



Finnish Institute of
Occupational Health

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**Activities of the Finnish Institute
of Occupational Health in 2009–2013**
Self-evaluation

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1 Mission and Strategy

Mission, legislation, organization

The Finnish Institute of Occupational Health (FIOH) is a research and specialist organization that *promotes occupational health and safety as part of good living*.

FIOH is not a government agency but an independent, subsidized, public corporation. Its tasks and financing are defined by law¹. According to the act on FIOH, FIOH's purposes are "research and service activities relating to occupational health and safety". According to the Act, FIOH exploits two funding sources: government subsidies and external funding. The Ministry of Social Affairs and Health (MSAH) approves the extent of operations and their budgeted costs, of which 80% are financed from the annual State budget. In addition, FIOH may pursue activities financed by its own income accumulated as fees for services, training courses and publications, and external grant funding for research projects. FIOH is also obligated by law to provide research and specialist services to companies as well as to individuals.

Since 2011, FIOH has operated as a matrix organization (Fig. 1). *Areas of Activity* are responsible for operations ("core processes") and *Centres of Expertise* for competence (human resources for core processes). FIOH also has a unit for in-house services. Internally, all the units are organized as teams. The organization is nationwide, with six *Regional Offices*, providing a capacity for local services and co-operation with clients and partners. A team may have members in several regions.



Figure 1.1 FIOH's organization

All the essential occupational health and safety authorities and labour market organizations are represented in FIOH's highest administrative organ, the *Board of Directors*. The Board approves the basic administrative documents such as the Strategy, the Annual activity plan and the Activity report. The Director General leads the general management, with the support of the *Executive Committee*. All the directors of the *Areas of Activity* are members of the *Executive Committee*; it also contains one of the directors of the *Centres of Expertise*. When needed, the Executive Committee meets in an extended form, which includes all the directors of the *Centres of Expertise*.

¹ Act on the Operations and Financing of the Finnish Institute of Occupational Health 24.2.1978/159 and Decree on the Operations and Financing of the Finnish Institute of Occupational Health 29.6.1978/501

At the end of 2013, FIOH had 778 employees. The number of person-years was 709. Since 2008, person-years have decreased by 90, due to cuts in state subsidies. Among the 18 Finnish state R&D institutions, FIOH ranked as sixth when measured by the amount of budgeted R&D expenditures in 2013, with a share of 5% of the total R&D expenditure of state R&D institutions². FIOH's total expenditure was estimated to be 68.8 M€ in 2013, of which 55% was funded by state subsidies and 45% by external sources.

FIOH's strategy for 2011–2015

Relevance - *Well-being through work*

The new strategy for 2011–2015 introduced "*Well-being through work*" as the core of FIOH's vision³. The slogan tries to reverse traditional thinking about the relationship between work and health. The industrial era OSH approach understands work as a world of hazards and risks which have to be controlled. OSH activities in Finland have succeeded quite well in traditional risk management. Of course, actions are still needed to maintain the achieved level and to tackle emerging risks from new technologies in good time. The slogan sets the goal much higher: the modern OSH approach should develop work as a source of well-being.

The vision of *Well-being through work* has at least three aspects: the ageing population, the problems of the state and municipalities in financing public services, and the changes in the characteristics of work. The first two issues are very much interconnected and have the same basic solution: extended working careers and wider participation in work, which will result in less costs to social security and more for tax payers. While otherwise quite successful, traditional OSH has not succeeded in bringing sick leaves and disability pensions due to musculoskeletal diseases (MSD) and mental disorders under control; instead, their incidence has been increasing since the 1990s. The potential added value of succeeding in the prevention of work disability due to MSDs and mental disorders is huge at the national economy level, at least several hundred million if not billions of euros.

Even though health care services strive to promote health, the real focus is still more on treating diseases; i.e. in practice, health equals the absence of diseases. The idea of *Well-being through work* aims for a different concept of health. Health should not be thought of as a physiological or mental state but as a capacity, as an ability to act. The ability to act and illnesses are at least partly independent: one can, with certain limitations and sometimes with special arrangements, be active in work life despite having a chronic illness – and feel better. In fact there is strengthening evidence that in cases of musculoskeletal diseases and mental disorders, work promotes recovery more effectively than sick leaves, and often better than detached rehabilitation procedures.

Work life is changing rapidly as a result of economic globalization and information technology. Many of the present work life structures are designed for traditional industrial wage work, which is being widely replaced by other types of work as a result of the information society, growing service sector work and global networking. OSH needs to be reformed in order to meet "new" work life issues. This is also an opportunity: being successful in today's new work life is due to the capacity to adapt, create solutions, communicate, and act in emerging situations. Thus the well-being of personnel and work communities are very much intertwined with productivity.

The vision of *Well-being through work* is addressed both inwardly and outwardly. The vision aims to modernize the approach of developing work life among policy-makers and social partners and at workplaces. Therefore, the impacts of *Well-being through work* would be systemic, and penetrate work life practices through various channels, not only through FIOH's

² Source: Statistics Finland 2013

³ IEG2009 recommendation no. 3

own activities. The general response has been quite positive. The *well-being at work* (työhyvinvointi in Finnish) concept is widely used; in so many contexts that it is even becoming worn-out. The national policy programmes for extending working careers and for developing work life have adopted the concept. Workplaces have “well-being at work activities”. In many organizations, the managers responsible for OSH have been substituted by managers of well-being at work. The MSAH’s strategy has adopted the idea that work is the best social security. However, in recent government policies (Policy programme for structural changes, autumn 2013) the scope of the means for extending working careers has somewhat narrowed to traditional employment and pensions policy actions. Chapter 2 discusses the actual achievements in more detail.

The vision is internally phrased: “Bring in the empowerment approach alongside the risk management approach”. It aims to develop FIOH’s actual portfolios of activities and competence structure in order to improve the capacity to embark on the *Well-being through work* approach in practical operations. Among FIOH’s personnel, the vision is very much accepted. The concept of well-being at work is internally discussed more critically: it is seen as obscure, ambiguous and theoretically undefined.

Effectiveness –FIOH’s innovation model

Success in realizing *Well-being through work* depends on whether the governing of work-health interactions succeeds: how well risks are managed and positive interactions promoted. The circles in Figure 2 represent the means used by work life partners in governing work and health interactions. The means and the partners’ roles are interconnected; together they create an “ecosystem”. For example, the legislation set by the authorities obligates employers to provide OHS (OHS) for their employees, which are purchased from service providers.

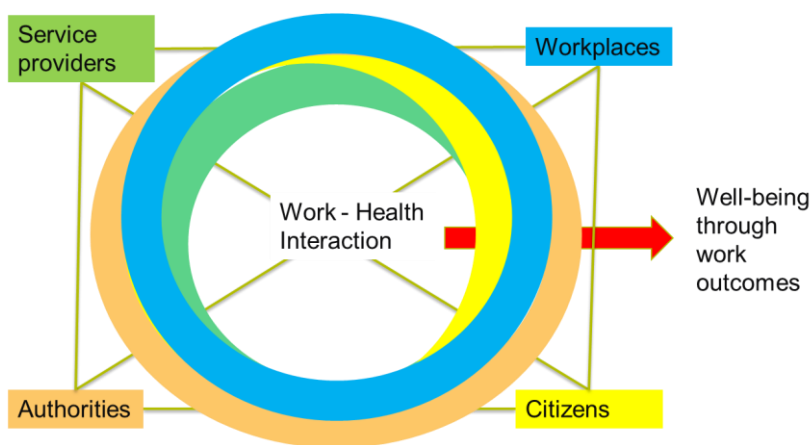


Figure 1.2 Governing the work-health interaction

The strategy positions FIOH as an institution that aims to provide the ecosystem with adequate and efficient means and the knowledge and tools to govern the work-health interaction. Efficiency depends upon the scientific quality (“coefficient of determination”), on the quality of the governing tools (e.g. the extent to which the determinants can be controlled), and on the implementation of these tools. The strategy recognizes the systemic role of creating impact through FIOH’s promise to clients: “FIOH is the best partner in creating solutions for well-being at work; regionally, nationally, and internationally. Our promise to our clients is based on our innovation model, with the help of which we convert work- and health-related research results into functional and cost-effective solutions, together with our clients and partners”.

The 2011 strategy reforms FIOH's innovation model⁴. The innovation chain is transformed into a more intertwined model (fig. 3). The new model acknowledges that the innovation process is more of a learning and co-creation process; a dialogue, than a chain that starts from basic sciences, moves to applied sciences, then to development and finally to implementation. FIOH's model aims to both exploit existing knowledge and to efficiently reform it. The three areas of activity, *Creating Solutions*, *Client Services* and *Influence through Knowledge* represent three different ways of creating and transferring knowledge; they have different operations logics, different time spans, and different funding logics, but they can exploit and develop the same knowledge capital in the *Centres of Expertise*.



Figure 1.3 Innovation model

The organization and management⁵ were straightforwardly restructured according to the innovation model. The *Areas of Activity* are responsible for operations and for the use of human and financial resources. The positive experiences of the *Thematic Area* pilots from the previous strategy period were explored and exploited: *Creating Solutions* was organized as nine *Themes*⁶, each led by a full-time director. Much of the support functions were organized in the *Areas of Activity* instead of being provided by the *Centres of Expertise* or as common services. Because the *Areas of Activity* have their own personnel, directors and managers for core operations, as well as process support personnel, they also have the same role as the *Centres of Expertise*. Every employee is a team member and has a team leader as their immediate supervisor. The team leader's responsibility is to promote each employee's competence and to balance workloads.

The matrix makes the balance between the demand and supply of competence visible, and therefore more manageable. The benefits of the matrix are prominent when the operations combine competence from several teams.

The strategy emphasizes partnerships as a source of efficiency. Partnerships allow more internal focusing on competence structure and at the same time stronger combinations of competence when, for example, organizing and seeking funding for large projects. The most prominent example is perhaps the *NanoSafety Centre* which has succeeded in combining competence worldwide in large EU programmes (see Chapter 3).

The previous evaluation of FIOH advised a stronger partnership with the National Institute for Welfare and Health (THL)⁷. THL and FIOH prepared a partnership agreement in 2011, but in agreement with the MSAH, the preparations further led to wide coalitions between the institutions in the field of health and well-being. The SOTERKO Consortium of National

⁴ IEG2009 recommendation no. 7

⁵ IEG2009 recommendations no. 11, 14 and 20

⁶ IEG2009 recommendation no. 21

⁷ IEG2009 recommendation no. 3

Institutes for Health and Well-being was established in 2011. SOTERKO now has six R&D programmes, two of which are co-ordinated by FIOH. FIOH has also agreed on partnerships with most of the Finnish universities.

Drawing up and implementing the strategy

The drawing up of the strategy for 2011–2015 was organized as a participative process which aimed to engage both FIOH's personnel and its stakeholders in the strategy. The process started with an internal evaluation in 2009, which included a thorough self-evaluation. The self-evaluation and the recommendations from the international evaluation group raised both readiness for changes and offered a snapshot of FIOH's situation. The evaluation was followed by a "strategy project". The project group in turn prepared proposals, facilitated workshops and tested the outcomes with clients and stakeholders⁸. As the result took the shape of an extensive change, a "change project" was established in continuum to carry out the organizational changes and to finalize the management system.

The 2011 strategy is no longer an action plan; it now defines an approach for FIOH. Therefore the role of the *Executive Committee* as an agile strategic decision-maker became important. The rapid changes and turbulences in FIOH's environment made this even more crucial. As the directors of the *Areas of Activity* are represented in the *Executive Committee* and the directors of the *Centres of Expertise* in its extended form, the group has a good executing capacity and is committed to common decisions. A set of indicators⁹ were defined for the follow-up of the aimed strategic outcomes. These indicators are also used in reporting performance to the MSAH.

Conclusions and future challenges

The approach implied by the vision of *Well-being through work* is expected to be even more imperative in future work life. The governing of the work-health interaction needs to be modernized, as work continues to become more knowledge- and communication-intensive, even in the manufacturing branches. It is encouraging that in future work life, occupational safety and productivity seem to be strongly connected: poorly organized, ineffective work is neither good for health nor profitable, and vice versa.

Current OSH has not succeeded in controlling musculoskeletal diseases (MSD) and mental disorders. Social and economic well-being has a huge potential for diminishing sick leaves and disability pensions due to these illnesses.

Well-being through work is not yet a well-established approach. The diffusion of the approach would benefit from being more systematically formulated. The approach implies more emphasis on the evaluation of the effectiveness of current governing models, and co-creation and testing of new models.

The Finnish R&D&I environment is undergoing restructure. Although some clear decisions about structures¹⁰ now exist, there are ambiguities, inconsistencies and divergent opinions about the goals of state research institutions. The Ministry of Education (responsible for research policy) emphasizes high quality international research; the Ministry of Employment and the Economy (responsible for innovation policy) emphasizes the commercialization of inventions; and the Prime Minister's Office emphasizes support for national level strategic decision-making. The D in the R&D&I policy discourse refers more to productization, yet in FIOH's approach, it means developing and implementing tools and practices for the

⁸ IEG2009 recommendation no.6

⁹ IEG2009 recommendation no. 13

¹⁰ The Government Resolution on Comprehensive Reform of State Research Institutes and Research Funding, issued in Helsinki 5 September 2013

management of the work-health interaction (i.e. social innovations). FIOH's approach has not been very well acknowledged in the discussion of possible overlap with THL. The concern has been consequences and ill-health outcomes, rather than the prevention of ill-health: this is how the targets of FIOH's and THL's activities differ. This discourse partly reflects the even more basic issue of the public sector's role in the welfare society. This issue can be seen in TEKES' (Finnish Funding Agency for Innovation) draft research and innovation strategy for health affairs.¹¹ The draft treats health care as a promising business area and the innovation policy should promote the health business in Finland. Therefore, according to the TEKES draft, the resources of FIOH and THL should be reallocated to targets that have a clear commercial potential in health technology.

It is expected that FIOH's basic funding (state subsidy) will be cut from the 2013 level by one fourth by 2017. Basic governmental funding is needed in R&D activities as a national/own component of total funding. Therefore, given the current model of operations, the consequences for FIOH's activities and the number of permanent personnel that can be financed are even greater.

FIOH's innovation model is one of the most articulated among R&D institutes when it comes to the effective exploitation of research in developing practices. In 2011–2013, the internal developmental focus was on the establishment of work processes inside the three *Areas of Activity*. There is still more to gain from the synergy of the *Areas of Activity*. It remains unclear whether better synergy would be better achieved by formal processes (such as productization) and/or be competence-mediated (experts working in two or three *Areas of Activity* and thereby transferring knowledge and needs between the areas). In any case, the elements of the model are tightly interconnected: if research is moved to universities, knowledge capital to be transferred to the clients by the two other *Areas of Activity* will become outdated in a few years.

The matrix model adds value to the *Areas of Activity* only so far as multidisciplinary and multiprofessional projects and other activities exist.

Table 1.1. Self-evaluation of FIOH's 2011-2015 strategy and its implementation (Moderate +, Good ++, Excellent +++)

| | Internal Implementation | Topical Relevance | Future Relevance |
|---------------------|--------------------------------|--------------------------|-------------------------|
| Mission | ++ | +++ | +++ |
| Vision | ++ | +++ | +++ |
| Innovation Model | ++ | +++ | ++ |
| Matrix Organization | + | ++ | ++ |

¹¹ In Finnish. Terveystieteiden tutkimus- ja innovaatiotoiminnan kasvustrategia. Luonnos 5.12.2013. http://www.tekes.fi/Global/Strategia_luonnos%2005122013.pdf

2 Well-being through Work – Focal Achievements

In our global economy, Finland faces major challenges with regard to its competitiveness. Such challenges include changes in the population's age structure and in methods of production. Although the whole of Europe will be affected by a changing demographic structure, in Finland this change is on average more extensive than anywhere else on the continent. The baby boomer generations are retiring and a new generation, smaller in number, is entering the world of work.

In terms of the national economy's competitiveness, it is crucial that we harness all our resources by increasing participation in employment and improving the productivity of work, as the structure of enterprises, industries and the entire economy changes. By attending to the quality of work life and well-being at work, productivity and profitability can be increased in a sustainable way.

FIOH's research activities are based on the needs of society and aimed at strengthening the international competitiveness of work life in Finland. Well-being and longer careers are solidly connected; healthy, safe, and meaningful work creates well-being. Our strategic goals are safe and meaningful work, a supportive organization, effective OHS, and flourishing workers.

Our strategic objectives are annually monitored using national indicators. We aim to achieve our targets through annually reviewed priority areas, called focal areas. In practice, these focal areas have been slightly revised each year and are as follows:

1. Extending careers, particularly the integration of young people into work life
2. Bringing our vision, *Well-being through work*, to the centre of public discussion on careers
 - The Leadership Development Network and the Forum for Well-being at Work
 - Developing services for well-being at work
3. Improving the effectiveness and coverage of OHS

We contribute to improving work life as part of the national system/network (Figure 1). FIOH has an important role and is responsible for creating good practices, examples and policies to extend working careers. We contribute to the network by studying factors which, for example, keep young or ageing workers in the workforce and by finding evidence of effective policies. We improve work life through joint research and development projects with universities and research institutes, by providing practical solutions to workplaces and by co-operating with labour market organizations, ministries, policy-makers, pension insurance companies and OHS providers.

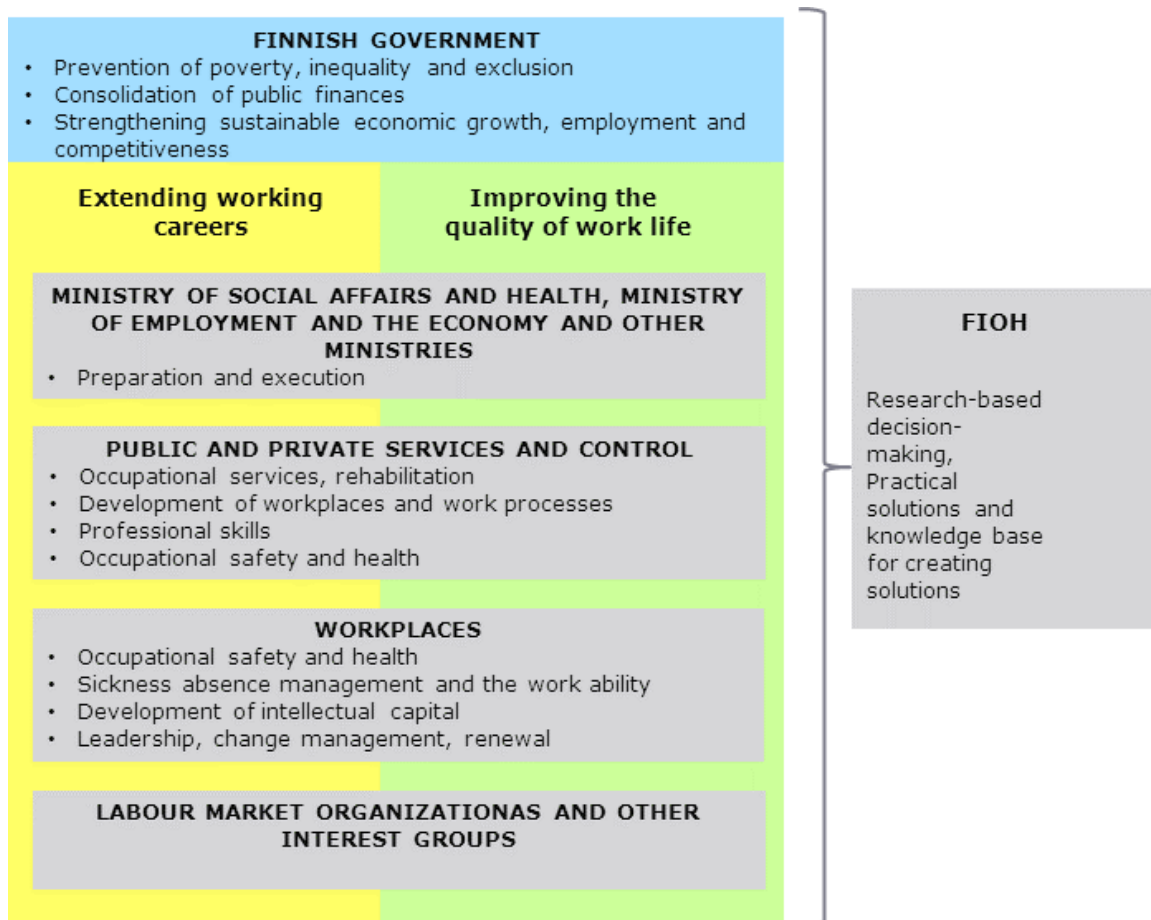


Figure 2.1 FIOH's role in the development of work life

The results of different reports indicate improvement in well-being at work (Kauppinen T et al 2012 and Working Life Barometer 2012). The expected effective retirement age for 50-year olds was 62.4 years in 2010 and has increased by 1.5 years since 2005. Slightly over a quarter of those employed felt that work is mentally fairly or very stressful in 2012. Compared to the situation at the beginning of the 2000s, it seems that the mental strain of work has slightly decreased, as has stress. Employees now feel that the management of organizations is more interested in the well-being of their personnel. A major proportion of employed people also feel that the decision-making procedures of their workplace are fair. Work engagement – vigour, dedication and absorption in work – is experienced fairly often. Approximately 90% of respondents experience work engagement at least once a week and 40% daily. Work engagement is known to promote the financial success of organizations; commitment to work, the workplace and work performance; and also to decrease intentions of retiring. Basic needs related to work that promote work engagement include independence, a sense of solidarity and feelings of success.

However, work life still faces many challenges. For example, sickness allowances have remained at a high level in recent years (Kela's statistical Yearbook 2012). Reports on the smell of mould have significantly increased, especially at workplaces of education, health care and social services. (Kauppinen et al 2012).

There are significant differences between the health and work ability of population groups and different professional groups. People in different professional groups share many health risk factors related to lifestyle, the standard of living and workplace risks. When measured by life expectancy, the differences between socio-economic groups have even grown. The difference in life expectancy between the highest and lowest fifth of the income level increased between

1989 and 2007 for men from 7.4 to 12.5, and for women from 3.9 to 6.8. The difference in life expectancy between workers and upper white-collar workers increased during follow-up for men from 5.2 to 6.1, and for women from 2.6 to 3.5. (Myrskylä M. et al. 2013).

The results of the 10Town study show large differences between the sickness absences of different professions, and these differences seem to have remained stable from year to year. Cleaners, home-based personal care workers, orderlies and other service workers have 3-4 times more sickness absence days than teachers, doctors and technical experts (FIOH 2013). In addition, the incidence of disability pensions was highest among construction and maintenance workers, gardeners and farm relief workers, and their risk of disability was up to 14 times higher than that of teachers and priests (Pensola et al. 2010).

Extending careers, particularly the integration of young people into work life

One of the main national objectives was to postpone retirement by 2–3 years. In the early 2000s the age limits for different pension benefits were changed. The achievement of this long-term objective is monitored through the expected effective retirement age (expectancy) for 25-year-olds. In contrast to the average and median age, expectancy is not affected by the age structure of the population.

Careers appear, on average, to be developing in the desired direction. Expectancy has now risen by approximately 2.1 years from the level prior to the national pension reform, in other words, even faster than predicted (Kannisto J 2013). In 2012, the expected effective retirement age was 60.9 years (Figure 2). We believe that the impact of the national retirement reform in 2005 is due to our long-term efforts in promoting well-being at work, health and occupational safety (Table 1)

Table 1. Examples of our research, research-based solutions and added knowledge regarding extending working careers (Chapter 3):

- Supporting solutions regarding the stages of career transition
- Supporting integrating young people into work life and their participation in work
- Utilizing factors related to work attractiveness and resources
- Focusing on the promotion of work ability and health and work
- Supporting work participation among groups for whom finding employment is difficult
- Putting solutions into practice for the work/life balance
- Finding associations between psychosocial work-related factors and health, work ability and continuation at work
- Research and solutions related to the development of organizations and leadership

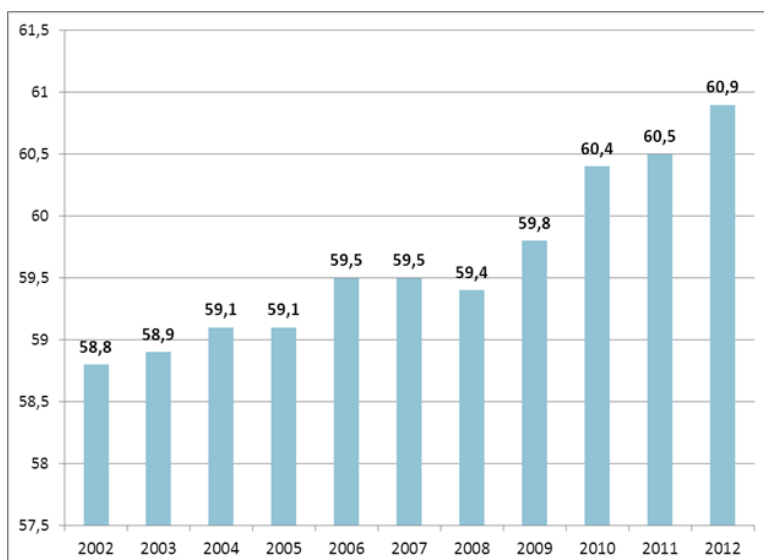


Figure 2.2 Expected effective retirement age for 25-year-olds, 2002–2012, years

Although the expected effective retirement age for a 25-year-old has developed favourably in the 2000s, the risk of disability pension between the age of 30 and 34 in particular has increased (Figure 3.). As a whole, disability pensions in Finland are still at a high level. Most often, incapacity is caused by mental disorders (28%) and musculoskeletal diseases (29%) (Statistical yearbook of pensioners in Finland 2012). The annual number of new disability pensions is relatively larger among blue-collar workers than among those in expert positions in all age groups (Pensola T et al. 2010). Even though the annual number of new disability pensions has fallen in the 2000s, the differences in pensions between occupational groups have not decreased very much (Järnefelt N et al 2013).

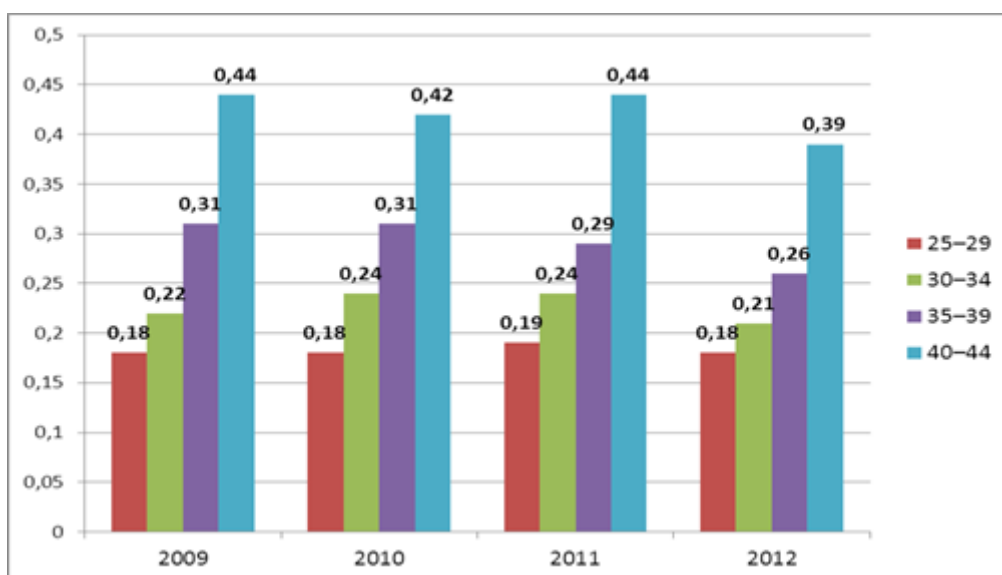


Figure 2.3 New disability pensions in 25- to 44-year age group, % in 2009–2012

Young people’s entry into the labour market, their integration and support are particularly important ways to increase participation in work and prevent social exclusion. Young people’s difficult access to the job market delays the new generation’s integration into work life and will have long-term effects on their careers. In addition to the unemployed, 103 000 people are excluded from work life, the so-called hidden unemployed, who may want to and be able to

work but have not actively sought it. The hidden unemployed consist of 15–24 year-olds (33 000) and 55–64 year-olds (26 000) in particular. (Myrskylä 2012)

In the last few years, the employment rate of the ageing population has developed in a positive direction. The 2011 employment rates for 55–64-year-olds gives reason to expect a favourable development in the expected effective retirement age also in the future. Economic development, however, plays an important role in the employment rate of the ageing population and subsequently in the continuance of the current positive trend. In the age cohort of 60–64-year-olds, the employment rate has increased by as much as 18 percentage points in the 2000s. (Statistics Finland 2012)

Bringing our vision, *Well-being through work*, to the centre of public discussion on careers

One of FIOH's key objectives is to extend working careers. Careers are extended when employees are able, allowed and willing to remain at work. The quality of work life is the most significant factor in encouraging Finnish employees to be willing to extend their careers and in providing opportunities to do so.

We have a common goal of well-functioning, profitable workplaces that create a good work life. Finnish work life must be developed through flexible reforms, in a direction that strengthens the will and ability of as many people as possible to continue in work life for a sufficiently long time, while remaining motivated.

Well-being at work has been an active target of development in Finland in the 2000s, but there are some methodological challenges in measuring the meaningfulness of work. The results of different reports indicate that well-being at work has genuinely improved in recent years (Kauppinen T et al. 2012 and Working Life Barometer 2012). However, it is worrying that through the 2000s, the respondents of the Working Life Barometer have felt that work and meaningfulness of work has deteriorated. At the same time, the proportion of those who believe that the situation remains unchanged has almost doubled in the last 21 years. In 2012, a clear majority of the respondents felt that the situation remained unchanged (Working Life Barometer 2012).

A survey of activities by Finnish companies aimed at extending working careers found that since 2011, knowledge regarding extending working careers had improved and willingness to work for longer had increased (Aura J et al. 2012).

However, according to the recent Work and Health 2012 survey, 74% of respondents of at least 45 years of age are considering continuing work after the age of 63 (Figure 4.) (Kauppinen T et al 2012). To extend working careers, a change of attitudes and emphasis on a resource-centred approach are required.

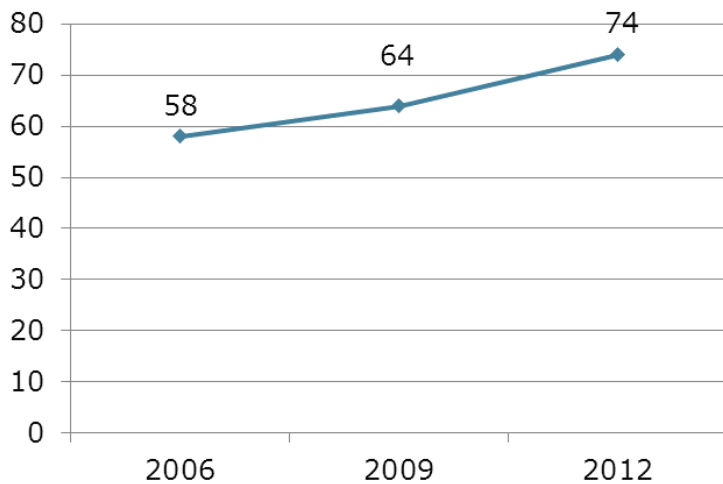


Figure 2.4 Employees considering continuing work after 63 years of age %

The Leadership Development Network and the Forum for Well-being at Work

We have convinced relevant audiences of the economic importance of occupational health and safety activities. This has been done by demonstrating how much deficient well-being at work costs society and workplaces each year, and by showing the amount of resources spent on OSH activities.

An increasing number of companies and workplace communities operate as part of a network. National networks bring the different actors together. The most visible of these is the Working Life 2020 network, which is based on the National Working Life Development Strategy to 2020. FIOH manages several national networks with strong local activities. These are the Leadership Development Network, the Forum for Well-being at Work, the Zero Accident Forum and the Network for Well-being at workplaces. These are non-profit networks that promote occupational health and safety.

Developing services for well-being at work

One of the objectives of *Client Services* was to create comprehensive commercial services for workplaces. FIOH's services in the area of well-being have been scattered, and a new comprehensive approach was required. During the strategy period, it became evident that a larger re-orientation of *Client Services* was needed. Furthermore, the development of only well-being services was not wise in terms of opportunity costs.

In 2013, the focus of *Client Services* was directed more towards the natural business strengths of FIOH. This included withdrawing from several well-being segments with intensive rivalry in which FIOH could not offer enough. This did not however, mean that FIOH discontinued its agenda for well-being at work services in the form of *Influence through Knowledge's* activities, for instance through the Forum for well-being at Work, which has been gaining solid momentum throughout Finland. All activities also continued for Working Life 2020, currently the most important national campaign for developing work life in Finland. Moreover, this decision to withdraw did not affect on-going research projects. It was mainly a business-driven decision on the part of *Client Services*. Accordingly, it is more favourable to focus on those segments in which FIOH can truly utilize its strengths, scale or innovation – very much valid in, for instance, the upcoming and novel brain-related research. In areas of weakness or in areas in which a major investment is needed for the breakthrough, the plan is either to use partnering as a tool for market entry or alternatively withdraw from selected segments. This

decision is very much driven by the toughening situation of the economy of Finland and the rise of new competitors. In Chapter 4, we discuss in more detail the position of the business focus of FIOH's *Client Services*. Despite the changes, we continue to annually reach roughly 10 000 business-to-business clients, largely through networks. Through our networks and client services we have a positive impact on over 300 000 Finnish workers' well-being. Our customer satisfaction remained at a high level in 2012.

Improving the effectiveness of occupational health services

A total of 1.9 million people are covered by OHS in Finland. Of wage-earners, 91% were covered by OHS and of these 86% had the option of medical treatment as part of OHS. No large changes took place in the coverage of OHS in 2009–2012. At small workplaces and among entrepreneurs however, coverage is still deficient (FIOH 2012). Private clinics increased their number of customers in the 2000s so that every other customer now uses private health services. This increase has stabilized during recent years. The field of municipal OHS is under development: instead of health centres, OHS is now more often organized through municipal public utilities and limited companies.

During the past three years, OHS has investigated the working conditions of every other employee and carried out a medical inspection of two out of three employees covered by OHS. One in nine employees has been on continuous sick leave for over three weeks in the last year. The support received from OHS when returning to work has increased, and the change in legislation, which became effective in 2012 (the "30/60/90" rule), has even further increased investment in return to work.

In order to reduce the number of new disability pensions, OHS has been redirected so that the promotion of work ability and support for continuing at work have been introduced as new focal points alongside the prevention of work-related health hazards (see more in special report on the status of OHS in Finland). We are the most significant body providing OSH professionals and experts with training leading to a qualification and have developed operating models, new practices and electronic tools to be used in OHS units (Chapter 3). Customer satisfaction with OHS has steadily increased since the late 1990s. In 2012, four in five respondents of the Finnish Work and Health Survey rated the services as either good or excellent.

Conclusion

Well-being at work has been FIOH's active development target for years. The future will show whether there is sufficient positive development. The role of improvement in well-being at work in increasing economic durability is still significant. Annual costs accumulated through sick leaves, disability pensions, occupational accidents and related medical treatments, and diminished work ability totalled around 40 billion euros in Finland. These are expenses that can be influenced by improving well-being at work. It is possible to increase participation in work and thus improve economic durability.

In the future, well-being at work will be an even more central enabler of productivity. It is linked to the ability to renew and endure change. The development of well-being at work through risk management (decreasing ill-being, and prevention activities) is still needed. However, developing well-being at work through strengthening the positive resources of actors, people and work communities will be even more important. Co-operation and the competence of people and organizations undergoing constant change are now at the heart of the new economy, instead of machines. The connection between well-being at work and productivity will become stronger than ever.

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3 Creating Solutions

3.1 Introduction

Vision and role

Well-being and longer careers are solidly connected; healthy, safe, and meaningful work creates well-being. Our strategic goals are safe and meaningful work, a supportive organization, effective OHS, and flourishing workers. *Creating solutions* produces new modes of operation based on broad collaboration with the two other *Areas of Activity* as well as with our clients and partners. Innovations and solutions are based on high-level research. We convert the results of scientific research into innovative, cost-effective solutions that serve work life. We also assess the usability and effectiveness of our solutions.

Key targets

Research and development (R&D) at FIOH focus especially on interactions between work and health. We develop, test, evaluate and disseminate best practices, models and other solutions. The solutions are aimed at improving *Well-being through work* and working conditions at workplaces and at promoting health and work ability on the level of individuals, work organizations, work life, and society.

More than 90% of our R&D (calculated by external funding and R&D person-years) is carried out in FIOH's nine *Themes*. The key target of the *Themes* is to address the current challenges facing work life and to predict future changes (Figure A1 and A2)¹². The activities of the *Themes* are described in more detail in Sections 3.2–3.10.

Work Participation and Sustainable Work Careers

- leadership of various aged workers
- transitions throughout work life
- work participation among groups with employment difficulties
- health promotion

Effective Occupational Health Services

- collaboration between OHS and workplaces
- system of OHS and its effectiveness

User-centric Indoor Environments

- Workspace design for users
- improvement of indoor environments

Well-being Solutions for the Workplace

- operational models for well-being at workplaces
- work productivity
- solutions of work environment and occupational safety

Work Life and the Future

- internationalization
- changes in working conditions, work organizations and working
- new technologies
- sustainable work life

Brain and Work Research Centre

- brain-friendly work
- capacity of various aged workers and work
- workload and return to normal state

Social Capital, Health, and Well-being at work

- psycho-social factors at work
- interactions between health and work ability
- leadership supporting well-being
- criteria for good leadership

Disability Prevention Centre

- reasons leading to work disability: musculoskeletal and mental disorders
- management of sickness absences
- practices for return to work from sick leaves

Nanosafety Research Centre

- safety of nanotechnologies and nanomaterials at workplaces
- safety of nanotechnologies as the key to success

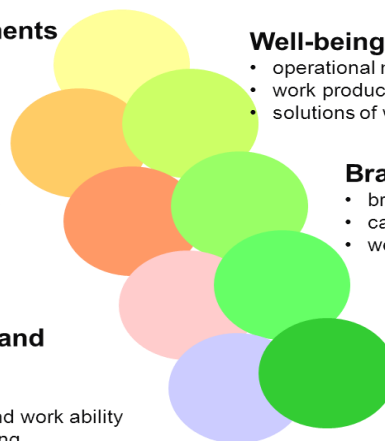


Figure 3.1.1 Key targets of FIOH's nine Themes 2011–2015

¹² IEG2009 recommendations no. 21 and 54

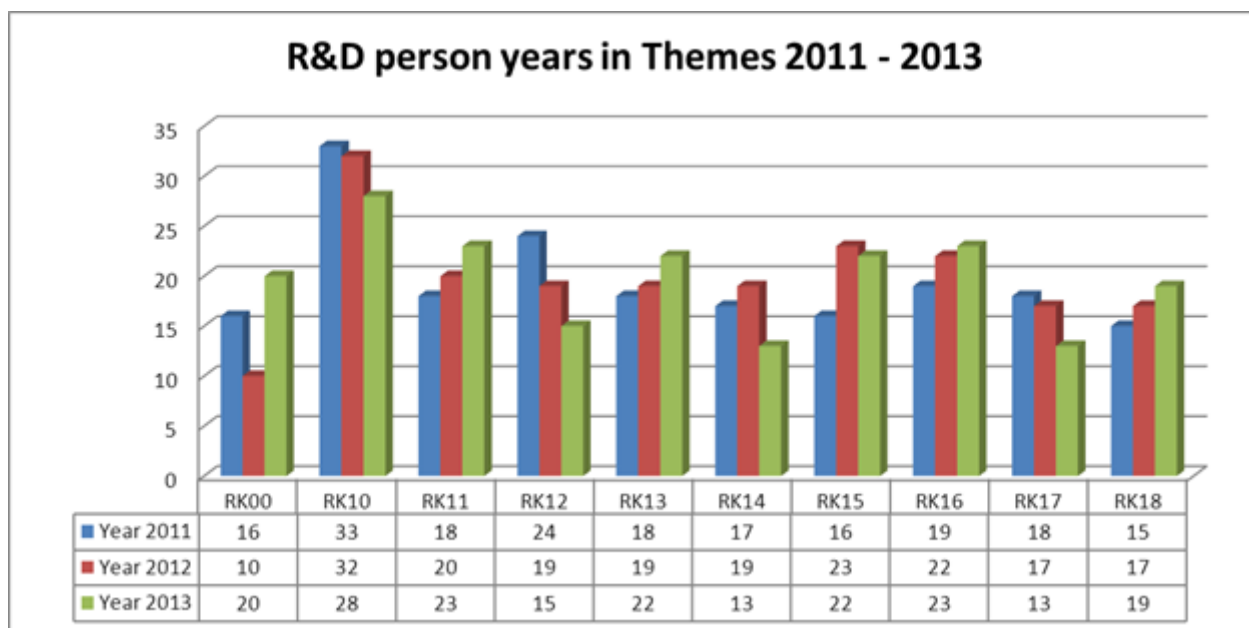


Figure 3.1.2 Conducted R&D person years in Themes 2011–2013

Development from 2009 to 2014

The nine *Themes* (Figure A) were established through the strategy process in 2010, which considered the achievements of the former strategic goals, the recommendations of the international evaluation in 2009 and dialogues with key stakeholders, partners, and clients. A full-time director and *Executive Group* were nominated for each *Theme*.¹³ The vision, aims and project database were determined for each *Theme* at the beginning of 2011.¹⁴ To ensure dialogue with essential interest groups and stakeholders, seven advisory groups representing dozens of organizations were set up for the *Themes* in 2011 (one shared group was established for three *Themes*). The role of the groups is to support and give feedback on the function of the *Themes*, to identify silent signals, to obtain new ideas, and to evaluate operational preconditions for future work. The follow-up groups carried out a midpoint evaluation of each *Theme* in October 2013, the summaries of which are presented in Section 3.2–3.10.¹⁵

At the end of 2011, 73 projects that did not belong to any of the nine *Themes* were still ongoing. The *Centres of Expertise* concluded that 56 projects no longer supported the current strategy of FIOH, and 17 projects were recognized to contain elements for reformative, future-orientated research (RFR). An end date was set for the 56 projects to be terminated, according to two criteria: the end date of the external funding and the end date of the ethical approvals or permissions of the project. As a result of this process, 28 projects ended in 2012, 21 projects in 2013, and the last project will end in January 2014. Six projects were determined as constant activities supporting R&D activities.

The background information of the 17 RFR projects was collected from the project managers. The information included: 1) the status and the description of the project, 2) the main activity of the project: basic or applied research, development and 3) the added value of the project to FIOH's strategy. The Director of *Creating solutions* and several experts from various research areas evaluated the information and recognized ten projects

¹³ IEG2009 recommendations no. 14 and 20

¹⁴ IEG2009 recommendations no. 13 and 21

¹⁵ IEG2009 recommendation no. 6

that fulfilled the RFR definition. Seven projects were determined as either constant laboratory work or basic research, requiring reconsideration after external funding ended. At the end of 2013, FIOH had 20 ongoing RFR projects, 14 of which will continue in 2014.

Overall, in 2011, R&D *outside the nine Themes* covered 9% of external R&D funding, 8% of the person-years of all R&D projects, and 22% of the R&D project database. In 2012, the corresponding figures were 10% of external funding, 5% of person-years in R&D projects and 5% of the R&D project database. In 2013 they were 10%, 10% and 6%.

According to the definition of FIOH's *Executive Committee* (10.4.2012), RFR refers to the production of new, internationally high-quality scientific knowledge or high-resolution databases. It focuses on the sustainable development of work life and the promotion of scientific knowledge and innovations to support the development. RFR utilizes the social and structural capital of FIOH as well as public relations, which are valuable for FIOH activities and support the accomplishment of the long-term aims of the nine *Themes*. RFR was divided into two research areas, which are described in more detail in Section 3.11: 1) Development and validation of biomedical research methodology (Biomedicine-associated Research), and 2) Collection and maintenance of high-resolution databases for the research of work and health (Finnish Public Sector Study and Whitehall II collaboration).¹⁶ The director of *Creating Solutions* acts as the leader of the RFR and both the research areas have their own responsible person. The research areas of RFR were also evaluated by two external experts in December 2013. The summaries of the evaluations are presented in Section 3.11.

The three main targets for the development of *Creating Solutions* in 2011–2012 were to update the Good R&D Practices (quality assessment guidelines), to define the funding policy for R&D, and to choose the key indicators for the follow-up and anticipation of the *Creating Solutions* activities.

The Good R&D Practices guidelines describe the principles and practices of R&D that ensure high quality and reliability of R&D as well as the cost-effective and appropriate use of resources for R&D at FIOH. The guidelines include the following sections: 1) the purpose of the manual, quality control practices for R&D, 2) general legislation, guidelines and instructions concerning R&D, 3) the organization, management and processes of R&D, 4) the principles for ethics and data protection in R&D, 5) the funding and finances of R&D, 6) contracts and intellectual property rights in R&D, 7) the management of research data, and 8) communication and publication. The guidelines are updated annually if needed (version 4.0, dated 20.11.2013).¹⁷

The R&D funding policy covers the general principles and targets for external R&D funding at FIOH as well as the description of guidelines for the main funding sources: the European Union, the European Social Fund, the Finnish Funding Agency for Innovation (TEKES), the Academy of Finland, the Finnish Work Environment Fund, Government Departments, other foundations, and private companies. The main targets of the R&D funding policy have been to increase external R&D funding from the EU and TEKES, and to utilize collaboration networks (e.g. Soterko) effectively.

Present organization of Creating Solutions

Figure 3.3 illustrates the organization of *Creating Solutions*.¹⁸ As well as the organization of the joint activities of *Creating Solutions* and the *Themes*, *Creating Solutions* has two teams: *Project Support* and *Statistics and Health Economics*. The *Project Support* team provides support services for all R&D projects during their lifecycle, from the application

¹⁶ IEG2009 recommendation no. 22

¹⁷ IEG2009 recommendation no. 48

¹⁸ IEG2009 recommendations no. 14 and 20

phase to the final reports. Services focus on taking care of daily financial administration and the reporting of R&D projects, as well as supporting R&D funding possibilities and agreements.

The *Statistics and Health Economics team* provides FIOH researchers with expert services and methodological support. The aim is to promote the proper, effective use of statistics and economics in in-house projects, thereby improving the quality of research activities. The team members are involved in study planning and designing, data analysis and reporting results of an average of 75 research projects annually. In addition to methodological support, the team provides up-to-date statistical software and training for FIOH's R&D personnel. The team also has some resources for data management support and data infrastructure development. Statistics based on FIOH's register data and surveys are not produced in the *Statistics and Health Economics team*, but in the *Influence through Knowledge Area of Activity*.

Due to the heterogeneity and large volume of research activities at FIOH, the statistical methodology applied varies greatly. A great deal of effort is put into planning and designing interventions but also into supporting the measurement and collection of data. In data analysis, a great variety of common parametric and non-parametric approaches are used. At FIOH, the economics approach is often microeconomics, since a vast majority of projects are carried out in co-operation with firms and organizations. The most commonly used statistical software is SAS, SPSS and R.

