

# Work Life, New Technology and the Employment of Disabled People - A Twenty-year Programme

## Comfort Audio – from Idea to Viable International Business and some other examples

# Origin of the Programme (early 1980s)

It was a governmental initiative, typical at the time

- a) Societal Needs to be Supported *by*
- b) New Technology promoted *by*
- c) Pre-competitive Procurement *in order to*
- d) Strengthen Swedish Industry (SMEs)
- e) Some 10 themes were proposed
  
- f) New Technology == Information Technology (ICT)

# One theme (out of these ten) was

“Supporting disabled job-seekers by applying ICT technology for better work-place adaptations.”

The **Swedish Labour Market Board** (AF) was commissioned by the Swedish Government to define and carry out a long-term programme.

The programme was given the acronym **TUFFA**.

# Why the Swedish Labour Market Board?

a) The expressed policy at the time was: “Everybody who will and can work should also be offered a suitable job”

Disabled and impaired job-seekers were certainly included.

b) The AF Board is the Government’s instrument to carry out this work principle.

c) The AF Board has adequate public funding and expertise for the task at job centres and employability institutes covering the whole country.

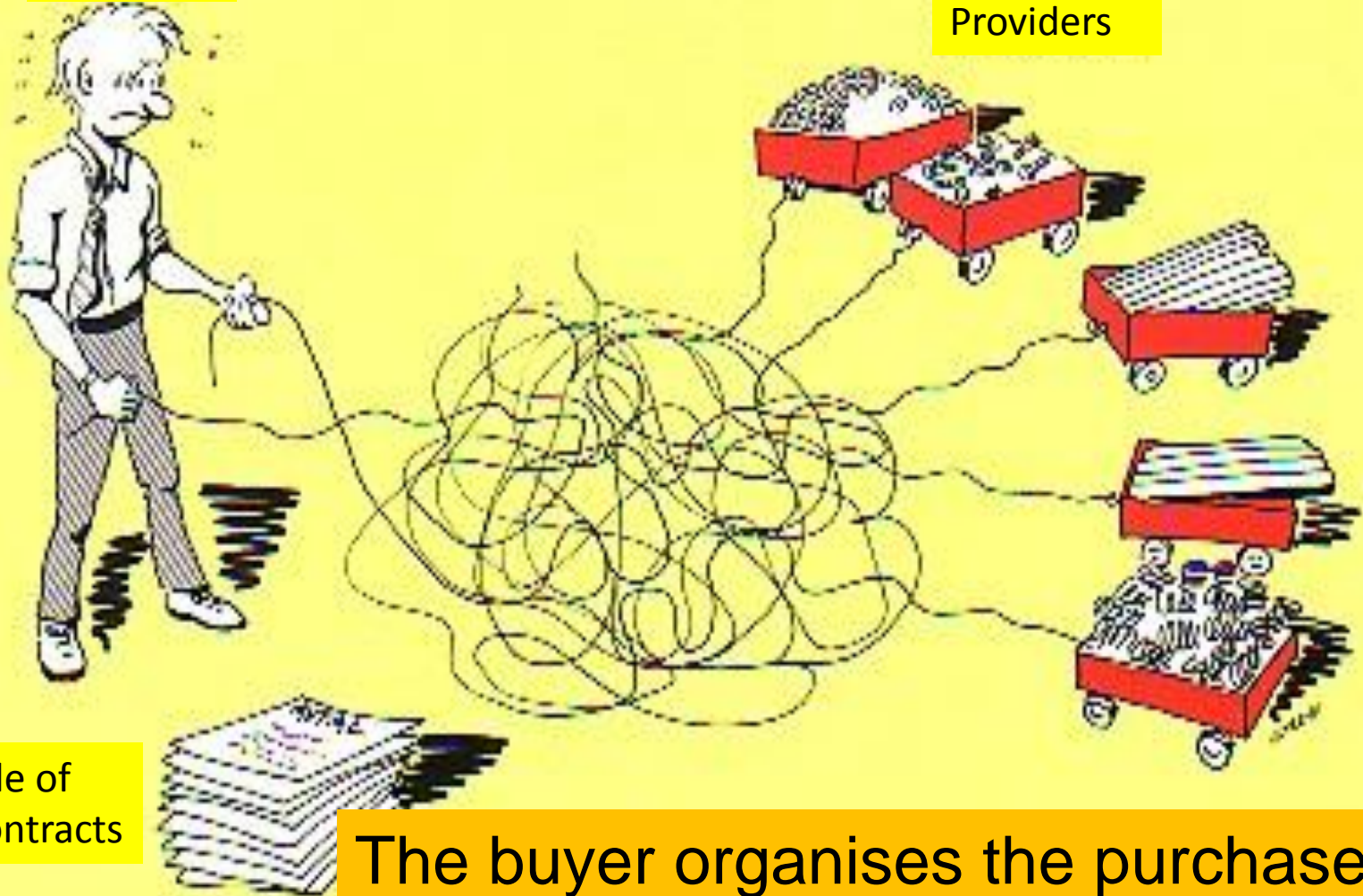
# What were the problems?

