherapist education are often engaged in medical rehabilitation as a central task such as ultrasound and acupuncture

- **Health promotion.** This is often arranged through different suppliers according to individual needs.

- **Health examinations.** Ergonomists take part when examinations are made before diagnosis and rehabilitation planning.

- **Health surveys.** Surveys are intended to obtain information on the general health situation at a client.

- **Workstation assessments.** These assessments are performed before rehabilitation or in order to discover reasons for a patient’s injury or discomfort.

- **Risk analyses.** This is undertaken either as part of a workstation assessment or as part of planned changes in production.

- **Technical interventions.** These may vary from assessments of drawings or technical specifications to ergonomic information for engineers and workers.

- **Technical design.** Designs include solutions to be implemented at workstations.

- **Information transfer.** Clients ask for information regarding specific questions that the ergonomist answers orally or by sending written material.

- **Education.** This includes planning and execution of short seminars for the client’s personnel in order to invoke proper behaviour to avoid injury.

- **Strategic tasks.** Some ergonomists take part in developing programs for health management, such as assessment criteria and methods for work and analysis in large organizations.

**Early Involvement**
Interviewed ergonomists express a wish to take part earlier in their client’s change processes, but consider it very difficult to realize this possibility. They suffer from being contacted too late when only small corrections or organizational remedies are possible. It seems to be only ergonomists belonging to embedded WHCs that get the possibility to take part in a change process from early on.
Many ergonomists describe their work as focused on individuals, sometimes even calling them patients. This patient perspective is also emphasized when they discuss examples of short assignments, which seem to be more prevalent in external WHCs. Embedded WHCs seem to be engaged to a greater degree in larger projects where the problems and the end beneficiaries are more generalized. Ergonomists in embedded WHCs mention possibilities to take initiative within their client organization according to needs they discover.

**Perception of Client Reaction**

The ergonomists’ perspective on how clients react to their efforts seems to differ depending on whether they belong to an internal WHC or an external WHC. Ergonomists in internal WHCs have the opinion that their work is appreciated and their suggestions are taken seriously. Some even get the chance to take part over large periods of time which, according to the ergonomists in question, is evidence of trust and credibility. They also repeatedly meet their client’s representatives and thus receive considerable feedback. They point out the need for putting a lot of effort into building relationships within the client’s organization.

Ergonomists belonging to external WHCs, operating as a hired service from outside the company, have a more mixed experience. Some point out that they get very little feedback and thus have little information describing the results of their work.

**DISCUSSION**

It appears that the roles of internal versus external WHCs may significantly influence an ergonomist’s situation and ability to choose work methods. It is primarily the larger organizations that possess not only the resources to maintain an embedded WHC, but also the inclination to work systematically in the change process. However, even in these organizations, ergonomists appear to lack the support or resources to use more objective tools that are available, relying mostly on observation, expert judgement and oral communication.

It was also noted that many ergonomists/physiotherapists talk about their clients as “patients”. The patient perspective can be seen as a reason for difficulties in assuming a consultative role and may conflict with the larger ‘system’ perspective of engineers and managers. Nevertheless, many participants expressed a desire to work earlier in their client’s development process to be able to avoid future musculoskeletal problems. Their opportunities to actually do so may be impeded by the tools and methods they use today, which include mainly checklists that are based on the user’s expert knowledge and consequently are difficult to communicate or hand over to clients. A reflection resulting from the interviews is that the desire among Swedish ergonomists to contribute throughout their client’s development/design processes may be impeded by: 1) this lack of objective tool use, and 2) their educational background as predominantly medical experts. As a result, their clients do not expect anything but activities in the area of rehabilitation. Some ergonomists, especially those belonging to embedded (internal) clinics, have succeeded in breaking out of this locked-in position, but many still have a long way to go.

Primarily, the ergonomist appears to play the role of an expert who analyses a problem and delivers a solution. They understand that their clients are content with this; only a few ergonomists demonstrated any wish to change the situation. According to Flemström (2003), the WHC has the capacity to deliver an acceptable solution, but not to increase their client’s competence in ergonomics. Some ergonomists expressed discontent during the interviews at the fact that their clients started doing ergonomics work on their own.
If organisations in Sweden are to incorporate ergonomics in their design processes for creating products, productions systems and work organizations in order to reduce future work-related disorders, then a prerequisite is that ergonomics experts are able to communicate, not only solutions, but also ergonomics knowledge and insights. The patient perspective and the expert role may be inhibiting development in this direction. Stepping outside of these roles, however, may pose a challenge to ergonomists seeking to expand the range of service they provide to their customers and employers.

