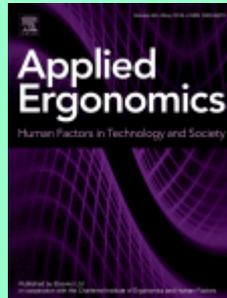


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Tad T. Brunyé, Shaina B. Martis, Carlene Horner, John A. Kirejczyk, Kathryn Rock. *Visual salience and biological motion interact to determine camouflaged target detectability.* Pages 1-6.

Target visual salience and biological motion independently influence the accuracy and latency of observer detection. However, it is currently unknown how these target parameters might interact in modulating the detectability of camouflaged human targets. In two experiments, observers performed a visual target detection task. In a pilot experiment, observers detected a static human target with parametrically varied visual salience, superimposed on a complex background scene. As expected, results demonstrated varied target detectability as a function of salience, with observers showing higher hit rates and faster response times as a function of increased salience. In the Main Experiment, observers detected simulated human targets walking across a complex scene at five different speeds and three different levels of visual salience (as validated in the pilot experiment). We found strong effects of both movement rate and visual salience, and the two parameters interacted. Specifically, increasing the rate of biological motion increased detectability for even the least salient camouflage patterns. In other words, biological motion can “break” even the least conspicuous camouflage pattern. In contrast, a very salient pattern was highly detectable under static and moving conditions. Results are considered in relation to theories of camouflage detectability, and trade-offs between camouflage development efforts versus advanced training in military maneuvering.

- **Keywords:** Camouflage; Visual salience; Biological motion; Visual perception

Joyce M.A. Bouwens, Luisa Fasulo, Suzanne Hiemstra-van Mastrigt, Udo W. Schultheis, Alessandro Naddeo, Peter Vink. *Effect of in-seat exercising on comfort perception of airplane passengers.* Pages 7-12.

Sitting still for extended periods of time can lead to physical discomfort and even serious health risks. Due to safety regulations, reducing passenger’ sitting time in aircrafts is not feasible. This paper presents the results of a laboratory study, in where an interactive airplane seat was compared with a current economy class seat. Participants used both seats for 3.5h, and performed significantly more in-seat movements when using the interactive seating system. Furthermore, this interactive seat predominantly lead to significantly better comfort experiences and reduced discomfort experiences, however no significant differences have been found in self-reported localized musculoskeletal discomfort. Passengers indicated that they would prefer this interactive seat over a standard aircraft seat.

- **Keywords:** In-seat exercise; Passenger comfort; Aircraft interior; Airplane seat

Xuguang Wang, Michelle Cardoso, Georges Beurier. *Effects of seat parameters and sitters' anthropometric dimensions on seat profile and optimal compressed seat pan surface. Pages 13-21.*

Designing one seat for multi-sitters and multi-activities is challenging especially in a very restrained aircraft economy class cabin. In this paper, the effects of seat parameters and sitters' anthropometric dimensions on seat profile and optimal compressed seat pan surface were studied using a newly built multi-adjustable experimental seat. The 'optimal' seat pan contact surface was obtained by controlling the height of 52 cylinders so that the normal contact force was distributed to all cylinders as evenly as possible. With 13 other motorized adjustments controllable by a computer, individual seat profile in the symmetry plane such as seat height, seat pan length, seat pan angle, lumbar protrusion and headrest position were also studied. Data were collected from 36 men and women of varying body size testing 40 seat configurations. Parametric models were obtained for predicting seat profile and optimal compressed seat pan seat surface in function of seat pan and back rest angles for two sitting postures. It is expected that the proposed parametric models provide necessary reference values in seat development for a better fit of a target population of sitters with large varying body size.

- **Keywords:** Seat comfort; Posture; Aircraft; Seat profile; Parametric modelling

April Savoy, Himalaya Patel, Mindy E. Flanagan, Joanne K. Daggy, Alissa L. Russ, Michael Weiner. *Comparative usability evaluation of consultation order templates in a simulated primary care environment. Pages 22-32.*

