Health hazards in computer work and new organizational options: Experience in the media industry

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The debate on expected trends in the workplace ensuing from the digital revolution has reached the area of occupational health and safetystandards. To assess the risks, we should focus primarily on changes that are already affecting former structures and which will probably have an impact on future working conditions.The media industry is an appropriate area of investigation.[1] Viewed from the angle of occupational health and safety, the possibilities of a holistic approach to work organization may be explored.

The first step is to examine existing problems and shortcomings in order to stimulate debate on which of the existing approaches to reform in the area of health and safety standards must be developed and strengthened. We propose to base our argument on a series of hypotheses. European Union (EU) legislation on the work environment, particularly the Framework Directive and Display Screen Equipment Directive, constitute a useful starting-point for the discussion. In the Federal Republic of Germany, the EC directives on health protection were implemented with a four-year delay. The new Occupational Health and Safety Act of August 1996 and the Screenwork Decree of December 1996 now provide the legislative structure for implementation in the workplace.[2]

New health risks and ways of handling them

First hypothesis: *Digital technology accelerates the shift in stress and strain patterns to psychomental and psychosocial factors. This calls for a corresponding change of emphasis in occupational health and safety standards, for which the general thrust and methodology of EU work environment legislation provide a sound basis.*

Existing multimedia literature fails to investigate possible health risks or else depicts the technology as in all cases "clean" and "healthy". Admittedly, digitization can eliminate a number of traditional risks such as hazardous substances in printing shops or the preliminary stages of the printing process.

When domestic implementation of the EC Screen Directive was discussed, employers persistently disputed the very existence of risks and health hazards from screenwork and hence the need for regulations. The issue has in the meantime been conclusively settled in legal terms: the Federal Labour Court – the highest legal authority in the area of labour legislation – ruled in its judgement of 2 April 1996 that the EC Screen Directive and the grounds on which it was based set forth "binding arguments for German employers to the effect that screen work places employee safety and health at risk, thereby necessitating the regulations set forth in the Directive".[3] Paragraph 3 of the new Screenwork Decree explicitly includes mental strain among the factors to be ascertained and assessed in the case of screenwork stations.

Specific categories of health hazard must be examined more closely. It may be assumed that the strain experienced by operators at computer work stations is increasing in at least three respects:

- Firstly, the technological ability of digital systems to process increasing quantities of data in compressed form can represent a major source of stress.
- Secondly, increasingly complex systems make growing demands on users since faulty decisions have an ever greater impact. This is also a source of stress.
- Thirdly, the incorporation of diverse media (text, images, films, speech, etc.) in multimedia technology can lead to an increase in *multifactorial strain*. An idea of the structures that generate such strain may be formed from a glance at present-day work

stations for broadcasting staff, for example editors or producers. Following an inspection of electronic vision mixing work stations in a major broadcasting corporation in 1991, representatives of the Federal Institute for Occupational Health and Safety came to the following conclusion: "The stress at an editing work station must be ranked considerably higher than at 'traditional' screen work stations. This increased stress is due to the specific demands of electronic vision mixing. Frequent pressure of time, deficient ergonomic organization of work stations, a probable risk from high magnetic fields in the immediate vicinity of the work station and irregular working hours are particularly hazardous."

Despite these multiple sources of strain, broadcasting organizations held out for a long time against recognition of the applicability of the EC Screen Directive to such work stations.[4] In the meantime, even an informal publication of the Federal Association of German Employers' Federations (BDA) has had to admit that all "screens for the production and processing of moving images in film and television production or adaptation studios" are also subject to the provisions of the new Screenwork Decree.[5]

This example shows clearly that *combinations of stress factors* occur at screen work stations – especially those involving multimedia – and that organizational factors such as work intensity, multiplicity of tasks, pressure of deadlines and many others play a role alongside ergonomic shortcomings. Nervous disorders are often the first warning signs of impending chronic illness. Combinations of stress factors are often also the root cause of traditional physical disorders. The use of new technology has led in particular to increased health risks in the following areas:

Firstly, there is a risk of visual imbalance coupled with diminished physical and manual activity. Screenwork involves focusing on the selective recording of data and signals, while visual skills such as holistic-pictorial perception or relief of eye strain through free-floating observation are impaired. When combined with stress, this may become a fixed pattern of "visual behaviour" leading to asthenopic disorders, muscle and skeletal disease and fatigue and exhaustion syndromes.[6]

Secondly, an increase in chronic disorders in the shoulder-arm area due to repetitive activities has led to wide public discussion of what is termed "repetitive strain injury" (RSI), a concept which originated in Australia and the United States of America and which is also referred to by other names such as "overuse syndrome".[7] Connections with mental stress, social strain, heavy workloads (e.g. intensive data entry) and poor ergonomic conditions are discernible in most cases. Generally speaking, it has not yet been possible to secure recognition of this disorder in Germany as an occupational disease.[8]

Obviously, the single-cause approach that has generally been adopted in respect of the prevention of occupational accidents and diseases is of little use in the case of computer-assisted jobs – a category into which the overwhelming majority of jobs will fall in the future. But such outmoded approaches are still typical of a large proportion of the occupational health and safety regime. For example, duty periods for company doctors and specialists in occupational safety are established, as a rule, on the basis of accident hazards in the company.[9] Areas exposed to "modern" categories of risk and disease are therefore systematically neglected.

In the meantime, a broad consensus has developed among German accident insurance companies – as reflected, for example, in the definition of prevention used by the Union of Trade Associations (*Hauptverband der gewerblichen Berufsgenossenschaften*) – that an expanded concept of prevention, as required by the EC Directive on Occupational Health and Safety, must be developed to serve as a comprehensive shield against all occupational diseases.[10] The new 1996 Social Security Code VII provides a clear-cut legislative basis for the *Berufsgenossenschaften* prevention concept. It also expressly includes topics such as reduction of monotony, lessening of mental strain, multiple job strain and holistic organization of work.

Prevention-oriented work organization calls for participation

Second hypothesis: *Prevention-oriented work organization requires far more than control of basic ergonomic standards. It cannot be achieved without involving employees as experts on their own case. This radically alters the traditional role concept in occupational health and safety: monitoring of compliance with regulations is replaced by promotion of communication and cooperation in the interests of better health.*

Although we may still be far from achieving comprehensive compliance in everyday

working life with the basic ergonomic regulations set forth in the annex to the Screenwork Decree, the most demanding task is clearly contained in paragraph 5 of the Decree, which calls for a form of work organization that allows for changes and interruptions in screenwork-related stress. The response to this requirement for prevention-oriented organization of work will differ from one activity to another. It is precisely in cases involving a high proportion of screen-assisted activity that "mixed work" becomes difficult. On the other hand, variety and quality of screen-assisted activities, individual communication and qualification periods and self-arranged breaks are of prime importance.[11]

At all events, such arrangements can only bring about a reduction in stress if employees themselves are involved in their investigation and organization. In the absence of approval by employees and the development of individual responsibility for healthy behaviour, most efforts – specifically among skilled brain-workers – will prove futile.

Upstream from the task just described, however, another problem, which in many companies is a source of considerable mental strain, disruption of work organization and even loss of productivity, must be addressed: we refer to deficient skills and lack of company training facilities, particularly in the use of installed software. Even where costly training is provided, it may prove ineffectual if it is inadequately geared to practical work station requirements. Here again employees must be involved. Ongoing in-service training is a vital response to rapid technological change, particularly in the interests of prevention-oriented work organization as a means of reducing or avoiding mental strain. These new and expanded tasks call for approaches to company cooperation that transcend traditional responsibilities.