- a) The staff at AF (who saw the needs everyday) was at the time (mid 1980s) almost ignorant of ICT as a tool to assist disabled in their job situation. No skills or experiences in the technology purchasing process .
- b) Providers of ICT-based assistive technology were mainly very small enterprises (typically 2-3 employed)
- c) These providers covered mostly a local market. Few were active over the whole country.
- d) Very limited funding in the field of radical technical development, despite a huge expected potential

# The current situation at the time

Purchaser

Providers



Pile of contracts

The buyer organises the purchase

# Could these problems be solved in one stroke? (which was the government's intention)

The indicated method was the  
Technical Procurement procedure

based on the same principles as military procurement

(In the EU setting it is now called  
Pre-competitive procurement)

It comprises a) definition of needs

b) specification of requirements

c) call for tenders and contracting

d) revision of the preliminary requirements

e) securing further deliveries

# How we proceeded

- 1985 Four **specifications groups were set up**, staffed by experienced expertise mainly from AF organisation (vision impairment, hard of hearing, motor disability, cognitive impairment).
- 1986 A **generic** functional specification based on these four groups was produced.  
**18 workplaces** were specified with a description of the working individuals and their **status and skills** and of the **job requirements** at each place.
- 1987 Funding for **1000+** subsequent workplace adaptations were secured for the next three years.

