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COLLA 2021

Forward

The Eleventh International Conference on Advanced Collaborative Networks, Systems and Applications (COLLA 2021) continued a series of events aiming to gather an interdisciplinary spectrum of researchers around collaboration technologies.

Collaborative systems have raised to become an inherent part of our lives, supported by global infrastructures, technological advancements and growing needs for coordination and cooperation. While organizations and individuals relied on collaboration for decades, the advent of new technologies (e.g. from wikis to real-time collaboration, groupware to social computing, service-oriented architecture to distributed collaboration) for inter- and intra- organization collaboration enabled an environment for advanced collaboration. As a consequence, new developments are expected from current networking and interacting technologies (protocols, interfaces, services, tools) to support the design and deployment of scalable collaborative environments. Current trends include innovations in distributed collaboration, collaborative robots, autonomous systems, online communities or real-time collaboration protocols.

We take here the opportunity to warmly thank all the members of the COLLA 2021 technical program committee, as well as all the reviewers. We also kindly thank all the authors who dedicated much of their time and effort to contribute to COLLA 2021. We truly believe that, thanks to all these efforts, the final conference program consisted of top quality contributions. We also thank the members of the COLLA 2021 organizing committee for their help in handling the logistics of this event.

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An Idea for Software Enabling and Utilising Personnel Participation in the Development of Well-being at Work

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***Abstract*—This study aims to discover ideas for computer or mobile device software promoting the participation of employees in assessing and developing key well-being aspects of their own work. By analysing literature dealing with maturity models of organisations, we formed a list of essential words describing the main psychosocial, cultural job and leadership characteristics. The 10 words we discovered as central aspects of one's work conditions are utilised in the software idea, called PEPADE (PErsonnel's PArticipation in DEvelopment (of well-being and efficacy at work organisations)). PEPADE shows the evaluating employee a multimedia presentation of their workstation in their own workplace(s), a visualisation of the tangible real features of the Work System (WS) in question. In this way, we believe that intangible organisational maturity features will be a much more realistic and valid way to conduct an assessment. PEPADE is helping organisations identify the needs and ways for improvements by designing better details for the current real WS and its leadership practices. New solutions can be presented, rated, and ranked in many ways. The possibilities of PEPADE also increase the interests of personnel and the possibilities of promoting innovations related simultaneously to current and future well-being and efficacy in goods or services production.**

Keyword - organisation: maturity; psychosocial; leadership; concepts; work systems; ergonomics; multimedia; assessment.

I. INTRODUCTION

We find a European project's definition of well-being at work as one we can predominantly agree with: 'well-being at work means safe, healthy, and productive work in a well-led organisation by competent workers and work communities who see their job as meaningful and rewarding and see work as a factor that supports their life management' [1]. The role of leadership is an important issue that must be emphasised. We will see that well-being at work is closely and holistically connected to a mature organisational culture. This connection is the first key focus of this article. The article outlines the background of this culture that is being proposed to operationalise within a new computer-aided tool, namely PEPADE (PErsonnel's PArticipation in DEvelopment (of well-being and efficacy at work organisations)).

Another key topic partly researched to develop it for many types of workplaces, and one that the authors themselves have utilised earlier, is well-being in the Work System (WS) of the human, technology, task, organisation, and work environment elements [2]-[4]. In our former papers, WS is described as a framework to achieve simultaneously desired—and preventing non-desired—outcomes, factors and various deviations within the work processes run by both blue- and white-collar personnel of an organisation or its contractors [4], [5]. These cases remind us about the connections between quality managing systems that often measures the mostly intangible maturity [3] and the more tangible wholeness of the WS. Maturity level describes the holistic level of quality of the assessed production or servicing facility. In quality assessments, the term 'deviation' is frequently utilised to show the inconsistency in practical work situations, particularly, the type and number of details that the organisation observed in real situations that differ from ideal, optimal, planned functions. This style of assessment, auditing, should include the positive and negative essentials of the terms 'organisational', 'management', 'leadership', 'HR', 'safety and health' and 'well-being' in addition to pure productivity, technology, technical and effectiveness issues.