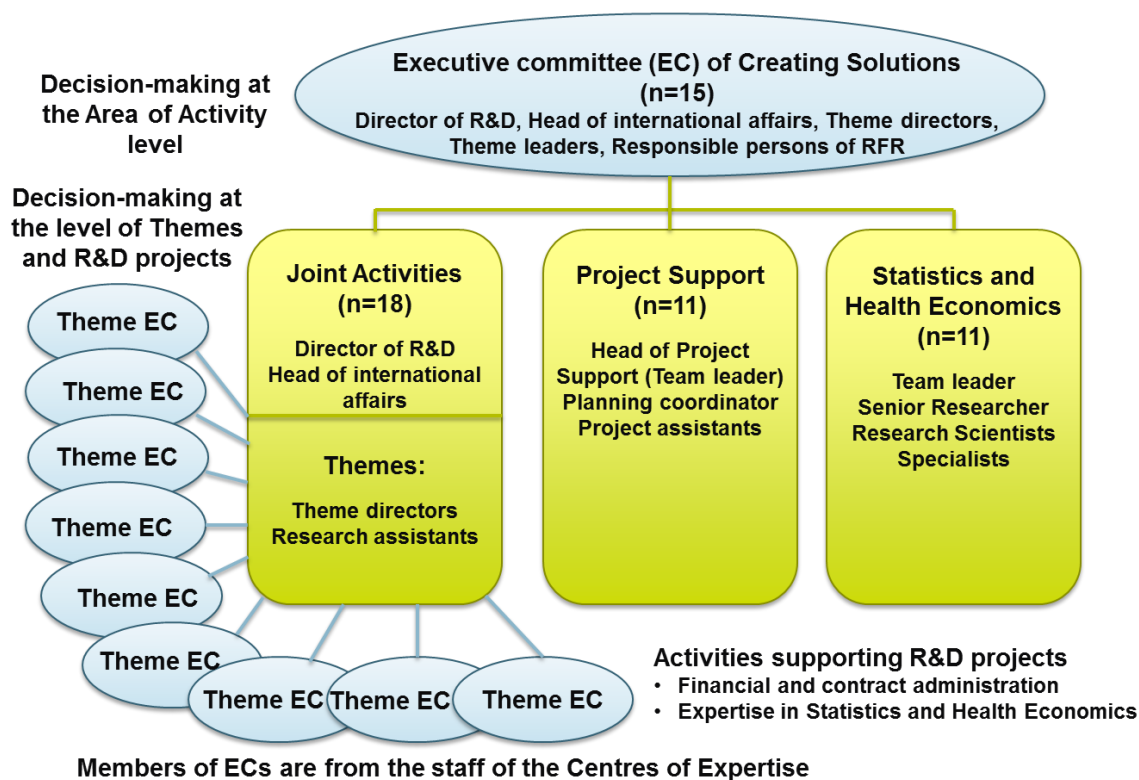


Figure 3.1.3 Organization of Creating Solutions

The key indicators for the follow-up of the activities of *Creating Solutions*, set in 2011, are presented Table 3.1. The indicators were taken into use in 2012.¹⁹

¹⁹ IEG2009 recommendation no. 13

Table 3.1.1 Key indicators of Creating Solutions and development in 2011–2013

| Indicator | Setting of targets | Development in 2011–2013 |
|---|-----------------------|--|
| Effectiveness | | |
| Innovative, practical cost-effective solutions | Targets for 2011–2015 | see Section 3.2–3.10 |
| Scientific effectiveness based on scientific publications | No target values | See special report |
| Quality, processes and collaboration | | |
| National and international collaboration | No target values | see Section 3.2–3.11 |
| Number of scientific and non-scientific publications per R&D person-year | Annual target values | see Figures 3.4 and 3.5 and Table 3.2 |
| Approval % of the number of R&D applications | No target values | 2011: no information available 2012: 40.7% 2013: 42,5% |
| Economy and efficacy | | |
| Total costs of R&D per person-year | Annual target values | 2011: 85 000 € / person-year 2012: 95 000 € / person-year 2013: 95 100 € / person-year |
| External funding from main funding sources | Annual target values | see Figures 3.6 and 3.7 |
| Income/costs at the level of <i>Creating Solutions</i> | Annual target values | 2011: 43% 2012: 41% 2013: 41% |

RFR = Reformative, Future-oriented Research; R&D = Research and Development

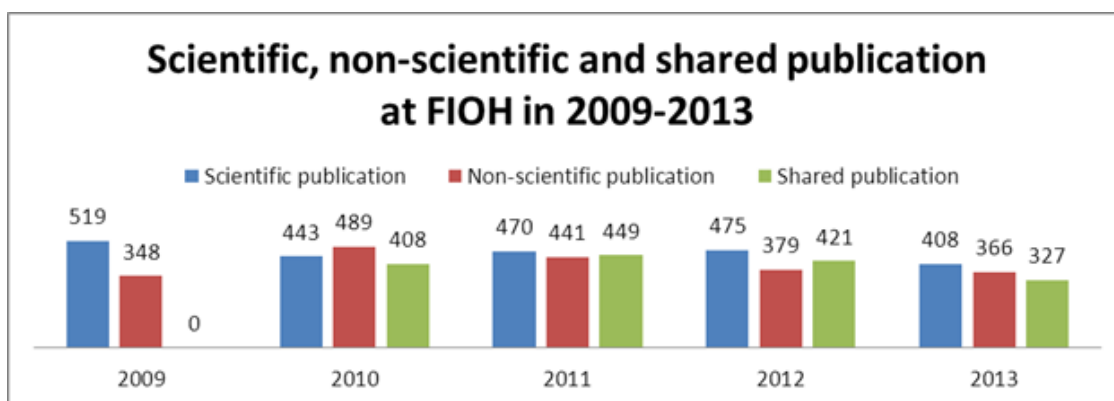


Figure 3.1.4 The production of scientific, non-scientific and shared publications at FIOH in 2009-2013

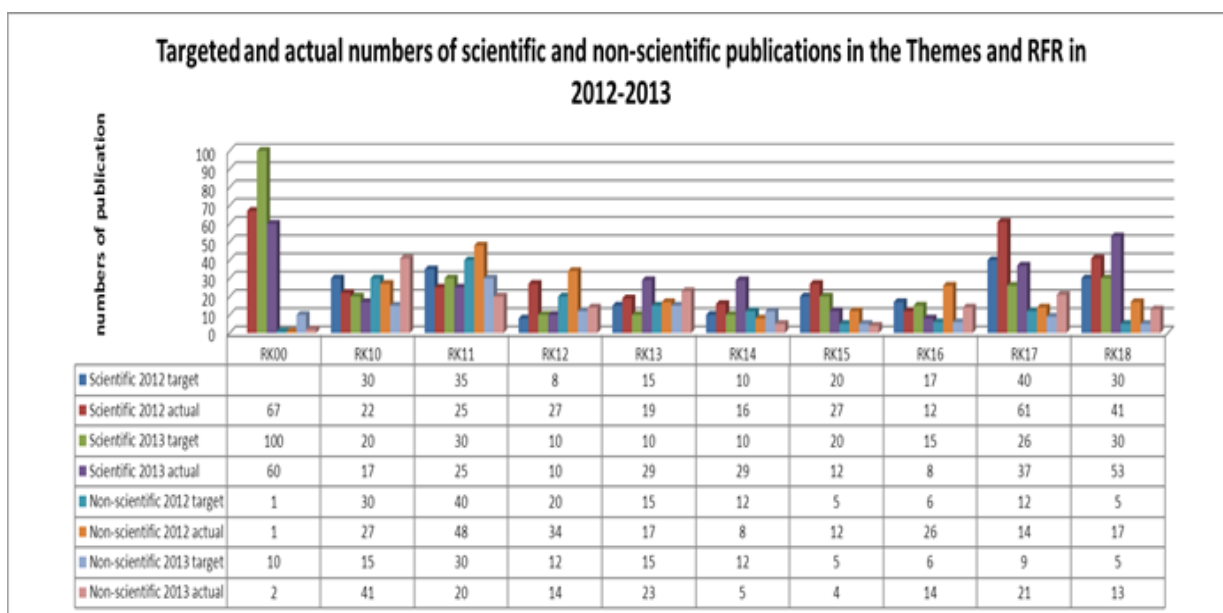


Figure 3.1.5 Targeted and actual numbers of scientific and non-scientific publications in the Themes and RFR in 2012–2013

Table 3.1.2 Conducted numbers of scientific and non-scientific publications / R&D person years 2012–2013

| | Conducted numbers of publications/R&D Person years | | | |
|-------------|--|----------------|------------|----------------|
| | 2012 | | 2013 | |
| | Scientific | Non-scientific | Scientific | Non-scientific |
| RK00 | 6.70 | 0.10 | 3.00 | 0.10 |
| RK10 | 0.69 | 0.84 | 0.61 | 1.46 |
| RK11 | 1.25 | 2.40 | 1.09 | 0.87 |
| RK12 | 1.42 | 1.79 | 0.67 | 0.93 |
| RK13 | 1.00 | 0.89 | 1.32 | 1.05 |
| RK14 | 0.84 | 0.42 | 2.23 | 0.38 |
| RK15 | 1.17 | 0.52 | 0.55 | 0.18 |
| RK16 | 0.55 | 1.18 | 0.35 | 0.61 |
| RK17 | 3.59 | 0.82 | 2.85 | 1.62 |
| RK18 | 2.41 | 1.00 | 2.79 | 0.68 |

²⁰ RK00 Reformative, Future-oriented Research, RK10 Work Participation and Sustainable Working careers, RK11 Well-being Solutions for the Workplace, RK12 Effective Occupational Health Services, RK13 Work Life and the Future, RK14 User-centric Indoor Environments, RK15 Brain and Work Research Centre, RK16 Nanosafety Research Centre, RK17 Social Capital, Health, and Well-being at Work, RK18 Disability Prevention Centre

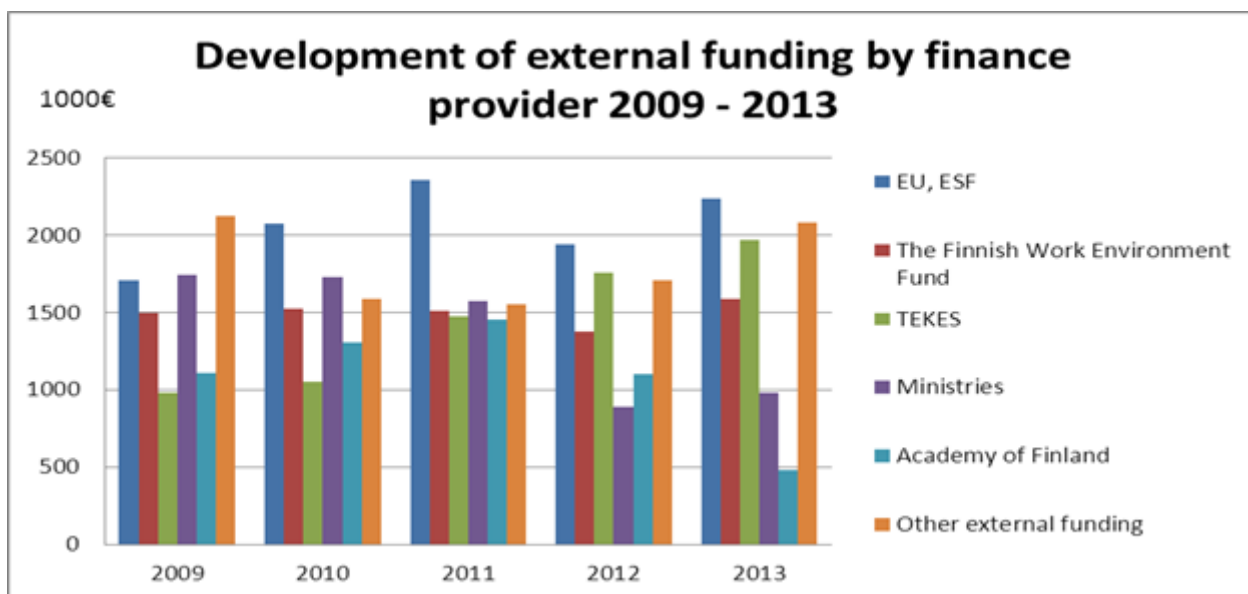


Figure 3.1.6 Development of external funding by finance provider 2009–2013

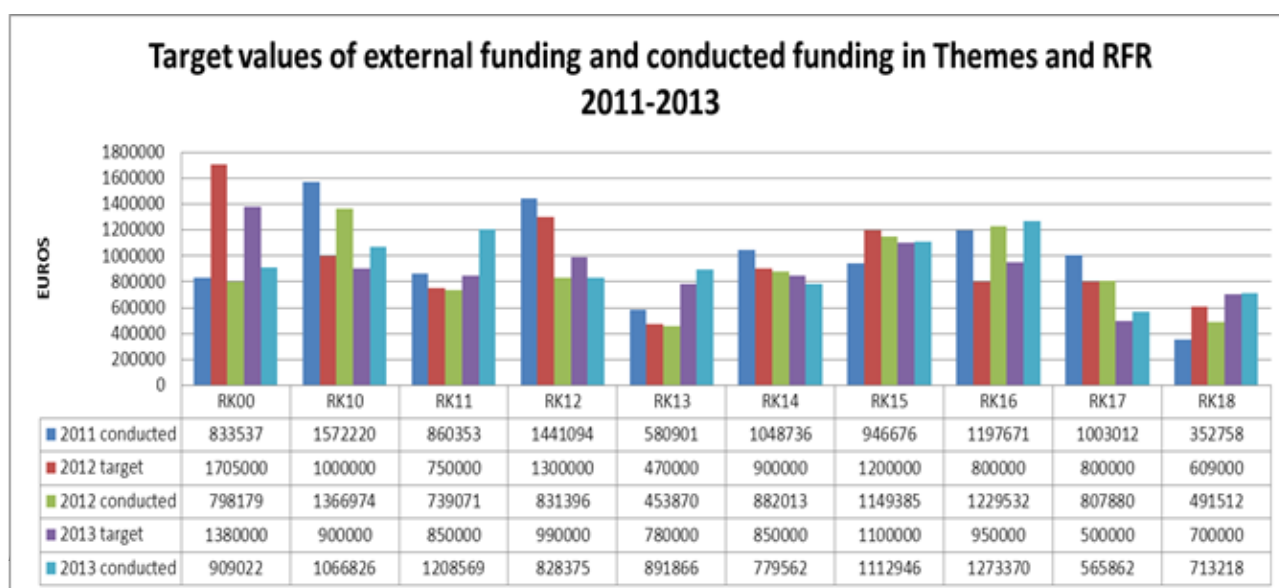


Figure 3.1.7 Target values of external funding and conducted funding in Themes and RFR 2011–2013

²¹ RK00 Reformative, Future-oriented Research, RK10 Work Participation and Sustainable Working careers, RK11 Well-being Solutions for the Workplace, RK12 Effective Occupational Health Services, RK13 Work Life and the Future, RK14 User-centric Indoor Environments, RK15 Brain and Work Research Centre, RK16 Nanosafety Research Centre, RK17 Social Capital, Health, and Well-being at Work, RK18 Disability Prevention Centre

3.2 Work participation and sustainable working careers (RK10)

Overview

Vision to be achieved by the end of 2015:

Work participation in the different stages of careers has increased. This has been achieved by the inclusion of the employed, those on the fringes of work life, young people in particular, and by the capacity and solutions for integration into work, and being successful at work. FIOH has played an important role by developing, with its partners, solutions at the individual and workplace level to ensure work ability, health, resources, and expertise. The developed products, the impacts of which have been analysed, have been implemented at workplaces, in education and in OHS (OHS).

Objective to be achieved by the end of 2015:

The *Theme* examines careers and their diversity at various stages. The objective is to study, develop and implement solutions to support work life participants. The solutions are targeted towards groups of different ages, in different life situations and with different backgrounds: their integration into work, success at work and continuing at work for longer and with fewer interruptions.

The target of the *Theme* is to achieve more sustainable, qualitatively better and therefore longer working careers. Its motto is: Help young people integrate into work life, extend good working years for everyone!

Background information on the outlining of working careers in the *Theme*: The career equation involves many different factors and cannot be solved without understanding the bigger picture

The need to extend working careers has been at the centre of social dialogue and decision-making since 2009, when the idea of raising the retirement age was first introduced. Extending careers has been seen at the macro decision-making level as a way of achieving several large-scale goals. According to a commonly held belief, longer working careers reduce the sustainability gap, protect the sustainability of the pension system, improve the dependency ratio, increase the employment rate, improve the productivity of work, and prevent predicted labour shortages. In practice there is little empirical evidence of these links.

Public discussion often states that working careers must be extended and defragmented at their beginning, middle and end. This means that young people should enter work life earlier, unwanted interruptions in the middle stages of careers should be minimized, and senior workers should continue to work for longer. The aim of increasing work participation at all stages of the working career is a significant challenge for social, economic, educational, labour market, and labour and employment policy, as well as for social affairs and health. Tackling this challenge requires unidirectional and complementary measures across a broad front. Changing individual career variables, such as raising the retirement age, is unlikely to solve the challenge alone. Raising the retirement age would not, for example, reduce the rate of early retirement resulting from health problems, lost work ability or insufficient well-being at work.

The issue of working careers is more complex and multidimensional than the public discussion suggests. The idea of influencing the qualitative factors of work life to enable more sustainable, longer and better careers is an important factor. The prevailing rhetoric on extending working careers should not stifle the discussion on the sustainability and quality of work.

Finding an effective solution to the career question requires an understanding of the big picture. It is important to understand the actual everyday factors affecting careers. Moving

one piece of the jigsaw can have either a desired or undesired effect on other career-related factors. The responsibility for longer working careers should not be assigned to a single administrative field or branch of policy. It requires a change in attitudes and a sense of shared responsibility, starting from sociopolitical choices and decisions, extending to the functional and structural reform of the service system, and further, through development at the workplace level, to choices and responsibility at the level of communities and individuals.



Figure 3.2.1 Frame of reference of the thematic areas from the perspective of exerting influence

Research topics and solutions

Working career extension can be seen as a question of whether a person is allowed, willing and able to work, or whether they end up outside of work life. Tackling this challenge requires research data, new solutions and putting them into practice in various areas which affect working careers and which are related to the quality of work life. Of these areas, the ones in bold below have been given special attention during the first half of the theme period:

- A new understanding of careers: the individualization and diversification of careers as work life takes new dynamic forms
- **Supporting the integration of young people into work and participating in work** and improving their skills to promote work ability already during professional education and from the very beginning of work life
- Preventing incapacity for work due to mental health issues among young people
- **Supporting solutions for career transition stages**
- Supporting expertise and improving management at all stages of the working career
- **Utilizing factors related to work attractiveness and resources**
- **Focusing on the promotion of work ability and health at work**
- **Supporting work participation among groups for whom finding employment is difficult (people with disabilities, immigrants, the unemployed, people with partial work ability)**
- Reducing inequality in work life
- **Putting solutions into practice for balancing work and other aspects of life**

The thematic areas are research-orientated, but solutions-focused. This means that the aim of the activities of the *Theme* is to produce research-based solutions. The key perspectives of the solutions are research-based evaluation, effectiveness, implementation and diffusion. These will remain the focus of each thematic area in the remaining strategy period.

During the strategy period, the thematic area of careers will develop several solutions, such as age management practices; workplace solutions to support the employment of people with disabilities; methods to promote healthy lifestyles and work ability at workplaces, for example

the transportation sector and young immigrants; solutions to support work engagement and positive work-life phenomen; and group guidance methods for career management.

Group guidance methods for career management and age management practices:

The ***From school to work method*** was developed to increase employment, its quality, and mental health among young people during their transition from vocational college to work. We utilized a social cognitive approach to motivate and empower participants to apply effective career management and employment strategies and practices for seeking and gaining desirable employment.

The results of a randomly assigned field experiment showed that the proximal effects of the group method on employment preparedness were highly significant. The results of the long-term effects (10 month follow-up) showed notable beneficial impacts of the group method on both employment and on how well it matched participants' education and personal career plans. The group method also had a significant preventive effect on psychological distress and depression symptoms among those initially at risk of suffering from mental disorder. Moreover, it considerably developed participants' personal work life, finances and property goals. (11.)

The group method has been disseminated in collaboration with acting organizations in the educational sector. Several vocational institutions and schools (including teachers' education) have integrated both the From school to work and Towards work life group method into their curriculum and courses.

FIOH, together with other collaborating trainer supervisors, has trained 505 group trainers nationwide. Over 17 000 of the method's workbooks had been ordered by the end of 2012, indicating about the same amount of group participants. At least 1500 trainer's manual were also sold. The method has been published in Finnish, but will also be published in English and in Spanish in 2014. A plain language version of the method has also been published for students with special needs.²²

The aim of the **Towards Work life method** is to increase preparedness for the transition to upper secondary level or vocational studies, to increase pupils' vocational exploration and career planning, and to teach them to develop strategies to carry out their plans.

The results of a randomly assigned field experimental study among 1034 ninth graders in 11 comprehensive schools showed a highly significant proximal increase in career choice preparedness and career choice task values. The results of the long-term effects (one-year follow-up) show that the group intervention had interaction effects with the baseline risk of depression and learning difficulties on symptoms of depression and school burnout. Among those initially at risk of depression, the intervention decreased symptoms of depression. For students who were at risk of depression and had learning difficulties, the intervention decreased school burnout. (8.)

The group method has been disseminated in collaboration with acting organizations in the educational sector. FIOH, together with other collaborating trainer supervisors, has trained more than 350 group trainers altogether nationwide. Over 5200 of the method's workbooks have been ordered, indicating an even greater amount of group participants, as workbooks are also recycled in indigent schools. A plain language version of the method has also been published for students with special needs.²³

The **Towards Successful Seniority group method** was developed to promote career management, job retention and mental health among employees in today's changing work life. The general aim of the method is to provide companies with tools for primary prevention by combining the knowledge bases of OHS regarding stress and mental health, with those of human resources management regarding competencies and careers.

The results of a randomly assigned field experimental study among 711 participants from 17 organizations showed a highly significant increase in career management preparedness,

²² IEG2009 recommendation no. 34

²³ IEG2009 recommendation no. 34

number of work life goals and intrinsic motivation. The results of long-term (seven-month follow-up) effects showed an increase in mental resources, and decrease in thoughts of early retirement and symptoms of depression. (2, 15, 20.) The method was published in Finnish in 2008 and will be published in English in 2014. FIOH has now sold 216 Trainer's manuals and 2420 Participant's workbooks.

As a result of the method's demonstrated effectiveness, and excellent user experiences, about 150 certified trainers from various organizations have been trained in the method at FIOH. At FIOH the method has served as a basis for developing applications. The method is also used by organizational consultants outside of FIOH. In work organizations it is used as a collaboration tool that can be incorporated into a company's normal activities, such as age or well-being programmes. For instance, in one banking company it is included in a comprehensive well-being programme as a life coaching component, which is targeted separately at ageing personnel, young newcomers, and retiring personnel.²⁴

From parental leave to work life application of the Towards Successful Seniority method. This application is currently being developed at FIOH for parents on parental leave. The aim is to promote return to work preparedness and the mental well-being of parents thinking about returning to work life after parental leave either to their previous job or as job seekers. The programme is being tested in six municipalities in which daycare services and health professionals collaborate to support families in this transition. The preliminary results from a randomly assigned field experimental study among about 300 parents show that the programme has a highly significant effect on return to work preparedness. The method will be published in Finnish and in English in 2014.²⁵

Safe beginning for working careers application of the Towards Successful Seniority method. This application is currently being developed at FIOH for young newcomers to work life. The aim is to promote the safety attitudes of newcomers, and to support the mental well-being and work ability of young employees. The programme is implemented in five work organizations that employ young people, from the construction industry to fast food chains.²⁶

Age Power – leadership training The *Age power* training programme is developed for workplaces to increase age awareness at work, improve attitudes towards ageing, and to counteract negative stereotypes regarding work and age. Furthermore, the training programme increases organizations' willingness to find and develop their own solutions to age-related problems. The purpose of the *Age power* training programme is to make working careers both longer and better. At the same time, the goal is to enhance the productivity of the organization and the well-being of employees.

The training programme has been disseminated both nationally and internationally. FIOH has trained over 100 *Age Power* group trainers nationwide. In collaboration with FIOH's specialist advisory services, organization-specific training has been carried out in different sectors; such as education and health care services. Internationally, *Age Power* training was organized in the Czech Republic 2011, where a total of 45 HR professionals and managers were trained in three locations: Prague, Brno, and Olomouc. The *Age Power – leadership training* manual was published in 2011 and 412 copies had been sold by December 2013.²⁷

The *Age Power* concept was also utilized in the Grundtvig learning partnership of the Age-related leadership workshop for managers of elder employees in 2010–2013. During the partnership, an intercultural workshop and training concept was developed for managers to improve their knowledge and competencies of supervising ageing employees, and for HR managers to apply these workshops and training as "train-the-trainer" in their companies. A

²⁴ IEG2009 recommendation no. 34

²⁵ IEG2009 recommendation no. 34

²⁶ IEG2009 recommendation no. 34

²⁷ IEG2009 recommendation no. 34

pilot workshop on “age-related leadership” was organized in Germany with managers and trainers from all the involved countries.

Age management is constantly an acute issue at workplaces due to worldwide demographic changes. FIOH’s longstanding experience and knowledge on age management continues to draw international attention. The expertise is shared in international research and development projects, for example in the scientific steering boards of the EU-funded Best Agers Lighthouses in the Baltic Sea region and the Outil-Ages Transnational Regional Government project of the greater Paris area in France. In addition, international employers, HR and researcher delegations and media crews (i.e. radio, TV) are welcomed frequently from around the globe, for example from France, the Netherlands, Brazil, Japan, Korea, and Singapore.

An international book called “Sustainable working lives – Managing Work Transitions and Health throughout the Life Course”. Ed. by Professor Jukka Vuori (FIOH), Professor Roland Blanck (TNO Work and Employment) and Professor Richard Price (University of Michigan) will be published in 2014 by Springer Publishing (1.) **Short description:** The purpose of this publication is to describe the impact of the increased demand for flexibility on the part of employees and its impact on their individual work life trajectories and health. The book offers concrete examples of interventions aimed at finding innovative ways to sustain working careers among today's workers. We focus on the school to work transition, job loss and re-employment and retirement. The interventions described offer strategies for implementing support in employment contracts, increasing the preparedness of individual employees through public education programmes, or developing work arrangements and support systems in work organizations.

People with disabilities in work life: We carried out a systematic literature review of the impact of workplace accommodations on people with disabilities (people with physical disabilities, the visually impaired, the hearing-impaired, people with speech impediments and people with developmental disabilities). The impacts are examined from the perspectives of work ability and finding employment, and the cost-benefits of the workplace accommodation measures. The review is conducted in co-operation between FIOH, the National Institute for health and welfare (THL) and the University of Tampere, and is funded by the Social Insurance Institution of Finland (Kela). The information can be utilized at the societal level in decision-making pertaining to career extension for people with disabilities, as well as in implementing solutions at the workplace level. With sufficient workplace accommodations, people with disabilities gain a better perception of their work ability and improved opportunities to receive social support, equal treatment, work management and development and to participate. We produced online guidance material for use in practical work by employees, workplaces, OHS and other hearing rehabilitation professionals. The online guide provides information on hearing impairment and its various forms, as well as the effects of impaired hearing on communication and work performance. The online guide also includes information on suitable workplace accommodations. The online service features a number of hearing tests. The guide is available at www.ttl.fi/kuuletyossa.

The aims of the activities related to the **promotion of health and work ability at workplaces**²⁸ are to produce knowledge, services and tools for promoting health and work ability at the workplace level. Work ability is enhanced by influencing work, the work environment, the individual and external environment, and by supporting workplace culture and the opportunities to choose healthy lifestyles during work and leisure time.

To promote workplace health and well-being, a co-creation method (TEDI) was developed and tested. The TEDI co-creation method guides a process in which personnel recognize the factors that influence well-being at work, create criteria for an organization that promotes health and well-being, make an action plan, and implement it. The TEDI method increased co-operation

²⁸ IEG2009 recommendation no 32

both at the workplace and between the workplace and its OHS. The management of the workplace must be strongly involved in the activities during the process. Furthermore, it is important to ensure that aspects of well-being at work are taken into account in management and decision-making at the workplace. In order to develop co-operation between workplaces and OHS, roles, responsibilities and procedures must be clarified. (16.)²⁹

To **prevent alcohol-related harms at workplaces**, different tools were developed and evaluated in a three-year R&D project (Guide for workplace on alcohol and drug policy, A-step preventing alcohol-related problems at workplaces, a drinking diary, instructions for supervisors on how to act, and a training programme.)

Obesity and unhealthy behaviours are associated with impaired work ability, so the association between genes, behaviours, obesity, and cardiovascular risk factors among adolescents and young adults was studied in the Northern Finland 1966 and 1986 birth cohorts. Results show that, for example, regular five meal frequency is beneficial in promoting normal body weight also among those with high genetic susceptibility to obesity. (4, 9, 13.)

Other health and work ability promotion interventions focused on **risk groups**, such as professional drivers at a high risk of traffic accidents and premature work disability due to lifestyle diseases related to obesity and unhealthy habits (drivers also have a low level of education and usually work in small enterprises, and thus face several challenges related to the possibilities for promoting health and safety issues); groups with employment difficulties, for example **immigrants and young workers, (young drivers)**; or workers with a cluster of burnout, stress and unhealthy behaviours. The aim of the practical tools developed in the interventions are to help workplaces and workers be active and promote their work ability and health themselves and with the help of OHS. The interventions are performed in the work context and are focused on employees' own premises and on their own viewpoint. They take into account the professional groups' culture and social environment. We have used a down-to-earth approach to health and work ability issues in order to maximize the participation of workers, and also to maximize the effects and cost-effectiveness of interventions. (10, 17.)³⁰

Midlife is a crucial phase as regards a worker's work ability, and affects the ability to continue working for as long as possible. FIOH has two ongoing prospective cohort studies that focus on midlife. The Finnish longitudinal study among municipal workers (FLAME), which started in 1981, has already shown the significance of work demands and work organization for work ability. More recently, a study group of scientists from the Universities of Jyväskylä and Tampere and also from FIOH has shown the importance of midlife work ability for later-life health, functional capacity, and well-being. So far, about ten original articles on this topic have been published in scientific journals. The main focus of the other cohort study, work ability in early midlife, part of the Northern Finland Cohort Study (NFBC), which started in 2013, is on the factors of lifestyle and work in adolescence and early adulthood that are associated with work ability in early midlife. This study is funded by the Finnish Work Environment Fund and the main results will be published in 2014. (12, 18-19.)

Work engagement: Several longitudinal studies on work engagement among Finnish dentists conducted at FIOH have shown that the positive state of work engagement predicts better employee health and mental well-being, happiness and experiences of work-life as enriching and improving the quality of family life. In addition, engaged employees are more proactive and innovative even in the long-term and are also better able to mobilize various job resources in their work than their less engaged colleagues. An internationally awarded 35-year follow-up study in a general Finnish working population indicated that the accumulation of resources protected against burnout in late middle-age. Moreover, the study showed that the adverse impact of poor childhood conditions on occupational well-being can be mitigated by resourceful working conditions. (5-7.)

²⁹ IEG2009 recommendation no. 26

³⁰ IEG2009 recommendations no. 4 and 26

The *Better well-being and organizational performance through good HRM* project aimed to identify the relationship and mechanisms between well-being, organizational performance and HRM. The results emphasized the important liaising role of middle-management in these issues. They also pointed out the positive effect of employee-involving HR practices on performance and well-being. Employers can use information as part of management practices and corporate risk management.³¹

Other activities

The *Theme* co-ordinates the *Reducing gaps in the health, well-being and participation in work of young adults* (NUORA) programme component of the Consortium of National Institutes for Health and Well-being (SOTERKO). FIOH's partners in the NUORA activities are the National Institute for Health and Welfare (THL), the Finnish Centre for Pensions (ETK), the Social Insurance Institution of Finland (Kela), the Finnish Youth Research Network, Finland's Slot Machine Association (RAY), the Cultural and Sports Association of Finnish Vocational Education and Training (SAKU), the Government Institute for Economic Research (VATT) and the Universities of Helsinki, Jyväskylä, Turku and Tampere. This *Theme* co-ordinates the activities of the Leadership Development Network mentioned in the Finnish Government programme, which is aimed at extensively improving management at Finnish workplaces in order to extend careers.³² As part of the NUORA activities, the *Theme* actively supported the Youth Social Guarantee action plan (now referred to as the Youth Guarantee) mentioned in the Government programme. The *Theme* was also actively involved in the preparation of the National Development Programme for Social Welfare and Health Care (KASTE) and the new ESF programme period that will begin in 2014.

Careers are a diverse issue with multiple levels. Understanding the big picture, conducting research and creating solutions requires broad-based co-operation between several parties. Key co-operative partners in the *Theme's* R&D activities include the Universities of Tampere, Oulu, Jyväskylä and Helsinki, ETK, VTT Technical Research Centre of Finland, VATT, the Social Insurance Institution of Finland (Kela), THL and the UKK Institute. The *Theme* also engages in active co-operation and interaction with stakeholders and funding providers, such as the Ministry of Social Affairs and Health (STM), the Ministry of Employment and the Economy (TEM), the Ministry of Education and Culture (OKM), the Prime Minister's Office (VNK), central labour market organizations and federations, the Finnish Innovation Fund Sitra, the Finnish Funding Agency for Technology and Innovation (TEKES), Keva, Varma and Ilmarinen. The *Theme's* intervention R&D projects are conducted in active co-operation with several municipalities (particularly their education departments and social and health departments) as well as many private sector workplaces and OHS units. International co-operation is particularly active in the areas of age management and career group guidance methods.

Based on an assignment given by the Government working group for the co-ordination of research, foresight and assessment activities, we conducted a survey of the effectiveness of policy measures in reducing social exclusion among children and young people in SOTERKO co-operation with NUORA partners. This is an example of a new way of producing reports quickly to support societal decision-making. Successful execution of the assignment depends on close co-operation with the project steering group, which comprises representatives of all ministries as well as SOTERKO partners. The recommendations of the report have been actively communicated with the aim of strengthening the dialogue between researchers and decision-makers.³³

In 2012, FIOH developed the *Policy Brief* concept to more effectively reach and support decision-makers. The briefs are distributed electronically to a large group of decision-makers.

³¹ IEG2009 recommendation no. 23

³² IEG2009 recommendation no. 3

³³ IEG2009 recommendation no. 3

So far briefs produced by the careers thematic area are (4): Careers must be extended and improved, Making substance abuse programmes mandatory at all workplaces, Prevention of ageism improves productivity, and Work ability in middle age predicts functional capacity in retirement. We also prepared a literature review and summary on factors and methods connected to careers, which was distributed to representatives of Finnish ministries and labour market organizations as well as the to Prime Minister's Office.

We have served decision-makers by putting together research and expert data on careers, management, well-being at work, work life changes, work life inequality and OHS, to be used in, for example, speeches by government ministers. We have delivered a large number of presentations related to careers and work participation at various events, seminars and working groups. We have also arranged many seminars and workgroups at national and international conferences. The *Theme's* projects have produced national and international scientific articles as well as popular articles, compilations and guidebooks, totalling 241 to date. In 2012, a total of 25 FIOH press releases were produced on the basis of research conducted in the *Themes*.

For example, at the beginning of the 21st century intensive cross-sectoral co-operation has been achieved in Finland on actions to promote health-enhancing physical activity. Researchers from FIOH have played an important role in working groups preparing The Government Resolutions on policies to develop health-enhancing physical activity (2002 and 2008). These actions have served as a good basis for recent activities. In order to make the co-operation more effective, the Ministry of Social Affairs and Health and the Ministry of Education and Culture jointly appointed a steering group for health-enhancing physical activity (2011-2015). FIOH has and will continue to play an important, essential role in the future in supporting the working population in all the strategy's guidelines: reducing sitting and increasing physical activity during the life course, highlighting physical activity as a vital element in enhancing health and well-being, the prevention and treatment of diseases, rehabilitation, and strengthening the status of physical activity in Finnish Society. http://www.stm.fi/c/document_library/get_file?folderId=6511564&name=DLFE-27873.pdf Furthermore, FIOH's researchers have participated in the production of the new Finnish dietary recommendations published in January 2014. The recommendations serve as the basis for the promotion of health and healthy nutrition of the working aged by, for example, OHS.

From the perspective of the activities of the *Theme*, in addition to expertise related to the substance and content of the thematic area, expertise related to intervention, qualitative research methodology, evaluation and impact assessment studies (process evaluation in particular), and the implementation and diffusion of research and epidemiology have proved important. The adequacy of competence resources will be a key challenge in the future.

Conclusions and future outlook

Based on statistical data primarily produced by the Finnish Centre for Pensions, working careers appear, on average, to be developing in the desired direction, which is to say that they are becoming longer. However, it appears that this extension of careers is occurring more slowly than would be required to meet the Finnish government's target of raising the retirement age to 62.4 years by 2025. It is estimated that the effects of the structural changes implemented as part of the 2005 pension reform have, for the most part, already been realized with regard to retirement age. Without new systemic structural reforms, the primary methods available for extending careers are mainly related to qualitative factors in work life, such as factors associated with work ability, well-being at work, health, occupational safety, inequality, and the public service system. As the activities of the *Theme* focus on these factors, they are expected to remain highly relevant in the future.

One of the tasks of the *Theme* has been to determine what is known about career-related factors on the basis of current research. The conclusion is that working careers are affected by a multitude of factors. Empirical and research-based information on several aspects are connected to careers. Most of the research data and evidence is indirect. They highlight factors

that lead to incapacity for work, thoughts of early retirement and sickness absences. They also highlight factors that promote work ability, health and work participation. Eliminating risks and problems and strengthening the positive factors is estimated to result in less fragmented and longer careers. (FIOH 2013).

Not enough is known about the mechanisms and interrelationships between career-related factors. The same applies to the combined effects and interdependencies of factors that affect careers. There is also insufficient research-based data on the implementation and diffusion of career-related solutions in the structures and practices of work life. These will be the focus of the thematic area in the second half of the strategy period. As a new step involving various parties in the field of research and development, working career research will aim to combine the perspectives of the economy, employment, health, competence, and participation. Questions concerning the working careers of entrepreneurs are also in focus. The resiliency and formation of the working careers of the personnel in start-up companies is an especially important question.

Examples of publications by the Theme (only English publications):

1. An international book "Sustainable working lives – Managing Work Transitions and Health throughout the Life Course". Ed. by Prof. Jukka Vuori (FIOH), Prof. Roland Blonk (TNO Work and Employment) and Prof. Richard Price (University of Michigan).(forthcoming in 2014 by Springer Publishing)
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Statement from the Theme's advisory group

The vision of this thematic area is relevant, socially significant and expected to remain current and important in the future. The choice of objective has proved to be successful. The *Theme* covers broad subject matter. Its content focus on participation is in line with current themes: they are central aspects to many parts of the government programme and the government's structural policy programme. The structural policy programme comprises 33 projects, of which ten are closely related to the theme of careers. The Focus Areas of the *Work participation and sustainable careers Theme* are therefore significant to societal decision-making. Solutions aimed at increasing work participation depend on the availability of information as well as models that are applicable in practice and which will actually be implemented in practical settings.

3.3 Well-being solutions for the workplace (RK 11)

Overview

The main target of the *Theme* is to increase information, to create situation awareness, to participate in national discussion on the concept of well-being at work, and to create models for services. The *Theme* produces information and solutions for, for example, safety, productivity, chemical safety, noise control, and accident prevention. We have attached empowerment and a salutogenic view to the risk assessment approach. We are active in the Forum for Well-being at Work, the Leadership Development Network and Working Life 2020 in order to implement solutions in practice. The sectors under focus include industry and production, but also safety and security, administration in safety, and services.

When the *Theme* started its work in 2011, it had about 30 projects from the preceding strategy era that focused on safety and occupational hygiene and, for example, military work in cold and hot conditions, impulsive noise in the entertainment industry, good baking practices, effectiveness of national occupational safety and health (OSH) regulations and work safety inspections and arctic mining [1-5, 10],³⁴. One significant project concentrated on Cooperation for Safety in sparsely populated areas (www.cosafe.eu)³⁵. All these projects have provided information for more general purposes regarding national or international needs, often for the needs of small and medium-sized companies³⁶.

In 2013, the main areas were classified as follows:

1. Productivity and well-being needs to be analysed at the workplace level, especially in small scale enterprises, in the present economic situation.
2. Research on Safety and the Work Environment continues as part of well-being at work. Chemical safety is an important area as FIOH has a significant role in the fulfilment of the obligations of the National Programme on Dangerous Chemicals (http://www.ym.fi/en-US/The_environment/Environmental_hazards_of_chemicals/National_Programme_on_Dangerous_Chemicals). Emphasis is also given to risk communication and disseminating information on chemical safety (KemikaaliVihi, interactive web forum on chemical safety at workplaces) [6, 12].
4. Projects in which companies participate are important for gathering information from different business and industrial sectors, such as the safety sector and mining. The development projects of micro and small-sized companies are important, because they are the fastest growing group, and do not have the resources to develop their safety as well as larger scale companies³⁷.

Activities in 2014:

- Ten solutions for well-being and productivity have been designed and described (TEPSI-project, Forum for Well-being at Work and Working Life 2020).
- Development of a generic model for well-being in safety critical areas.
- Dissemination of productivity and well-being solutions for small scale enterprises and their OHS.
- Information on well-being at the workplace level through example models and solutions published in books, on websites and in the social media.
- Developing safety and health solutions so that safety actions better respond to safety legislation. This forms the basis for the development of Working Life 2020.

Larger areas of the *Theme* in 2013–2015 are well-being and productivity, chemical safety, and industrial hygiene and accidents. Providing support to national authorities and taking part in the activities of the Forum for Well-being at Work are also in focus. Important industry sectors

³⁴ IEG2009 recommendations no. 62-64

³⁵ IEG2009 recommendation no. 64

³⁶ IEG2009 recommendation no. 24

³⁷ IEG2009 recommendation no. 24

include mining, industry and the safety sector. The planned and partly certified budget is about 2 million euros.

Solutions

Figure 3.3.1 shows a general concept for the *Theme's* projects. The main goal is to influence workplaces through networks and unions, but every workplace can obtain the available information for their own use. The goal of information dissemination is to influence workplaces as well as consultants and service enterprises including occupational health units.

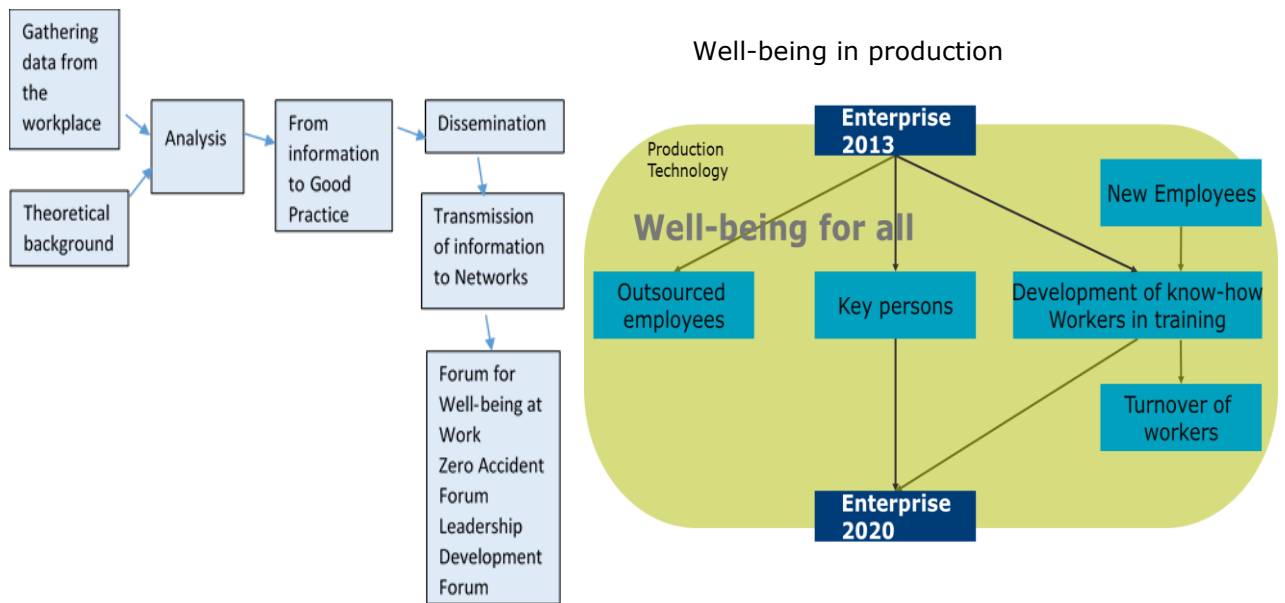


Figure 3.3.1. Modelling of the Theme's processes

The connection between the *Theme* and the workplace is our foundation. On the informative level the *Theme's* goals are:

- To simplify the meaning of holistic well-being at work, and how workplaces can improve their activities.
- To transmit information and provide services. The company obtains an idea of possible models for well-being at work and can start actions at the workplace.
- To follow and evaluate. We actively collect information on what is happening at workplaces and evaluate the impacts of actions.

We have collected material on company perspectives of well-being at work, which we will use to create generalized good practices [11]. In 2013 we published a book on productivity and well-being

http://www.ttl.fi/fi/verkkokirjat/Sivut/Nostetaan_tuottavutta_ja_tyolaman_laatua_yhdessa.a_spx Here we also collaborated with Finnish universities (Oulu, Tampere, Helsinki).

We are publishing a leaflet on the same subject for decision-makers. In 2014 we intend to publish another book on the benefits of well-being activities. We will also gather company examples on an information database.

Well-being cannot be a luxury of good times only. We live in a demanding economic situation in Finland and Europe. Well-being at work must also be maintained when companies are re-orienting, renovating, outsourcing and reforming resource planning. Simultaneous well-being solutions are needed. For this purpose we have published guidelines:

www.psyres.pl and http://www.ttl.fi/fi/verkkokirjat/sivut/organizaatiomuutos_esimiehen_henkilostohallinnon_ja_tyontekijan_nakokulmasta.aspx

The *Theme* is creating “target levels” and good risk management solutions for workplaces to support risk management.

We have supported the work of safety and health administration by annually carrying out projects on the effectiveness of work inspections and how it could be improved³⁸. We have also supported safety professions such as the military, police and rescue professionals. At the same time the *Theme* also tries to improve safety-critical workplaces such as the nuclear industry, energy, mining, and land, water and air traffic [6, 8].

Research topics

The module-based development approach can determine both the problems that cause ill-being and the factors that create well-being at workplaces. According to the analysis, development measures can be designed.

The aim has been to direct research activity towards a broader concept of well-being. New solutions to compensate the risk-orientated view of traditional safety work contribute to legislation, the attractiveness of work and empowerment. However, risk-orientated research is still needed [9]. Promoting a safety culture (safety, occupational hygiene, ergonomics, work communities and safety leadership) is important; alternative approaches to social responsibility, the development of attitudes and workplace co-operation are needed.

As regards the Forum for Well-being at Work, we have founded an interactive web forum (KemikaaliVihi) to support the management of chemical risks at workplaces. KemikaaliVihi also includes a risk management tool (Stoffenmanager), which is freely available for companies in Finnish. One current issue in the field of chemical safety in the EU is the interaction of REACH (Registration, Evaluation, Authorization & Restriction of Chemicals) and OSH legislations at workplaces. In the Retris project we aim to find good practices for the use of REACH information at the company level. This project is carried out in collaboration with national authorities and communicated to the European Chemical Agency (ECHA). Other projects related to REACH legislation concern the risk assessment of complex chemical mixtures and the preparation of MSDS for mixtures as well as the impact of REACH on chemical safety at Finnish workplaces. In order to prioritize the activities in the chemical safety field, the KemKu project tries to identify the most significant chemical exposures in Finland and to estimate the burden of disease they cause. Research related to exposure to endocrine-disturbing substances such as Bisphenol A is also ongoing. This relates to the European discussion on the regulation of endocrine disrupters.

The *Theme* has co-operated with the Zero Accident Forum, which promotes accident management work, creates a safety culture and transmits good practices. Disseminating zero-accident thinking in Europe has been one target of the *Theme*. We have opened a SAFERA (Co-ordination of European Research on Industrial Safety towards Smart and Sustainable Growth) platform for developing well-being at work in new technologies, climate change and energy solutions. SAFERA is an EU-funded, three year industrial research programme, which FIOH co-ordinates. It covers problems in traditional industry such as catastrophes or major hazards and safety culture, as well as risks in new technologies. SAFERA activities are divided between the themes of Nanosafety and well-being solutions for the workplace.

The *Theme* takes part in the Soterko risk management programme, the purpose of which is to seek larger, multidisciplinary projects. We have organized a seminar on risk management and the precautionary principle and several collaboration seminars on the mining sector. We have

³⁸ IEG2009 recommendation no. 16

also researched the effects of magnetic fields, because this area causes concern and is growing at a fast pace [7].

We have started a project (BEST) funded by the national Cleen programme, concerning the safety and well-being of bioenergy supply chains. This project aims to support the use of green energy.

Other activities

Unions and organizations that support enterprises are important partners for the Theme. These are, for example, Trade Union Pro, the Finnish Metalworkers Union, the Chemical Industry Federation in Finland, Technology Industries, the Confederation of Finnish Construction Industries, The Finnish Construction Trade Union, and Finnish Statutory Accident Insurance. Working with different Unions provides access to a large amount of enterprises. One emphasis of the *Theme* has been micro and small enterprises, which we influence through entrepreneur organizations, the Chamber of Commerce and similar company level actors. Furthermore, the occupational health system helps in providing information. The main partners of the project have been the Centre for Occupational safety, the Occupational safety and health administration, Unions, universities and universities of applied sciences and consulting company experts such as 3T and Akukon. Internationally we co-operate with the Dutch Arbo Unie and Swedish Dalarna University.

The focus of the *Theme* is on providing practical solutions for the workplace. Thus, the main funding has been from the Finnish Work environment fund, TEKES (Finnish Funding Agency for Technology and Innovation) and the Ministry of Social Affairs and Health. The *Theme* has also some EU-funded projects.

Examples of events that the *Theme* has attended; international Work Life Development seminars in Baarlo Netherlands, 2012 and Espoo 2013; several national seminars for different listener groups such as administrative judges, Union development seminars, and meetings with university contacts, rescue personnel, personal protection representatives, researchers and electromagnetic fields experts. The *Theme* has organized NIVA courses and had themes in FIOH's Occupational Health Convention in 2012 and 2013. We also created a seminar series on well-being in safety critical work.

Conclusions and future outlook

Workplace-level evaluation is the main success factor of timely and effective actions in the development of well-being at work or the development of work life. The *Theme* has excellent know-how regarding workplace level co-operation. Another critical success parameter is good work life co-operation networks, enabling the *Theme* to also operate according to the instructions of ministries and administration. The *Theme* has been able to increase the multidisciplinary and multifactorial approach in the area of large scale projects. The challenge is to continue this work in future projects.

The vision of the *Theme* is being realized, but the concept of well-being still needs further focus. Therefore, after this strategy period, we need new insight into occupational safety and health. The connection between business benefits and well-being must be further clarified. In particular, the client view of the workplace, and how it is connected to well-being at work need more effective analysis from the perspective of human actions, safety and health. There are huge differences in how the concept of well-being is understood in public discussion, and further discussions in, for example, Work life 2020, at workplaces, and among developers and forerunners is very important in defining actions for workplaces.

The *Theme* has succeeded in determining the needs of workplaces for developing work life³⁹. The funding and the amount of projects illustrate the response to the need. However, the *Theme* has been weak in guiding general well-being at work activities, and the same development has been seen in service activities. According to a new scientific dissertation on well-being at work, the general concept of well-being is very difficult to formulate (Laine, P University of Turku December 2013). Many publications on well-being at work have been written nationally. The information can be used in practical work in companies.

In the field of chemical safety, important future issues include the perception of chemical risk, risk prioritization and risk communication. REACH and OSH linkage concerns the whole EU and needs to be solved. The impact of REACH on chemical safety at workplaces requires evaluation.

The actions should be designed in a manner that takes into account the unique processes and procedures of a single workplace. The procedures of small and large enterprises often differ. Development measures should be closely tied to the everyday operations and existing support systems of a workplace. For example, co-operation between the official safety personnel of workplaces and OHS personnel is a resource only partly exploited for improving well-being at work. In Finland, every workplace exceeding ten employees is obligated to name an official safety representative. If the amount of employees exceeds 20, an occupational safety and health committee must be set up. Respectively, all workplaces are obligated to organize OHS for their personnel. Enhancing the co-operation between OHS and safety personnel can produce great benefits.

The concept of safety needs re-evaluation in Finland, and the *Theme* has just started this work. There is a constant need for safety work, and legislation on safety covers only the juridical part of well-being work. The concept of social safety is not well known in Finland and there are not many methods to evaluate it. Safety personnel operate mainly in the physical side of safety, although there is a need for mental and psychosocial safety, especially in service branches. The psychosocial perspective needs simpler, clearer tools and methods for workplace use.

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The main focus of this *Theme* is to publish guidelines and good practices in Finnish, (as opposed to peer reviewed articles), which FIOH previously lacked. At the end of 2012, holistic well-being at work reports began to emerge from the *Theme*. Furthermore the *Theme* has given numerous presentations on well-being. In 2011 and 2012, 34 references were made to cold and winter travelling, 18 to well-being at work, 16 to electromagnetic fields, 15 to chemistry, 10 to physical factors (noise and vibration), 9 to physiology and ergonomics, 7 to safety and 2 to biology. Some examples of these references are listed below.

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Statement from the Theme's advisory group

Workplaces and work life need well-being solutions. Attention must be paid to changes in the content of work when this need is recognized. For example, ICT work and psychosocial load have increased. Positive and empowering work must be the focus in finding these solutions. Every measure taken must have proven impact and cost efficiency. Concepts of performance and empowerment should be disseminated. Special emphasis must be given to the polarization development of companies. Structural changes and new responsive evaluation methods are emerging. New evaluation methods for psychosocial factors in particular are needed in order to meet the challenges of work life and to help enterprises gain productivity and efficiency. A vast amount of information is available. The challenge is to find the best practical solutions to be used at the company level.

In connection with the development of work life, there is a need to renew the concept of well-being at work. We need concepts that better describe the quality of work at the company level instead of the well-being of single workers. This could be part of the company's performance and reporting. Safety and health and their promotion should be well integrated into other elements of leadership, learning and social responsibility. The solutions should have a strong theoretical basis and impact connected to the experience and development of companies. Measurement of these parameters can be very difficult because no common parameters exist. Modular analysis of well-being or ill-being does not seem suitable for the ordinary life of companies. We must also focus on the service sector and small enterprises.

3.4 Effective occupational health services (RK12)

Overview

According to our vision, good collaboration between workplaces and OHS help extend employees' working careers, and therefore workplaces find OHS useful. The risks arising from the decreasing workforce and growing pension costs can be reduced by promoting the occupational health, functional capacity and work ability of employees. OHS has a crucial role in helping workplaces to achieve this goal.

The scientific knowledge in the *Theme* is built on health promotion at work, work disability prevention, and the evaluation of related costs and benefits. The applied methods include research on evaluation, effectiveness and work-related health economics, as well the use of case studies. The approach is multidisciplinary, qualitative or quantitative. In addition, the data from surveys performed at FIOH are also utilized.

Some of the R&D projects are performed in collaboration with other *Themes*, workplaces, OHS units, and key stakeholders. We benefit from the research knowledge of both FIOH and other research institutes and universities by collaborating in research projects with them.

Solutions

On the basis of the research, solutions can be achieved at three levels. The policy level needs evidence for decision-making, OHS need knowledge for improving their processes, and workplaces need guidelines and examples for practical decision-making. The results have been published in both scientific journals and the national media, which is more easily accessible for both OH personnel and workplaces. The following are descriptions of some of the solutions that have been developed in the *Theme*.

A template was innovated for farmers to document issues related to well-being at work before a farm visit and health examination is performed by OHS. Through this form, farmers felt that they had been able to influence the way the farm visits and the health examinations were performed.

One of the statutory duties of OHS is to inform, consult and guide workplaces in topics related to occupational safety and health. This is part of a health examination, medical consultation and workplace assessment. It can also be planned as an independent process directed either to individuals or groups. After four research projects, a practical model was published to initiate and support learning among clients in order to increase their knowledge on work-related health.