# We were looking at

Purchaser

Principal contractor



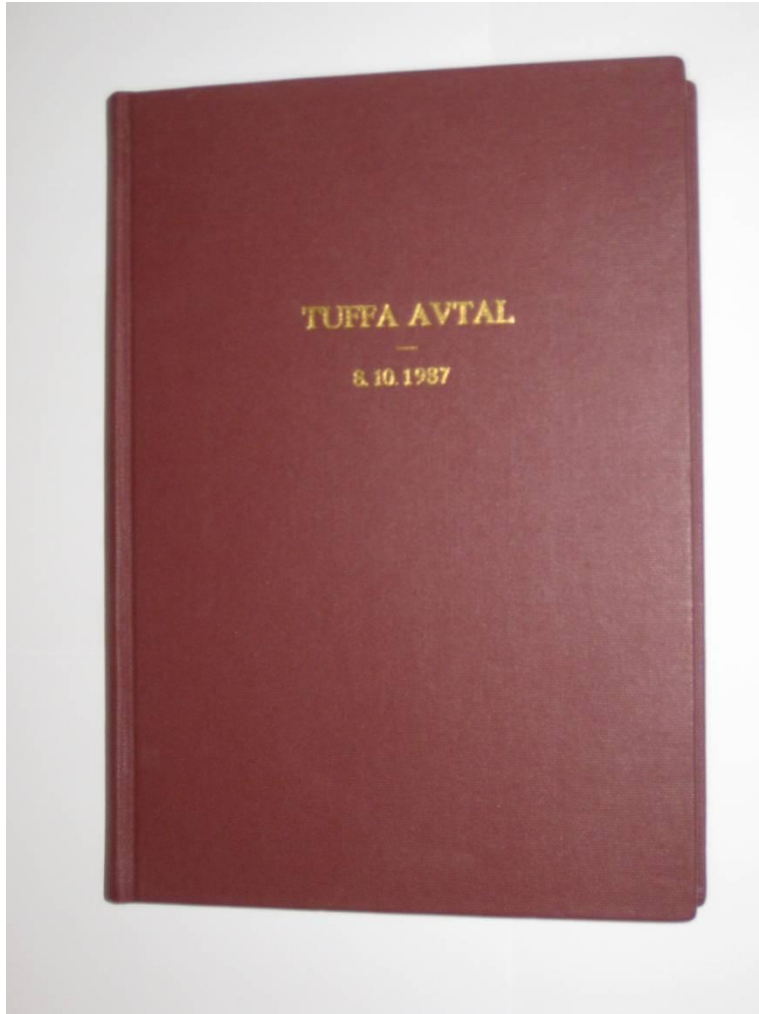
Subcontractors



One single contract

The principal contractor model

# The contract with a principal contractor



## Head lines:

General requirements

Deliveries and Installations

Support and Maintenance

Instructions on site

Guaranties – different levels

Delays, Damages, Compensations

Options

Service levels

Further deliveries

## How we proceeded (cont'd)

- 1987 Call for tenders based on the requirement specification and other requirements, including a price model. Three companies/consortia, all national, offered services according to the call. After the evaluation a subsidiary to a large telecom company was selected.
- 1988 The 18 prototype workplaces were successfully completed.
- 1989 Other companies were invited to bid on single adaptations according to established procedures.

## How we proceeded (cont'd)

1990 The 1000 workplace adaptations goal was achieved.

1993 Nearly 4000 workplace adaptations for people with all kinds of disabilities were completed. The TUFFA programme as such was terminated. Adaptations were continued, now within the AF regular organisation.

1987- and on. The specific governmental funding for technical development was supplied during the entire period and continued beyond 1993.

# Technology development

From the beginning (1987) extra funding was set aside for such workplace adaptations considered technologically advanced or offered work opportunities and new types of jobs for people with various impairments and disabilities.

Some sort of ICT application was the common token.

Up to 1 M€ a year were available for the purposes.

Projects could be proposed by the AF or by external bodies. A specific individual on a job was still required.

# Technology development (cont'd)

## Obstacles encountered

A main problem was the fundamental ignorance or lacking understanding within the AF staff of the ICT as a major vehicle for assisting disabled jobseekers. For these OTs, psychologists and other professionals ICT was not a desired complication at the time.

Another problem was the inattentive attitudes on the management levels within AF. The supporting body over time (decades) was the Swedish government (Ministry of Labour).

# Technology development (cont'd)

## More obstacles

Often very small companies (< 10 employees) were engaged in the development. Start-ups. No robust balance sheets. No real experience of marketing.

Only **one specific** disabled person in mind. It was always about a work place adaptation, no general development. This was changed in the 2000s. It became obvious that general developments for larger groups might be more effective.

# Technology development (cont'd)

## Remedies

- A contract between the AF and the explorer/developer /deliverer based on functional requirements developed by experienced expertise.
- Securing that the requirements had enough flexibility.
- Implementation in real work sites with employees or potential employees. Employer involved.
- Strict contracts (deliveries, check-points, penalties, payment, testing, final approval, etc). But, flexibility in their execution.
- No refund, also in case of success.

