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Working Conditions and "Sustainability": Converting Knowledge into Action

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Conditions de travail et « soutenabilité » : des connaissances à l'action

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RAPPORT DE RECHERCHE

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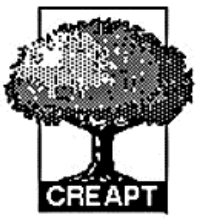

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SUMMARY

This report synthetizes - and converts into guidelines for action - available knowledge, mainly in ergonomics, in order to characterize "sustainable" working conditions and find out several avenues for improvement. This synthesis has been asked for by Eurofound[1] to CEE[2] and Creapt[3].

Here the issue of "sustainability" refers back to the following questions: do these conditions enable people to remain healthy, fully integrated and efficient employees throughout their career? If this is not the case, what types of obstacles do these workers encounter? What are the consequences for them personally? What are the results in terms of their occupational health, skills development and economic efficiency?

Starting with the major changes in working patterns, as presented in a large number of research and statistical studies (including the European five-year survey), the aim of the report is to ask whether these changes are compatible with the demographic trend of an ageing working population

The authors first specify the angle from which they intend to address the issue of "sustainability", and its links with the ageing of the workforce. Next, they examine four major changes (or "non-changes"), setting out the challenges they pose in relation to the changing age profiles: significant on-going physical constraints in the workplace; the slow but continuous rise in shift work, in particular night work; the growing prevalence of time constraints; and increasing pace of change in the workplace. In the end these analyses lead them to re-examine the overall approach to "sustainability", highlighting how and why this preoccupation deserves to take centre stage in economic and social policy at every level.

Given the diversity of working environments, and the corresponding diversity of "sustainability challenges" which depend on the specific situations, this paper is supplemented by five short example cases, illustrating how these general ideas may be deployed in specific professional contexts: repetitive work (example of assembly lines in the automobile industry) ; high-risk industrial processes (example of steel workshops) ; work in open-air settings (example of collection of household waste) ; care professions (example of hospital departments) ; IT changes (example in administrative services).

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[1] European Foundation for the Improvement of Living and Working Conditions (Dublin)

[2] Centre d'Etudes de l'Emploi (Noisy-le-Grand, France)

[3] Centre de Recherche sur l'Expérience, l'Age et les Populations au Travail (Noisy-le-Grand, France)

Background paper developed by Serge Volkoff and Corinne Gaudart on request of the European Foundation for the Improvement of Living and Working Conditions (Eurofound), contract number: 2013/0478/3163.

In terms of working conditions, the issue of “sustainability” refers back to a number of simple questions: do these conditions enable people to remain healthy, fully integrated and efficient employees throughout their career? If this is not the case, what types of obstacles do these workers encounter? What are the consequences for them personally? What are the results in terms of their occupational health, skills development and economic efficiency?

In the context in which the proportion of "older" workers in the workplace continues to rise, for reasons linked both to general demographic trends and to policies aimed at extending our working lives, social stakeholders continue and will continue for some time to be confronted with these issues. This requires us to gather, review and if possible summarise the available knowledge on these issues. This was the intention of the seminar hosted by Eurofound in November 2013, and of our own contribution to this seminar, which this paper takes up, develops and extends. Starting with the major changes in working patterns, as presented in a large number of research and statistical studies (including the European five-year survey), we ask whether these changes are compatible with the demographic trend of an ageing working population.

This question finds a partial response in the results of existing studies, which means we can now focus our attention on public policy measures and issues for negotiation. However, most of the answers do not come ready-made, and the different areas for further research are also worth consideration.

Before examining the state of play in this area, we must first specify the angle from which we intend to address the issue of "sustainability" [1], and its links with the ageing of the workforce [2]. Next, we examine four major changes (or "non-changes"), setting out the challenges they pose in relation to the changing age profiles: significant ongoing physical constraints in the workplace [3], the slow but continuous rise in shift work, in particular night work [4], the growing prevalence of time constraints [5] and increasing pace of change in the workplace [6]. We conclude by returning to the overall approach to "sustainability", in the light of the analyses presented throughout this paper, highlighting how and why this preoccupation deserves to take centre stage in economic and social policy at every level.

Finally, given the diversity of working environments, and the corresponding diversity of "sustainability challenges" which depend on the specific situations, this paper will be supplemented by five short sector-based examples, illustrating how these general ideas may be deployed in specific professional contexts.

1. "REGENERATING HUMAN AND SOCIAL RESOURCES"

Thinking in this field was initiated, if not explicitly driven, by a work produced by a group of Swedish researchers in 2002, with contributions from various other countries[4]. The authors contrast "sustainable "systems with "intensive" ones. They analyse the expansion of the latter and their negative effects in the long term, both in terms of workers’ wellbeing and the quality of the goods and services produced. They call for alternative approaches, based on the idea of the "regeneration of human and social resources".

A number of themes developed in this research work naturally relate to this paper: the intensification of working practices, what forms this takes and what criteria determine the outcomes and consequences; the complex nature of work tasks and their relationship with the cognitive resources available to workers; the challenges posed by technological and organisational change from the point of view of workers' individual career pathways; potential ways to generate discussion on work strategies at local level; methods of appraising work performance; etc.

[4] Shani, AB, Docherty, P., Forslin, J. (2002).

Given the scope of the subject area, it is not easy to limit this reflection, nor moreover to propose a conclusive definition of what "sustainability" is. During a seminar held at the *Centre d'études de l'emploi* (Employment Research Centre)[5], an attempt was made to produce this definition. A work system would be considered sustainable if the following criteria were satisfied: It must be "biocompatible", which means that the work is adapted to the functional capacities of the human body and to the changes that occur with age; "ergo-compatible", supporting the development of effective work strategies; and "socio-compatible", allowing self-fulfilment both within family and social spheres, and allowing people control over their life aims. These criteria provide a useful initial framework, but it is clear that they need to be fleshed out. Furthermore, these dimensions interface with each other, diversifying both how we understand them and the potential avenues for taking action. With regard to working conditions which form the focus of this paper, we have identified a number of key ideas outlined herein.

2. "SUSTAINABILITY" AND AGEING OF THE WORKING POPULATION

Research into ageing, conducted on people of working age, reflects two main types of approaches[6]. "Functional" approaches focus on the age-related decline of the main physical and cognitive functions (lung capacity, muscle strength, powers of attention and memory etc.), whereas "developmental" approaches – to which we will refer here – take into account individual people's pathways in all their multiple dimensions (physical, cognitive, social and mental).

Functional approaches, based on experimental evidence, relate age to a downward trend in performance in separately assessed functions. Developmental approaches, often based on observations carried out in real-life situations, pay attention to these functional declines but stress their variability depending on the individuals in question and the impact of the environment – which includes the work environment. The work environment may speed up or delay these functional declines; it may accentuate or mitigate them. It may or may not bring them to light, as some impairments are only perceptible when the demands of work are extreme. Furthermore, research conducted in real-life situations, particularly in the field of ergonomics, has observed a process whereby workers develop new resources as they acquire experience[7]. Experiences throughout their lives, in particular in their working lives, enable workers, providing they are able to draw lessons from them, to acquire skills relating to their job, themselves (what causes aches and pains, fatigue, what they find easy or difficult etc.) and other people (identifying beneficial forms of cooperation). This may lead to the deployment of new strategies in order to be able to continue to perform a task, or even extend it further in some circumstances, and to implement efficient work strategies.

This knowledge supports the adoption of a "conditional approach" to ageing, and to its challenges in terms of occupational health and efficiency.[8] The difficulties experienced by older workers will be more or less pronounced and more or less visible, while the benefits of experience will be more or less recognized, depending on the choices made in terms of working conditions: work schedules, training, managing work groups, managing career development, social representations on the effects of ageing.

Two questions can be posed to determine "sustainability" in any work situation: Do the demands of the job require basic capacities for which there is a correlation between age and progressive decline (joint flexibility, quality of eye sight and hearing, quality and stability of sleep cycles, short-term memory performance under intense time pressure, etc.)? Conversely, does the accumulation of

[5] Gollac, M., Guyot, S., Volkoff, S. (2008).

[6] Delgoulet, C., Jolivet, A., Volkoff, S. (2010). 85-107.

[7] Gaudart, C., Weill-Fassina, A. (1999). 47-62.

[8] Volkoff, S., Pueyo, V. (2008). 116-119.

knowledge and experience acquired throughout their career enable workers to be more productive and achieve good results without becoming physically or mentally exhausted?

These two overarching questions must be examined in detail, looking at multiple aspects of working life and taking into account the changes throughout the world of work, to which we will now turn our attention.

We should first of all note that "sustainability" of working conditions would not pose a major problem for social policy if this was subject to a natural process of improvement driven by technical progress, growth of the service sector and improved skills levels. This would be a "solution" both to older workers becoming worn out and to the new expectations of young people. However, this does not correspond to the findings of the field studies and statistical surveys carried out, including the European working conditions surveys conducted by Eurofound[9].

What these results highlight in particular, as evidenced by employee feedback, is that physical demands are still an issue for a high proportion of the workforce. The fall in the number of industrial workers, which has been slower than widely believed, has not produced a sufficient reduction in strenuous manual work, as occupations frequently classified as "white collar" (non-manual) include positions in the health, hotel and cleaning sectors for example, which involve significant physical strain. Moreover, although the mechanisation and automation of certain tasks has eliminated some repetitive or strenuous tasks, this is not the case in all workplaces and the resulting improvements are not always as significant as might have been hoped for.

In addition, in terms of work organisation, the dominant model is that of "reactive productivism"[10], which seeks to instantly adapt working resources to the object (or service) to be produced, and in turn adapts this to external demand. The predominance of this model is reflected in particular by an upsurge in shift work, increased time pressure in the job[11], and the proliferation of different forms of instability in the workplace: frequent changes in the products or services supplied by the company, working goals, techniques, composition of work groups, supervision, performance indicators, etc.[12]

The purpose of this paper is not to highlight or analyse these changes, which are already well documented. Instead, its aim is to examine each of these trends, in the light of the problems it raises in terms of "sustainability", which means maintaining workers in employment throughout their working lives, especially as these get longer. For each aspect relating to working conditions, we will try to adopt the overall method of analysis briefly presented at the start of this paragraph, taking into account both the factors involved in decline and the building processes that accompany ageing.

3. "AGEING WORKERS", FACED WITH SIGNIFICANT PHYSICAL CONSTRAINTS

The human body's muscular and cardio-respiratory systems evolve throughout our lives, including our working lives, even though these changes are not as marked as those that characterise "old age"[13]. The impairments that can result are neither considerable, nor are they negligible. Most importantly, they are not the same across the board: the pace of ageing is unique to every individual, and this decline varies enormously depending on the person's job. In this respect, the differences between individuals increase with age. This means that a position that would be virtually untenable for the majority of elderly workers has every chance of proving difficult to and impacting negative-

[9] Volkoff, S., Pueyo, V. (2008). 116-119.

[10] Eurofound (2012).

[11] Askenazy, P. (2004).

[12] Green, F., Macintosh, S. (2001). 291-308.