Practical guidebooks on the criteria for assessing the effectiveness of OHS have been published for both small (less than 20 employees) and bigger workplaces. The criteria focus especially on work disability prevention. Collaboration between OHS and the workplace is crucial for a positive change in the final outcomes. Therefore the published criteria also include the activities at the workplace.

The employer can also purchase OHS from public health centres, which have a duty to offer their services. Due to the problems of the public primary health care system, OHS in health centres has poor opportunities for development. Therefore, a project was launched to give practical support for public OHS providers in developing their services and professional skills. So far, the project has proven its applicability and benefits in four different areas in Finland, strengthening collaboration not only between the public OHS providers in municipalities, but also with health care outside of OHS. This project was awarded by the Finnish Association of Occupational Physicians.

A screening questionnaire was published to support earlier detection of symptoms possibly related to solvent exposure at work. With this method, intoxications were found at an earlier stage (Furu H et al Neurotoxicology 2012), which means less human suffering and economic losses related to disability compared to usual screening processes.

A project to prevent ill-health caused by vibration produced both guidelines on exposure and an instrument for its assessment (Sauni R et al. Suomen Lääkärilehti 2011). The instrument includes exposure levels for the most common hand tools, as well as information on how long a worker can use the tool before the exposure limit is reached. A survey after the campaign showed that risk assessments of exposure to vibration had increased, and interventions to reduce vibration at work were more common than before the campaign.

FIOH's pulmonologists, in collaboration with specialists in other hospitals, have been active in defining the criteria for the diagnostics of occupational asthma. The work of this specialist group was described in articles published in a national scientific journal (Lindström I et al. Duodecim 2011; Suojalehto H et al. Duodecim 2011).

In 2012, FIOH published the seventh report on 'OHS in Finland' as a method for the Ministry of Social Affairs and Health to survey OHS units as regards their human resources, competencies, processes and customers. The report can also be used by the OHS units themselves for benchmarking.

The *Theme* also researches occupational medicine, which has resulted in scientific articles in international peer-reviewed journals (e.g., Aalto-Korte et al. Contact Dermatitis 2012; Sauni R et al OEM 2012; Suuronen K et al. Contact Dermatitis 2012).

Research Topics

According to our targets, effective OHS fosters employee well-being, and therefore OHS is a profitable investment for the employer. We evaluate the effectiveness of OHS, and based on this, develop solutions to improve the contents, quality and cost-benefit ratio of OHS, as well as increase its coverage among entrepreneurs and small enterprises. We develop models to support collaboration between workplaces and OHS, in order to make better use of the OH professionals' expertise.

In order to achieve more effective OHS research and development, four different R&D areas are recognized (Figure 3.4.1). Based on this, the projects are categorized according to their primary focus: (A) collaboration between workplaces and OHS, (B) collaboration between OHS and other health care, (C) work-related rehabilitation (support in return to work, vocational and medical rehabilitation), or (D) practices within OHS itself.

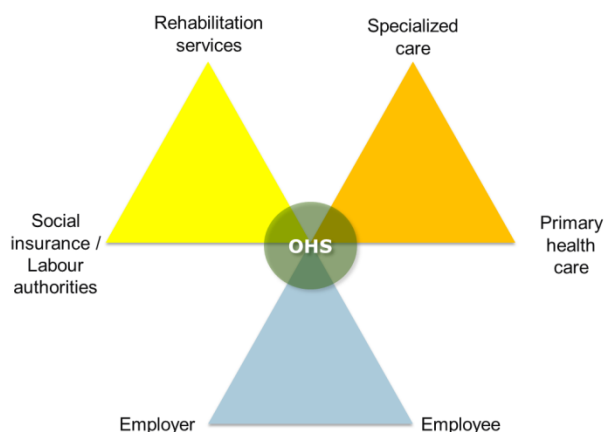


Figure 3.4.1 Role of OHS system in society

Collaboration between workplaces and OHS

A project on quartz and its health effects shed light on present levels of exposure, and provided guidance for reducing exposure. A clinical study found no new cases of silicosis, indicating that all suspected cases are discovered effectively by the health care system.

A study project analysed how OHS promotes the functionality of work communities, as required by the Act on OHS. The results show that OHS should increase their emphasis on work organizational issues. Therefore, methods and practices for OHS to work in collaboration with workplaces should be developed. In relation to work organizational issues, the criteria for compensating these activities within OHS should be clarified.

Studies of customer orientation have revealed that OHS' approach centres largely on their own processes, focusing mainly on individual workers. Collaboration with organizations requires, for example, that the roles and duties of OHS and the workplace are clarified. One apparent challenge is how to convert expert jargon into a more comprehensible language. Another challenge is to understand the divergent needs of individual and organizational customers.

A future project will focus on collaboration in effective disability management with the aim of studying the impact of disability management on the correlation between investments in personnel and work disability expenditure as an outcome. Data will be analysed on investments in, for example, OHS, voluntary insurance, occupational safety, the promotion of health and work ability, supervisor and employee training, as well as costs related to sickness absence, disability pensions and occupational accidents.

Collaboration between OHS and other health care systems

A project has been planned on how to support work participation through better collaboration between OHS and other parts of health care. The hypothesis is that better collaboration will improve the effectiveness of OHS; work disability will be managed more effectively by timely medical treatments and rehabilitation as well as workplace accommodations. The target is to create regional models for collaboration in health care, as well as guidelines for the treatment and rehabilitation of work disability, in order to co-ordinate the various actors in supporting return to work, reducing sickness absences and preventing permanent disability pensions.

Work-related rehabilitation

The role of case managers in OHS has become a more important part of preventing work disability. As of January 2014, case managers with training in social work are included as experts in the OHS team. Therefore, the competencies of present case managers, their work orientation, customers, and collaboration within and outside of OHS were surveyed. The results show that case management focuses on the individual when the worker is returning to work after sickness absence or at the stage of vocational redeployment. Work orientation can vary from organizing services and co-ordinating processes for a more intensive approach to coaching and empowerment. This challenges the traditional collaboration within OHS and between OHS and rehabilitation services.

In collaboration with The Social Insurance Institution of Finland (Kela), we are carrying out a project that aims to evaluate a new model for the rehabilitation of working-age people. It has been designed and implemented among rehabilitation providers. Our role is to evaluate the role of OHS in the project. The main hypothesis of the new model is that if the rehabilitation process is integrated more closely into workplaces and tailored according to individual needs, both the employee in rehabilitation and the workplace benefit more.

Practices within OHS

A project was launched to develop a model for managing depression in OHS. In the intervention, training and advice were offered to OH physicians and nurses in the treatment of

depression, as well as consultations with both psychiatrists and psychologists. The intervention group achieved partial or full recovery more often than those in normal care. Based on the results, OH physicians and nurses should be given better opportunities to co-ordinate the care of employees with depression and to support work retention in collaboration with the workplaces.

A new law came into force in Finland on June 1, 2012, obligating all patients who have been on sickness benefit for more than 90 days to obtain a certificate from their OH physicians regarding their remaining work ability and their ability to return to work with accommodations made by the workplace. A study was designed to examine the implementation of this new requirement. The available doctors' certificates and interviews with the patients and their employers were used as study material.

One project studies the effectiveness of a combination of a workplace visit by OHS and risk assessment by the employer in small enterprises. The applicability of an electronic version of this model will be tested in OHS. Its effectiveness will be analysed by comparing the new model with the usual practice in relation to safety attitudes at the workplace, safety level and collaboration with OHS. The validity of the model will be tested by comparing the conclusions made by OHS and the workplaces with those made by occupational safety experts. The follow-up will look at the changes implemented on the basis of recommendations in the assessment.

Another project aims at improving the coverage and contents of OHS in small enterprises. A structured OHS model for small workplaces will be encouraged by organizing training for OHS personnel, and by spreading information to entrepreneurs, employees in small workplaces, and councillors working in the 15 Centres for Economic Development, Transport and the Environment in Finland.

A project has been planned to develop IT systems within OHS. Its aim is to describe the required contents in these systems, innovate new ways to use modern IT technology, and analyse the opportunities and threats presented by this development.

Other Activities

FIOH's OHS specialists participated in the preparation of the new Decree on 'Good Occupational Health Practice' (GOHP), which describes the statutory OHS practices based on the Act on OHS. The implementation of GOHP will be described in a guidebook, which is also primarily written by FIOH specialists. The new Decree includes an obligation for OHS units to have a documented quality system, the contents of which will also be described in the guidebook.

FIOH's OHS experts participated in the activities of the European Cooperation in Science and Technology aimed at improving the methodology for discovering trends not only in occupational diseases but also in other work-related diseases. The aim is to become aware of new risks earlier than before.

The *Theme* director, as well as some other members of the management team, participate in the work of OHS task forces on a regular basis at both the Ministry of Social Affairs and Health and the Social Insurance Institution of Finland (Kela), which reimburses part of the OHS costs to the employer.

The pressure to make major structural changes in the entire Finnish health care system has intensified in recent years. OHS has been considered a good example of a well-functioning part of Finnish health care on the one hand, and a threat to the health care system on the other, because of increasing medical care within OHS. The *Theme* has been active in these discussions both in emphasizing the core functions of OHS and the ability of OHS to adapt to the changes in other health care. As a practical example of this, FIOH supported the initiative taken by the National Institute of Health and Welfare to reconstruct the entire primary health care system in Finland.

Conclusions and future outlook

OHS, together with occupational safety organizations and human resource specialists at workplaces, play a crucial role as users of the knowledge produced at FIOH. Therefore, it is impossible to include all research relevant to OHS in one *Theme*. As a solution, OH expertise has also been included in the projects of the other *Themes*.

Solutions created in scientific projects are seldom applicable as such in practice, but the research results serve as evidence-based knowledge to guide decisions. This depends on how the new knowledge is available to OHS experts, and on the relevance of the research. So far, most research choices have been driven by the key stakeholders; the Ministry of Social Affairs and Health, the Social Insurance Institution of Finland (Kela) and labour market organizations. OHS units and OH professionals are seldom included in the prioritization of research questions.

The long and internationally acclaimed tradition of OHS research and development at FIOH has been made possible by strong financial support from the Ministry of Social Affairs and Health. As the financial situation of the Ministries has deteriorated, and governmental research institutions are becoming obligated to cut their budgets, finding new sources for funding has become a challenge, as funding the development of one part of the health care system is not in the primary interest of most sponsors.

Society is changing rapidly, and, as a consequence of this, research needs to change more rapidly than reliable and high quality research can be produced. In the future, the challenge is to balance producing timely knowledge to support decision-making on the one hand, with making science with a more sustainable focus on the other. Funding is more readily available for scientific research, but funding for more applied research and evaluation at the national level should also be secured.

Although many OH experts have left FIOH, the research and development of OHS has continued and new experts have joined. However, skills in research methodology and paradigms have to be expanded. More controlled and (group) randomized studies are needed. In addition, qualitative methods should be used more rigorously, and used to create new research hypotheses.

The present strategy period has been too short to determine whether the activities of this *Theme* have reached the targets presented in the vision. Workplaces already consider OHS to be useful, mainly because of the widely accessible medical care and the management of sickness absences. Some business cases already show that working careers have been extended as a result of collaboration between the workplace and OHS. However, at the national level, the development has not yet been sufficient.

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Statement from the Theme's advisory group

The wide range of research topics in this *Theme* derives from the research tradition and competencies at FIOH. This does not necessarily support emerging research topics, such as evaluating the effectiveness of OHS. The research has focused on the quality of the processes, rather than on their effectiveness. In addition, the roles of OHS and the workplace should be clarified and the research focused on activities which are within the OH professionals' competence.

Most of the research is relevant to OHS, but the implementation of its results is insufficient. More research is needed to clarify and better understand the concepts of assessing functional and work ability, work retention, the process of work disability, and well-being at work. In addition, the outcomes, such as productivity, effectiveness and impact, should be used in a more uniform manner in the projects.

From the stakeholders' point of view, the benefits of the present strategy and the organization of FIOH are not obvious. Overlapping activities in various *Themes* should be avoided by better co-ordination, bearing in mind that other *Themes* also include research that is relevant to OHS. Funding is dependent on the scientific quality of the research. In addition, less rigorous research is needed to achieve fast results that are applicable in practice without delay.

The targets of the *Theme* will also be relevant in the future, considering that OHS has limited capabilities and competencies. Prioritization becomes important; what is the effective core of OHS, and what activities can be excluded?

3.5 Work life and the future (RK13)

Overview

The *Work life and the future Theme* focuses on probing and exploring essential changes, new topics, new ways of working, new practices and the trends leading towards future work life. The *Theme* identifies new work life phenomena and new effects, characterizes the ongoing changes in work life and facilitates forecasting the major work life trends. The *Theme's* main targets is to increase the understanding of the ongoing work life transition and of the effects of the changes on aspects of occupational health and well-being, and to create new tools, meta-models and approaches to support work life development towards a healthy and sustainable future.

Work life is undergoing a heavy global transition. It is becoming increasingly globalized, technologized, virtualized, personalized, mobilized, and overwhelmingly dynamic. It is quickly breaking traditional workplace boundaries, traditional job and authorization roles, and traditional ways of working. Structural changes in work life, as well as demographic and regional changes, affect Finnish work life in ways that are still hardly understood. They cause pressure for massive changes in management and leadership styles, workplace cultures, occupational health and safety support practices, and for major changes in the promotion of well-being and the quality of work life by the public and other organizations. The accelerating pace of societal, business and technological change also creates heavy pressure to change the ways of conducting the research of work life and health effects.

The extent of the ongoing transformation of work life is estimated to equal that of the industrial revolution. "New work" and the inevitable changes in work life are driven by a number of global trends. In the industrial era, the role of the employer, the time and place of work, the work community, co-workers, supervisors, customers, the customer's needs, and the employees' competence and identity were relatively stable: regular, ordinary, static, predictable and quite well-established. The ongoing transition of production and services questions all of this. It produces increasing diversity, variety and joint effects. In new work, employees are increasingly required to be capable of independently managing their work, and the workplace must support the work community, supervisory work and the smooth use of technology.

The major upcoming challenges of Finnish work life will rise from the increase of networked, mobile, linked and scattered work, combined with the sociotechnical evolution and followed by widening diversity in ways of working, participating, authorization and supervision, responsibilities, and support at work. This development calls for new ways of organizing and clarifying work and of redesigning workplaces and work communities. It requires new knowledge and competence of employees and employers, and a new focus of support organizations.

The main target of the *Theme* is to produce a clear, understandable picture of the major trends of change in Finnish work life; of the new resources and threats and of the emerging phenomena shaping new work. It is crucial to determine the potential impact of the ongoing development affecting well-being and work life quality, in order to ease the task of policymakers, workplaces and other work life actors of identifying the trends of changes and of initiating and designing necessary actions on time.

Experts from over 20 research institutes and universities from different countries have collaborated as the *Theme's* international research partners in different research projects. The *Theme's* co-operation network for the research, development and dissemination of results also includes the key ministries (the Ministry of Social Affairs and Health, the Ministry of Employment and the Economy), various EU actors, labour market organizations, and national work life development promotion actors, such as TEKES and SITRA Funds; Centres for Economic Development, Transport and the Environment; Regional State Administrative Agencies; the Social Insurance Institution of Finland (Kela); Statistics Finland; the VTT Technical Research Centre, National Institute for Health and Welfare (THL) and Radiation and the Nuclear Safety Authority

(STUK); the main domestic universities, as well as numerous domestic and international companies participating in the *Theme's* R&D projects.

Solutions and research topics

The *Focus Area of Globalizing Work Life* aims to determine the new challenges and requirements that Finnish workplaces are facing in the globalizing world. The results will help support Finnish work organizations adapt to the globalizing and multicultural work environment, support the promotion of equality and diversity, and reduce discrimination in Finnish work life.

In collaboration with the National Institute for Health and Welfare, the *Theme* has researched the work, health and work life experiences of immigrants. As a result of this project, the *Theme* produced web-based support material and workplace evaluation tools for promoting well-being and functionality at multicultural workplaces. The factors and effects on well-being caused by international business travelling have also been studied. Instructions on how workplace and occupational health care can support well-being in international business travelling are in press.⁴⁰

The *Theme* is currently researching the new needs for supporting well-being at the workplaces that are emerging in the global environment or global work community. New policies and models to support employee and work community well-being and productivity in international or multicultural networks are currently under development. A website is under construction, which will disseminate basic information in several languages about work-related well-being issues, management and workplace requirements, and organizing work and successfully operating in multicultural work communities. It focuses on immigrant workers and entrepreneurs in Finland, as well as on multicultural workplaces that recruit and employ immigrants.⁴¹

The Diversity Barometer was conducted to help authorities obtain basic information on the current situation. It reflects the views of public and private sector workplaces regarding the diversification, needs and challenges related to its development. The *Theme* takes part in ongoing EU statistics production, and the Labour Force Survey's additional immigrant section, which is conducted by Statistics Finland and the National Institute for Health and Welfare. This surveys immigrants work and health issues, and gives good baseline data regarding the well-being of immigrant workers and workforce in Finland.⁴²

Second-generation immigrant's successful integration into Finnish work life is an increasing challenge. The number of immigrant's children entering the workforce is rising continuously. The *Theme* has applied for funding from several financing sources to follow-up the second generation's successful work life integration and factors affecting this, but with no success so far. The search for research funding for this purpose will be continued.⁴³

The *Focus Area of Technologies at Work* identifies new, expanding and future technologies and the new use of technologies at workplaces. It focuses on the advantages and disadvantages related to well-being, and the possible need for measures induced by the use of new technologies. The well-being related effects of all-over expanding Lean production, sociotechnical change and changing ways of workplace communication are still not well known. The main point is to evaluate the social and human impacts of emerging technologies and to find supportive ways of using new technologies.

The volume of this *Focus Area* is the *Theme's* smallest, and the main projects are either still running or have just applied for funding. For example, in 2014, we will know more about how to use Lean production methods so that they support rather than demote well-being and efficiency. A supportiveness evaluation tool for using Lean production in workplaces is now under development.

⁴⁰ IEG2009 recommendation no. 4

⁴¹ IEG2009 recommendation no. 4

⁴² IEG2009 recommendation no. 4

⁴³ IEG2009 recommendation no. 4

Automatization, digitalization and robotization will expand. This will unavoidably change the range of jobs available to people and shift tasks between roles, such as from the employee to the consumer or from the employee to the robots. Robots that communicate with each other and human employees or that develop new robots are no longer science fiction but reality. They appear increasingly often as people's 'colleagues'. Work communities and processes that include both people and robots have not been studied much from the perspectives of well-being at work and occupational health and safety. The *Theme* is trying to find research funding for this very new but expanding topic on a Finnish scale.⁴⁴

The *Focus Area of Changing Work and Work Community* aims to identify and evaluate the ways in which work communities, operating concepts, workplace structures and employee identities, cultures and roles are changing and fragmenting due to the scattering of work and employment. It focuses on the effects and consequences of the diversification on the performance, safety and occupational health needs of work organization and employees. It also studies the kind of effects, needs and roles that new work raises for different workplace actors from the aspect of supporting well-being. This *Focus Area* is the most important for achieving the *Theme's* goals, as it deals with the changes and phenomena that have a major impact on Finnish work life right now and in the near future.

As part of this *Focus Area*, with funding from the Academy of Finland, the *Theme* has started a large research study on the emerging threats to work life that affect employees' mental well-being and the Finnish work life trends and determinants causing mental symptoms and unfavourable developments.⁴⁵

The best ways to make major organizational changes such as mergers or outsourcing, without giving up support for employees' well-being during restructuring, have been studied in an EU co-operation research project. Currently, the *Theme* is running projects that focus on finding the best well-being supportive solutions for authorization, supervising and self-leadership in scattered workplaces and complex organization networks, and on finding solutions to deal with the effects of the different interfaces and borders shaping organizations' activities.

Some of the current research projects are focused on finding effective new forms and practices to support work communities operating under decentralized management or using various forms of community-based approaches to leadership, as well on finding solutions to organize work and support employees who mainly work in complex networks. The organizational factors that increase organizational and self-leadership resilience in new complex operating environments or increase well-being in different new production systems are also under research.⁴⁶

The *Focus Area of Structural Changes and Sustainable Work Life* mainly aims to produce essential information regarding work life, health trends and new phenomena for decision-makers, labour market and work organizations and key stakeholders. The focus is on obtaining a comprehensive picture of upcoming challenges and opportunities in the near future, even 10-15 years from now, and to help guide the knowledge-based development of sustainable, productive and meaningful work life in the future. To achieve this goal, the *Theme* develops future-oriented indicators and explores new ways for work life and well-being trend surveillance; and develops and conducts work life and well-being anticipation and forecasting. Several surveys, reviews and publications indicating different trends, the current Finnish situation and the possibilities for sustainable work life have been produced or are in press.⁴⁷

⁴⁴ IEG2009 recommendation no. 35

⁴⁵ IEG2009 recommendation no. 35

⁴⁶ IEG2009 recommendations no. 4, 35 and 36

⁴⁷ IEG2009 recommendations no. 4, 35 and 36

Conclusions and future outlook

The *Theme* will reach the goals that were set at the beginning of the strategy period. However, even though the results obtained from both past or current R&D projects give versatile answers to the *Theme's* research questions; they also raise many new questions.

The *Theme's* work has indicated that the current transition in Finnish and global work life is tremendous and that work life will change fundamentally in the coming decades. This is still quite difficult to understand for the many different actors in work life. Much more new research and meta-model development should be carried out. The role of employers, management and the providers of work life support should change. They will be increasingly needed to assist with the evaluation of the situation at the workplace and in the operating environment; and with the development of meta-level thinking, scattered decision-making and acting guidelines. In addition, they should look for and provide relevant information for the case-specific promotion of well-being at work or working careers, applicable in multicultural, complex and decentralized operating environments.

The most important current resources of the *Theme's* R&D activities are a multidisciplinary approach, the excellent expertise of the researchers, and a strong culture of co-creation, innovativeness and organizational learning. Regular high-level co-operation with the top external research partners and workplaces taking part in the projects is also important. This provides an opportunity to tie together theoretical focus and real work life as an innovative R&D project; resulting in high-level research outcomes for immediate practical use. The *Theme's Focus Areas* and R&D approach have also proved to be successful in obtaining research funding for new, often very novel research ideas, despite tough competition.

The *Theme's* most important tasks; identifying new phenomena and the trends of the work life transition, and enhancing the understanding of and the ways of coping with ongoing change are still relevant at the end of the strategy period. The demand for the *Theme's* outcomes is proven by the great interest of different enterprises in taking part in the *Theme's* research projects. The transition of work life and the nature of new work have also been very popular topics for speeches in different events by the *Theme's* experts.

As the theme is so broad, it is necessary to focus on highlighting the R&D outcomes most crucial for work life in a useful package at the end of the strategy period. It is also important to promote these findings in close co-operation with the other eight *Themes*, since Finnish workplaces will benefit from combining their R&D work.⁴⁸

Examples of publications by the Theme

Focus Area of Globalizing Work Life

1. Bergbom B, Vesala H, Leppänen A, Sainio M, Mukala K, Smolander A. (2011). Kansainvälisten työmatkojen kuormittavuus sekä terveys- ja hyvinvointivaikutukset (International work-related travel and its effects on the health and well-being of workers). 98 pages. Finnish Institute of Occupational Health. Helsinki.
2. Toivanen M, Haapanen A, Väänänen A, Bergbom B, Viluksela M. (2012). Monimuotoisuusbarometri 2011 - Henkilöstöalan ammattilaisten näkemyksiä monimuotoisuudesta työelämässä (The diversity barometer 2011 - The views of HR professionals concerning diversity in working life). 65 pages. Finnish Institute of Occupational Health. Helsinki.
3. Toivanen M, Väänänen A, Airila A, Bergbom B, Yli-Kaitala K, Koponen P, Koskinen A. (eds, 2013). Maahanmuuttajien työ ja terveys Suomessa – tutkimus venäläis-, kurdi- ja somalitaustaisista työntekijöistä ja kantaväestövertailu (The work and health of immigrants

⁴⁸ IEG2009 recommendation no. 36

in Finland – a study on Russian, Kurdish and Somali born employees and comparison with native Finns). 155 pages. Finnish Institute of Occupational Health. Helsinki.

4. Yli-Kaitala K, Toivanen M, Väänänen A, Bergbom B, Airila, A. (2013). Monikulttuurinen työpaikka - Opas esimiehelle (Multicultural workplace - Guidebook for multicultural work communities and supervisors). 108 pages. Finnish Institute of Occupational Health. Helsinki.

Focus Area of Technologies at Work

5. Tantarimäki S, Erlund A, Kahila P, Keerberg A, Lehto V, Packalen K, Perjo L, Söderlund N, Tenhonen P, Tuomivaara S, Vesala H. (2012). Flexible Working Culture, Rethinking of Work, Place, Time and Life. University of Turku. Turku.

Focus Area of Changing Work and Work Community

6. Ansio H, Hirkman P (eds.). (2013). Työ ja johtajuus liminaalitullassa (The Work and Leadership at Liminal Stages). 69 pages. TEKES. Helsinki.
7. Bergbom B, Janhonen M, Toivanen M. (2013). Työnteon uusia piirteitä: Yhteistyö yli rajojen. (New features of work: Co-operation over traditional structures) In: Kauppinen T et al. Työ ja terveys Suomessa 2012 (Work and Health in Finland 2012). Finnish Institute of Occupational Health. Helsinki.
8. Houni P. (2013). Artist's work - vocation, dedication, a way of life or just a normal job? (Abstract). Critical Management Studies Conference 2013, 10-12 July. University of Manchester (UK).
9. Pahkin K, Mattila-Holappa P, Nielsen K, Wiezer N, Widerszal-Bazyl M, de Jong T, and Mockallo Z. (2011). Steps Towards sound change – Initiatives for Ensuring Employee Well-being during restructuring. Finnish Institute of Occupational Health. Hyvinkää.
10. Väänänen A, Ahola K, Koskinen A, Pahkin K, Kouvonen A. (2011). Organizational merger and psychiatric morbidity: A prospective study in a changing work organization. Journal of Epidemiology and Community Health, 2011; 65, 682-687.
11. Fact sheet: (2011). How to Manage Restructuring – to Maintain Employee Well-being During Restructuring. Finnish Institute of Occupational Health.
12. Website: (2013). Mahdollisuuksien organisaatiomuutos -verkkosivusto (Organizational restructuring - how to conduct it and support well-being?) (www.ttl.fi/organisaatiomuutos). Finnish Institute of Occupational Health.

Focus Area of Structural Changes and Sustainable Work Life

13. Kasvio A. (2014, in press). Kestävä työ ja hyvä elämä - kirja työelämän historiasta, nykyisyydestä ja tulevaisuudesta (Sustainable Work and Good Future). Gaudeamus. Helsinki.
14. Torsti P, Kandolin I. (2012). Työvoiman käyttötapojen ja työn tekemisen muotojen muutostrendejä selvittävän ja kehittävän työryhmän väliraportti (Trends of employment forms and ways of using workforce and labor in Finland, report). Ministry of Employment and the Economy. Helsinki.
15. Väänänen A, Toivanen, M, Kokkinen L. (2013). Työelämän muuttuva rakenne (The changing structure of work life). In: Kauppinen T et al, Työ ja terveys Suomessa 2012. (Work and Health in Finland 2012). Finnish Institute of Occupational Health. Helsinki.
16. Serial survey: (2012-). Työsuojelupaneeli (Panel Study of Occupational Safety Personnel). 2-3 times per year. Finnish Institute of Occupational Health in co-operation with The Centre for Occupational Safety. Helsinki. www.ttl.fi/tyosuojelupaneeli.

Statement from the Theme's advisory group

The research and development carried out by the *Work Life and the Future Theme* is professional and of high quality, and focuses on topics that are interesting and topical from the viewpoint of Finnish work life and workplaces. The research questions are highly relevant at the midpoint of the strategy period, and we consider that they will also be relevant at the end of the period. All the issues that the advisory group considers to be most important for today's work life are included in the *Theme's* topics. It is valuable to continue building the overall picture of the developing phenomena and new work life trends and to connect them to the structural changes of work life. Globalizing work life; multiculturalism; the socio-technical development affecting work communities; the new roles and approaches of employees, leadership and organizations; as well as the forecasting of the effects of structural changes on Finnish work life are topics that are highly important for the future also.

3.6 User-centric indoor environments (RK14)

Overview

Workspaces can promote well-being, improve the functionality of processes and lead to increased productivity if they are well designed and of good quality. In order to improve workspaces, the mindset of facility planning must change: the human aspects and functionality of processes for which the spaces are designed must come first.

The *User-centric Indoor Environments (UCIE) Theme* focuses on the quality of workspaces and on work environment factors - the main elements of indoor environments that are recognized as pleasant and comfortable - which could promote well-being, work ability and productivity.

The vision of the Theme is that 1) the real estate and construction industry recognizes that spaces have to be designed for people and their activities, 2) user-centric and participative planning is adopted in design processes of workspaces, and 3) understanding significantly improves of both perceived indoor environment and of the key elements of spaces that promote well-being.

The UCIE *Theme* continues the work of the previous *Good Indoor Environment Quality Theme* (2006–2010), which acted as a pilot theme at FIOH when the theme-concept was tested for the approaching strategy. The aim of the pilot theme was to develop social innovation to achieve better indoor environments. We realized that if we do not significantly change design and construction processes, we will not improve the quality of the indoor environment of workspaces. By working together with the construction industry, we may produce a change in attitudes and ways of working.

The UCIE *Theme* took the real estate and construction industry as a target but also as a partner in developing new R&D projects for better construction. In addition, the focus was strictly on work ability: how could we design workspaces so that the premises not only prevent disability but really promote well-being?

By causing a significant change in both the mindset and operating models of design and construction work, one can improve the quality and functionality of workspaces, which eventually leads to improved well-being among workers and productivity of companies. The construction industry would be willing to aim for better indoor environment quality if workplaces paid higher rent. This is a realistic vision: better health and improved productivity can be achieved in workspaces of higher quality.

The objective of the UCIE Theme is to develop new operating models, tools and products in collaboration with the real estate and construction industry in order to improve the quality of the indoor environment of workspaces. Models and tools will be implemented in new buildings and in those under refurbishment. User-centric and participative planning processes will be developed for practical use. We aim to improve the understanding of the indoor environment factors that are important for well-being and health.

The UCIE theme works in close collaboration with one of the national Strategic Centres for Science, Technology and Innovation (=SHOK), namely RYM SHOK (=Built Environment Innovations SHOK) which focuses on the development of built environments in Finland. In the last five years, SHOKs have become one of the main instruments of Finnish innovation policy. The financing model is based on an average of 60% of funding from TEKES (Finnish Funding Agency for Technology and Innovation) and of 40% from the companies involved. Between 2008 and September 2012, TEKES funded SHOK programmes with a total of over 343 million €.

RYM Ltd, which is responsible for running the RYM SHOK programmes, was established in 2009 and is owned by over 50 companies mainly from the real estate and construction sector. FIOH has been one of the stakeholders of RYM Ltd and the Director of the UCIE *Theme* has been a member of the board since 2009. The *Theme* has actively participated in planning and launching the Indoor Environment Program (IEP, 2011–2014) of RYM SHOK. The budget of the IEP program is over 24 million €. The Research consortium of the programme consists of 26 companies and 10 research institutes. FIOH's total budget for the IEP program is over 1.3 million €.

Funding for the projects of the UCIE *Theme* has mainly originated from RYM SHOK (30%), TEKES (30%), The Finnish Work Environment Fund (10%), the Ministry of Social Affairs and Health (10%), private companies (10%), and others (10%).

Solutions and research topics

The UCIE *Theme* has three *Focus Areas*: 1) User-centric orientation and perceived indoor environment, 2) Well-being aspects of construction and refurbishment (especially in the health care sector) and 3) Management of indoor environment problems.

FOCUS AREA 1) User-centric orientation and perceived indoor environment

In the planning workplace premises, more emphasis should be placed on user-centric design and the needs of the facility users should be taken into account. In order to increase the involvement of the users of the new premises, new operating models and tools are needed.

RYM SHOK has been an important forum for the UCIE *Theme* to challenge the building sector with a new approach to how the occupants of new premises should be taken into account in the facility planning. The *Theme* has been responsible for five Tasks of the Indoor Environment Program:

RYM Task 1. Human & Green; Energy-efficient and socially responsible working and learning environments. The objectives are to develop a participatory design approach to promote energy efficiency targets and to support the effective working and well-being of employees. Methods are developed for participatory workplace design and for evaluating workplace experiences and the well-being of employees. For measuring energy consumption and energy efficiency, a new set of indicators will be planned. The project consists of longitudinal case studies in pilot organizations in which the impact of renovating a building is examined from both process and end result standpoints. Preliminary results show that several stages in the planning process could be improved by using new strategies and operating models. In addition, employees could participate more effectively in planning if new methods were used. A new survey method was developed and tested for job analysis, and user needs and experiences of the premises were evaluated. A new visualization method was developed to illustrate survey results in the building. The workshops, which included both the users and the designers of the premises were considered useful for communication, idea generation and preparing for workplace changes (1).

RYM Task 2. Perceived indoor environment – measurable conditions. The aim is to increase the understanding of the perceived indoor environment in relation to measurable conditions (thermal comfort, air quality and acoustics). Even if the measured quality is good, users may perceive it as dissatisfying. The research question of the relation between measured and perceived quality is therefore important. New information and deeper understanding of the perception can be utilized in developing new technical solutions and products, space layout and usage as well as indoor environment management (5).

RYM Task 3.1. Clean, safe and individually controlled breathing air. Ventilation plays a major role in protecting hospital workers against airborne infectious diseases. The aim is to improve ventilation and air distribution in customer service units of hospitals. Our results show that, depending on air temperature and pressure differences, air flows from patients often move towards hospital personnel which can increase the risk of infections. The results of measurements can be used in planning and designing air distribution in hospitals' customer service units. Mixing ventilation is currently commonly used in hospital wards and in customer service units. Although this system generates good mixing and uniform temperature, it also leads to the distribution of impurities in occupied zones, increasing the risk of infections. For this, we developed a prototype of an individually controlled personal (protective) breathing air system which is a technical solution to decrease workers' exposure.

RYM Task 3.2. Low energy houses and buildings. The aim is to find out how building tightness and thermal insulation affect thermal conditions, energy use and indoor air quality. The results help in planning good, healthy indoor air in low energy houses with energy efficiency regulations. We have showed that variation in indoor air temperature was lower in low energy houses than reference buildings in the winter and summer. The occupants in low energy houses were also more satisfied with their perceived indoor air quality and thermal environment than occupants in reference buildings. More attention should be paid to the use of fireplaces because it increases CO concentration during the heating season. We also found that the tightness of ductwork should be measured after installation.

RYM Task 4. Methods for IEQ analysis. The main goal is to develop methods for adopting time-dependent LES-simulation for modelling room air flows, thermal comfort and air quality. Modelling enables the analysis and prediction of the indoor environment and the effects of different factors on this in the design phase. The project develops new simulation methods that can be used by ventilation and indoor environment researchers, product developers and designers. The new time-dependent methods enable more realistic and accurate simulation of conditions than the earlier time-averaged methods. Realistic time dependent room airflows and internal diffuser airflows have been successfully simulated by applying the LES modelling methods (5).

RYM Task 5. Non-measurable and subjective conditions. The salutogenic perspective, which promotes well-being related to workplaces and the indoor environment, is important in order to meet the objectives of coping at work and extending working careers. The preliminary framework will be developed for the dimensions and elements of workspaces that could promote well-being. The results can be applied in workplace design and refurbishment. RYM Task 5 has collected the scientific literature concerning the factors in indoor environment that have evidence-based effects on human health. By focusing on these when planning the facilities, we are able to assess the outcomes related to well-being, work ability and productivity (9-11).

The ***TOTI project*** (Qualified design of indoor environment of open-plan offices) aimed at holistic and scientific understanding of the effects of indoor environment on work performance and environmental satisfaction in open-plan offices. The project consisted of four laboratory experiments with over 300 test subjects, and before and after intervention studies in four offices with 350 workers. Assessment of indoor environments focused on acoustics, air quality, temperature, and interior design. The main result was that the holistic design of the indoor environment and the involvement of occupants in the office design were key factors for high environmental satisfaction and successful office design. The project produced 63 scientific articles, and the results have been well appreciated in the international scientific community. The design guide for multi-space offices has had a significant impact on the development of Finnish work life (6).

ÄKK project (Appropriate metrics for sound insulation requirements). Sound insulation in dwellings is of primary importance for health and well-being. Environmental noise levels should be low enough to enable undistracted sleep and relaxation, which are also necessary prerequisites for performing well in work life. The project aims to develop the evidence-based

physical metrics used in future sound insulation regulations. The project is closely connected with other European projects through COST TU0901 action. It is cross scientific, and contains work packages for listening experiments, building acoustics measurements, sleep research, cognitive psychology, sosioacoustic surveys, and environmental psychology. The project results will directly affect the national building code (2).

Research network in FOCUS AREA 1: Technical University of Denmark DTU, Denmark; Gävle University, Sweden; University of Aachen, Germany; University of Eastern Finland, Aalto University, Tampere University of Technology, University of Turku, Satakunta Polytechnic, Finland; and the IEA research program Annex 62 Ventilative Cooling, including 18 countries.

FOCUS AREA 2. Well-being aspects of construction and renovation (especially in the health care sector)

Today the number of newly built premises is greatly exceeded by the volume of buildings under renovation. If we can increase the quality of refurbishment, we will also have a significant impact on the quality of indoor environments of workplaces.

Development of rehabilitation premises. In 2006–2009, the previous IAQ *Theme* was responsible for running a nationwide development project in hospital buildings funded by TEKES. After this, the present UCIE *Theme* has played a key role in producing a road map for TEKES (in 2009–2010) concerning “well-being construction”, and for the building stock of the health care sector in particular. Based on this, the *Theme* has now carried out a project which aimed to assess the needs of rehabilitation centres while their processes faced significant changes, and to develop new operating models and tools for more effective use of user-centric and participative design in renovation projects in rehabilitation centres. A new method was developed which simultaneously assesses the condition of the premises and the health risks of the indoor environment related to, for example, water and mould damage or poor indoor air quality. The method has now been widely tested and can be used as a practical tool in prioritizing the buildings to be refurbished (8).

The control of airborne infectious diseases in isolation rooms of hospitals. Nosocomial infections, pandemics, and terrorist threats pose a challenge to the design, construction and operation of isolation rooms in hospitals. The aim was to develop and test the new design methods of isolation rooms and the study was conducted in five hospitals. Based on our findings, the requirements for the envelope tightness, air exchange, filtration and pressure differentials between spaces have now been defined. The guidelines can be used to build isolation rooms so that the exposure and infection risk of hospital staff, patients and visitors is as low as possible. Another project developed methods for preventing the airborne spreading of infections from hospital isolation rooms. The project focused on the migration of contaminated air during the passage to and from the isolation room. The amount of migrated air during passage and door operation in different conditions has been quantified and modelled (4, 12). This new data is important for improving the safety of isolation rooms in hospitals.

Guidelines for cleaning ventilation systems in hospital wards. The cleanliness and condition of ventilation systems were evaluated in hospital wards. The effect of duct cleaning on particle concentration in indoor air, on the dust accumulation on room surfaces, on the particle emission of the supply air, and on balancing the airflows was also assessed. Based on the results of the hospital survey, the *Theme* has now created guidelines for hospital engineers, duct cleaners, and ward staff on practical instructions for the cleaning of ventilation systems in hospital wards.

Research network in FOCUS AREA 2: Chalmers University, Sweden; Brisbane University, Australia; Technical University of Denmark DTU, Denmark; Singapore University, Singapore; University College of London, and Leeds University, UK; Penn State University, USA; University of Alberta, Canada; University of Eastern Finland, VTT Technical Research Centre, Finland.

FOCUS AREA 3. Managing indoor environment problems (especially moisture and mould problems)

Operating models to resolve indoor air problems. For several years, Senate Properties has been a key partner in the R&D activities of the UCIE *Theme*. Senate Properties is a government-owned enterprise, responsible for managing and letting the property assets of the Finnish state. Senate is responsible for over 13 000 buildings, which offer workspaces for over 500 000 office workers. Already during the previous pilot theme we launched a joint long-term development project in order to study how health and safety aspects could be better integrated into real estate management. We were able to develop clarified strategies and operating models for environmental issues, from which thousands of workplaces and their workers now benefit all over the country. The results were disseminated through a wide training programme. In the current theme we evaluated the usefulness of the new operating models and training courses. Currently, development work continues in the form of an *Indoor environment clinic*, which is an ongoing joint collaborative body of Senate Properties and our *Theme*. Because of the leading role of Senate Properties in Finland, it is obvious that the developed good practices are transferred to companies in the construction industry that provide services to property owners. The guidelines of the project have also been disseminated to other property owners in both the municipal and private sector (8).

Another considerable project was carried out in co-operation with University properties of Finland Ltd and ISS Proko Ltd. In this project, we utilized knowledge gained from the co-operation with Senate Properties in quite a different operational environment. Particular attention was paid to building a systematic problem-solving process, and multiprofessional, participative collaboration and risk communication between the occupants of the premises and building maintenance. In addition, a practical toolbox was tailored to support the process. A training programme comprising altogether four 1-2 day modules was implemented, which was targeted at the personnel of University properties of Finland and the Indoor Air Groups of ten universities. Improved operation modes influence the environments of tens of thousands of university students and personnel all around the country.

Guidelines for solving indoor air problems. The *Theme* has produced guidelines for workplaces and property management on how to solve indoor air problems. The project group included indoor air experts, owners of large properties, representatives of ministries, the City of Helsinki and authorities, as well as experts from engineering offices. The result, a very clear precept, is available on the websites of FIOH and the Ministry of Social Affairs and Health. Training in the procedure has also been arranged. The guidelines recommend gathering a multiprofessional team (an "Indoor Air Group") for each case when background information indicates a complex or large indoor air problem at the workplace. The group also decides whether indoor air experts are needed in the process. The guidelines provide competence requirements for experts and guidelines for tendering processes. In the case of complex or large indoor air problems, a leading expert must be appointed who takes responsibility for the solution process. The leading expert also gives information to the reparation project group. The leading expert and the indoor air group agree on a follow-up procedure for the process.

Moisture and mould problems in buildings and exposure to microbes at work.

In 2012, the Finnish Parliament invited the UCIE *Theme* to carry out a survey on moisture and mould problems in Finland. The aim of the study was to assess the extent of the problem and the health outcomes and economic consequences related to the moisture damages, and to propose recommendations for remediate actions. The theme first defined the term "**significant moisture damage to health**" in order to be able to more reliably assess the extent of the problem and the number of exposed people. Significant moisture damages were found in 10% of apartment buildings and single houses, and in over 20% of floor areas of schools, day care centres and health care premises. The number of exposed people in these buildings varied between 500 000 and 850 000. The annual cost of significant moisture damages to health and productivity was on average 0.5 billion €. We assessed that to renovate all significant moisture damages would cost over 1.4 billion €.

According to the suggestions of the study, the Parliament agreed and gave the Finnish Government 14 tasks related to improvements to legislation, education, services, and the delivering of information and research. The Government has to give an annual report to the Parliament on the measures which have been performed in response to the 14 tasks.

Research at FIOH related to moisture problems and health. The *Theme* has used systems biology and toxicology in order to better understand the immune mechanism related to the exposure and adverse health effects in moisture problem buildings. Microbes, toxins and allergens, chemical substances (volatile organic compounds), and particles originating from moist and damaged materials have been used in laboratory tests to evaluate the possible causes of the symptoms and diseases related to water-damaged buildings. Furthermore, the effect of microbial cell wall fragments, for example, beta-glucan, and mycotoxins were assessed in human primary macrophages and in mouse models. Studies demonstrated that fungal mycotoxins act as microbial danger signals that trigger the activation of central (inflammasome mediated) innate immunity pathways in human primary macrophages (7).

The TOXTEST project, funded by the Ministry of Social Affairs and Health was carried out by the *Theme* in collaboration with the National Institute for Health and Welfare and three universities to determine the suitability of some simple, rapid techniques for assessing the toxicity of dust samples collected in moisture-damaged buildings. The study revealed, however, that the toxicity methods were not specific enough for further use in, for instance, risk assessment in occupational health. This may lead to better understanding of the mechanisms of the diseases and better diagnostics.

Microbiological hazards and their health risks for workers in facilities processing biodegradable waste. The aim of the project was to assess workers' health risks caused by microbial exposure in biodegradable waste treatment plants and to provide guidance for the assessment and control of microbiological risks in waste management companies and in their health maintenance. The project developed exposure assessment methods, for example the real-time PCR analysis method for nasal mucous membrane samples, which can be used in various work environments. This helps establish potential respiratory health risks and the efficiency of preventive measures and the personal protection of workers.

Other activities

The UCIE *Theme* arranged the Helsinki Summit - Workspaces promoting well-being - in 2012, in association with RYM Ltd. The Summit focused on how to design and develop facilities that promote well-being. The target group was architects, indoor environment experts, civil engineers, HVAC professionals, psychologists, physicians, researchers and policy-makers. It comprised key note lectures and workshops which produced material for further use. The aim of the summit was to work hands-on with the present theme and produce good practices for daily use. The workshops revealed which factors are necessary for promoting well-being. The second day of the summit focused on aesthetic aspects; art and culture in inner spaces. The results and outcomes of the summit will be published as a special issue in the Intelligent Building International Journal in 2014.

Conclusion and future outlook

The vision of the *Theme* has at least partly been fulfilled, as the construction sector has actively participated in the RYM SHOK Indoor Environment Program. In addition, operating models and tools have been developed and adopted for the user-centric, participative planning of workspaces, and understanding has significantly improved of both perceived indoor environment and some important factors in the work environment that promote workers' well-being. Collaboration directly with the real estate and building industry has proven to be an effective way of developing operating models and tools which have led to good results. The experience has been positive and should be continued. By showing that a good indoor

environment can improve well-being, work ability and productivity, the *Theme* has tried to convince the construction sector that workplaces are really willing to pay higher rent for better work environments.

FIOH's 'theme concept' has been a well-accepted and effective way in which to operate in the demanding field of indoor environment research. The key points of the concept have been the need to find a new way of thinking, to change the mindset in the design and construction business and to understand the important role of committed partners from the real estate and construction industry. 'Champion enterprises' such as Senate Properties have been necessary to accomplish difficult tasks and to convince the construction industry of the importance of good quality indoor environments. Without pressure from the Senate Properties on construction companies, the outcome would not have been realized.

The multi-professional, cross scientific approach, consisting of both technical and human aspects, has been an important innovation for facility design and building research. By combining technical expertise with health and psychology, we have been able to introduce something new to the construction sector. We hope that this innovation could later become a real business potential for this field of industry. Research and development have not formerly played a significant role in the construction sector. Now the RYM SHOK platform also offers a new arena for the construction sector to increase their resources and participation in research.

Pilot operating models and new tools have now been developed. Future FIOH R&D projects should focus on collaboration with the real estate and construction industry on how to implement these operating models and tools more widely in new building projects and refurbishment in general.

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Statement from the Theme's advisory group

This *Theme* has continued the work of FIOH's previous *Good indoor environment quality Theme*. The focus of the new *Theme* is now wider and emphasizes multi-professional orientation and networking partnerships with the real estate and construction industry. The topic is very relevant to both Finnish society and these industries. Furthermore, this *Theme* has created a fresh new solution to the demanding challenges of this industry.

The first *Focus Area*, "User-centric orientation and perceived indoor environment" is the bravest, most attractive and discussed area of the *Theme*. It has the most significant ideas and results. Companies were also most involved in the projects of this topic. This area most efficiently brought the human and behavioural aspects into the field of real estate and construction. The projects of this *Focus Area* effectively combined client needs and scientific interests. The TOTI project in particular has had an important impact. Collaboration in the projects of RYM SHOK has been productive. The real estate and construction industry have been active in the RYM SHOK programme. The *Theme* should continue to be part of this programme in the future.

The second *Focus Area*, "Well-being construction and renovation", has also been an important field of interest for Finnish society. The building stock of social and health care in particular has struggled considerably in recent decades. Thus, action models and tools for resolving problems associated with both processes and economic issues are needed. This will obviously become both a national and international research area. The *Advisory Board* suggests that in the future the *Theme* could be more active in international openings in this field, by challenging new partners from real estate and construction companies.

The third *Focus Area*, Management of indoor environment problems, especially moisture and mould problems, has been a very relevant topic. This *Theme* has been a key player in proposing national operating models and tools for resolving indoor air problems. The topic of moisture and mould problems has been very difficult. Neither the government, public sector or the construction industry have been able to resolve the problems so far. Thus, the *Theme*, with its multi-professional expertise and wide networking orientation among different actors, has played an important role in resolving these problems.

In conclusion, due to the public interest in this issue, the *Theme* has had direct, open access to the highest level of national government and political decision-making. The strength of the *Theme* has been the new, wider operating model in collaboration with the real estate and construction industry. It has been challenging to propose this new way of "human" thinking to the industry. No one, however, can deny the relevance and importance of this modern

approach and the researchers of the *Theme* have gained great respect among the actors in this field. Therefore, the *Advisory Board* recommends prioritizing, selecting and focusing (or widening) the scope and aims of the *Theme's* projects.

3.7 Brain and Work Research Centre (RK15)

Overview

The promotion of good brain health and functioning is essential to the competitiveness of Finnish society. In a recent EU survey (<http://osha.europa.eu>), corporate leaders and HR directors expressed their concern for the overall brain well-being of the workforce. Globalization, rapid development of technological devices and information handling systems, and the digitalization of services have changed ways of working and work content. Cognitive challenges have increased in nearly all fields of work. Workers need to quickly switch between different types of work tasks, adapt to changes in their information load and endure interruptions at work. Mobility and irregular working hours are increasing. People with different language and cultural backgrounds team up together. Lifelong learning and upgrading of working skills is constantly needed.

The goal of the Brain and Work Research Centre (BWRC) is to promote the compatibility of work demands with the brain and cognitive resources, thus ensuring good work ability throughout workers' careers. Our research focuses on cognitive neuroergonomics and human factors at work. We study the interactions between physical, physiologic, mental, cognitive and brain performance. Our research results can be used to optimize cognitive workload, develop more efficient working practices and to facilitate humans' recovery from work days and weeks.

Special emphasis is placed on information handling and the characteristics of knowledge work in different types of work, for example, safety critical work, transportation, health care and ICT sectors. Rapid advances in technologies and digital solutions for handling large quantities of data are changing knowledge work in a fundamental way. A recent Foresight 2030 future scenario (www.2030.fi) predicts that low-level, standard information work will be automated and humans will carry out knowledge work that requires the handling of heterogeneous datasets from several sources. Within this *Theme*, we develop and study emerging technologies and both computationally and cognitively develop sound solutions for exploratively studying such datasets (Lijffijt et al. 201X, Henelius et al. 2013).

The development of new objective methods for studying the working brain is a unique and essential part of our activities. The *BrainWork laboratory*, *DynaMITE*, and the *Future Information Technology Research Laboratory* play a key role in our R&D work. They consist of information work simulation facilities, sleep laboratories and a semi-living laboratory environment for planning and piloting field studies. Neurophysiological metrics, work simulation, computerized work tasks, cognitive tests, subjective symptom questionnaires, and immunological, metabolic and hormonal tests have been integrated into study designs depending on research questions. We carry out experimental laboratory, semi-living lab and field studies at actual workplaces. The BWRC is multidisciplinary and employs physicians, psychologists, physicists, and engineers.

Our aim is the rapid transfer of research-based knowledge into work life. R&D programmes are designed and executed in close collaboration with national and international research groups, and the key users of research results. They include, for example, IT and health technology corporations' R&D units, HR units and healthcare; transportation and logistics; IT and media sectors; OHS providers; and labour and employer unions. We participate in the training of master's level and doctoral students in collaboration with several universities in which senior researchers hold adjunct professorships or work as part-time professors. The main external funding sources are TEKES (the Finnish Funding Agency for Innovation), the Academy of Finland and the Finnish Work Environment Fund. To increase public awareness of the relevance of brain well-being to all human activities in society, special emphasis is also placed on media visibility, the popularization of research findings and training activities.

