

Jochen Pack

Hartmut Buck

Ernst Kistler

Hans Gerhard Mendius

Martina Morschhäuser

Heimfrid Wolff

Future Report

Demographic change

Innovation ability in an ageing society

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Innovation ability
in an ageing society**

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Declining birth rates and a continuing rise in life expectancy are leading to a considerable change in age structures in Europe and other industrialised nations in the medium and long term. Forecasts anticipate a decrease in population accompanied by a drop in the number of younger people of working age. Against this background, bottlenecks can be expected in the recruitment of new young staff and a higher age amongst workforces. Wrong company strategies, short-sighted personnel policies, parameters which favour the early retirement of older employees and a fashioning of work which does not respect the ageing process intensify this trend. The question is posed whether the innovation ability of enterprises is endangered by this development.

The question of the consequences of demographic change for enterprises and the world of work led the Federal Ministry of Education and Research (Germany) as early as 1994 to initiate a research programme on the topic of "Demographic Change and the Future of Gainful Employment in Germany". Research work was commissioned in the following areas:

- Changing work and innovation potential
- Viable demands and strategies for the future in the craft trade sector
- Limited occupational lifetime and new models for working hours for older persons
- Innovation in changing age structures
- Innovation, workforce structures and ageing in enterprises

Since the need for a new way of thinking amongst enterprises, employees and intermediaries takes time, just as does the implementation of countermeasures, it is already important today to prepare for the situation which can be expected in a few years. Explaining these coming changes and the required countermeasures is however also necessary since apart from the hidden ageing process sneaking up amongst population and workforces, a prejudice will have to be fought centrally which is threatening to assert itself: Older persons, so the common stereotype, are less efficient and less capable of innovation. By contrast, the research results available reveal quite categorically that efficiency and innovation ability have less to do with biological age(ing) than with the conducive or restrictive conditions to which people are subjected in their individual working, professional and private lives.

The results of the individual research projects reflect a wide spectrum of problems. They however demonstrate above all a broad diversity of potential solutions which must be adopted in order to counter any possible dangers from demographic change for the innovation ability of the economy. This brochure presents a synopsis of the most important results of these research projects.

In order to examine whether and to what extent these potential solutions are practicable, the project "Demographic Change: Public Relations and Marketing Strategy" was started in the autumn of 1999 by the Federal Ministry of Education and Research". The objective of this transfer project is to develop and disseminate solutions on the basis of awareness, advice and creativity together with and for the working population, enterprises and associations in order to cope with the consequences of socio-demographic change.

The Authors.

Demographic change – the change in the composition of age groups in a society – as a result, for example, of natural catastrophes, wars, changes in the birth rate and continuous improvement in healthcare – is in principle a normal occurrence and – seen in isolation – to be deemed neither as positive or negative. Demographic change can lead to completely opposing results:

- A high birth rate and decreasing mortality lead to a younger population and population growth. The result is a compact age pyramid.
- A declining or consistently low birth rate and rising life expectancy lead to an ageing of the population and to a decrease in population. The results is an unbalanced age structure.

Discussions about demographic change have concentrated in the past primarily on the foreseeable decrease in the population from which is derived a drop in national and economic influence. One of the prime reasons for this decline in population (regarded as a net figure and without taking any increase from immigration into consideration) already started to make its impact in Europe at the end of the 19th century. Following the transition from a predominantly agricultural to an industrial society, there was a so-called "demographic leap" in Europe – later too in Japan – together with periodic shifts between the countries, that is a permanent change in generative behaviour which resulted in a considerable drop in the birth rate. This is a structural problem to be found in all industrial societies and one which is in principle irreversible. As a result of immigration and above all of a continuously rising life expectancy the feared decline in population was however pushed into the future.

A combination of both factors, on the one hand a declining birth rate and on the other hand continuously rising life expectancy, is leading in the medium and long term to a major change in age structures in Europe and Japan. What is now primarily being debated is the correlation between an ageing society and how to finance pensions and health services.

The following questions on the other hand are neglected:

- To what extent does a rising average age of the overall population make an impact on the age structure of the potential working population (15–64 years of age)?
- What are the consequences of this development for enterprises and the working population?
- How is the age structure of workforces in enterprises developing?

- What impact do ageing workforces make on enterprises' innovation ability and performance potential?

Demographic change: The research programme

Against this background of massive shifts in population structure and in the anticipation of the bottlenecks caused by them with regard to supply of new young human capital and future-oriented qualifications, in 1994 the Federal Ministry of Education and Research publicised its research programme on the topic of "Demographic Change and the Future of Gainful Employment in Germany". Accompanied by an advisory committee, in 1995/1996 research work was commissioned which led to a total of five joint projects on the following key topics:

Group project I: Changing work and innovation potential

What changes in the work available and in the demand for human capital can be identified and what are the consequences for work and innovation potential? What opportunities are there for ageing employees under these new circumstances? The following institutes were involved: INIFES – Stadtbergen, ISF Munich and SÖSTRA – Berlin.

Group project II: Viable demands and strategies for the future in the craft trade sector

How can the craft trade sector cope with demographic changes? Is this area of the economy particularly suitable for improving the employment situation of older persons by creating additional jobs? What prospects are there for personnel development and the potential for systematic preventive healthcare in the craft trade sector? The following institutes were involved: The "Future Factory" of the Hamburg Chamber of Craft Trades, Lower Rhine Polytechnic – Mönchengladbach and ISF Munich.

Group project III: Limited occupational lifetime and new models for working hours for older persons

What lies behind the phenomenon of a limited occupational lifetime? What consequences result from demographic change for enterprises? What possible actions can they take to prepare themselves for this by means of appropriate organisation and fashioning of work and working hours? The following institutes were involved: ISO – Saarbrücken, ISIS – Frankfurt, Gerontology Research Society – Dortmund and Centre for Social Policy – Bremen.

Group project IV: Innovation in changing age structures

Under which circumstances can the innovation ability in the manufacturing sector as well as in the service sector be secured under changing age structures as well? What future opportunities do ageing employees have in high-tech, innovative and youth-oriented sectors, such, for example, as non-standardised software development? The following institutes were involved: FhG-IAO – Stuttgart, TU Chemnitz and BTU Cottbus.

Group project V: Innovation, workforce structures and ageing in enterprises

How can enterprises with different types of age structures organise their knowledge, innovation and performance potential under consideration of the ageing of their workforces so that their business and innovation activities are secured both in the present and the future? The following institutes were involved: GfAH – Dortmund, ISO – Saarbrücken, VDI/VDE IT – Teltow, TU Hamburg-Harburg, FH Neu-Brandenburg, a&o research – Berlin, HDZ – Aachen.

The results presented in this brochure are based on the work performed within these group projects.

In future: More older and less younger potential workers

Forecasts on the development of the population in Germany and Europe assume a decline in the overall population accompanied by a drop in the size of the potential working population. As the results of Group 1 show, from the year 2000 onwards until 2040 the working population will decrease continuously by about one fifth in total, assuming that there is no substantial increase in the birth rate or in immigration. Forecasts and expectations for the labour market, which conclude from this that there will be a general shortage in human capital in the foreseeable future as a result, are scarcely likely to apply. This is reflected in the findings of Group 1 which indicate the following opposite effects:

- Increases in productivity
- Greater use of working population potential, for example, of part-time staff, women
- A possible drop in domestic demand
- Increases as a result of migration
- Further decreases in employment in wide areas of the secondary but also in the traditional areas of the tertiary sector.

Thus, for example, it is hardly to be expected that there will be a shortage of human capital below the level of skilled worker or amongst workers without common labour market qualifications. However it is precisely in this segment which many potential workers stemming from increases in immigration have in the past been categorised and will in future also be categorised. For other groups however the labour market will ease up and an increased demand can be expected. Depending on the situation in the individual sectors (growth, stagnation or recession), this demand will present itself in a highly differentiated manner according to regional structure and attractiveness as well as according to specific qualifications.

Far more dramatic than the drop in the absolute size of the potential working population is however the change in the composition of its age groups, since the

number of new young human capital is slowly but continuously decreasing and the group of older potential workers will rise constantly up until 2020.

Thus the percentage of the age group of 15-24 year-olds has constantly shrunk in recent years, the age group of 25-34 year-olds will decrease noticeably in coming years. These are the groups used by enterprises as a reservoir of new young blood and which they consider to be particularly efficient and capable. Thus it is probable that in 2030 there will be more than a quarter less and in 2040 about a third (7 million) less potential workers available on the labour market in these age groups. This development will make its impact with delayed effect from 2010 onwards on the intermediate age group of 35 to 44 year-olds too which will also decrease by about a quarter (3.8 million) up until 2040. The group of older potential workers on the other hand will increase up until 2020 by up to about a quarter (4.7 million).

In future there will be less and less potential workers under 45 years of age (- 10.1 million) in comparison to more and more older ones (by 2020 4.7 million). This will lead to ageing workforces. If there is no change to the already decided rise in the official retirement age to 65 and the increasingly unattractive possibilities for early retirement and more difficult access to a status of being unable to work and with a reduced pension, then it is to be expected that a large number of employees over 60 will remain at work longer. (Fig. 1)

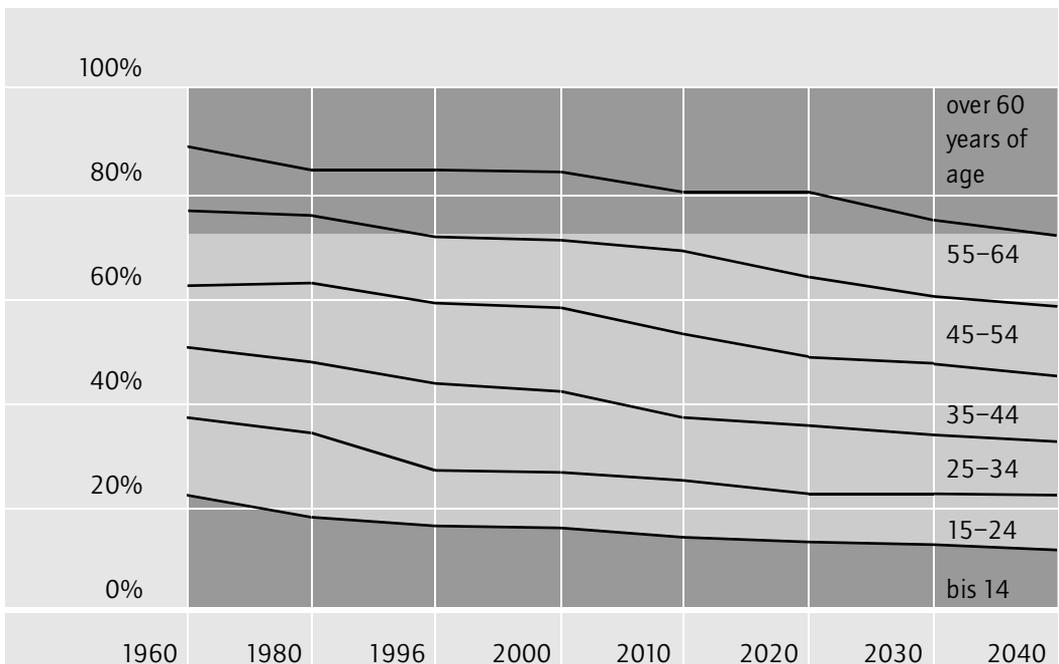


Fig.1: Development of the population according to age groups (Source: Group 1)

In view of the demographic shifts and those resulting from structural change, it is precisely those potential workers which are becoming the focus of attention which to date have either not been employed or have been under-employed, either because they were registered as unemployed or in various forms of hidden reserves: Young people still in training and in the waiting line, women waiting to return to work after having their children, persons involuntarily in part-time employment or in early retirement as well as persons employed at levels below their actual qualifications. Demographic change could make a contribution to the greater appreciation, care and development of the human capital of these people, which to date has been devalued increasingly rapidly due to non-use. Undoubtedly the trend towards working women which has already increased and will in all probability rise further will have particular significance. Measures which respect the ageing process and demographic developments and measures which support women and improve the compatibility of family and profession by no means contradict each other but rather are congruent in many respects in terms of their content. To take this into consideration and give it support would not only be an appropriate strategy in terms of national economics and labour market policy – and also a contribution against discrimination – but is also more appropriate in the context of a longer term demographic perspective than an attempt – which would in any case scarcely be more successful – to suppress the rising trend towards employment.