[13] Green, F. (2006).

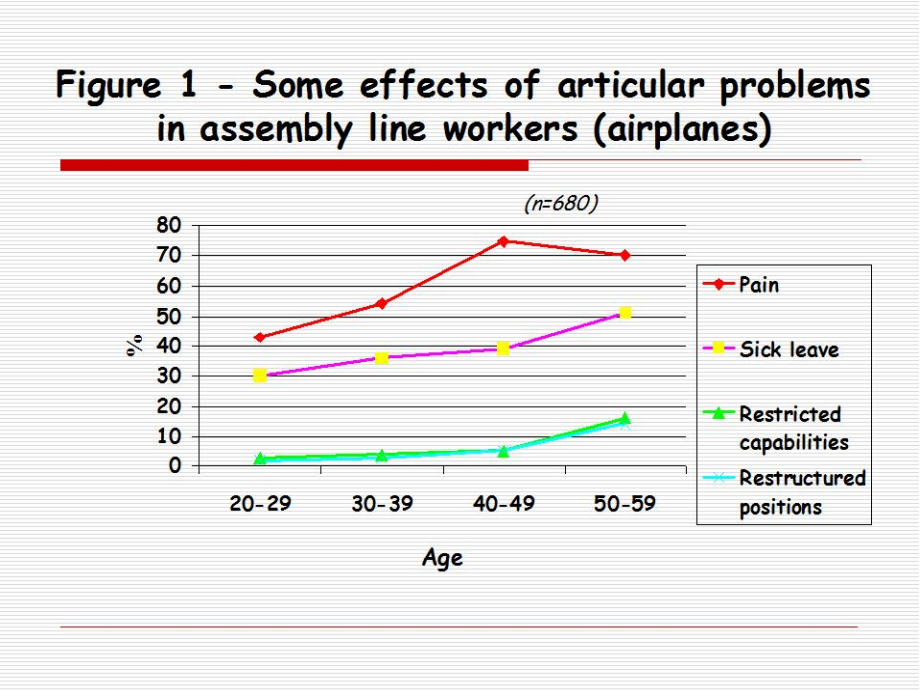
ly on a large proportion of young workers too. That being said, there is one other important statistical observation that must be taken into account given the aforementioned demographic changes: when exposed to strenuous physical demands, the probability of experiencing difficulties increases with age.

This is particularly true in the case of joint mobility: jobs that require prolonged or repeated movements – bending, stooping, twisting, elevated arms etc. – are detrimental to large numbers of older workers. This is very clear in the case of lower back or shoulder strain – whereas for other upper limb joints (elbows, wrists), the differences between age groups are less marked. It has also been proven that a combination of two types of physical constraints (for example: a strenuous posture and a heavy load) creates additional problems for ageing workers, leaving them little room to adopt coping strategies.

However, according to successive editions of the European working conditions survey, it appears that mechanisms for "sheltering" workers from extreme physical constraints – and strenuous postures in particular – are very limited, or even non-existent at the present time[14]. In many companies, the demographic ageing of the workforce, and continuing high overall level of physical constraints, mean there are not (or are no longer) enough "non-strenuous" positions for employees no longer capable of coping with a more demanding job. It is becoming increasingly difficult for workers to avoid lengthy exposure to significant physical stresses, including at the end of their working life; otherwise, they are quite simply at risk of losing their job. The older the worker, the more likely they are to require sick leave due to back pain and work demands. They are also more likely to request adjustments to their workstation – however this is not always possible.

Figure 1 below, which is taken from a study conducted by occupational health doctors in an aeronautical construction company in France[15], clearly illustrates these difficulties.

Figure 1 - Some effects of articular problems in assembly line workers (airplanes)



[14] Millanvoye, M. (1998).

[15] Vendramin, P., Valenduc, G., Volkoff, S., Molinié, A-F., Léonard, E., Ajzen, M. (2012).

If we now examine this issue from the point of view of experience, it has been shown that more senior employees, through their knowledge both of the job and of themselves, are able to devise strategies (choosing their gestures / preparing their actions) that enable them – to a certain extent and when the work organisation permits this – to avoid exposure to the most physically strenuous constraints[16].

Figure 2 - An example of « task capability » : an effort-saving strategy, while wheighing blocks of ingredients

Age, seniority →	23 years old, Seniority: 1 year	49 years old, Seniority: 15 years
Number of times the blade is dipped	137	**321**
Average pressure time of right arm per weighing session	*1'23"*	*54"*

Here, by way of example, we can compare the work of a young worker with that of a more senior colleague in tyre manufacturing[17]. Part of their job consists of cutting, then weighing blocks of ingredients used to make tyres. The blade becomes hot during use and must therefore be dipped in a bucket of cold water at regular intervals. However, it is observed (figure 2, first line of table) that the older worker performs this dipping action much more frequently than the younger person.

The first advantage of this operating method is that the dipping action provides an opportunity to relax the arm and shoulder. However, another benefit is that it enables the employee to make cut with better precision, which reduces both the duration of this task (figure 2, second line of table) and consequently the effort required. In this example, which we can consider as demonstrating "experience of the task", the strategy employed by the senior worker was clearly preferable. Initially intended to protect the worker's health, it is also efficient for the company and following the study, was recommended to the younger workers.

Another significant example of a gesture or posture-related strategy employed by senior workers, this time more indicative of "self-knowledge", was included in a study of the postures adopted by carpenters[18] (figure 3).

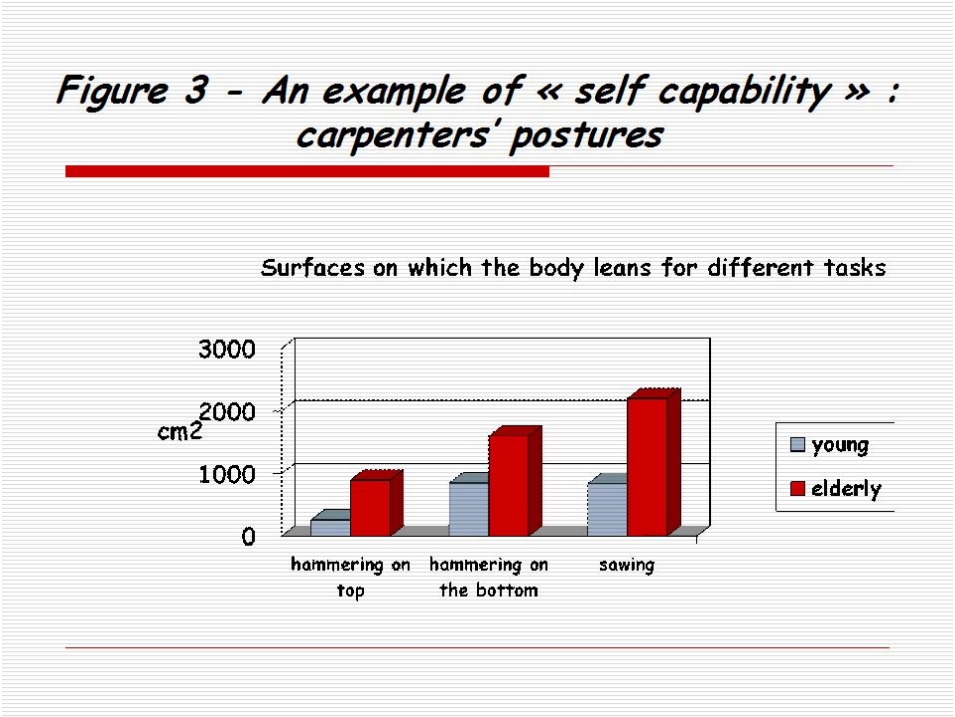
[16] Millanvoye, M., Colombel, J. (1996). 39-46.

[17] Gaudart, C. (2000). 453-462.

Chassaing, K., Volkoff, S. (2006).

[18] Montfort, N. (2006).

Figure 3 - An example of « self capability » : carpenters' postures

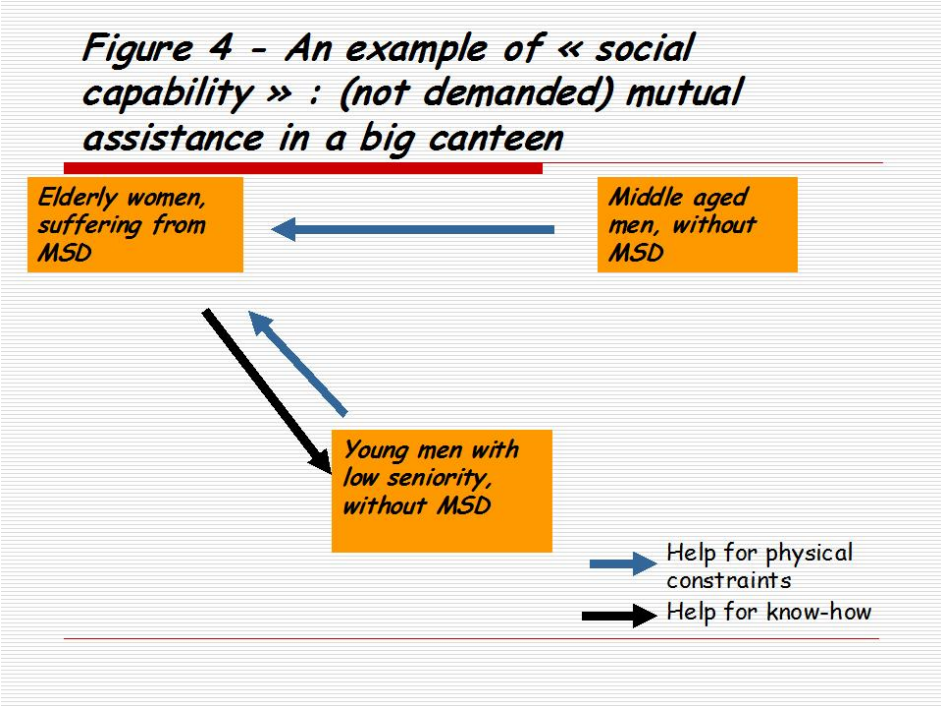


It is observed that older carpenters adopt a more stable posture than younger workers by creating a larger supporting surface, irrespective of the task to be performed; they achieve this by spreading their legs wider or by using their hand or knee to provide additional support. This observation is consistent with what we know about the relationship between age and balance control, where the body experiences more difficulty in maintaining balance when certain sensory or sensory-motor functions deteriorate due to age. Because of the need for precise gestures and occupational safety, workers must be allowed (particularly in terms of space) to adopt the posture most suited to their physical ability and to their awareness of their own capacities.

Thus a variety of "postural strategies" are available, and it is impossible to say that any are generally preferable to others. Examples of this nature from different sectors (automobile assembly – see the first sector-based example below - postal delivery, hospital care services, etc.) would suggest we need to adopt ways of thinking about work resources – space, equipment, tools, etc. – that allow for differentiated usage, depending on workers' specific circumstances and preferences; these in turn are linked to the state of their joints (and therefore, statistically speaking, to their age), and to their skills in terms of the gestures they adopt to perform their work (and therefore linked to their experience too).