# External reviews of the TUFFA programme

1992 The International Labour Organisation, Geneva  
through Rehabilitation International, NY.

1998 Technopolis, Policy Research Associates, UK.  
“Evaluating the TUFFA programme –  
a scoping study”

(The latter, specifically, pointed out the AF top management lacking interest and engagement in the programme)

# Four companies and business cases

1. **Voxit** – Speech technology
2. **Omnitor** – Video-communication for the deaf
3. **Oribi** – Software for people with read-and-write disorder (dyslexia)
4. **ComfortAudio** – assistive technology for people suffering from hard of hearing

# Voxit – Speech technology

1) Text to speech, 2) Speech recognition 3) Continuous speech

Voxit started in 1993 with a speech recognition system for workplaces for vision impaired or blind people, later for people suffering from dyslexia (writing impaired).

Five employees + representatives elsewhere in Sweden and distributors in Finland, Norway and Belgium.

Principal own product Voxit VoiceExpress

Extended the market to non-disabled, dentists, lawyers, and others.



# Voxit

## Talk-in registration by a dyslectic driver

Talk-in data with speech confirmation instead of tapping date on a tiny keyboard during short work-cycles



The talk-in solution was the job applicant's only real chance to keep his job

# Omnitor

From start in Omnitor 1998 developed projects for deaf people on usability research and development on real time text and video communication.

Developed the *Total Conversation* concept, in national project, including a number of consecutive AF funded undertakings; now among the Universal Services required in the European Communication Directives.



**Total Conversation** – video, text, audio



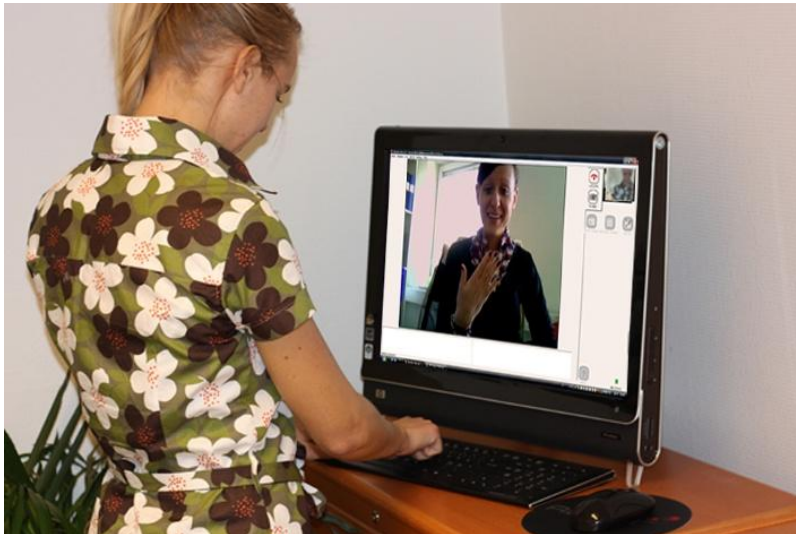
Deaf lorry-driver at work using sign language and text messaging



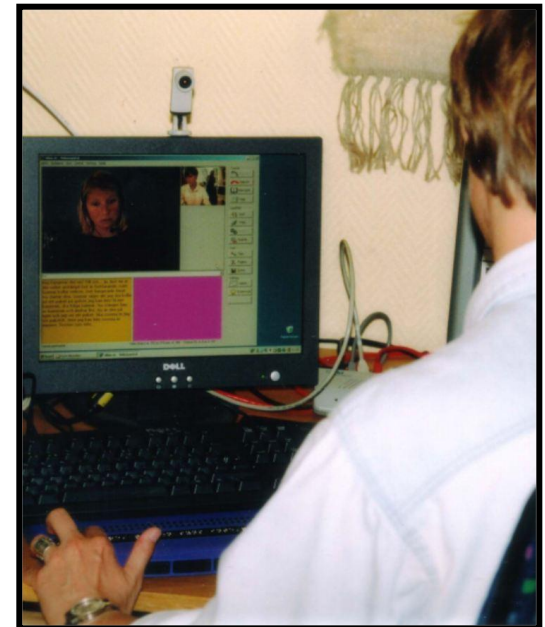
*Total Conversation & 112 for all*

Omnitor - REACH112 partner.