Uncontrolled immigration as in the past would, even if an above proportionally large number of younger people were to arrive, tend rather to enlarge the group of less qualified potential workers. Without training measures, this group can today scarcely be deployed in any enterprise since it cannot fulfil even the minimum requirements. Even more so than the question of the decrease in the number alone of younger persons is the question at the same time of the decrease in skilled staff with intermediate and higher qualifications, for example, amongst skilled craftsmen, skilled workers, engineers and computer experts. The subsequent gaps in the workforces of many enterprises in the manufacturing sector and firms offering high-tech, R&D or technical services aggravate the problem totally. Most German enterprises are completely unprepared for this situation, they still fail to see the problem or else ignore it.

This is not particularly surprising in so far that in recent years and in conjunction with drastic cutbacks in personnel, a gradual personnel restructuring process has taken place in many enterprises. As results from work performed by Group 1 have revealed (but also from other surveys), these personnel cutbacks took place and still take place to a considerable degree on the basis of age, i.e. older employees were and still are affected to an above average level. As a result, the problem – and the pressure on an enterprise to take action – which could have occurred due to an ageing workforce was for a short time defused. This has definitely contri-

buted to the indifference often diagnosed amongst these companies towards this (potential) problem. These "externalisation measures" were possible on the one hand because enterprises were in a position to shift most of the related costs elsewhere, i.e. primarily to unload them onto the social security services. With regard to the future, the question must be posed whether such strategies – in view of the limited financial resources of pension funds and the change in the legal situation but also in view of the growing awareness that valuable know-how leaves an enterprise when older employees depart – will still be feasible.

The prejudice stubbornly prevails in the heads of many company managers that older employees are generally less innovative, efficient, creative and resilient than younger staff. Apart from lesser adaptability and a greater tendency to fall ill, a large number of positive and negative stereotypes are attributed to older persons. In the following table, such common stereotypes towards older persons are presented. (Fig.2)

	Physiological performance	Psychological performance	Qualification
supposed advantages			
+	Practised in motoric procedures	Sense of responsibility	Practical sense of judgement
+		Maturity	Organisational talent
+		Composure	Experience
+		Loyalty	Reliability
+			Accuracy
expected handicaps			
-	Limited perception	Resignation, frustration	Antiquated know-how
-	Reduced ability to react	Conservative thinking	Lack of further training
-	Low performance reserves	Stubbornness	Insufficient motivation to learn
-	Drop in strength and agility	Low mental resilience	Underdeveloped ability for teamwork
-	Physical deterioration	Poor memory	
-		Slow perception	

Fig. 2: Prejudices towards older employees (Source: Group 4)

Premature wear and tear, and not age, is the main problem

An employee's age as such is not, in the first instance, a problem which would prevent carrying out a profession or render this more difficult. Ageing in professional life mostly then becomes a problem when employees remain for a long time in highly stressful jobs and when the specific resilience demanded there is used up to such a degree that the individual's performance ability is less and less able to satisfy the demands of the job. This applies not just to professions where considerable physical effort is required, but also to occupations where certain types of mental stress predominate. If an employee, who according to his or her calendar age of 40, 50 or 60 is actually "in the prime of life", shows signs of age and decreasing efficiency at the same time, then this is obviously linked to the cumulated effects of stress and strain from the occupational activity carried out to date. Nevertheless the fact that older employees in highly stressful jobs are often less efficient is repeatedly attributed to "nature" or to their age as such. The reduced efficiency of older persons becomes a stereotype, a general no longer reviewed statement. But the reason behind it is hidden as a result, just as are individual differences.

Ageing in working life only then becomes a problem when the relationship between occupational demands on the one hand and individual performance ability on the other hand no longer correlate. Part of the cause of physical wear and tear and the so-called burn-out syndrome, of reduced mental flexibility and of subsequently being unused to learning are the duration of a one-sided physical and mental work load and too low demands being placed on an employee's qualifications in badly designed work systems. Thus, for example, insufficient physical demand from one-sided body positions, such as permanent sitting down at work, leads to a reduction in physical efficiency and ultimately to the same result as over-exertion, i.e. to back ailments. Now as before, sickness-related wear and tear amongst employees is frequently closely linked to the occupation or the conditions under which the occupation is carried out and has been carried out in the past. The state of health of an employee is therefore not primarily determined by his or her calendar age but rather much more the result of working conditions in the past.

Limited efficiency amongst older employees is therefore not generally applicable – it is always related to quite specific activities and work demands and is therefore relative. For example, freight workers with back ailments may no longer be able to handle freight but would be highly efficient in the office or in documenting the freight. A 30 year-old sportsman can already be considered as "very old" – as national trainer he would be extremely young. In the same way employees are never generally qualified or unqualified but instead always in relation to quite specific demands.

One of the key areas of psychological and gerontological research is focussed on the development of mental performance characteristics and personality changes in old age. Personality features, such, for example, as how thinking, feeling and action are directed outwards/inwards, emotional stability, how a person sees himself or control convictions mostly remain, as many surveys have agreed, stable in old age as well. In a highly simplified manner, the following statements can be derived from such empirical investigations on mental performance:

- A reduction in the speed of reaction and in perception and a slowing down in mental processes can frequently be observed amongst older people. These performance deficits can, should they occur at all and play any role in the work process, be offset by taking suitable measures when designing and planning work systems.
- The prerequisites for efficient performance, such as memory, creativity, problem-solving ability, intelligence, social skills or the ability to cope with stress depend to a major degree on the stimuli to which an individual is exposed in the course of his working life. By means of targeted encouragement they can be sustained or further developed.

Numerous surveys show that the ability of older persons to learn something new is greatly dependent on the level and extent of learning demands placed on them previously in their working life. Undemanding monotone occupations with too high a degree of routine lead to premature physical wear and tear, dequalification, demotivation, loss of ability to learn and declining mental flexibility. Thus it is by no means correct to speak in an undifferentiated way about the performance and innovation ability of an age group.

According to available findings, older persons generally tend to perform tasks better which

- are familiar and learnt,
- can be carried out autonomously, i.e. work quota, rhythm and procedure can be determined to a certain degree independently,
- encompass complex working procedures where experience plays an important role in mastering them,
- require social skills,
- and which require knowledge about internal company procedures and informal relationships in order to be fulfilled.

Older persons tend to find it harder to cope with tasks involving

- extreme ambient influences such as heat, cold and high air humidity,
- heavy physical work,

- situations where there is time pressures and pressure to perform,
- work speeds determined by someone else,
- insufficient opportunities for rest,
- and differentiated demands on sight and hearing.

Ageing processes in enterprises

A pronounced change in age structure is already taking place today within many enterprises. This is not however due to the demographic change in the population but instead to a decline in employment amongst younger employees, for example as a result of job cutbacks and a drop in the recruitment of young staff. In addition, because of the unfavourable situation in the labour market, the middle age groups, which are today strongly represented in certain enterprises in terms of their number, are growing old "en bloc". Thus there is an ever smaller number of younger employees compared to an ever growing percentage of older ones. The change in age structure in enterprises, resulting in a collective ageing in the future of their workforces, has occurred to a particularly dramatic extent in eastern Germany. A typical example is given below for eastern German companies in the mechanical engineering sector. (Fig. 3)

Due to a decline in business after Germany unification, an eastern Germany mechanical engineering firm sent its older employees into early retirement and at the same time implemented massive cutbacks amongst its younger staff in accordance with social plan criteria. At the same time it was and is not possible to recruit or take on sufficient young workers, in particular apprentices. Nevertheless the number of older employees does not currently present a problem, on the contrary, the firm can only remain competitive and innovative because it has the experience and know-how of the older employees at its disposal.

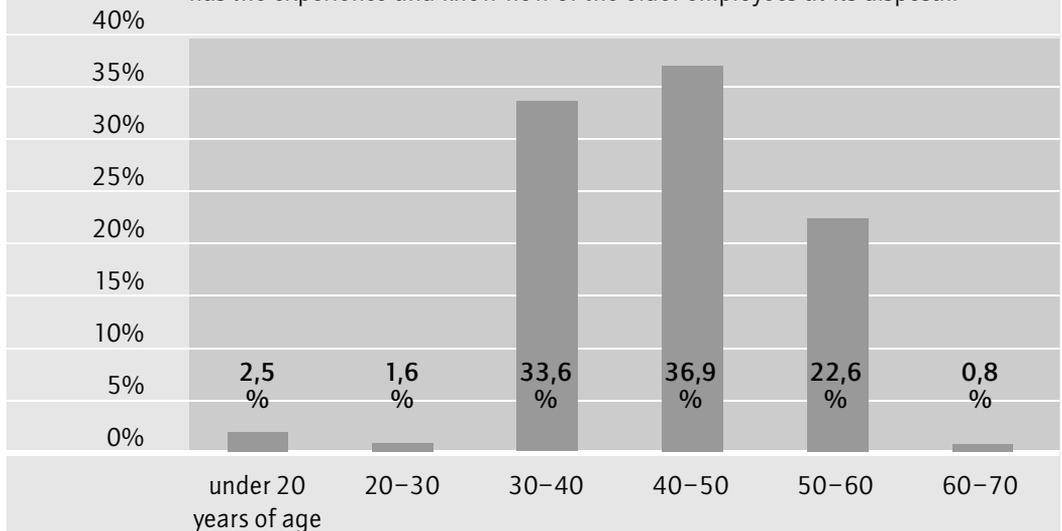


Fig. 3: Age distribution in an eastern German mechanical firm (Source: Group 4)

This company's main problem now lies in the fact that in the next 10 to 15 years about half the workforce – including the most experienced staff – will retire. How can this half of the workforce be replaced successfully and as smoothly as possible with qualified young employees? How can the considerable loss in experienced staff be counterbalanced and the required experience transferred to younger employees?

Many western German mechanical engineering companies are faced with a similar problem, as the following example shows. (Fig. 4)

In recent years, massive staff cutbacks have been implemented in a western German mechanical engineering firm. The workforce shrank from 1041 people in 1990 to 741 in 1996. In order to reduce the workforce in a manner as socially acceptable as possible, employees aged 55 and over were offered attractive opportunities for early retirement; as a result the number of the employees aged over 55 dropped in the period mentioned from 52 to three (!). The average age of workforce has nevertheless risen since at the same time scarcely any new young workers were recruited and those age groups greatest in number have moved up a group.