The examples above illustrate the existence of individual strategies, adopted by workers in order to cope with the physical demands of their work. It should also be noted that collective strategies are also found, whereby workers draw on "each other's skills". In this respect, the methods and stratagems by which cooks in a large canteen help each other is an interesting case in point[19] (figure 4).

[19] Millanvoye, M. (1998), *op. cit*., 158.



An assessment of the operations performed by the different cooks shows that the oldest workers, in this case women with musculoskeletal problems, occasionally receive assistance from younger colleagues with tasks they find painful (lifting and tipping a large cooking pot, removing a large baking tray from the bottom of the oven etc.). Such help is not organised by the restaurant's line managers, nor is it requested by the cooks. It is based on a collective *modus operandi*, in which the cooks without health problems identify in advance the times when their older counterparts will need support.

"In return" for this support, the older workers provide their younger colleagues with useful advice on scheduling meal preparation tasks and making recipes. This is a comprehensive and revealing approach towards "sustainability". Experienced older workers will retire in the next few years. Their duties will be taken over by middle-aged colleagues, who in turn will begin to age and may also be exposed to joint pain. By that point in time, it will be important for them that today's young workers have acquired the vocational skills required to play a pivotal role in the "collective activity". It is precisely this knowledge that the senior workers are now passing on to them.

To conclude this section on "sustainability" in the face of physical demands, we should first of all remember that the persistence of such demands means it is essential to pay heed to their consequences for workers' health in the long-term. This includes their health in retirement, which could form the basis of an investigation within the context of the announced extension to working life. Epidemiological research linking exposure throughout one's working life and health post retirement is not yet sufficiently advanced, but it is already establishing close links between constraints due to physical effort and posture at work and limited physical capacities and mobility in old age[20].

In addition, it is important to clearly identify to what extent health problems due both to advancing years and to exposure throughout working life, are likely to result in reduced efficiency at work during the latter part of one's career. To take just one example: many jobs involve gestures requiring a high degree of precision in order to meet quality objectives; however, it has been established that these precise movements are more difficult to perform for older workers, if (and only if) they suffer from back pain which prevents them from placing their body in the correct position to perform the

[20] Avila-Assunção, A., Laville, A. (1996). 23-30.

movement properly.[21] In this case, as in many other instances, there are points of convergence between the occupational health issues for ageing workers and the issues relating to the efficiency of the production system.

We have also seen that the problems partially "resolve themselves" via a range of mechanisms which allow older workers to benefit from a lower level of exposure. However, on the one hand, assignments that are differentiated according to age are only tenable if the overall level of constraints and the respective weighting of the age cohorts lend themselves to this[22]. There is no guarantee, within a given company, that they can continue indefinitely. On the other hand, this is not a sustainable solution to the problems outlined in this section, since the corollary is that younger workers have to contend with over-exposure, and the risk of premature ageing.

Finally, it has been noted that protective mechanisms, both individual and collective, have an important role to play if the working arrangements and organisation make them possible. This type of possibility may at times depend on inexpensive adaptations being made to workshops; these simply require careful consideration of where potential improvements could be made. "Sustainability" in this sense can be achieved with the help of careful deliberation on certain material or organisational aspects of work situations.

4. "AGEING WORKERS", FACED WITH SHIFT OR NIGHT WORK

Work schedules are an area in which the question of sustainable working has long been considered. Current knowledge on this subject confirms the difficulty of living a full life whilst working unsociable hours. According to experts, large numbers of shift workers cannot cope with these working time arrangements and abandon them in the shorter or longer term. A national survey carried out in France highlighted that the average length of exposure to night work over the course of one's working life was fifteen years[23].

The issue of the "sustainability" of a job involving shift work is complex, as it can be understood according to different non-exhaustive criteria. A work schedule is considered as unsustainable: if large numbers of employees try to remove themselves from this situation; or if they continue to be employed in this role but suffer adverse or detrimental effects; or if they develop objectively-assessed health problems.

These viewpoints are not always divergent, but can be. They require feedback from those involved: an expert, the employee themselves and their family circle. For example, an expert may consider that a work schedule system is not sustainable because it causes health problems, whereas the employee in question may feel that the benefits of the situation (salary, career progression, rest days, work environment etc.) are more important than the disadvantages, making this regime relatively sustainable in their opinion; for their part, their spouse or partner may find this situation untenable for reasons linked to their life as a couple or time spent with the children. Moreover, the non-sustainability of a work situation may arise or be fully apprehended only after a period of exposure to this situation, which may vary in length. Nevertheless, the data from surveys draws out a number of key points:[24]

• *The onset of early health problems is earlier for shift workers than for other employees*: according to an Italian study carried out in the textile industry, early problems – nervous complaints in parti-

[21] Cassou, B. et coll. (1997). Vézina, M., Brisson, C., Vinet, A. (1989). 382-391.

[22] Volkoff, S., Laville, A., Molinié, A-F., Maillard, M.-C. (1997). 33-59.

[23] Molinié, A.F. (1999). 399-404.

[24] Bahu, M., Mermilliod, C., Volkoff, S. (2013). 107-136.

cular – appear after three years for employees with alternating or set shifts, whereas for employees who work a normal day, the figure is ten years.

• In some circumstances, certain shift workers enjoy "better" health than those who give up this type of work in favour of normal daytime hours. This observation dates back to Danish studies conducted in the 1950s and verified at regular intervals since, in other national contexts. It points to important selection mechanisms in relation to health: employees who work night shifts tend to return to normal work schedules when major health problems become apparent.

• *There is a non-systematic relationship between the age of employees and the length of time they engage in shift work*. Patterns vary across individual countries and occupational sectors. Generally speaking, in the United States and some European countries, work constraints are shared between employees based on their seniority. This means employees begin their careers with the most difficult work schedules, such as night work, with access to more convenient shifts, for example afternoon shifts, following later. However there are numerous, and increasingly frequent, exceptions to this rule, as seen in security services or hospital care services for example. Overall, the European working conditions survey shows a reduction in night work the older the employee gets, though this reduction is relatively small[25].

• *A range of factors that may influence the choice of work schedule system*. The example of the hospital sector, which is marked by its highly atypical work schedules (diversity of sector-specific work schedules: set morning, afternoon and night shifts; alternating day/night schedules, with 2-day, 5-day or 1-week rotation patterns, etc.) and their organisation is a case in point. Schedule rotation choices depend on a number of factors: the context and geographic location of hospitals; the organisation of their work schedules; options to negotiate work schedules on the basis of their professional demographic; and, of course, the age of the care personnel.

• The importance of work content in evaluating the sustainability of a work schedule and the length of time this can be tolerated. We know, for example, that a high cognitive workload is particularly difficult to manage at "peak fatigue times" in the middle of the night; that a tense confrontation, either with clients or users, is difficult to cope with at the end of the night, etc.

It is in this last area that experience-based work strategies are forged and implemented, if the organisation of the production system allows. Taking by way of example a group of workers responsible for quality control of output of steel coils from a rolling mill[26], it is observed that work-related discussions with colleagues are more frequent among older rather than younger workers, irrespective of the time of day. However, this difference is particularly apparent at night. Young people respond to night fatigue by adopting an autonomous mode of operation and avoiding interactions with others; older workers, on the other hand, are keen to avoid or at any rate limit incidents due to hazards in the production process; they continually anticipate how the equipment will operate, in particular by exchanging information with the technical personnel in the event of any qualitative glitches. Both methods of operation are productive, but the one adopted by the older workers is more conducive to their desire to limit crisis interventions during the night.

This concept of work strategies tailored specifically to night work is also seen in experienced nurses[27] (see sector-based example No.4). One of the most noticeable modes of operation is slight shifts in treatment times (providing this does not compromise the quality of patient care), in order to group these operations together and create rest periods for themselves, even if these are only short. It is observed that certain tasks requiring a high level of basic cognitive function (counting out medication after distribution, writing handover reports for the morning team) are more likely to be performed outside "peak fatigue times", which often occur at around 4am. Highly precise mechanisms

[25] Quéinnec, Y., Gadbois, C., Prêteur, V. (1998). 209-230.

[26] Vendramin *et al*., *op. cit*.

[27] Pueyo, V., Toupin, C., Volkoff, S. (2011). 251-255.

for anticipating the night tasks are also observed, including ways of providing more or less intensive monitoring of a particular patient's room, gathering important information from the nurse on the afternoon shift, etc.

Overall therefore, the current trend towards a progressive shift away from regular, daytime working hours does not equate to a universal decline in living and working conditions. Shift or night work may be offset by compensations which make the situation acceptable to employees. However, a great deal of research has documented its negative consequences over the long term, both for the human body[28] – poorer sleep, digestive and cardiovascular problems, general fatigue – and for family and social life. These negative effects accumulate in addition to the effects of ageing and may even interact with them. Both the form and scale of these effects must be examined, in particular for employees in their 50s who would have liked to change work schedules but for whom this has not been possible.

For employees who must therefore continue to do shift work, and night shifts in particular, there are a range of potential working arrangements that are worthy of consideration: precise implementation of the work schedule (start and end times, rotation methods); allowing and facilitating short breaks for night teams; seeking the best way to allocate tasks on an hourly basis; and, as we have seen, acquiring experience of night work (including training), which modifies the conditions and content of the job.

5. "AGEING" WORKERS, FACED WITH INCREASED TIME CONSTRAINTS

Many analyses consider the intensification of working practices to be a major development of production systems in industrialised countries. This development, which is based on a downsized workforce, can undermine the beneficial effects of technical progress on the quality of working life. It is characterised both by an accumulation of various time constraints (production standards, shorter lead times, urgent requests from customers, etc.) and, consequently, by an increased sense of urgency in performing the work[29]. This trend is clearly problematic in light of the workforce's ageing profile.

Demographic studies – including the results of the EWCS survey [30] – have shown that a job performed under intense time pressure, particularly if it is repetitive, cannot be sustained in the long term in any age cohort, and results in younger workers being over-exposed to pressure. This observation must be considered in relation to what we know about physiology and work psychology[31]. Evidence from extensive research into individuals' reaction times during laboratory tests and their behaviour under intense time pressure has revealed a slight slowing of all sensorimotor processes and decision-making mechanisms in the central nervous system in older workers. However, these findings, based on experimental evidence, cannot be directly transferred to real life situations, particularly in terms of work performed, for two reasons: firstly, the high degree of individual and intra-age cohort differences and secondly, the impossibility of distinguishing between mental and basic gestures performance on the one hand, and strategies based on careful attention and verification, on the other.

Results, obtained from studies conducted in real work situations, offer the most relevant information in this field. Studies by ergonomists have produced qualified evaluations about the relationships between age and speed of task performance, under the combined effect of functional declines

[28] Ditto.

[29] Costa, G. (1996). 9-16. Costa, G (2003). 83-88.