Communication breakdowns in the referral process negatively impact clinical workflow and patient safety. There is a lack of evidence demonstrating the impact of published design recommendations addressing contributing issues with consultation order templates. This study translated the recommendations into a computer-based prototype and conducted a comparative usability evaluation. With a scenario-based simulation, 30 clinicians (referrers) participated in a within-group, counterbalanced experiment comparing the prototype with their present electronic order entry system. The prototype significantly increased satisfaction (Cohen's $d = 1.80$, 95% CI [1.19, 2.41], $p < .001$), and required significantly less mental effort ($d = 0.67$ [0.14, 1.20], $p < .001$). Regarding efficiency, the prototype required significantly fewer mouse clicks (mean difference = 29 clicks, $p < .001$). Although overall task time did not differ significantly ($d = -0.05$ [-0.56, 0.47]), the prototype significantly quickened identification of the appropriate specialty clinic (mean difference = 12 s, $d = 0.98$ [0.43, 1.52], $p < .001$). The experimental evidence demonstrated that clinician-centered interfaces significantly improved system usability during ordering of consultations.

- **Keywords:** Communication and teamwork in health care; Health information technology; Mental workload; Outpatient care; Usability/acceptance measurement and research; Referrals

Margherita Raccuglia, Benjamin Sales, Christian Heyde, George Havenith, Simon Hodder. *Clothing comfort during physical exercise – Determining the critical factors. Pages 33-41.*

Clothing comfort is determined by multiple material and design factors. Wetness at the skin-clothing interface mainly impacts wear comfort. The current study investigated the combined effect of fabric contact area, fabric absolute sweat content and fabric moisture saturation percentage on wetness and stickiness sensations, during exercise. Moreover,

factors causing wear (dis)comfort during exercise were identified. Higher fabric saturation percentage induced greater stickiness sensation, despite lower fabric contact area and absolute sweat content (typically associated with lower stickiness). Wetness perception did not change between fabrics with different saturation percentages, contact areas and sweat contents. Therefore, fabric saturation percentage mainly affects stickiness sensation of wet fabrics, overruling the impact of fabric contact area and absolute sweat content. No overall model of wear discomfort across all data could be developed, however, models for different time points were produced, with texture and stickiness sensations being the best predictors of wear discomfort at baseline and during exercise, respectively. This suggests that the factors determining clothing (dis)comfort are dynamics and alter importance during exercise activity.

- **Keywords:** Clothing comfort; Wetness perception; Stickiness sensation; Fabric contact area; Texture sensation

Knar Sagherian, Shijun Zhu, Carla Storr, Pamela S. Hinds, Debra Derickson, Jeanne Geiger-Brown. *Bio-mathematical fatigue models predict sickness absence in hospital nurses: An 18 months retrospective cohort study. Pages 42-47.*

This study examined the associations between bio-mathematical fatigue-risk scores and sickness absence (SA) in hospital nurses over 18 months. Work schedules and SA data were extracted from the hospital's attendance system. Fatigue-risk scores were generated for work days using the Fatigue Audit InterDyne (FAID) and Fatigue Risk Index (FRI). Over the study period, 5.4% of the shifts were absence shifts. FAID-fatigue ranged from 7 to 154; scores for a standard 9–5 work schedule can range from 7 to 40. Nurses with high FAID-scores were more likely to be absent from work when compared to standard FAID-scores (41–79, OR = 1.38, 95%CI = 1.21–1.58; 80–99, OR = 1.63, 95%CI = 1.37–1.94 and ≥ 100 , OR = 1.73, 95%CI = 1.40–2.13). FRI-fatigue ranged from 0.9 to 76.8. When FRI-scores were >60 , nurses were at 1.58 times (95%CI = 1.05–2.37) at increased odds for SA compared to scores in the 0.9–20 category. Nurse leaders can use these decision-support models to adjust high-risk schedules or the number of staff needed to cover anticipated absences from work.

- **Keywords:** Sickness absence; Fatigue; FAID; FRI; Bio-mathematical models

Kartheek Reddy Syamala, Ravi Charan Ailneni, Jeong Ho Kim, Jaejin Hwang. *Armrests and back support reduced biomechanical loading in the neck and upper extremities during mobile phone use. Pages 48-54.*

Mobile phone use is known to be associated with musculoskeletal pain in the neck and upper extremities because of related physical risk factors, including awkward postures. A chair that provides adequate support (armrests and back support) may reduce biomechanical loading in the neck and shoulder regions. Therefore, we conducted a repeated-measures laboratory study with 20 participants (23 ± 1.9 years; 10 males) to determine whether armrests and back support during mobile phone use reduced head/neck flexion, gravitational moment, and muscle activity in the neck and shoulder regions. The results showed that the chair support (armrests and back support) reduced head/neck flexion ($p < 0.001$), gravitational moment ($p < 0.001$), and muscle activity ($p < 0.01$) in the neck and shoulder regions significantly compared to no chair support. These results indicate that a chair with adequate support can be an effective intervention to reduce the biomechanical exposures and associated muscular pain in the neck and shoulders during mobile phone use.