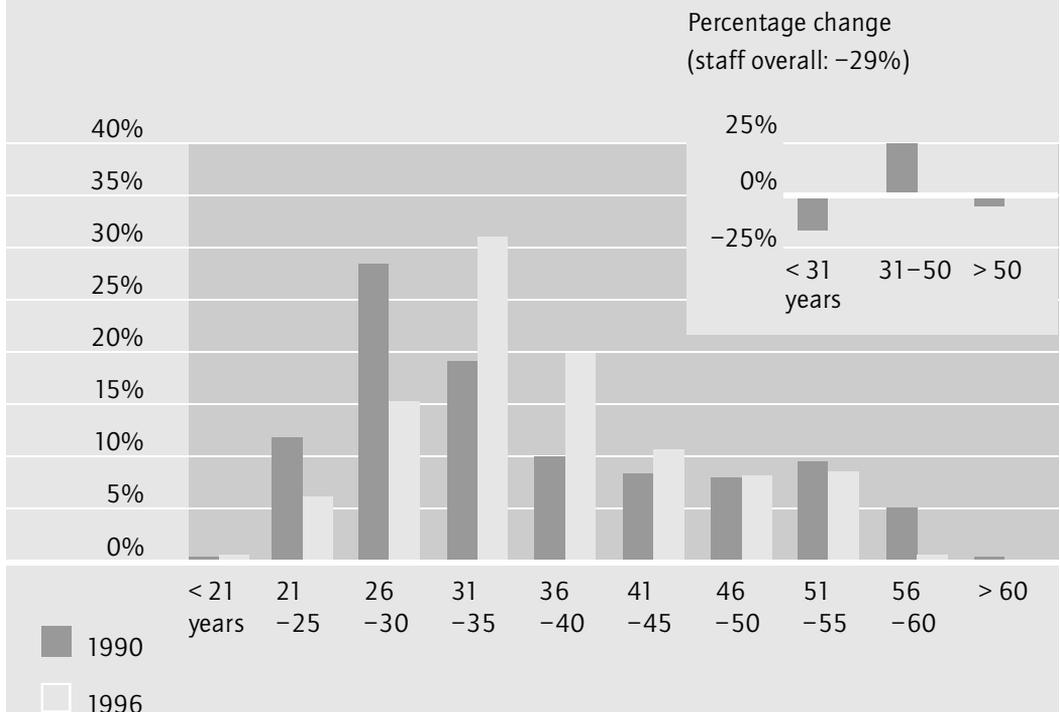


Fig. 4: Development of the age structure in a mechanical engineering firm (Source: Group 3)

This trend of ageing workforces is presumably typical for the entire mechanical engineering sector in western Germany: The percentage of employees aged under 30 has decreased in this sector from 33.1 percent in 1991 to 22.7 percent in 1997; the largest number of persons is no longer to be found in the age group of 25 to 29 year-olds but amongst the 30 to 34 year-olds. Whilst in 1991 still half of all employees in the mechanical engineering sector were under 36.8 years of age, this figure (median) had risen by 1997 to 38.8 years. The basic problem is similar to that in eastern Germany, if somewhat delayed. When a relatively large part of the workforce goes into retirement in 20 to 30 years time and must be replaced, younger qualified new staff will generally have become more scarce. Then the mechanical engineering firms, which are mostly small or medium-sized (with regional variations), will enter into competition with large companies which can, for example, pay far more attractive salaries. With regional differences, this situation already occurs today, thus for example SMEs in Baden-Württemberg complain of a shortage of skilled CNC operators.

Companies with a similarly imbalanced age structure as in the mechanical engineering sector can be found in many other sectors. As a result of:

- a decrease in market volume
- stagnation
- increases in productivity and rationalisation

they have a shrinking or unchanging workforce and have hardly recruited any new staff. This can frequently be observed amongst commercial vehicle manufacturers (busses and lorries) with their sub-contractors, amongst food manufacturers and manufacturers of small and large electrical goods. But not just in these enterprises is there the threat of a collective ageing of the workforce. There are also entire trades which are threatened – not least in the craft trade sector. A sector which will be particularly affected in the near future is the roofing trade. (Fig. 5)

In order to avoid these possible consequences, the reasons behind the massive migration of the over 35 year-olds need to be identified and if possible eliminated. The results from Group 2 clearly demonstrate that the reasons lie predominantly in the fact that the occupation as roofer, under current working and organisational conditions, can only be carried out for a limited duration. Under current conditions, for many workers it cannot be practised for more than 20 to 30 years because of physical wear and tear. This is also where an approach for preventive and corrective measures in the area of work and organisational planning is to be sought which are today already urgently in need of implementation.

When examining the age structure amongst the roofing firms investigated, it is conspicuous that almost two third of the employees are under 35 years of age whilst the age groups over 35 are far more weakly represented. With 38%, the age group of 25 to 34 year-olds is particularly dominant. Assuming that the migration of the over 35 year-olds continues to the same degree over the next 10 years, then a massive shortage of new young workers in this trade and consequently possible closure of some firms can be expected, if the potential of new young workers continues to drop.

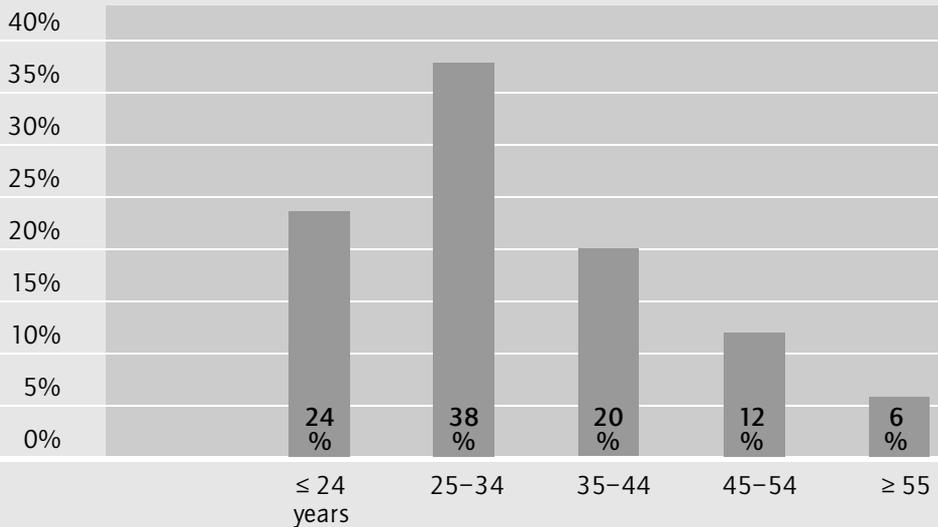


Fig. 5: Age structure of roofers (Regions: Aachen, Essen, Cologne, Mülheim-Oberhausen. 1993-95 mean values, Basis 13.490 employees) Source: Group 2

Age-related workforce segmentation

In enterprises with a high level of distribution of labour and specialisation, e.g. in series assembly and software development in banks and insurance companies, it was possible to identify definite patterns with regard to reactions to problems with age and qualification structure which are very similar to each other, despite considerable differences in the spectrum of requirements, products, processes and organisation. (Fig. 6)

Thus, for example, in the series manufacturing of electrical equipment, amongst automobile subcontractors, electrical household appliances, chemicals, automobile chassis, etc. and in companies with larger software departments (banks, insurance companies) it could be observed that with regard to product and process innovation, an age-related assignment of personnel and products and/or processes took place. Age-related segmentation means that old products are

Area	Segmentation	
	Old products	New products
Assembly	older employees traditional form of work organisation on the basis of distribution of labour	younger employees new form of work organisation
Software development	older employees older programming tools	younger employees new programming tools

Fig. 6: Age-linked segmentation (Source: Group 4)

manufactured with old production processes in the traditional manner of work organisation by older employees or employees who have worked for a longer time in the company. Either already available younger qualified employees are assigned to the new products with the new production processes and possibly new type of work organisation or else new staff is recruited – above all in the area of software development. This approach remains unproblematic as long as the percentage of new and old products remains stable and matches the same percentages of younger and older employees in the workforce. The short-term rationality of companies' "age-related segmentation" pattern of reacting and the long-term consequences for the enterprise can be illustrated by way of example with a case study from an assembly firm.

In the example firm, small electrical appliances of similar types have in the past been manufactured in mass or large series production. A large percentage (about 2/3) of trained older employees (over 40 years old) who have been employed in the firm for a long time (25 years and more) works in this area. The company reacted to the gradual changes in market demands in the following way: Those younger and in its opinion more highly motivated, better qualified employees who were also more ready to learn were deployed on new, highly flexible assembly lines for products with a wide variety of types and varieties. As a result of this selection on the basis of qualification, an age-related segmentation took place at the same time.

In the sense of short-term optimisation, this was a very rational reaction since in this way changing market demands could be answered without any major costs for qualification measures and competitiveness also maintained. Due to many years of working in the short-cycle tact of large series production, the older employees were unused to learning, had lost part of their original qualification

and could not be deployed directly and without additional extensive qualification measures on the new systems. However, due to the departure of the younger staff, flexibility and qualification reserves were withdrawn from the area of large series manufacturing. The result of this was that there were considerable start-up problems and quality deficits when the regular model changes took place.

In this enterprise too the management can already see that the product range will greatly increase and include far more variations and consequently that the size of each series will considerably decrease. As a consequence, the area of large series manufacturing with a high division of labour must be continuously substituted by small and more flexible systems which place higher demands on employees' qualifications. These systems must then be operated by the older employees who are unused to learning because they will remain in the firm due to their long service record and cannot be replaced by new staff. The qualification measures required are therefore only postponed and not annulled.

Similar segmentation patterns as in the manufacturing sector were also to be found in the area of software development and are presented below by means of a typical example.

In the EDP department of a company in the banking and insurance sector there are several teams responsible for the further development and maintenance of older software programmes. This work requires older programming languages such as Cobol. The teams, which primarily comprise older employees, adapt these programmes to changes in business processes. The consequences of this task lasting many years are:

- a major degree of specialisation,
- an activity lasting many years with no change in the demands placed on it,
- a high level of routine,
- little immanent motivation for learning, staff are unused to learning,
- decreasing flexibility towards new tasks,
- internal isolation of these teams, scarcely any informal contacts.

When a decline in maintenance work occurs, those employees specialised in maintaining older programmes cannot be dismissed due to their long service record.

If they are transferred to younger development teams with new products and tools, they are not accepted without further ado because they:

- are not directly deployable due to their antiquated qualifications,
- nevertheless earn more money because of their longer service record and
- are accustomed to regular and planable working hours due to the high level of routine of their work to date.

How can such specialisation traps be avoided? What is conceivable is the integrated development of as well as responsibility for older and newer products within a team. This however demands that younger and older software developers are mixed together from an early stage. Both age groups could in principle mutually profit from each other in that on the one hand the older employees adapt their qualifications with the assistance of the younger staff in the work process and on the other hand the younger employees are protected from excessive demands in terms of time and mental pressure. (Fig. 7)

The different qualifications of younger and older employees can complement each other extremely well. Successful innovations namely, as was shown by the case studies carried out, require a broad spectrum of qualifications. They can just as little do without the joy in experimenting more frequently to be found amongst younger staff as without the circumspection and quality awareness more predominant amongst older employees. If an attempt is made to analyse the different tasks involved in software production then it can be seen that

- for the analysis of the task and the design of the system, both the ideas of younger staff as well as the circumspection and associative thinking of older employees are needed,
- for the design of individual modules, their encoding and testing, younger employees are often better suited, especially if they can count on more experienced colleagues if there is a problem,

Possibilities to integrate experience via younger employees	Possibilities to integrate experience via older employees
New programming languages	Realistic planning of time and resources
New approaches	Realistic systems analysis
High level of time commitment with tendency towards self-exploitation and overtaxing	Social skills Resistance towards unrealistic deadlines

Fig. 7: Teams of mixed ages in software development (Source: Group 4)

- for indication and system testing, older employees should in any case be involved and
- in the area of implementation as well above all as in after-sales service and maintenance it is a matter of experience and knowledge of customer problems which older employees possess more frequently than younger ones.

An age-related segmentation of products, processes or personnel, whether it has been consciously invoked or has crystallised unintentionally, is thus only then appropriate from a company's point of view (not from the standpoint of occupational science) when the percentages of old and new products remain stable over the same period of time. In view of turbulent markets this is only likely to apply in the rarest of cases. Thus an age-related segmentation of the workforce can only be regarded as an interim strategy for an enterprise.

"Innovation ability" encompasses a whole range of aspects. In the following section, the following are examined more closely: Company innovation strategies and milieus, the conducive and restrictive working conditions of innovative core groups, as well as the innovation ability of employees. With regard to ageing workforces, above all the following questions arise:

- Can any correlation be identified between company innovation strategies and milieus and existing age structures?
- How are innovation strategies and milieus co-ordinated with a company's personnel strategies?
- What status does the working environment have for the innovation ability of younger and older employees?
- What role do the working conditions of innovative core groups play?

Certain innovation patterns lead to age-selective personnel strategies

Many enterprises pursue a personnel policy which does not openly put older employees at a disadvantage, yet strategies can be recognised which have precisely this effect. Demands are derived from the company's innovation policy which give preference to certain individual age groups with regard to recruitment, qualification and allocation of authority since specific characteristics are attributed to specific age groups.