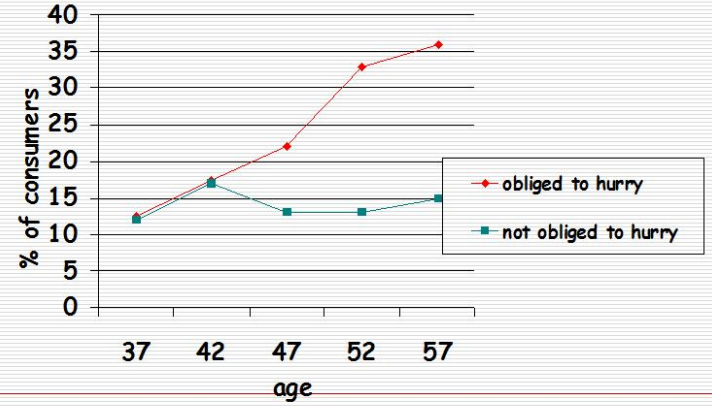
[30] Green, F. and McIntosh, S., *op. cit.*

[31] Vendramin, *et al*., *op. cit.*

and acquisition of experience[32]. It appears that time pressure management strategies are not used exclusively by the oldest workers, but are clearly used more in this age group. Strategies relating to experience, which enable optimal management of tight time constraints, have been analysed across numerous professions. One of many such examples is that of domiciliary help for elderly people (provided by home care personnel who are themselves ageing)[33]; their strategies for manageing time constraints are reflected in the way they screen health problems in patients (whereas this task is not part of a home carer's remit), and in the very precise way they develop a relationship with patients in order to secure their cooperation. By implementing these working practices, home carers come to adjust the order in which they make their visits in their daily schedule.

Figure 5 - The effect of haste on the consumption of sleeping pills or tranquillisers : it depends on the age

(n = 3 400 women in administrative jobs, included in the French « Estev » survey)



This being the case, are these strategies always achievable and effective? Are they sufficient to enable ageing workers to overcome difficulties linked to tight time pressures, maintain the required pace and manage emergencies, while at the same time protecting their own health? Unfortunately this is not the case, as is confirmed by results such as those presented in Figure 5, based on a survey conducted by French occupational health doctors into health, work and ageing[34].

This result reveals the benefit of comparing ages when evaluating excessive consumption of psychotropic drugs by employees – in this case, women in administrative jobs – who state whether or not they regularly have to perform their work under time pressure. It is significant that the gap widens considerably at around the age of fifty, whereas there is no deviation at the 40 year mark; it is as if some of the negative consequences of intense pressure only become apparent in the final decade of an employee's working life.

Apart from general problems caused by the intensification of working practices for all workers, and for ageing ones in particular[35], the issue of "sustainability" in this context hinges on whether or not

[32] Volkoff, S, Pueyo, V. (2005). 17-22.

[33] Ditto.

[34] Cloutier, E., David, H., Ledoux, E., Bourdouxhe, M., Gagnon, I. and Ouellet, F. (2008). 389-402.

[35] Buisset, C., Volkoff, S., Mignien, L., Hiault, A. (1996). 14-15. Buisset, C., Hiault, A., Laurent, P., Mignien, L., Volkoff, S., Monfort, C. (2001). 153-165.

it is possible to draw on specific experience (made increasingly necessary yet also compromised by having to rush the work); on the trade-off between time pressure and work benefits (a "less-pressured" post may also be less interesting); and on the conditions for professional knowledge transfer between generations – which may be fragilised if both young and older workers are continually caught up in emergencies.

6. "AGEING" WORKERS, FACED WITH INCREASING PACE OF CHANGE IN THE WORKPLACE

For the past twenty years in industrialised countries, it has been considered a gauge of success in both the business and administrative world to demonstrate "responsiveness" by seeking to make regular changes to techniques, organisational structures or work objectives. This corresponds to the image of a "dancing giant" as used, for example, in 1992 by Rosabeth Moss Kanter (it is the title of her work, a best-seller of management literature of that era[36]) to characterise a company's capacity for responsiveness and adaptation, and therefore a requirement for its employees, too, to be perpetually called upon to change their post, task or skills.

This requirement, or supposed requirement, can put older workers in a difficult situation[37], not because of any loss of basic mental capacity (this aspect is increasingly contested). Rather it is because of corporate practices that reduce the opportunities for apprenticeships over the course of career pathways, reticence on the part of management when it comes to offering older workers training, and doubts on the part of the workers themselves who, when changes occur, fear they will find it hard to transfer their skills – the very skills outlined in the preceding paragraphs –, and makes their status vulnerable in relation to younger workers just out of school.

However, it is not possible to settle for a model which excludes older employees, to a greater or lesser extent, from situations of change or learning for two reasons: firstly, as we have seen above, these situations are ubiquitous and being excluded from them could be harmful to the employee's professional development; secondly, the concept of "sustainability" directly relates to the idea of work which, beyond the commitment of resources from the individual, also allows them – as proposed by Shani and colleagues in their work cited at the start of this paper – to create and generate new resources to be (re)used in similar situations of production or, conversely, in different contexts. In short, the work should provide opportunities for development and learning and offer the employee experiences by which they can develop or transform, regardless of their age, seniority or previous career path.

Recent research into work psychology has also shown that the dynamics of an individual's career path and a depth of learning can mitigate the strenuousness of certain tasks for older employees; encourage re-assignments where required; and delay or prevent the decline in cognitive capacities[38]. This research has also shown that the range of content within the job, the variety, and the learning opportunities provided are an essential factor in the employee's desire to pursue their professional activity late into their career[39]. If we look at the results from the EWCS survey in this area, the overall trend is towards an increase in the number of negative answers to questions such as: "Does your work involve learning new things?"[40] However, a model which bars a majority of employees from any further career development as of the middle of their career is also unsatisfactory. Im-

[36] Volkoff, S., Buisset, C., Mardon, C. (2010). 754-762.

[37] Moss Kanter, R. (1992).

[38] Cau-Bareille, D., Delgoulet, C. and Gaudart, C. (2006).

Gaudart, C., Volkoff, S. (2005). 12-15.

[39] Marquié, J-C., Rico Duarte, L., Bessières, P., Dalm, C., Gentil, C., Ruidavets, J. B. (2010). 1287-1301.

[40] Molinié, A-F. (2005). 112-117.

provements in "sustainability" will therefore depend on both a collective ability to identify - and subsequently mitigate or eliminate - the stress factors relating to changes in tasks (regarding mobility, multi-tasking, reorganisation or any change to the job content) for older employees. This should also serve to promote meaningful changes which offer coherent career progression, create a climate of trust within the teams, and progressively build up an "experience of change".

This objective can only be met if the notion of different ways of learning is taken into consideration in the same way as different ways of working. This diversity should form an integral part of a company's thinking when designing training schemes or change management approaches.

In companies, expertise and skills are often considered as an accumulation of capacities and aptitudes whose transfer and development is the sole responsibility of the individual themselves. However, it has been found that these are built up through an encounter with a task or a working environment which facilitates (or not) training and stimulates (or not) the production of protective experiences or increasing precariousness. According to the research in these areas, certain conditions would appear to be necessary to support the acquisition and development of these resources and contribute to the "sustainability" of career pathways.[41]

One essential condition relates to the use of time. Learning in working situations or within the framework of formal training requires having some *"time ahead of yourself"* to "implement" the knowledge acquired from this learning and to develop links with previous skills acquired. However, it also requires *"time to yourself"* with no constraints, free from production pressures to construct the significance of the task.

Field observations show that in reality the situation is rather different. When employees are able to access training, it often takes the form of short courses, closely grouped together. There is very little or no time to breathe between training courses, which limits the possibilities for each individual to equip themselves with individual learning strategies which correspond to their personal way of learning and to reach the expected level of efficiency. The "experiences" in a given position are often too short-lived to allow workers to develop detailed knowledge of the different aspects of the job, beyond the most basic tasks.

This much-needed additional time is seen as incompatible with models of economic efficiency. It sometimes goes against the trainers' interests in terms of training engineering and against certain managers' conception of time by which managerial rationalization is a gauge of efficiency. It is a period of time which cannot be quantitatively assessed. The duration may vary between individuals and learning contexts, as well as according to the work processes involved: when confrontations with specific situations take place over a short time, the employees are rarely aware of the results of their actions. If they do not benefit from this "reality shock" they do not take the learning process to its conclusion by correcting their practices according to the observed effects. For the most experienced employees the lack of time means they cannot reconfigure their professional skills.

CONCLUSION

If we look again at the model of ageing in work proposed in our introduction, work which allows strategies resulting from the decline/construction pairing to develop, and to become efficient (in terms of results) and transferable in situations of change, can be considered as "sustainable". To this end it is important that these strategies are "acknowledged" which does not mean that management should be aware of every detail of these – that would be both unrealistic and hazardous – but that they should know where they exist and adopt organisation and project steering methods which respect them.

[41] Vendramin P. and al., *op. cit*.

Where these strategies fail or are impossible to build or deploy, certain experienced employees are designated, or self-designated, as "old workers". This is an unenviable position to find oneself in and creates an entirely legitimate preference for the status of a "young pensioner".[42] The considerations presented herein therefore have a direct influence on the debate within society surrounding the issue of the duration of working life.

It can therefore be said that thinking and actions regarding the "sustainability" of work should adopt a longitudinal, evolving approach to the relationships between work, health and experience. This approach suggests enhancing the concept of "sustainability" itself by combining three perspectives:

• Sustainable work should be *exempt from constraints or harms which can ultimately lead to the onset of long-term, or even permanent, pathologies*. It should be remembered that detailed analyses of differential mortality which show, not only the extent of persistent variations between social categories, but also the key role of mobility between categories, form the backdrop to the concerns presented herein.[43] In this area, two vital issues need to be further investigated: the cumulative effects of multiple exposures, and the future consequences of current development, notably the intensification of work.

• Work is only sustainable if it tolerates *broad diversity between individuals*. It should not require narrow prior selection or systematically exclude employees who are suffering from joint pain, coping with the after-effects of an accident, fragilised by psychological stress, burdened by the demands of family life... or getting older.

• Finally, sustainable work should be supported by giving a *free rein to human activity*. This means allowing employees a certain flexibility in terms of deadlines (compatible with quality requirements), of adapting movements and operating methods and of seizing opportunities for cooperation. The organisation of the work plays a dominant role in this context, along with the employment systems. Indeed, the building of efficient strategies can be compromised by human resources management which restricts the sharing of ways to work more carefully, or by job insecurity which, as the EWCS survey clearly shows, also applies to older employees[44].

This gives us an insight into how closely interwoven the health and skills dimensions are – they cannot simply be juxtaposed. Failure in a professional context is a risk factor for health, and this does not only apply to people who are made redundant or who cannot find work. If an individual only masters some of the constitutive elements of their work, this causes mental fatigue which can have extremely harmful long-term consequences. Furthermore, knowledge which is accumulated, developed, and contextualised by each individual increases their ability to change their work at the right moment and improve their working conditions (less strenuous, more interesting position, etc.). Conversely, health problems, whether work-related or not, can fragilise the individual's position in the production system and reduce the opportunities they have to consolidate their professional experience or undertaken training.