- **Keywords:** Joint torque; Moment arm; Electromyography; Muscle activity; Musculoskeletal disorders

Ahmet Kolus, Richard Wells, Patrick Neumann. *Production quality and human factors engineering: A systematic review and theoretical Framework. Pages 55-89.*

The purpose of this paper is to systematically examine available empirical evidence on the impact of human factors (HF) in the design and management of manufacturing operations on system quality performance. A systematic review was conducted to map the linkages between the human-system fit in the design of operations systems (OS) with production quality. A total of 73 empirical studies were identified linking HF to OS performance in manufacturing. Quality risk factors included HF aspects in product design, process design and workstation design of the manufacturing OS. Quality deficits were associated with undesirable human effects of workload like fatigue and injury-related risk factors. Forty-six percent of the studies reported on efforts to improve HF in the OS with effect sizes for quality improvements reaching up to 86%. The paper documents available quality risk factors in the design of OS. It also provides a conceptual framework explaining HF-Quality linkage.

- **Keywords:** Human factors/Ergonomics; Production quality; Manufacturing design

Hannah J. Foy, Peter Chapman. *Mental workload is reflected in driver behaviour, physiology, eye movements and prefrontal cortex activation. Pages 90-99.*

Mental workload is an important factor during driving, as both high and low levels may result in driver error. This research examined the mental workload of drivers caused by changes in road environment and how such changes impact upon behaviour, physiological responses, eye movements and brain activity. The experiment used functional near infrared spectroscopy to record prefrontal cortex activation associated with changes in mental workload during simulated driving. Increases in subjective ratings of mental workload caused by changes in road type were accompanied by increases in skin conductance, acceleration signatures and horizontal spread of search. Such changes were also associated with increases in the concentration of oxygenated haemoglobin in the prefrontal cortex. Mental workload fluctuates during driving. Such changes can be identified using a range of measures which could be used to inform the development of in-vehicle devices and partially autonomous systems.

- **Keywords:** Mental workload; Prefrontal cortex; fNIRS

Carlo Caponecchia, Wu Yi Zheng, Michael A. Regan. *Selecting trainee pilots: Predictive validity of the WOMBAT situational awareness pilot selection test. Pages 100-107.*

The WOMBAT pilot selection test is widely used to select candidates for pilot training programs. Despite use in many countries, little information is available regarding the predictive validity of the test. This study was designed to test the ability of the WOMBAT test to predict performance outcomes in a sample of ab-initio pilots. Sixty students commenced the study in 3 cohorts, and completed the WOMBAT test before their performance in the training program was evaluated through flight time to solo, flight time to licence level achievement, and instructor ratings of performance. Higher WOMBAT total scores were significantly related to reduced time to solo, achieving flight licences, as well as some early ratings of performance by flight instructors. Further research now needs to examine the exact nature of the skills and abilities that the test indexes in order to further improve pilot selection and training procedures.

- **Keywords:** Selection test; Validation; Aviation; Pilots; Training; Human factors; Aviation psychology

Eleanor J. Harvey, Patrick Waterson, Andrew R.J. Dainty. *Beyond ConCA: Rethinking causality and construction accidents*. Pages 108-121.

The construction industry takes an orthodox approach to safety: Finding root causes, quantifying risk, and often blaming frontline workers. However, safety has reached a plateau and the limitations of this approach are starting to be acknowledged. A sociotechnical systems approach (as applied in the ConCA model) presents new opportunities to understand accident causation by linking immediate accident circumstances with the distal shaping and originating influences. 32 construction safety managers, consultants, and experts contributed their views regarding the hazards of construction (both human and physical) and the difficulties managing these. The findings provide an insight into the work of construction safety managers and their decision making which is influenced by industry-wide pressures and worker attributes over physical hazards. Construction suffers from a wide range of pressures; a combination of both top-down, from the client, and bottom-up challenges from the workforce it attracts. The original ConCA model has been revised to reflect the findings. By applying systems thinking, the relationships between negative perceptions of workers' risk-taking and these challenges can be crystallised. The results support integrating safety into primary activities to increase engagement, learning legacies to transfer knowledge between projects, multi-disciplinary teams to raise risk awareness, empowerment to combat their feelings of dissatisfaction and disloyalty, and collaboration in risk management to incorporate workers' expertise and ensure they feel valued.

