

UTILIZING DIGITAL DATA TO ESTIMATE WORKING CONDITIONS IN HEALTH CARE



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Factors affecting employees' well-being at workplaces are typically measured using personnel surveys. In the **DigiWork Consortium**, we will examine whether working conditions in health care can be assessed using routine, daily accumulating digital records on personnel and organizational performance at hospitals. With data-driven approaches, we will construct objective digital indicators for online monitoring of working hour characteristics and workload and evaluate their relation to employee health, well-being and performance as indicated by absence from work due to sickness and quality of care.

The target organization of this project is the Hospital District of Southwest Finland which includes 8 000 employees and provides specialized health care for a population of 500 000. We will use two large existing digital information pools: (1) *Personnel Data Lake* which comprises daily-level records on working hours from a shift scheduling software Titania® for each employee from year 2000 onwards and (2) *Auria Data Lake* that is an administrative Clinical Data Repository containing electronic health records of treated patients. A third



In the picture from left: Aki Koskinen, Marianna Virtanen, Annina Ropponen, Mika Kivimäki, Jenni Ervasti and Mikko Härmä

source of data, used as a reference, is biannual survey responses for the entire personnel from 1998 onwards.

We will merge the first two databases and use modern statistical methods of data analysis, including advanced machine learning (such as hierarchical clustering and association rule analysis or regression, decision trees, and Bayesian classifiers) to construct predictive models. Our outcome measures include employee absence from work due to sickness, occupational injuries, and measures of quality of care operationalized e.g. by hospital readmissions. We will estimate working hour schedules and workload from routine digital data that are linked to our outcome measures and assess whether they outper-

form traditional survey-based predictors of workload.

The project will expand the use of 'big data' into working life research in the context of working life. It represents a proof-of-concept to determine the feasibility of digitalised on-time assessment of routine data as a tool to improve monitoring of working conditions that affect employee well-being and quality of care in health care organisations.

DigiWork Consortium is led by Finnish Institute of Occupational Health (Adjunct prof. Annina Ropponen) with partners from University of Eastern Finland (Prof. Marianna Virtanen), and University of Helsinki (Prof. Mika Kivimäki).

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