Social skills play a significant role in working places because of many positive outcomes [6] - [8]. They can be defined as the ability to behave according to the environments of the social context [9], integrate feelings and thoughts and behave according to one's environmental circumstances and personal goals [10]. Social skills are linked to higher well-being at work [10]. Additionally, social skills are linked to perceived social support [11], which forms one of the job resources [12] that enables well-being at work and work engagement [12]-[14]. Social support mediates the association between psychosocial well-being and work safety [12]. It can be defined as social relationships that improve health and decrease the amount of stress [13] and is closely linked to job performance, effective stress coping and well-being [15]-[20]. Dialogic leadership emphasises supervisory social support and the relationship between supervisor and subordinate [21]-[23]. Previously, we found that collegial support is associated with higher work engagement and supervisory support [24], [25]. Organisational maturity assessment and the terms and words utilised in it are in focus of this article. These terminological words linked with mainly psychosocial contexts and conditions at work are presented with utilisation of the pictures and other descriptions of

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employee's own WS at her / his employer's premises. Thus, we think personnel should be able to analyse and assess every responding employee's own intangible work organisation and organisational environment. We will also deal with the discipline of Human Factors and Ergonomics (HF/E) [26] and its mainstream terminology like WS as well (cf., Appendix 1), including some views on the correlation between the terminologies 'organisational maturity' and 'HF/E'. The rest of the paper is structured as follows. Section II gives a quite short description of the methods and materials for participation within assessing, based on combining the general maturity words and utilisation of pictures of assessing employee's own workplace. The methodological results are presented in Section III under the title findings and proposal. Next Sections comprise of IV discussion and V conclusions.

II. METHODS AND MATERIALS

A. General Approach

We outline an application and/or software that will function as a multidisciplinary, multimedia description tool that assesses the central aspects of every employee's own psychosocially emphasised organisational work conditions. At the same time, employees can give their own opinions, characterisations and developmental needs related to these aspects. Intangible leadership-related organisational maturity words are mainly presented for assessing together with the more tangible WS as a whole and its elements. Multimedia enables the use of both written and spoken texts, photos, pictures, animations, and videos for description.

B. Presentation of Assessment Setting

We decided to use 10 words/terms as intangible maturity descriptors. To find and determine these descriptors, a list of essential word(s) (Appendix 1) was collected based on the organisational and leadership maturity assessing documents (Appendix 2) of three internationally well-known researchers' articles [27]-[31] focused on safety culture and just culture within work organisations. Appendix 1 shows the relative amounts (% of total 'culture word' findings (N = 1103)) in the (maturity) culture documents. Additionally, a comparison was made with the use of the key terminology of ergonomics in the maturity assessment documents. The ergonomics terminology was chosen according to its definition document of 1018 words. The description in the document is given by the globally leading HF/E (Human Factors / Ergonomics) society, International Ergonomics Association (IEA) [26]. We chose our list of the most essential HF/E words from the abovementioned IEA document as follows: 1) human (people, employee), 2) (socio)techn(olog)ical, 3) system, 4) interaction, 5) physical, 6) cognitive, 7) organisation, 8) optimal, 9) well-being and 10) performance. Appendix 2 includes the proportion (%) of each one of the chosen key terms in the IEA terminology found in the organisational culture maturity assessing documents. It seems that IEA very rarely uses most of the culture terms. On the contrary, the IEA words, plus the phrases closely related to those main themes, were frequently mentioned (N = 3270) in the culture documents. 'Human' was the most often used and was mentioned 5 times, 'organisation' 4 times and 'performance' 1 time. 'System' was the second one in terms of popularity, being mentioned in 5 of the 10 documents.

For the practical assessment by employees, a table that includes first the dimensions describing the WS and its elements separately, i.e., a total of the six columns, and secondly, the 10 rows for dimensions of organisational maturity words, is needed. Therefore, that table will comprise a total number of 60 cells. Of course, the number of aspects assessed by employees can be smaller. For instance, a pre-study can be made to define the cells with high enough importance.

III. FINDINGS AND PROPOSAL

The mission of design science is to build innovations, such as new constructions like software applications or improvements to existing designs and assess their usefulness [32]. In addition to building new artefacts, an essential part of design science research is evaluation [32], [33]. In both phases, emphasis on the participation of personnel has been increasing. Usability engineering is said to comprise user and usability studies, as its essential processes [34], [35]; it has an important role for ordinary people, lay people as users and knowhow servicing professional product developers. The need to embed usability engineering in technology is increasing more and more, whether in the WS or in the user interface of products or machinery.