Determining the sustainability of an individual's work based on the individual themselves would therefore not take into account very influential determining factors relating to the context. From the outset, the organisation of a company sets out internal limits on which the "sustainability" of the work may or may not be built. This organisation can be a constraint, for example when there is a

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[42] Delgoulet, C. (2001).

[43] Volkoff, S., Bardot, F. (2004). 71-94.

Blanchet, D., Brugiavini, A., Rainato, R. (2005). 246-252.

[44] Cambois, E. (2004). 2545-2558.

lack of technical resources, or when the mechanism for setting objectives means workers are discouraged from taking responsibility for their work and their career. In companies, as in the different countries across Europe, "sustainability" is an issue with a political, economic and social scope.

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Five sector-based examples

As explained at the beginning of this paper, we are finishing with five short "examples" to illustrate how these general ideas can be used in specific professional contexts. The diversity of working environments has been taken into account, as has the diversity of the "sustainability" issues in different situations.

Each example refers to a type of task or professional environment, with a single profession used as an example of a given type of situation. In keeping with the approach adopted throughout this paper, the elements presented herein aim to draw attention to certain developments or ongoing situations regarding work constraints and their likely impact on "sustainability", taking into account the strategies that experienced workers can, or cannot, implement.

For the purposes of accuracy the examples have been selected from situations that the authors of this paper, or their research team, have studied directly. Furthermore, each situation is very different from the others but also corresponds to a widespread situation.

These examples cover (in order):

* repetitive tasks and production rates *(example: automobile assembly)*
* high-risk industrial processes *(example: workshops in the steel industry)*
* work in open-air settings *(example: the collection of household waste)*
* care professions *(example: care services in hospital departments)*
* situations involving IT changes *(example: administrative services)*

The examples aim to give an overview of each situation. The references listed in the bibliography can be used to investigate each of these elements in more depth.

Example 1

The issue of "sustainability" in repetitive work to a production rate

Sector-based example - assembly lines in the automobile industry

Assembly lines are a widely used process in the industrial sector, although these processes may apply to very different realities. Assembly lines operate using the principle of dividing the product into distinct units for assembly. However, the rate or complexity of these procedures can vary greatly between, for example, a car and an aeroplane. It is nevertheless possible to describe some key, shared developments.

Repetition, flexibility, vulnerability

The traditional Taylor and Ford models of organisation have been succeeded by models created to respond to and adapt to more varied demands. These models integrate traditional working characteristics in this sector, along with the existing commercial constraints of the service sector[45]. The resulting organisational structures are still based on the principles of repetitive gestures (varying according to the production rate), and the standardisation of procedures, with the later addition of the principle of increased flexibility in terms of both production tools and workforce. Increased workforce flexibility is obtained externally (by building up a workforce on short-term contracts) and internally (by increasing versatility). The other key characteristic of these models, marking a clear departure from previous models, is the principle of responsibilisation of individual staff members, as well as the continual improvement of the process, through "kaizen projects" for example.

In the 1990s, this type of organisation was shown to render one section of the production workforce more vulnerable, notably older employees.[46] In the automobile industry, process standardisation *("one man - one job - one minute"*) has reduced the number of jobs off the production line, which were previously assigned to older members of staff and machine operators with health concerns. At the same time the population has begun to age. Greater diversification of products has multiplied the traditional constraints in production line work, thereby raising the cognitive workload and the risk of error. Operators find themselves held directly responsible for non-quality. Adjusting production volumes to match demand leads to a regime of permanent change where proven versatility is constantly tested. Versatility falls off at 40 years old making this section, the majority, of the population a vulnerable category which struggles to adapt to this new management regime. In this context, being found unfit for work in order to escape these situations is used as a last resort, although this is obviously unsatisfactory both for the operators themselves and for management, who find themselves facing serious performance issues.

However, an understanding of how operators of different ages work reveals a more nuanced reality: The strategies deployed by older workers may be aimed at avoiding the most strenuous aspects of the work, however, they clearly also demonstrate these workers' commitment to doing their jobs

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[45] Macduffie, J.P., Krafcik, J. (1992). "Integrating Technology and Human Resources for High Performance Manufacturing : Evidence From the International Auto Industry". I*n* T. Kochan, M. Useem (eds). *Transforming Organisations.* New York: Oxford University Press, 209-226.

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[46] Gaudart, C., Laville, A. (1998). "Ageing and Ways of Regulating Work: the Case of Repetitive Tasks under the Pressure of Pace". *In* Marquié, J.C., Paumès Cau-Bareille, D., Volkoff, S. (eds.). *Working with age.* London: Taylor & Francis.

"well", *i.e*. by blending the performance and quality requirements with their own resources and vulnerability.[47]

Personalised actions

Let us examine the example of a mechanical production unit. Within the unit, real cycle times can be elastic for younger workers: in the most extreme cases they take anything from half to twice the allotted time. The time taken by older workers also differs from the allotted amount but the difference is not so great: these workers know that successively speeding up and slowing down can prove to be costly in physical terms, and so they reduce the differences where possible. Greater consistency in cycle times is also a sign of their experience. Each cycle is organised in space and time so as to reduce the difficulty of the work, in particular the time spent moving from one place to another or in strenuous positions. From 40 years of age, operators stray from the prescribed operating methods by grouping together the parts they need at the beginning of the cycle: for example, they grasp a pendulum arm with one hand, screws in the palm of the other and bolts between their fingers. Then, intelligently using both space and time, the boxes of spare parts are available when needed; hence the aim of obtaining the greatest possible regularity in terms of cycle times. Reducing the time spent moving from one place to another by a few seconds per cycle also makes it possible to anticipate future developments; an incident or disruption could occur in the next cycle and they may need more time.

In this context, versatility (*i.e*. learning other jobs and changing jobs according to need), adds a factor of uncertainty: will it, or will it not be possible for each worker to use the resources that they have acquired through experience?[48] In the same job, a younger person, for whom preservation is less important, would move around according to the need for parts, anticipating less from one cycle to the next: working just-in-time.

Rather than purely being a question of age it is a question of using strategies acquired with experience (which clearly correlates with age in statistical terms.) On the same production lines, an accident leading to injury that occurs during or outside of working hours, can lead to the adoption of similar self-preservation strategies.[49] These strategies reveal the workers' desire to create *time for themselves*, time in which they can get their bearings. Versatility is not therefore simply about an ability to assimilate new technical actions. Nevertheless, these strategies are fragile when confronted with organisational changes.

Rethinking learning, integrating diversity

What about sustainable work on production lines? With reference to the characteristics of "sustainability" set out in this paper, several options can be drawn out.

Since the 1990s, the organisational forms described have been accompanied with policies for improving working conditions, although these are not always the same from one country to another. Actions have been taken to reduce the number of strenuous positions carrying heavy loads. Systems for mistake-proofing ("poka-yoke") have been created, reducing the amount of vigilance required to avoid errors. These improvements still have their limits. The constraints introduced by the products

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[47] Gaudart, (2000). *op. cit*.

[48] Gaudart, C., (2003). « Losing versatility with age: is it a question of ageing, experience, or of different generations?". *PISTES*, vol.5, n°2 http://pistes.revues.org/3323

[49] Chassaing, K., (2005). « Le rôle de la construction des gestuelles avec l'expérience dans la prévention de la douleur ». In *Les évolutions de la santé au cours de la vie professionnelle : altération, préservation, construction.* Actes du séminaire *Vieillissement et travail*, year 2004, EPHE- CRÉAPT. Centre d'études de l'emploi, *Rapport de recherche*, n°27, 53-61, http://www.cee-recherche.fr/publications/rapport-de-recherche/les-evolutions-de-la-sante-au-cours-de-la-vie-professionnelle

themselves can restrict improvements; and the mistake-proofing mechanisms - although they reduce errors - increase the automation of tasks and reduce their complexity.

In addition, the potential improvements cannot be made without some thought on what was termed *a free rein for human activity* in the conclusion of the main text above. The key concern remains the possibility for enhancing, and even encourageing, the construction of effective experience, i.e. experience that is reliable from an economic and social point of view and in terms of individuals' health. In this way, periods of learning – too often subjected to the dictate of immediate performance – are a key period of time.[50] The conception of versatility which integrates this experience and its demands, rather than as a "stop-gap" measure, is also another avenue to explore.[51]

It is clear that these same paths to improvement may even lead to a deeper – and more subtle – reflection on the third characteristic of sustainability: the tolerance of the diversity between individuals within production models. Is a production model that considers most of its population to be vulnerable, particularly in terms of production constraints[52] socially acceptable and economically sustainable? If we are to get beyond a model that leads to local management saying that *"a temporary worker measuring 1m72 and weighing 72kg, is a lifeline for the unit"* it is important to investigate the value of this vulnerability[53], not as an individual incapacity to work, but more as an ontological vulnerability, an inherent characteristic of men and women, which harnesses creativity.

[50] Gaudart, C., Chassaing, K. (2012). « Formation "*in situ*" et "école de dextérité" dans l'automobile : analyse des modalités d'apprentissage et de leurs coûts pour les opérateurs ». *In* Molinié A.-F., Gaudart C., Pueyo V. (coord.). *La vie professionnelle : âge, expérience et santé à l'épreuve des conditions de travail*. Toulouse: Octarès, coll. « Travail et Activité humaine », January, 75-94.

[51] Gaudart, (2000). *op. cit*.

[52] Brooker, A. S., Cole D. C., Hogg-Johnson S. A., Smith J. M., Frank J. W., and Early Claimant Cohort Prognostic Modeling Workgroup (2001). "Modified work: prevalence and characteristics in a sample of workers with soft tissue injuries". *J Occup Environ Med*,vol. 43, nº 3, 276-284.

[53] Lhuilier, D., Waser, A-M. (2014). « Maladies chroniques et travail – « Me rendre le travail vivable maintenant », *Pistes*, 16-1. http://pistes.revues.org/2884

Example 2

The issue of "sustainability", in high-risk industrial processes

Sector-based example - steel workshops

The steel industry has been subject to profound industrial, economic and social changes since the end of the 1960s. We will not cover these changes in detail here, as they have been the subject of a number of sociology and management sciences publications.[54] However, it should be noted that this period marked the beginning of a drastic reduction in headcounts in the industry. In France, this was mainly implemented through early retirement of workers aged 50 and over and an almost total freeze on the recruitment of younger staff.[55] In 1991, a bill on the funding of this system forced the sector to invent new ways of manageing human resources in the context of an ageing population, and of transforming production tools in the face of increasing competitiveness, while the "crisis" showed no signs of abating. Although the French situation cannot be generalised, it still reveals some issues common to this sector in other so-called "industrialised" countries. The French situation sheds light on the demographic and organisational problems that may play out elsewhere on a smaller scale. Furthermore, the system for manageing human resources implemented in French steel industry in the 1990s was organised according to reasoning based on "ability". This was considered to be a major innovation at the time, offering a model for career progression that broke with the old Ford model and the qualification grid. In light of its exemplary nature, the French case will be examined from a "sustainability" standpoint. It shows that risks in the sector do not just come from the dangers in the process or the difficulties of very high-risk professions, but also from the organisational choices that are made at management level.