- **Keywords:** Construction; Safety; Sociotechnical systems

Yazdani, Richard Wells. *Barriers for implementation of successful change to prevent musculoskeletal disorders and how to systematically address them*. Pages 122-140.

This scoping review identified common barriers and facilitators encountered during the implementation of changes to prevent musculoskeletal disorders (MSD) and examined their relationship with those encountered in general Occupational Health and Safety (OHS) efforts. Thematic analysis of the literature identified 11 barriers: (i) Lack of time; (ii) Lack of resources; (iii) Lack of communication; (iv) Lack of management support, commitment, and participation; (v) Lack of knowledge and training; (vi) Resistance to change; (vii) Changing work environment; (viii) Scope of activities; (ix) Lack of trust, fear of job loss, or loss of authority; (x) Process deficiencies; and (xi) Difficulty of implementing controls. Three facilitators identified were: (i) Training, knowledge and ergonomists' support; (ii) Communication, participation and support; and (iii) An effective implementation process. The barriers and facilitators identified were similar to those in general OHS processes. The integration of MSD prevention into a general management system approach may overcome these barriers.

- **Keywords:** Management systems; Commitment; Participation; Barriers; Injury prevention

Linda Victoria Rolfö. *Relocation to an activity-based flexible office – Design processes and outcomes*. Pages 141-150.

Many organizations relocate to activity-based flexible offices (A-FOs) and the results are mixed. This study aims at identifying factors in the design and implementation process that contribute to perceived performance and environmental satisfaction with A-FOs. A company with 50 employees was studied using interviews, questionnaires and documentation before and after relocation. The results showed that process factors such as objectives, financial and time resources, employee participation and empowerment, and methodological approach contributed to the outcomes. Perceived performance and employee satisfaction with the physical environment increased significantly after the

relocation. Employee empowerment, highlighted by the employees, correlated with the performance and satisfaction parameters. A conceptual model is proposed relating process factors, internal and external organizational context, and physical office setting to work condition consequences and overall outcomes such as employee performance and satisfaction.

- **Keywords:** Office planning; Activity-based working; Work analysis

Jie Xu, Shilo Anders, Arisa Pruttianan, Daniel France, Nathan Lau, Julie A. Adams, Matthew B. Weinger. *Human performance measures for the evaluation of process control human-system interfaces in high-fidelity simulations. Pages 151-165.*

We reviewed the available literature on measuring human performance to evaluate human-system interfaces (HSIs), focused on high-fidelity simulations of industrial process control systems, to identify best practices and future directions for research and operations. We searched the available literature and then conducted in-depth review, structured coding, and analysis of 49 articles, which described 42 studies. Human performance measures were classified across six dimensions: task performance, workload, situation awareness, teamwork/collaboration, plant performance, and other cognitive performance indicators. Many studies measured performance in more than one dimension, but few studies addressed more than three dimensions. Only a few measures demonstrated acceptable levels of reliability, validity, and sensitivity in the reviewed studies in this research domain. More research is required to assess the measurement qualities of the commonly used measures. The results can provide guidance to direct future research and practice for human performance measurement in process control HSI design and deployment.

- **Keywords:** Human performance measure; Process control; Systematic review; Human-system interface

Michael T. Pascale, Penelope Sanderson, David Liu, Ismail Mohamed, Nicola Stigter, Robert G. Loeb. *Detection of visual stimuli on monocular peripheral head-worn displays. Pages 167-173.*

Objective: To compare people's ability to detect peripherally presented stimuli on a monocular head-worn display (HWD) versus a conventional screen. **Background:** Visual attention capture has been systematically investigated, but not with respect to HWDs. How stimulus properties affect attention capture is likely to be different on an HWD when compared to a traditional computer display. **Method:** Participants performed an ongoing perceptual task and attempted to detect stimuli that were displayed peripherally on either a computer monitor or a monocular HWD. **Results:** Participants were less able to detect peripheral stimuli when the stimuli were presented on a HWD than when presented on a computer monitor. Moreover, the disadvantage of the HWD was more pronounced when peripheral stimuli were less distinct and when the stimuli were presented further into the periphery. **Conclusion:** Presenting stimuli on a monocular head-worn display reduces participants' ability to notice peripheral visual stimuli compared to presentation on a normal computer monitor. This effect increases as stimuli are presented further in the periphery, but can be ameliorated to a degree by using high-contrast stimuli. **Application:** The findings are useful for designers creating visual stimuli intended to capture attention when viewed on a peripherally positioned monocular head-worn display.

