



Työterveyslaitos



WORKSHOP

New project: TOTI – user oriented office spaces – knowledge work, space solutions, indoor environment and work performance

2009-2012

Hongisto
Finnish Institute of
Occupational Health

toti - käyttäjälähtöiset toimistotilat



Summary

- The aim is to develop holistic indoor environment solutions and user oriented office environments for workers.
- Indoor environment covers e.g. thermal conditions, acoustics, ventilation, lighting and interior design.
- Research methods include laboratory experiments and field surveys and longitudinal experiments.
- The project combines
 - environmental psychology,
 - acoustics, ventilation,
 - HVAC design and
 - real estate business.
- Results can be applied in the design of future offices.
 - office solution, workstation design, indoor environment

Toti

- Funded by
 - Tekes (60 %)
 - 15 companies (20 %)
 - 4 research parties (20 %)
- Timetable: 1.9.2009 - 31.12.2011
- Volume:
 - 100 pomow
 - 916 000 €



Tekes Space programme

- Aim of programme is to promote business related to different types of facilities and improve international competitiveness.
- Aim is also to increase user knowledge and e in spaces ??
- Programme has been started because user's needs for spaces are changing and conventional thinking of the architecture and design of offices, etc. must be developed.



Tila

Companies

Material manufacturers or distributors:

- Sound absorption materials:
 - Saint-Gobain Ecophon
 - Mood-Works
- Ventilation products
 - Fläktwoods
 - Halton
- Furniture
 - Martela
 - Isku Interior
- Speech masking systems
 - Audico Systems
- Lighting solutions
 - KT-Interior

Architectural design companies:

- Conbalance

Facility users:

- Elisa
- Wärtsilä
- TeliaSonera
- Nordea
- OP-Keskus

Facility owners:

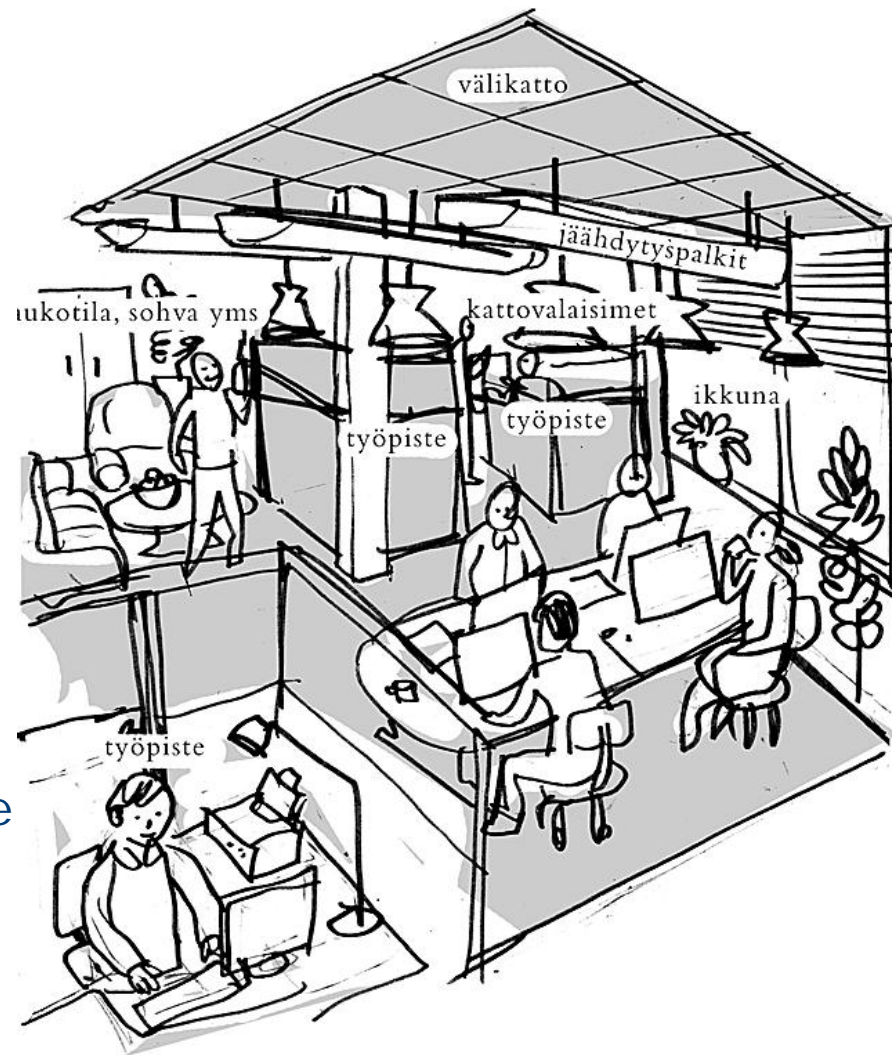
- Senaatti-kiinteistöt

Building companies:

- NCC Rakennus

TOTI aims

- Holistic control of office environment using evidence based research
 1. Development of indoor environment concepts and products for open-plan offices - comfort and work performance
 2. Challenges of office design in organizations doing knowledge work
 3. Field evidence about successful solutions
 4. Assessment tools and office design guidelines for general use



Work package 1: Development of indoor environment solutions

AIM:

- Development of indoor environment concepts and products for open-plan offices based on evidence about comfort and work performance

METHODS

- 30 subjects are recruited to a full-scale open-plan office environment for a 4-hour experiment, 8-12 persons at a time.
- Subjective opinions are collected and work performance is monitored.
- 5 to 10 different indoor environment solutions are experimented.
- Each environment is realized using commercial up-to-date furniture, ventilation devices and acoustic materials
- Physical measurements and models in each experimental environment

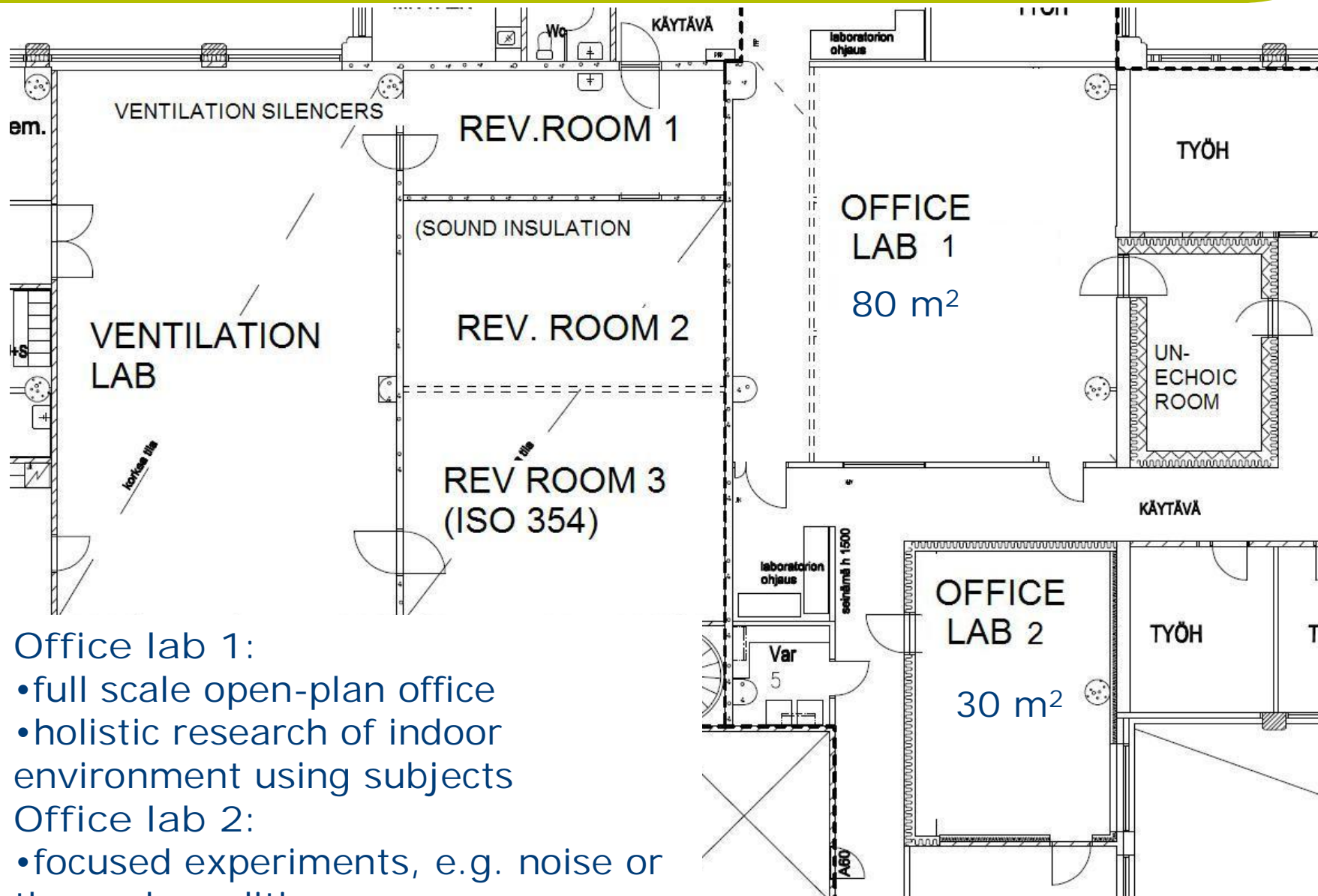
Main variables which creating the office environment:

- Acoustic environment
- Thermal conditions
- Lighting
- Interior design
- Privacy

Other variables to be monitored

- airflow rate
- energy consumption
- ergonomics
- air quality
- total expenses of the solution

Office laboratories in Turku



Office lab 1:

- full scale open-plan office
- holistic research of indoor environment using subjects

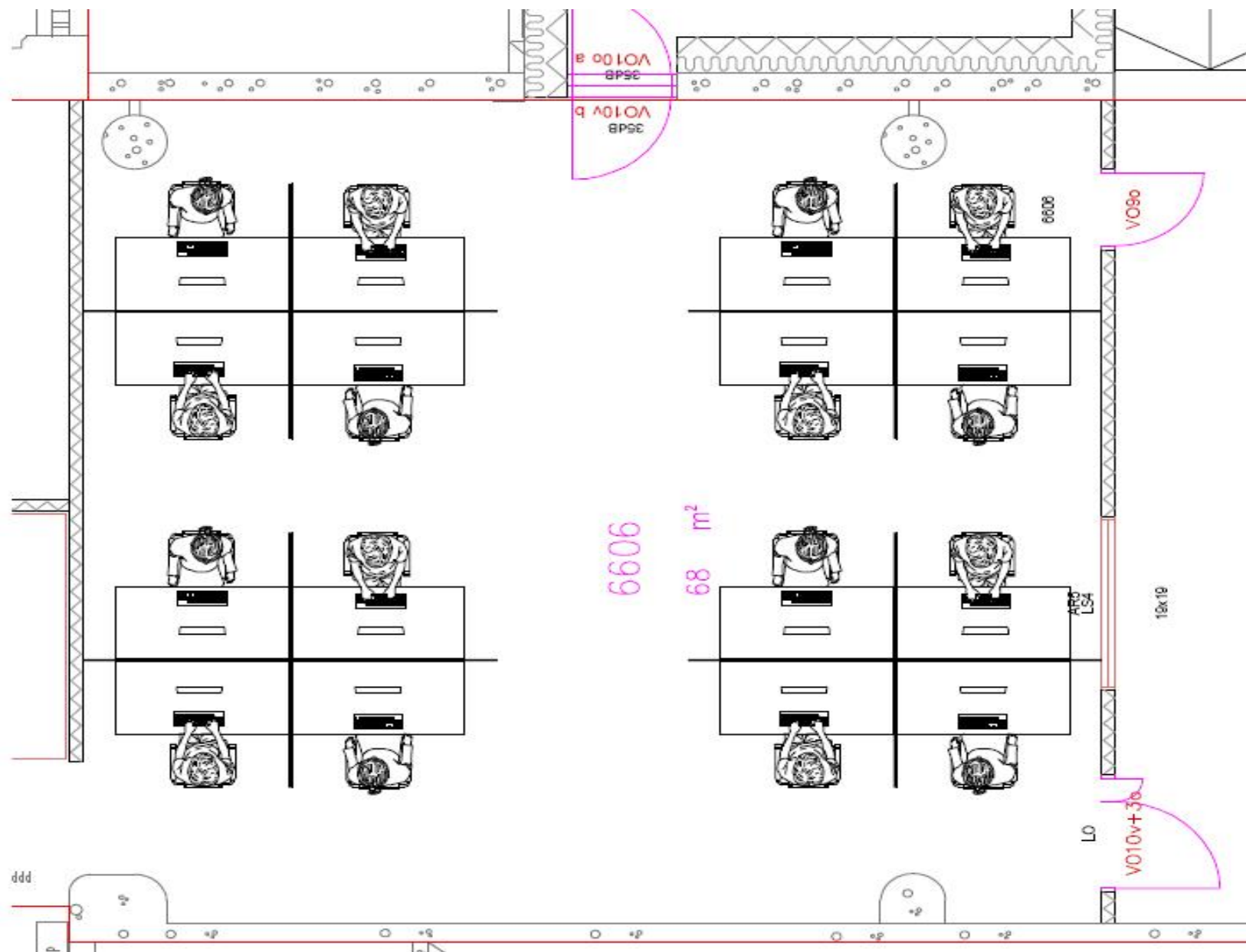
Office lab 2:

- focused experiments, e.g. noise or thermal conditions

Previous studies in office lab 2, 30 m²



Preliminary workstation layout of toti experiments, 80 m²



Work package 2: Challenges of office design in organizations doing knowledge work

AIM:

- to investigate user experiences about facilities in organizations

METHOD

- field surveys and interviews in offices
- Helsinki University of Technology is responsible of this.

Work package 3: Field evidence about successful solutions

AIM

- effect of indoor environment improvements on work performance, office satisfaction and well-being

METHODS:

- intervention studies in offices
 - measurements and occupant questionnaires before and after the renovations
 - participation to indoor environment design
- Possible intervention themes
 - improvement of acoustic conditions
 - improvement of cooling system
 - effect of space layout
 - renovation from private room office to open-plan office
 - improvement of lighting system

Work package 4: Assessment tools and guidelines

AIM

- Creation of simple tools for the assessment of office premises in respect with office satisfaction, knowledge work, performance and comfort

METHODS:

- creation of tools and guidelines on the basis of scientific work done in work packages 1-3
- piloting of tools in 5 to 10 offices

- This is the public and practical output of the project which summarizes the main findings into practical language.
- The deliverables are

1. Objective assessment form of the indoor environment and HVAC systems
 - piloting in 5-10 offices
2. office environment questionnaire
 - short, 2-page questionnaire for work environment consultancy
3. Guideline for the indoor environment design of multi-space office

Researchers

- Finnish Institute of Occupational Health, Indoor environment laboratory, Turku
 - adj.prof. Valteri Hongisto
 - 9 researchers in physics and psychology
- Helsinki University of Technology, Facility Services Research Group,
 - adj. prof. Suvi Nenonen
 - 4 researchers
- University of Turku, Laboratory of applied cognitive psychology
 - adj. prof. Jukka Hyönä
 - 2 research assistants
- Satakunta Polytechnic, Pori
 - Lic. Sc in tech. Esa Sandberg
 - 1 research assistant

Sciences and professionals

- knowledge work, facility user experience
 - Suvi Nenonen, Kaisa Pöyhönen, Ursula Hyrkkänen
- work environment psychology
 - Annu Haapakangas, Marke Koskelin-Davies
- cognitive psychology
 - Jukka Hyönä
- thermal conditions
 - Hannu Koskela, Henna Hägglom, Pekka Saarinen
- acoustic environment
 - Valteri Hongisto, Jukka Keränen, David Oliva
- assessment of HVAC devices
 - Esa Sandberg
- lighting
 - Jukka Keränen, companies
- interior design, colours, office layout
 - companies
- rakennusurakointi laboratoriossa
 - Jarkko Hakala
- internet tools
 - Toni Rosendahl
- other factors
 - indoor air, Eero Palomäki
 - physical ergonomics, Jouni Lehtelä

Publication plan

- 5 papers in peer-reviewed scientific journals
- 17 international congress papers
- 9 papers in national congresses
- 5 master's theses
- office design guidelines
- other reports directed to different readers

Altogether 43 publications

International collaboration

FIOH

- PhD Andreas Liebl, Fraunhofer Institute, Stuttgart, Germany.
- Prof Staffan Hygge, University of Gävle, Sweden.
- Dr Sabine Schlittmeier, Prof Jürgen Hellbrück, Catholic University of Eichstaett-Ingolstadt, Germany.
- Prof. Arsen Melikov, Indoor Environment laboratory, Technical University of Denmark, Copenhagen, Denmark.
- KTH, Architectural research, Christina Bodin-Danielsson

helsinki university of Tech

- Professor Per Anker Jensen, Technical University of Denmark, Copenhagen, Denmark.
- Professor Wim vanPullen, University of Delft, Center of People and Building
- professor Kent Larsson, MIT, USA.

- Collaboratorion started in an internationa seminar October 5-8 in Turku, where 15 participants discussed about the tasks and environments to be used in Workpackage 1
- Future seminars will be in 2010 and 2011
- Smaller work meetings are made in between
- researcher exchange project to Technical University of Denmark (Henna Häggblom)