A new "underlying agreement"

Let us examine the problems that arose following these early retirements in more detail. In addition to the ageing demographic, which was further accelerated by lengthening careers, career progression was cut brutally short: "the vacuum effect", through which the mass departures of older workers had led to rapid promotions, stopped. This stoppage caused serious human resources problems, further exacerbated because industrial sites carried out rapid re-organisations to improve competitiveness. Sites began to reason in terms of quality and product diversity, rather than output in tonnage, and at the same time modernised their installations and the organisation of work. A draft agreement was proposed and signed by all sides[56] to support the changes. It was seen as a way of overcoming the crisis and a means for developing staff skills in a new context. Its stated objectives were: to promote a qualification policy that recognises individual skills; to define career paths enabling each individual to progress according to their skills; to put in place a scheme enabling each staff member to determine their position at any point in their professional career. There was, therefore, a new, "underlying agreement"[57] between the staff and the company.

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[54] Forrant, R., Konzelmann, S. (2003). "Creative Work Systems in Destructive Markets: The Late-20th Century Steel and Metalworking Industries". *In* B. Burchell, S. Deakin, J. Michie, and J. Rubery (eds). Systems of Production: Markets, Organisations and Performance, London: Routledge.

Zarifian, P. (2001). *Le modèle de la compétence*. Paris: Editions Liaisons.

[55] This was the new Convention Générale de Protection sociale (new general convention for social protection) which had been used to manage early retirement between 1977 and 1991.

[56] Project called « Acap 2000 ».

[57] Pueyo, V. (2012). "Quand la gestion des risques est en péril chez les fondeurs ». *In* A.-F. Molinié, C. Gaudart, V. Pueyo (coord.), *La vie professionnelle : âge, expérience et santé à l'épreuve des conditions de travail*. Toulouse: Octarès, coll. « Travail et Activité humaine, 257-284.

On reading the draft agreement, it would be reasonable to think that it set up "sustainable" working conditions. However, in practice it moved further away from them. There was gap between the skills acquired and those required, and the collective dimension of the work was no longer taken into account. This gap could be attributed to the long-term crisis, but ergonomic studies[58] have also highlighted a lack of consideration for the "work perspective", which led to simplistic visions of the work and to organisational decisions being implemented which had damageing consequences in terms of the viability of the system and workers' health.

Human Resources Management (HRM), skills and safety

These comments can be illustrated by the results of an ergonomic analysis carried out on foundry workers who were responsible for the functioning of blast furnaces where cast iron was made, notably for carrying out botting and de-botting (or plugging and unplugging in the funnels)[59]. Key technological changes occurred on the site during this period, including the reconstruction of one of its blast furnaces, while at the same time new HRM strategies were being implemented requiring greater mobility, flexibility and versatility. Alongside the older, experienced staff, still the majority, younger staff appeared who needed to be trained according to new inter-team procedures, as well as "older novices": old coke oven workers who were required to re-train under a policy of focusing on "core business". The organisational structure could not cope with changes of this scale, and the management requirements came into conflict with the production requirements. The "underlying agreement" was broken. Minimum levels of safe staffing, three foundry workers per blast furnace, were not met: there were often only two members of staff, or just one, even though two funnels had to be monitored simultaneously. This understaffing coincided with the introduction of a rotation system across several teams for the younger staff, which destabilised the teams and the transmission of skills. Mentoring functions were not clearly identified and training was provided on an ad hoc basis. The most experienced workers feared for the safety of their teams, for the installations, and also for the future of their profession: as well as feeling that there was a poor transmission of skills, they often remarked that some "older novices" (coke workers converting to new positions) would retire before their mentors.

If the organisational structure in this context did not constitute a resource, this was not only due to the economic factors which limited the possibilities for hiring new staff, but was also down to management and the engineering staff's representations of risk and of the profession. The risk of accidents was seen as a failure to follow procedure. The real work, i.e. the work as it was actually done, was therefore a deviation from recommendations that needed to be eliminated. The possibility that this work responded to the variability and complexity of situations and the diversity of foundry workers experience and their health, or in other words, that it played a part in the foundry's viability was not taken into consideration, and the inherent collective approach to dealing with risk even less so. In the guidelines based on the agreements, the profession of foundry worker was reduced to monitoring installations and the foundry worker was reduced to a manual means of doing what the control room could not do automatically. It should also be noted that there was a requirement to be in good physical condition, in order to cope with a strenuous work (carrying heavy loads, noise, extreme variations in temperature, etc.). In fact, the coke workers were offered positions as foundry workers, presented as a career development, due to their ability to withstand heat. However, analysis of the work showed that, on the contrary, the experienced foundry workers were actually co-supervisors of the process and actors in risk management.

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[58] Pueyo V. (2012), *op. cit.*

Gaudart, C. & Pondaven, S. (1998). Polyvalence, vieillissement et expérience dans deux métiers de la sidérurgie. *Actes du XXXIII^e^ du Congrès de la SELF « Temps et Travail »*, 16-17-18 September, Paris, 599-609.

[59] Pueyo, V. (2012). Expérience professionnelle et gestion des risques au travail : l'exemple des hauts-fourneaux. *Quatre Pages*, n°50, Centre d'études de l'emploi, http://www.cee-recherche.fr/publications/anciennes-series/experience-professionnelle-et-gestion-des-risques-au-travail-lexemple-des-hauts-fourneaux

The acquisition of know-how

For these foundry workers, the blast furnace is an "unpredictable cauldron" that must be tamed. Foundry workers know how to contain this unpredictability with the tricks of the trade: strategic actions aimed to pre-empt risk, constant assessment of indicators to determine the state of the process, and ways of moving about in a high-risk space. Other considerations include watching over each other, the transmission of the trade and self-preservation. Observation of teams of foundry workers, composed of young or experienced workers, or of a mix of the two, shows how this know-know is transformed through practice, and that the increasing complexity requires several years to master (10 years according to the experienced workers). Safety know-how is acquired and alters over time, providing that it is made the object of collective regulation, *i.e*. that it can be debated and adjusted and that it is recognised as the rules of the trade by the workers' peers and line management. Time is also required so that it can be handed on. However, lack of time, linked to the instability of teams, can lead to the oldest workers refusing to expose novices to dangerous situations. This emergency strategy is worrying in the long term. Massive departures of experienced workers are expected in the coming years. The inadequate quality of the transmission of skills, due to lack of resources and limited time periods for training, is a concern for older foundry workers, worried about how the trade can continue reliably when that time comes.

This example points to two of the characteristics of "sustainability" as defined above. The first, examined above in the main body of this paper, is a clear argument for giving this work visibility when manageing change projects. It should help, amongst other things, to debate the partial or simplified representations of work, and of the workers'. If these are not discussed, numerous technological and organisational decisions are made based on these representations which can be harmful, as we have already seen. The second characteristic, which is clear in the example cited, refers to the long-term picture. A sustainable project is one that possesses the characteristics shown in the previous example (example 1), but also one with the means to ensure these characteristics last. Hence, the transmission of know-how between older and newer workers becomes crucial. It enables working groups to remain open to their past (the older workers in the profession who are still present or who have left) and their future, with the arrival of new workers.

Example 3

The issue of "sustainability", in work undertaken in open settings

Sector-based example - household refuse collection

General opinion would not hesitate to class the profession of refuse collector as one of the most unpleasant jobs and, hence, as "not very sustainable". As this job is carried out under the eyes of the surrounding populations and in contact with them, the typical constraints and difficulties of the work would seem to be obvious to everybody. But this "obviousness" is fundamentally of little interest in terms of preventative policies. It certainly only takes a rapid assessment to see that a refuse collector does manual work, that it is strenuous, that they work in the open air in all weathers, work restrictive hours and partly at night, and with dirty or dangerous objects. However, an equally rapid, but more optimistic evaluation would note that the equipment is modern, that fresh air is not harmful in itself, and that the refuse collectors have a socially useful role and are in direct contact with the beneficiaries of their work, all of which are conditions that apparently favour "sustainability". This is why careful investigation is of value, and there is a need to use a variety of observation methods.[60]

Progress in equipment

An analysis of the work of refuse collectors shows above all the importance of the equipment used, and, in particular, the type of container[61]. One study showed that in comparison with wheeled containers that the truck can self-load (which is clearly the least difficult container to handle), dustbins with handles mean the arm has to be lifted over the head three times more often, bin bags require seven times more twisting of the torso, coupled with "punches to the kidney" if the bag is large, and large bending motions are needed to pick up small bags, etc.[62] Significant progress has been made overall in terms of equipment, but the older workers did not benefit from this progress at the start of their professional careers. According to the older workers, the trucks used today are more comfortable than in the past, the working clothes are more practical, the re-surfacing of roads has reduced jolting and above all the replacement of bins by containers has reduced the total amount of physical effort required[63].

It is nevertheless still necessary for the use of containers to be properly established and used everywhere (which is far from the case) and to ensure time pressures do not lead to the refuse collectors lifting and tipping the containers manually: some observers have found that the average time for manual emptying is 4 seconds compared to the 12 seconds taken by the machine[64]. If these figures are multiplied by the number of containers per round, it is clear that the method chosen has a signif-

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[60] Gerossier, E., Massardier, C., Pueyo, V., Germain, C. (2008). « L´analyse de l´activité en préambule à la conception d´un mode d´organisation, une application dans la collecte des ordures ménagères ». *In* P. Négroni, Y. Haradji (coords). *Ergonomie et conception. "Concevoir pour l'activité humaine"*. Actes du 43e congress of SELF. Lyon: Agence Nationale pour l'Amélioration des Conditions de Travail. 135-143.

Poulsen, O.M. et coll. (1995). "Collection of domestic waste. Review of occupational health problems and their possible causes". *The Science of the Total Environment*, 170, 1-19.

[61] Kingma, I., Kuijer P., Hoozemans M., Van Dieën J., Van der Beek A., Frings-Dresen M. (2003). "Effect of design of two-wheeled containers on mechanical loading" *International Journal of Industrial Ergonomics*, 31, 73-86.

[62] Volkoff, S., (2006). « Montrer » la pénibilité : le parcours professionnel des éboueurs. *Actes de la Recherche en Sciences Sociales.* n°163, June 2006, 62-71.

[63] *Ibid*.

[64] Morlet, T. (2011). « La pénibilité au travail des équipiers de collecte dans le secteur privé : éléments organisationnels et managériaux ». *In* D.Corteel, S. Le Lay, *Les travailleurs des déchets*, Erès, 153-167.

icant impact on the total time for the round. This is how time constraints come to play an essential role, and their effects differ according to age (see above §5 in the main text).

Hurrying - for colleagues and end customers

In the professional environment, this question of time pressure is a particularly delicate one because in the day-to-day it seems to come from the team itself. Theoretically, the truck driver "decides" how quickly to drive and the duration of each stop. It is the refuse collector who "chooses" to walk or run, to handle a container himself or to use the machine, to grab the bags in twos or fours, to put them down nearby or to throw them, and to pay more or less attention to traffic when crossing the road.