Due to the nature of our projects' consortiums, the implementation of research results in practice is integrated into our mode of operation. Our projects form three thematic programme lines:

- Sleep, stress, recovery, and cognitive performance
- Cognitive performance and identification of its early impairment
- Cognitive and neuroergonomics of information technologies and systems

Research topics and solutions

1. Sleep, stress, recovery, and cognitive performance

Training truck drivers in alertness management does not solve the problem of driver sleepiness: Severe sleepiness at the wheel is a problem among professional drivers that affects traffic safety. Our study showed that staying awake is a problem, especially on the first night shift (Pylkkönen et al. 2013). Alertness management training given to drivers was not an effective remedy for the problem. This highlights the need for more comprehensive development of safety culture and practices and working hours.

Task performance is overestimated under sleep restriction: Shift workers with restricted sleep opportunities have to rely on their subjective ability to estimate their ability to properly perform their tasks. Our experimental study showed that sleep-restricted individuals are inclined to overestimate their performance capacity, especially before commencing a task (Sallinen et al. 2013). Shift workers in safety-critical occupations need technological solutions that give objective and online feedback on performance. The BWRC will study the possibilities of quantified self R&D solutions.

Sleep restriction activates immune response-related gene-expression pathways: Night sleep restricted to only four hours per night for one working week activates the immune system, up-regulating many immune response-related gene pathways and individual gene transcripts. Our findings may at least partly explain how prolonged sleep restriction can contribute to inflammation-associated pathological states, such as cardiometabolic diseases. These findings emphasize the need for feasible solutions for work-related sleep-wake problems caused by shortage of sleep due to long or irregular working hours. Our results indicate that an ergonomic shift schedule aids in physiological recovery between successive work shifts. This may prevent the development of medical problems (e.g. cardiovascular and metabolic) related to shift work adverse health effects. (Aho et al. 2013, Järvelin-Pasanen et al. 2013)

Work stress compromises sleep and recovery from work among shift workers. DNA-level changes are also observed: Psychosocial stress and irregular working hours are common health risk factors in the health care sector. We explored the effect of long-term job strain on the sleep and recovery of shift working nurses. Our study showed decreased quality of sleep in shift working nurses with long-term, high job strain. High job strain was associated with less ergonomic shift schedules, severe sleepiness in morning shifts and poor recovery from evening shifts. Exposure to high job strain is associated with epigenetic changes expressed as lower DNA methylation levels at the promoter CpG upstream of SLC6A4, which may increase the risk of depression. (Karhula et al., 2013 a, b, Alasaari et al. 2012)

Non-medical cognitive-behavioural treatment of insomnia within OHS: To our knowledge, our study is the first to show that this type of treatment is also effective in shift work. We will continue this practically-orientated research, as adjustment to irregular working hours will be an increasing challenge in future work life. We have written a handbook on insomnia for professionals, arranged teaching courses and produced web-based treatment applications to aid clinical work. Instructions for the evaluation and treatment of sleep disorders are now also available for Finnish physicians in an electronic medical handbook (Hublin 2013 in www.terveysportti.fi). (Järnefelt et al. 2012a, b,c, Partinen & Hublin, 2011, Hublin 2011a,b, 2013 a,b)

Screening for shift work sleep disorder (SWD): Compromised sleep and fatigue are common among shift workers. Some workers also suffer from s that are poorly recognized in OHS due to the lack of a screening method for this disorder. We have shown that a shift-specific questionnaire is useful for screening SWD (Vanttola et al).

Behaviourally-induced insufficient sleep could be treated in a similar way to stress and smoking: Based on current knowledge of the treatments for other behavioural-based problems, such as stress, smoking, and heavy alcohol consumption, we propose that treatments based on the Transtheoretical Model of Behavior Change could be a cost-effective way of improving the sleep and alertness of sleep-restricted individuals and also be suitable for use by OHS (Hublin et al. 2012).

Sleep disorders affect memory and learning but most of the effects are reversible: Sleep is essential for memory and learning. A literature review revealed that, on the one hand, both sleep apnoea and insomnia, which are prevalent sleep disorders among the working population, easily interfere with memory processes and impair learning results through many pathways. On the other hand, these problems can be alleviated through appropriate treatments (CPAP and CBT therapy), which can be provided by OHS. (Sallinen 2013)

2. Cognitive performance and identification of its early impairment

Burnout and cognition: In collaboration with the OHS of the City of Helsinki we studied cognitive functioning in currently working people with different degrees of burnout symptoms. Research focused on information processing, working memory, behavioural distractibility, and attention. We also studied the association between job burnout and brain neurophysiological responses during different tasks. Data-analysis is in progress.

Job burnout has been clearly noticed in workers consulting OHS. However, only 20% of the job burnout participants of our study were referred by OHS, and 80% entered the study in response to advertisements displayed at OHS centres or on OHS websites and the City of Helsinki website. Study participants reported fear of being stigmatized as mentally ill if they discussed their symptoms with health care professionals. This indicates a challenge for OHS to reach employees with symptoms of job burnout.

Next we need to develop new practices of first stage professional consultation for workers experiencing job fatigue. We also aim to provide early screening methods to detect early symptoms associated with burnout, such as sleep and memory problems which contribute to functional disability. This helps in differential diagnostics of underlying causes of memory problems and in the analysis of the role of work- and non-work related causative factors.

New guidelines for identifying occupational exposure to neurotoxic substances: In a Finnish population study of 20% of workers at risk of chronic solvent encephalopathy (CSE), we showed that a postal screening approach followed by clinical investigations finds three times as many new cases as the current national OHS guidelines. Economic analysis showed that the cost of finding one case of CSE was 20 times less than that of traditional screening. This cost-effective screening method for early CSE detection has been implemented in national OHS guidelines. (Furu et al. 2012: <http://www.terveysportti.fi/dtk/tyt/koti>)

Next (if funded) we aim to screen the rest of Finnish workers. For example, boat builders, previously not properly studied, will be investigated in more detail.

Memory problems and work: About 400 000 of working-aged Finns suffer from subjective cognitive problems. Work demands that exceed performance capabilities and knowhow, and working in information intensive environments are typical stressors behind these complaints. They can increase the risk of psychological distress and other health problems. Individual worker-related factors such as poor sleep, alcohol consumption, clinical medical conditions and overall lifestyle may also impair cognition. We are currently developing a novel internet-based questionnaire and cognitive test methods for studying subjective and objective cognitive

performance in working-age subjects in a two-year follow-up population study. We will also obtain biological stress markers to see whether these reflect psychological distress associated with cognitive complaints. Our aim is to improve the early detection of risk factors for cognitive impairment and to develop a comprehensive model for assessing subjects with memory problems in primary health care and OHS.

3. Cognitive and neuroergonomics of information technologies and systems

Revolutionizing knowledge work: An expanding area of our research relates to fast developing information technologies and the changes occurring in knowledge work in which making sense of large amounts of complex information is crucial. We have just started a large scale R&D project: *Revolutionizing knowledge work* (www.reknow.fi), which focuses on new human and work-task centred IT solutions and new ways of presenting data, and navigating and exploring data-spaces.

Computational data analysis is of increasing importance to BWRC for two reasons. On the one hand, our data is multiparametric and often collected in real-world experiments. Analysing such data and developing new methods for using the data that is applicable in research or work life requires a high level of competence. On the other hand, in order to understand modern knowledge work and to make it possible to design systems for future knowledge work, an in-depth knowledge of the inner workings of information systems is needed.

Studying ICT user interfaces: The number of parallel interfaces that one employee uses is steadily increasing. Switching between tasks leads to a significant performance cost due to increases in response times and/or performance errors. We have developed an objective method to simulate and study the cognitive demands of a typical multi-interface work situation. It provides a new means for the human and task-centred evaluation of IT solutions at work. In addition, we are developing new approaches for ICT systems in which work research, knowledge on human capabilities, and economic factors are linked to the goal to improve both the quality and economic viability of ICT systems in public organizations (Kalakoski et al. 2011) .

Researching new user interfaces: We have developed a novel method for visualizing three-dimensional data (e.g. medical and industrial imaging, modelling and simulation data). An international patent application for the method has been filed. Using this method, investigating 3D data (currently implemented on a tablet device) is intuitive and natural, and eases the cognitive burden of mentally reconstructing complex volumetric structures such as the human anatomy, enabling better decision-making, collaboration and communication. (Lukander 2012)

We have also developed wearable, mobile gaze-tracking glasses and software, which calculate and visualize the point of gaze in real-time. The glasses can and will be used in many research projects in which the focus is on attention. Our revolutionary gaze-tracking system is over 20 times cheaper than existing similar commercial systems, while accuracy is on the same level and robustness surpasses most commercial solutions. We are planning to publish the source code, schematics and the instructions for manufacturing the glasses as open source, for anyone to build and set up a system. (Lukander et al. 2013)

Studying motor functions and cognition: The use of hands and gestures as well as other motor functions is essential in creative and cognitive work. We are currently studying the role of using both hands and voice by a designer in a design process. We also investigate the changes in brain activities while learning new skills and the attention of students in learning situations. The goal is to gain an insight into the effects of embodied elements in cognitive performance. The project makes use of the gaze tracking technology developed at BWRC.

Mobility and global team work present new challenges to both designing work and promoting overall brain well-being and cognitive performance. Our ongoing study aims at identifying the stressors and cognitive demands that are placed on global workers and learners who participate in multi-cultural and cross-disciplinary collaborations in a rich technology-enabled

environment. Multiple sources of data, including objective measures of heart-rate variation (HRV), physical activity and sleep, cognition, interviews, diary entries, and self-evaluations are collected from global workers in Finland and global learners from several continents in real life work and study situations. The data will be used to identify indicators of stress, cognitive load, recovery, and well-being. Our aim is to develop novel research methods that allow reliable, non-intrusive investigation of global work and learning in real-life settings at workplaces, schools and during leisure time, and also to enable workers to self-monitor and regulate their performance.

Conclusions and future outlook

The research programme of BWRC addresses relevant current and future work life topics. The need to develop and promote cognitive and neuroergonomics at workplaces has been widely acknowledged in society. Its relevance is further emphasized by the growing need to raise the retirement age and extend the overall length of working careers. OHS are keen to develop practices that promote brainwork at both an individual and workplace, as well as organizational level, and to identify and abolish factors with adverse effects on work performance or human health.

BWRC is a sought-after partner and has been very successful in obtaining external research funding. Our know-how in the R&D of both health and information technology applications brings added credibility. Our unique cutting-edge laboratories also pave the way for combining quantified self-elements into field studies at workplaces and for participating actively in the R&D of new ICT systems and applications.

In the future, more emphasis will be given to neurocognitive research on changing knowledge work, mobile and virtual work topics, memory problems, psychosomatics. Environmental sensitivities, for example, will need more attention. Lifelong learning and collaboration with both schools and universities also need strengthening. Furthermore, we will implement our research results into leadership training programmes.

Constantly increasing competition for funding is a challenge. More emphasis should be given to the training and mentoring of younger scientists and experts in the planning of large-scale projects, consortium negotiations and the writing of funding applications. At FIOH, overall know-how and human resources in the development of data-analysis and digitalized services, as well as effective and agile use of immaterial properties are scarce. This hinders the effective use of R&D results, participation in the development of new practices and the implementation of results into everyday work life.

Here are a few examples of the future BWRC programme priorities:

- To develop and implement 'human friendly' shift schedules as a part of the overall fatigue management of workers, company- and occupation-tailored approaches are needed, with special emphasis on safety sensitive industries such as transportation, energy production and the health sector. Methods for OHS and HRM to assess strain and recovery in higher-skilled occupations with irregular and flexible working hours are also needed. Combining personalized medicine with shift work ergonomics paves the way for meeting these demands. A cost-effective comprehensive model for OHS to prevent sleep-wake disturbances and other safety and health risk factors in shift work (e.g., individuality, working hour arrangements) is also needed.
- Human perception and decision-making are biased and liable to errors when estimating either one's workload or cognitive performance or physiological state at a certain time. Objective measures that link knowledge on work task content and demands to an individual's neurocognitive and physiologic performance are needed. Health technologies are reaching a maturity phase in which they can be used both in laboratory environments and at real workplaces without disturbing the worker or work. The consumer-driven quantified self-movement, in which individuals collect data on

their own health, is spreading. This brings new possibilities for neuroergonomic research. Data that workers have measured themselves can be further used for tailored designing of work and work processes. Before this stage is reached, the analysis tools that make sense of measured raw data and aid in identifying reliable objective outcome measures of health, performance and, for example, stress or vigilance levels at work must be developed. Advances in computer science play a key role here.⁴⁹

- In Finland, work disability due to environmental sensitivities is mainly associated with indoor problems, i.e., moisture damage associated health risks. A scientific literature review is currently in progress on the evidence-based treatment of environmental sensitivities. Several measures will be undertaken to manage multiple sensitivity disorders. Guidelines to help workplaces identify and manage indoor problems will be updated. Information will be provided to OHS on how to recognize, study and treat environmental sensitivities already at an early stage. This research area converges with reversible functional psychosomatic disorders, a major and inadequately characterized cause of work disability. The characterization of neurophysiological and psychobiological mechanisms will facilitate the evolution of new cognitive behavioural interventions.

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Statement from the Theme's advisory group

The research goals of the BWRC are ambitious and the achievements reached so far are of high quality. The research environment is unique, focusing on applied work-related R&D. The

chosen research areas and questions are highly relevant to both current and future work life. The challenge lies in implementing the obtained research results in practice. Here, collaboration with different work life actors is needed. The versatile multimedia activities of the BWRC were given special credit. The evaluators suggest a more systematic approach at FIOH to the use of, for example, digitalized media to raise public awareness of topics related to optimizing workload and the human brain, and cognitive and physiologic performance. The need for more emphasis on the possibilities to develop the BWRC's new research-based services was also pointed out.

3.8 Nanosafety Research Centre (RK16)

Overview – vision and description of the Nanosafety research centre

The vision and goals of the Nanosafety Research Centre (Centre) include the promotion of the safe use of engineered nanomaterials (ENM) at Finnish workplaces, and the provision of valuable safety information on ENM for enterprises, decision-makers, social partners, the research community, and the public at large. One of the goals of the Centre is to be the leading competence centre on the research of the workplace safety of ENM in Finland and the EU, and to be globally recognized as one of the leaders in this area. The Centre is very well networked with national and global scientific communities. It also has an excellent network with the regulatory and industrial communities in Finland. Other partners include the European Commission, EU Agencies such as the European Chemicals Agency, and employer and employee organizations at the EU level. Partners in the network are also international organizations such as the ISO, the OECD, and WHO. NIOSH, NSF, the NCL/NCI, and the NNCO in the US, the Academy of Sciences and RUSNANO in Russia, the CSIRO in Australia, the NIHS in Japan, the Chinese Academy of Science in China, and relevant research organizations in economies in transition, for example, the NIOH and the CSIR in South Africa also belong to the network. The Centre also collaborates in an advisory role with Finnish and EU funding agencies such as the Finnish Work Environment Fund and the European Commission.

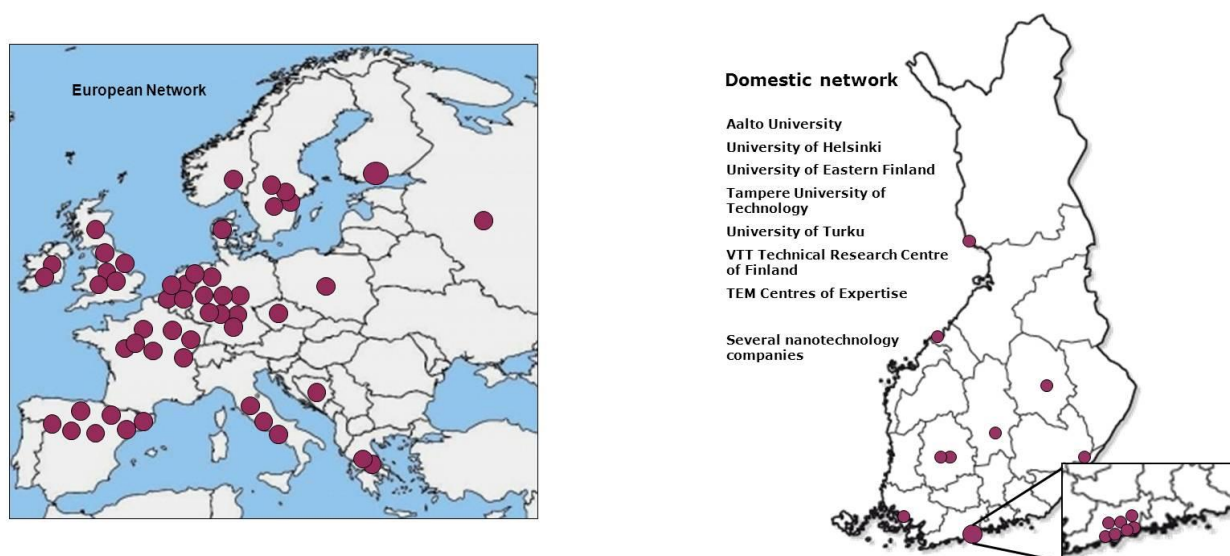


Figure 3.8.1 Networks of the Nanosafety Research Centre

Solutions based on research conducted or digested by the Centre

The solutions include 1) a practical guidance sheet on the safe handling of ENM at workplaces; 2) a practical guidance sheet on the use of collective (e.g. ventilation filters) and personal protective equipment for workplaces using ENM; 3) draft action limit values (target levels) for ambient ENM number concentrations based on the precautionary principle; and 4) risk management guidance for workplaces handling ENM, including sample collection strategies for the assessment of occupational exposure. The Centre has provided safety advice to enterprises on ENM, and capacity building to Finnish social partners, insurance companies in Finland and abroad, and to domestic and EU authorities, including ECHA. Through the research and solutions created by the Centre, FIOH is fulfilling its responsibilities related to the

promotion of nanosafety, as presented in the National Programme on Dangerous Chemicals (Ministry of the Environment, 2013).⁵⁰

Research Topics: maintaining its strategic orientation

The Centre's goals set specific requirements for all research carried out in the Centre. The main goal of the Centre is to have a positive impact on nanosafety, and to create solutions for the safe handling of ENM at workplaces. The goal is also to promote a sustainable nanotechnology industry, and to support a large number of Finnish stakeholders in ENM safety. Additional goals include serving the global research community, regulators and decision-makers in the EU. All applications for funding from the Centre must fulfil the following criteria: 1) the research is in agreement with the strategy of FIOH; 2) the project is relevant to the safety of ENM workplaces; 3) the project is relevant for the main stakeholders of FIOH; 4) the resources are in balance with the requested funding; and 5) the cost/benefit ratio of the project is appropriate. The following section will briefly describe the main research topics of the Centre, and its goals for 2014, also covered by the general goals of the Centre.

Toxicological research

In-depth knowledge regarding ENM immunotoxicity and genotoxicity is crucial in order to evaluate their effects on human health. The *Systems toxicology team (about 51 members - for additional information see Section 3.11 and Appendix X)*, together with collaborating teams at FIOH, has set-up a unique multidisciplinary research environment with the expertise to study the immunotoxic and genotoxic effects of ENM under the umbrella of the Nanosafety Research Centre. Facilities and know-how include:

- 1) *state-of-the-art cellular approaches* in the field of immunotoxicology and genotoxicology,
- 2) *animal experimentation using recent advances in animal models* including the use of gene targeted mice,
- 3) *systems toxicology approaches* including proteomics, transcriptomics, epigenetics and advanced systems biology and bioinformatics methods.

Toxicological research is supported by state-of-the art facilities, including complete laboratories and equipment for immunology and molecular biology, immunopathology, genotoxicology, as well as experimental mouse models with modern inhalation exposure systems with off-line and on-line particle monitors. Selected examples of the toxicological research highlights are given below.

- ***Inhalation exposure to rod-like multiwalled carbon nanotubes (CNT) induces asthma in mice through so far unknown mechanisms.*** Occupationally relevant, short-term inhalation exposure to rod-like CNT, but not tangled CNT, induced novel innate immunity mediated asthma in mice. These observations emphasize the diversity of the ability of different carbon nanotubes to impact health, and should be taken into account in the risk assessment of these materials.
- ***Rod-like CNT and asbestos induce inflammatory reactions through similar mechanisms.*** To identify the underlying mechanisms of CNT-induced inflammation, human primary macrophages were exposed to graded doses of different types of CNT and crocidolite asbestos. Results revealed that rod-like CNT and asbestos induced inflammatory reactions via highly similar mechanisms. Understanding the mechanisms of ENM-induced deleterious health effects is mandatory in the development of their predictive risk assessment.
- ***Joint effects of ENM and industrial chemicals.*** Studies on human immunological cells showed that co-exposure with C₆₀ fullerene may influence the acute cytotoxicity and immunotoxicity of industrial chemicals. Complementary molecular modelling simulations proved that the co-aggregation of organic chemicals with C₆₀ in an aqueous environment is likely to be responsible for the joint biological effects. These results suggest that possible co-exposure scenarios have to be taken into account when workers are protected from nanomaterial exposure.

⁵⁰ IEG2009 recommendations no. 35 and 36

- **Long, rod-like CNT are highly genotoxic in mice subjected to inhalational exposure.** Based on our experiments, it is quite clear that long, rod-like CNT are highly genotoxic in mice subjected to inhalational exposure, whereas other types of CNT are less active. It seems that many of the studied ENM express genotoxic potential, some at high doses only, and that there are large differences between this potential in different materials. Rigid, rod-like CNT in particular seem to express strong genotoxicity. These studies are mandatory for the risk assessment of ENM.

Exposure to ENM

Workers are usually exposed to ENM during their synthesis, production, applications and end of life. In our research projects we have identified methods to assess ENM exposure separately from background particles. These methods have successfully been applied to estimate ENM exposures in different workplaces during the synthesis and handling of ENM. ENM exposure concentrations were used to estimate inhaled dose rates in order to study ENM accumulation in the respiratory system in different exposure scenarios. For predictive ENM exposure assessment and risk control, methods were developed to identify ENM emission sources.

In addition, a state-of-the-art inhalation exposure laboratory has been developed to study the health effects of *in situ* synthesized and commercial ENMs in animals in collaboration with companies producing ENM.

Other activities

Co-ordination of the NanoSafety Cluster (NSC)

The Centre co-ordinates NSC, an organization bringing together all 35 currently running nanosafety research projects with an EU funding of 140 million euros and about 1000 scientists from the EU and beyond. Research in these projects covers all aspects of nanosafety and the NSC connects all leading nanosafety research groups in the EU. The Centre maintains the integrity of the NSC, organizes its meetings, and is responsible for maintaining contacts and disseminating information to and by the NSC. This co-ordination, based on an agreement between FIOH, the NSC and the European Commission, continues until the end of 2015. The Centre also co-ordinated the preparation of the *Nanosafety in Europe 2015-2025: Towards Safe and Sustainable Nanomaterials and Nanotechnology Innovations* book, organized by the NSC. The document was handed to the European Commission representative in Dublin on June 20th, 2013 during the EuroNanoForum event. The goal of the book is to provide contents for nanosafety research in *Horizon 2020*, which is the next EU Research and Innovation funding programme, and will run from 2014 to 2020.

Global Network

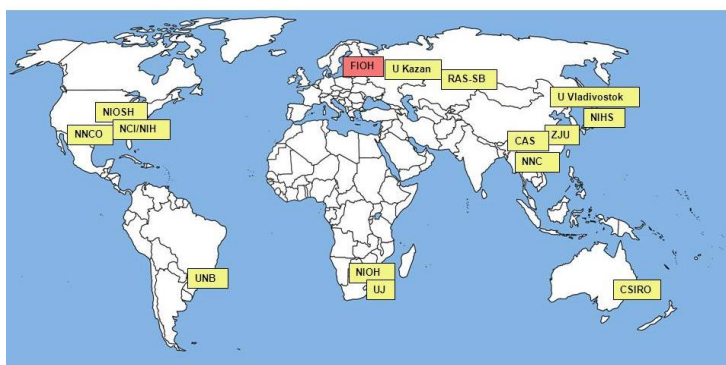


Figure 3.8.2 The NanoSafety Cluster

Participation of the Ministry of Social Affairs and Health in the Nanosafety Network

The Centre has been an active member of the nanosafety network of the Ministry of Social Affairs and Health since the beginning of 2011. The goal of the network is to improve contacts between the ministries of the Finnish Government, and to streamline their activities related to nanosafety. The main activities of the network are regular meetings and the annual organization of one to two national seminars on nanosafety and its regulation. The Centre has been a key player in implementing these activities.

Organizing international congresses on nanosafety

The Centre has organized several congresses on the safety of ENM in Helsinki:

- The NANOEH'2007 congress
- The 4th International Congress of Nanotechnology: Occupational and Environmental Health in 2009
- SENN2012 - International Congress of Safe Engineered Nanomaterials and Nanotechnologies
- The Centre will organize SENN2015 on April 12-15, 2015.

The Centre also organized a joint EU-USA workshop in 2012 in Helsinki. The next joint EU-US workshop was held by the US NNCO and the European Commission in Arlington, VA, on December 2-3, 2013 and the Centre co-ordinated the activities of the EU delegation at the workshop on behalf of the European Commission (DG Research).

Policy Brief to decision-makers

FIOH annually publishes six to ten policy briefs for decision-makers in Finland on topical occupational health and safety issues. They are distributed to 800 key decision-makers in Finland. When an issue is of EU or global interest, such policy briefs are also published in English. During SENN 2012, FIOH published such a policy brief in Finnish and in English with a regular, wide-ranging global distribution, entitled "Safety Research on Nanotechnology is Needed". The brief was also published in Nature Nanotechnology in a dialogue in which the Centre also actively participated.

PEROSH collaboration of the European Institutes of Occupational Safety and Health

In the Nano Exposure and Contextual information Database (NECID) project, a new database will be created for collecting European information on exposure to ENM. The Centre has been actively involved in its establishment and in defining the boundaries of the database.

Coordination of European Research on Industrial Safety (SAFCRA)

SAFCRA (Coordination of European Research on Industrial Safety towards Smart and Sustainable Growth) is an ERA-NET project (2012–2015) funded by the European Commission in the 7th Framework Programme. Under the ERA-NET scheme, it identifies areas of joint interest and expected synergies of collaborative research, and stimulates transnational research on industrial safety, including safety issues related to new technologies. The Centre is the co-ordinator of this European Union key-activity.

EU-Level Risk Assessment in the Scientific Committees of the European Union

Experts of the Centre work as members of the EU Scientific Committees, which have a major impact on European Union legislation and regulations (the Scientific Committee of DG SANCO on Emerging and Newly Identified Health Risks; the Scientific Committee on Consumer Safety; the Scientific Committee on Health and Environmental Risks; and the Scientific Committee on Occupational Exposure Limits, which operates under DG Employment).

Critical success factors

Most of the research collaboration takes place through large research projects with partners from several countries, or organizations in a given country in the EU and beyond. The expertise areas of the Centre include immune- and genotoxicology, cell biology, material characterization, and exposure and risk assessment. The Centre utilizes omics technologies, systems biology, and bioinformatics to develop predictive hazard and risk assessment of ENM to enable sufficient ENM risk assessment resources also in the future. The activity comprises about 50 scientists and 25 person-years.

The main critical success factors of the Centre are a wide-spread and robust understanding of the key-issues in nanosafety research and the implementation of its results. An important factor has also been an informal and discovery/innovation orientated approach towards new challenges, which has obviously been a source of motivation for the scientists formally working for the Centre since the beginning of 2011. As indicated before, the right strategic orientation of all research projects from the outset in 2005 has assured that this mentality has smoothly continued through the current strategy period. The Centre has also systematically developed its new brand as part of FIOH's brand, and this has greatly improved its visibility.

Creativity, networking and the ability to obtain resources from external sources have been crucial for the success of the Centre, and have contributed to the highly positive atmosphere within the Centre. Considerable attention has been given to the willingness of the staff to create their own networks and strengthen existing ones to make the Centre stronger and ready to quickly reach for external and internal needs when required. One of the major goals has also been assuring the personnel's multi- and interdisciplinary set of competences. Key competences now include material sciences, aerosol physics, exposure assessment, occupational hygiene, toxicology (including genotoxicology and immunotoxicology), life and medical sciences, systems biology, omics technologies, bioinformatics, and exposure and risk assessment.

Conclusions and future outlook

The vision and goals of the Nanosafety Research Centre have proven functional, flexible and capable of facing new challenges. They also fully meet the strategic goals of FIOH and hence effectively support its mission. All this has enabled and will enable the Centre to effectively support its main goal – promoting the safe handling of ENM at Finnish workplaces – by using high quality research and expertise supported by extremely effective national and international networking for the benefit of Finnish society. A good example of a successful attempt at impact is the Policy Brief that was distributed both in Finland and globally, and published as part of the nanosafety dialogue in Nature Nanotechnology.

The collaboration of the Centre with relevant Finnish ministries (Social Affairs and Health; Commerce and Employment; Education and Culture), major nanotechnology companies, insurance companies in Finland and abroad, regulatory authorities in Finland and in the EU will be increasingly important in the future for improving the societal impact of the Centre. Research collaboration with universities, governmental research institutes and industry will be an even more important key success factor in the coming years when the Centre co-ordinates, or acts as a partner in large, mainly EU-funded, three- to four-year research projects with a large number of partners. This will lead to even closer collaboration with the European Commission, US NNCO, NIOSH and other important nanosafety research organizations both nationally and internationally.

The Centre continues to develop solutions for workplaces in Finland and beyond with an increasing emphasis on collaboration with both Finnish and international enterprises, domestic workplaces, and workplaces abroad. A major future goal for the Centre is to markedly contribute to the development of a predictive risk assessment of ENM which is affordable, quicker than its present form, but still reliable. This enables both regulators and companies to enjoy the full benefits of safe nanotechnology innovations in safe working environments, as well as safer consumer products. It is expected that in these areas, the Centre will be well recognized both in Finland and globally.

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Statement from the Theme's advisory group

The research carried out by FIOH's Nanosafety Research Centre is of high quality and extremely well networked internationally. The solutions and results of the research have high exploitation potential and the vision of the Centre will remain relevant in the near future.

Nanotechnologies are recognized as important for promoting sustainable growth and environmental-friendly solutions. The use of the life-cycle analysis (LCA) of ENM is one example of the application of these principles in practice for nanotechnologies, because the assessment of LCA is important for assessing the environmental fate of ENM. FIOH has not traditionally considered these issues. FIOH should also consider covering the environmental fate of ENM through LCA by sharing responsibilities with other authorities and organizations

responsible for the environment and human health, while taking the lead role in the implementation of the activities.

The Centre has reached an excellent position in international research collaboration. The quality of its scientific work has provided the Centre with the opportunity to considerably influence the contents of EU research programmes, and has enabled the Centre to reach its goals through national and international partnering with leading research organizations. An important issue in international collaboration is avoiding the duplication of work. Without open information exchange, there is a risk of wasting resources. The European Commission has been a pioneer in reducing overlapping work on nanosafety, and the Centre has also played a highly visible role in this activity.

The visibility and impact of FIOH's activities go clearly beyond the borders of its formal responsibilities. It is important that in addition to current nanosafety research, the whole life-cycle of ENM is also covered. The *Advisory Group* proposes increasing domestic collaboration between the Centre and health and environmental authorities and different stakeholders. We see the potential platform for this collaboration as a joint collaborative group of institutions in the area of health and social sectors (the SOTERKO collaboration) in which FIOH could act as the co-ordinator of a national nanosafety network. Other organizations such as VTT could also be members of this network.

3.9 Social capital, health, and well-being at work (RK 17)

Overview

The focus of the *Theme* is on work-related psychosocial factors, health and well-being. The *Theme* aims at enhancing scientific knowledge and developing operating models for improving the quality of work life and employee well-being at work as well as that of management and leadership. Both quantitative and qualitative research methods are used. Quantitative methods are applied for monitoring the development of the psychosocial work environment and examining the effects of work-related factors on health, the intermediating mechanisms, risk groups, and protective factors in large-scale occupational cohorts. In qualitative research projects, in turn, models, tools, and training programmes are developed together with the end-users, which are workplaces. Project results are published in scientific and non-scientific forms. The number of scientific publications is high (e.g. 89 publications in 2012), and the practical solutions developed are numerous.

International collaboration and networks. International collaboration in the *Theme* is extensive. For instance, the Finnish Public Sector study is active in the ongoing IDEAR (Integrated Datasets across Europe for Ageing Research)⁵¹ collaboration of five cohort studies and in the IPD-WORK (Individual Participant Data Meta-Analysis in Working Populations) consortium, comprising data from 17 European cohort studies. Large research consortia that pool data enable the achievement of more precise estimates of associations between work-related factors and health, and the testing of the generalizability and subgroup differences in the associations to identify vulnerable employee groups.

In the field of positive work psychology research, we collaborate with research groups in the University of Utrecht (concerning interventions and work engagement), The Erasmus University Rotterdam and Eindhoven University of Technology (job crafting), the School of Management of the Erasmus University Rotterdam (servant leadership), and Universitat Jaume I (healthy organization perspective), and the Technology University of Zurich (e.g. sense of coherence).

In the sphere of studying innovation management, international collaboration will be expanded through active participation in the European network involving ten countries, led by the University of Amsterdam with the aim of planning research collaboration for EU's Horizon 2020. In addition to the University of Amsterdam (research on public sector leadership), the network includes Roskilde University (research on service innovations), the University of Lillehammer (research on public innovation), the University of Oxford (research on organizational change), and the University of Bologna (research on education for the elderly and ageing workforce)].

There is also intensive collaboration on the topic of service networks and customer understanding with CNAM (Conservatoire National des Arts et Métiers), the INRA (French National Institute of Agricultural Research), and the University of Oxford, UK.

Solutions

In addition to research publications, the outputs of the theme are operating models, methods and tools for organizational, management and leadership development; books and handbooks.

Books on the development of the psychosocial work environment deal with topics such as the development of the quality of work life and employee well-being in the public sector in the 2000s; working conditions in the social welfare and healthcare sector in 2010 and its progression over two decades; and the key resources that promote work engagement in various occupations, trades and organizations.

⁵¹ IEG2009 recommendation no. 15

Models for management and leadership development

- The *INNO-VOINTI – Leadership for innovation and well-being in the public sector* is a web-based model that provides a practical learning-aid for top management, line managers, employees, and personnel development experts. It comprises best practice cases and tools for innovating and promoting well-being. The model is created for public sector workplaces but can also be modified and applied in third sector organizations and private companies. An instructive *booklet for grassroots innovators* helps in the implementation of the model.
- *The multidisciplinary model for enhancing collaborative innovation* is under construction. The model is based on research that gives new theoretical insights into collaborative innovation processes especially during changes in the social and health care sector and its service development. The model will be used as a practical tool for organizational development by top management, HR experts and line managers. It will also provide a theoretical background for further research and validation of the model.
- *A training programme for Servant Leadership* is being developed and tested. It is based on theories of positive psychology and experiences of successful leadership and targeted at line managers and immediate superiors. The concept of servant leadership refers to people-centred, empowering and engaging leadership whereby leadership is understood as combining the roles of a servant and a leader to better achieve organizational goals and employee well-being simultaneously.
- *Challenging Social Situations* and *Support for Work Ability* are guidebooks targeted particularly at supervisors. The former gives support and displays guidelines for line managers on how to tackle and solve different kinds of social and interpersonal conflict situations. These include examples of irresponsible behaviour that interferes with daily work situations at the workplace and may have negative effects on the well-being and motivation of the members of the work unit. The latter encompasses information and practices for supervisors to promote mental well-being at work and to support work ability.
- *The quality standards for good management and leadership in the public sector* have been published online. They were developed as a part of the Leadership Development Network, set up by the Finnish government. The standards were drawn up through the collaboration of several public sector quarters and players. The first field tests are in progress.

Solutions for developing work communities and organizations

- The *Shared change – wellbeing through developing work* book offers novel tools and methods for managing change and developing work collaboratively at workplaces. The development of innovative new work practices requires apt interpretations of current problems, as well as a new kind of understanding of the emerging challenges. The book is directed at supervisors guiding change processes, but is also a valuable guide for other organizational actors involved in work development and the promotion of well-being.
- Inter-organizational and inter-functional network collaboration is an increasing trend in work life. *A theory-based prototype for investigating the developmental directions and possibilities of service networks*, with a particular emphasis on customer understanding, is under development. Based on the prototype, a practical tool will later be developed for use by HR staff.
- *A development process of job crafting (2013–2015)* in order to better exploit the initiative of employees, work engagement and willingness to develop one's work is under development. In addition, a mobile application to activate and support the process is in progress. To support the work engagement, innovativeness and inspiration of teams, a resource-driven development process called "*Flourishing work teams*" is being developed and evaluated.
- *Succeed in Renewing Competences - a self-evaluation model for work organizations*, provides workplaces (line managers, HR development experts) with a concrete tool for assessing whether employee-driven methods and the gender perspective in particular are utilized adequately in companies' formal competence development policies and practices. The model helps workplaces co-ordinate and match formal development activities more effectively with workplace learning activities of daily life.

- The "*Healthier entrepreneur – Healthier Enterprise*" materials and model will support entrepreneurs' and micro-scale enterprises' own activeness in taking care of their health and work environment. Entrepreneur's well-being is also in the interest of intermediaries (e.g. accounting firms, banks, enterprise associations), and the model encourages them to be "health messengers" for their customer entrepreneurs. This innovative approach will benefit not only the well-being of entrepreneurs but also intermediaries nationwide.
- *Joint action on mental health and well-being*. FIOH takes part in a European collaborative project to draw up recommendations on mental health promotion at workplaces. Good practices in the promotion of mental health at work and the prevention of mental disorders and work are collected from experts, practitioners, and workplaces in order to draw up recommendations concerning mental health promotion at workplaces.
- Knowledge, best practices, guidelines and recommendations in order to decrease *workplace bullying and harassment* will be collected into an extensive database and published on FIOH's website. The website will include, for example, information on the antecedents and consequences of workplace bullying, legislation on harassment and inappropriate behaviour, information on the roles, responsibilities and rights of different actors, and advice to those targeted, observers, supervisors, and worker representatives.
- *Fluent Implementation of ICT – practical recommendations*: From the perspective of supervisors in social and health care services, adapting information technology for work poses many challenges and needs for development, in addition to its many benefits. The recommendations contain a general list of the key development issues from the perspective of supervisors in applying ICT. They also contain principles for the implementation of successful IT-related changes at workplace.

Research Topics

The trends of work life quality as regards the psychosocial work environment are followed up in three occupational studies: (1) as of 1997/98, all employees in ten municipalities and six hospital districts have been targeted with biannual surveys, involving 20% of the public sector employees in Finland; (2) nationally representative cross-sectional surveys in health care and social services in 1992, 1999, 2005, and 2010 thus far; and (3) a longitudinal study in 2011 and 2014 (non-randomized sample of Finnish workplaces) of various occupations, trades and organizations related to long-term key resources and strengths at work

Associations between psychosocial work-related factors and health, work ability and continuation at work

- *The Finnish Public Sector study's (1998–2020)* specific objectives are: to examine the effect of change⁵² in and cumulative exposure to work-related psychosocial factors (e.g. work stress and workplace social capital) on multiple health outcomes, such as morbidity, mortality, early retirement and work disability; to identify vulnerable socioeconomic and occupational groups; to examine the behavioural, biological, social and psychological mechanisms linking psychosocial factors and health; to determine the status of stress as a disease trigger focusing on the timing of stressful events; and to evaluate the outcomes of primary and secondary preventive measures on the basis of observational data.
- *School environment as a determinant of teachers' well-being (2009–2012)*: The student- and school environment-related determinants of health, well-being and turnover of school teachers in Finnish comprehensive schools and upper secondary schools have been studied. For example, pupil-related psychosocial risk factors and lack of teacher resources at school were examined as risk factors for teacher sick leave, and the socioeconomic school setting was studied as a risk factor for lack of commitment and turnover among teachers. In addition, teacher subgroups at a high risk of violence and sick leave were investigated.

⁵² IEG2009 recommendation no. 27

- *Occupational burnout and health (2009-2013)*⁵³: The association between burnout, health and work ability as well as the mechanisms in these associations have been studied in the research collaboration between different FIOH teams, the National Institute for Health and Welfare, and the University of Helsinki. Burnout has been shown to predict health problems, such as severe injuries, hospitalization and mortality, and to increase the risk for disability pension. The studies have also analysed the health behaviours, cellular level changes (leucocyte telomeres), and molecular genetic background that are related to burnout.

Research related to the development of organizations and leadership

- New responses and innovations are required in the public sector, and employees and consumers, largely neglected up to present, must be directly engaged and their expertise and ideas utilized. The *INNO-VOINTI – Leadership for innovation and well-being in the public sector project (2010-2013)* explored how public sector managers and employees cope with innovation challenges. It aimed to support employee-driven innovation management practices that promote well-being in the public sector. Future research on this topic will bring together European scientists and public sector organizations for cross-sector and cross-organizational knowledge building and sharing about how employee engagement and leadership development can influence innovative capacity in the public sector. By linking local initiatives to international research collaboration, the topic opens up currently underutilized opportunities and sets a new research agenda.
- The *Collaborative Innovation and Advancing Its Management (2012–2014)* project provides new insights into collaborative innovation management and how collaborative innovations can be supported in health care and social services. The focus is on searching for new methods for managing and leading collaborative innovation processes that enable more active participation of personnel, clients and service providers. The research consortium aims to develop a multiscientific and multiperspective partnership network that pursues the enhancement of new practical methods and theoretical contribution to the collaborative innovation process.
- *Possibilities of Information Technology in Practical Management and Supervisory Work in Social Work and Health Care (2009–2012)*: The role of information technology in the production of health care and social services has increased. It is seen as a tool for responding to challenges regarding the availability of the workforce, the increase in the need for services, the increase in the workforce and treatment expenses, and the reduction in public finances. The project charted the use of information technology in supervisory work as well as the impressions of supervisors of the benefits, drawbacks and strains related to information technology in management and supervisory work. In addition, the experiences of changes related to the advent of technology in supervisory work were studied.
- The *Organizational resources predicting employee well-being and performance project (2013-2014)* identifies leadership and management practices that promote both employee well-being and performance. The project reviews international scientific literature on causal relationships between task, social and organizational resources and employee well-being and performance. In addition, workshops are conducted in Nordic countries in which organizational representatives and social partners comment on the results of the literature and suggest interventions that may promote employee health and well-being.
- *Succeed in Renewing Competences (2009-2011)*: Future research on competence development calls for a longer-term perspective to future challenges, such as responding to the increasing dominance of service in production. Recognition of the existence and importance of gender, and support for women's (and other minorities') competence and careers serve companies' renewing capacity and competitiveness. Organization culture does not change on its own and over time, but requires active measures and practices that take gender into account.
- The *Kohaus* project produces new knowledge and insights into *customer understanding and well-being and tools for customer-orientated collaboration in the context of evolving*

⁵³ IEG2009 recommendation no. 5

service networks. Customer understanding, institutional practices and common tools mediate and shape network collaboration. Network collaboration both challenges and supports work-related well-being. The project has also tested some developmental customer-orientated methods to promote network collaboration. The *Kohaus* project integrates theories of social forms of collaboration, theories of activity concepts and theoretic-genetic generalization at the network level in its model building.

- The aim of the first stage of the *Spiral of Inspiration (2011–2012)* project was to identify, in the spirit of positive work and organizational psychology, the key resources and strengths of Finnish workplaces. In the second stage (2013–2015), best practices and key resources for promoting employee and organizational flourishing are identified by a qualitative study. In addition, the effectiveness of three positive interventions targeted at developing servant leadership, employee job-crafting (a form of self-leadership), and team-level engagement and innovativeness are studied. In addition, the role of servant leadership in individual and group level job crafting and work engagement is examined by a longitudinal study. Influential theories in positive work psychology, such as the conservation of resources theory and the job demands-resources model have been rigorously tested and further refined in longitudinal studies.
- The *Harmonic Work Community* project promotes zero tolerance of workplace bullying and an organizational culture that genuinely refuses to accept it in organizations by implementing interventions at all organizational levels.
- Flourishing entrepreneurship, successful enterprises and society as a whole needs healthy entrepreneurs. Information regarding entrepreneurs' work ability, health, well-being at work and the means to support these are collected by a nationwide quantitative survey.
- A collaborative project in four Nordic countries (2013–2015) will produce new knowledge regarding *how factors concerning the implementation of workplace health promotion relate to the programme's effects*, i.e. changes in employees' health and well-being. The purpose of the project is to integrate process and outcome data on workplace health-promotion interventions to study the significance of various implementation components for the intervention results. The process measures include questionnaire items on employees' experiences of the implementation process, such as leaders' commitment and actions, participation, facilitation, exposure and readiness for change. The programme effects are evaluated through employee self-ratings of stress, health, sick presenteeism, and sick leave.

Other Activities

The *Theme* is responsible for conducting a sub-programme of the *National Development Programme for Social Welfare and Health Care (Kaste 2013–2015)*. FIOH was charged by the Ministry of Social Affairs and Health with carrying out this sub-programme, which is related to supporting the service structure and well-being at work.

The *Theme* is also actively involved in the operations of the *Leadership Development Network* (e.g. the above-mentioned Quality Standards of Management).

Conclusions and future outlook

For the most part, the *Theme* has successfully reached its goals: we have added to the knowledge regarding the associations between work-related psychosocial factors and health and work ability, and the models developed during the course of the research projects are in use in organizations. The next step is to increase implementation research in order to measure the effects of developmental interventions.

The focuses of the *Theme* are current and will remain relevant in coming years. The *Theme's Advisory Group* also came to this conclusion. Developing well-being at work is a long-term process that requires resources and the commitment of management. Because of the insufficiency of public financial resources, this development must be founded on scientific knowledge regarding the factors that encourage employees to remain at work. The *Theme's*

researchers have strong competence in both quantitative and qualitative methods, which enables a diverse approach to the research questions.

The Finnish Public Sector study is a good example of high-quality quantitative research: wide international networks and research collaboration with top researchers in the field along with long-term partnership with the target organizations in the public sector.

Competence in combining R&D is particularly strong in the field of organizations, work and leadership development. In the qualitative studies, research and development are connected in, for example, the form of research-assisted development, developmental work research or action research. Our pioneer research in the field of positive work psychology has advanced both theory and the empirical evidence concerning the impacts of job resources and work engagement on positive organizational outcomes and employee health and quality of life. One of the *Theme's* objectives is to more effectively combine the quantitative and qualitative approach in 2014 and 2015. The aim is to better utilize the high-resolution data of the Finnish Public Sector study by exploiting the data in the intervention studies of organizations and work communities development⁵⁴.

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Statement from the Theme's advisory group

The vision statement and aims of the *Theme* were considered clear and topical, and the projects relevant to work life development. The created solutions were considerably topical and relevant and the conducted research was of a high level. The R&D perspective, that is, both the quantitative research and the developmental work in the *Theme* profile, makes the *Theme* strong and impressive. Moreover, the research is not restricted to risk factors, such as work stress, but also employs the approach of positive work psychology and job resources, which will also be important in the future. The solutions and research results had excellent implementation potential. However the methods of implementation need to be further

developed. In sum, the *Advisory Group* highlights the need to continue the funding of the *Theme*. Recommendations for future development are: efficiency and effectiveness could be enhanced by combining the best parts of different approaches and increasing the dialogue between them; further studies and developmental work for the acute needs of organizations; and more attention to the middle ground of public and private sectors and their hybrids. It is also recommended that the connection between the *Theme* and National Working Life Development Strategy to 2020 (Työelämä2020) could be even stronger because the topics in the focus of the National Strategy – for example, innovations, trust, co-work, competence – are also essential to the *Theme*.

3.10 Disability Prevention Centre (RK18)

Overview

A major national goal in Finland is to increase work participation. While some positive development can be seen, for example, the increase in the average age of retirement from 60.4 years in 2010 to 60.9 years in 2012, the average age of disability retirement has been as low as 52 for several years. Sustainability of the Western welfare society requires increased work participation at all stages of the working career.

According to preliminary results from the Health 2011 Study, the health and functional capacity of Finns – especially of those middle aged and older – have mainly shown a favourable development during the first decade of the second millennium. Despite this, work disability – associated in particular with musculoskeletal and mental disorders – remains at a relatively high level in Finland as well as elsewhere in Europe. Work disability related to these two common public health problems is typically partial, and people have a remarkable amount of remaining work capacity. However, this potential has not been adequately utilized in work life. Benefitting further from partial work ability at workplaces requires changes in attitudes at workplaces, in OHS, and in society.

The Disability Prevention Centre aims to contribute to the national goal of extending working careers and increasing work participation by

- Tackling the causes of work disability
- Enhancing return to work and increasing the effectiveness of vocational rehabilitation
- Studying the efficacy and effectiveness of solutions targeted at work or the worker which can assist in utilizing remaining work capacity

OHS activities in Finland are currently being developed to focus more on the prevention of work disability, in addition to preventing ill-health. The research activities of the Disability Prevention Centre support this development, and a number of the Centre's studies are carried out in the OHS setting.

The main activity of the Centre is to produce evidence through scientific research as a firm basis for the prevention of disability at workplaces, in OHS, and nationally, for the development of social security legislation. Special emphasis has been placed on applying sophisticated study designs and analytical methods to achieve a high international quality and impact. Study settings include workplaces, nationally representative population samples and register-based data, as well as international population samples and multicentre studies. Research is carried out in wide national and international collaboration. The main external funders are the Academy of Finland, the Finnish Work Environment Fund, the Social Insurance Institution of Finland (Kela), the Fire and Rescue Work Safety Fund, the State Treasury, and some other funds.

Solutions

Intervention research to enhance return to work (RTW)

Intervention research is a central focus of the Centre's activities. The main target of the current intervention studies is the prevention of work disability and the enhancement of sustainable return to work (RTW). With a long tradition of interventions to prevent

musculoskeletal disorders and associated disability, the current studies also focus on mental health problems⁵⁵ and indoor air problems. The extent and type of the measures of the interventions depend on the duration of disability: at an early stage, simple interventions, for example, workplace modifications, are applied, since more extensive interventions are not likely to be cost-effective. At later stages of disability, more complex measures are necessary for an intervention to be effective. Most of the intervention studies of the Centre apply a randomized controlled design; however when randomization is not ethically possible (e.g. when the intervention involves prescription of sickness absence), the Centre adopts other designs.

Interventions at an early stage of disability

A randomized trial was carried out among workers with incipient upper extremity symptoms in collaboration with the OHS of three large enterprises. The results showed that the intervention – consisting of physician contact with the supervisor to discuss work modifications, workplace visits by an occupational physical therapist and ergonomic modifications – was effective in reducing sickness absence during a follow-up of one year (Shiri 2011). The proportion of participants with production loss showed a marked decrease at two months, and this effect could be seen for up to one year (Martimo 2010)⁵⁶.

Another randomized trial among participants with early stage (≤ 2 weeks) work disability due to musculoskeletal disorders (unable to perform regular duties, but able to perform some duties) showed that staying at work part-time compared with full sickness absence enhanced sustainable return to work without compromising recovery. During the entire follow-up year, the proportion of sickness absence days remained lower in the partial sick leave group (Viikari-Juntura 2012, Shiri 2013^b).

A new large-scale intervention project will look at the effects of temporary work modifications on sickness absence, work ability and health at an early stage of disability due to musculoskeletal pain or depressive symptoms⁵⁷. An ongoing case study will look at the processes and the return on investment of a collaborative work disability management activity by the top- and mid-level leadership and OHS of a communal enterprise.

Interventions at a later stage of disability

In a randomized controlled trial among workers in the forestry industry, employees with subacute low back pain (LBP) were randomized into progressive back-specific exercises, multidisciplinary rehabilitation, and self-care. The active interventions had modest effects on disability and pain-related fear as well as sickness absence during a follow-up of four years (Rantonen 2012). Within the same study setting, another subcohort with mild symptoms was randomized to receive a booklet of back information or booklet with additional information by the occupational health nurse. No differences were seen in this latter trial (Rantonen 2013).