- Enterprises with a highly dynamic innovation process focus their personnel policy on younger staff from whom it is expected that they on the one hand can master this dynamism and on the other hand offer less resistance towards heavy workloads and weekend working and at the same time are more flexible in terms of time and space. The preference towards younger employees as an important source of impetus in the innovation process is often accompanied by a lower claim to perfection and quality.
- The striving for continuity and the focus on gradual innovation lead to know-how gained from experience in the areas of development and design and thus also the higher age of those involved being valued positively. At the same time, older employees are sooner credited with being able to master complex processes and to hold their ground in chaotic situations.
- An absence of development possibilities leads to older employees being shut out from qualification measures. As a consequence they are unable to keep their know-how and skills up-to-date so that they are excluded due to their "declining innovation ability".

Age-selective criteria already play a major role today in decisions about recruitment, qualification and allocation of responsibility. A clear and self-determined innovation strategy and an unequivocal management approach strengthen the innovation potential of an enterprise and of its employees. A company's success is dependent on an intact social climate which takes into consideration the needs and idiosyncrasies of the various members of the workforce, conveys a sure hand when taking action (e.g. by tolerating mistakes) and provides open communication structures which permit the mediation of knowledge in a problem-oriented and targeted manner within the concrete work situation. However, the divulgence of know-how based on experience which ensures the individual employee a knowledge monopoly and a position of power is always risky for the person concerned, since he then loses his "indispensability".

The subordinated role of personnel management in the innovation process

Personnel management as an executive organ of company management is generally entrusted with the organisational implementation of personnel requirements and qualification measures, itself however possesses only a limited scope for action. The framework for its personnel recruitment activities is staked out on the one hand by formal requirements and on the other hand by unspecific social characteristics. The fact is emphasised again and again that new employees must "fit in" with the enterprise and the candidates should bring with them the readiness to anticipate the existing company and innovation culture. Thus in particular social and communicative skills play a predominant role aside from professional abilities. At the same time the positive features of teams of mixed age groups are emphasised yet without the majority of enterprises drawing the necessary consequences from this when fashioning procedures and forming teams. Problems of ageing in companies' workforces which are especially concerned with the qualitative adjustment of personnel do not represent an independent personnel topic in enterprises but rather one which runs alongside and which is explicitly or implicitly closely linked to other personnel matters such as "group work", for example, or "know-how transfer".

A direct exclusion of those older applicants sometimes takes place who appear to be less "malleable". In particular very dynamic enterprises indulge in a completely unconcealed manner in the youth credo that the "inexperienced" can be more easily integrated into the existing environment. Personnel development measures are in general not implemented for employees over 40 years old. Enterprises today still rarely pursue new personnel and qualification strategies which are more closely directed at the positive interaction of the generations.

Older employees: An obstacle to innovation or an asset?

Older employees are not an obstacle to innovation, on the contrary: In many enterprises they are an asset to the innovation process. In order for employees' innovation ability to come commensurately to fruition, enterprises need a suitable innovation policy whereby deciding factors are their market activities, the personality of the entrepreneur and the organisation of the innovation process which together fall under the term "innovation milieu" (Group 5).

There is absolutely no evidence of the fact that the ability to participate productively in innovation processes declines with increasing age. The fact that groups within the workforce concerned with innovation tend to be older than the workforce overall, that older employees not only contribute to the innovation process their experience and skills in the area of practical realisation but are – much more so than their younger colleagues – the ones with the ideas, that only very rarely are adjustment problems amongst older employees in view of new innovation technologies reported, underlines that neither for product nor for process innovation is age of any major significance. This applies for all innovation patterns with the exception of explicitly anti-age models which wager on acceleration, youth and the unloading of innovation risks onto the employees.

Conducive and restrictive working conditions for innovation core groups

Skilled workers, the mid-field between commercial/technical intelligentsia and engineers, count amongst the innovative core groups. Improved co-operation between various departments, hierarchical levels and individuals is increasingly regarded, in particular in large enterprises, as a pre-condition for the improvement of innovation ability. By contrast, sudden changes to specifications at a late stage in a project and the large number of projects to be carried out at the same time – combined with time pressure and the associated deadlines – come to the forefront as restricting barriers. By means of involving several organisational units in larger enterprises, product development, for example, and other projects always bring with them a high level of complexity of resources to be co-ordinated. Due to the distribution of responsibilities, the result is then conflict between project and line activities. A further critical factor which is often a central topic in product development is market relevance and customer nearness.

These obstacles to innovation are however weighted differently by younger and older innovators: Whilst an absence of strategic information and insufficient further training opportunities (for reasons of cost or time) are put at the forefront by both age groups, older employees place more emphasis on inadequate personnel capacity, lack of customer orientation (including insufficient information

from customers) and the absence of any appreciation of their own work. For younger employees, decisions forced on them by others and too little scope for independent action represent a greater hindrance.

Small and medium-sized enterprises differ markedly from the innovation pattern to be found in large companies. Their innovation process is rather more "under-structured" but at the same time far more compelling than that in a large enterprise. The R&D function and nurturing of the technology in question frequently represents the essential lifeblood in small and medium-sized industrial enterprises. That is why it is often not even embodied in a separate department but is the very heart of entrepreneurial activity. The lines of differentiation between development and manufacturing, between product and process development and between market and innovation policy are only weakly defined, in principle the entire small or medium-sized enterprise is an innovation network. In many instances innovation is still "the boss's business". The mostly older entrepreneurs or managers are the inspiration and impetus behind the innovation process who keep their workforces on the go with new ideas and often not quite ripe suggestions for projects.

This type of innovation management creates an innovation milieu which is characterised by the fact that the innovation process is not locked up in departments but is the responsibility of a broad team of employees. Innovation is then not understood as a special activity of selected employees but rather as a process which is constituted via social exchange beyond departmental and company boundaries and via mutual learning from each other. The pre-condition for successful "cross-fertilisation" is the entrepreneur's or management's trust in the different innovation potential of all employees, of the younger, the middle-aged and of the older.

Employees' innovation ability: Not a question of age

Employees' innovation ability results from the reciprocal relationship between individual prerequisites (creativity, experience) and conducive or restrictive circumstances. This has considerable consequences for a company's organisational and personnel development, leadership and innovation management. Differences in the innovative behaviour between older and younger employees are however not a question of biological age(ing), they are rooted far more in

- the differing experience (in particular from innovation processes) and different know-how (gained from experience), as well as
- the different and variously long impact made by company structures and processes and in the social status achieved and to be defended.

The experience with innovation gathered by older employees in the course of

their career biography has a major influence on their innovation ability. The more negative the experience is, the more reservations people have about participating in further processes of change. The increasingly rapid renewal of products and the associated structural changes have however also resulted in there being less demand for know-how gained from experience than in the past and for this know-how thus remaining unused. Older employees experience this as a devaluation of their qualification.

Older employees are additionally aware that the innovations of today are tomorrow antiquated. For this reason too they are partly more hesitant and enquiring, have a keener – in the opinion of others complicating – eye for problems. After all, with each innovation old values and one's own working and personal performance are put into question and revalued. Older employees have also mostly experienced failed innovations and could contribute to drawing the necessary conclusion from this. Younger employees are generally equipped with the very latest know-how and in this respect are at an advantage compared to their older colleagues – particularly when the further training opportunities of the latter group were or are restricted. As a consequence, in certain high-tech areas older employees as innovators are scarcely represented. Nonetheless, the know-how gained from experience would definitely be important:

- Know-how gained from experience about processes and about the company (important for process safety) is particularly useful and cannot be achieved by younger employees on the same scale or in as much detail.
- Know-how gained from experience is especially then in demand when scholastic and theoretical knowledge or an analytical approach no longer helps and "complex knowledge and ability" are required.
- Know-how gained from experience assists in the search for problem solutions and in choosing the right path to take.

Innovative enterprises follow various ways of combining the different know-how of younger and older employees and of mobilising an exchange between the generations. But in addition the "functioning in well-trodden paths" or a "blindness to everything outside the company" are not the inevitable consequence of social ageing in an enterprise. In so far as new learning and learning by means of change is practised in the organisation concerned, older employees can actively shape organisational change in the same way as all other groups in a workforce.

The role of the working environment

There is no exact arsenal of "conditions" in an enterprise needed to guarantee the innovation ability of the employees. But a working environment which displays the characteristics named below is conducive to innovative behaviour:

- Working environments in which knowledge can grow and new approaches develop
- Working environments where a linking of “old” know-how and new is possible
- Diversified and challenging work
- Co-operative leadership and involvement
- Independence and free scope (areas in which to experiment)
- A working environment which forgives mistakes
- A culture of trust towards employees
- Transparent internal procedures
- A stimulating and open climate (stimuli from outside as well as within)
- Targeted exchange between the generations in the enterprise
- Purpose of the targeted innovation is comprehensible
- Opportunity for and encouragement of permanent training

Access to individual “innovative potential” can be rendered difficult or even prevented by internalised social and company stereotypes of younger and older (e.g. younger = innovators, older = experienced). The future belongs to those enterprises which, aside from innovation in the areas of technology and information, at the same time nurture and develop their human potential. These are so far however in the minority.

How does management in enterprises in which evident ageing processes have taken place or are becoming apparent for the future react to this development? It often fails to perceive the structural change in the ages or to turn it into a concrete issue, instead it is ignored. Early retirement on a large scale in recent years has even enticed management in many cases to assume that their enterprise has been rejuvenated. If one observes the development of the age structure in the enterprise as a whole, then this opinion proves in many instances to be a misapprehension, as the following example shows:

Asked about the development in age structure in their enterprise, personnel managers proudly pointed out the rejuvenation of the workforce thanks to a skilled use of early retirement and part-time work for older staff. They were generally unfamiliar with current company figures. Thus they were all the more surprised when the personnel data was evaluated. This revealed that the average age in the enterprise had risen by 1.5 years over the last two years alone and – under consideration of protection from dismissal and length of service – would rise at a comparable rate in the next 5 to 10 years.

How in future to manage employees' transition into retirement – from what age onwards and in what form – is the only question currently discussed and negotiated in enterprises in any depth. With the new legal regulations which have applied since 1996 (e.g. part-time work for older employees), the early retirement policy widely practised up until then by large enterprises, where entire age groups went into retirement from a certain age (frequently at 57), has reached its limit. Since then early retirement is linked to major financial losses for the employee. In the framework of the new laws, in particular the law on part-time employment for older persons, new ways are now being sought where employees can continue to go into retirement long before they reach the official retirement age. At the forefront of the discussion are political objectives with regard to employment. It is primarily a matter of cutting back staff in a way which is "socially acceptable", of recruiting new young employees or of taking on apprentices and trainees.

One reason why demographic change is scarcely a matter for discussion even in large enterprises lies in the fact that companies' personnel planning is generally characterised by a time horizon of a maximum three years. A reaction can only then be expected when the "problem is acute", in our context that means when older employees do not fulfil (anymore) the demands placed upon them. The

reason for this can be, for example, that the know-how of the persons concerned is no longer up-to-date or that they are unused to learning, that their health is impaired or they are not fit and motivated enough to keep up with rising performance requirements. At this point in time it is then often too late to take any appropriate counteraction.

There is no standard recipe for shaping work – tasks, personnel deployment and working hours – in a way which does justice to the ageing process, but there is a large number of different approaches and measures. Which path is the “right” and practicable one for an enterprise depends on the initial concrete parameters in a company, the problems and the conditions for action. In view of constant innovations and increasing flexibility, a greater fundamental social awareness towards the topic of ageing would be important on the basis of which aspects of ageing are taken into consideration again and again in various contexts in the ongoing process of work planning and personnel deployment.

As long as company strategies are targeted exclusively at short-term increases in return and at rationalisation, “age-related work planning” out of necessity remains an illusion. Such strategies however harm the enterprise itself in the long term as examples of misunderstood “lean management” show: Problems with inadequate planning capacities and a shortage of qualified staff were the result of excessive staff cutbacks. Successful examples in a whole number of enterprises confirm that despite all economic constraints, scope exists for age-related work and employment policies.