Ergonomic software issues play an important role in the area of stress and work routine. Whereas standard-setting for software ergonomics in a "normal" office-based screenwork station have progressed in accordance with the provisions of EU work environment legislation, the development of multimedia systems is still almost exclusively determined by the concept of the technologically feasible. F. Koller of the Fraunhofer Institute for Work Economy and Organization draws attention to the danger "that the potential range of multimedia may itself lead to the overloading of user surface, thereby confusing instead of supporting the user". Very little heed was paid to issues of software ergonomics. He concludes: "The potential for cooperation between software ergonomists, designers, media experts and computer specialists has hitherto been greatly neglected. It is essential to exploit this potential in the future".[12]

The much-discussed need for a change in the role of employees in the area of occupational health and safety from being passive subjects of protection to "experts in their own right" also points towards the overstepping of bounds. Two comments are called for:

- Many current business concepts in the area of company restructuring and "business reengineering" are predicated on the "activation of internal resources", in other words on employee skills and efficiency. The fact that they are in turn, as already shown, very closely bound up with appropriate prevention-oriented organization of work should be taken into account in the debate on such concepts.
- In addition, trade union initiatives in the form of surveys and questionnaires can help to set in motion a debate on working conditions at screenwork stations. IG Medien has conducted such surveys in broadcasting organizations and publishing houses and supports appropriate company-specific projects.[13]

The demise of the traditional work environment and the need for new regulations

Third hypothesis: *New forms of "mobile digital work" are undermining existing occupational health and safety standards which are geared to a spatial concept of the workplace. Alongside independent initiatives by unions and management, new regulations are needed to address prospective working conditions in the multimedia age*.

Most organizational claims have hitherto perforce related to the workplace as a spatial concept. But what will happen when the digital revolution leads to an unbalanced acceleration in the already discernible shift in employment to small units, self-employment and/or home-based telecommuting?

Given the enormous shortcomings that already exist in the implementation of up-to-date occupational and health and safety provisions, the very question may sound discouraging. Half of all employees already lack occupational safety and medical coverage and

it will take years for new accident protection regulations based on EU provisions to provide even a partial remedy for these shortcomings.

The key requirement of the EC Framework Directive – equal occupational health and safety rights to begin with for all employees, including home employees and the self-employed – has not been fully realized in the new Occupational Health and Safety Act. For example, paragraph 2.2.3 stipulates, in the face of protests by the German Federation of Trade Unions (DGB), that the provisions of the Act shall not apply to "homeworkers and persons of equivalent status". However, where, for example, telecommuting is undertaken under contractual conditions of employment, the Occupational Health and Safety Act and the Screenwork Decree are applicable.[14]

Instead of deregulation, there continues to be a need for re-regulation of emerging new categories of working conditions so that standards of occupational safety and health protection and basic ergonomic conditions are firmly secured for all employees. W. Dostal of the Federal Labour Institution's Labour Market and Occupational Research Institute predicts that "with the emergence of multimedia the 'normal employer / employee relationship' will virtually cease to exist".[15] Precarious employment conditions, particularly a trend towards "pseudo-self-employment" – reflecting the increasingly nomadic lifestyle of workers[16] – are undermining both social and economic structures. In the United States, a quarter of the economically active population is already affected.

The spotlight is currently on the rapidly growing number of telecommuting jobs, although the burgeoning growth in announcements and press releases is in inverse proportion to the actual increase in such jobs in Germany. The Bonn firm of technology consultants Empirica estimates that there are some 150,000 teleworkers in Germany, whereas the *Deutsche Industrie – und Handelstag* (Germany Chamber of Industry and Commerce) puts the number at no more than 2,000.[17] Alternating telework already predominates, i.e. alternating in-house and home-based employment, while persons exclusively employed in telework is rare and satellite office work more common. A great deal has been written about general impediments and resistance to this mobile type of digital work:[18] it offers both greater potential for controlling work schedules, which meets with resistance from management, and the possibility of extensive self-exploitation, which generates fear among employees.

Experimental models such as the wage and salary agreement concluded between Telekom and the German Postal Union provide material for selective testing of this kind of telework. The following aspects are pertinent to our area of study:

- Voluntary arrangements provide solely for *alternating* telecommuting jobs so that social contact with the staff is not severed. A lower limit is set for in-house employment, the aim being to counteract a trend towards "electronic reclusion".
- Home-based work stations are fully equipped by Telekom, which also provides office furniture and an ISDN connection. Video technology will also be tested in the pilot phase.
- The home-based work station must comply with certain basic conditions and is subject to inspection by representatives of Telekom and the Works Council. The latter has access to the electronic communication system for its own work.