As far as innovations go, there is at present a lively discussion about employee-driven ones. Owing to its tight links with the users/employees, PEPADE with for instance VIDAR (A video-based method for ergonomic evaluation [36]) might be regarded as an instrument through which personnel can become promoters or even producers of innovations within their own sector of industry [c.f., 36]. We conclude that if we very briefly—but very specifically—mention only a couple of essential issues related to organisational culture as well as know humans as 'users' of the WS context (user study), we can secure the 'usability' of the system (usability study) in all phases during innovation and make design decisions. Both of the abovementioned studies can be aided by all the 'words' in this study.

Both defencing and empowering functions have to be included in contemporary systems and contexts where people are working. Defencing is more related to the prevention of accidents, diseases and errors, risks in general, while empowerment of the people in processes is more related to high performance and psychosocial well-being, with pleasure as a part of it. At its best, ergonomic development—including its tools like PEPADE, with the help of the abovementioned VIDAR [36]—provides double utility: firstly, it shows how personnel could use today's existing artefacts and intangible issues in a better way and, secondly, how to develop better artefacts for WSs and leadership for future work organisations. Our proposed software or application designed for computers or mobile

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phone and pad-style devices (i.e., PEPADE) can utilise VIDAR or other kinds of similar tools or systems. As far as innovations go, there is at present a lively discussion about employee-driven ones. Owing to its tight links with the users/employees, PEPADE with VIDAR might be regarded as an instrument through which users can become promoters or even producers of innovations, or at least improvements, for their own workplace. VIDAR, which provides videos showing people working in their own workplace, is a good example of how to visualise a WS and the humans working within it for use in the context of a PEPADE evaluation. Specifically, it shows the good and bad features of current work conditions and gives details of assessments, scoring properties, ranking of importance, expression satisfaction on some scale, listing details causing errors or slow progress within tasks and so forth. Different kinds of illustrative visualisations and descriptions, enriched by the key terminology listed in this article, enable improvements and innovations. We see that organisational culture maturity, WS and HF/E are resources of PEPADE, together with its visualisation and description features.

We see that the results of Glendon, Clarke and McKenna [37], who were going through numerous issues regarding successful (safety) training, clearly support our approach, though it is aimed for a wider application than only safety issues. The authors [37] concluded that the trainee is two, three or even five times more likely to remember the presented material if they are looking at pictures or watching a demonstration than if they were in a situation where they only hear words or read relevant materials. This boost can also be increased significantly by active participation, simulation and performing [37]. Additionally, we believe that contemporary developments with regard to software, the Internet and computer and hand-held device technologies offer entire time-improving possibilities.

We see and propose to expand the usability criteria of and within a WS, similar to how the IEA [26] defines human factors. We propose wider criteria than what people and experts generally consider. IEA speaks about physically, cognitively, and organisationally (psychosocially) optimal conditions for the well-being of people at work and during leisure. A WS with its elements defined by its tangible features, bylaws and managerial actions shall be enlarged by views presented within and included in the mainstream of key organisational aspects. We find that these mainly intangible aspects comprise predominantly the 10 ones we found in the selection of organisational maturity capability documents. We hope that our relatively short outline related to the intangible aspects and the WS as the context for the aspects could be continued with more detailed next steps. The properties of PEPADE should be designed and confirmed with a user study that has wider and sufficient coverage. Moreover, PEPADE's own usability shall be at a very high level according to the best knowledge, practical experiences and examples, and further trials and tests must be utilised.