**CONCLUDING REMARKS**

Based on this preliminary analysis, it appears that the context of the ergonomist, as internal or external to the firm, is influencing the role of the ergonomists and affects opportunities for follow-up and engagement in design work. It also seems that many Swedish ergonomists use professional judgement in their work more than they do quantitative analysis tools. While many participants expressed interest in contributing to earlier stages of work-place design, this goal may be compromised by the current tendency to practice ergonomics as an individually focussed ‘treatment’ using primarily expert judgement methodologies. Follow-up interviews with engineering personnel are planned and may shed light on how such a practice modality is viewed by these important work-place design stakeholders.

The interviews summarised here are currently being translated to English for formal analysis as part of a joint Canadian-Swedish study on this topic. The Canadian interviews may provide useful contrasts by which alternative forms of the practice of ergonomics could be explored and developed. The results of this study can help ergonomists reflect upon their current practice and find new approaches and methods to apply their skills, thereby improving the application of human factors in the workplace – particularly in early design phases.

**Acknowledgements**

This work was conducted with financial support from the WSIB and from the former Swedish National Institute for Working Life.

**REFERENCES**


HF Tools Project

- Aims: support integration of HF into work system design.
- Objectives:
  - Identify available tools for work system design
  - Understand what tools are in use and how they are being used by
    - Ergonomists (CDN & SE)
    - Engineers (CDN & SE)

International Collaboration (SE & CDN)

PRELIMINARY report on Swedish Ergonomist Interviews

Ergonomists in Sweden

- Not a protected title
- Eur.Erg. is protected but only 33 Sweden
- Predominantly physiotherapists with additional education in ergonomics
- Mostly work through H&S service either INTERNAL or EXTERNAL to firm.

Methods

- Semi-Structured interviews
- 167 invitations to ESS members
  - not Academics
- 23 (14%) participated (In ACE we had 2 responses!)
- Follow-up with non-responders
  - 21 - no time
  - 33 – other type of job
  - 15 – other reason
  - Rest (75 – 45%) no answer

Sample

- 7 internal, 6 external (explain better) and 2 consultants
- 8 female and 7 male
- Average age: 52

- PRELIMINARY Analysis here
  (currently translating for analysis with CDN interviews)

Questions

Need to understand CONTEXT and PROCESS in which tools are used!

- Background
- Stakeholder network
- Work process
- Tool use
- Information flow
- Outcomes
Results - Project Start-up

- Contacted by the customer (External)
- Running/scheduled process (Both)
- Own initiative (Internal)

Results - Activities

- Rehab/return to work
- Health promotion & Ergo training
- Health surveys
- Workplace assessments
- Risk analyses - general and prospective
- Interventions & follow-up (more Internal)
- Strategic efforts (more Internal)

Results - Tools used

- Professional judgement
- Camera
- AFS 1998:1
- Health/discomfort survey
- ‘Ergonomitermometer’ checklist
- Some equipment (tape measure, stopwatch, heart rate monitor, force-gage, etc.)
- Few using: EMG, BUMS, FMEA,

Discussion - Work process

- Few tools
- Observations/dialogue
- Checklists
- “Diagnosis”
- Report

Discussion

- Treatment paradigm – medical & individual focus
- Reactive
- Expert role, leaves a report not a solution
- Current approach hard to use in design stages
- Most want to work earlier in development
  - Barrier - training
  - Barrier - ‘customer’ expectations
  - Barrier - no tools to communicate with designers?
- Some resistance to others doing ergonomics
  - Will there be a power struggle integrating HF into design?

Preliminary Conclusions

- Patient focus not system focus
- Position (Int/Ext) affects role
  – Internal can engage earlier and follow up
- Judgement more than measurement
- Locked (?) into reactive & RTW role by training, socialisation, customer expectation
NEXT?

- Complete interviews in CDN
  - Joint analysis
  - PLEASE VOLUNTEER!!
- Extension of ‘Tools Inventory’ – Eng. tools
- Engineering interviews in CDN & SE

Identification of opportunities for development

THANK YOU

- This work has been funded by the Ontario WSIB and the (now defunct) Swedish National Institute for Working Life via the SMARTA R&D theme.

- QUESTIONS? COMMENTS?