The union negotiators made additional specific demands for implementation of the Screen Directive[19] which are still under negotiation.

In a "Memorandum on the Structure of the Information Society", the Postal Union and IG Medien developed common standpoints on telecommuting, including the need to ensure contractually established working conditions involving mandatory social security provisions and the applicability of wage and salary agreements and occupational health and safety provisions.[20] Similar criteria were agreed in the Multimedia Investigation Committee of the Baden Württemberg State Parliament.[21]

Under a staff agreement on telecommuting at the Federal Ministry of Labour, alongside regulations governing the voluntary nature and contractual nature of such employment, provision was made, in agreement with the staff and with possible Staff Council participation, for an "ergonomic inspection of home-based screenwork stations" with a view to ensuring compliance with occupational health and safety provisions, including the EC Screen Directive.[22]

Notwithstanding the agreement reached in the foregoing examples on rights of access for ergonomic inspections, the problem of how to control and supervise such home-based work stations for compliance with occupational health and safety standards will obviously grow as telecommuting becomes increasingly widespread. In particular, professional and

trade association factory and technical inspectorates, which are already hopelessly overtaxed, especially in small-scale enterprises, continue to be excluded from the whole sphere of telecommuting. Supervision of employment falling under the Homework Act has already proved virtually impossible. Under these circumstances, the duty of employers to inform and instruct their staff, including teleworkers, in accordance with the provisions of EU work environment legislation or the new Occupational Health and Safety Act, is obviously of the greatest importance. In all cases, off-line and on-line assistance for ergonomic and healthy organization of work stations offer effective support. Trade-union based advisory arrangements could play a pilot role in the development of this type of service.

The organization of humane working conditions for all computer work stations will undoubtedly become a key trade-union policy task, requiring a broader definition of the traditional concept of occupational health and safety.

Notes

[1] See Pickshaus, K. 1994. "Medienbranche im Umbruch. Verschlafen die Gewerkschaften die digitale Revolution?", in *IG Medien Forum*, No. 10, pp. 6 et seq.

[2] See Konstanty, R.; Zwingmann, B. 1997. "Die Arbeitsschutzreform. Ruckblick und Paerspektiven", in van Haaren, K. (ed.), *Arbeit im Multimedia-Zeitalter*, Hamburg. See also IG Medien (ed.). 1996. *Das neue Arbeitsschutzgesetz, Schriftenreihe Gewerkschaftliche Betriebsarbeit*, No. 30, Stuttgart, and DPG / HBV / IG Medien (eds.). 1997. *Die neue Bildschirmarbeitsverordnung*, Düsseldorf / Frankfurt / Stuttgart.

[3] Judgement of the Federal Labour Court of 2 April 1996, 1 ABR 47 / 95 (quotation from the statement of grounds, p. 23).

[4] In 1994, the Deutsche Welle succeeded in negotiating a staff agreement on screenwork containing regulations governing health protection in accordance with the EC Screen Directive which are also applicable to production work stations. See Gäbert, J.; Maschmann-Schulz, B.: "Mitbestimmung bei der Arbeit am Bildschirm", in *Arbeitsrecht im Betrieb*, Nos. 6-7 / 1995, pp. 418 et seq.

[5] Keller, Karl-Josef. 1997. *Die Bildschirmarbeitsverordnung. Ein Vorschlag zur praktischen Umsetzung*, Bergisch-Gladbach, p. 17.

[6] Forschungsverbund. 1994. A long-term research project is being conducted under the Employment and Technology Programme on these work-related health hazards. See"Arbeit und Sehen, Vereinseitigung des Sehens als Ursache arbeitsbedingter Gesundheitsrisiken – ein neuer Ansatz in der betrieblichen Gesundheitsförderung", in *ErgoMed*, No. 6, p. 172 et seq.