5.1 Age-related shaping of work and organisation

What is important is to act in a preventive and thus age-oriented manner before “age problems” arise. Ideally it is a matter of fashioning the work and employment situation and of encouraging employees in such a way that their performance potential is shown to advantage throughout the entire course of their working life and is also sustained and further developed. This requires – apart from the appropriate technical equipment – to an equal degree qualification and health measures and social recognition:

- Qualification and work deployment: The trend towards a knowledge society is unbroken, tasks and demands are changing ever faster as technical and economic change progresses – even today knowledge is calculated in terms of “half-lives” of at most five to ten years. At the same time the demand for low-qualified staff is dropping. Permanent vocational training is therefore necessary in order to secure deployment possibilities and employment opportunities for older employees

throughout their entire working biography. However, these measures should not be exhausted with qualification measures. It is far more the case that employees should also be deployed in such a way that they can contribute and develop their skills and continuously familiarise themselves in their work itself with new developments and methods. Age-oriented career concepts, rotation models or types of group and team work which support qualification are aimed in this direction.

- Promoting good health: Whilst the ageing process as such does not have any relevant influence on a person's occupational performance up until his 60's, (chronic) illnesses can lead to drastic losses or even the complete loss of working ability. Above all the typical illnesses "muscle and skeletal complaints" and "heart and circulatory diseases" frequently occur with increasing age. They creep up over the years whereby natural processes of wear and tear, work-related influences and influences resulting from individual lifestyle all add up. In order to lessen health risks in old age it is therefore important to encourage and to maintain good health in younger years. Encouragement of good health by enterprises can encompass a wide range of measures, e.g. ergonomic workplaces and work systems, reduction of stress factors in the working environment, training in ways of working which protect health or a planning of working hours which is less burdensome and at the same time takes into consideration personal needs.
- Social recognition: It should not after all remain unmentioned that a lack of social recognition, discouragement or disappointed career expectations can lead to crises about an individual's purpose, inner resignation and limited deployment

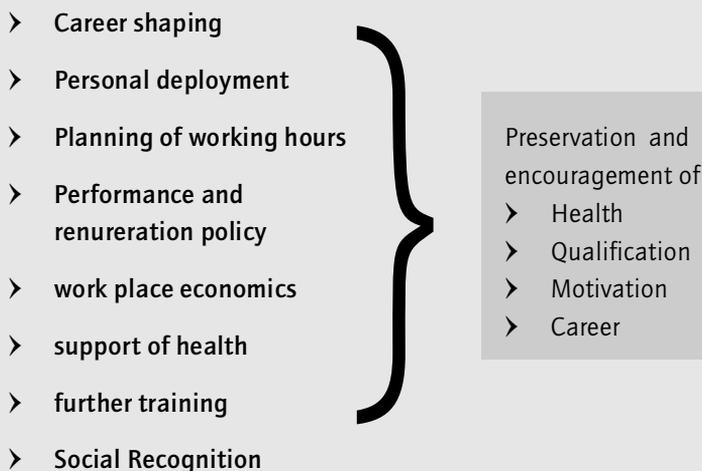


Fig.8: Measures of fashion work which respect the ageing process
(Source: Group 3)

possibilities for older employees, e.g. when employees "remain stuck" over a long period in a job which they find unsatisfying and can see for themselves no opportunities for further development. Or when older employees are confronted with the fact that they are attributed with lesser skills due to their age. Typical examples for this are when older customer service staff in the area of EDP are not thought capable of being familiar with the latest developments or it is insinuated that older hairdressers cannot do modern hairstyles. (Fig. 8)

What is necessary is that short-term optimisation strategies in personnel policy are overcome and thus at the same time long-term cost/benefit considerations taken into account in company policy. The prerequisite for this continues to be that the long-term preservation of the employability and employment opportunities of employees as they grow older is also understood as an objective of entrepreneurial action. Demographic change furthermore means that it is a good idea to commit other groups outside the enterprise (people in hidden reserves, e.g. during maternity leave) to the enterprise by means of suitable measures.

An age-oriented way of shaping work is also a human-oriented way

A far-sighted fashioning of work must be targeted at encouraging the mental and physical efficiency of employees throughout the course of their (working) life and at exploiting the specific performance offered by employees as they grow older to a far greater degree than to date. What must be observed here above all are:

- the mental and physiological performance prerequisites,
- the possibilities of a type of work and personnel deployment planning which preserves and develops a person's qualifications,
- the potential of an early integration of planning principles in terms of occupational science into the work system planning process.

What must be taken into consideration in the process is the fact that each time a job is performed, in the medium to long term and depending on what is demanded, a person's physical and mental efficiency changes as a result of training, learning or however also as a result of deterioration processes. Thus work should be designed in such a way that both a wide diversity of alternating body positions and movements as well as a variety of changing mental demands are needed to deal with the work task in question. Standardised instruments for the design of work systems in manufacturing which take into account human needs do indeed exist and are already being applied successfully in a short version suitable for use in practice without external support.

In many instances attempts are made, by means of creating "comfortable" jobs or systems, to permit the further deployment of older employees whose level of performance has altered. In the area of manufacturing it is undoubtedly appropriate

to adapt the physical demands to the performance ability of the employees deployed by designing workplaces ergonomically and equipping them with lifting devices. However it is frequently the case that too many of the physical demands are eliminated so that as a result of not using the potential which those employees still have, further losses in performance are produced. Simply adapting work systems to already existing wear and tear can cement bad working conditions. As an alternative, solutions must be developed which are gradually more demanding.

5.2 Team work in mixed age groups

In the discussion about how to succeed in employing personnel in manufacturing in old age too and how employees whose abilities have changed can be re-integrated, team or group work in groups of mixed ages as an organisational form is often regarded by scientists and company managers as the instant recipe. It is assumed that the younger employees lessen the load for their older colleagues with regard to heavy physical labour whilst on the other hand the older staff support the younger ones with their experience. Such an understanding of team work in mixed age groups would have disastrous consequences.

From experience, the danger exists in teams of mixed age groups that too high a degree of distribution of labour and specialisation evolves due to short-term internal attempts at optimisation. This is not just the case in the area of manufacturing but can equally be found in project, research and development groups. The trend towards such a type of distribution of labour – because of its advantages in the short term – can be found in many working groups, as the following example shows. (Fig. 9)

In the components assembly department of an agricultural machinery manufacturer, both younger and older employees are deployed. They organise their group work themselves, the distribution of labour is the responsibility of the group. Although formally speaking the group has achieved a high level of qualification, each member of the group performs those sub-tasks which he masters most quickly and efficiently. The result is the following distribution of labour: The younger employees primarily carry out the assembly tasks, the older members of the team are responsible for the more complex sub-tasks (testing, adjusting, re-working) because of their experience and because of "established rights". Thus in principle each member of the team is deployed so that he makes his optimum contribution to overall group performance.

Since the simpler tasks in the first instance demand physical strength, dexterity

Group logic	Each team member performs the task he masters fastest and best	
	Younger	Older
Qualification demands	simple sub-tasks with high physical demands	More complex sub-tasks with demands on experience
Impacts	<ul style="list-style-type: none"> ➤ Preservation or deterioration of physical state ➤ No building up of experience ➤ Decline in initial qualification ➤ Drop in ability to learn 	<ul style="list-style-type: none"> ➤ Drop in physical efficiency ➤ mental over-exertion ➤ Preservation of existing qualifications and abilities to learn

Fig. 9: Team work in mixed group on manufacturing assembly line (Source: Group 4)

and speed from the younger employees, the physical prerequisites are sustained or even broadened by means of a training effect. What is however not demanded are the existing specialist qualifications of these employees. Because of the more complex tasks, it is to be assumed that amongst the group of older and more experienced staff their existing qualifications, experience and ability to learn can be sustained or even developed further. However, for the group as a whole and for the work system, it is to be assumed that in the medium term there will be a more intensified polarisation of qualification, experience and learning ability towards the older employees and of physical capabilities, strength and dexterity towards the younger staff. Viewed overall, the type of distribution of labour selected results in a low level of flexibility in terms of personnel deployment. When employees with a specialist qualification are absent, for example on holiday or ill, the additional result is quality and productivity problems.

Various strategies are currently to be found in the area of manufacturing. There are companies which stake their bets on young "Olympic teams" and others which are careful to see that their work groups contain a balanced age mix. As practice shows, a few basic conditions must be fulfilled so that stable team work with mixed age groups is possible.

- A team with mixed age groups must in principle achieve the same performance (units/time) as a team of young employees of homogenous age. If this is not the case, then the management will exert pressure on the group which often triggers internal conflicts between older and younger staff. Such conflicts are more likely to occur when variable remuneration factors such as bonuses are based on group performance.
- It must be possible to compensate for possible limitations in physical performance with experience, problem-solving ability and planning skills. This means the group's task may not be reduced to a simple carrying out of activities. Activities which are primarily a simple "carrying out", that is, which demand sequences of movements learnt off by heart and mentally automated, are thus scarcely suitable for team work in mixed age groups.

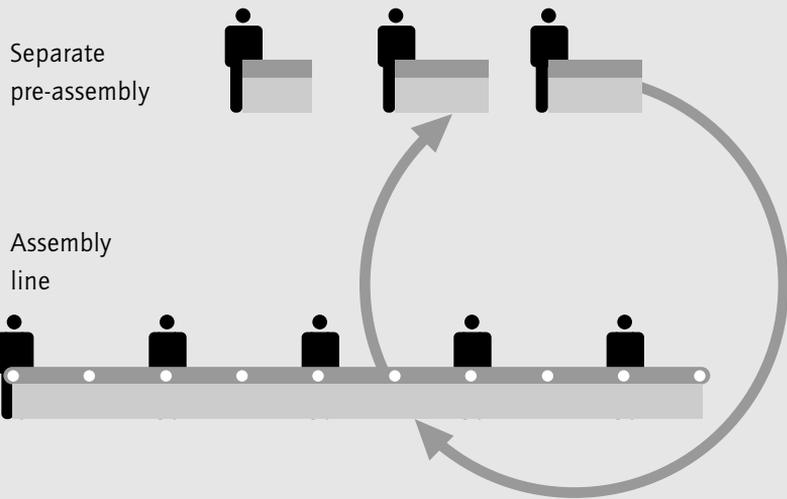
The following example demonstrates how team work in mixed age groups is also possible in tact work on assembly lines. (Fig. 10)

The assembly system in a vehicle factory comprises an assembly line with tact work and a pre-assembly area with individual work stations separate from the line. 70% of the work within this work system takes place on the line and 30% in the pre-assembly area. In order to allow for diversity in the physical and mental load, it is necessary that regular job rotation takes place in the pre-assembly work stations and in those planning activities independent of tact (e.g. materials supply).

When group work was introduced, it was the management's declared objective to design a highly flexible work system which should be a match for future demands on the increasing complexity and variety of components. Employees flexibility in terms of deployment should therefore be so great that in principle each employee should master every activity within the group's task. That is why the group was given a budget from the outset for basic and further training. In addition, a remuneration scheme was developed together with the group which included a bonus for proven regular rotation as an incentive for rotation through all the sub-tasks in the group. This bonus was staggered according to the percentage rate of the group task mastered.

By means of regular rotation through all the sub-tasks in the group and reciprocal exchange of experience within the work process, existing physical and mental performance prerequisites can be sustained and even broadened for all members in the group. Thus the employees can preserve their existing physical condition and skills and also expand them by building up know-how from experience. Thus when introducing team or group work, a budget should be made available for

Assembly team with dispositive tasks



- Systematic rotation
- Exchange of experience
- Systematic Qualification
- Dispositive demands

- Sustaining and broadening of physical and mental performance prerequisites
- Personal flexibility
- Work system with learning and innovating ability

Fig 10: Team work in mixed age groups on manufacturing/ assembly line
(Source: Group 4)

appropriate basic training. Only when time is available are an exchange of experience and learning within the work process possible. In order to ensure that rotation throughout all group sub-tasks actually occurs, suitable incentives (e.g. via remuneration) are necessary.