IV. DISCUSSION

We recommend that all organisations collaborate with all their employees in their attempts to manage and construct a culture that involves all personnel, subordinates, and supervisors, as much as possible in the development and changes for a better WS and organisational culture. Doing so will bring into use powerful driving forces of potential benefits due to people's participation, involvement in processes and motivation, competence, and confidence, all of which are created by participation [c.f., 38]. One new emphasis for the improved utilisation of collaboration with regard to achieving innovative organisation is presented by Gloor [39], who stated that consciousness is a key added-value factor for further boosting teamwork by utilising the so-called swarm leadership thinking: 'The future of business is swarm business. Whether it is at … Tesla, or Apple…, it is not about being a fearless leader, but creating a swarm that works together in collective consciousness to build great things and generate successes. Swarm is probably one example of new terms being needed in the context of organisational maturity. New ways of management, leadership and collaboration within a work organisation are also needed for new ways of working in many distributed sites (e.g., if all or part of the personnel are working remotely). Utilisation of teleworking via the Internet is enabling this new working mode, most often from home. Used as a tool, a normal computer can most often connect remotely working people with individual colleagues or management via voice and video, such as at the office where most or some of the personnel are working. If a more academically emphasised approach is applicable, we recommend that an organisation become acquainted with the connections of design science and innovation management [40] approaches. Järvinen [32], similar to Hevner et al. [33], briefly defines design science as building innovations and evaluating them. Svensson and Nilsson [41] emphasised that innovation is an intentional change and, further, that one form of innovation is a social one. One good idea is to speak about micro-innovations to emphasise the importance of every person's own experiences with them as well as the roles of the organisation and its people in promoting new positive issues in their own and other persons' living context [42].

We think and hope that the main lines of the PEPADE-style software, at least the further development of its application, would be regarded as promoting participatory creativity towards continuously improving work organisations and their leadership by emphasising a sufficiently deep, psychosocial approach. PEPADE is a tool for 'traditional-style' workplaces, but ones where people are working remotely can be evaluated as well. However, the last-mentioned situation may mean that issues like social support or work engagement, as mentioned in the Introduction, require more recognition. Furthermore, we see

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that PEPADE as an aid is usable in the context of outlining a totally new, or totally new kind of, workplace or station. Organisational maturity words, often intangible and abstract, can be concretised with visualisation. Utilisation of the physical ergonomics-oriented development of the whole WS with its tangible characteristics can be focused on simultaneously.

Ergonomics analysis or safety analysis assesses improvement needs for general well-being and innovates or designs new solutions for production or servicing by, for example, taking a holistic view of the maturity of one's own organisation. All these, along with many others, can realise new possibilities through the ideas and their background, presented here as the PEPADE approach. We find that our tool is an effective enabler for supporting the essential core values of HF/E [24]: 'humans as assets, technology as a tool to assist humans, promotion of quality of life, respect for individual differences, and responsibility to all stakeholders'. As researchers, we have likewise collaborated in a project called Frictionless Communication (FriCo) [43], [44]. We now see that both FriCo and PEPADE could get and give, thereby enriching each other's added value. The former study excels in focusing on the useful communication within all people at work, and the latter provides a description with miscellaneous visualisation and through essential words that remind us all about responsible and psychosocial organisation. Additional proven, valid words that are usable in the context of this process are provided by IEA [26]. Ideas, experiences, and the whole approach of FriCo combined with the vision of PEPADE would be worthy of field experiments within companies and other work organisations and, of course, with the close deep participation of their personnel, whether blue or white collar [4], superior or subordinate. The People Capability Maturity Model (P-CMM) is a special, wide, and widely used tool that helps successfully address the critical people issues in an organisation of software companies [45]. It has a long and successful history in this field. PEPADE comprises less maturity aspects and is focused to be used by all employees, compared with P-CMM that is utilised by organisational experts and managers. Additionally, we have to consider that well-being at work and productivity there, are depending not only on issues and factors being within the space of the own workplace. Home, family, friends are especially psychosocially of utmost importance [c.f., [24], [25]], and increasing importance has to be focused on social, environmental, and economic sustainability [c.f., [5]].

V. CONCLUSIONS

To conclude, the two last sentences of the discussion show more and more significant points in the working life and context of every employee. Our paper is dealing with a total of 26 concepts of tangible and intangible factors affecting at each workplace where individuals her- or himself are contributing for production, as an essential part of it. We find that the ten organisational maturity concepts, together with six WS and ten HF/E ones comprise quite a good toolbox for describing most of workplaces quite holistically. The high-quality knowhow, skills and continuous development means of the 26 concepts, combined into PEPADE software with contemporary technological abilities like multimedia, offer an approach for new kind participatory assessment and development with multidisciplinary background. The need of that kind tool at work, useable with all people there, is not decreasing. The idea might be quite ready for preliminary field trials that we recommend being carried out hopefully as well by many other researchers than us as the authors of this paper. We have a lot of experiences of many study projects that have opened quite directly possibilities to apply the new methodology at workplaces or utilise it there as a tool for consultancy provided by outer experts. PEPADE might be able to follow for instance the successful path of HSEQ AP or FriCo as a service product.