- Leading provider of Total Conversation solutions in Sweden.
- Contributes to global policy development and harmonization standards, e.g. collaboration with the Trace Center, Wisconsin.
- Now 18 employees, mostly deaf people.



Text always available during video call enriches communication for all.



Deafblind woman using Total Conversation with Braille.

# Oribi

Dyslexia was recognized as a major problem for many job applicants to acquire and keep their jobs in an increasingly demanding job market in the mid 1990s.

The ability to read and write Swedish was observed as an increasing principal faculty in many jobs – new and traditional.

A substantial programme was launched by AF and others. One of the sustaining results was the Oribi company.

# Oribi

1996 First project started – “Spell right” (Stava Rätt)  
- a spelling assistive software for the Swedish language.

Features:

- a) directly accessible when using MS Word
- b) proposes correctly spelled words in frequency order
- c) when sound confusion may occur (Eng. which/witch), sentences demonstrating different meanings are shown, a large library of sentences was developed.
- d) also errors in first letter of a word is caught (Eng. “shus” -> shoes, chose, shows)
- e) an AI approach for the kernel is the key asset of Oribi.

# Oribi

2001 Company started

2003 First own product delivered (Stava rätt 3, XP version, later called Stava Rex)

2004 Word prediction software Saida launched

2005 SpellRight – English as the second language

2006 SpellRight – Danish version

2010 VeritySpell – Native English version

Now with 5 employees in Sweden and a sub-branch in York, UK

# ComfortAudio

assistive technology for people with hearing aids

1994 An employee with hearing difficulties. Job comprised meetings most days, which he had difficulties to follow.

Started with a formal procurement based on functional requirements. Only one tender, out of six, complied to all requirements.

Two young engineers just graduated (BSc) from school, skilled in the new digital technology were contracted.

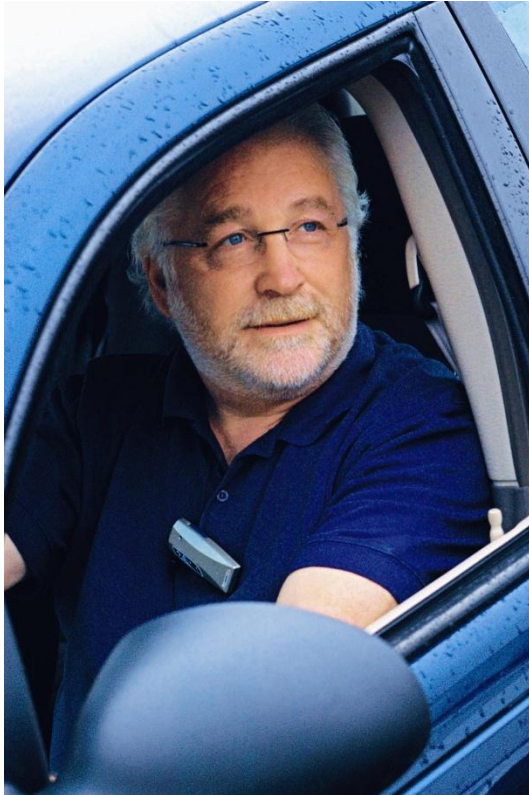
AF consulted expertise, who, in fact, doubted the solution. Anyway, the tender was accepted.

# ComfortAudio



Comfort Conference  
4<sup>th</sup> generation

# ComfortAudio



Selecta BT

transmit the signal **from telephone** (mobile or fixed line) to an ordinary hearing aid in the ear.