An ongoing randomized study will look at the efficacy of different therapies carried out in multidisciplinary collaboration on various symptoms related to indoor air problems. A rehabilitation model will be developed in this project for maintaining and improving work and functional ability.

⁵⁵ IEG2009 recommendation no. 5

⁵⁶ IEG2009 recommendation no. 15

⁵⁷ IEG2009 recommendation no. 5

The Centre's research topics

1. Legislative changes aimed at enhancing return to work: effects on sickness absence, disability retirement and work participation

To achieve the national goal of longer working careers and higher work participation, several changes have been made to the social security legislation of Finland. In 2007, partial sick leave was introduced as an alternative to full-time sickness absence in cases of long-term sickness absence (of at least 60 days) in which the medical condition prevents return to regular duties, but the employee could cope with part-time work without compromising recovery. In 2010, the use of the benefit was made possible after only 10 days of sickness absence.

Researchers currently belonging to the Centre previously carried out a literature review on the use, feasibility and effects of partial sick leave in the Nordic countries. The Centre continued this by carrying out nationwide register-based studies in collaboration with the Social Insurance Institution of Finland (Kela) and the Finnish Centre for Pensions on the effectiveness of the use of partial sick leave. The users of partial sickness benefit were compared with full sickness benefit users. The results showed a slight increase in sickness absence days immediately following the sick leave period in the partial sick leave group; however, the differences levelled off during the remaining follow-up time of 1.5 years (Kausto 2010). Another analysis using propensity score matching showed that the use of partial sick leave reduced the absolute risk of full disability pensions by 6% and increased the absolute risk of partial disability pensions by 8%. This effect could be seen in cases of both musculoskeletal diseases and mental disorders, but not in cases of traumas or tumours. Although there was an increase in partial disability pensions, the fact that over 60% of people with partial disability pension work part-time suggests that the overall effect was an increase in work participation (Kausto 2012). A later difference in differential analysis with additional register data supports a major enhancement of work participation after partial sick leave (Kausto, submitted).

Another more recent legislative change in Finland – launched in June 2012 – is the obligation of an employer to inform OHS of all sickness absence periods exceeding 30 days. At the same time, the eligibility requirements for prolonged sickness benefit were also amended. Despite the fact that any licensed physician can assess work disability and issue related certificates, the Social Insurance Institution of Finland (Kela), which grants sickness benefits, requires an assessment made by an occupational health physician if the disability persists for over 90 compensated days. The aim of this change is to assess not only work disability but also remaining work ability, as well as to negotiate potential work modifications and other rehabilitation options with the employer in order to prevent unnecessary prolongation of absence from work.

The Centre will assess the effects of the legislative changes mentioned above on sustained RTW and their costs and benefits in 2013–2017 (Viikari-Juntura et al.)⁵⁸. Furthermore, we will explore whether the effects can be seen in different parts of Finland, across industrial sectors, in public and private enterprises, and in major diagnostic categories. This work will be carried out in collaboration with the Social Insurance Institution (Kela), the Finnish Centre for Pensions, the Erasmus Medical Center within the University of Rotterdam in the Netherlands, and the Institute of Work and Health in Toronto, Canada.

⁵⁸ IEG2009 recommendation no. 26

2. At work with chronic diseases

In a five-year project initiated in late 2012, we examine the **associations of work-related factors with chronic diseases**, with special focus on common diseases with a great public health relevance, such as depression⁵⁹, type 2 diabetes (T2D), cardiovascular diseases, and alcohol problems. In one study, we carried out a systematic review and meta-analysis on job insecurity and incident coronary heart disease (CHD), including 17 study cohorts from Europe and the US. Job insecurity was associated with a 19% increase in CHD, which however, was partly due to a more adverse baseline CHD risk profile among employees reporting job insecurity (Virtanen 2012). In a study among Finnish public sector employees, we found that the onset, return to work, and recurrence of disability due to depression were all strongly associated with socioeconomic status; a better prognosis was observed among employees with a high socioeconomic status (Ervasti 2013). In another Finnish public sector employee study, we examined the predictors of sustained employment beyond the pensionable age among old-age, non-disabled employees. We found a greater effect of control over working time on extended employment than that observed for the presence of any chronic diseases or symptoms of ill health (Virtanen, conditionally accepted). In a study based on almost 19 000 Finnish twin individuals and a 23-year follow-up, sleep quality and changes in sleep quality appeared to be early predictors of disability pension due to low back diagnoses independent of other confounding factors (Ropponen et al. 2013).

A large consortium (MSDs@Lifecourse Consortium) co-ordinated by the Centre was completed during the two first years of the Centre's activity. Within the "Responding to Public Health Challenges" research programme (SALVE), funded by the Academy of Finland, the **"Musculoskeletal disorders in a life-course approach: Effects of work exposures, lifestyle, and genetic factors"** project looked specifically at the common risk factors of musculoskeletal and cardiovascular diseases. Three population-based cohorts served as study material: the Young Finns Study, the Health 2000 and the Health 2011 Studies and the 1966 Northern Finland Birth Cohort. We found that obesity and lack of physical activity both predicted the risk of lumbar radicular pain, and that moderate physical activity was protective against LBP (Shiri 2013^c). A follow-up of the 1966 Birth Cohort showed that women who had been overweight at the age of 14 and men who smoked at the same age were at an increased risk of hospitalization due to low back disorders (Rivinoja 2011). Physical workloads showed an association with incident LBP already in adolescence (Mikkonen 2012). We further found that low childhood socioeconomic position was associated with lumbar radicular pain and sciatica in adult age, and stable lower socio-economic position and downward mobility were associated with lumbar radicular pain (Lallukka 2013). Associations of overweight and obesity with lumbar radicular pain and sciatica were also confirmed by meta-analyses (Shiri, Am J Epidemiol, in press).

In studies on **genetic factors in low back disorders**, we have systematically gathered and evaluated genetic association studies on lumbar disc degeneration. This was done through international collaboration. Our review showed that existing associations were predominantly weak or moderate, and called for large population-based studies (Eskola 2012). A genome-wide association study (GWAS) on sciatica was performed utilizing genome-wide genotyping scans available from two large Finnish populations (n~2500 in Young Finns Study and n~2200 in Health 2000). GWASes were first carried out in these two discovery populations and the results were then combined into a meta-analysis. Preliminary results indicate several novel genomic regions that are involved in central cellular signalling pathways and call for further investigations (manuscript in progress).

⁵⁹ IEG2009 recommendation no. 5

During the course of the Consortium studies, we developed and validated a **job exposure matrix for physical workloads** (Solovieva 2012), and the validation of a **matrix for psychosocial exposures** is underway (manuscript in preparation). The aim is to apply these matrices in large-scale epidemiological studies, in which occupational information is available but data on occupational exposures are lacking. They will also be tested for use in practice in considerations of job replacement and vocational rehabilitation.

A systematic review found associations between **long working hours, working overtime, and weight gain**, especially among men (Solovieva 2013). As part of another large consortium within the SALVE programme "Lifestyle interventions to prevent type 2 diabetes: translating research into clinical practice", we introduced and tested the feasibility of a method for identifying workers with an increased risk of T2D in OHS. Based on the baseline results, former male shift workers had a higher, and current two-shift workers and night-shift workers a marginally higher prevalence of the metabolic syndrome than those who had never worked in shifts (Puttonen 2012). Moreover, two- and three-shift work was associated with elevated levels of markers of inflammation (Puttonen 2011). The new health check-up process was found to be effective in identifying workers with an increased risk of T2D (Viitasalo 2012). A lifestyle intervention by OHS showed beneficial effects, especially among men at high risk of T2D (manuscript in preparation).

In order to improve the working hours in the public sector in Finland, we have developed a **methodology to store and evaluate the relevant characteristics of the pay roll-based objective working hours in the public sector**. The method was embedded into the shift planning software (Titania) used in the whole Finnish public sector. The working hour data of all the organizations since 2008 will be linked to the current Finnish Public Sector (FPS) study to investigate the effectiveness of the new shift scheduling tool, as well as to study the health effects of some past and future natural interventions in working hours. These interventions include the FIOH-launched "Working time autonomy" and "Shift ergonomics" models that are widespread in the public sector. In 2011, FIOH was awarded by the main social partners ("Round Table of Productivity") for its long term effective work for the development and distribution of "healthy" working hour models in Finland.⁶⁰

Several population-based studies have shown that most subjects with pain report it in more than one body site. **Multisite pain** has a negative impact on work ability. In a seven-year register-based follow-up of the Health 2000 Survey, we found that the probability of belonging to a group with a high occurrence of long sickness absence increased with the number of pain sites (Haukka 2013). The independent effect of multisite pain was stronger than that of other predictors such as ageing, clinical musculoskeletal and other somatic disorders, mental health problems, physical workload, low job control, poor sleep, or obesity. Similarly, among female kitchen workers, multisite pain predicted membership of trajectories of intermediate and, in particular, high occurrence of sickness absences due to musculoskeletal pain during two years of follow-up, adjusted for age, musculoskeletal diseases, depressive symptoms, overweight/obesity, and smoking (Haukka, Scand J Work Environ Health, in press). Evaluating multisite pain may offer a means for OHS to identify an employee group with a pronounced need for support for their work ability. Although the risk factors of multisite pain are insufficiently known, we did find that high physical workload, poor psychosocial working conditions, obesity, and low leisure-time physical activity predicted an increased occurrence of multisite pain among kitchen workers (Haukka 2012). The relationship between psychosocial factors at work and multisite pain seems strong and reciprocal (Haukka 2011). In another study using the Health 2000 population, we found that depressive symptoms and musculoskeletal pain potentiated each other's adverse effects on physical work ability and individuals' thoughts of early retirement (Shiri 2013^a)

⁶⁰ IEG2009 recommendation no. 33

In a 13-year longitudinal study on the **functional and work capacity of firefighters**, a low level of physical activity and regular smoking predicted a decline in aerobic capacity (Punakallio 2012). The latter in turn predicted an increase in arterial stiffness (Lindholm 2012). Work engagement and a healthy lifestyle were associated with good work ability (Airila 2012).

Other activities

In addition to scientific articles, seminars and congress presentations, the new research results have been disseminated in Finnish to occupational health professionals through several articles in professional journals, to workplaces through widely distributed specific journals on work life and occupational health, and to decision-makers through specific *Policy Briefs* launched recently as a new online communication concept by FIOH, and to the general public via press releases. The researchers of the Centre have participated in the evidence-based "Current Care Guidelines" developed by the Finnish Medical Society Duodecim, with a total of four guidelines completed or underway during the activity period of the Centre. Firefit – an assessment and feedback tool developed by FIOH for the functional capacity of fire and rescue workers has been widely adopted in Finland. Courses on its use have been well attended.

To widely distribute information about its activities, the Centre has a website in Finnish and in English, and is also responsible for the specific webpages on musculoskeletal disorders. The Finnish webpages contain descriptions of all projects and links to publications and press releases. They also contain information about seminars and their presentations, organized annually by the Centre. The experts of the Centre lecture actively at courses given to OHS and other health professionals, and to representatives from workplaces and HR personnel. They are often invited to act as experts by the Ministry of Social Affairs and Health and by the Parliament.

As active members of the international scientific community of the field, the Centre's researchers have participated in the organization of international scientific congresses and courses. For example, the Centre organized an international course "Musculoskeletal disorders - risk factors and solutions at work" with the Nordic Institute of Advanced Training (NIVA) in 2011, and several special seminars in international conferences such as that of ICOH in 2012 and *Work, Well-being and Wealth* in 2013. The Centre's senior researchers have given several invited keynote presentations in international conferences.

Conclusions and future outlook

The Disability Prevention Centre has generated a great deal of new research-based evidence on the efficacy and effectiveness of measures to prevent work disability related to major public health problems. External research funding achieved mostly by the senior researchers of the Centre has increased considerably since the first years of the Centre's existence, and has reached a stable level for the next three to four years.

In order to ensure the high quality and timeliness of the research carried out at the Centre, special attention has been paid to up-to-date research methods. The effects of the solutions at the workplace or OHS level have typically been looked at utilizing randomized controlled trials. Population level interventions, such as changes in the social security legislation, have been looked at with quasi-experimental designs in either register data or register data combined with questionnaire survey data. A shift of study designs from observational to experimental and quasi-experimental, and the adoption of appropriate analytical methods have been necessary to achieve the goals of the Centre. Observational studies are continued in selected research areas to discover new tools for prevention. Furthermore, qualitative methodology is

used to foster the development of new solutions and practical methods for disability prevention to be applied at workplaces and in OHS.

The research results of the Centre support the significance of active approaches towards disability prevention, including early return to work. In discussions with policy-makers, representatives of employees, employers and OHS, as well as in more structured interviews related to an ongoing workplace intervention study, we have seen that the new knowledge regarding the possibilities for disability prevention has been received in a way that is likely to change attitudes. This can be considered a first step to the improved implementation of this new knowledge and is expected to lead to novel, practical, evidence-based solutions in the future.

Disability Prevention Centre: Future Outlook

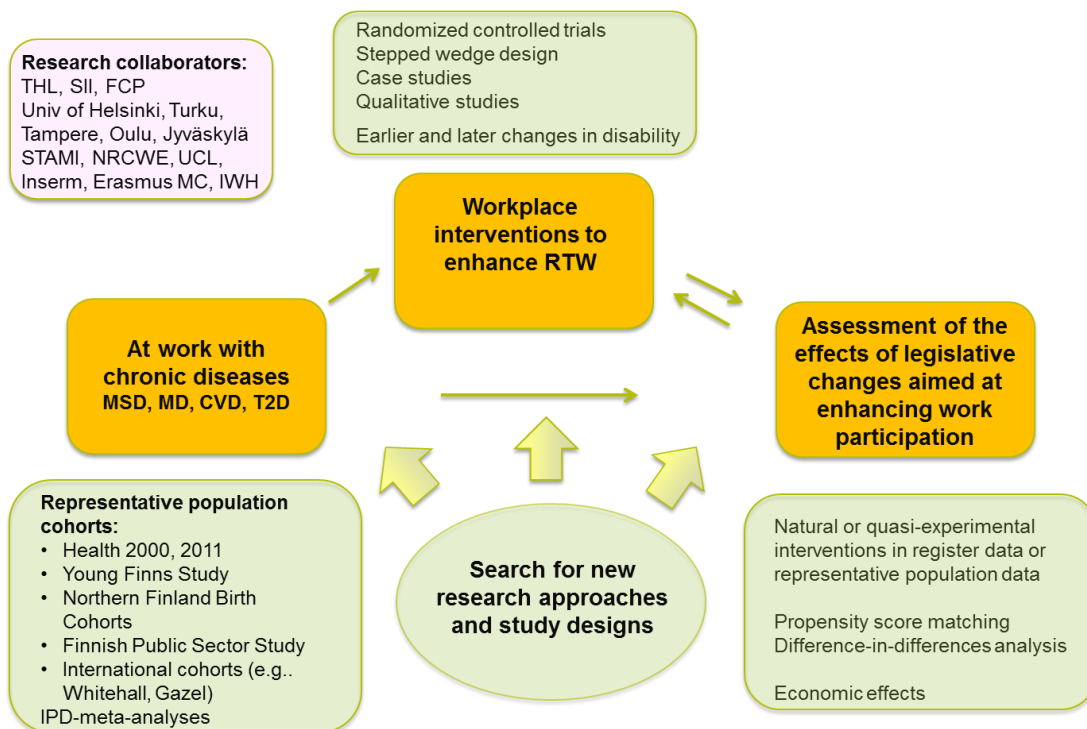


Figure 3.10.1 Compilation of future research areas for the Disability Prevention Centre with new research approaches and study designs

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Statement from the Theme's advisory group

In general, the *Advisory Group* considered the vision of the Disability Prevention Centre up-to-date, and that the goals have been very well set to meet the needs of societal decision-making. The activities of the Centre clearly reflect the shift of FIOH's research paradigm, aiming to produce solutions. The solutions and research topics are central for the enhancement of work retention and the extension of working careers. They form a balanced entity, in which actual questions have been looked at from various points of view. The Panel also concluded that the Centre's researchers are experts in their field.

The Centre uses previous research results as a basis in the planning of new studies. This has resulted, on the one hand, in deeper knowledge regarding selected research questions and, on the other hand, the designing of new intervention studies. The latter have produced knowledge regarding implementation and initiated good practices in the field. However, it remains a challenge to implement all new knowledge into the current practices of occupational and other health services as well as those at workplaces.

The studies on partial sick leave are important for workplaces and the *Advisory Group* encourages the Centre to continue research related to the better utilization of partial work ability. The *Advisory Group* emphasized the importance of focusing research on the early stages of disability and of the replacement of the current practice of "train and place" with "place and train". Rehabilitation could take a more prominent position among the Centre's projects. Furthermore, work ability, work participation and the unemployment of older

workers, and the maintenance of work disability prevention through the future reformation of the health services were considered important. The research of the Centre has served well the needs of decision-makers and the development of social security legislation in Finland.

3.11 Reformative, future-orientated research⁶¹

3.11.1 Development and validation of biomedical research methodology (Biomedicine-associated research)

Biomedicine-associated reformative, future-orientated research (RFR) focuses on the development and utilization of cutting-edge technologies and approaches in the field of biomedical research. This supports strategic research at FIOH. RFR focuses particularly on the utilization and development of systems toxicology approaches including various omics methodologies and advanced bioinformatics and systems biology. An important strategic decision is to facilitate the development of predictive toxicology over conventional descriptive toxicology.

Due to the strong methodological orientation of biomedical-associated RFR, it has been strategically agreed that these projects have more scientific freedom than the *Themes*' projects, which are formed to generate more practical solutions for work life. **The purpose of biomedicine-associated RFR is to provide systems biology tools for creating information for the evidence-based solutions of the *Themes*.** Moreover, all RFR projects have a clear impact on FIOH's mission, as they deal with important work-related diseases (e.g. musculoskeletal diseases and allergies) or utilize highly relevant occupational cohorts to investigate social and occupational influences on health and illness (e.g. the Whitehall II cohort).

Research infrastructure

The *Systems Toxicology team* was established in January 2013 by merging two biomedicine-related research teams (the *Immunotoxicology team* and the *Mechanisms of work-related diseases team*) and one research group (Genotoxicology). The team (51 members) consists of 24 permanent workers and 27 project employees.

On the basis of its historical background, research in the *Systems Toxicology team* can be roughly divided into three large areas: **1) Immunotoxicological research**, including studies on allergy and asthma, microbe-host interaction, damp building related illnesses and the inflammatory effects of nanomaterials; **2) Genetic studies** including studies on molecular biomarkers and genetic susceptibility associated with musculoskeletal diseases, non-malignant pulmonary diseases (asthma, COPD) and asbestos-induced diseases; **3) Genotoxicology research**, including studies of occupational genotoxicants and carcinogens especially in the field of nanosafety research. In addition, **the pathology laboratory** is directly involved in the clinical diagnosis of occupational diseases in addition to its research activities in damp building related illnesses and the molecular biology of tumours.

Importantly, **systems biology and systems toxicology approaches** (e.g. proteomics, transcriptomics, epigenetics, metagenomics) form the core of biomedicine-associated RFR. The integration of the team's expertise structure with RFR and the *Themes* are presented in the figure below.

⁶¹ IEG2009 recommendation no. 22

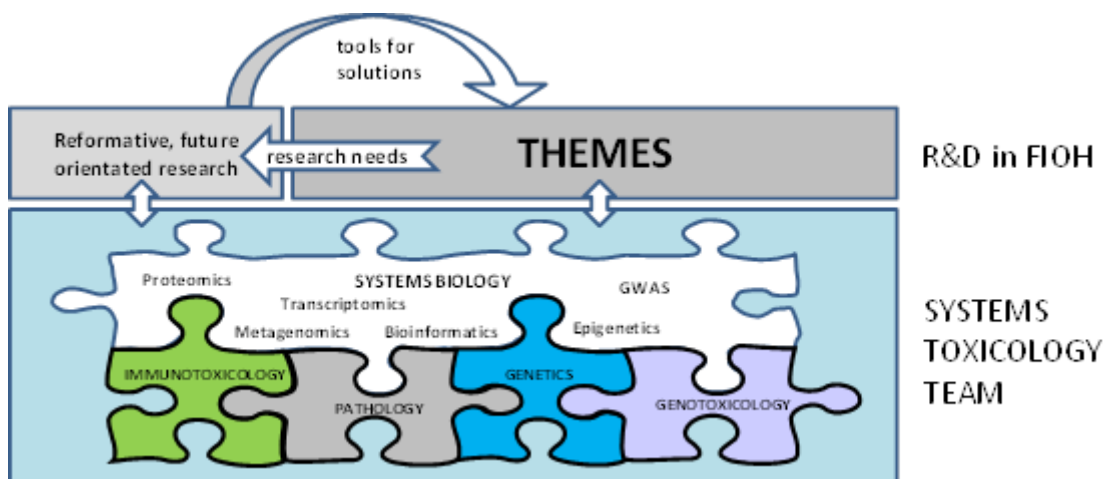


Figure 3.11.1.1 Reformative, future-orientated research

Scientific impact and research collaboration

The team members have obtained about **5 776 153€ of external competitive funding for systems biology orientated research from 2011 to present**. Of this sum, 2 254 153€ is directed to biomedicine-associated reformative, future-orientated research and about 3 522 000€ to research in the *Themes*.

The research groups currently belonging to the *Systems Toxicology team* have published **128 peer-reviewed publications altogether during the follow-up period (2009-present)**. **The average IF of the journals in which the publications appeared was 4.94** (6 publications had an IF of > 10 and 41 had an IF of 5–10). A total of 118 articles published in 2009 and later have been cited 1339 times (ISI Web of Knowledge) altogether. One of these articles has been cited more than 100 times and six articles more than 50 times. The H-index is 21.

Biomedicine-associated future-orientated research relies on a wide network of collaborators both nationally and internationally. For the multidisciplinary nature of their projects, the researchers of the team actively combine the expertise of scientists from different fields involved in clinical, high-throughput, epigenomics and genomics, immunology and microbiology, and systems biology and bioinformatics studies. In addition, the *Systems Toxicology team* has intensive national and international collaboration via various projects belonging to FIOH's *Thematic Areas*.

Societal impact and exploitation of knowledge within FIOH:

Biomedicine-associated reformative, future-orientated research focuses on the development and utilization of cutting-edge technologies and on supporting strategic research at FIOH. The development of systems biology-based approaches in RFR and the application of these tools in the *Themes* has a societal impact mainly via:

- **Improvement in the diagnosis and aetiology** of occupational and work-related diseases. This enables the development of better treatment and prevention strategies.
- **The detection of predictive biomarkers** for identifying workers at risk of developing work-related diseases. This facilitates the development of measures to prevent future illnesses.
- **The development of predictive toxicology** that can be used, for example, to distinguish harmful and safe nanomaterials, or other work-related chemicals. This in turn creates novel tools for improving the regulation and legislation of chemical use and development.

As a tools-generating engine and via intensive co-operation between the *Themes* and FIOH as a whole, RFR is a vital part of the R&D process. The *Systems Toxicology team* is the only team at FIOH that performs laboratory-based biomedical research. All systems biology orientated studies at FIOH are carried out by the team. Even more importantly, all laboratory-based biomedical and toxicological studies of the *Themes* are performed by the same people and research groups of the *Systems Toxicology team*. Thus, RFR research activities and the biomedical research of the *Themes* are tightly linked, as they are performed by the same personnel of the *Systems Toxicology team*.

Some examples of the fruitful collaboration between the *Themes* and systems toxicology orientated RFR approaches and projects are given below.

The MAARS project (6M€ FP7 project, co-ordinator H. Alenius) was the first large-scale systems biology orientated project at FIOH. This multidisciplinary project in the field of allergy research includes the utilization of international patient cohorts, state-of-the-art transcriptomics, metagenomics methods, advanced bioinformatics, and systems biology approaches. The MAARS research platform has been an important cornerstone for the design of several theme-associated projects:

- **User-centric Indoor Environments:** Reliable tools for the diagnosis of mould-induced diseases are presently lacking. The MAARS research platform has been used and modified for a moisture damage patient study in which nasal and eye lid epithelia from mould-exposed and non-exposed controls have been studied by transcriptomics and by 16S microbiome sequencing. This study is a pioneer in the field and provides important information regarding the inflammatory and microbiome profiles of subjects suffering from mould-induced symptoms.
- **Effective Occupational Health Services:** Distinguishing allergic contact eczema from non-specific irritant eczema is a major challenge for dermatologists working with occupational skin allergies. We have set up a new research project in which the MAARS transcriptomics and bioinformatics platform, as well as novel classification tools are used to identify the most relevant biomarkers that are specific for allergic eczema and irritant eczema.
- **Nanosafety Research Centre:** NANOSOLUTIONS is a 10M€ FP7 multi-national project co-ordinated by FIOH (co-ordinator Professor K. Savolainen and vice-co-ordinator H. Alenius). The purpose of this project is to generate a computational safety classifier which can be used to distinguish harmful and safe nanomaterials. The MAARS platform has been an important initial corner stone in designing NANOSOLUTIONS.

Future prospects

Current diagnosis of occupational diseases is essentially based on methods and approaches that were developed several decades ago. It is anticipated that the integration of modern systems biology tools with strong clinical experience will significantly improve the diagnosis of occupational diseases. This gives grounds for the development of better treatment and prevention strategies. Similarly, current toxicological research is mainly descriptive and toxicological risk assessment is also based on guidelines that were developed several decades ago. However, the rapid development of thousands of novel chemicals, for example, nanomaterials, is significantly challenging the usability of the old risk assessment paradigm. The utilization of advanced systems biology approaches in the development of predictive toxicology provides fascinating possibilities for generating new, highly improved risk assessment paradigms.

The *Systems Toxicology team* and biomedicine-associated future-orientated research forms an essential part of FIOH's innovation chain. It is clear that the elemental integration of current toxicological and clinical experience with modern systems biology approaches is required for future success in the field of occupational health and medicine.

Conclusions and recommendations from the evaluator of biomedicine-associated RFR

The focus on systems toxicology is very topical, and the *Systems Toxicology team* appears to be very well positioned to have a positive impact on the overall research goals of FIOH. The research implements systems biology approaches that are likely to provide new answers to important questions in the field of occupational medicine and work-related illnesses. RFR is recently established, but builds on previous efforts at FIOH, with an excellent track record in terms of publications. The research on host-microbe interactions stands out as being of particular interest and the work is currently well funded. As the only team at FIOH that performs laboratory biomedical research, the *Systems toxicology team* holds a key position at FIOH.

However, it is difficult to remain at the forefront in so many different areas, and it may be necessary to focus research efforts and to consolidate interactions within the *Systems Toxicology team* in the years to come. Overall, the research in team appears to rely heavily on EU funding, but continued internal support from FIOH is also deemed necessary in order to establish and maintain a state-of-the-art infrastructure and to provide professional administrative support to the leadership of RFR. The *Systems toxicology team* should also consider coming up with a set of concrete aims, along with a strategy for the fulfilment of these aims, considering both funding and recruitment strategies, as well as actual research strategies.

The *Systems toxicology team* has the potential to become an internationally leading platform for systems toxicology research. It will be important to continue to build its bioinformatics competences, and to fully integrate the bioinformatics/systems biology group with other groups in order to exploit the potential of systems biology approaches. Close interaction with, for instance, clinical experts, and occupational medicine experts, will be important in order to maintain a strong focus on work-related illnesses. The recruitment of scientists with different backgrounds will be highly beneficial for this interdisciplinary RFR, and interdisciplinary training at all levels will be useful in terms of fostering a common 'culture' in this emerging field.

3.11.2 Collection and maintenance of high-resolution databases for the research of work and health (Finnish Public Sector Study and Whitehall II collaboration)

Overview

The Finnish Public Sector Study (FPS), led by Professor Jussi Vahtera and Professor Mika Kivimäki, is a large prospective study targeting all employees in the service of ten municipalities and six hospital districts around Finland. FPS collects and maintains high-resolution databases for the research of work-related psychosocial factors and health.

The data include large-scale biannual surveys and annual records of all job contracts in all work units. Between 1997 and 2012, seven waves of identifiable questionnaire data were collected from employees at work during the survey year. Each survey includes a large set of items covering topics such as the psychosocial, behavioural and psychological determinants of health as well as a range of work-related questions. To date, a total of 113 266 employees have responded to a survey at least once. Large register data from the employers' records cover all people (n=517 431) who have worked in the target organizations in 1990–2012. These data include work unit characteristics, and the exact dates of all days of absences due to sickness, as well as absences due to other reasons. The FPS study research cohort (n=151 732) comprises employees with a job contract of ≥ 6 months in any year between 1991/96 and 2005 in the target organizations, who have been linked to national health

registers. FIOH's *Psychosocial Factors team* co-ordinates the data collection and research. The team comprises ten employees of which five are part-timers.

Moreover, to address the biological mechanisms underlying the associations between work and health, with particular focus on metabolic and inflammatory changes, the FPS study team collaborates closely with the Whitehall II study team at University College London (UCL), UK, one of the leading academic centres of research on psychosocial factors and health in the world. The unique longitudinal Whitehall II study comprises the data of 10 308 employees examined repeatedly over the past 30 years. The Whitehall II collaboration (WH II) further enables questions regarding causality in relation to work-health associations to be addressed. Close collaboration between FIOH and UCL is facilitated by Professor Kivimäki's affiliations with both sites. See the detailed Status Report in Appendix X.

Strategic aims and research questions

The overarching aims of FPS are to provide novel evidence on psychosocial factors at work, and their trends and impacts on the differences in employee health and well-being. Long-term evidence of these factors in the changing nature of work life, as part of FIOH's strategy to understand the associations between work and health, contribute to helping workers remain healthy, engaged and willing to extend their careers.

Specific research topics include:

- Examining the effect of change in and cumulative exposure to both traditional and new psychosocial risk factors on mortality, morbidity, early retirement, healthy ageing and extended work lives.
- Identifying vulnerable groups, such as occupational groups, in terms of psychosocial risk factors and their associations with health outcomes.
- Examining the behavioural, biological, social, and psychological mechanisms linking psychosocial factors and health. Although the relationship between psychosocial factors at work and biological diseases such as coronary heart disease is widely studied, the underlying mechanisms are not well understood.
- Determining the status of stress as a disease trigger focusing on the timing of stressful events, such as the diagnosis of cancer, injury, major organizational restructuring, job loss, major stressful life events, retirement, and ward overcrowding.
- Evaluating the outcomes of primary and secondary preventive measures (e.g. rehabilitation, organizational-level interventions) based on observational data.

These questions are of vital importance for FIOH given its core mission of identifying the work-related determinants of health, well-being and productivity, as well as its current emphasis on extending working careers.

Scientific efficiency and relevance through wide research collaboration

FPS has established a wide national and international research network, and a large part of the research is carried out and published in international collaboration with leading scholars. In the period 2011–2013, the investigators have published papers with foreign scientists from more than a dozen countries, worked in several consortia and research groups, and collaborated with several Finnish universities and research centres resulting in nearly 300 published papers. Of these papers, 17 were published in journals with an impact factor (IF) of over 30; 39 in journals with an IF ranging between 10–30; and 85 in journals with an IF of 5–10.

One of the best examples of international research collaboration is the IPD–Work consortium, led jointly by UCL and FIOH. Individual-level data were derived from 17 European cohort studies, including a total of 240 000 working men and women from Finland, Sweden, Denmark, Germany, the Netherlands, Belgium, France and the UK. During the first funding period of 2010–2013, meta-analyses of this pan-European dataset have focused on the

associations of psychosocial factors, such as job strain, long working hours and job insecurity, with lifestyle and biological risk factors (intermediate outcomes) and chronic conditions with major public health relevance, such as fatal and non-fatal coronary heart disease, stroke, type 2 diabetes, cancer, and obesity (outcomes).

Long-term partnership with target organizations for societal impact and policy relevance

FPS databases and research results are increasingly used for research purposes in several *Thematic Areas* and as evidence-based grounds for developmental actions at FIOH⁶². Furthermore, FPS offers diverse ways through which research-related knowledge and skills benefit individuals, organizations, and society at large. We have identified six broad groups of stakeholders for societal impact:

1. Policy-makers at the government and intermediary levels, that is at the municipal and hospital district level, where the results are used for strategic leadership and planning.
2. Professional users, such as HR managers and health and safety officials, who want knowledge in order to improve public services through the improved quality of work life and well-being of employees.
3. OHS staff who need updated data to better identify vulnerable groups of employees for delivering their services.
4. End users in the target organizations; that is, supervisors in work units who use the results for organizational development and employee well-being.
5. The general (lay) public, whom the results can inform of potential work-related health risks.
6. Academia; professional networks.

One of the best examples of the the results helping decision-makers make informed decisions is that the top management of FPS' target organizations (including six of Finland's largest cities) utilizes the research results to make data-driven decisions by (1) monitoring the trends of the quality of work life and employee health, (2) identifying vulnerable groups and target groups for interventions, (3) using strategic planning and leadership to develop effective public services, and (4) organizational development. Importantly, our research results have been used to set performance targets in these organizations. For example, several organizations already use survey results as part of their strategy performance management tools, such as Balanced Score Cards, at organizational and work unit levels.

Future prospects

FPS will continue the accumulation of high-quality evidence on work and health through continued data collection: biannual follow-ups will continue until 2020–2030. Data collection is secured through strategic alliances with the target organizations.

FPS and WH II have established a large scientific network and will continue leading larger research consortia that pool individual-level data for meta-analyses in order to test hypotheses. The aim of these 'mega-studies' is to provide definite tests to confirm or refute hypotheses, to achieve precise effect estimates for associations, to test the generalizability of the associations; and to identify vulnerable employee groups.

A further aim is to set up a monitoring system for the effects of interventions occurring in the organizations that participate in FPS and systematically analyse changes between pre- and post-intervention using a matched reference of similar work units without the intervention. The extensive FPS dataset, including over 4000 well-characterized work units, combined with individual-level surveillance of morbidity and work disability provides an ideal platform for such quasi-experimental testing.

⁶² IEG2009 recommendation no. 22

FPS and WH II collaboration is currently defined as Reformative, future-oriented research at FIOH, co-ordinated by the *Psychosocial Factors team*. Its previous status was the *Unit of Excellence for Psychosocial factors*⁶³. Both statuses have enabled a significant contribution to FIOH's strategic goals and support the accomplishment of its long-term aims. Nonetheless, internal and external research collaboration, as well as long-term partnership with FPS' target organizations, benefits from a clear and comprehensible organizational structure. For example, Units/ Centres of Excellence are well-established organizational structures in the international research community.

Conclusions and recommendations from the external expert

assessment of the research area (see Mid-term Evaluation Report of the RFR as additional material)

FPS and WH II collaboration has provided added value for the development of work life by addressing several core research needs, such as studying work and health from a life course perspective, identifying vulnerable groups, understanding the mechanisms behind associations, and investigating the determinants of healthy ageing. FPS and WH II are among the few studies in the world that have high-quality data to address these research needs. These research aims and plans also fit well into FIOH's research strategy focus to promote occupational health and safety as part of good living. FPS and WH II can be considered core studies not only for FIOH but also for the international research community of psychosocial work environment and health. Their scientific quality, productivity, and significance are outstanding.

FPS and WH II collaborate with almost all important European research institutions that conduct psychosocial work environment research and with the Harvard School of Public Health. The research is of great value for the development of work life in Finland, the other Nordic countries and in countries with a comparable economic and social background. Still, it is not known whether the association of the psychosocial work environment and health are similar or different in countries with different economic and social contexts. Therefore, FIOH in general and FPS and WH II in particular should consider extending collaboration into countries in Eastern and Central Europe, Japan and Australia.

The impact on non-academic users and the interaction with the user community is a key issue of FPS. Collaboration with workplaces, top managers and supervisors is very close. However, there is room for improvement in terms of collaboration with employee representatives, health and safety representatives, shop stewards, and unions.

To fulfil the extensive national and international commitments, the functioning is dependent on too small a core group of permanent key personnel, and both FPS and WH II are mainly driven by the two research professors. This is a potential threat for future research. In order to unburden the research professors and to secure the continuation of FPS and WH II collaboration, establishing a second level of academic leadership might be considered.

⁶³ IEG2009 recommendation no. 22

3.12 Summary of self-evaluation and discussion

Summary of the external evaluation of the Themes and reformative, future-orientated research⁶⁴

The *Themes*' advisory groups made a midpoint evaluation for each team in October 2013. A short summary of the evaluation is presented at the end of the description of each *Theme* (Sections 3.2-3.10).

In general, the evaluation reports stated that

- The topics of the *Themes* are generally current and relevant and reflect the needs of work life in the future,
- no topics that should not belong to the area of FIOH were recognized,
- some topics that did not concern a particular *Theme* were recognized, but these topics were included in other *Themes*,
- the dissemination and implementation of the solutions and results of R&D at workplaces are crucial and the effectiveness of solutions should be further evaluated,
- FIOH's specialist advisory and training services are good means through which to have an impact on workplaces. The dissemination of knowledge via the internet is also effective, provided that the information is easily available,
- collaboration with mediator organizations (also with labour market organizations and other associations, besides OHS and occupational safety personnel and authorities) should be broadened in order to better reach workplaces,
- communication with the media may awaken discussion in society but is not an effective way to reach workplaces or to achieve changes at workplaces.

Two independent experts evaluated the two research areas of RFR in November–December 2013. A short summary of the evaluations is presented at the end of Sections 3.11.1 and 3.11.2.

Concerning biomedicine-associated RFR, the evaluation pointed out that the focus of systems toxicology approaches is very topical, fits well with the overall research goals of FIOH, and the research team has excellent production and quality of scientific publications and the potential to become an internationally leading platform for systems toxicology research. However, the evaluation also addressed a need to focus the research efforts, to consolidate interactions within the research area and to clarify the management structure of the research team in coming years.

As regards FPS and WH II collaboration, the evaluation highlighted that the research suits FIOH's research strategy well, has outstanding scientific quality and productivity, and is very relevant from both a scientific and a societal perspective. However, the evaluation suggested intensifying interaction with employee, health and safety representatives, shop stewards and unions, delineating the research to some extent, broadening international collaboration outside Europe, and ensuring the continuation of the research by strengthening academic leadership.

⁶⁴ IEG2009 recommendations no. 21 and 22

Conclusion of the Creating Solutions concept

Contribution to the innovation model and general support for FIOH:

| Strengths | Weaknesses / Targets of development |
|--|--|
| <ul style="list-style-type: none"> • Collaboration and interaction inside FIOH has increased. • New approaches are more bravely considered. • Multi-professional expertise is utilized more actively. • Maintenance of larger totalities has been improved. • Activities in various networks have been developed and increased. • 'Informal forums' promote activities. • The innovation model is best applied in measures that have focused on the level of R&D projects. • The innovation model enables the effectiveness of measures on the national and EU level. • The <i>Project Support team</i> is vital for the administration of R&D projects, a successful innovation in the matrix organization. • Inside the <i>Area of Activity of Creating Solutions</i>, processes and operating models are clear. • Management, leadership and practices within <i>Creating Solutions</i> are logical and clear, communication inside <i>Creating Solutions</i> is active and effective. | <ul style="list-style-type: none"> • The follow-up and anticipation of the financial situation of the <i>Themes</i> and <i>Creating Solutions</i> are not sufficient. -> Financial processes and support from <i>In-house Services</i> should be clarified, and overlaps in the administration should be recognized and removed. • Planning and maintenance of human resources are challenging. Decision-making and problem-solving are more complicated in the matrix organization. -> Practices and responsibilities in collaboration between <i>Creating Solutions</i> and the <i>Centres of Expertise</i> should be further developed. • Collaboration between the <i>Areas of Activity</i> has progressed and should be further developed: <ul style="list-style-type: none"> ○ <i>Creating Solutions</i> and <i>Client Services</i>: development and productization of commercial products ○ <i>Creating Solutions</i> and <i>Influence through Knowledge</i>: channels of communication and implementation of knowledge at workplaces • There are some overlaps in the vision, focus and aims of some <i>Themes</i>. • Economic pressures require a great deal of attention in the activities, too little time to concentrate on the content. |

Summary of self-evaluation

| Theme / Reformative, future-orientated research | Scientific quality | Efficiency of implementation | Use of partnerships | Potential impact | Achieved impact |
|--|--------------------|------------------------------|---------------------|------------------|-----------------|
| Work Participation and Sustainable Working Careers | ++ | ++ | +++ | +++ | ++ |
| Well-being Solutions for the Workplace | + | ++ | +++ | ++ | ++ |
| Effective OHS | + | + | ++ | +++ | + |
| Work Life and the Future | ++ | ++ | +++ | +++ | ++ |

| | | | | | |
|--|-----|-----|-------|-----|--------|
| User-centric Indoor Environments | ++ | +++ | +++ | +++ | ++ |
| Brain and Work Research Centre | +++ | ++ | +++ | +++ | + (++) |
| Nanosafety Research Centre | +++ | ++ | +++ | +++ | ++ |
| Social Capital, Health, and Well-being at work | +++ | ++ | ++(+) | +++ | ++ |
| Disability Prevention Centre | +++ | ++ | +++ | +++ | +++ |
| Development and Validation of Biomedical Research Methodology | +++ | ++ | +++ | +++ | + (+) |
| Collection and Maintenance of High-resolution Databases for Research on Work and Health | +++ | +++ | +++ | +++ | ++ |

Self-evaluation (Moderate +, Good ++, Excellent +++)

Conclusion: key messages for the future

The *Creating Solutions* concept, based on subject-orientated *Themes* and future-orientated research, works well and it is recommended that FIOH continues with the concept in the next strategic period. However, the content of the *Themes* and future-orientated research should be further focused and reconsidered: for example which topics is it necessary to concentrate on in one *Theme* and which topics can overlap in several *Themes*? Multi-professional collaboration is FIOH's strength, and it should be further developed and enriched. International networking is necessary for breakthroughs.

Due to diminishing resources, it is also necessary to recognize research that will be run down, and to increase further collaboration with national and international research institutes and universities. External funding is obligatory for R&D activities and new funding instruments (Horizon 2020, the EU structural fund, Finnish funding for strategic research) should be utilized effectively. To achieve more efficient and flexible modes with which to use and maintain resources, overlapping administration between *Creating Solutions* and *In-house Services* should be removed. Moreover, practices in the planning and maintenance of human resources should be unified in the *Centres of Expertise*. For the realization of the innovation model, further development of co-operation within all the *Areas of Activity* is crucial.

As FIOH has external funding for and commitments to R&D activities up to 2017, it is clear that R&D in the next strategic period will be established on the grounds of present commitments. On the level of the *Themes*, the focus will be on the dissemination and implementation of solutions developed in this strategic period at workplaces, on intervention studies, and on evaluating the effectiveness and societal and economic impacts of solutions. This will set requirements for the development of the knowledge capital of the research staff in the *Centres of Expertise*. However, there should be room for new openings in R&D activities, to ensure the regeneration of the activities and a platform for new innovations. In new *Themes*, a balance should be considered between research and development activities, between the use of quantitative and qualitative methodology, and between risk and empowerment / salutogenic approaches. In addition, FIOH's present status of the two Strategic Centers for Science, Technology and Innovation (RYM-SHOK and SaIWe-SHOK) and the research centre status of three research areas should be taken into account when new *Themes* are established.

4 Client Services

Client Services is responsible for FIOH's services business. Under this mandate, *Client services* performs three critical tasks for FIOH. It:

1. funds FIOH (on a non-profit, non-loss basis as defined by the legislation on FIOH) to enable the scale of laboratory-based research and services activities
2. disseminates the results of the research carried out by FIOH in the form of further developed, commercialized services to drive effectiveness and develop Finnish work life in general
3. Fosters FIOH's customer data and interface.

Client Services conducts investigations, analyses and reporting work, carries out measurements and provides services related to the prevention and elimination of health hazards at workplaces and in work environments. *Client Services* is also engaged in training, publishing and information activities related to its field and carries out other duties prescribed to it. In addition, *Client Services* produces health care services; it carries out studies related to its sphere of operations, personal evaluations and other investigations.

Key Messages

During the strategy period 2011–2013, *Client Services* has:

- Enjoyed net sales growth despite a difficult market situation
- Increased management transparency and business awareness
- Driven operational renewal and sharpened the business focus
- Become more recognized for talent and good expertise

Client Services' key challenges are to:

- fight against eroding margins by cutting overheads and pursuing selective price moves
- ensure the renewal of key products and drive more aggressive new business development
- invest more in sales and channel development
- improve IPR management and skills in the social media, user experience and application development
- rationalize the workload of key people and support their competence renewal.

4.1. Review of recommendations

Table 4.1.1 summarizes the review of the top-line recommendations of the IEG to *Client Services* in 2009. Accordingly, all recommendations have been considered and most of them deployed. Alternative courses of actions to some recommendations have been preferred, as driven by changes in market conditions.

Table 4.1.1 Review of IEG2009 recommendations

| 2009 Recommendation | Status in 2013 |
|--|--|
| 17. Regional Office reports indicate that in many areas there is more demand for services than Offices can provide. Taking into account high demand on services internal work sharing in the Regional Offices and between the FIOH and Regional Offices should be discussed as well as which of the work could be outsourced or to accredited external partners. | Issue analysed and corrective measures taken; currently the key challenge is the lack of balance between the different services in which competence bases do not allow changes from one competence to another. Major actions taken in late 2013 as part of the consultation process to re-correct. |
| 25. The FIOH is to be commended on the diversity and quality of its research programmes in relation to work organization and well-being. | Several items and topics added, but it is difficult to review all in detail due to the major overhaul of OHS training in 2013. |

| | |
|--|---|
| <p>The IEG recommends that the FIOH educates OHS on results, methods and tools regarding this topic in the OHS training courses.</p> | |
| <p>31. The IEG commends the FIOH on the development of OHS guidelines. It encourages the FIOH to continue to improve the effectiveness of OHS in collaboration with key organizations and associations of relevance to this area. Due to great demand, regional differences and availability of expertise should be considered in this context. Training provided to OHS should be further updated to focus more on prevention and key priorities in Finnish working life (especially mental health) and to be flexible enough to also address new risks and emerging needs.</p> | <p>Prevention highlighted as a key topic for OHS training; OHS issues discussed in a wide steering team set-up by the ministry. Regional scope not focused against the recommendation due to the financial streamlining of OHS services.</p> |
| <p>39. The FIOH still reaches only a limited number of the potential clients. For the planning of services in the future it might be of value to survey what potential clients are not reached at present. The IEG would suggest a survey of the organizations and corporations that are not presently reached by the FIOH.</p> | <p>FIOH annually reaches roughly 10 000 business-to-business customers. Only a fraction of these are managed professionally in a consistent way. Tools and processes were created by the end of 2013 to increase the productivity and quality of interaction with the customer. The key customer segments have been identified, with the SME sector in special focus. In general, regular customer surveys are completed. Clear targets and investment levels have been set for 2014.</p> |
| <p>40. Some interviewees have noted that their knowledge of competence available in the FIOH is rather haphazard and relates to personal contacts rather than active marketing. FIOH should consider being more proactive in marketing its competence.</p> | <p>Marketing is now organized in <i>Client Services</i> as a separate entity. (Product) marketing is deployed according to a monthly campaign mode. Each marketing campaign is managed as a combination of the strategic priorities of FIOH and short-term business (demand-supply) priorities. (also rec. 12)</p> |
| <p>41. There was critique from some interviewees concerning the costs for services; the basis for the pricing was not as transparent as desired. The IEG suggests that the FIOH provides a budget for services sufficiently detailed for clients to be satisfied.</p> | <p>Transparency of pricing increased as a part of the new order confirmation process. Selected key clients are managed in detail.</p> |
| <p>42. Much of the Finnish working population is employed in small and medium-sized companies. Furthermore, service companies increase in significance – the IEG would suggest that the FIOH expands its reports to describe the involvement of small companies and reports service companies separately. Services to these categories should be reinforced.</p> | <p>The changes to reporting have not been deployed. Channel and pricing are identified as key obstacles to address small- and medium-sized companies. A development project was launched to address this issue in 2013.</p> |
| <p>43. The Labour Inspectorate is an important partner for the FIOH. The IEG suggests that the FIOH contacts the Labour Inspectorate to discuss the critique from representatives for the authority, concerning delays in commissioned</p> | <p>The issue has been discussed with the Ministry and the Labour Inspectorate. It seems that the trouble is more outside of FIOH, and corrective actions have been taken. In addition, collaboration with the Labour Inspectorate has</p> |

| | |
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| surveys. The IEG suggests that measures are taken to decrease these delays. | been increased. |
| 44. The FIOH should concentrate its services to areas where new services are developed and areas where the competence of the FIOH is unique. The IEG suggests that the FIOH should consider outsourcing routine services like the operation of aptitude assessment, while retaining R&D, training and quality control. | The set-up of FIOH has been renewed according to the main business models (described in detail later) and in accordance with the most competitive business focuses and competences of FIOH. Outsourcing has not been pursued, but several non-profitable businesses with high opportunity cost discontinued. |
| 45. The IEG suggests reinforcing the product line Work Processes and Equipment Development, where the demand is great and expected to increase in the future. | Product line discontinued in late 2013 due to the difficult market situation and competence gaps, Some activities have been moved to new business entities. (See also rec. 32) |
| 46. There appears to be a shortage of manpower in occupational health even though major efforts have been made in recent years. The IEG suggests that training in occupational health is even further expanded and that marketing of such training is improved. | On the basis of the changes in market demand, a decision was made to maintain the current resourcing level. Despite this change, the number of courses has been increasing. |
| 47. The FIOH produces much written and web-based material. It is unclear if this material achieves the desired effects. The IEG suggests that an end-user survey of the information activities of the FIOH is performed. | A process for regular end-user surveys has been introduced. The <i>Client Services</i> website – including the social media – is to be renewed in early 2014. |
| 49. The IEG commends the FIOH for the changes made to enhance the efficiency of the laboratory service provision and encourages the FIOH to continue to assess efficiency and be sensitive to client needs across regions. | Completed and now continues as usual, clear improvements have been made to productivity and quality. |

Table 4.1.2 summarizes the review of the 2009 top-line recommendations of IEG to the *Regional Offices*. Accordingly, all recommendations have been considered and most of them deployed. Alternative course of actions to some recommendations have been preferred due to changes in market conditions.