[7] See Pickshaus, K.; Priester, K. (eds.). 1991. *Gesundheit und Ökologie im Büro*, Frankfurt / Main, pp. 70 et seq., and Engel, M.; Sorgatz, H.; Weissenstein, C. (eds.). 1994. *Prävention von Bewegungsschmerzen bei der Bildschirmarbeit* (report on a technical meeting in Darmstadt on 1 October 1993), Darmstadt.

[8] See Osterholz, U. 1993. "Soziale Wahrnehmung und Bewältigung arbeitsbedingter Erkrankungen: Das Beispiel RSI", in *Jahrbuch für Kritische Medizin*, Vol. 21, Arzt-Konsumenten-Verhältnisse, Hamburg, pp. 100 et seq. On initial successes see "Durch Bildschirmarbeit krank geworden – Erfolgreiche aussergerichtliche Einigung in Berufskrankheitenverfahren", in *Arbeit & Ökologie-Briefe*, No. 3 / 1995, pp.7 et seq.

[9] See Schmitthenner, H. 1995. *Anforderungen an die arbeitsmedizinische und sicherheitstechnische Betreuung von Kleinbetrieben aus Sicht der Gewerkschaften*, paper delivered at the Kongress Arbeitsschutz und Arbeitsmedizin, Düsseldorf, 7 – 10 November (hectographed manuscript).

[10] See Board of the Union of Trade Associations (Hauptverband der gewerblichen Berufsgenossenschaften). 1995. "Sicherheit under Gesundheitsschutz bei der Arbeit: Berufsgenossenschaftlicher Präventionsansatz", report in *WSI-Mitteilungen*, No. 2 / 1995, pp. 137 et seq.

[11] See Köchling, A. 1994. "Der Tägliche Arbeitsablauf (nach EU-Bildschirm-Richtlinie)", in *Arbeitsmedizinische Aspekte der modernen Büro arbeit*, series published by the Bundesanstalt für Arbeitsmedizin, Meeting Report No. 5, Berlin, pp. 97 et seq.

[12] Koller, F. 1992. "Gestaltung von Multimedia-Systemen", in *Ergonomie & Informatik*, November, p. 7.

[13] IG Medien (ed.). 1993. *Gesundheitsschutz bei der Arbeit an Bildschirmen. Ergebnisse einer Umfrage in Hörfunk, Fernsehen und filmtechnischen Betrieben*, Stuttgart 1993, and ZATU (ed.), *Gesundheitsschutz an Bildschirmarbeitsplätzen. Ergebnisse einer Belegschaftsbefragung in 5 Betrieben der Druckindustrie*, 2 vols., Nuremberg.

[14] See the new publication by the Federal Institute for Occupational Health and Safety and Occupational Medicine (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin). 1996. *Telearbeit – gesund gestaltet. Tips für gesundheitsverträgliche Telearbeit*, Dortmund / Berlin.

[15] Dostal, W. 1995. "Multimedia – Arbeitsmarkt von morgen?" in *ibv-Publikationen*, No. 41 of 11 October, p. 3547.

[16] See, for example, the analysis by Welsch, J. 1994. "Zukunft der Arbeit: Neues Nomadentum oder auf dem Weg zum Wirtschaftsbürger?" in *Gewerkschaftliche Monatshefte*, No. 11, pp. 743 et seq.

[17] See Fischer, U. 1995. "Telearbeit in Europa", in *Computer Information*, No. 9, loc. cit., p. 56.

[18] See Welsch, J. 1995. "Multimedia und die Angst vor dem Ende der Arbeit", in *Blätter für deutsche und internationale Politik*, No. 7, pp. 871 et seq.

[19] For more details see Altmeyer, V. "Auf Eigeninitiativen setzen. Die sozialen Folgen von Multimedia in den Betrieben", in van Haaren, K., Hensche, D. (eds.), in *Multimedia*, loc. cit., pp. 111 et seq.

[20] The Memorandum is reproduced in *IG Medien Forum*, No. 6 / 1995, pp. 11 et seq.

[21] See Schröter, W. 1995. "Innovation mit innovativen Formen", in *Frankfurter Rundschau*, 26 October, p. 12.

[22] See "Blüms Projekt", in Computer Information, No. 9 / 1995, p. 28.