- **Keywords:** Head-worn displays; Google Glass; Monitoring; Attention; Perception

Modi Owied Al-Moteri, Mark Symmons, Simon Cooper, Virginia Plummer. *Inattentional blindness and pattern-matching failure: The case of failure to recognize clinical cues.* Pages 174-182.

Eye-tracking methodology was used to investigate lapses in the appropriate treatment of ward patients due to not noticing critical cues of deterioration. Forty nursing participants with different levels of experience participated in an interactive screen-based simulation of hypovolemic shock. The results show that 65% of the participants exhibited at least one episode of non-fixation on clinically relevant, fully visible cues that were in plain sight. Thirty-five percent of participants dwelt for sufficient time (>200 ms) on important cues for perception to take place, but no action followed, indicating they had pattern-matching failure. When participants fail to notice what, they should notice in patient status until it is too late, this can have serious consequences. Much work needs to be done, since these human perceptual limitations can affect patient safety in general wards.

- **Keywords:** Attention; Notice; Nursing; Patient safety; Inattentional blindness; Eye tracking; Pattern matching

Jouh Yeong Chew, Koichi Ohtomi, Hiromasa Suzuki. *Glance behavior as design indices of in-vehicle visual support system: A study using crane simulators.* Pages 183-193.

A prediction model is used to predict subjective responses of crane operators with respect to different designs of In-Vehicle Visual Support (IVVS). Selected gaze metrics are used as objective metrics to minimize prejudice, which is commonly caused by subjective measures. Experiments are carried out using crane simulator to measure glance behavior of novice operators and the 3D perspective projection method is used for autonomous mapping of gaze fixations to dynamic Area-of-Interests (AOIs). Subjective responses, such as operators' emotion and usability of IVVS, are evaluated using the Likert scale of the Semantic Differential method. Correlation between gaze metrics and subjective responses is established using multiple linear regression. Glance behavior exhibits a statistically significant difference when information on IVVS is perceived as useful to ease operation and reduce tension. Despite this, there are no significant signs of distraction. Glance behavior is found to be a reliable sub-conscious indicator of subjective response and distraction. More importantly, the proposed gaze metrics are found to be a good representation of glance behavior, such as randomness and distribution of attention. The methods and findings are useful to evaluate impact of IVVS, which is becoming more common in many other applications.

- **Keywords:** Gaze metrics; Dynamic area-of-interests; In-vehicle visual support system (IVVS); Operator distraction; Subjective response; Crane operation

David P. Looney, William R. Santee, Laurie A. Blanchard, Anthony J. Karis, Alyssa J. Carter, Adam W. Potter. *Cardiorespiratory responses to heavy military load carriage over complex terrain.* Pages 194-198.

This study examined complex terrain march performance and cardiorespiratory responses when carrying different Soldier loads. Nine active duty military personnel (age, 21 ± 3 yr; height, 1.72 ± 0.07 m; body mass (BM), 83.4 ± 12.9 kg) attended two test visits during which they completed consecutive laps around a 2.5-km mixed terrain course with either a fighting load (30% BM) or an approach load (45% BM). Respiratory rate and heart rate data were collected using physiological status monitors. Training impulse (TRIMP) scores were calculated using Banister's formula to provide an integrated measure of both time and cardiorespiratory demands. Completion times were not significantly different between the fighting and approach loads for either Lap 1 ($p = 0.38$)

or Lap 2 ($p = 0.09$). Respiration rate was not significantly higher with the approach load than the fighting load during Lap 1 ($p = 0.17$) but was significantly higher for Lap 2 ($p = 0.04$). However, heart rate was significantly higher with the approach load versus the fighting load during both Lap 1 ($p = 0.03$) and Lap 2 ($p = 0.04$). Furthermore, TRIMP was significantly greater with the approach load versus the fighting load during both Lap 1 ($p = 0.02$) and Lap 2 ($p = 0.02$). Trained military personnel can maintain similar pacing while carrying either fighting or approach loads during short mixed terrain marches. However, cardiorespiratory demands are greatly elevated with the approach load and will likely continue to rise during longer distance marches.