Table 4.1.2 Review of 2009 IEG recommendations for Regional Offices

| 2009 Recommendation | Status in 2013 |
|--|---|
| 54. The Helsinki Regional Office has well-working and highly competent collaborators with holistic touch on problems. One example is the indoor air team with its systemic approach. A strategic question is how to find similar comprehensive approaches in other teams. The IEG suggests that this model is applied to other teams as well. | The <i>Helsinki Regional Office</i> is undergoing a considerable reform. After relocations, the number of personnel will increase to 90 from the present 33. New teams and expertise in the office increases the opportunities for collaborative work. However, co-operation across team boundaries needs to be emphasized in decision-making, as well as in daily routines and work flows in the future. |
| 55. The Helsinki Regional Office has a great demand for measurement and for interpretation of the measurement results. It is important to find a balance between these two functions taking into account client needs and staff resources. | Since 2009, the market has shifted and the need for adding resources is now less immediate. |
| 56. Client satisfaction is vital for successful work of the Helsinki Regional Office. That is why it is recommended to continue existing feedback and | Customer satisfaction is the most important factor when considering the core functions of the office. The main functionalities include service |

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|--|--|
| <p>networking methods and to develop new fora for cooperation and information distribution.</p> | <p>functions to customers. Today and in the future it is necessary to find a way to move from informal ways of sharing customer and operative information to more formal methods, over team boundaries, in order to have the information as a basis for decision-making also on the FIOH level.</p> |
| <p>57. The Helsinki Regional Office has good know-how and efficiency to wider approach and development which would give good opportunities to think about the work and task sharing between the FIOH headquarters and the Helsinki Regional Office.</p> | <p>Work and task sharing has increased significantly between FIOH headquarters and the <i>Helsinki Regional Office</i>, as well as between all <i>Regional Offices</i>. This has been driven by the new nationwide team structure and more customer-centric operational mode</p> |
| <p>58. The Kuopio Regional Office should continue to develop strategies to market the FIOH services to small enterprises. This effort should be coordinated with those planning the programmes under the Strategic Goal "<i>The management of occupational health hazards at work as part of management practices and corporate risk management.</i>"</p> | <p>We have proceeded with several different strategies for SMEs. For example, we have lowered the threshold of participation in our projects, contacted selected potential customers by email, found new ways to meet customer needs and to activate networks to work with us and for us.</p> |
| <p>59. The Kuopio Regional Office should continue to enhance the interactions with the regional Advisory Board to support the Strategic Goals of the FIOH and refine the priorities of the Regional Office.</p> | <p>The <i>Regional Advisory Committee</i> has increased communication between parties. This development has been further elaborated by the new operational mode assumed in late 2013.</p> |
| <p>60. The Advisory Group is very favourable in relation to the ongoing activities of the Lappeenranta Regional Office. This view was supported by the client impact and societal usefulness analysis. Critical views concentrated on available service resources of the Lappeenranta Regional Office which were considered insufficient to provide needed services. The IEG commends the successful cooperation with the Advisory Group to analyze future needs. It is also important to keep in mind the region's high numbers of traditional safety and health problems. By putting more resources on these the Lappeenranta Regional Office can increase its added value for employees and enterprises.</p> | <p>The <i>Lappeenranta Regional Office</i> currently has 16 employees; 5 less than in 2009. The office now concentrates on customer services due to the fact that it has a small number of research personnel. The industrial ventilation expertise area has decreased most significantly. Due to this, the <i>Lappeenranta Regional Office</i> has to use subcontractors. Furthermore, if our own personnel are not able to carry out customer services, the national teams and product families offer experts to be used for regional customer services. As the IEG mentioned in 2009, the region had high numbers (2007) of traditional safety and health problems. The latest numbers (2011) of recognized and suspected occupational diseases in the Lappeenranta region were on an average level compared to the national level.</p> |
| <p>61. The Director acts as a "main ambassador" for marketing and networking services, activities, training courses and development projects to clients. The Director also supports teams in their activities. According to assessments this has been done very well in the Lappeenranta Regional Office. Besides this, another important issue of the manager is to support and develop multi-professionalism and flexibility of the staff. A recommendation is to consider the strategic choices of the Lappeenranta Regional Office: how to balance services and other activities of the Lappeenranta</p> | <p>The former regional director retired and the new director works 60% as director and 40% as an expert in customer services. This is an example of multi-professionalism. The small staff is flexible, and co-operation with other regions is increasing all the time. The support nowadays is mutual between the regional director and the staff. The contradiction in balance between service and research activities was solved by concentrating on customer services and on customer satisfaction. The new <i>Advisory Committee</i> represents local economic life and partners. Group meetings will be arranged at</p> |

| | |
|---|---|
| <p>Regional Office taking into account the client satisfaction and staff resources as well as the FIOH Strategic Goals.</p> | <p>least twice per year. In addition, the members of the <i>Advisory Committee</i> have been invited to all local network meetings. Local research activities are relatively low.</p> |
| <p>62. The IEG commends the Oulu Regional Office on the outstanding research and solutions for cold climates and encourages further development of research and solutions for workers in both cold and hot climates.</p> | <p>R&D projects have continued and more knowledge regarding, for instance, arctic mining has been acquired. As a result, we have published several articles, dissertations and books on the effects of cold during work and leisure time. We have also been active in international and national standardization organizations.</p> |
| <p>63. The IEG encourages the Oulu Regional Office to continue its research, teaching and service with partners on mining and metals.</p> | <p>Co-operation with the University of Oulu's mining faculty is continuous. We have also taken an active part in specialized mining training programmes, and established new services and task forces to address mining.</p> |
| <p>64. The IEG values the knowledge gained from and encourages continuing the exploitation of the unique Nordic Birth cohort studies.</p> | <p>We have continued to exploit the Northern Finnish Birth Cohorts. We have evaluated the role of lifestyle and psychosocial risk factors in low back pain and musculoskeletal pain in multiple sites. In addition, several articles and dissertations have been published.</p> |
| <p>65. The Labour Inspection Authority appreciates the training the FIOH provides for inspectors. However, in daily inspection activities, inspectors have often an acute need of service. The FIOH has problems meeting demands of urgency. We therefore recommend that the FIOH and the Labour Inspection Authorities define jointly the legitimate service expectations including waiting periods so that both parties know what the FIOH service promises are.</p> | <p>The original problem has been solved, but new issues have recently surfaced along the same topic, due to diminishing budgets on both sides.</p> |
| <p>66. The Turku Regional Office, as other FIOH Offices, is responsible for a large number of small and medium-sized enterprises, also spreading across the archipelago region. The IEG commends the Turku Office for the development and implementation of programmes that address small and medium-sized enterprises and entrepreneurs' health. It is recommended that resource availability is considered in light of staff retirement in order to address small and medium-sized enterprises needs.</p> | <p>A person has been employed full-time for the development and implementation of programmes that address small and medium-sized enterprises and entrepreneurs' health. The topic will also be a key focus at the <i>Client Services</i> level in 2014.</p> |
| <p>67. The FIOH has already identified the lack of occupational health physicians and nurses in the Turku Regional Office. This has been confirmed by the current evaluation. This has an impact on training of occupational health personnel in the region, and also on the provision of quality OHS. This problem may not be restricted to the Turku region and may not be a responsibility of the FIOH. However, the FIOH should consider increasing the activities in training of occupational health physicians.</p> | <p>An occupational health physician has been employed in the <i>Turku Regional Office</i>. A training programme for occupational health physicians has also been started and the number participants has been increased in order to quickly respond to the need of occupational health physicians in the region.</p> |

4.2 Introduction

Client Services offer advisory services, consulting, training, and commercialized/licensed knowledge and products. Our customers include organizations from all disciplines, in both the private and public sectors. Our key goal is to improve well-being at workplaces, increase productivity and quality, and to support the fulfilment of the statutory obligations for occupational health and safety.

Since 2009, we have taken two major development steps to ensure our competitiveness and renewal (as illustrated in Figure 4.2.2). First in 2011, FIOH became a matrix organization and the *Centres of Expertise* were complemented with five *Service Centres* – present in all FIOH's *Regional Offices*. At the same time, several new support functions were launched to foster business development. These included, for example, market intelligence, CRM, sales development, quality, and operational support. Simultaneously, a new governance model was introduced.

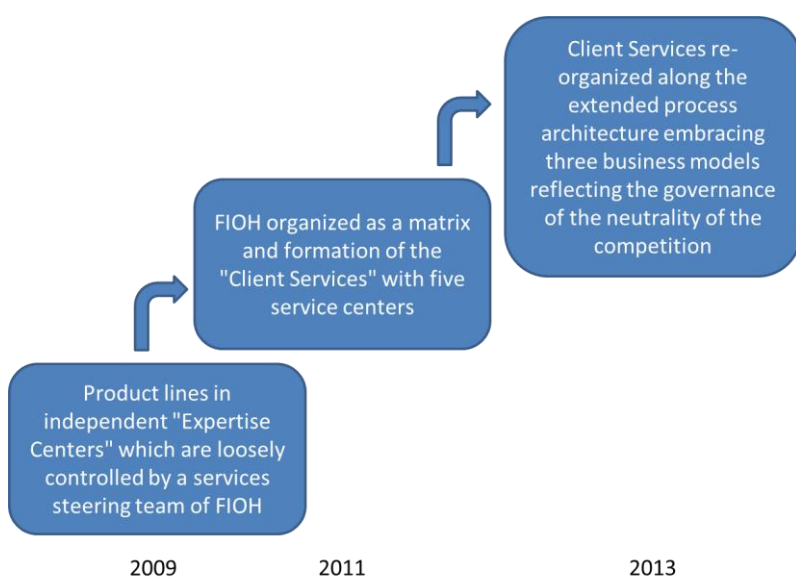


Figure 4.2.1 Development of the Client Services operational mode from 2009 to 2014

As the next major step, *Client Services* was again re-organized into its current form in 2013. The new set-up embraces independent business lines built according to the main business models (i.e. licensing, training and services). As the main change, business is now organized to follow the prevailing business models and customer segments rather than the embedded competence base of FIOH. In addition, the growing requirements for the increasing neutrality of competition as driven by the European Union have been taken into consideration. Finally, as part of the new set-up, the process architecture of *Client Services* has expanded from one to four core processes – paving the way for new supportive functions and teams.

The current organizational structure of *Client Services* is shown in Figure 4.2.2. The business lines (or *Service Centres*) own the businesses of *Client Services* with end-to-end profit and loss responsibility. They are organized as vertical silos supported by the common processes. The main business lines include Work Environment, Occupational Health and Training. They represent mature businesses in which the market position of *Client Services* is strong and solid. All in all, they represent over 80% of the net sales of *Client Services*. Behind these, *Customized Services and Licences* represent upcoming businesses - still more in the new business development mode. In *Customized Services*, the focal point of the business includes work safety and organizational development.

The key goal of the horizontal entities is to master and own the key processes of *Client Services*. These processes are the skeleton of the business operations, i.e. the business lines run on top of them. Thus the processes are supportive by nature. Overall, the *Client Services* practices for the *Customer process* as well as the *Commercialization process* are still emerging, while the *Delivery process* is deployed at a highly mature level – as externally accredited.

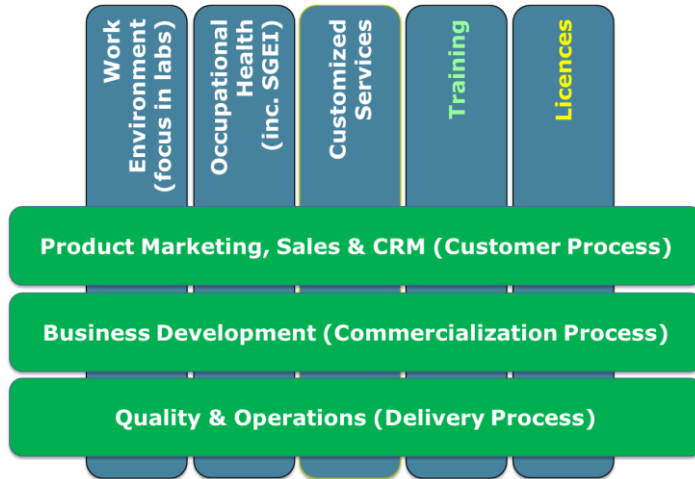


Figure 4.2.2 Current organizational structure of Client Services

In addition to managing the business core, *Client services* hosts the regional offices of FIOH in a virtual set-up. The rationale behind this is to ensure close collaboration with all potential customers throughout Finland. Accordingly, FIOH has *Regional Offices* in Helsinki (established 1974), Kuopio (1975), Lappeenranta (1975), Oulu (1973), Tampere (1974) and Turku (1974). The size of the *Regional offices* is illustrated in Table 4.2.1.

In order to develop and deliver the best solutions, we consolidate the resources from various units and work together with our regional partners. All FIOH’s services are available to all customers through the *Regional Offices*. Accordingly, almost half of the service income comes from outside the Helsinki metropolis area. Currently, the importance of the *Regional Offices* and the service coverage provided by them for the whole of Finland is highlighted by the growing importance of small- and medium-sized businesses, by the urgent need to renew community level services, and by several industries – such as mining in Northern Finland or the paper and pulp industry in Eastern Finland.

Table 4.2.1 Regional Offices personnel statistics 10/2013

| Number of | Helsinki | Turku | Tampere | L:ranta | Kuopio | Oulu |
|-----------|----------|-------|---------|---------|--------|------|
| Personnel | 33 | 45 | 67 | 17 | 67 | 49 |

4.3 Review of market opportunity

In recent years, Finland’s economy has faced major turbulence. It is estimated that the Finnish GDP will decrease by 0.4% in 2013, with moderate growth projections and risks on the downside. In 2011, roughly 320 000 enterprises operated in Finland. They employed 1 486 000 people and generated EUR 385.2 billion in turnover. Small or medium-sized enterprises, with personnels of less than 250 people, represented 99% of all enterprises. They employed 65% of the employed workforce and accounted for 51% of total turnover. As embedded in Figure 4.3.1, the majority of the customers of *Client Services* are mainstream businesses with large organizations. Accordingly, small and medium-sized organizations remain a major

untapped opportunity for *Client Services*. In this respect, it must be simultaneously noted that a similar gap can also be seen with some bigger organizations; illustrating an internal need for detailed discussion about the investment focus and embedded opportunity cost.

FIOH's position in the market is diverse, as most of the service products play a leading role in marketing their respective field. For standardized services of larger volumes, FIOH often operates in a market-based manner. FIOH's consulting services tend to stand out from other operators, not only because of their high quality, but also their higher prices. However, FIOH's assistance tends to focus on more challenging cases, and therefore does not always compete with other consultants producing standard services. FIOH's research and practical information products are fortified by their prestige, and FIOH expertise is highly valued.

FIOH's main competence-based market segments of include work safety services, work hygiene measurement and laboratory services, OHS, medical science services, and organizational development services. Currently, *Client Services* operates mainly in Finland with roughly 10% of net sales coming from outside. Overall, the top 100 customers cover more than 50% of the business of *Client Services* illustrating the importance of CRM and solid account management (Figure 4.3.1).

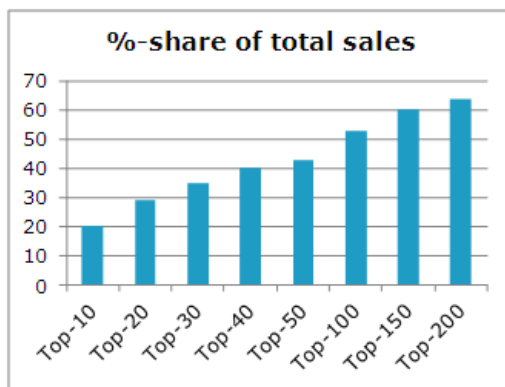


Figure 4.3.1 Accumulation of *Client Services*' net sales from top customers

In general, the market space for *Client Services* can be illustrated by two main market segments. The first comprises 'free-market' services, which have no legislation, government or structure of demand-driven entry barriers. The majority of *Client Services*' business can be located here. In this market, the barriers for entry are relatively low and there is vigorous rivalry between the key players.

The second market segment of *Client Services* contains services that can be characterized as services of generic economic interest (SGEI). According to the European Commission, this covers economic activities that deliver outcomes for the overall public good that would not be supplied by the market without public intervention (or would be supplied under different conditions in terms of quality, safety, affordability, equal treatment, or universal access).

In Finland, FIOH has been separately designated tasks to perform under crisis-related and emergency conditions. FIOH also caters for some market segments in which the availability of the service can be seen as critical for the economy of Finland. Some of these activities – such as the awareness of chemical-related health risks and the co-ordination of a network of experts in chemical threats – are currently managed by *Client Services*. This is done in a transparent context against "free-market" services, even if some of the operations from both extremes may be deployed by one individual, based on projects. Due to emerging legislation, *Client Services* is currently clarifying its scope of SGEI-based services. Our goal is to end this assignment by the end of 2014.

Client Services addresses the market through three main business models as shown in Figure 4.3.2.

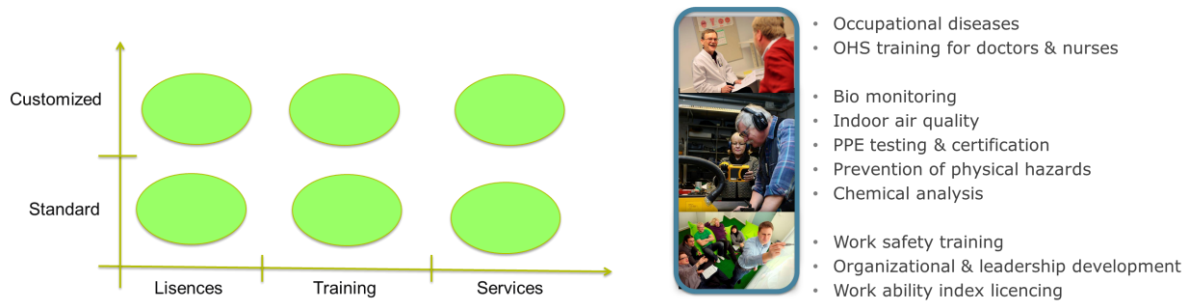


Figure 4.3.2 *Client Services'* main business models and some examples of products

In general, *Client Services'* business can be divided into two horizontal clusters: standard services and customized services. Over recent years, a great deal of attention has been paid to rationalizing and standardizing the services portfolio. The business models embedded in *Client Services* can be further divided into three vertical clusters. Within these, *Client Services'* footprint has been strong in terms of training and standard services in the form of laboratory services. Most recently, the customized services cluster has faced major market turbulence, which has forced *Client Services* to discontinue several services. As a new area, the licencing cluster is still emerging. There are some good examples of solid licencing products, but in general, the cluster is still maturing as a future opportunity.

4.4 Review of operational mode

Client Services is based on four core processes:

1. Customer Process
2. Commercialization Process
3. Delivery Process
4. Management Process

Figure 4.4.1 shows the *Customer Process* of *Client Services*. It consists of three main processes derived from the key customer segments. CRM (customer relationship management) is the backbone of the *Customer Process*. In addition to this, various customer-related operations are performed, as guided by customer priority.

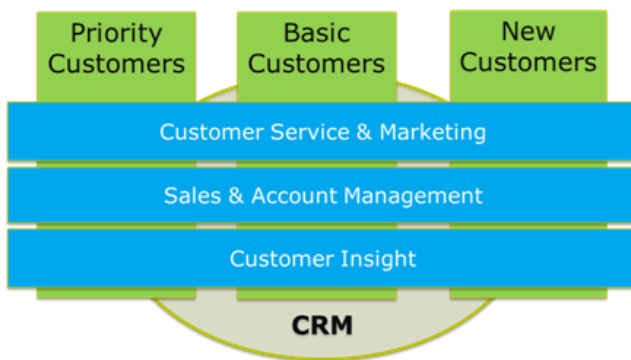


Figure 4.4.1 *Customer process*

The *Customer Process* describes how we manage our customer base and how we manage customers from the first contact to a continuous customer relationship and customer relationship maintenance. The *Customer Process* is reciprocal; we take into account FIOH's objectives and ambition as well as the differences between customers and their needs.

The process is described by customer segments because it is different for different customers. At the moment, for profitability reasons, the *Customer Process* focuses on three main customer segments: 1) priority customers, 2) basic customers, and 3) new customers.

For consumer insight, customer feedback is obtained by customer satisfaction queries and as spontaneous feedback. The customers may also ask for contact or for an offer by filling in a form on the internet. The form is then forwarded to the correct expert who makes an offer or contacts the customer by phone or email. Customer feedback is discussed monthly and necessary actions assigned.

CRM is a tool for managing our customer accounts and customer segments. The CRM system stores our customer and potential customer basic information, such as names, addresses, segmentations and contact persons with contact information. The basic information is needed to plan, implement and monitor multi-channel marketing efforts, as well as to manage customer contacts.

The *Commercialization Process* describes the way in which new product ideas become ready products to meet our customer's needs in the market. The *Commercialization Process* is illustrated in Figure 4.4.2. The process has two concepts:

1. Checklist of how a single product idea becomes a product
2. Process for managing the entire product portfolio.

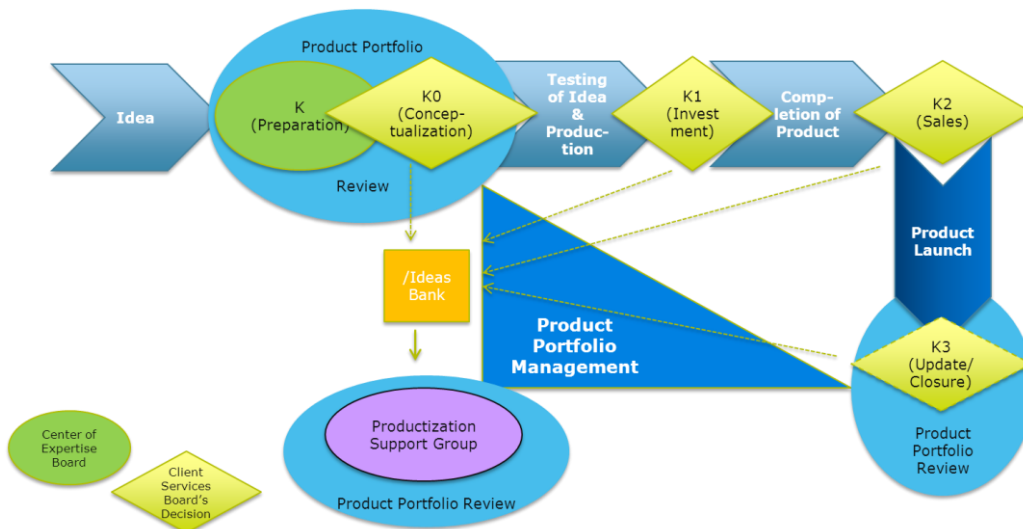


Figure 4.4.2 Commercialization process

The *Commercialization Process* supports product development at the different levels of the process. The process contains the development of the product idea into the product, and the launch and management of the product portfolio.

The aim of the *Delivery process* (Figure 4.4.3) is to produce the service the customer needs in an efficient and cost-effective way. The process consists of two sub-processes, i.e. the order process and the delivery process.

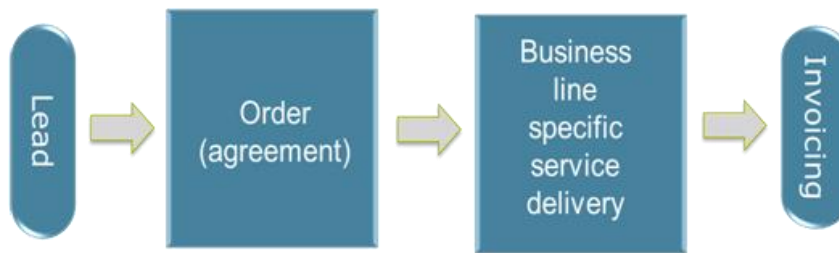


Figure 4.4.3 Delivery process

The main task of the delivery process is to promote communication within *Client Services*. The information helps the directors of the business lines and product family managers in production control and resource allocation. The delivery process is divided into service centres, product families and product-specific sub-processes. The JOTI (management information system) sales process is common to the sub-process.

The management process of *Client Services* is based on the Deming quality circle. The aim of the process is to provide preconditions for effective and cost-effective market-based services, taking into account the relevant regulations and stipulations. It also sets the rhythm for managing *Client Services*, according to the annual calendar (as in Figure 4.4.4) with key meetings linked to FIOH’s governance model. The key meetings of *Client Services* include:

- monthly Client Services Leadership team meetings to discuss the business situation, check on the progress of the strategy definition, implementation and follow-up, as well as to make investment decisions.
- weekly AR/Lync meetings on current business issues.
- monthly AR/live meetings to discuss the current status of *Client Services* with the whole matrix organization as well as all common issues to accelerate renewal

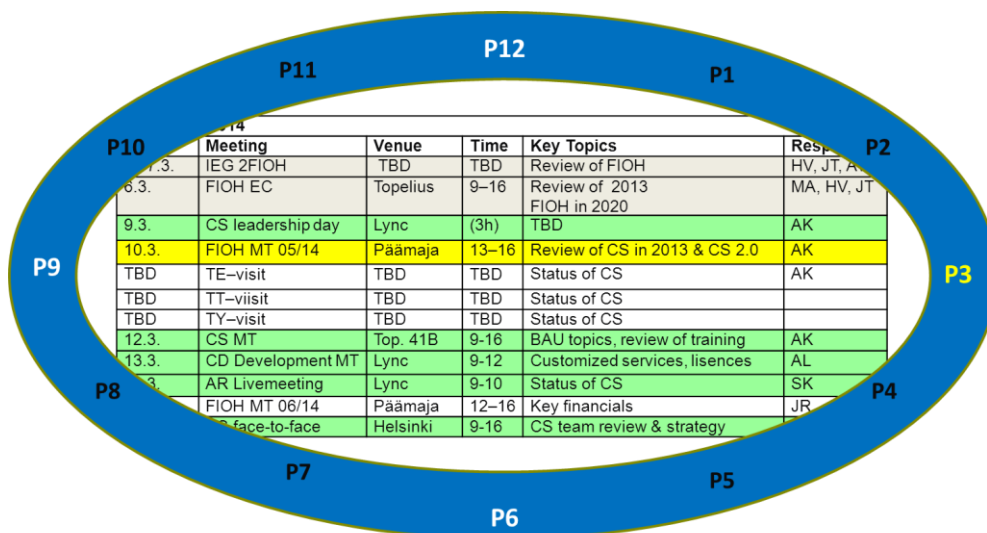


Figure 4.4.4 Management Flow of Client Services

FIOH’s quality control system forms a pivotal, key component of the management processes. The quality system is documented according to the *FIOH Quality Manual for Client Services*. The *Quality Manual* and the *Client Services* procedure instructions are maintained by the *Client Services’ Head of Quality*, and are accepted by the *Director of Client Services*. All quality documents are available to the personnel on FIOH’s intranet.

In 2011, FINAS (Finnish Accreditation Services) made *Client Services* an accredited testing laboratory according to ISO 17025:2005. The scope of the accreditation is available at <http://www.finas.fi/scope/T013/uk>. To achieve this, *Service Centre* audits are performed annually. Processes are also audited according to a separate schedule. The accredited activities have been audited by FINAS every 1-2 years with 4 to 8 annual visits. The *Product Families* perform their internal audits according to their own auditing schemes.

4.5 Summary of business results

From 2009 onwards, the overall volume of *Client Services* has remained on a growth path despite the difficult market situation (Table 4.5.1). In the bigger picture, there have still been major deviations between the *Product Families*, leading to a transparent decision to focus on business in the most profitable extremes, as well as on growth opportunities in the future.

Table 4.5.1 Actual outputs 2009–2012 and latest estimate for 2013

| | ACT 2009 | ACT 2010 | ACT 2011 | ACT 2012 | LE 2013 |
|--|----------|----------|----------|----------|---------|
| Specialist Advisory service days | 47 513 | 50 000 | 49 000 | 53 400 | 50 000 |
| Work environment measurements and analyses | 45 327 | 40 000 | 52 946 | 58 647 | 48 000 |
| Occupational diseases and work ability consultations | 1 932 | 2 300 | 1 930 | 1 864 | 1 700 |
| Training days | 16 066 | 20771 | 20 871 | 22 700 | 20 000 |

Overall, FIOH’s customer satisfaction has remained high. Several new tools have been deployed to continuously measure the quality of services. Figure 4.5.1 shows the results of a new Webropol-based customer satisfaction survey. Accordingly, the key developments’ focus is on mastering the delivery schedule.

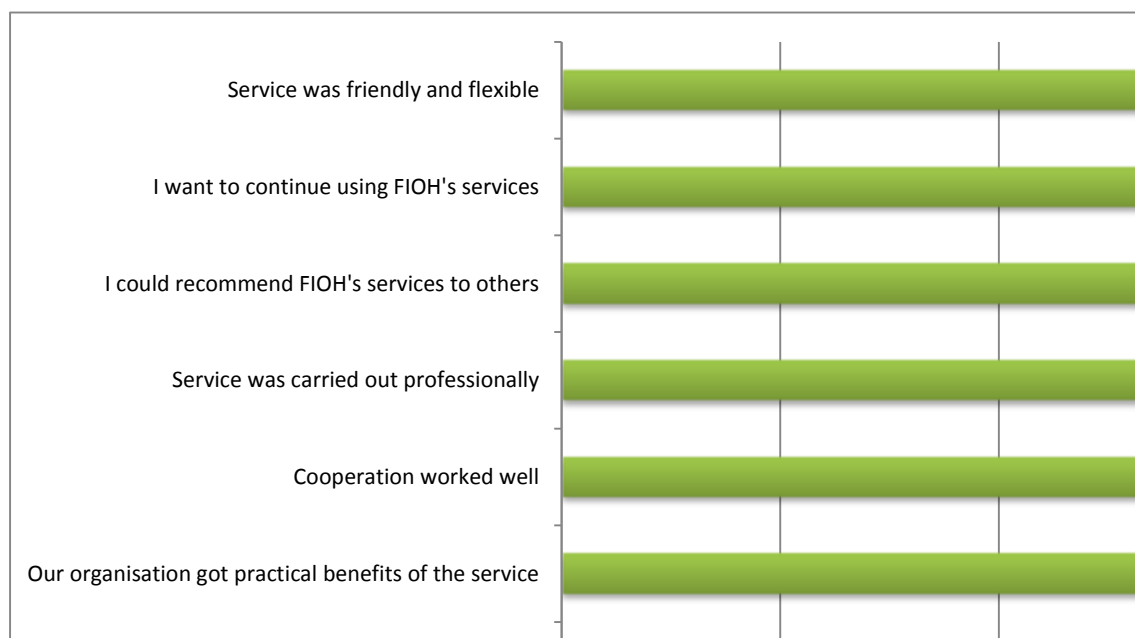


Figure 4.5.1 Customer satisfaction survey results from Nov.2012 to Aug.2013 (n=70)

As an outcome of growing delivery volumes and solid customer satisfaction, *Client Services*’ net sales have been growing (Table 4.5.2). In addition, *Client Services*’ sales margin has stayed at a healthy level of roughly 40%

Table 4.5.2 Net sales growth of Client Services from 2009 to 2013

| | ACT 2009 | ACT 2010 | ACT 2011 | ACT 2012 | LE 2013 |
|----------------|------------|------------|------------|------------|------------|
| Services total | 15 957 883 | 16 252 172 | 17 486 434 | 18 764 127 | 18 500 000 |
| Sales margin | | | 36% | 42% | 38% |

4.6 Summary of self-evaluation and discussion

Table 4.6.1 shows the summary of *Client Services*' self-evaluation. In the self-evaluation, the main businesses of *Client Services* pave the way for solid potential and achieved impact in terms of customer footprint. The upcoming services under licencing as well as organizational development are still taking their first steps to becoming real businesses. Meanwhile, the overall rating of these two services is pulled down by the weight of old services currently in ramp-down mode.

Table 4.6.1 Self-evaluation of Client Services (Moderate +, Good ++, Excellent +++)

| Services | Quality of services | Efficiency of implementation | Use of partnerships | Potential impact | Achieved impact |
|----------------------------|---------------------|------------------------------|---------------------|------------------|-----------------|
| Work Environment | ++ | +++ | ++ | +++ | +++ |
| Occupational Health | ++ | + | +++ | +++ | +++ |
| Training | ++ | ++ | + | +++ | ++ |
| Licences | + | + | + | ++ | + |
| Occupational safety | ++ | ++ | ++ | ++ | ++ |
| Organizational development | ++ | + | + | + | + |

Contribution of Client Services to Innovation Model

The origin of *Client Services* resides in the legislation related to FIOH, in which a special task is given to FIOH to generate a minimum of 20% of its annual funding from the market by providing services and products for the private and public sectors under the scope of FIOH. Since the 1970s, this task has paved the way for FIOH's current services business. This activity has been carried out on a non-profit basis, without using government funding to subsidize the business side. As a more recent milestone, the upcoming EU-level legislation related to the neutrality of competition has raised the bar for the transparency of business even further. As a result of this development, today, *Client Services* operates in an efficient, transparent, high quality manner in selected market segments. *Client Services* contribution to FIOH's *Innovation Model* is three-sided.

First of all, *Client Services* represents FIOH's customer interface, allowing the sharing of research and development results with thousands of companies - and hundreds of thousands of workers - mainly in Finland, but also outside. Within this umbrella, FIOH also provides selected services that are critical for Finnish society as well private companies, in order to be competitive on a global scale. For the customer footprint, the role of *Client Services* as the host of customer-related data and insight is pivotal for FIOH.

Secondly, *Client Services* - as a non-profit organization - carries a major, embedded load related to FIOH's overhead costs. This enables FIOH to maintain the current scale of high

quality laboratories and facilities for general purposes. Thirdly as the business arm of FIOH, *Client Services* provide the employees of FIOH with the opportunity to act in different roles between research, knowledge sharing and the commercial roles of FIOH.

As the main conclusion, interaction between the main parties of FIOH's *Innovation Model* must be embraced. Clearly, the *Innovation Model* - and FIOH as a whole - is based on seamless, systematic collaboration between the main parties. Therefore, it must be seen as one entity with tight internal links and interdependencies, enabling FIOH to work as it does today.

5 Influence through Knowledge

5.1 Role and key targets of Influence through Knowledge

The *Influence through Knowledge Area of Activity* has a two-fold function at FIOH: to support and strengthen the communication between FIOH and its stakeholders in order to support the strategic goals of FIOH such as extending working careers; and to facilitate efficient internal communication to increase the intangible assets of FIOH. Intangible assets are the combination of human capital (individual capabilities), structural capital (processes and internal relations) and relational capital (external relations and brand value).

Influence through Knowledge is organized into four main entities, directed by team leaders:

- Strategic communication (brand management, stakeholder relations, press connections and press releases, public events)
- Systemic influence through knowledge (printed and electronic media)
- Surveillance and surveys (periodic reviews, statistical databases, Cochrane reviews)
- International collaboration (WHO, ILO, ICOH, Nordic Council of Ministers, NIVA)



Figure. 5.1.1 Main entities of Influence through Knowledge

5.2 External communication and stakeholder relations

Seminars and lectures

FIOH's experts give lectures to various audiences either free of charge or as part of courses and events organized by *Client Services*. Lectures open to the public are given as part of agreed network activities, such as the Leadership Development Network or the Forum for Well-being at Work, or in other public events that promote the goals of FIOH.

In its public communication, FIOH approaches relevant audiences with topics related to well-being at work, working careers, work ability, safety at work, etc. One central issue in this strategy period has been the economic importance of occupational health and safety activities. Awareness-raising has been carried out both by demonstrating how much poor well-being at work costs society and workplaces each year (Work and Health in Finland 2012) and by showing the amount of resources spent on OSH activities (The State of strategic well-being in Finland 2012). It has become widely known that annual losses are more than 40 billion and investments less than two billion per year. This reasoning has also been discussed on an international level. (Public Service Review, European Union, Vol. 23, 2011, 134). A similar discrepancy has been demonstrated at the corporate level.

Occupational Health Convention (Työterveyspäivät)

The *Occupational Health Convention* is the most significant occupational well-being event in Finland and one of FIOH's main annual events. The participants consist of, for example, occupational health and safety personnel, HR experts, managers and representatives of different authorities. The Convention aims at providing information and practical tools for workplaces and authorities. It also works as a forum for high-level discussions and opinion formulation on work life and the right mechanisms for supporting it.

The topics support FIOH's strategic goals of enhancing good quality work life; extending working careers; improving well-being at work, work ability, safety at work; and developing OHS. Special topics of recent years have included young people in work life, the development of competences and know-how, good leadership and management, and supporting positive change at workplaces.

The first Convention was organized 60 years ago. The Convention activities include seminars, workshops, panels, videos, audience testing (well-being and health and safety tests) and large exhibitions of FIOH and various companies and stakeholder organizations.

In addition, FIOH annually organizes approximately 50 seminars free of charge. These gather around 2 500 participants annually.

Table 5.2.1 FIOH training days and number of participants of the Occupational Health Convention

| Indicator\Year | 2010 | 2011 | 2012 |
|---|--------|--------|--------|
| No. of training days (subject to a charge) | 20 771 | 20 871 | 22 700 |
| No. of participants at the Occupational Health Convention | 600 | 770 | 650 |

National Networks

FIOH leads and takes part in several important work life related networks and forums in Finland (see Fig. 5.2.1). In addition to national activities they all have strong local representation. The most visible of these are the Leadership Development Network (Johtamisverkosto), the Forum for Well-being at Work (Työhyvinvointifoorumi), the Zero Accident Forum, and the Network for Well-Being at Workplaces (Työpaikkojen työhyvinvointiverkosto). These are non-profit networks, which promote occupational health and safety.

The Leadership Development Network website has over 12 000 visits annually and its seminars gather more than 1000 participants per year. In the seminars the participants share good practices and continue the common discussion in the social media.

The Zero Accident Forum is a group of workplaces that commit to sharing their successful practices with others and spreading information to encourage other workplaces to achieve a high level of safety. The Forum's concept is extremely effective. In 2008–2012 the accident rate of the Forum members fell by 46%, whereas in Finland as a whole the accident rate decreased by only 7%.

Table 5.2.2 Zero Accident Forum members

| Indicator\Year | 2010 | 2011 | 2012 |
|------------------------------------|------|------|------|
| No. of Zero Accident Forum members | 246 | 283 | 297 |

FIOH is also an active member of Soterko (Consortium of National Institutes for Health and Wellbeing), and promotes KASTE activities (National Development Programme for Social Welfare and Health Care).

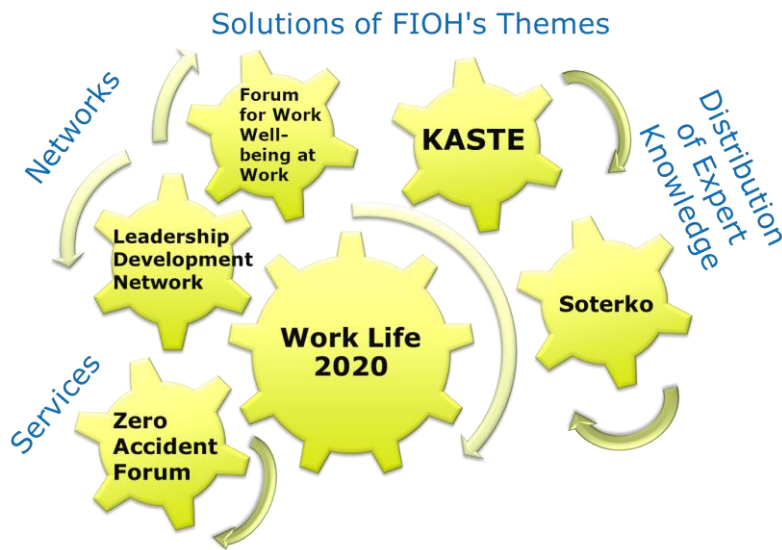


Figure 5.2.1 Different work life related forums and networks

International Networks

The contribution of FIOH to the work of **International Organizations**: the World Health Organization, WHO; and the International Labour Office, ILO, has always been bilateral, but during the past few years increasingly multilateral and based on the collaboration of the members of the networks. Over the years, FIOH has put a great deal of effort into establishing and further developing various networks, such as the WHO Global Network of Collaborating Centres in Occupational Health, the WHO European Network of WHO Collaborating Centres in Occupational Health, the ILO-CIS Network of national CIS Centres, the Baltic Sea Network on Occupational Health and Safety. FIOH has contributed to the networks of the Nordic Council of Ministers, and later also the Northern Dimension Partnership in Public Health and Social Well-being (NDOHS). These networks provide excellent fora for collaboration globally, regionally and sub-regionally. The contributions of FIOH to WHO and the ILO activities have strengthened further in recent years.

In the **European context**, FIOH participates in several networks, for example the ENWHP (European Network for Workplace Health Promotion), EUOSHNET (European Occupational Safety and Health Network for experts involved in standardization, testing, certification and/or related research), ETPIS (European Technology Platform on Industrial Safety) and ENETOSH (European Network Education and Training in Occupational Safety and Health).

The **International Commission on Occupational Health, ICOH**, is an association of occupational health and safety experts in which FIOH has traditionally had strong representation.

Collaboration within the **Nordic framework** has continued to be important, and FIOH is involved in the administration and development of the training of NIVA, the Nordic Institute for Advanced Training in Occupational Health.

The **Baltic Sea Network** and the more political Northern Dimension Partnership network have worked closely together over the last seven years, and the NDPHS network has endorsed a Health at Work Strategy, which was implemented by the BSN Network. In 2013, conclusions on developing the reporting of occupational accidents were endorsed by the Ministers.

Study visits to FIOH have been organized for experts from other countries in order to familiarize them with the Finnish OSH system, including OHS. The number of visitors has varied as follows:

Table 5.2.3 Foreign visitors

| Indicator\Year | 2010 | 2011 | 2012 |
|-------------------------|------------------------|-----------------------|------------------------|
| No. of Foreign visitors | 11 groups, 45 visitors | 8 groups, 76 visitors | 14 groups, 62 visitors |

The organization of **international scientific and expert meetings** is one form of FIOH activity. In 2010–2012 a total of 11 international meetings were organized. The topics of the meetings covered well-being at work, active ageing, prevention culture, occupational safety, and nanomaterials.

Table 5.2.4 International expert meetings and symposia

| Indicator\Year | 2010 | 2011 | 2012 |
|---|------|------|------|
| No. of international expert meetings and symposia | 2 | 5 | 4 |

Regional activities

FIOH is physically located in six regions in Finland. This is the basis for FIOH's regional activities. The *Regional Advisory Committees* support FIOH's regional activities. They are the basis for FIOH's contacts with universities, companies and local organizations and authorities. The *Regional Advisory Committees* hold 4–6 meetings annually.

FIOH's internal communications

The internal communication group supports the matrix organization and co-operates with the management, and makes necessary information available and easy to understand. FIOH places great importance on developing interactive communications. A new internal communications platform has been developed and will be taken into full use in 2014.

Press releases⁶⁵

FIOH's traditional media communication (press relations, press releases) aims to provide a clear, influential view of FIOH's research results and different work life phenomena. The number of press releases has slightly increased over the years, although the number of personnel has decreased.

According to website hits, the highest degree of media exposure in 2012 was achieved by FIOH's studies on organizational changes, career extension, electromagnetic radiation and sleep. Open-plan office working conditions, work-related stress and fatigue, and the costs of poor well-being at work also made the news.

In addition to press releases, FIOH specialists were featured in some 800 newspaper and magazine interviews, television programmes and videos.

According to the Media Survey (Mediabarometri), FIOH's communications function very well. FIOH is considered highly reliable as a source of information and our information officers are seen as professional. However we should be more active and make sure our experts and information officers can be easily reached.

⁶⁵ IEG2009 recommendations no. 28–30

Table 5.2.5 Press releases, press conferences and website hits

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|-----------------------------------|------|------|------|------|-------|
| Media communication and PR | | | | | |
| – Press releases | 62 | 81 | 71 | 77 | 81 |
| – Press conferences | 11 | 7 | 10 | 15 | 15 |
| – Website hits (millions)* | | | | | 1 012 |

Green = very well, red = poorly

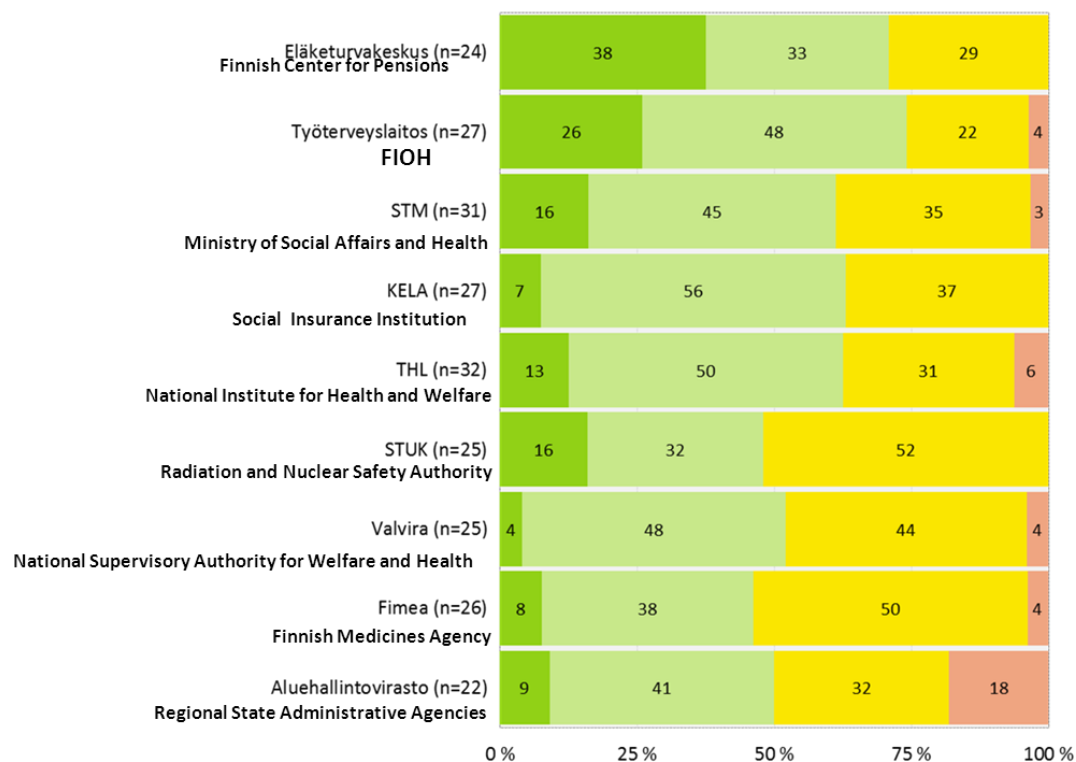


Figure 5.2.2 FIOH's communications serve journalists professionally and efficiently. Media Survey 2013, Mediabarometri.

FIOH statements and expert engagement

FIOH is the leading expert on work-related hazards and well-being at work. Therefore, statements are often requested from FIOH in different work-related matters. The number of annual written official statements has slightly declined over the years. This is a technical consequence of the new organization, according to which only the statements approved by the Executive Committee are registered centrally.

Table 5.2.6 Experts' statements and visitors

| INDICATORS FOR INFLUENCE THROUGH KNOWLEDGE | 2008 | 2009 | 2010 | 2011 | 2012 |
|--|-------|-------|------|-------|-------|
| Number of experts' statements | 69 | 58 | 38 | 27 | 22 |
| Number of visitors | 1 216 | 1 200 | 963 | 1 047 | 1 177 |

FIOH experts constantly engage in various activities in which their expertise is needed. Typically they participate in different work groups and projects organized by different authorities in both Finland and internationally. FIOH is represented in a number of national committees and other groups.

Table 5.2.7 Memberships in national committees and permanent groups

| Indicator\Year | 2010 | 2011 | 2012 |
|--|------|------|------|
| No. of memberships in national committees and permanent groups | 240 | 200 | 150 |

The work time and orientation of FIOH's expert engagement is followed by *Influence through Knowledge* and the *Centres of Expertise*. The amount of expert engagement has decreased during recent years. One reason is statistical: in 2012, expert engagement hours were partly reported as intellectual capital (osaamispääoma).

Table 5.2.8 Expert engagement days

| Year | 2009 | 2010 | 2011 | 2012* | 2013 |
|---------------------------------|--------|--------|-------|-------|-------|
| No. of Expert engagement (days) | 12 420 | 12 706 | 9 300 | 6 514 | 6 655 |

Table x. Expert engagement days/year. In 2012 part of expert engagement hours were reported as intellectual capital.

Image and brand-building

Influence through Knowledge is responsible for the general brand of FIOH, whereas *Client Services* takes care of the marketing of commercial services. The brand is best promoted by high quality research, which is indicated by the number and quality of publications in peer review journal articles, which is the responsibility of the *Creating Solutions Area of Activity*. By attending fairs and publishing advertisements, FIOH strengthens its public image.

FIOH regularly screens its public image value through surveys. Our stakeholder survey indicates that FIOH has a reputation of reliability and respectability. The media survey in turn demonstrated that awareness of our brand has increased and our communications are effective. The Stakeholder survey (Maine) is carried out every three years and the Media survey every other year.

Table 5.2.9 Attended fairs, fair participants and paid advertisements

| Indicator\Year | 2010 | 2011 | 2012 |
|--------------------------------|---------|---------|---------|
| No. of attended fairs | 25 | 30 | 20 |
| No. of fair participants | 244 141 | 237 391 | 245 835 |
| No. of paid advertisements (€) | 59 190 | 22 262 | 25 000 |

5.3 Publishing

FIOH publishes a number of national and international printed expert periodicals, policy briefs and international regional newsletters, which are targeted at different audiences, both local and global. FIOH also functions as a book publisher. Publishing books is economically profitable for FIOH.

Publication of non-scientific publications and books⁶⁶

In recent years, FIOH has actively produced non-scientific publications such as guide books, articles and additional practical material on work life, though the annual number has slightly decreased in the last few years in correspondence with the declining number of staff. The topics support FIOH's well-being at work strategy of. They include stress and work life, management of sleeplessness, management of change and well-being in work life, and challenging workplaces.

The aim is to secure the quality of and access to information on work and safety and health professionals in Finland, to reach a wide audience and to raise awareness regarding well-being at work, work ability and safety at work, and to support workplaces. The publications are created and designed in close collaboration between researchers, experts and *Influence through Knowledge* personnel.

Table 5.3.1 Non-scientific publications

| Indicator\Year | 2010 | 2011 | 2012 |
|------------------------------------|------|------|------|
| No. of non-scientific publications | 486 | 447 | 393 |

FIOH publishes about 25 new books and some 10 reprints every year for the FIOH Bookstore and retailers to sell. Approximately 28 000 copies of books are sold annually. The best-selling publications from year to year are "Työturvallisuuslain soveltamisopas" (Guide for application of the Occupational Health and Safety Act) and 'Työsuojelun valvonta' (Monitoring Occupational Health and Safety).

All the textbooks for university studies, for example, "Work-related diseases", have been revised in recent years, as have as the best-selling "Guide for application of the Occupational Health and Safety Act" and "Monitoring Occupational Health and Safety".

Our aim is to take into account the public and its needs. The number of published popular and low-priced books has increased in the last years. The media has been interested in the subjects, and the reviews have been very good.

We also aim to reach the young. Some of FIOH's books are discussed in blogs and on Facebook and for the first time we have also asked the public to contribute to the content of a book. Since 2009 we have published books especially for managers/supervisors and small- and medium-sized companies. In addition to FIOH's traditional topics, one important topic is mental health, including stress.

Table 5.3.2 Publications

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|----------------------|--------|--------|--------|--------|--------|
| Publications | | | | | |
| – New titles | 33 | 32 | 25 | 24 | 74** |
| – Sold copies: books | 37 852 | 29 696 | 29 600 | 29 200 | 28 910 |
| – Reprints | 27 | 17 | 17 | 18 | 5 |
| – Dissertations | 3 | 3 | 4 | 3 | 2 |

⁶⁶ IEG2009 recommendations no. 28–30

Work Health Safety periodical⁶⁷

“Work Health Safety” (TTT) is a national periodical that focuses on work well-being. About 80% of the readers work with occupational safety matters and over 50% read the magazine at their workplace. The amount of readers is 158 000 (per one issue) and the circulation is 56 000 copies. FIOH’s Director General, Harri Vainio, is Editor-in-chief. A reader survey indicated that 97% of readers are satisfied with the publication. Each copy of the periodical is read by approximately 5.1 people per workplace and nearly 60% of subscribers keep the magazine after reading it. Two thirds of the respondents say that the periodical has influenced their own activities and nearly the same amount state that the articles have spurred discussions at their workplaces.

Practical tips for purchasing new products or services are also highly appreciated by readers.

The *TTT-Digi web magazine* was launched in January 2013 to supplement the printed TTT magazine. TTT-Digi is subject to a charge and includes the magazine, additional articles, an archive, thematic entities, news, interactive services, and videos. It is partly free. There were 34 000 visits to TTT-Digi between January and December 2013. The pages were viewed 98 000 times and the average visit lasted approximately 3 minutes.

Table 5.3.3 Issues of national periodical, subscribers and readers

| Indicator\Year | 2010 | 2011 | 2012 |
|--|-----------|-----------|-----------|
| No. of issues of national periodical (TTT) | 8 | 8 | 6 |
| No. of subscribers to above | 506 740 | 492 990 | 360 050 |
| No. of readers of above | 2 584 370 | 2 514 250 | 1 836 240 |

Policy Briefs

FIOH developed the ‘Policy Brief’ (VP, Viesti päättäjälle) concept in 2012. Decision-makers need facts presented in a brief and comprehensible form to make decision-making easier. The Policy Briefs have covered important, topical work life issues, for example, return to work after sick leave and the safety of nanomaterials. They present a brief synopsis of key information and recommendations for action.