However, these decisions are taken within the framework of higher level constraints. An initial analysis seems to show that the team and its members go faster out of a desire to finish the round as soon as possible, because of the very widespread "go-when-you're-done" system used in this sector: the refuse collectors can go home when the round is finished. The complicity or tension in the groups reflects this pressure; the desire not to hold up the others arises from a feeling of solidarity, or a fear of being ill-thought of - of garnering reproaches, even "friendly" ones, such as: *"You're a bit slow today...showing your age, mate!!"* Older refuse collectors are very sensitive to this accusation because on the one hand their relative "slowness" is indeed often due to health problems (general tiredness, high blood pressure, or knee pain, for example) which are often the result of their work history, and which their greater practice cannot fully compensate.[65] On the other hand they find it difficult to convince their younger colleagues of the risks they run in the long term if they do not pace themselves. They also know the routes and their lengths are adapted at regular intervals, based on the teams' performance.

The multiple ways in which their work is dependent on residents and the associated pressures are an additional factor. There are direct pressures such as the impatient behaviour of motorists stuck behind the truck. This is sometimes means the refuse collectors decide to run, because even if running gains very little time, it shows the car drivers that they are doing their best. There are also other forms of indirect, but targeted pressure, for example when a resident calls the truck back, sometimes forcing it to make a long detour, because it passed by a little early and they had not yet put out their container. There is also indirect and group pressure from the local authority, whose requests for proposals aim to implement spending cuts, and who are trying to satisfy the many demands of the electorate. All in all, it is a field in which all older workers consider that the circumstances are getting worse, reflecting changes in behaviour in the population. According to them, there are more and more motorists and they are increasingly less mindful of refuse collectors' safety; residents throw away more and more excessively heavy objects, do not respect the sorting guidelines and are less friendly.

Sparing yourself, and/or driving

In this context, refuse collectors, and in particular the more experienced, try to create and implement ways of doing the job that will spare them a little. When handling bags, they save on physical effort by reducing their movements, and showing greater dexterity in handling them. They limit their use of the step on the truck to reduce the number of times they need to get down, a motion that causes injuries in the long term. They allocate tasks between themselves carefully - notably, according to the weight to be moved. They may even get involved in the task rotation systems that the management often implements to a greater or lesser extent[66]. These strategies are precious, and

[65] Schibye, B., Hansen, AF., Sogaard, K., Christensen, H. (2001). « Aerobic power and muscle strength among young and elderly workers with and without physically demanding work task ». *Applied Ergonomics* 32, 425-431.

[66] Kuijer, P., Visser, B., Kemper, H. (1999). « Job rotation as a factor in reducing physical workload at a refuse-collecting department ». *Ergonomics*, 42, 1167-1178.

communicating them through well-adapted training schemes has long been recommended in order to meet safety objectives.[67] However they provide only limited room for manoeuvre for the reasons stated above. The main action points for "sustainability" are therefore situated at a higher level.

As some of the constraints specific to this job are unavoidable in the short term, one path towards "sustainability" is to look at people's career paths and in particular the move from refuse collector to truck driver. This job also has its own constraints, but is less physically demanding. It is clear from one study, quoted above,[68] that within the same refuse collecting company, the drivers are of an "older" demographic than the refuse collectors. The annual rate of transfer from refuse collector to driver is relatively high: 5% of refuse collectors under 30.4% around forty, and 2% more over 50 years old. Furthermore, interviews confirmed that the inherent strains of refuse collecting had pushed some of them towards taking this route out, by transferring to a driving role.

"Sustainability" specifications?

However, this option is not open to everyone because there are a limited number of positions and you need a special licence. It is still essential to improve refuse collectors' working conditions, and facilitate the strategies they adopt with experience. From this point of view, there is the well-known, but unevenly applied, recommendation for mechanising refuse collection through the use of wheeled household containers and special vehicles. Many years after this equipment first appeared on the market, we should be asking why these containers are not used for refuse collection across the board. The reasons include the residents' habits, local authority decisions on parking, shop owner preferences, and the resolution with which refuse companies defend the working conditions of their own staff which is highly compromised when faced with stiff competition in the market.

However, it has been found that this mechanisation is not the answer to everything. The main challenge is the need (or not) to hurry, which also highlights the fact that this rushing varies between the towns and areas where the observations are carried out. We have noted the importance of the negotiations which take place between the refuse collection employer and the local authority that is his client, or that he hopes will become his client.

Drawing up specifications is therefore of key importance, because it can serve to show how much attention is paid health and safety at work, particularly in terms of whether it contributes to increasing or relaxing time constraints. It is important to set up an adapted organisation that anticipates the safest working rates, time for recovery, reasonable workloads, and facilitates greater cohesion in the teams. This shows that "sustainability" in this type of situation depends on a whole raft of decisions which largely go beyond the internal negotiations in the companies affected. The term "open settings" therefore reflects both the concrete aspects of working life (in the open air) and the scale of the very open decision chain governing this work.

[67] Bourdouxhe, M., Guertin, S., Cloutier, E. (1992). *Étude des risques d'accident dans la collecte des ordures ménagères*, rapport de l'Institut de recherche en santé et en sécurité du travail du Québec, Québec, R-061.

[68] Volkoff, S. (2006). *op. cit.*

Example 4

The issue of "sustainability" in the care professions

Sector-based example - health care provision in hospitals

In many countries, hospital organisations are being affected by in-depth restructuring programs effecting political, social, economic and management changes that across the health sector and its environment.[69] The ageing population means that how care is paid for must change, given that this population (?) often suffers from multiple pathologies. Increasingly, the main challenges focus on the care management of chronic diseases. At the same time, there has been substantial and permanent progress in techniques and technology which has reduced the average length of hospital stays.

Changing organisations

In each establishment, change often results from decisions taken higher up in the organisation. This can lead to uncertainty regarding the future, or even contradictions between decisions taken by different organisational units. The staff in place when these changes take place then have to deal with situations in their work in which these contradictions manifest themselves. These uncertainties, the constant changes and the movable nature of the organisation, reduce any leeway in terms of time at all levels and for both more experienced and more recent employees. However, the challenges involved can depend on where each staff member finds themselves in terms of their professional career path and, therefore, in terms of their age.

Another characteristic of these developments is the increasingly central role occupied by patients who are often "co-decision makers" in the medical choices that concern them. They are no longer just ill people who need to be cared for, but also customers who must be satisfied. Legal proceedings brought by patients are increasingly common. Furthermore, the *customer service* dimension is an increasingly visible part of the nursing staff's remit. However, due to the impact of budgetary constraints, these developments are not necessarily supported with new resources, or with any thinking on the practical implications of these objectives.[70]

At the same time, perhaps in a somewhat contradictory fashion, the priority given to risk management has led to an increasing number of procedures that must be followed. This means more work for the nursing staff – filling out traceability documents, for example. The writing of protocols, and procedures, in particular for nurses, offers a standardised way of reporting on their care actions, often pre-printed forms. This is despite the fact that the "customer service" stance calls for a patient-adapted approach, and therefore for greater diversification in professional behaviours.

The role of older staff and their methods

Within this context, the singularity of older nursing staff is that they know what went before: less patient rotation, for example, less financial pressure, less demanding administrative tasks, and clearer working objectives. The wealth of new constraints is a key contributing factor to the early departure of certain sections of nursing staff (departures which have been the subject of a specific

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[69] Gheorghiu, M., Moatty, F. (2013). *L'hôpital en mouvement : changements organisationnels et conditions de travail.* Editions Liaisons.

[70] Dujariern M.A. (2006). *L'idéal au travail.* PUF.

European study[71]) for two reasons: firstly, the perception that these constraints call the values of the profession into question – values which the nursing staff, particularly older members, believe in; and, secondly, because the constraints compromise the forms of collective regulation which previously allowed each nurse to construct a career path that took into account their abilities and difficulties at each period of their professional lives.

The professional career paths of nurses and care assistants, in particular, can be largely explained by looking at how they deal with various forms of work constraints[72]. "Younger" units, *i.e.* those that employ a lot of young nursing staff, tend to require more shift work and night work solutions, a higher level of psychological strain linked to patients' states of health, unpredictability in the work, time pressure, the use of new technologies and a requirement for versatility – precisely the characteristics of work previously seen in this paper to be becoming more important. Other "older" care units (consultation units for example) provide a place for staff (?) who have had difficulties coping with these high-level constraints. It is clear that, in the context of an ageing population of nursing staff, an increase in the constraints usually dealt with by younger staff poses serious problems in allocating personnel to different units, and in terms of the "sustainability" of career paths.

Nevertheless, there is, yet again, no reason to underestimate the resource of experience, which offers numerous possibilities for regulating the constraints encountered through individual and collective working strategies. [73] Collective strategies are supported by multiple forms of mutual assistance with moving patients, reading prescriptions, or calibrating equipment and so on, all of which take into account each person's physical condition, which is in itself age-dependent. For example, we have identified individual strategies which include different methods of personal organisation that allow staff to better identify and rank priorities within the available time, as well as methods for "taking a step back" from patients to preserve staff members' own psychological health.

We have also been able to closely study the specific role experience plays, and how it develops in nursing staff working nights[74] (see #4 above). Older nursing staff, in particular, organise their tasks to deal with the tiredness and dips in alertness, both very familiar phenomena in this professional environment[75], often felt at around 3 or 4 o'clock in the morning. As a result they may dispense care or medication a little earlier than planned (when it is not prejudicial to the patients' health), in order to leave some time for themselves to rest in the middle of the night. They are also particularly attentive to the information that the evening team gives them and plan their protocols and patient observations accordingly in a very forward-looking way.

Nursing staff working in groups and sharing know-how

All this know-how is built up on an ongoing basis with age and throughout the nursing staff's careers. It is based on extensive professional practice, increasingly acute self-awareness, and discus-

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[71] Estryn-Béhar, M., Van der Heijden, B., Oginska, H., Camerino, D., Le Nézet, O., Conway, P., Fry, C., Hasselhorn, H. (2007). The impact of social work environment, teamwork characteristics, burnout, and personal factors upon intent to leave among European nurses, *Medical Care*, 45, 939-950.

[72] Gonon, O. (2003). « Des régulations en lien avec l'âge, la santé et les caractéristiques du travail : le cas des infirmières d'un centre hospitalier français ». *Pistes*, 5(1), http://pistes.revues.org/3336

[73] *Idem*.

[74] Pueyo, V., Toupin, C.y, Volkoff, S., (2011). "The role of experience in night work: Lessons from two ergonomic studies", *Applied Ergonomics*, vol. 42, 251-255. http://www.elsevier.com/locate/apergo

Barthe, B. & Quéinnec, Y., (2005). "Work activity during night shifts in a hospital's neonatal department : How nurses reorganize health care to adapt to their alertness decrease". *Ergonomia* IJE & HF, 27 (2), 119-129.

[75] Mardon, C., & Toupin, C. (2007). "Psychosocial and physical risk factors depending on age and shifts among french nurses". *Ergonomia*, *29*(3-4), 105-110.