- **Keywords:** Load carriage; Military; Heart rate

Daniel C. McFarland, Michael N. Poppo, Emily M. McCain, Katherine R. Saul. *Spatial dependency of shoulder muscle demand during dynamic unimanual and bimanual pushing and pulling. Pages 199-205.*

Work involving extensive pushing and pulling is associated with higher frequency of shoulder complaints. While reports of shoulder muscle demand during submaximal isometric tasks are abundant, dynamic submaximal push-pull exertions are not well understood. We evaluated how muscle demand (weighted EMG average) of surface glenohumeral muscles varies with task type and target. Seventeen healthy young adults performed seated unimanual and bimanual pushes and pulls to 3 thoracohumeral elevations (20° , 90° , 170°) and 4 elevation planes (0° , 45° , 90° , 135°) with loading at 15% of isometric push-pull capacity. Pulling required less demand than pushing ($p < 0.0001$). Muscle demand varied more with elevation than elevation plane. The lowest target had highest demand for pulling ($p < 0.01$), and the most elevated target had highest demand for pushing ($p < 0.0001$). Working above the shoulder is known to increase demand during isometric tasks, however, these results suggest that for dynamic tasks working against gravity has a larger effect on demand than task target.

- **Keywords:** Upper limb; Shoulder; Electromyography

Angelica E. Lang, Jacquelyn M. Maciukiewicz, Meghan E. Vidt, Sylvain G. Grenier, Clark R. Dickerson. *Workstation configuration and container type influence upper limb posture in grocery bagging. Pages 206-213.*

Introduction: Repetitive movements and awkward postures are two persistent injury risk factors for grocery store cashiers. Due to the recent rise in popularity of environmentally-friendly grocery bagging options, current recommendations for cashiers are likely outdated. Correspondingly, the objective of this study was to examine the effects of cashier-specific work demands, workstation configuration, and container type on upper limb postures during typical job activities. **Methods:** Fifteen experienced cashiers bagged groceries at varying combinations of workstation height (low, medium, high) and container type (reusable bins, reusable bags, plastic bags). Upper limb movement was quantified with motion capture and amplitude probability distribution functions of humeral elevation and humeral axial internal rotation were used to assess the static (10th percentile), median (50th percentile), and peak (90th percentile) postural demands, which were then interpreted in the context of existing postural guidelines. **Results:** High workstation height and reusable bags increased right arm elevation at peak posture by 15.7° compared to the low workstation height and reusable bin combination. However, reusable bins increased internal rotation demands of the right arm by 4.3° compared to other container types. Left arm elevation and internal rotation were consistently lower than right arm angles. **Conclusion:** Cashiers are encouraged to adjust the workstation to decrease the arm elevation and internal rotation required by higher workstation heights and tall containers, and to use both arms for scanning and packing, when possible, to reduce undesirable arm postures.

- **Keywords:** Upper limb posture; Cashier; Ergonomics; Shoulder; Kinematics

Dimitris Nathanael, Nicolas Marmaras. *From the seat to the system: Re-designing a tram drivers' workstation combining technical and contextual aspects.* Pages 214-226.

Through the detailed account of a design case-study, the paper aims to demonstrate how the activity-oriented approach promotes a systems perspective in ergonomics interventions. Specifically, by presenting an activity-oriented re-design of a tram drivers' workstation, it is shown: (i) how technical and contextual aspects were jointly considered, (ii) how their combination affects workers' activity in a non-trivial manner, and (iii) how this system level view helped generate feasible and sustainable design solutions. First, the activity-oriented theoretical lens is briefly presented, followed by the analysis of the tram driving activity, emphasizing on drivers' efforts to compensate for the original work-system design flaws. Next, key elements of the re-design process are presented, through a concept map, combining technical and contextual aspects, coupled with an account of stakeholder debates and resolution processes. The paper ends with a discussion on the lessons learned, concerning the adopted approach for design interventions in real work situations.

- **Keywords:** Tram workstation; Activity-oriented approach; Systems' perspective; Contextual factors; Stakeholders