5.3

Shaping career paths

When shaping career paths it is a matter of allowing the demands, the incentives and the pressure within a working life to follow each other in a specific order so

that premature wear and tear to health is counteracted and the motivation and the performance potential of employees are encouraged. Because traditional career and promotion paths are increasingly blocked due to flat hierarchies and ageing workforces, new paths which allow a change of jobs within an enterprise must be planned and established in a targeted way, whereby the possibilities to change jobs on a horizontal dimension are coming more and more to the fore-front. The individual tasks in an enterprise are generally accompanied by very different work loads and demands. With respect to age, some of these are regarded as critical, others rather as unproblematic. The principle prerequisite for shaping a career biography in a way which respects the ageing process would therefore often exist – when observed from the aspect of a company's demand structure.

In a mechanical engineering company observed here by way of example, the problem of ageing is already immediately acute: Large sections of the manufacturing department such as assembly and the welding department are regarded as critical in terms of the age of the workers, not just in view of the physical demands of the work but also because of the accompanying high demands on performance: The piece-work and the dependency of jobs on each other mean that if one person works more slowly, then this immediately leads to lower pay for his colleagues. In view of these work demands in manufacturing many employees aged over 45 were categorised by their superiors as "too old" or as "not efficient enough", whereby it should be remembered that over 30 percent of all employees in industry are over 46 years old or over.

Since management was no longer able to solve the problems which arose with the decline in performance of some of the older employees within the department, the personnel department examined the performance potential of the persons involved and on the basis of this initiated the setting up of a new field of business to which the older employees were transferred. This is a customer service department for the servicing and maintenance of special equipment manufactured by the firm. In this service department, which is closely linked to production, the older employees can contribute to advantage the professional experience gained from their manufacturing background. Since in the new department hourly rates are paid and physical stress does not play any role worth mentioning, this type of change of job can be regarded as one which respects the ageing process.

In the case of this company, the ageing processes which have taken place and the problems caused as a result have triggered a creative search within the management for possible ways to cope with these problems. New jobs were created for some of the older employees at least where they no longer count as being only partly efficient but instead as being fully efficient. This type of personnel deve-

lopment planning – aside from the existing demand for the new services – is however linked to a number of conditions which have permitted or encouraged its implementation in practice: The older employees are moving in a group into an area of work newly created especially for them. As experienced and skilled employees they are for the most part bringing with them the qualifications needed for the new tasks. And their transfer is not combined with any financial loss.

Women are quite often in a starting position completely different to the one described. Now as before they mostly carry out specific jobs (a labour market segregated according to sex). Their working lives, characterised by more frequent changing of jobs, interruptions to their careers due to family reasons and part-time work, generally follow a different pattern to those of men.

- Many typically female professions are characterised by an extremely young age structure (hairdressers, receptionists, nursery school teachers) in which women at the same time mostly work for only a short period. These are often so-called "dead end jobs": According to a survey amongst employment brokers, it is just as difficult to find jobs for 40 year-old hairdressers as for men of the same age in occupations which are particularly physically strenuous, such as in the building trade, for example.
- Career interruptions and changes in occupation, e.g. after maternity leave, have always been widespread amongst women. Usual career patterns, e.g. first training and then work in a "female occupation", then setting up a family followed by semi-skilled employment in industry or an office job, are increasingly difficult to achieve due to changes in the employment market situation and the recruitment attitude of enterprises.
- At the same time women are involved to a far lesser degree than men in vocational and internal company further training measures which could serve to qualify them for new tasks.

Effective concepts for shaping careers do not start just with older employees who are already affected by performance limitations, but rather already begin at the start of a career or even during training. Foreseeable wear and tear in terms of qualification, health and motivation should be counteracted as early as possible. This also encompasses a new way of thinking amongst the employees and enterprises themselves which should lead to fields of activity with optional positions and jobs being the point of orientation and no longer the job itself or the job description or the profession or occupation. What also belongs to this learning process is that a switching between various types of task should not be associated with the reservation that this is linked to better remuneration or promotion. Appropriate mobility processes will however only materialise to the same degree as the necessary material security of the persons concerned is guaranteed.

Deciding criteria should be that as a result of a change between different work demands:

- New knowledge is gained.
- Incipient fixations on constellations of workload and strain which are impairing to health are interrupted.
- New social constellations (working groups, teams, process chains in working procedures, amongst others) are experienced and as a result new key qualifications are learnt in particular for increasing organisational/social skills and for coping with stress.
- Overall individual readiness and ability to adjust to new work situations and to adapt work demands is actively supported.

Such types of mobility processes can stimulate or encourage "lifelong learning" and thus strengthen the working ability of employees with a long service record in the same enterprise. What is however also improved is the opportunity when changing from company to company or from employment into unemployment of preserving an individual's employability. The basic pre-condition for lifelong learning is however that there are incentives for learning at the place of work and in the work process. This pre-condition is however rarely given.

A change in job can either take place on a horizontal plane within an enterprise or else between different enterprises by taking on a position located on the same hierarchical level. What is essential for the employees and the enterprise is that the change is linked to the opportunity to gain additional knowledge and "key qualifications".

- Mixed commercial/technical qualifications, for example, on the level of skilled worker or industrial manager lead to new bridge qualifications. Indirectly productive tasks (purchasing, distribution, logistics) and direct manufacturing tasks are brought together. Bridge qualifications are designed in such a way that they are also targeted at improving co-operative working between skilled workers and engineers as well as between the R&D department and manufacturing. The aim is to create new and mobile paths in the area of structural and procedural organisation. Such bridge qualifications can be imparted both as an "extra" either already anchored at the vocational training stage or else via further training measures. In order for these bridge qualifications to be used appropriately, a change in the organisation of structures and procedures is necessary.
- Training professions, such as master craftsman, for example, but also vehicle service technicians in the craft trade sector, are based on existing basic vocational qualifications and a comprehensive training course (e.g. internal or external courses, correspondence courses, supplementary courses at further education

institutions). They assume that the support offered by the company and the employee's obligations can be co-ordinated and that the agreement reached is binding. Once the further training course has been successfully completed, the "graduate" and the enterprise should attempt to use as optimally as possible the new qualifications, e.g. by changes to the position held to date or by transfer to a newly created position, possibly even in another area of the enterprise.

Such a policy can be beneficial both to the employee as well as to the enterprise (e.g. more flexible deployment). With regard to the employee, it is a matter of setting the points in his working life as early as possible in order to be able to counteract prolonged one-sidedness in terms of qualification and the accumulation of health risks with a subsequent negative impact on efficiency and resultant demotivation.

Since it is not a matter of changing between positions unequivocally defined by job descriptions but rather of changing between areas of activity with optional positions which often must be defined anew, this is often too overtaxing for personnel management on its own. Together with other specialised departments such as distribution, purchasing, logistics, R&D and manufacturing, the demands likely to be placed in the future in terms of know-how should be identified as far as possible beforehand in order to enrich basic training concepts within the company and to be able to initiate specific further training measures as early as possible.

A working environment which encourages learning with permanent incentives for self-training (learning on the job) is by no means sufficient. Individual encouragement of development potential in the framework of more sophisticated personnel development concepts is a necessary but insufficient parameter. Whilst optimised types and methods of learning, e.g. by using IT techniques, do indeed improve the objective prerequisites, what is however ultimately the deciding factor is the ability to adjust to new tasks and to master new know-how. A start can be made both in the case of further training measures as well as of more demanding training measures at any phase of employment within an enterprise or of a working life. It is essential that this opportunity be open to all age groups. Another important point is that the measures are adapted to quite different types of initial individual circumstances. For example, to the situation of

- new trainees or young academics at the outset of their career who are curious about all that work can offer them.
- younger new staff and experienced middle-aged employees seeking a new direction.
- women who wish to return to work following maternity leave.
- older persons where limitations in performance are starting to show or have already occurred.

"Over-ageing" is neither regarded by management or employees as an independent company problem to be solved as a matter of importance nor is any special priority attributed to it. At company level, "ageing" has no independent status but is treated – if at all – in close conjunction with other problems and this under pursuit of quite specific company interests. The concept of intergenerative personnel policy is presented here by way of the example of a large enterprise in the steel sector. (Fig. 11)

The company in question has about 3000 employees. It is assumed that no measures in terms of personnel policy are going to be implemented in the next 20 years (imaginary situation). A special feature which can be identified is an age distribution curve with one pronounced peak with a large number of employees aged between 30 and 50. By contrast, there are very few young (up to 20 years old) and scarcely any very old employees (50 or over). This "compact occupation" of the middle age group is on the one hand the result of failings in recruitment and on the other hand the result of a wide-scale practice of early retirement. The following diagram shows how the age structure in this enterprise would develop if no new recruitment and no fluctuation apart from employees going into retirement were to take place over the next 20 years.

The younger groups in the workforce are currently already greatly underrepresented. The problem is intensified by the fact that there is an increasingly rare supply of human capital precisely amongst the young and skilled technical workers needed by this industrial firm. Both in conjunction with new recruitment as well as with early retirement by means of part-time work for older employees the result is:

- considerable financial costs for the enterprise which under certain circumstances can only be covered by adjusting budgets for personnel and social costs. This also clearly reveals the limitations of early retirement as a solution. A search for alternative solutions is on the agenda in particular since employees increasingly want to continue working until they are 65 because of lower pensions. Under consideration of the cohort effect over the next 10 to 20 years, these problems in enterprises with such age structures are likely to worsen.
- problems of the transfer of know-how and experience between the generations – previously handled rather on an informal and voluntary level – on the one hand as a guarantee of a constant supply of new knowledge from new young staff and on the other hand as a way of securing the transfer of the know-how gained from experience to younger employees. The latter is of particular significance for com-

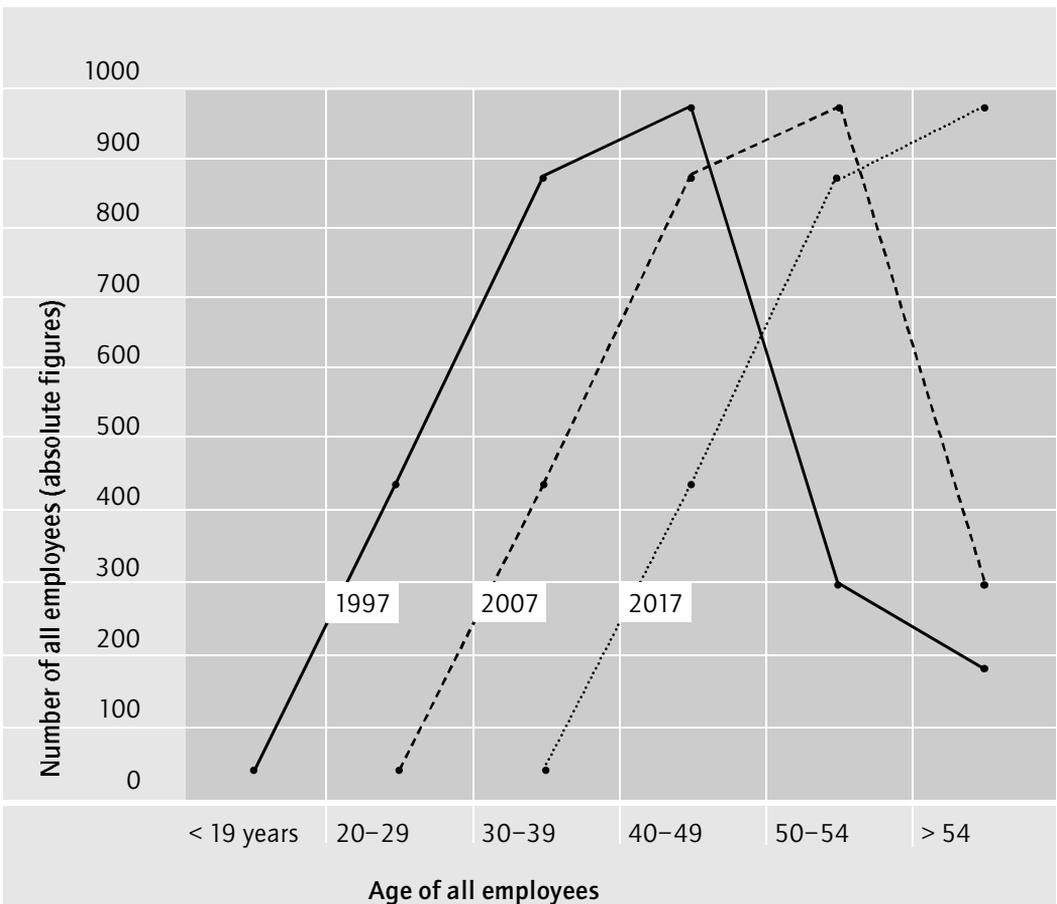


Fig. 11: Status quo extrapolation of the age structure in a large enterprise (Source: Group 5)

petitiveness since know-how gained from experience by its very nature escapes comprehensive documentation. It ought to be examined whether such a word-of-mouth handing down of know-how on the basis of personal relationships of trust as a pattern of behaviour can be partly complemented or replaced by formalised and organised forms of transfer.