All Policy Briefs are in Finnish and Swedish, and some are also translated into English. They are published on the FIOH website about five times per year and distributed by e-mail and at FIOH events. Those interested can subscribe to Policy Briefs on the FIOH website.

The FIOH stakeholder newsletter has 5 200 subscribers and the different newsletters (Bookstore, Zero Accident, Agriculture etc.) have over 11 000 subscribers altogether.

Development of FIOH’s E-media services⁶⁸

FIOH’s website (www.ttl.fi) has established itself as a firm favourite among those interested in well-being at work. The annual number of visitors has grown from one million to 1.45 million in one year. The website’s content was also increasingly shared on social media channels such as Facebook and Twitter. The most frequently clicked sections on the website are education, ergonomics, chemicals, and work engagement. The most popular search terms include well-being at work, ergonomics, workplace bullying, carpal tunnel syndrome, OHS, work ability and OVA instructions (instructions regarding chemicals that may potentially cause accidents).

⁶⁷ IEG2009 recommendations no. 28–30

⁶⁸ IEG2009 recommendations no. 28–30

The web service adapts and evolves constantly in close partnership with our experts and stakeholders. An extensive project for renewing the website began in early 2008 and the website was further revised in the spring of 2012. It was given a lighters visual appearance . The front page content was made more topical: new books, tips, upcoming events, and seminars etc. were presented in a more illustrative way. The popular content of different parts of the site is highlighted on the front page.

All the pages have social media icons (Facebook, Twitter, Google and LinkedIn). Online magazine *Työpiste*'s latest titles are displayed on the front page. Twitter feed is displayed on the Finnish and English front pages.

According to a user survey, 94% found the website content professional and reliable. A total of 92% gave the website a positive overall rating. FIOH is also actively present in several social media platforms (Facebook, Twitter, Youtube, LinkedIn, Slideshare, Issuu).

Table 5.3.4 Website visits, Facebook likes and Twitter followers

| Web services www.ttl.fi | 2008 | 2009 | 2010 | 2011 | 2012 |
|--|-----------|-----------|--------|-----------|-----------|
| Total number of visits | 1 017 294 | 1 007 924 | 988 00 | 1 000 000 | 1 451 000 |
| Facebook likes | | | 250 | 1 400 | 2 213 |
| Twitter followers | | | 110 | 450 | 870 |

The following lists show the topics that have attracted the most visits or resulted in the most interaction on our website (between May 2011 and January 2014). The statistics were gathered using the Snoobi web analytics tool.

Table 5.3.5 Most visited pages on FIOH (Finnish) website 2011–2013

| Selected pages covering current topics | visits |
|---|--------|
| Patient transfers in nursing (related to ergonomics) | 96 800 |
| Work engagement and related online measurement test | 74 700 |
| Conflicts and bullying at the workplace | 42 100 |
| Instructions for granting sick leave | 27 900 |
| Friday meetings (open lectures on OSH for personnel, researchers) | 21 200 |

Most popular Facebook posts that got the most interactions (shares, comments or likes)

- How to get used to work routine after the summer holidays
- FIOH goes Harlem Shake (flash mob interrupts lecture)
- FIOH Facebook Christmas calendar 2013
- Work-related stress wears down the body
- Greeting colleagues is free and increases work satisfaction
- No basis for age racism, Professor Clas-Håkan Nygård
- What kind of boss do you have?: test (linked to a web test devised at FIOH)
- Work engagement worth striving for as it increases happiness and well-being at the workplace
- Like the picture and win! Tips for good sleep and feeling refreshed
- Positive people live longer, statistically speaking. Train yourself to be more optimistic

Most read news articles on FIOH website (descriptions translated from Finnish)

- Working in hot weather requires breaks
- New publication: work engagement

- Protect yourself from cold weather
- Sufficient clean-up after mould-damage reparations
- Difficult people in work life
- How to apply occupational safety and health laws - Guidebook
- Mental powers diminish with age
- Test how you contribute to well-being at the workplace
- Stress at work contributes to multiple health risks
- Why does your memory fail you - New guidebook
- Free conference on self-motivation and renewal amid increased insecurity in work life
- Director General Vainio: safety of electronic cigarettes unproven

Most read news articles on FIOH international web pages

- New research results for improving open-plan offices
- Proceedings of the International Forum on OH&S (2011)
- New publication: Process of burnout
- OHS Forum 2011
- New publication: Occupational Health of Health Care Workers
- 30th ICOH Congress - Occupational health for all
- Scandinavian Journal of Work Environment and Health offers open access for all FIOH accepted papers
- FIOH research impresses OSHA leader David Michaels
- NIVA courses 2014, see the list! (The Nordic Institute for Advanced Training in Occupational Health)
- Issue 5 of the Cochrane Occupational Safety and Health Review Group has been published (2011).

A web magazine called *Työpiste*⁶⁹ (Workstation) was launched in 2009. The web-only publication it is aimed at a wider audience and popularizes FIOH's research. It is frequently updated and includes tips, features, interviews, columns, blogs, Q&A, and user-generated content, including tips on well-being at work. It also offers concrete advice and tips on how to improve well-being at the workplace.

Työpiste has published around 700 articles so far. The social media is used to distribute the content and to build an interactive community around the topics. Other media outlets frequently quote *Työpiste*. *Työpiste* achieved 210 000 hits between September 2012 and September 2013. The magazine's popularity was boosted by the growth of its Facebook group. At the end of 2012, the magazine had over 1 500 followers on Facebook. This is comparable to regional newspapers in Finland.

In December 2013, FIOH's website had some 175 e-publications and this amount has increased by 20–30 publications each year. The Work Healthy Safety periodical and 42 publications are also available electronically via a service that the Finnish Medical Society Duodecim offers to several hundreds of thousands of users.

The **regional international newsletters** reflect the long-term collaboration of FIOH in East Africa, South-East Asia and in the northern region of Europe. The Newsletters are a publishing forum primarily for the experts in the Regions, and use FIOH's networks of international experts as contributors. They are not peer-reviewed journals, but offer a channel for the exchange of information on good practices, ongoing activities, various information sources and training opportunities, etc. They use thematic issues and over a period of years have covered a wide spectrum of OSH topics, thus also offering a kind of OSH-wiki for the experts of the regions. The themes of the Newsletters in 2010–2012 covered occupational diseases and registering systems, risk assessment at workplaces, mining, information technology and the transfer of technology, climate change, nanotechnologies and occupational safety, construction

⁶⁹ IEG2009 recommendations no. 28–30

safety, the transport industry, the informal sector and OSH, to mention only a few examples. The Newsletters have readers in close to 140 countries of the world. The feedback from the readers in both industrialized and developing countries has been encouraging. According to the feedback, the contents have been utilized as training materials in some of the countries where training materials are not easily available. In 2010–2012, the regional newsletters remained the channel for maintaining networks in East Africa and South-East Asia, as FIOH has not been eligible for funding from the Ministry for Foreign Affairs of Finland.

The international newsletters are distributed through FIOH’s international networks and are used as practical media to provide information on occupational health and safety and to educate people in work health matters in the developing regions of the world. The newsletters are very popular at international events around the world. They are also accessible on the internet: the African Newsletter since 1/2001 (themes since 1/1997) the Asian-Pacific Newsletter since 1/2000 (themes since 1/1997) and the Barents Newsletter since 2/1998.

5.4 Information management and information support

Library

During this strategy period, the development of the library and its services has been characterized by a constant decrease in traditional services such as book loans, article searches and library visits in general. The services have been available to FIOH’s researchers and experts as well as wider audiences. The needs of scientific audiences have changed significantly in recent years due to new possibilities especially in the field of web-resources and electronic assets. Accordingly, the number of FIOH’s library service hours per week has been reduced. The use of electronic information sources has remained constant and the access of FIOH personnel to new E-book services has expanded. As a consequence of this development, the library staff has diminished from 7.5 people in 2008 to 4 in the autumn of 2013.

Table 5.4.1 Loans and article copies, library visits, search requests and use of electronic information sources

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|--|--------|--------|--------|--------|--------|
| Library and information services | | | | | |
| – Loans and article copies | 11 699 | 7 421 | 5 310 | 5 746 | 3 251 |
| – Library visits | 2 198 | 1 290 | 818 | 823 | 675 |
| – Search requests | 300 | 194 | 94 | 216 | 175 |
| – Use of electronic information sources, no. of articles | 23 900 | 22 201 | 19 445 | 20 279 | 24 146 |

Information management

Occupational safety and health inspection in Finland is a network of five regional offices led by the Ministry of Social Affairs and Health. *Influence through Knowledge* provides this network with regional information services and OSH trends. For this purpose, *Influence through Knowledge* has created **Regional Work and Health Profiles**, which include summarized statistics and information on work accidents, occupational diseases, work absenteeism, work disability pensions, exposure to carcinogens, and a wide selection of factors covered by the national surveys on work and health carried out every three years by FIOH. Data are updated annually and are intended to help regional authorities analyse the regional status of OSH and improve the efficiency of their inspection and prevention work. These data and other statistics are freely available (in Finnish) to anyone interested in regional matters through the FIOH website.

Another joint activity with the regional occupational safety and health authorities and the Ministry is the legal **Register of Workers Exposed to Carcinogens** (ASA Register) which has been maintained by FIOH since 1979. Each year, FIOH provides a list of 'ASA workplaces' to regional authorities for information and for checking that the notification duties of employers are fulfilled. FIOH publishes annual statistics on carcinogen exposures on the internet. ASA was evaluated in the late 1990s by a questionnaire survey and an epidemiological follow-up study. It was considered to have a sufficient preventive effect on carcinogen exposures at workplaces, and based on these results the Ministry decided to continue the obligatory duty of workplaces to notify the ASA of workers exposed to selected carcinogens. The re-evaluation of the impact of ASA and a related epidemiological study on possible cancer risks among notified workers is to be carried out in 2014.

Effective prevention of hazards and the promotion of well-being at work require a good national fact basis. *Influence through Knowledge* includes a team that produces **national surveillance information** on a wide variety of OSH issues. FIOH's surveillance tools include interview surveys (e.g., Work and Health surveys); annual or periodic information on occupational diseases, carcinogen exposures and occupational hygiene measurements (e.g., three legal registers): and the collection, analysis and dissemination of information of other data providers, such as Statistics Finland, the Federation of Accident Insurance Institutions, the Social Insurance Institution of Finland (Kela), the Finnish Centre for Pensions and the National Institute for Health and Welfare. FIOH provides an analysis, expert assessment and summary of the national state and trends of OSH every three years by publishing a book (**Work and Health in Finland**). These books and comprehensive information on the related Work and Health surveys are freely available on FIOH's website (In Finnish, with extended Swedish and English summaries).

Questionnaire-based surveys are rapidly becoming old-fashioned as a means of reaching respondents. The response rate in all interview studies has decreased significantly due to the poor availability of cell phone numbers for contacting respondents. The Internet panel approach among the safety officers and representatives of workplaces has been tested as an alternative for interview surveys. Reliability issues also concern other producers of survey data, and we will search for solutions to this in 2014 together with Statistics Finland, the National Institute for Health and Welfare, and the Ministry of Employment and the Economy.

COCHRANE Collaboration on Occupational Safety and Health Review

Table 5.4.2 Indicators of COCHRANE collaboration

| Indicator\Year | 2010 | 2011 | 2012 |
|---|-------|-------|-------|
| Full Cochrane reviews published | 1 | 4 | 6 |
| Cochrane Protocols published | 0 | 2 | 15 |
| Authors involved | 7 | 40 | 151 |
| Readers of Cochrane newsletter | 800 | 930 | 982 |
| No. of international (regional) Newsletters | 3 | 3 | 3 |
| No. of issues | 3 | 3 | 3 |
| No. of pages | 252 | 224 | 256 |
| No. of readers of above | 38700 | 38700 | 38700 |
| Contributors of articles etc. | 96 | 85 | 115 |
| Visitors on the internet | N/A | 2095 | 3815 |

FIOH houses and finances the editorial base of the Cochrane Occupational Safety and Health Review Group (OSH CRG). FIOH has invested in Cochrane since 2003 when the first activities began in the Cochrane Occupational Health Field. The Cochrane Collaboration upgraded the status of the field to a review group in August 2010. The group's goal is to publish systematic

reviews of the effectiveness of occupational safety and health interventions. The group has now full discretion over which topics are taken up for reviews and the group is also responsible for the quality of their reviews.

The editorial base consists of a co-ordinating editor (0.8 FTE), a managing editor (1 FTE), trials search co-ordinator (0.8 FTE in 2014) and a statistical advisor (0.2 FTE). Cochrane reviews are used as evidence input for guidelines both in Finland and abroad and as a basis for policy decisions. The Finnish guideline producer Duodecim has calculated that half of their guidelines are based on Cochrane Reviews. NIOSH, FDA and CDC issued a recommendation for surgeons to use blunt needles where possible, which was based on an OSH Cochrane review.

The group's five-year business plan foresees the publication of 15 new reviews, 15 new protocols, 25 new titles and the recruitment of 40 new authors by 2015. There is a constant influx of new titles and the output will be higher than planned. The editorial base works with voluntary review teams and also produces reviews commissioned by external funders (so far: Work Safe British Columbia, SafeWork Australia, the Finnish Work Environment Fund)

The group maintains a website containing guidance on how to start and conduct a Cochrane review and produces a bi-monthly newsletter that is currently mailed to 1375 readers.

The titles of the reviews cover a wide range of important occupational health and safety topics, such as decreasing exposure to physical factors, disability prevention, management of occupational diseases, workplace-based health promotion interventions, regulatory workplace inspections and prevention of needlestick injuries. Topics that have not been taken up are prioritized on the basis of a Delphi-like approach among the readers of the newsletter and the editorial and advisory boards. (<http://osh.cochrane.org/priority-topics-0>).

The group's challenges are to find the right mix of methodological rigour and practical relevance, especially for safety interventions, and to keep control of the review process. The biggest risk is that the voluntary review teams do not have the stamina to finish their reviews and abandon their project. This requires considerable input from the editorial team.

In addition, the editorial group produces other reviews capitalizing on Cochrane methodology, besides intervention effectiveness reviews. Aetiology reviews are especially important for OSH. The group reviewed the role of shift work as a risk factor for breast cancer commissioned by the Danish Work Environment Fund. Prognostic reviews are also valuable, and the group is currently working on a review of factors predicting hearing loss as a result of noise exposure funded by the Finnish Work Environment Fund. A Cochrane methods group for aetiology reviews is under construction. Methods that could be beneficial to OSH research are further explored, such as the use of non-randomized studies in intervention reviews.

The expertise of the OSH CRG is also used in national and international evidence-based guideline projects, such as the WHO essential occupational health interventions and nanomaterial guidelines. Given the emphasis placed on evidence-based guideline development by WHO, this is highly valuable expertise. As part of the Partnership in European Research on Occupational Safety and Health (PEROSH), the group leads a Clearing House project on OSH reviews (www.perosh.eu). The project aims at bringing together OSH relevant systematic reviews and methods for reviews.

From late 2010 through 2013, FIOH has served as the Finnish correspondent in the Network of European Observatories (NEO), organized by EU's European Foundation for the Improvement of Living and Working Conditions ([Eurofound](http://eurofound.eu)). This activity has entailed the provision of information services regarding working conditions (EWCO), restructuring processes and cases (ERM, EMCC), and industrial relations (EIRO; subcontracted). The products, all openly available on the Eurofound website, have included Finnish contributions to Eurofound's comparative reports (10/year) and sectoral representativeness reports (4–6/year) as well as shorter news items ('information updates'; 12–16/year), certain annual reports, and major restructuring events (primarily mass). In the comparative reports, particular attention has

been given to the impact of the 2008–2009 financial crisis on working conditions in both general and specific sectors, as well as among the young and residents with a foreign background. Topics on restructuring have included tools and instruments designed to assist employers and employees in companies undergoing restructuring.

Table 5.4.3 Contributions and information updates

| Indicator\Year | 2010 | 2011 | 2012 |
|---|------|------|------|
| No. of contributions to Eurofound's comparative reports | | 10 | 10 |
| No. of Eurofound information updates | | 16 | 16 |

5.5 Summary of self-evaluation and discussion

A summary of the activities of FIOH's *Influence through Knowledge* is provided in the self-evaluation table below.

In its recommendations, the previous international evaluation group stated that (Rec no. 15):

The FIOH should develop a comprehensive plan toward increasing productivity in Finland's workers by prevention of occupational health problems that reduce a worker's ability to function. This plan should focus on aging workers but also on new workers.

To address this, special communication efforts have successfully been made in the economic feasibility of occupational health and safety activity. This has been carried out on both a personal and a network level. The issue of ageing has been one of the two main objectives of the Leadership Development Network, which has been the responsibility of FIOH since its establishment in 2011.

The overall quality and achieved impact of external communication is rated as good. In particular, the quality of personal communication is rated as excellent. This is supported by the fact that a number of FIOH's experts are in high demand as speakers at well-being at work events.

Regarding the use of internet, the 2009 IEG recommended that (Rec no. 18):

FIOH consider sharing information widely, particularly addressing the needs and barriers (e.g. cost) of small enterprises and entrepreneurs. The FIOH is in the process of transforming its website for easy usability and to make information widely available. The 2009 IEG strongly recommends continuing expansion of these efforts to reach this important group constituting a majority of workplaces in Finland.

These recommendations have been addressed by improving FIOH's website and using the various networks that FIOH leads (the Leadership Development Network, the Forum for Well-being at work, the Zero Accident Forum), as well as the extended use of the social media. The Zero Accident Forum is a good example of a concept that can successfully be used by SMEs. However, despite all efforts, FIOH still does not reach a sufficient number of citizens.

Expert engagement is also rated as good. The achieved efficiency of implementation is moderate because an increasing amount of staff time is used per official statement.

In its recommendation, the previous international evaluation group stated that FIOH should (Rec no. 31):

continue to improve the effectiveness of OHS in collaboration with key organizations and associations of relevance to this area. Due to great demand, regional differences and availability of expertise should be considered in this context. Training provided to OHS should be further updated to focus more on prevention and key priorities in Finnish working life (especially mental health) and to be flexible enough to also address new risks and emerging needs.

FIOH developed the 'Policy Brief' concept in 2012. These briefs are particularly directed at decision-makers in OSH matters.

The overall quality and achieved impact of networking and stakeholder relations is rated as good. The use of regional and national networks has been quite successful. Therefore the achieved impact on the national level has to be considered excellent. Performance in the international arena has continued to be excellent.

The recommendation of the previous IEG on the European and international collaboration (Rec no. 37) stated that:

The IEG commends the FIOH for the scale and scope of its European and international collaborations and strongly recommends the continuation and growth of these efforts.

Activities at both the European and international levels have been continued on as wide a scope and large a scale as the economic framework has allowed.

The recommendation of the previous IEG on collaboration with International Organizations and developing nations (Rec. no. 38) stated that:

The IEG notes with appreciation the FIOH's contributions to the health and safety of workers in developing nations through its collaborations with the WHO, the ILO and the Finnish Ministry for Foreign Affairs, and strongly recommends the continuation and growth of these efforts.

Both the Ministry of Social Affairs and Health and FIOH deem the systematic work with International Organizations; WHO and the ILO in particular, as an extremely important form of achieving system-wide impact. FIOH's contributions to WHO and ILO activities have been further strengthened in the past few years. This work also opens avenues to collaboration with developing nations.

In 2010–2012, the regional newsletters remained the channel for maintaining networks in East Africa and South-East Asia, as FIOH has not been eligible for funding from the Ministry for Foreign Affairs on the basis of its legislation.

In conclusion, the overall quality and impact of FIOH's *Influence through Knowledge* activities are in good standing. Performance in the international arena is excellent and the latest development in national networking must also be rated excellent. To reach wider audiences, FIOH has to learn to use e-media more efficiently.

| Functions | Quality | Efficiency of implementation | Use of partnerships | Potential impact | Achieved impact |
|--|---------|------------------------------|---------------------|------------------|-----------------|
| External Communication: | ++ | ++ | ++ | ++ | ++ |
| • Personal communication | +++ | ++ | ++ | ++ | ++ |
| • Printed media | ++ | ++ | ++ | ++ | ++ |
| • E-media | ++ | ++ | ++ | ++ | ++ |
| Expert engagement | ++ | + | ++ | ++ | ++ |
| Networking and stakeholder relations: | | | | | |
| • Brand promotion | ++ | ++ | +++ | ++ | ++ |
| • Regional | ++ | ++ | +++ | ++ | ++ |
| • National | +++ | ++ | +++ | +++ | +++ |
| • International | +++ | ++ | +++ | +++ | +++ |

Self-evaluation (Moderate +, Good ++, Excellent +++)

6 Competence

6.1 Human resources

Personnel Structure

FIOH employed 778 people at the end of 2013, which is 76 less than in 2009 (shows a continuous decrease; 11 less than the previous year). Women comprised 72%, and the average age of employees was 46.5 years. Staff turnover increased slightly but remained relatively stable. The turnover of permanent staff was 6.8%. A total of 23 employees retired, and the average retirement age was 63.9 years, which is well above the national average retirement age of 60.9 years.

Table 6.1.1 Personnel structure

| | 2009 | 2011 | 2013 |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Employees | 854 | 824 | 778 |
| Person-years | 751 | 736 | 709 |
| Type of employment | Permanent: 74% Temporary: 26% | Permanent: 75% Temporary: 25% | Permanent: 77% Temporary: 23% |
| Turnover of permanent staff | 8.1% | 6.9% | 6.8% |
| Average age | 46.3 years | 43.6 years | 46.5 years |
| Average retirement age | 63.6 years | 62.1 years | 63.9 years |
| Gender distribution | Women: 71% Men: 29% | Women: 71% Men: 29% | Women: 72% Men: 28% |
| Sick leaves, percentage | 3.5% | 3.4% | 2.3% |
| Average training days per person | 3.6 days/person | 3.7 days/person | 2.6 days/person |

As competition for competent employees continues to be fierce, it is essential that FIOH finds and recruits people with the right skills to meet both current and future needs. The recruitment policy at FIOH concentrates on future prospects: in recruiting new experts, the focus is not only on their ability to extensively use their current knowledge in FIOH's operations, but also on their potential to develop their competence in accordance with future needs.⁷⁰

FIOH employees have a high level of education, with 24% holding a doctorate degree and 9% a licentiate degree. A total of 67% employees have at least a Master's degree. Both its level of education and its age structure make FIOH an expert organization: staff have theoretical knowledge as well as competence based on long work experience.

⁷⁰ IEG2009 recommendations no. 9 and 50

Well-being at work

FIOH's management uses the Annual Personnel Statement Report for managing activities related to the well-being of its personnel. This report is based on analysing the relationship of personnel investments and outcomes.

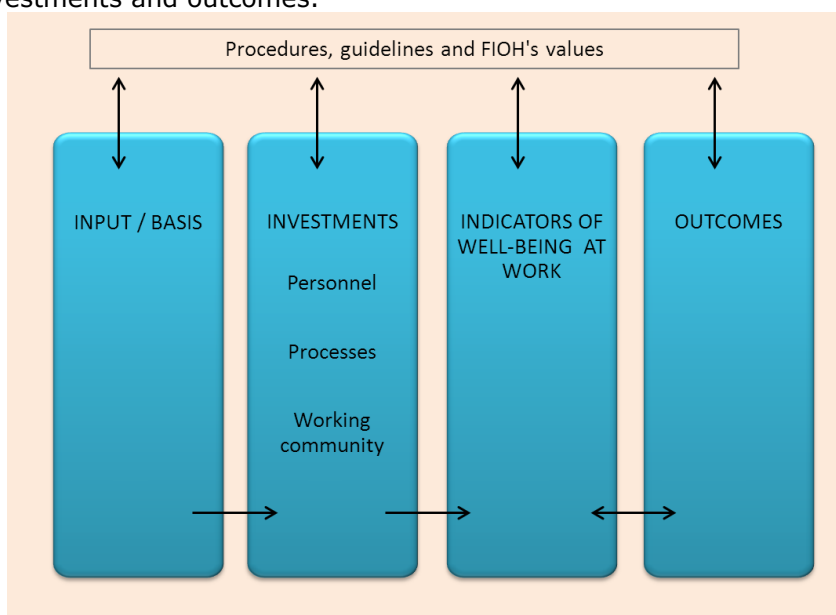


Figure 6.1.1 Investment-outcome model of FIOH's Annual Personnel Statement Report

The indicators often used to measure well-being at work are, for example: employment turnover, amount of sick leaves, employees' workloads (e.g. amount of overtime), and various questionnaires directed at different personnel groups. At FIOH these indicators and their changes are followed on the level of the whole personnel but are also targeted at, for example, a specific unit level. FIOH's *Centres of Expertise* are responsible for their staff's well-being. Each unit annually plans and evaluates goals and activities for managing the well-being of its teams.

The level of sick leaves at FIOH is relatively low. In addition, the number of long-lasting sick leaves in particular has been declining. The amount of overtime has risen slightly, but not alarmingly. Total personnel turnover is less than 30%, which can largely be explained by temporary employment contracts and the retirement of employees. The leaving rate of permanent employees has declined to 6%. In 2013, a personnel satisfaction questionnaire was carried out, using a barometer widely used by the Finnish state administration.⁷¹ The following table shows the results of the six main indicators:

Table 6.1.2 Results (means) of FIOH's personnel and of the Finnish state administration in the key indicators of the State job satisfaction survey in 2013

| | FIOH, 2013 | Finnish State Administration, 2013 |
|--|-------------------|---|
| Actions of the management as an example and as a forerunner | 3.16 | 3.14 |
| General organization of work within the work community | 3.22 | 3.22 |
| Functionality of result and performance appraisals as a tool for developing know-how | 3.20 | 3.04 |

⁷¹ IEG2009 recommendation no. 52

| | | |
|--|------|------|
| Opportunities given by supervisors and management to renew and enhance the operational environment | 3.44 | 3.25 |
| Transparency of the working community in preparatory work and decision-making | 3.29 | 2.99 |
| Inspiration and satisfaction experienced from work | 3.79 | 3.55 |

Scale = 1 (very dissatisfied) to 5 (very satisfied)

In 2012, FIOH updated early support practices and implemented sickness absence monitoring to correspond with the 30-60-90 model. The discussions and work ability negotiations of the operating model are in active use. Work ability and return to work after extended absences through rehabilitation, work trials, and partial sick leaves when necessary, are supported. An early support method called "TYÖTIE" (work road) was developed to improve well-being at work by helping supervisors recognize problems at an early stage, and to assist in constructively discussing challenging and difficult topics. An evaluation questionnaire on the benefits of the "TYÖTIE" method is carried out annually to further develop its processes. In addition, collaboration between supervisor work (managing well-being at work), OHS and occupational safety representatives has been improved in the organization. ⁷²

Various steps have been taken to help employees and operations adapt to FIOH's new matrix organization structure. In 2011, an external coaching organization carried out a project to support the organizational change. A total of 73 participants discussed different themes in small groups, including the new processes and procedures of the matrix, supporting implementation and client relations, competence development management, and supervisory skills. The coaching concentrated on helping to understand the concept of the matrix and the ways in which the new organization model affects planning, financial responsibilities, leadership, and specific challenges such as how to motivate employees or work as a supervisor in a different location. After the project, 62% of attendees reported that their understanding of FIOH's matrix organization had improved to some extent.

A small group coaching project was launched in 2013 with the goal of strengthening team work by increasing knowledge and offering means to recognize procedures and practices that especially add to mental strain. The project supports FIOH's change to a matrix organization, which began in 2011. Specific themes for improving personnel well-being were recognized in the change project and small group coaching is offered to support these themes by developing continuous practices and methods. ⁷³ The effectiveness of small group coaching is ensured at different levels. The applicability of topics for coaching, and the selection of participants and their ability to commit are taken into consideration when selecting the groups. The working methods and the coach's ability to develop the safety of the group are important factors for ensuring that the coaching aims to find real answers to everyday problems. In addition, the members of FIOH's *Executive Committee* work as sponsors in order to support communication between the groups and the upper-level management decision-makers.

A collaboration forum was also established by FIOH's *Areas of Activity* and *In-house Services* in 2011 to support open discussion on topics across unit boundaries, including common co-ordination and information-sharing. In an effort to reduce bureaucracy in the organization and to activate employees to participate in developing FIOH's operations and processes, all employees were asked to give new ideas on enhancing the efficiency of FIOH's operations and processes. A total of 41 suggestions for improvement were addressed, processed, and replied to by the unit in charge of the matter. ⁷⁴

A majority of the personnel is either satisfied or very satisfied with the competence development measures and workplace training opportunities offered by FIOH according to the State job satisfaction survey of 2013 (67% of the respondents). An individual performance

⁷² IEG2009 recommendations no. 10 and 51

⁷³ IEG2009 recommendation no. 52

⁷⁴ IEG2009 recommendation no. 11

appraisal is carried out with almost every employee annually. However, the activity and dialogue of the appraisals requires further improvement, as 20% of the respondents were unsatisfied with their own performance appraisals.

FIOH has taken different steps to ensure that important knowledge and competence does not disappear from the organization as a considerable amount of employees approach retirement age. FIOH has implemented a set of organizational practices through age management.

A method called "Age stops" was developed to remind both the supervisor and the employee to have discussions and prepare for an employee's possible retirement. At different age stops, the employee and supervisor, in collaboration with OHS, hold a development dialogue in which they consider the employee's competence, hopes for development, ability to work, and overall life situation. The development dialogues are carried out during the year the employee turns 45, 55, 60, or 65. Towards Successful Seniority coaching (TUURA) supports ageing employees' well-being at work by providing new ideas and perspectives on how to manage their workload and maintain their own competence at work.

FIOH has also conducted special long-term retirement transition training for employees close to retirement age. The purpose of the so called "+58 Beautiful Exit Plan" is to support employees in drawing up a plan for the last period of their work life by sharing their experiences of the meaningfulness of work. The training helps both the employee and the supervisor prepare for forthcoming retirement, by tackling issues such as how to share tacit knowledge in the organization.⁷⁵

In addition to the ageing senior employees' group, another special personnel group at FIOH is that of young researchers at the beginning of their careers. It is important that young researchers are committed and that they find their role in the research institute of work life. Mentoring is one of FIOH's methods in which the needs of younger and senior employees meet. The objective of FIOH's mentoring programme is both the professional and personal development of the mentoree, and from the organization's perspective, the transfer of knowledge, experience, and networks as the organization's capital. In other words, mentoring can be described as "Thinking companionship" at FIOH. The programme is conducted approximately once a year. The themes are: enhancing professional competence, expanding one's overall view, recognizing one's own recourses, increasing self-knowledge, networking, improving managerial skills, and supporting the transfer of tacit knowledge.⁷⁶

To ensure that employees' achievements are recognized, FIOH awarded extra monetary rewards in both 2012 and 2013. The goal of this was to acknowledge the employees who through their work had positively contributed to FIOH's results in the fields of services, research, and communications. The awarded were employees who had spontaneously taken extra responsibilities to share tacit knowledge and had actively increased competence that benefits the working community. FIOH has awarded extra monetary rewards by an amount of approximately 18 k€ per year (0.8% of the total monthly salary cost).

In an expert organization such as FIOH, employees appreciate and are motivated by the recognition of their peers. Therefore, intangible rewards such as appreciation and recognition are vital for the motivation of employees. Recognition is an open acknowledgement of an employee's behaviour and performance in their work. Intangible rewards are annually given to employees in different work roles (e.g. Employee of the year, Supervisor of the year, R&D project manager of the year, Trainer of the year, and the most effective Influencer through knowledge). FIOH also invests in making each employee feel appreciated for their contributions and their accomplishments. Feedback skills and culture have been recognized as

⁷⁵ IEG2009 recommendations no. 9 and 50

⁷⁶ IEG2009 recommendations no. 9 and 50

a topic that needs more attention and therefore training is provided that concentrates on giving effective feedback.⁷⁷

The organizational structure supports competence development, which is essential at FIOH. Current methods are at a satisfactory level. However, ambition and plans exist to continue the development and implementation of these methods. The methods related to performance management in particular need more attention. Qualifications related to scientific work are developed in projects and teams. Several of FIOH's scholars also act as part-time professors or adjunct professors at universities, and supervise the doctoral dissertations of young researchers. These seniors guarantee the quality of the outcomes of the studies by sharing their knowledge and experience.

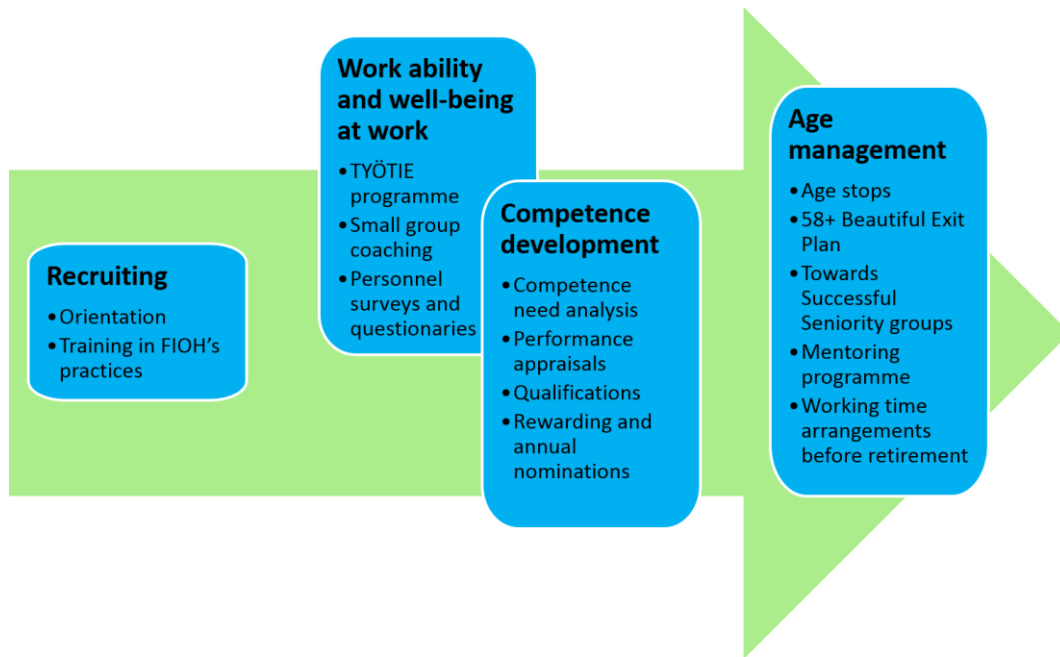


Figure 6.1.2 Methods used at FIOH grouped by the stages of an employee's working career.

The quality and involvement in activities promoting work ability and well-being at work have increased. This is due to systematic procedures that are supported by the *Executive Groups* of the *Centres of Expertise*, in which the team leaders report on different aspects of work ability and well-being at work in their teams on a monthly basis. The procedure is supported by sickness absence data. In addition, the *Centre of Expertise for Health and Work Ability* has launched a pilot project with FIOH's OHS provider with the aim of developing closer co-operation with team leaders in this area.

In the area of competence development, a new stronger emphasis is applied to systematic and timely interaction with FIOH's *Areas of Activity*. In addition, new procedures to ensure the dissemination of the new knowledge produced in projects are being developed.

Intellectual capital

One of the most important aspects of FIOH's operations is the ability to create and apply new knowledge. A concept of managing intellectual capital has been implemented at FIOH. This concept relies on a model of three aspects: human capital, structural capital, and relational capital. Human capital is the knowledge, skills, experience, and intuition of each employee. Structural capital consists of organizational and technological elements that pursue integration

⁷⁷ IEG2009 recommendation no. 53

and co-ordination within the company, e.g. copyrights, processes, databases, and software. Relational capital is the value of FIOH's relationships and the likelihood that people and organizations in the company's network will keep doing business with FIOH. The common framework for understanding intellectual capital increases the awareness of organizational learning and helps integrate personnel into a unified FIOH.⁷⁸

All FIOH employees are led to use approximately 15% of their working hours for developing intellectual capital. In reality, usage of working time for this varies greatly between teams, from under 10% to up to 35%. Summaries of personnel time reports are used for directing employees to use their working time accurately. Ideally, the majority of time should be targeted at core functions, and the time used for developing intellectual capital should be goal-orientated.

Human resources development (HRD) at FIOH can be placed into the wider context of the management of knowledge workers in a knowledge-intensive organization, including themes such as innovation, knowledge creation and knowledge sharing. This requires FIOH to develop flexible organizational potential to suit changing environments and to keep up organizational competence. One of FIOH's goals remains to support a culture that promotes knowledge sharing and learning among employees and teams. HRD practices such as performance evaluation, training, and rewards may facilitate the building of the organizational culture and guide employees' behaviours.

One key aspect of HRD at FIOH is, and will continue to be, to succeed in knowledge sharing. This is not only transferring knowledge from seniors to other members of the working community. Sharing each member's knowledge is also very important in multi-professional project teams, where the research question on which they are working benefits from different competences. From the knowledge sharing perspective, long-term training under a degree programme has been recognized as an effective method for targeted groups of staff. In 2013, long-term training was implemented in the following areas of expertise: supervisor work, vocational degrees in financial administration, and pedagogic postgraduate studies for employees in educational work.

Currently over 100 different training courses are offered to FIOH's personnel. These are excellent channels for different personnel groups to broaden their knowledge. In addition to classroom teaching, diverse training methods in use are study groups, online studying, case-work, and guided practical training. From the knowledge sharing perspective, it is logical to have FIOH's seniors as trainers, but in certain areas of expertise external trainers from, for example, universities or other coaching organizations, are needed. FIOH has successfully clarified the structure and policies concerning immaterial properties rights. By contracts and employees' personal covenants, the transfer of, for example, copyrights from the employee to FIOH have been confirmed. A wide variety of new procedures have been put into practice; for example the training materials used by experts are now in common use, and FIOH's own experts arrange training directly for FIOH's staff.

The goal of competence management is to secure FIOH's ability and resources to achieve future visions. This is achievable only when all FIOH's employees constantly acquire new skills and competencies in line with the principles of life-long learning. The *Centres of expertise* maintain and develop the competence of their personnel with the aim of optimally balancing functional needs and the quality and quantity of competence.

The aims of FIOH's human resource strategy are to ensure the availability of the skilled and committed personnel needed by FIOH, and to develop such human resource policies that allow the utilization of existing intellectual capital for achieving common goals. As a knowledge-based organization, FIOH also promotes crucial common skills in many ways, such as business

⁷⁸ IEG2009 recommendation no. 11

and client orientation, scientific approaches, social and communicational skills and innovativeness.

To ensure the adequate and sufficient competence and knowledge of the personnel, a development project of competence and personnel structure was conducted during the spring of 2012. The project is part of transferring FIOH's new strategy into practice. In addition, the alignments of competence were defined for 2012–2015. The project identified FIOH's future competence needs and added detail and clarity to the operating methods used in managing competences. All employees were provided with opportunities to influence and discuss the subject matter together, through questionnaires, workshops, seminars, and *Executive Committee* discussions.

The competence and personnel structure development project defines the focal points of renewing competence at the strategic level and, in more detail, at the *Centre of Expertise* and *Area of Activity* levels. The project also defines responsibilities, instructions, and procedures for the development of competence.

The strategic alignments are:

1. Changing the focus of knowledge on single physical and chemical factors' effects to understanding the connection between physiological, psychological, and communal phenomena, and the work processes related to them.
2. Strengthening the competence development of resources and workplace health promotion alongside controlling work-related risks.
3. Strengthening the competence of OHS and the development of the operational environment
4. Strengthening evaluation and intervention competence
5. Increasing and investing in the international focus
6. Improving client, partnership, and interest group competence
7. Improving internal co-operation competence

Centres of Expertise

In FIOH's matrix organization model, the *Centres of Expertise* are responsible for their personnel's competences and well-being at work. Therefore, the main focus is to ensure that the capabilities and amount of personnel are scaled in relation to the targets at both the operative and strategic level.

The building of competence in the area of systems toxicology has been a successful example of team reorganizing. First, four research teams were merged and put under one team leader. Second, a bioinformaticist was recruited to enable the team to fully use its systems biological apparatus. Third, the team's network with clinicians was strengthened to make its approach more relevant to clinical practice. This has already resulted in mutual research plans and applications.

Centres of Expertise consist of *Teams*, which are formed on the basis of specific competence areas. Team leaders are both supervisors of team members and experts in their own area.

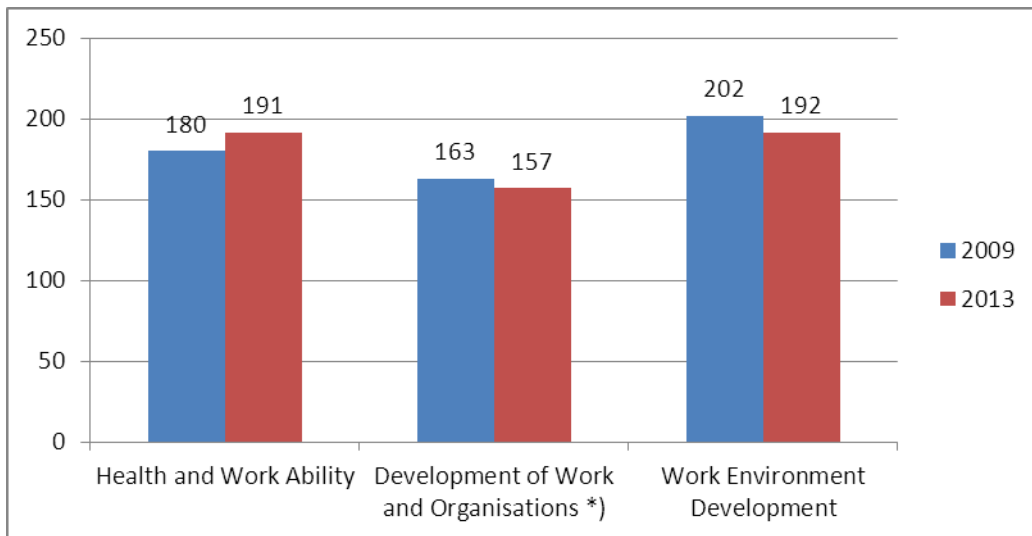


Figure 6.1.3 Changes in person-year resources per Centre of Expertise in 2009 and 2013

At the beginning of 2013, the *Centre of Expertise for the Development of Work and Organizations* began its operations. It was formed by merging the former *Centres of Expertise for Human Factors at Work* (2009: 80 person-years) and *Work Organizations* (2009: 80 person-years).

Work Environment Development

The *Centre of Expertise for Work Environment Development* is responsible for special knowledge and skills in the development of safe physical work environments in the context of today's changing work life.

The unit's special knowledge capital comprises expertise in chemical safety, electro-magnetic fields, noise and vibration, fine particles and aerosols, and in new safe technologies such as nanotechnology. The personnel consist of experts in chemical, physical and biological risk assessment and management. The continuous competence development focuses on combining the different disciplines and players of the field in a multi-professional manner.

The method is to combine research and development to answer the needs of clients and to solve their problems through joint projects and services. The client organizations are encouraged to solve problems independently and are given tools to accomplish manageable tasks in, for example, risk assessment.

Development of Work and Organizations

The *Centre of Expertise for the Development of Work and Organizations* maintains and creates knowledge and professional qualifications in work analysis, and the development of work, organizations, safety, and well-being at work. The unit also creates knowledge through research on psychosocial factors at work, work engagement, working hour arrangements, ergonomics, and changes in work life.

The educational background of the personnel is multidisciplinary, and consists of, for example, social scientists, psychologists, engineers, and medical doctors representing different areas of specialization. Therefore, several diverse approaches and methods can be applied both in the studies and in the consultative work at workplaces. Competence development focuses especially on intervention and evaluation research and on the methodologies for studying and developing safety critical professions. Knowledge related to safety critical professions has been shared and created in collaboration with the other two *Centres of Expertise*.

Health and Work Ability

The *Centre of Expertise for Health and Work Ability* is responsible for knowledge capital and resources in the fields of health, work ability, and OHS.

The unit's special knowledge capital comprises the areas of occupational medicine, promoting health and work ability, functional capacity, the epidemiology of work-related diseases, disability management, and systems biological mechanisms in occupational diseases. Its personnel consist of physicians, occupational health experts, physiologists, epidemiologists, biologists, nurses, and experts in behavioural and educational sciences.

Conclusion: key messages for the future

FIOH has successfully carried out a number of planned actions to improve the level of well-being at work in the last few years. In recent years, FIOH has also taken various steps to help employees and operations adapt and integrate into FIOH's new matrix organization structure. In the state job satisfactory survey conducted in 2013, all FIOH's results in the six main indicators were above the average of the Finnish State Administration personnel.

In 2012, FIOH's strategic competence *Focus Areas* were identified. The strategic alignments of competence direct learning and knowledge sharing in the organization. Moreover, the alignments support planned and consistent competence development in order to better answer the needs for developing products and services. In the future, it will be important to balance the competence of the personnel and the requirements of the operational environment.

Development of work and organizations: An interesting aspect is to consider how to utilize research competence in FIOH's own internal processes. At FIOH, work and its changes are approached mainly through questionnaires in surveys. Analysing actual work activities and changes in these are rare, but unique methods to conduct them exist. The analyses are made in a participative way, and the work and its methods will improve during the analysis. Methods to analyse work and its changes are developed in collaboration with the University of Helsinki. The performance capacity of these methods is also considered good. Furthermore, well-being at work is studied very intensively at FIOH, and the quality of the studies is excellent. Theories on work-related psychosocial stress, burnout and work engagement, and methods for operationalizing them are used by several research groups. The challenge is to integrate the measures of productivity and efficiency into the studies, and also into our service work.

Health and work ability: Recruiting in the area of occupational medicine and occupational diseases has been challenging for a number of years. Due to the expansion of OHS, there is a great demand for qualified physician workforce in the labour market. In addition, occupational health specialists experience the scope of traditional occupational diseases as too narrow. Most recently, closer co-operation and flexible contracts have been sought from large OHS units to overcome this challenge. Research competencies need strengthening in the area of OHS. Thus, the OHS team has merged with a team of qualified scientists with an epidemiological background.

Work environment development: This unit has a high level of knowledge capital and its competence development programmes have been useful among, for example, occupational hygienists. The capacity to build high-level expertise through theoretical education as well as learning through work is good. The strongest aspect of the development of the physical environment has been the work to increase safety and reduce the risks of exposure, as well as understanding the influence of a comfortable work environment on the productivity of companies. The strengths are in the evaluation and control of safety and risks in the work environment. The breakthrough in developing the concept of the work environment as an empowering resource has not yet taken place, although in the office environment the development has been good. Further development of the theoretical framework is needed. The high level of competence and appropriate resources, together with FIOH's national leading role, have guaranteed the capacity to reform even in challenging economic times.

FIOH has implemented a set of organizational practices by means of age management to ensure that important knowledge does not disappear from the organization due to the retirement of staff. In addition, the concept of intellectual capital supports the transfer of knowledge from the individual to the organizational level, while emphasizing the importance of structural and relational capital, in addition to human capital. Furthermore, the methodology of team performance appraisals focusing on joint projects and work-related knowledge development also supports knowledge sharing.

It has been found that enhancing the target orientation and systematic approach of competence management needs more attention. Practices in the documentation of one's professional achievements and qualifications transfer knowledge more explicitly. The documentation could, for example, combine the external funding of a researcher and the outcomes of the projects. The learning of all the participants in a project is one of its important outcomes.

6.2 Technologies

FIOH has outsourced all basic ICT functions and services such as its service desk, server services and server capacity. FIOH is currently modernizing its ICT infrastructure. The main goal of the modernization is to offer up-to-date, efficient methods of working.

FIOH has an *ICT Steering Group* which leads organization enterprise architecture and supervises ICT services. The group has members from each organizational unit.

FIOH has a specified ICT policy:

- Influence through knowledge using modern technology
- Data and knowledge will be shared, open and managed professionally
- Collaboration without demands of time, place or device
- More cost-efficient ICT infrastructure through package solutions and standardization
- Improved user experience in each ICT function and service will improve

The ICT policy guides the development of ICT services and systems development.

After the previous evaluation, several ICT projects have significantly improved FIOH's ICT infrastructure. For example, FIOH has increased automation and improved HR processes with a new HR system (Helmi). The new Online Meeting system (Lync 2013) has increased time-, place- and device-independent collaboration (Online meetings, instant messaging, presence information, and unified communication). FIOH is also deploying MS SharePoint 2013 (Into) for a new way to work together. MS SharePoint offers a single place to store all documents and collaborate with colleagues in real time. MS SharePoint also has several new functionalities which modernise our working methods (social feeds, communities, mobile functions). In addition, FIOH will also upgrade its workstations' operating system from MS Windows XP to MS Windows 8.1 in the first half of 2014.⁷⁹

⁷⁹ IEG2009 recommendation no. 8

7 Financial Resources

FIOH's financial situation was stable in 2009–2012. During the strategy period, the state subsidy decreased by 5%. To adapt to the situation, we identified means of balancing and funding. Total expenditure increased slightly. This increase is partly due to higher salaries and salary-related social insurance costs. Costs other than personnel-related costs have declined in nominal and inflation-adjusted terms. Sales revenues have also increased slightly, which is mainly due to the improved focus of business activities.