Totterdell,, P., Spelte,, E., Barton, E., Smith, L., & Folkard, S. (1995). On-shift and daily variations in self-report and performance measures in rotating-shift and permanent night nurses. *Work and stress*, *9*(2/3), 187-197.

sions and exchanges with colleagues. We re-investigated the effects of the aforementioned changes in the health system on these exchanges.

Increasing time pressure, the rotation of patients, and the rate of organisational changes did indeed create complications for circulating professional know-how, even though this practice has become even more indispensible.[76] Within the context of permanent change, each member of staff becomes a "new" employee, regardless their career path. This raises the question of how each person's know-how contributes to the "sustainability" of the work. Which piece of know-how enables the new objectives to be met? What changes should be carried out to adapt the know-how and existing practices? In what ways do these remain valid? This is an important question, in particular for older members of staff: they are sources of know-how and working strategies that can be "passed on", but their own know-how may be considered to be obsolete. It is even possible, and has been seen, for older members of the nursing staff to adopt a position of "resistance" to the changes themselves: because of their experience of the profession, and of the hospital and its operating procedures, they directly question these changes in a concrete way. When they feel alienated by the changes, it is difficult for them to implement these, and to "pass on", practices or objectives they do not adhere to.

In terms of actions to be taken to promote the "sustainability" of nursing staff's work, it is clear that the usual tried and tested methods of, for example, reducing physical strain[77], or reorganising shift times and lengths,[78] do not provide a full picture. A close examination should also be undertaken to look at how nursing staff work together and function in groups, taking into account these groups' heterogeneous nature in terms of age and professional experience. The transmission and discussion of professional know-how amongst nursing staff deserves to be considered as a work activity and as a construction linked to the history of the different collectives and the different individuals' career paths throughout their professional lives. For this reason it would be reductive to broach this subject, as is so often the case, in terms of relationships between generations, often seen from the perspective of two age groups, with the young on one side and the "old" on the other. It would be better to take into account the fact that the working population is made up of people with diverse ages, experience and career paths, each of these components working concurrently, in its own way towards the "sustainability" of the whole.

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[76] Thébault, J., Gaudart C., Cloutier E., Volkoff S. (2012). « Transmission of vocational skills between experienced and new hospital workers ». *Work*, n° 41, janvier, 195-204.

[77] Estryn-Behar, M., (2011). Hospital ergonomics: a review. *ILO Encyclopaedia of health and safety*.

[78] Costa, G. (2012). Management of shift and night work in hospital, *Giornale Italiano di Medicina del Lavoro ed Ergonomia*. 34(3):257-259.

Quéinnec, Y., Gadbois, C., Prêteur, V. (1998), *op. cit.*

Example 5

The issue of "sustainability" in IT changes

Sector-based example - administrative services

Work in administrative services has characteristics that would theoretically categorise it as a "sustainable" profession: a seated position that is generally comfortable, no great physical effort, not exposed to a harmful environment, and a working day that is generally diurnal and regular etc. This reassuring assessment is, however, called into question by certain changes, similar to those observed in other sectors, and two in particular which are closely connected: firstly the intensification of office work; and, secondly what we have termed "IT changes", which covers the establishment of new technologies, and the regular minor or major modifications to existing ones.

Workload and checks and controls on work

Research in a variety of disciplines has indeed analysed the "manifest complicity"[79] observed in these sectors, between modernisation and "a globalised market of managerial solutions leading to increased pressure on people in work" with new forms of time and cost controls that are facilitated or even promoted by new tools. Previously un-assessed business activities, have become "measurables". These measures are used as a point of reference by the management to make comparisons between departments, teams and even employees. However, in general, they pay very little attention to the inevitable and permanent gaps between the prescribed task and the real work activity – or consider these gaps as anomalies to be corrected. Continuous mechanisms for monitoring work and its results are an integral part of these schemes, and can increase anxiety, for example, when faced with the risk of errors in coding or inputting.

This has been aggravated, particularly in recent times, by the widespread use of the Internet and Intranet, and forms of "information overload"[80]: a mass of messages that need a rapid response more or less urgently, a mix of important and irrelevant information, and the complexity of determining priorities. This feeling of overload can also come from an excessive sollicitation of the memory. Although one of the main strengths of computers is their ability to "remember" enormous amounts of information, the memory of the user has not become entirely redundant. Information is not all presented on the screen at the same time; the path to the information is not always straightforward, or easy to memorise; taking up a task again after interruption means re-establishing a mental picture of how to do it, and of the step at which one stopped; and the modification of data on the screen can definitively erase ("delete") the previous version, etc.

Impact on health

As is often the case with the intensification of work, its effect on health differs from one employee to another, and for the same employee may differ from one period to another.[81] Some people find a certain professional satisfaction, at least for a while, in using quick, modern, high capability tools. Others (or the same people at different times) primarily feel a huge amount of pressure, and a sense

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[79] Vendramin, P., (2006). « Les TIC, complices de l'intensification du travail ». *In* P. Askenazy, D. Cartron, F. De Coninck, M. Gollac. *Organisation et intensité du travail.* Octares éditeur, Toulouse, 129-135.

[80] Bradley, G., (2000). "The information and communication society: how people will live and work in the new millennium". *Ergonomics, vol.43,7.*

[81] Volkoff, S., (2008), « L'intensification du travail "disperse" les problèmes de santé ». I*n* de Terssac G., Saint-Martin C., Thébault C. (coord.). *La précarité : une relation entre travail, organisation et santé.* Toulouse: Octarès, Coll. « Le travail en débats ». 29-40.

of being less in control of the determining factors in their own work, now managed by a more centralised, abstract system, developed at a distance from the work as it is actually carried out, a system that is costly and whose development time, often lengthy, means it cannot be modified for several years.

These overarching trends in the development of administrative work lead to the conclusion that their impact will depend on age and experience, which is why they require specific consideration with regards to the issue of "sustainability". This paper has already referred (see Figure 5 above) to the age-dependent effect of increasing haste in work on the consumption of tranquilisers and sleeping pills amongst women working in administrative positions. Harmful "physical" health consequences have also been observed, such as neck pain[82]. IT changes, whether linked to this feeling of haste or not, can also pose specific problems for older workers, even if there is no systematic pattern[83]. For some time, studies have reported a general reluctance in certain older employees towards such changes, based on various concerns[84]: anxiety at the idea of damaging the equipment or systems, a fear of learning something new and of competing with younger employees whilst doing so, the feeling of not having enough time to get used to new software[85], difficulties in understanding terminology and finding their bearings in user manuals etc. Additionally, as previously mentioned, the standardisation of procedures is sometimes reinforced by the introduction of new software applications, which can compromise older employees' work strategies[86] and can reveal the frailty of their knowledge, unless further back up and consolidation is offered at that time.

The same work with different tools?

When learning a new system, these difficulties are exacerbated, because this process is about remembering or "learning how to find", working principles with which the employee is not familiar. For older workers in particular, the plethora of written aids they have created over time during work or training courses (notebooks, summary lists, or post-it in user guides) demonstrates the sheer amount of information that needs to be acquired. This cannot be done so by merely mastering a keyboard and there is a clear need to personalise this information to overcome the specific difficulties met by each individual. It should also be noted here how useful it is to create practical, simple and user-friendly "manuals", which correspond as closely as possible to the reality of work and experienced acquired – such manuals do exist, but are not systematically created.

In this type of context older staff may or may not receive support from their team, and this – as can be seen in the previous examples – is one of the keys to "sustainability". Each employee works alone in front of their screen, but numerous collective strategies come into play: mutual assistance, sharing tasks and scheduling across time, "traces" left on the system for a colleague who is to take over a given file, etc. Failing to understand these collective aspects, or under-estimating their value, can lead to design faults in the software program itself, or insufficient time being allocated to exchanges between colleagues during the learning process and its practical application.

It is therefore clear that, when adopting a new system or rolling out a major modification to an IT system, this change, and any accompanying training, should not be managed as though it was merely a case of doing the same work with different tools (as trainers so often seem to believe). The vi-

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[82] Molinié, A.F., Volkoff, S. (2000). « Intensité du travail et santé dans un organisme administratif : une enquête à l'Agence nationale pour l'emploi ». *PISTES*, vol.2, n°1, http://pistes.revues.org/182

[83] Greenan, N., Narcy, M., Volkoff, S., (2014). "Ageing, changes, and quality of working life". *In* C.Korunka, P.Hoonakker (ed). *The impact of ICT on quality of working life*, Springer ed., Berlin.

[84] Marquié, J.-C., Thon, B., Baracat, B. (1994). « Age influence on attitudes of office workers faced with new computerized technologies". *Applied Ergonomics*, 25(3), 130-142.

[85] Hukki, K., Seppala, P. (1992). "Utilization of user's experience in the introduction of information technology: a study in a large municipal organization". *In* J. Ilmarinen (Ed.), *International scientific symposium on ageing and work.* Haïkko, Finland, 28–30 May.

[86] Gaudart, C. (2000). « Quand l'écran masque l'expérience des opérateurs vieillissants : changement de logiciel et activité de travail dans un organisme de services ». *PISTES*, vol.2, n°2, http://pistes.revues.org/3814

sion, which should be clearly outlined, is always about "*working differently*".[87] This is why there is a need to start from how employees, in particular the most experienced, actually work, in order to make them actors in their own change, to enable them to develop against the backdrop of the work activity, as practiced by each individual, marked by their own experience and their career path up to that point. This requires abandoning the idea of standardised training, making trainers aware of variability, and ensuring training programmes have a modular design which takes into account and adapts to individual difficulties and different learning speeds.

The role of experience in change

In this type of context, it is clear that the training process is not limited to the official length of the training course, but spills over this period to a large extent. Even in large administrative organisations, where the designing of IT systems takes a long time and mobilises numerous experts, the employees, and older staff in particular, should be involved in the change process as soon as the project is defined. They should then continue to participate in the development of the tools in order to ensure that a working point of view is taken into account. This is beneficial not only in terms of the use of the system but also for the training to be implemented. For the same reasons, it is of vital importance that they are then supported throughout the training process, up to when the go-live phase is ramped up in-situ, in order to consolidate their learning. The months following training, are therefore of strategic important and require support, which is all too often not provided. This gap in provision causes experienced staff in particular critical difficulties in terms of meeting their objectives.

This type of approach is not only indispensible for taking the variability and diversity of employees and their experience into account, but is also about adopting methods for designing tools and organising work that respect individuals and the skills and the meaning of the work that they have been doing to date - and that they perceive these methods in this way. With this approach, the introduction of new technologies and new techniques would not mean making previous skills obsolete, nor that the administrative employees themselves become "obsolete" as they get older.

[87] Cau-Bareille, D., Gaudart, C. (2012). « Formation et changements technologiques : des difficultés liées à l'âge ? ». I*n* Molinié, A.-F., Gaudart, C., Pueyo, V. (coord.). *La vie professionnelle : âge, expérience et santé à l'épreuve des conditions de travail*.Toulouse: Octarès Éditions, coll. « Travail et Activité humaine », janvier, 95-113.

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