# ComfortAudio

Earset DE-10



Microphone  
Transmitter



Receiver to be attached to the ear

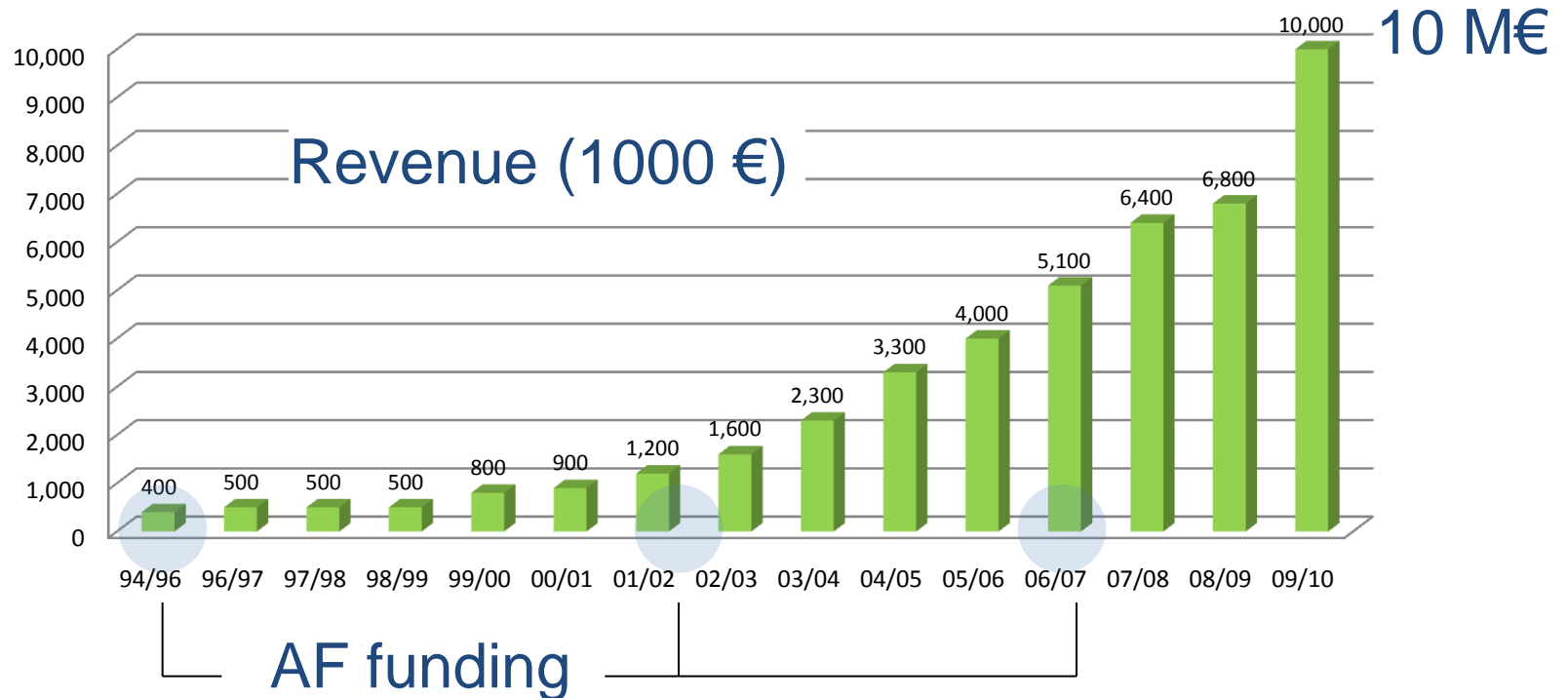
Receives digital sound signals from transmitter in conversation mode.

Fully encrypted for confidentiality

Look-a-like common ear gadgets of today

Still smaller sizes versions to be expected

# Comfort Audio Group Sales Statistics



2010 Offices in Sweden, Denmark, Norway and USA,  
and employs about 60 persons.

# Some major experiences

1. Most important was to have a well financed body (AF) behind the undertaking, which also had a long term commitment to support the disabled at work.
2. Expertise available who could describe functional requirements for the developments.
3. Strong contracting procedures and follow ups of the projects were indispensable. (no serious complaints or “scandals” during the whole period)
4. As a business development, the structure was not optimal. We were very much bound to the regulations that the AF had to comply with, e.g. always a specific handicapped job applicant in view. This was good in the beginning but not in the long run.
5. A great problem was the limited knowledge and interest in this kind of technology by the dominating majority of the AF expertise.

Thank you for your attention