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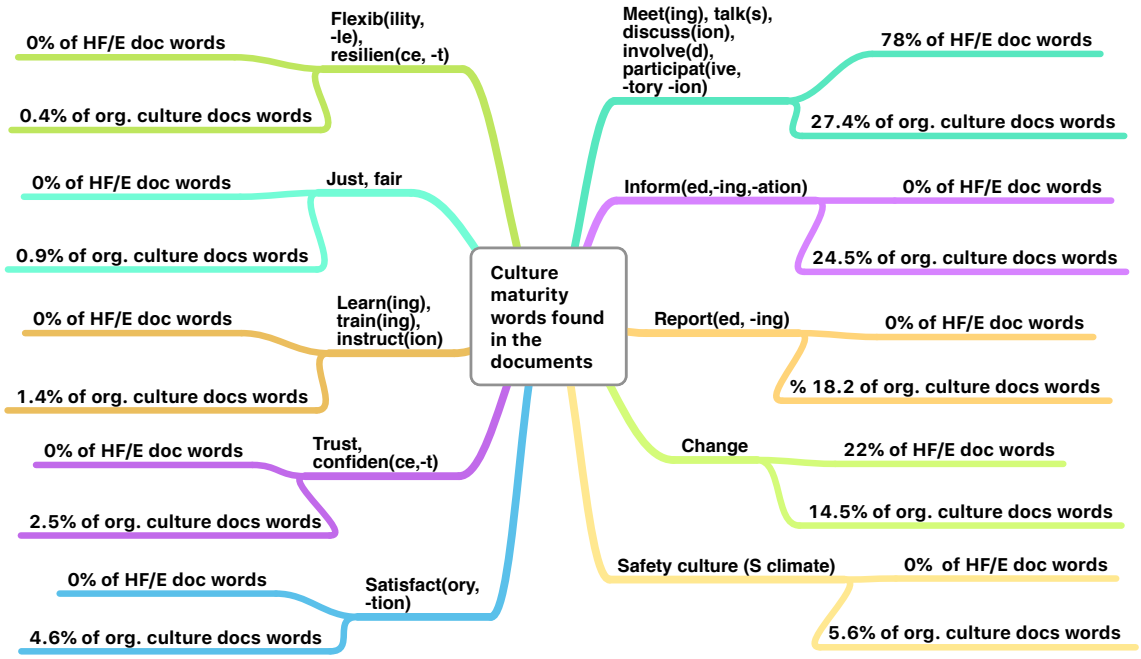
Appendix 1. The 10 concepts, culture maturity words, found in the organisational culture assessing documents, with their relative frequency increasing clockwise. As well, the relative frequency of the maturity terms found in the HF/E document [26] is presented. The HF/E document describes the essential characteristics of ergonomics as follows: 'Work systems are made up of humans, the tools, processes, and technologies they use, and the work environment. HF/E contributes to the creation of safe and sustainable work systems by considering the interrelatedness of human, technical, and environmental components and the potential effects of work system design changes on all parts of the system.' [26]. 'HF/E uses a holistic, systems approach to apply theory, principles, and data from many relevant disciplines to the design and evaluation of tasks, jobs, products, environments, and systems.' [26].



Appendix 2. The ten organisational culture maturity assessment documents analysed.

1 NOSACQ DK, FI, IS, N, S	2 Safety culture maturity model UK	3 ESPO Green Guide EU	4 RISQS Audit Protocol RSSB Railways UK	5 Score Your Safety Culture, Institutional. Resilience, Sustainability (J. Reason) CA, AU	6 Safety, Health & Environment Checklist for Contractors NL	7 Recommended Practices; S&H Programs in Construction US	8 Workplace Safety & Health Manual for Marine Industries SG	9 Vendor Checklist AkzoNobel, H&S, Sustainability, NL	10 Risk Management Maturity Model (RM3), Road & Rail UK

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