- problems of the limited working ability of older employees who continue working until they are 65. With regard to the next two decades, this problem will become more acute since the predominant group of middle-aged employees will remain in the company. In order to secure productivity, the re-establishment of working ability (health, qualifications, motivation) must be taken seriously, in particular in the case of those group and team concepts with multiple-task work and bonus remuneration. Corrective measures such as ergonomics "suited to older persons", rest periods, changes in pressure and workload and transfer to jobs which are less stressful and demanding or to staff pools with "comfortable" jobs are often just

emergency solutions. The frequent practice of balancing out strengths and weaknesses in groups of mixed ages (differential personnel deployment) however assumes precisely that availability of the entire spectrum of age groups which is not guaranteed here.

All these measures are "short-winded". An enterprise which wants to place its competitiveness on a sound footing must install "safety buffers" in order to minimise its risk and make a start as early as the vocational training stage or at the beginning of employees' careers whereby the career biography forms a pattern for orientation. Not only for the longer term preservation of employees' working ability but also in conjunction with quite other problems, concepts have evolved which accompany a working life. Flexibility and mobility within the enterprise should be improved by means of additional qualifications and supply of knowledge in a foresighted, offensive and planned manner. If such types of "alternative career paths" prove to be attractive to young skilled workers and academics, then an enterprise's recruitment opportunities are at the same time increased. The more such biography-oriented concepts assert themselves, the more successfully foreseeable limitations in performance will be preventable by means of foresighted work planning.

Demands on the personnel policy of the future

The turn-around from corrective to foresighted work planning, from post-care for older employees to preventive care for all age groups, places specific demands on the personnel policy of the future which make a new way of thinking and new learning necessary amongst all the company protagonists involved ("change in paradigms"). The demands placed on personnel management are outlined in the following section. Firstly, aspects of the ageing process should be integrated as personnel targets in the framework of a company's objectives and implemented as personnel strategies. Secondly, a procedure and methodology which are appropriate to the age issue are necessary when implementing personnel policy instruments. Thirdly, a special framework of company culture must be created.

Upholding a transfer of knowledge and experience over generation borders as a guarantee for competitive business processes and innovation ability demands constant staff additions and departures. At the same time the prerequisites for a workforce structure with mixed age groups is created. What must be asked is whether and to what extent "age-mixing" as a personnel policy objective should apply as a general structural pattern in all organisational units or whether just as an "average norm" for the enterprise as a whole. The realisation of such types of intergenerative objectives will not take place without conflicts and compromises. For example there is the question whether a continuous supply of new know-how

can only be achieved by recruiting new younger staff or however also by means of planning further training measures for all age groups which run parallel to their working lives.

A personnel policy "with staying power" demands thinking and action in personnel issues along several planning horizons (short term: 1-2 years; medium term: -5 years; long term: 10-20 years) in order to take into account cohort effects such, for example, as the "age peaks wandering through the generations". When searching for solutions, what must be born in mind is a company's changing resources (e.g. resources available for putting into practice part-time work for older employees) and on the other hand the inter-individual differences in working ability and retirement wishes. In addition, the learning processes of enterprises and employees must be taken into consideration.

Personnel strategies

...of the present	...of the future
Objectives	
➤ age structure are of no relevance	➤ permanent exchange between the generations and mixing of age groups as integrated objectives
Strategies	
➤ contradictory sub-strategies	➤ sub-strategies oriented at age structure objectives (revealing of conflicts and compromises)
➤ mutually isolated personnel	➤ mutually linked sub-strategies policy sub-strategies (recruiting, personnel development health and safety at work...)
Personnel management	
➤ short-term planning horizons	➤ taking into account of cohort effects over 10-20 years (short, medium and long-term planning)
➤ a solution for all	➤ broad scope for solutions with options (individualisation and differentiation)
Company culture	
➤ "seniority principle" or "youth culture" as predominant features	➤ generation contract as balance between different types of demands on company appeal ("age culture" specific to various age group)

Fig. 12: Future personnel strategies (Source: Group 5)

In "modern", "lean", cost and return oriented company and work structures, a new model is becoming increasingly established: A person employed here should be willing and able to cope with flexible forms of employment and working hours, stand up to high demands on performance and physical/mental strain, keep his qualifications up to date and additionally place himself without reservation at the service of the enterprise. In its "youth fixation", this new model evidently narrows to a major degree the opportunities for deployment and employment of older – in addition generally more expensive – employees: The favourite victim of age-selective staff cutbacks in an enterprise, the chances of finding adequate alternative employment on the external labour market are also minimal. However, enterprises are increasingly complaining that when older employees depart, then with them their know-how and experience are irretrievably lost.

How then can an enterprise on the one hand continue to fall back on the specific skills and resources of its older employees and on the other hand employment options be created for older persons which respect their situation and abilities?

An example of a possible solution in an enterprise can be seen in the ideas of a large German automobile manufacturer: Older qualified skilled staff with higher management and planning responsibilities are to be released from day-to-day tasks and – grouped in interdisciplinary staff pools – make their special know-how and experience available as required. And this not just for their own company (in-house consulting) but also as a service which others can purchase.

Examples of employment options outside an enterprise could be observed in recent years in the IT sector too. Here too "older" employees have been subjected to massive pressure and the favourite target of "externalisation measures" in enterprises. The comparatively low average age as well as the high level of qualifications of these "older persons" have however often opened up the way into self-employment – supported and indeed partly only made possible by means of high settlement payments ("golden handshake") or start-up finance. New employment alternatives are linked here to the flexible provision of "intellectual capital" which can now be called up as needed as an external service. A classic example taken from the craft trade sector of finding a solution outside the enterprise is the "setting up of their own business" of craftsmen who have passed their master craftsman examinations. This can also be the result of scarce promotion opportunities within an enterprise for the numerous employees with a master craftsman qualification but without an appropriate position.

What possibilities for vocational qualification and for changing profession or occupation would be appropriate for women in female-dominated areas of work under consideration of the ageing issue? In some professions, such, for example, as hairdressers and dressmakers, the step into self-employment can sooner be recommended when a person is older. However the opportunities and difficulties as well as the possibilities of support need examining. This needs investigating in particular in those areas of women's work which are quantitatively significant, such as the health services, doctors' assistants, hairdressers, hotel workers and saleswomen.

Under what conditions, in what form, whether as staff pool, self-employed, part-time work or in the form of advice agencies and above all for which groups of human capital this can represent a feasible and generally applicable model for the future, this still needs to be examined. Not only from the point of view of the persons concerned or of labour market policy but also from the standpoint of the enterprises is the development of alternative concepts for gainful employment between further employment and early retirement becoming increasingly urgent.

5.6

New employment possibilities for older persons too – Approaches in the craft trade sector

In broad areas of the craft trade sector, radical demographic change seems less likely to lead to direct bottlenecks in the supply of human capital than far more to a greatly altered composition of age groups in enterprises. This age blockage leads presumably, due to the fact that other economic sectors are no longer exerting a suction effect with a consequent decline in mobility, to growing problems in taking on those persons who have completed their basic training in the enterprise. That is why in particular in the case of older employees the creation not only of work opportunities but also the preservation and modernisation of their qualifications – which not least means the preservation or re-establishment of their ability to qualify – becomes particularly significant. This can be clearly illustrated by means of two examples from the automobile trade: the creation of new work opportunities in the automobile trade and qualification for the labour market instead of dismissal and the risk of unemployment as well as the introduction of the vehicle service technician as an example of the further development of vocational qualifications which are demand and labour-market oriented.

The situation in the automobile trade is causing experts to sound the alarm – thousands of firms and tens of thousands of jobs in the automobile trade are regarded to be at risk. By 2002 the closing of up to 8.000 firms and the loss of up to 80.000 jobs are feared. The main causes for this are considered to be a drop in the need for repairs, longer intervals between maintenance checks and a reduc-

tion in the size of manufacturers' networks. Many "older employees" (and in the automobile trade this already includes 35 to 40 year-olds) are no longer a match for the demands the work entails, such as a high level of physical effort, working to prescribed orders and a diversity of stress factors. The solution widely practised to date from this age onwards of moving to other sectors functions less and less: Most of the previous "recipient" sectors are themselves cutting back staff, the few expanding sectors have scarcely any need for workers from the craft trade sector. That is why considerable internal friction and employment problems are to be expected. Experts indeed see a major problem in the disposal of end-of-life vehicles, but also an employment opportunity (source: Group 2).

About 3 million vehicles are scrapped each year (total number in Germany about 40 million vehicles). An environmentally compatible solution could eliminate a serious current problem and would at the same time be a key pre-condition for safeguarding the "future viability" of the automobile industry. The objective of dismantling end-of-life vehicles in a manner as non-destructive as possible is

- to make immediately available usable parts for "repair work at current value" by the vehicle trade;
- to dismantle components on a larger scale than to date which can be recycled and used for repair purposes;
- to prepare everything which cannot be taken into consideration for the purposes mentioned above in an optimum way for recycling (recovery of secondary raw materials) and thus to secure and create jobs, in that
- market share in the automobile trade can be won back from illicit work and do-it-yourself by means of reasonably priced repairs at current value and
- capacity is improved thanks to growing demand and additional jobs created in the recycling business which are suitable for experienced workers from the vehicle trade. Additional tasks can furthermore evolve in the area of parts' and components' treatment in the automobile and sub-contracting industries.

For both areas of activity relevant experience and qualifications are to be found precisely amongst the older workers in the vehicle trade. Apart from stimulating the safeguarding of jobs in the area of repairs, it is therefore also a matter of supporting mobility towards dismantling and recycling firms by means of:

- information about the jobs which are being created;
- the further training measures on offer;
- using social plan and employment support measures (e.g. in accordance with § 254 SGB III.);

- regulations which protect claims which have been worked for e.g. claims to unemployment benefit, compensation for any possible disadvantages in terms of pension etc.

Another serious problem, which will be further aggravated in many other trades in the craft trade sector due to the shifting "upwards" of the age structure, lies in the learning and training ability precisely of older employees which is often scarcely developed. The vehicle trade is less affected by this problem since further training measures take place regularly. It is however affected by:

- an innovation leap in the automobile sector (increased use of electronics) resulting in a gap in qualifications and
- the problem the industry has of presenting itself in the labour market as an attractive sector, in particular in the apprentice market and of keeping qualified employees in the sector.

That this is by no means a matter of a structural, age-related phenomenon but above all far more the result of qualification opportunities which either do not exist or of which no advantage is taken, becomes evident in the following example from the vehicle trade which is confronted with a constellation such as can similarly be found in other trades. The vehicle service technician as a qualification between skilled craftsman and master craftsman has been created for the first time in the craft trade sector as a possible solution:

The qualification profile was developed jointly by the Central Association of the German Vehicle Trade, the Automobile Industry Association and the Metalworkers' Union, then tested comprehensively and finally adopted as a recognised training directive in accordance with vocational training legislation and craft >trade regulations. The fundamental principles:

- A uniform name for the qualification throughout the entire industry.
- Training in craft trade training centres and in the customer service schools of vehicle manufacturers with the same training offer.
- Final examinations with the same standards nationwide – standardised certificate.
- Recognition of examinations passed after the further training directive was approved (1998).
- The qualification counts towards the master craftsman examination.