FINANCES 2009–2013 1 000 euro

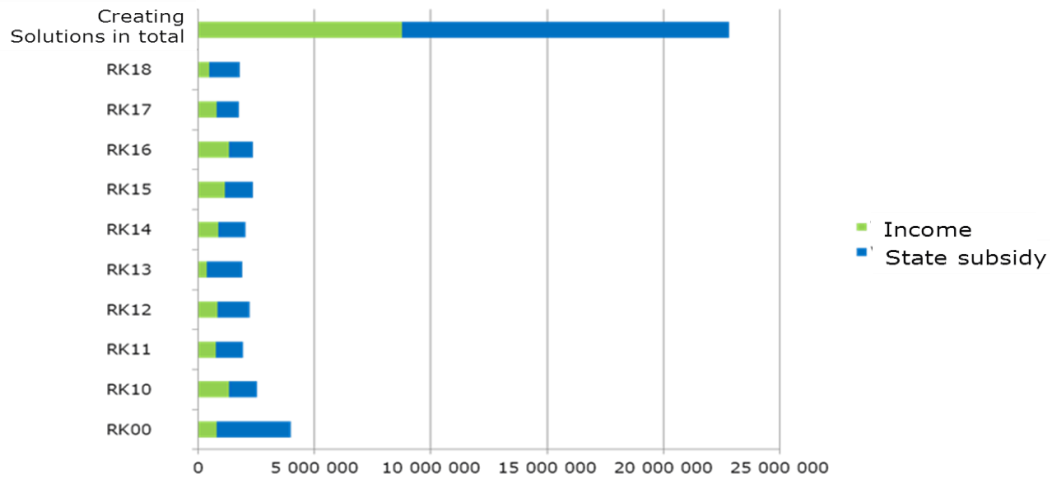
| | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|-------------|------------|------------|------------|-------------|
| OWN INCOME | | | | | |
| SALES REVENUES | 27 753 | 28 129 | 29 556 | 29 250 | 29 581 |
| Research contracts | 9 161 | 9 271 | 9 914 | 8 742 | 9 349 |
| Sales of publications & subscription fees | 1 072 | 1 137 | 1 560 | 1 619 | 1 541 |
| Services | 17 193 | 17 479 | 17 597 | 18 628 | 18 460 |
| Other sales | 326 | 242 | 486 | 261 | 231 |
| MISCELLANEOUS | 704 | 616 | 752 | 737 | 831 |
| TOTAL OWN INCOME | 28 456 | 28 745 | 30 308 | 29 987 | 30 412 |
| EXPENDITURES | | | | | |
| Salaries and fees | 32 193 | 33 041 | 33 414 | 33 068 | 34 035 |
| Salary-related social insurance costs | 6 501 | 6 672 | 6 692 | 7 184 | 7 412 |
| Depreciations of fixed assets | 542 | 740 | 698 | 690 | 650 |
| Other personnel costs | 3 016 | 2 588 | 2 619 | 2 803 | 2 542 |
| Materials/Goods | 2 503 | 2 327 | 2 593 | 2 609 | 2 479 |
| External services | 10 064 | 9 432 | 9 294 | 8 430 | 9 014 |
| Rentals & building maintenance | 9 022 | 8 921 | 8 923 | 9 596 | 9 516 |
| Other expenditures | 350 | 330 | 313 | 359 | 447 |
| Changes of material stocks | -84 | 37 | -37 | -12 | 11 |
| TOTAL EXPENDITURES | 64 108 | 64 087 | 64 509 | 64 727 | 66 106 |
| MARGIN AFTER INCOME/EXPENDITURES | 35 652 | 35 342 | 34 200 | 34 740 | 35 694 |
| INVESTMENTS | | | | | |
| Dividend revenues | 113 | 132 | 136 | 92 | 935 |
| Interest revenues | 18 | 104 | 112 | 87 | 61 |
| Pension Fund income | -460 | -34 | 0 | 0 | 0 |
| Interest expenditures | 9 | 4 | 6 | 17 | 1 |
| INCIDENTAL INCOME | 0 | 0 | 0 | 0 | 0 |
| MARGIN AFTER OWN ACTIVITIES | 35 989 | 35 143 | 33 957 | 34 578 | 34 699 |
| SUPPORT | | | | | |
| Government support | 37 918 | 37 000 | 37 146 | 37 461 | 37 115 |
| ./long-term exp.financed by Govt support | 2 117 | 1 662 | 2 430 | 2 356 | 2 656 |
| TOTAL SUPPORT | 35 800 | 35 338 | 34 716 | 35 105 | 34 459 |
| PROFIT/LOSS AFTER SUPPORT | -189 | 195 | 758 | 527 | -240 |
| PROFIT/LOSS FOR THE FINANCIAL YEAR | -189 | 195 | 758 | 527 | -240 |

Table 7.1 FIOH's finances 2009–2012

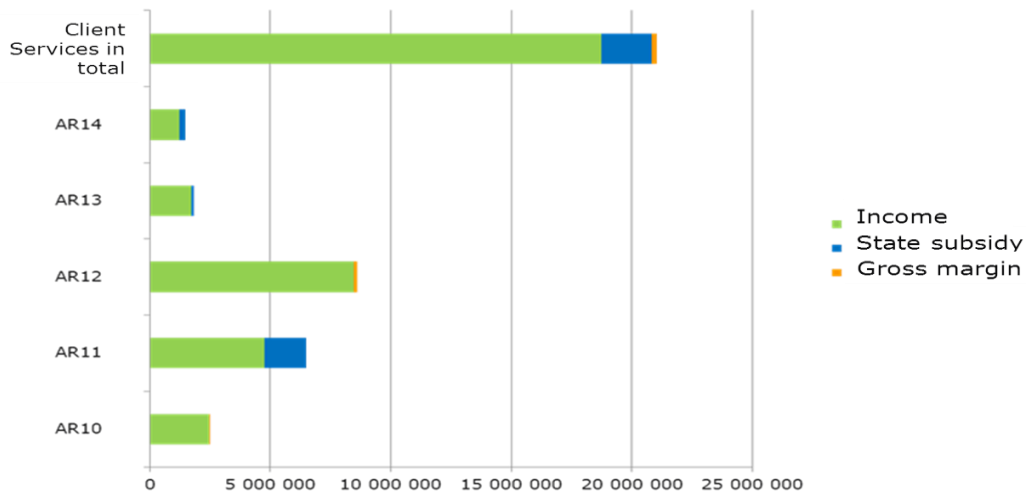
Overview of the financial structure of the Areas of cActivity 2012

The following graphs show the income and use of the state subsidy in the *Areas of Activity*. These graphs also include the subsidiary units of the *Areas of Activity*. Total costs equals income + state subsidy. Some units do not receive a state subsidy. In these cases, the graph uses gross margin instead of state subsidy. Total costs include overheads.

Creating Solutions



Client Services



Influence through Knowledge

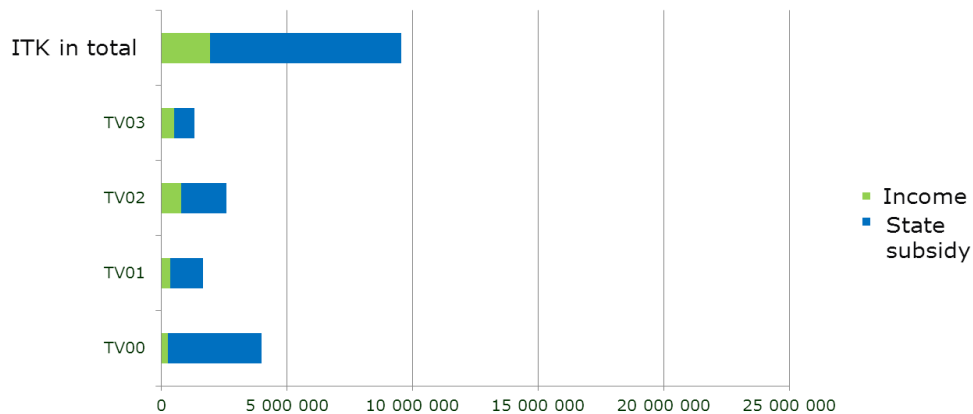


Figure 7.1 Financial structure of the Areas of Activity 2012

Development of revenues

The income of *Client Services* increased during the period, whereas the revenue of *Creating Solutions* remained at the same level, despite variations in some years. *Influence through Knowledge* succeeded in increasing sales.

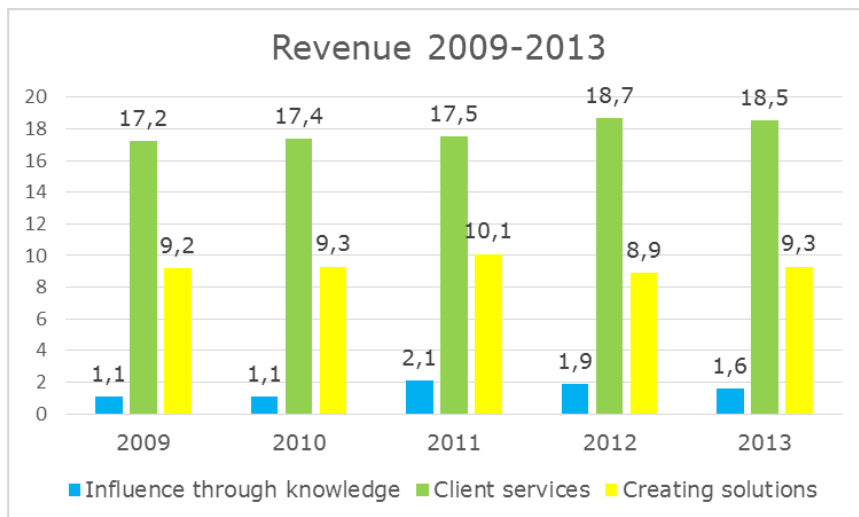


Figure 7.2 Revenue 2009–2013

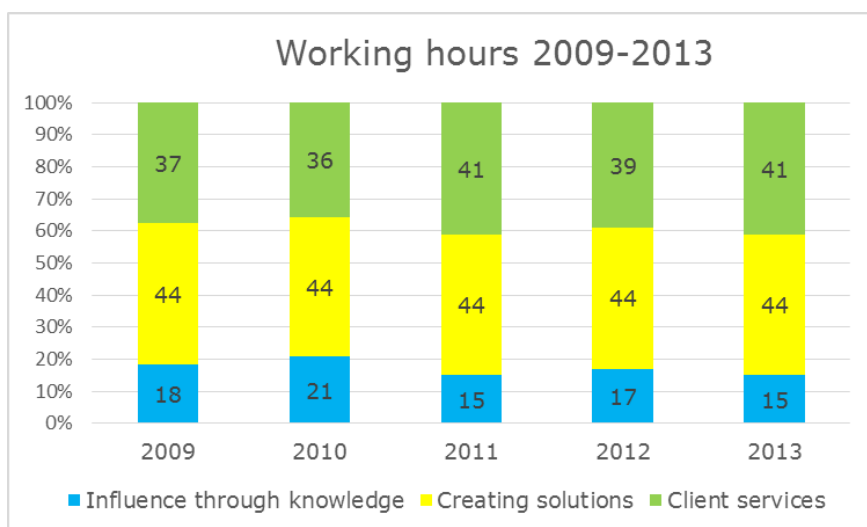


Figure 7.3 Working hours 2009–2013

The proportional distribution of working hours between the *Areas of Activity* remained mainly at the same level in 2009–2013. *Client services* slightly increased its share whereas that of *Influence through Knowledge* somewhat declined.

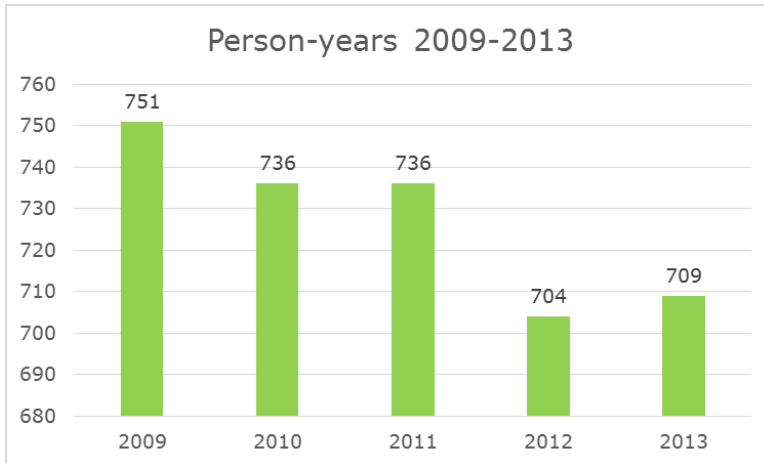


Figure 7.4 Person-years 2009–2013

Total person-years declined between 2009 and 2012. The government productivity programme⁸⁰ has been active since 2003, and in 2005, the government outlined that half of the positions of retiring government personnel should not be refilled. Declining annual person-year goals have also been set for FIOH. The outsourcing of ICT functions had an impact on FIOH’s person-years in 2009–2010. During the period, reductions to FIOH’s state subsidy affected FIOH’s person-years funded through state support. This decrease is expected to continue in the future due to declining government support.

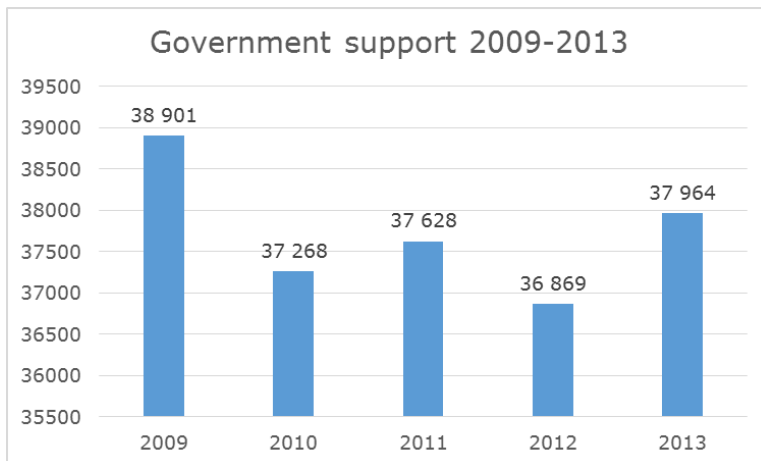


Figure 7.5 Government support 2009–2013

Government support (excluding transfers from the previous year and to following years) declined between 2009 and 2012. This decline is expected to continue in 2014–2017, during which period government support may fall by a further 25%.

Key messages for the future

As the amount of state support is likely to decline in the near future, the need for anticipatory financial planning is growing. Calculation models that focus on the different functioning logic and generation of income of *Client Services*, *Creating Solutions* and *Influence through Knowledge* must be developed. In addition, more detailed information on the proportional

⁸⁰ IEG2009 recommendation no. 2

division of working hours is needed. Because personnel costs are the largest component in the total expenditure and human capital is the critical factor of efficiency, the reporting of the proportional distribution of working hours and their impact must be further developed. The aim is to enhance the awareness of costs among personnel.

Summary of self-evaluation

| | Balance | Financial Management and Administration | Viability/Reforming capacity |
|-----------------|----------------|--|-------------------------------------|
| Finances | ++ | ++ | + |

Self-evaluation (Moderate +, Good ++, Excellent +++)

8 Processes and Management

8.1 Processes and management: core and support processes of FIOH

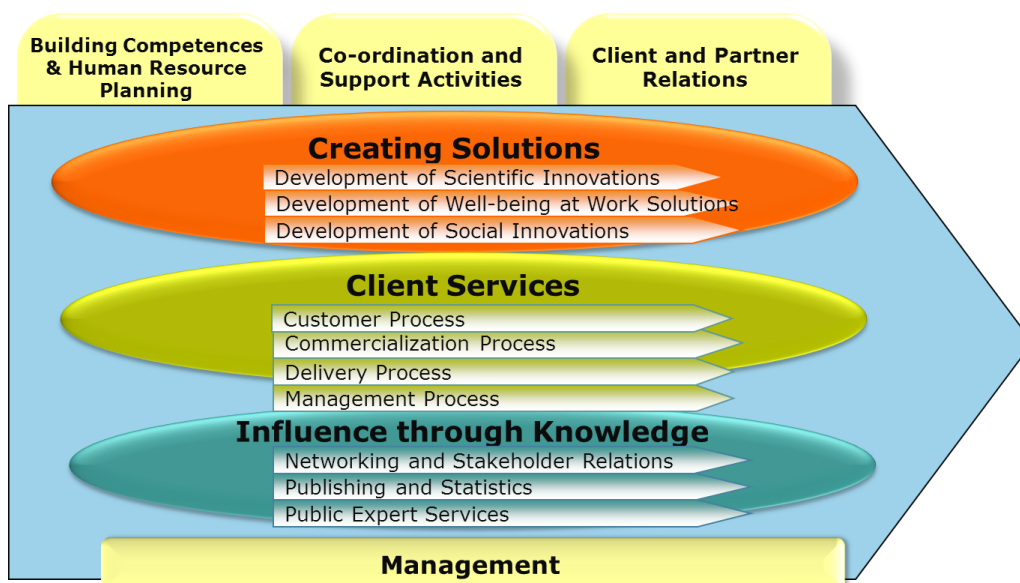


Figure 8.1.1 FIOH's process map

FIOH's **process map** includes its three core processes: *Creating Solutions*, *Client Services* and *Influence through Knowledge*. The outcomes of these processes are presented more closely in Chapters 3, 4 and 5. The process map includes four further support processes 1) Building Competences & Human Resource Planning managed by the *Centres of Expertise*, 2) Co-ordination and Support Activities directed by *In-house Services*, 3) Customer and Partner Relations Management implemented by all units of FIOH, with different emphasis and responsibilities and 4) the Management of FIOH.

The main processes are divided into sub-processes. The R&D project process of *Creating Solutions* guides the development of scientific innovations, well-being at work solutions and social innovations. *Client Services* maintains and develops client, commercialization, delivery and management processes. *Influence through Knowledge* consists of external communication, networking and stakeholder relations and specialist advisory services. Support processes also have sub-processes.

FIOH's **management system** includes the *Board of Directors* with its external representatives and authorities, the *Executive Committee* led by the Director General, the *Executive Groups* of the *Areas of Activity* (operational management of FIOH's Core Processes), and the *Executive Groups* of the *Centres of Expertise* (management and development of human resources and competence). The management system aims for transparent, goal-orientated and systematically assessed leadership and management of FIOH. The management activities are guided by a set of rules and regulations. The Director General empowers directors and team leaders by defining their mandates in the Rules of procedure of FIOH.

The **Board of Directors** is the decision-making body for the most general strategic matters. It holds 6–8 meetings per year. The *Board* approves FIOH's strategy, decides on the budget and plan of operations and approves the annual Activity report. The *Board of Directors* and the

Executive Committee hold strategy seminars two or three times a year in order to maintain the dialogue on strategic matters.

FIOH's **Executive Committee** is responsible for strategic management. The *Committee* is led by the Director General, and the other members are the directors of the *Areas of Activity*, two expert members (Head of administration and Head of development) and one Director of the *Centres of Expertise*. The members of the *Executive Committee* are expected to function as strategic leaders, not only as representatives of their respective units. Each member of the *Committee* is assigned responsibility for one of the *Focal Achievements* (see Chapter 2). Thus the directors of the *Areas of Activity* are also responsible for integrating their operations with the common Focal Achievements.

The preparation of the annual Activity plans and the annual Activity reports is also one of the tasks of the *Executive Committee*. FIOH's activity planning and reporting is adapted to the performance management system of the Ministry for Social Affairs and Health. The performance management system involves a four-year Performance Agreement which meets the strategic objectives of the ministry and government policy. The strategic objectives are set for a four-year period. The objectives are adjusted and monitored annually.⁸¹

The *Executive Committee* meets twice a month for strategic follow-up and decision-making. Strategic indicators⁸² are set to measure strategic outcomes. The progress of the indicators in measuring the success of the *Focal Achievements* is presented in Chapter 2. The strategic indicators for effectiveness are as follows:

Table 8.1.1 FIOH's strategic indicators

| Strategic targets | Indicators |
|---|---|
| Extending working careers | <ul style="list-style-type: none"> • Expected period of working • Expected effective retirement age of 25-year-olds |
| Integration of young people into work life | <ul style="list-style-type: none"> • New disability pensions in the 25 to 44-year age group |
| Development of well-being at work as an investment in resources | <ul style="list-style-type: none"> • Index for strategic management of well-being |
| Increased effectiveness of OHS | <ul style="list-style-type: none"> • Use of follow-up and control models of work ability and early support models among OHS customers • Functionality of co-operation between OHS and workplace • Coverage of OHS in Finland • Coverage of OHS in medium- and small-sized companies • Usage of quality system in OHS |

A set of indicators for internal efficiency was also designed for the strategy period. They include indicators from the Annual Personnel Statement Report, FIOH's performance in fulfilling targets set by the Ministry of Health and Social Affairs, client satisfaction figures, etc. They are reported annually in FIOH's Activity reports.

Table 8.1.2 FIOH's indicators of internal efficiency

| Strategic targets | Indicators |
|--|--|
| <ul style="list-style-type: none"> • Operational efficiency • Functionality of the innovation model: exemplary leadership and management of FIOH | <ul style="list-style-type: none"> • General grade in CAF assessment • The quality of leadership – INSPI questionnaire • Real estate expenses/operating expenses, |

⁸¹ IEG2009 recommendation no. 1

⁸² IEG 2009 recommendation no. 13

| Strategic targets | Indicators |
|---|--|
| <ul style="list-style-type: none"> • The premises of FIOH meet their needs • FIOH is the best partner for building well-being at work solutions locally, nationally and internationally • FIOH is valued and used as a research and expert institute of the State • Market leadership in the quality of well-being services • High competitiveness in acquiring R&D funding • Quality of competences meets the international level • Motivated personnel | <ul style="list-style-type: none"> • Media image index • Amount of key client contracts • The proportion of joint publications of all scientific publications • General grade in MAINE research • General grade in achievement of annual Performance Agreement • Client satisfaction • External R&D funding/R&D person-years • R&D income/costs/R&D person-years • The approval % of the number of R&D applications • Number of scientific and non-scientific publications per R&D person-year • The quality of inspiration and motivation – work engagement, INSPI questionnaire |

Executive committee seminars

To bind together the different dimensions of the matrix (The *Areas of Activity*, *Centres of Expertise* and the different support processes of *In-house Services*) and to enable in-depth reflection and the formation of opinion, the *Executive Committee* holds a seminar once a month. The topics include strategic planning and follow-up but also in-depth analysis of the scientific, financial, communications, and business orientation of FIOH. The seminars bring together the viewpoints of the different *Areas of Activity* on different topics. The topics include all FIOH's main strategic targets: developing working careers, OHS, occupational safety, leadership and well-being at work, as well as specific topics such as developing knowledge management and creating efficient support systems for decision-making, etc.

The ***Areas of Activity*** and units under these are responsible for FIOH's core processes and strategic project management i.e. operative management. They have large financial responsibilities to succeed in generating FIOH's income. The core processes are directed by the directors of the *Areas of Activity* and their respective *Executive Groups*. The *Executive Group of Creating Solutions* includes the *Theme* directors and expert members of the *Area of Activity*; the *Executive Group of Client services* includes the directors of the *Service Centres*; and the *Executive Group of Influence through Knowledge* includes the team leaders of *Influence through Knowledge*. The *Areas of Activity* report their achievements twice a year to the *Executive Committee*, which also monitors the financial progress of FIOH every other month.

Alongside the strategic indicators, a set of operative indicators⁸³ were designed for the *Areas of Activity* in order to guide their goal-setting during the strategy period. The design and development of these indicators are presented in Chapters 3: *Creating Solutions*, 4: *Client Services* and 5: *Influence through Knowledge*.

The ***Centres of Expertise*** are responsible for the support process of building competences and managing human resources. Competence building includes the reinforcement of human capital (knowledge and individual skills), structural capital (processes and technologies) and relational capital (networks and brand value) (See also Chapter 6).

The *Centres of Expertise* are organized into **Teams** based on different expertise and competences. The teams form the organizational home base for most FIOH employees. Teams are led by team leaders, who have an administrative leadership responsibility. The *Centres of*

⁸³ IEG2009 recommendation no. 13

Expertise provide their personnel with opportunities to maintain their professional excellence, skills and competence. In addition, the *Centres of Expertise* are responsible for developing well-being at work. From the competence building and securing well-being at work perspective, the *Areas of Activity* and *In-house Services* have the same responsibilities as the *Centres of Expertise*. When planning the future competences of FIOH, the needs of the *Areas of Activity* are paid a great deal of attention.

The support process for developing the competences of the *Centres of Expertise* is managed by an *Executive Group*, consisting of the director of the *Centre of Expertise* and the respective team leaders.

8.2 Co-ordination and support processes

In-house Services is responsible for the following supportive processes: HR, ICT, Technology and Infrastructure, legal and intellectual property services, financial administration and executive support. These processes are provided for the whole organization and are developed according to the needs of the *Areas of Activity* and *Centres of Expertise*. *In-house Services* is responsible for providing and maintaining the common strategic and financial overview of FIOH.

The director of *In-house Services*, i.e. the Head of Administration, leads the financing, HR and infrastructure functions. Each of these dimensions is monitored regularly by the *Executive Committee* according to an annual time schedule.

Human Resource Management consists of the following activities: recruitment, induction training, organizational development, and annual personnel training. These are planned and executed in close interaction with the *Areas of Activity* and *Centres of Expertise*. These activities are presented in more detail in Chapter 6.

Technology and Infrastructure is maintained and developed by investment procedures. FIOH's *Procurement Committee* steers this activity. All FIOH's units are represented in the Committee.

ICT at FIOH is directed by an *ICT Steering Group*, formed in 2013. This group leads organization enterprise architecture and supervises ICT services. ICT infrastructure maintenance has been outsourced. The ICT management system was renewed at the beginning of 2013, as described in Chapter 6.

Legal and Intellectual Property Rights Services are co-ordinated by *In-house Services* in close co-operation with the *Areas of Activity*, which are primarily responsible for contract and intellectual property rights (IPR) management in their operations. *In-house Services* provides advice and support for contract and IPR management in order to manage the contractual obligations and intellectual property in FIOH operations. Contract and IPR management are important elements of risk management and tools to implement FIOH's strategy. The fundamentals of the contract and IPR policy are to agree on FIOH obligations and IPR ownership and licencing in writing, to ensure transparency and risk management, and to retain ownership and the optimal use of IPR in FIOH operations.

Financial Administration is largely based on the JOTI ERP system, which offers account ledger and account keeping services and large scale reporting tools. The JOTI ERP system partly serves HR and completely serves the financial management and reporting of projects. The ERP system includes tools for human resources, finances, project management, sales, and customer relation management. JOTI is used to achieve integrated resource, cost and earnings management to support the strategic steering of operations and resources. JOTI also provides FIOH units with a budget system and budget reporting for projects.

Reporting includes follow-up and the future-orientated planning of unit budgets and projects. The reporting tool has been under active development during the strategy period. Matrix-level financial information has been systematically provided to the *Executive Committee* to help the management and analysis of the performance of FIOH, its three *Areas of Activity* and HRD.

Anticipatory project planning⁸⁴ with the support of the JOTI application has improved the ability to plan workloads in different teams many years in advance. Thus FIOH's management has a strong information basis with concrete standards and decision-making points.

Executive Support is responsible for the preparation of strategic planning and decision-making as well as the official performances of the Director General and FIOH.

Client and partner management

The responsibilities of Client and Partner Management are divided into the CRM activities of *Client Services*, the management of strategic partners by *Creating Solutions*, and public relations management and support for decision-making in *Influence through Knowledge* and *In-house Services*.

HR Management Model of the extended Executive Committee

To support the continuous management of human resources, an **HR Management Model**⁸⁵ of the Extended Executive Group was introduced and developed in 2013. This includes systematic reviews of recruitment decisions and reports on the use of human and financial resources at FIOH. The information is provided by the JOTI ERP application and the HR systems, with the support of *In-house Services*.

The *Centres of Expertise* also report on the well-being and workload of their teams to the *Executive Committee*. Thus the cyclical model allows systematic reviews, in-depth negotiations and decision-making regarding HRM at FIOH three times a year.

8.3 Quality management at FIOH

The quality handbook (FIOH's Quality Manual) describes the general management structures of FIOH and gives general guidelines for quality and risk management within the organization. *In-house Services* is responsible for planning and conducting systematic internal inspections.

The quality of several service products is assured by an accredited process. This applies particularly to occupational hygiene services, which involve measurements and laboratory analyses. The process accreditations comprise tens of analyses, given and audited by FINAS, the Finnish Accreditation Service. In addition to this, FIOH serves as a notified body for personal protective equipment (PPE Directive 89/686/EEC). Otherwise, ISO quality control is typically applied in the process-like production of a service.

As part of audit and internal inspections routines, *In-house Services* introduced a new CAF (Common Assessment Framework) self-assessment tool in 2012. CAF is a framework developed by the European Commission for the assessment of public organizations. A swift series of self-assessment workshops was organized across the three *Areas of Activity*, *In-house Services* and the *Centres of Expertise*. This was part of the adaptation to the new matrix system⁸⁶. In the Performance Agreement, the Ministry of Social Affairs and Health (MSAH)

⁸⁴ IEG2009 recommendation no. 19

⁸⁵ IEG2009 recommendation no. 19

⁸⁶ IEG2009 recommendation no. 11

obligates FIOH to assess and manage risks as well as to manage and set goals for the overall quality of operations and processes.

The workshops brought together employees from all levels of the organization. The nine CAF Assessment Areas were covered and key findings were identified in all areas. The findings were evaluated by the *Executive Committee* and formulated into development projects at FIOH in all the *Areas of Activity*.

8.4 Key findings, future challenges - development of the matrix organization

The introduction of a strong matrix model at FIOH in 2011 has required continuous process building and negotiation on the roles of the *Areas of Activity*, *Centres of Expertise* and *In-house Services*⁸⁷. In the preceding model, the *Centres of Expertise* were responsible for directing operations towards the strategic goals. Revenues and expenses were presented at the *Centre of Expertise* level. The task of the *Centres of Expertise* has changed so that they now ensure the fluent use of FIOH's best skills and knowledge and the development of competences and well-being at work. The new *Areas of Activity* lead the strategic projects and operative functions of FIOH. The monitoring of finances has been divided: *Areas of Activity* are responsible for revenue and the *Centres of Expertise* for expenses. This has caused more ambiguity than the preceding model, which was considered clearer.

As part of the development of the model, the number of *Centres of Expertise* was reduced from four to three in 2012 when two former *Centres* merged to form the *Centre of Expertise for the Development of Work and Organizations*. All the *Centres* now consist of 150-190 person-years.

FIOH's main challenge is the efficient steering of human resources. This includes recruiting, building efficient and qualified project groups across units, and the continuous development of competences. The introduction of the matrix model has increased co-operation between different teams and *Centres of Expertise* and the formation of project groups across units. This was one of the objectives of a strong matrix model. The matrix forces transparency in the orientation and use of human resources in the organization.

The success of a matrix organization often depends on the fluidity of communication and ability to make decisions in a multi-dimensional organization. The matrix was built in order to mitigate segmentation into groups competing for the same resources and in order to enhance joint project building and the transparency of resource management. In the matrix model, new fragmentation has occasionally been visible along the lines of the *Areas of Activity*. Discussions and mutual understanding of common targets is crucial in order to operate efficiently and to avoid wasting resources. In particular, commercialization, FIOH's public activities (events, seminars), the use of human resources, FIOH's financial planning, partner management and the success of the Focal Achievements require continuous joint decision-making.

Table 8.4.1 Key findings of FIOH's CAF assessment and main responses

| Findings of CAF evaluation | FIOH's responses 2012-2013 |
|---|--|
| Clarification of roles and responsibilities in the matrix model | The updating of FIOH's Rules of procedure Updating of FIOH's Quality Manual |
| Development of financial reporting and steering information Strengthening of the accountability of information provided by the JOTI ERP system | Development project of <i>In-house Services</i> and the <i>Areas of Activity</i> to design future-orientated financial planning and reporting as well as to formulate a new steering model for |

⁸⁷ IEG2009 recommendations no. 11, 14 and 20

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| Enabling of more targeted internal steering of FIOH's state subsidy | the state subsidy |
| Development of decision-making points concerning HR management and management of state support at FIOH | Testing and establishment of HRM Model Development project of <i>In-house Services</i> for renewing decision-making on channelling state support at FIOH |
| Development of commercialization | Creation of a Steering Group, development of commercialization process |
| Development of internal co-operation and co-ordination among <i>Areas of Activity</i> and between <i>Areas of Activity</i> and the <i>Centres of Expertise</i> . <ul style="list-style-type: none"> • HRM • Directing and building competences | Testing and establishment of HRM Model Enhanced regional co-ordination |

Summary of self-evaluation

| Process | Quality | Efficiency | Use of partnerships |
|--|---------|------------|---------------------|
| 1. Building of Competence and HR management | ++ | ++ | ++ |
| 2. Co-ordination and Support Services | ++ | + / ++ | ++ |
| 3. Client and Partner Relations | ++ | + | + |

Self-evaluation (Moderate +, Good ++, Excellent +++)

9 Responses to the 2009 Evaluation

In their evaluation report in 2009, the International Evaluation Group gave 67 recommendations to FIOH. The responses to these recommendations can be found in the present base report.

The 2009 recommendations have been appended to the text mainly as footnotes identifying the number of the recommendation. Some recommendations are inserted in the report as a table and a few are mentioned in the text separately.

Below is a list of the 2009 recommendations with the respective footnote numbers or other reference in the right column.

| Recommendations 2009 | FIOH response |
|--|-------------------------|
| General review of the Finnish Institute of Occupational Health | footnote or page number |
| 1. The performance targets for the FIOH are very general and may reflect the trust put into the FIOH by the MSAH. However, it is obvious that many of the performance targets would involve many other actors as well. The IEG recommends that performance targets for the FIOH, as stated in the agreement with the MSAH are more short-term and achievable by the FIOH's activities. Qualitative strategic goals might be considered in the next agreement. | 81 |
| 2. The FIOH has been very successful in attracting external funds and incomes from services. It does not seem logical that government funds and funds from external sources and services are handled in the same way. The IEG recommends that the external service activity of the FIOH be exempt from the government productivity programme. The IEG has the opinion that the government productivity programme has severe unintended consequences for the FIOH's ability to meet the demand of its services. Therefore, the programme should take into account only that part of the employment which is financed by government grant. However, the FIOH should be aware that in the long run this may have a negative side-effect of increasing financing of external sources to the extent that the FIOH's ability to contribute to the strategy of the Ministry of Social Affairs and Health is endangered. | 80 |
| 3. The FIOH appears to be well aware of the significance of occupational health for the individual's health as a whole and the IEG commends the FIOH on its holistic perspective in this regard. Many issues in health are related both to occupation and to the society outside the workplace. Such issues are partly covered at the FIOH and partly at the National Institute for Health and Welfare (THL). The IEG recommends that a strategic plan for the cooperation between the THL and the FIOH is elaborated and agreed upon. | 3, 7, 32, 33 |
| 4. The FIOH already has several projects in relation to the elderly at work, and they are important both for the individual and Finnish society. However, these projects could be complemented with more activities in relation to migrants and their involvement in work life. At present the FIOH has a project on equal treatment but there are also other aspects to be covered if equity in relation to cultural background is to be achieved. It is important that such projects focus on the needs both of refugees and of labour immigrants. | 30, 40-43, 46, 47 |
| 5. The FIOH has expertise and programmes on mental health in its different Centres of Expertise. The IEG proposes that the FIOH experts across centres | 53, 55, 57, 59 |

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| collaborate to achieve greater impact as concerns research and the development of skills and methods for the promotion of mental health at the workplace. | |
| 6. It is important for the FIOH to have credibility among the partners in the labour market. The IEG would recommend that the FIOH conducts a survey among labour market parties to establish what expectations they would have on the FIOH in future. | 8, 15 |
| 7. The concept of the innovation chain is valuable. However, the implementation of innovations appears to be the weak link in the chain. Therefore, the IEG suggests that the FIOH consider establishing a new unit or theme focusing on implementation research. | 4 |
| 8. The FIOH does not appear to have used the full benefits in modern information and communication technology (ICT). The FIOH should increase its infrastructure, ambitions and competence in ICT. | 79 |
| 9. The FIOH has rightly identified the retirement of key staff as a priority and also the need to ensure continuity of activities and knowledge (e.g. in relation to key programmes such as entrepreneurs' health). The IEG encourages the FIOH to continue to address the retirement and recruitment issue. | 70, 75, 76 |
| 10. The FIOH has taken steps towards staff well-being, among them the introduction of the TYÖTIE programme, and mentoring. The IEG commends the FIOH for the steps taken so far and recommends that the FIOH monitors the effectiveness of the actions taken in order to improve personnel's working ability and prevent long-lasting absenteeism due to sickness or other causes. Staff well-being should continue to be given high attention building on the measures already taken. | 72 |
| 11. The FIOH is advised to develop a group responsible for caring for FIOH staff in their continuing adaptation to the new matrix system, so that bureaucratic difficulties are reduced, the quality of work life continues to be enhanced, and the efficiency of productive work continues to be increased. This group should pay special attention to the needs of FIOH staff in the Regional Offices, who express enthusiasm about the integration of the Regional Office staff into a unified FIOH, but note extra hurdles that should be remedied by FIOH leadership. | 5, 74, 78, 86, 87 |
| 12. The FIOH should increase its visibility in the Finnish society. There already is good collaboration with different networks in the regions but the services and products available should be marketed more in a businesslike manner. | Client Services p. 105 rec. 40 |
| 13. The Aimed Impact Statements developed by the FIOH for each Strategic Goal provide valuable insights into the intent of the Strategic Goal. The IEG recommends expanding beyond Aimed Impact statements to include specific performance measures/indicators of success that can be used in evaluation of impact on health and safety and/or work ability. | 9, 14, 19, 82, 83 |
| 14. The FIOH should develop an effort to enhance management of the organization matrix. This effort should focus further on the mechanics involved in accountability, staff recognition, decision-making, and resource allocations. | 5, 13, 18, 87 |
| 15. The FIOH should develop a comprehensive plan toward increasing productivity in Finland's workers by prevention of occupational health problems that reduce a worker's ability to function. This plan should focus on aging workers but also on new workers. | 51, 56, Influence through Knowl. p. 131 |
| 16. Contacts with partners are important for the area of occupational health. Taking into account the importance and size of the labour inspector organization, it would be valuable to develop well-functioning cooperation | 38 |

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| between the FIOH and the labour inspector organization for development of healthier, safer and better functioning working life in the productive environment. | |
| 17. Regional Office reports indicate that in many areas there is more demand for services than Offices can provide. Taking into account high demand on services internal work sharing in the Regional Offices and between the FIOH and Regional Offices should be discussed as well as which of the work could be outsourced or to accredited external partners. | Client Services p. 104 |
| Responsiveness of the Finnish Institute of Occupational Health to the recommendations of the 2004 Evaluation | |
| 18. The 2004 IEG recommended that the FIOH consider sharing information widely, particularly addressing the needs and barriers (e.g. cost) of small enterprises and entrepreneurs. The FIOH is in the process of transforming its website for easy usability and to make information widely available. The 2009 IEG strongly recommends continuing expansion of these efforts to reach this important group constituting a majority of workplaces in Finland. We encourage evaluation of the use and usefulness of information, products, and training, and of the impact on health, safety, and quality of work life. | Influence through Knowledge p. 131 |
| 19. The 2004 IEG identified work overload of dedicated FIOH staff as an issue needing attention. The 2009 review of the FIOH applauds the approach taken by the FIOH first to ascertain and address the needs of clients, while involving FIOH staff in all aspects. It is now appropriate to address this issue in a supportive context. Interviews indicate general approval about the new FIOH, but also a bureaucratic complexity, too many meetings, an unfriendly electronic JOTI management system, and the absence of a FIOH internal advisory group recognized by employees as seeking their views, worries and suggestions. The IEG recommends that the FIOH creates a group to care for the staff needs, to reduce hurdles of functioning in the new matrix organization, and to assist staff to achieve a balanced working life. | 84, 85 |
| Relationship between Strategic Goals and organizational structure | |
| 20. The reorganization of the FIOH still is in an early phase and further efforts towards full implementation are needed. The IEG suggests strengthening the orientation of all organizational units towards contributing to the Strategic Goals. | 5, 13, 18, 87 |
| 21. The IEG suggests that the FIOH maintains the thematic areas, because they are an effective vehicle to transfer FIOH knowledge to solutions for the actual societal problems. The IEG likes to compliment the FIOH to the efforts they have attributed to establish a partner network of all relevant stakeholders in the themes. The IEG suggests that even more effort with communication and support of advisory skills could be invested to increase impact and visibility of the themes, thus illustrating the importance of the FIOH's contribution to solving the societal problems. | 6, 12, 14, 64 |
| 22. The IEG favours the Units of Excellence. The IEG is impressed that the Units have established an internationally leading scientific position on topics of high relevance for healthy and productive working life in a fairly short period of time. The Units of Excellence deal with demand-driven research questions in a problem-oriented way, which in that sense is not what is the case in a university. In addition the Units of Excellence provide the FIOH with the possibility to keep operating at the international (scientific) podium and to attract new top talent. It is important for the FIOH to keep up this high profile to serve the credibility in society. It is also important to have a clear view on the long-term contribution of the Units of Excellence to the FIOH's Strategic Goals. With respect to their primary role in obtaining scientific | 16, 54, 61-64 |

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| <p>excellence, this may result in formulating long-term societal impact targets and a road map towards that end goal, which can be built in the evaluation procedure of the Units. The IEG suggests that the internal transfer of knowledge of the Units of Excellence to other teams is enhanced.</p> | |
| <p>Strategic Goal 1: The management of occupational health hazards at work as part of management practices and corporate risk management</p> | |
| <p>23. The FIOH should conduct additional research on how employers get and use occupational safety and health information. This should include research on organization dynamics and decision-making.</p> | 31 |
| <p>24. The FIOH should expand its research efforts to identify and develop innovative ways to reach and motivate small business decision-makers.</p> | 36, 37 |
| <p>Strategic Goal 2: Innovative, regenerative and healthy work communities</p> | |
| <p>25. The FIOH is to be commended on the diversity and quality of its research programmes in relation to work organization and well-being. The IEG recommends that the FIOH educates occupational health services on results, methods and tools regarding this topic in the Occupational Health Services training courses.</p> | Client Services p. 104 |
| <p>26. The FIOH has impressive expertise, research and methods in the area of intervention studies to promote well-being at work. The IEG encourages the FIOH to continue in this area conducting more intervention and evaluation research and also further expanding its work on the cost-effectiveness of interventions.</p> | 29, 30, 58 |
| <p>27. The FIOH has also been active in research in relation to change and restructuring. The IEG recommends that the FIOH further develops its own expertise in anticipating change and meeting challenges as quickly as possible.</p> | 52 |
| <p>Strategic Goal 3: Each citizen equipped to ensure his or her occupational safety and well-being</p> | |
| <p>28. The new strategy has brought "the citizen" more to daylight as a client/group of clients. The activities up to now have shown good level of achievement, although the conceptual range of the Strategic Goal 3 can be broadened. The IEG encourages the FIOH to consider the benefit to small businesses that can be reached through this Strategic Goal and to incorporate all relevant health and safety topics.</p> | 65, 66, 67, 68, 69 |
| <p>29. In order to fully develop and evaluate the impact of this Strategic Goal, the anticipated results should be better defined and performance measures should be developed and used to measure impact.</p> | 65, 66, 67, 68, 69 |
| <p>30. The good progress in website development should be continued, and a strategy should be developed to increase and evaluate its use and usefulness to the users. Short-term value might be assessed by user panels and long-term impact on health and safety of individuals would be a worthy research topic in international implementation research.</p> | 65, 66, 67, 68, 69 |
| <p>Strategic Goal 4: Providing authorities with information for promoting occupational safety and health</p> | |
| <p>31. The IEG commends the FIOH on the development of OHS guidelines. It encourages the FIOH to continue to improve the effectiveness of OHS in collaboration with key organizations and associations of relevance to this area. Due to great demand, regional differences and availability of expertise should be considered in this context. Training provided to OHS should be further updated to focus more on prevention and key priorities in Finnish working life (especially mental health) and to be flexible enough to also address new risks and emerging needs.</p> | Client Services p. 105, Influence through Knowledge p. 131 |

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| Strategic Goal 5: Smoothly flowing work processes, safe and easy to use working methods and tools | |
| 32. The IEG is of the opinion that future implementation of the results of the research in this Strategic Goal may benefit from more rigorous evaluation of the developed solutions and their effects both on health and performance outcomes. | 28, 49 Client Services p. 106 (rec. 45) |
| 33. The IEG would like to complement the FIOH with the implementation efforts so far, in particular with the innovative shift systems. The IEG would like the FIOH to continue and intensify these efforts in that and other areas and does emphasize the importance of the extensive partner network in order to establish maximal effect. | 60 |
| Strategic Goal 6: Solutions for increasing participation in working life | |
| 34. The IEG recommends that now it is time to intensify the efforts to disseminate the methods and tools developed. This means that resources should be more focused on dissemination and implementation. However, this should not be done at the cost of research and development: the methods need to be continuously developed. This could be done in the mutual exchange of ideas between R&D and dissemination and implementation. In spite of that, the non-R&D share of the resources could be increased. | 22-27 |
| Strategic Goal 7: Controlling new occupational hazards, exploiting new opportunities | |
| 35. To continue its successful efforts in reaching this Strategic Goal, the IEG recommends that the FIOH develops a formalized activity, like an observatory function, for anticipating occupational hazards that are not yet known (for example, from climate change). | 44-47, 50 |
| 36. The IEG recommends that the FIOH continues to assure that the findings of programmes in the Strategic Goal <i>Controlling new occupational hazards, exploiting new opportunities</i> are integrated with other Strategic Goals. | 39, 46-48, 50 |
| European and international activities of the Finnish Institute of Occupational Health 2006–2008 | |
| 37. The IEG commends the FIOH for the scale and scope of its European and international collaborations and strongly recommends the continuation and growth of these efforts. | Influence through Knowledge p. 132 |
| 38. The IEG notes with appreciation the FIOH's contributions to the health and safety of workers in developing nations through its collaborations with the WHO, the ILO and the Finnish Ministry for Foreign Affairs, and strongly recommends the continuation and growth of these efforts. | Influence through Knowledge p. 132 |
| Client results | |
| 39. The FIOH still reaches only a limited number of the potential clients. For the planning of services in the future it might be of value to survey what potential clients are not reached at present. The IEG would suggest a survey of the organizations and corporations that are not presently reached by the FIOH. | Client Services p. 105 |
| 40. Some interviewees have noted that their knowledge of competence available in the FIOH is rather haphazard and relates to personal contacts rather than active marketing. The FIOH should consider being more proactive in marketing its competence. | Client Services p. 105 |
| 41. There was critique from some interviewees concerning the costs for services; the basis for the pricing was not as transparent as desired. The IEG suggests that the FIOH provides a budget for services sufficiently detailed for customers to be satisfied. | Client Services p. 105 |

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| 42. Much of the Finnish working population is employed in small and medium-sized companies. Furthermore, service companies increase in significance – the IEG would suggest that the FIOH expands its reports to describe the involvement of small companies and reports service companies separately. Services to these categories should be reinforced. | Client Services p. 105 |
| 43. The Labour Inspectorate is an important partner for the FIOH. The IEG suggests that the FIOH contacts the Labour Inspectorate to discuss the critique from representatives for the authority, concerning delays in commissioned surveys. The IEG suggests that measures are taken to decrease these delays. | Client Services p. 105 |
| 44. The FIOH should concentrate its services to areas where new services are developed and areas where the competence of the FIOH is unique. The IEG suggests that the FIOH should consider outsourcing routine services like the operation of aptitude assessment, while retaining R&D, training and quality control. | Client Services p. 106 |
| 45. The IEG suggests reinforcing the product line Work Processes and Equipment Development, where the demand is great and expected to increase in the future. | Client Services p. 106 |
| 46. There appears to be a shortage of manpower in occupational health even though major efforts have been made in recent years. The IEG suggests that training in occupational health is even further expanded and that marketing of such training is improved. | Client Services p. 106 |
| 47. The FIOH produces much written and web-based material. It is unclear if this material achieves the desired effects. The IEG suggests that an end-user survey of the information activities of the FIOH is performed. | Client Services p. 106 |
| Processes, technologies, human resources and finances | |
| 48. The FIOH's process management is well-organized. It assures the quality of decisions and a systematic follow-up of the projects. However, it may not be the most rapid way to decide which projects are pursued and which are not. The possibilities to react more rapidly to the demands of the customers at all levels of administration should be considered. | 17 |
| 49. The IEG commends the FIOH for the changes made to enhance the efficiency of the laboratory service provision and encourages the FIOH to continue to assess efficiency and be sensitive to client needs across regions. | Client Services p. 106 |
| 50. The FIOH has identified the retirement of key staff as a priority and also the need to ensure continuity of activities and knowledge (e.g. in relation to key programmes such as entrepreneurs' health). The IEG encourages the FIOH to continue to address this issue, especially by involving and developing younger staff. | 70, 75, 76 |
| 51. The FIOH has taken steps towards staff well-being, among them the introduction of the TYÖTIE programme. The IEG commends the FIOH for the steps taken so far and recommends that the FIOH monitors the effectiveness of the TYÖTIE programme in order to improve personnel's working ability and prevent long-lasting absenteeism due to sickness or other causes. Staff well-being should continue to be given high attention building on the measures already taken. | 72 |
| 52. The FIOH Work Climate survey is a useful tool for monitoring staff well-being. Building on recent results from the survey, the IEG recommends that the FIOH puts in place interventions to address work organization issues in order to reduce strain of staff. | 71, 73 |
| 53. Also on the basis of the Work Climate survey, the IEG encourages the FIOH to ensure the recognition of good work and encouragement of staff for their efforts as appropriate. | 77 |

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| Helsinki Regional Office | |
| 54. The Helsinki Regional Office has well-working and highly competent collaborators with holistic touch on problems. One example is the indoor air team with its systemic approach. A strategic question for the FIOH and the Helsinki Regional Office is how to find similar comprehensive approaches in other teams. The IEG suggests that this model is applied to other teams as well. | 12, Client Services p. 106 |
| 55. The Helsinki Regional Office has a great demand for measurement and for interpretation of the measurement results. It is important for the Helsinki Regional Office to find a balance between these two functions taking into account customer needs and staff resources. | Client Services p. 106 |
| 56. Customer satisfaction is vital for successful work of the Helsinki Regional Office. That is why it is recommended to continue existing feedback and networking methods and to develop new fora for cooperation and information distribution. | Client Services p. 106 |
| 57. The Helsinki Regional Office has good know-how and efficiency to wider approach and development which would give good opportunities to think about the work and task sharing between the FIOH headquarters and the Helsinki Regional Office. | Client Services p. 107 |
| Kuopio Regional Office | |
| 58. The Kuopio Regional Office should continue to develop strategies to market the FIOH services to small enterprises. This effort should be coordinated with those planning the programmes under the Strategic Goal The management of occupational health hazards at work as part of management practices and corporate risk management. | Client Services p. 107 |
| 59. The Kuopio Regional Office should continue to enhance the interactions with the regional Advisory Board to support the Strategic Goals of the FIOH and refine the priorities of the Regional Office. | Client Services p. 107 |
| Lappeenranta Regional Office | |
| 60. The Advisory Group is very favourable in relation to the ongoing activities of the Lappeenranta Regional Office. This view was supported by the customer impact and societal usefulness analysis. Critical views concentrated on available service resources of the Lappeenranta Regional Office which were considered insufficient to provide needed services. The IEG commends the successful cooperation with the Advisory Group to analyze future needs. It is also important to keep in mind the region's high numbers of traditional safety and health problems. By putting more resources on these the Lappeenranta Regional Office can increase its added value for employees and enterprises. | Client Services p. 107 |
| 61. The Director acts as a "main ambassador" for marketing and networking services, activities, training courses and development projects to customers. The Director also supports teams in their activities. According to assessments this has been done very well in the Lappeenranta Regional Office. Besides this, another important issue of the manager is to support and develop multi-professionalism and flexibility of the staff. A recommendation is to consider the strategic choices of the Lappeenranta Regional Office: how to balance services and other activities of the Lappeenranta Regional Office taking into account the customer satisfaction and staff resources as well as the FIOH Strategic Goals. | Client Services p. 107 |
| Oulu Regional Office | |
| 62. The IEG commends the Oulu Regional Office on the outstanding research and solutions for cold climates and encourages further development of research and solutions for workers in both cold and hot climates. | 34, Client Services p. 108 |

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| 63. The IEG encourages the Oulu Regional Office to continue its research, teaching and service with partners on mining and metals. | 34, Client Services p. 108 |
| 64. The IEG values the knowledge gained from and encourages continuing the exploitation of the unique Nordic Birth cohort studies. | 34, 35, Client Services p. 108 |
| Tampere Regional Office | |
| 65. The Labour Inspection Authority appreciates the training the FIOH provides for inspectors. However, in daily inspection activities, inspectors have often an acute need of service. The FIOH has problems meeting demands of urgency. We therefore recommend that the FIOH and the Labour Inspection Authorities define jointly the legitimate service expectations including waiting periods so that both parties know what the FIOH service promises are. | Client Services p. 108 |
| Turku Regional Office | |
| 66. The Turku Regional Office, as other FIOH Offices, is responsible for a large number of small and medium-sized enterprises, also spreading across the archipelago region. The IEG commends the Turku Office for the development and implementation of programmes that address small and medium-sized enterprises and entrepreneurs' health. It is recommended that resource availability is considered in light of staff retirement in order to address small and medium-sized enterprises needs. | Client Services p. 108 |
| 67. The FIOH has already identified the lack of occupational health physicians and nurses in the Turku Regional Office. This has been confirmed by the current evaluation. This has an impact on training of occupational health personnel in the region, and also on the provision of quality occupational health services. This problem may not be restricted to the Turku region and may not be a responsibility of the FIOH. However, the FIOH should consider increasing the activities in training of occupational health physicians. | Client Services p. 108 |

This self-evaluation report describes FIOH's activities in 2009–2013. It has been produced for the international evaluation of FIOH, which was carried out in 2014 by an independent international evaluation group of experts, appointed by the Ministry of Social Affairs and Health of Finland.

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**Finnish Institute of
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