Preliminary results (after about five years):

- A high level of interest amongst employees in the vehicle trade (about 10.000 have already taken part).
- The dual objectives succeed in covering a qualification gap and in increasing the attractiveness of the vehicle trade in the labour market.
- Older employees are also involved.

Whilst most of the participants are indeed younger, it was also possible in the first phase to reach the "older" ones (according to the vehicle trade's yardstick): 10% of the participants were between 36 and 40 years of age, a further 7% even older. It is expected that with a growing degree of diffusion of the qualification, the percentage of older employees will increase further. If the question is asked why it was possible to reach this age group at all, then one quickly arrives at the answer that employees in the vehicle trade have been confronted "since the year dot" with the demand to adapt their know-how to rapidly changing requirements. Thus the "unused to learning" widely to be met in other areas of the craft trade sector scarcely exists here: Only 10% of those who have completed the vehicle service technician training courses stated that they had not previously participated in any job-related training. Over half on the other hand had already taken part in seven or more training measures.

This example shows that regular opportunities to participate in training courses, even if initially less ambitious, and the associated "sense of achievement" can form an important basis for successfully conveying more demanding training qualifications to older employees as well. Such a "further training culture" is however so far still by no means the general rule in the craft trade sector. If noticeable progress in this direction can also be made successfully in other trades, then the result will be a major contribution to a better use of human resources in the craft trade sector and to the qualitative improvement of the supply of human capital and this not by means of "rotation", which is in many respects problematic, but instead by optimisation of stock. At the same time the situation in the labour market is also improved.

Demographic changes place organisations in the economy and society before new challenges: They are constantly confronted with the labour market consequences of demographic and technical/economic change and are often even held partly responsible for this. Demographic change intensifies the pressure from the economy and society and thereby implicitly questions the standards and rules in working life which have so far applied. In all areas of the economy, the variety of types of employment is growing. Traditional working relationships are not just becoming the exception in the software trade or the media sector.

Intermediary organisations such as chambers, employer associations and unions, professional and trade associations or welfare organisations influence, just as do organisations with regional responsibility via their central bodies, opinions in politics and amongst the general public and themselves offer information and services for enterprises as well as for employees, whereby they often find themselves in a dilemma:

- They have a duty towards their members or regions and these expect from them at least that they defend that which has been achieved so far and as far as possible changes to their advantage.
- They are (jointly) responsible for the development and stability of general, non-company parameters which however can only evolve with the consensus of all interest groups.

In view of the different interests and the major changes in the economy and in society, it is becoming increasingly difficult to maintain or to develop institutional service structures which are viable and capable of consensus. A good example of this situation are the agreements on early retirement. These were accepted on a broad scale in the early 90's because most of the costs could be off-loaded, above all onto the social services. This supposedly good solution however soon led after a few years to an increasing burden on social security, tax and public budgets and repeatedly demanded renewed political intervention. The initial consensus was revealed to be unstable. What was achieved – and certainly unintended – was precisely the opposite: In place of growing stability, for years the credibility of the reliability of the social net in Germany has declined. In addition, the average age in many enterprises is rising from year to year, the substitution in firms of one generation for the next is becoming increasingly difficult and creating new problems.

Only very few institutions in Germany have so far devoted themselves to questions about the impacts caused by demographic change. As an overall rule, more imminent problems, such as stabilising their own organisational structure, youth

unemployment, the smoothing out of social crises or the employment of persons already in retirement have enjoyed higher priority. The little initiative which has been taken however shows at the same time what scope for action there really is:

- The compilation and dissemination of information e.g. as tips for best practice examples, brochures on specific topics or workshops/seminars for enterprises, personnel managers or for employees who are interested or directly affected.
- Assistance via training in experience-based and company-oriented model tests in how to sustain the working ability of older employees or ones who have become unused to learning, how to train the exchange of know-how in groups of mixed ages or how to organise the co-operation of enterprises in order to conserve the lifelong employability of their employees.
- Advice for and mediation of human capital in order to improve the efficiency of the labour market as a whole and the deployment opportunities for older persons and at the same time to assist enterprises in the identification and satisfaction of their personnel requirements.
- The organisation of co-operation such as in the framework of regional initiatives, for example, training groups, employment initiatives, regional development and technology transfer in order to bundle one's own possibilities and to develop and test general and practice-oriented regulatory and service structures.
- The checking and adjustment of generally applicable regulations, as are found, for example, in laws, salary and wage agreements, regulations governing industrial relations, social regulations, in vocational legitimisation issues, in health and safety at work regulations or planning directives in order to facilitate the development of forms of employment which respect the ageing process.

An interesting example of how intermediaries also actively intervene in the shaping of demographic change is shown by a craft trade chamber's initiative. In its district the craft trade firms complained about the lack of skilled workers and apprentices. At the same time the number of skilled craftsmen and young people unable to find a job or position as apprentice increased. In order to assist both sides, the following solutions were developed:

1. A personnel consulting agency: Its task is to bring together craft trade firms seeking skilled workers and long-term unemployed persons. With the financial support of job creation schemes and the European Social Fund, the long-term unemployed are given appropriate training, training in how to apply for work and are placed in suitable enterprises for a 6-month training period. The rate of placement is very high.

2. Agency for the placement of skilled workers: This is an offshoot of the personnel consulting agency and now operates as a private enterprise. It actively seeks the most suitable applicants for craft trade firms, develops profiles and is responsible for pre-selection. Firms only pay if the agency is successful. Its closeness to the craft trade chamber and its training institutions is a key factor in its success.

3. The craft trade training agency: It helps to link up supply and demand in the area of training. It seeks new and additional trainee positions and helps craft trade firms seeking suitable applicants for apprenticeships. It advises enterprises offering traineeships for the first time, helps with formalities and if necessary with applications for public funding. It supports young people in finding an apprenticeship or traineeship which corresponds to their preferences and interests. A so-called "offer and demand file" will in future help to document the situation in the "apprenticeship market".

"The effect of demographic ageing is that human capital is becoming a resource which we must treat with much greater care than before". This observation from the European Commission's communication "A Europe for all age groups" of May 1999 is confirmed by all the groups involved in the research programme of the Ministry of Education and Research. The results of the individual research projects reveal a broad range of problems but also of possible solutions which must be seized in order to counter potential dangers from demographic change for the innovation ability of the economy.

What is actually banal, but in fact precisely for that reason very important, is the result that the process of demographic change as it sneaks up on us is so far scarcely anchored in the consciousness of the protagonists involved. Since the new way of thinking needed amongst enterprises, employees and all other protagonists needs time just as does the taking of countermeasures, then it is already important today to adapt to the different parameters to be expected in a few years. Explaining and providing information about these irrefutable changes is however also necessary since apart from this gradual and hidden ageing process of population and workforces, a prejudice will need to be centrally combated which is threatening to assert itself: Older persons, so this dangerous stereotype, are automatically less efficient and less capable of innovation, whereby the research results available show unequivocally that performance potential and innovation ability are linked less to biological age(ing) than with the conducive or restrictive conditions to which people are subjected in their individual working, professional and private lives. In a vicious circle of prejudice (image of oneself and of others), exclusion from qualification as well as encouragement and finally resignation, the readiness towards performance and innovation wither away.

The problems and reasons behind a working world not yet sufficiently prepared for the demands of demographic change, as shown in the research programme groups, are very diversified. As examples only the following are mentioned again:

- A recruitment policy derived from innovation strategy and oriented at young people,
- problems of one-sided physical or mental strain caused by a lack of variety of activity,
- the age-segmented allocation of tasks above all when introducing modern forms of work which can lead to specialisation traps for employees,
- the ignoring of natural limitations in the duration of certain tasks without

- opening up any options and alternatives which could stabilise career paths,
- the disregard for know-how gained from experience and for the need for an intergenerative exchange of knowledge in the workforce,
- short-term interests when making qualification decisions.

It is precisely in a modern knowledge and service society that know-how gained from experience and a qualification culture as well as lifelong learning and the transfer of knowledge become strategic and competitive prerequisites for individuals as well as for enterprises. In a knowledge society with a constant increase in virtual processes and products, many enterprises are confronted with the need to establish a system of internal knowledge management. The traditional path of acquiring new knowledge by recruiting young and skilled staff will in future become more difficult, in particular for small and medium-sized enterprises, due to the drop in the number of qualified younger persons. The consequence of this is that in ageing workforces older employees will also have to remain "up-to-date" in order not to endanger the competitiveness of the enterprise. Firms are not prepared for the task of initiating and organising the intergenerative transfer of knowledge. Systematic concepts and tried and tested approaches are however also lacking from the point of view of research. Various types of concepts and approaches – with quite different levels of testing – exist with regard to the planning of training (lifelong learning) and qualification which is oriented towards career paths, their degree of maturity is however scientifically disputed.

In Germany just as in other countries there are examples worth imitating of a better handling of the problems of ageing workforces and demographic change. In many cases their transferability to other enterprises and situations however still needs to be examined. Now that 11-year longitudinal investigations (Respect for the Ageing) in the Finn-Age-Programme have been completed, new international projects are currently in preparation in Finland which are focussed on the interaction of health, qualification and working environment, whereby a dynamic interpretation also takes place – under consideration of the career biographies of the individuals involved – of changing work demands and of the measures required. What can be learnt from this approach needs to be examined and also which questions and solutions are transferable to Germany. There is certainly some catching up to do in terms of how to handle international experience and in the area of international comparisons.

The changes necessary in personnel management and personnel development also raise a whole series of open questions, such as the fact that preventive measures towards the risks of demographic change must not just be adopted by enterprises. Sustaining innovation potential in an ageing society equally demands changes in

human capital (investment in qualification, motivation and mobility) and the testing and exploiting of generally applicable solutions. The consequences – which go beyond individual enterprises and sectors – of companies' future action strategies under a changed composition of the population are unknown: Should the composition of the working population develop as predicted, then the successful introduction of a balanced age structure in some enterprises will compulsorily lead to even greater upheaval in the rest. Precisely with regard to measures which go beyond individual enterprises as well as in training and labour market policy, there is a call for the state and intermediaries too to devote greater attention to the consequences resulting from demographic change. Explicit areas where there is a need for action still need to be carved out here.

Amongst older employees, limitations to performance due to health and qualification reasons frequently occur which can be traced back to a combination of various causes. A differentiation must be made between concepts whose starting point is employees who are already either partially or totally unable to work and which are of a corrective character and concepts which encompass measures to accompany an entire working life and are of a future-oriented nature. Only from a standpoint which goes beyond the short-term profitability interests of individual economies and which has precedence is it possible to do justice to the requirements of an ageing working population. Many of the measures necessary for preventive reasons are uncomfortable – at least more uncomfortable than the to date common but untenable practice of externalisation of older employees. Such strategies of an increasingly intensive use of human resources for an ever shorter period of time are socially and economically unsustainable. The about-turn towards a policy of a targeted rise in the employment rate of older persons – just as also of women – however demands massive changes in the employment behaviour of employees and in the recruitment behaviour of enterprises. What is also necessary is a new way of thinking – not least an overcoming of existing prejudices with regard to the efficiency of older employees and their role in the innovation process. This however takes time and also requires appropriate action from associations and the political and scientific community.

Quintessence – Need for action:

- Enterprises must create innovative working conditions which encourage learning: Concepts for an integrated labour policy must be developed which are not just directed at individual aspects but in a comprehensive manner at the shaping of work (work organisation, technical aspects), working hours, co-operation and social relationships, encouraging health, regulating performance and qualification with the aim of as long an integration as possible of older employees. This includes above all a dovetailing of organisational development and personnel policy.
- Enterprises must hurry along the development of a company culture across the generations which is oriented at the varying potential in the workforce: Questions of knowledge management and intergenerative knowledge transfer must be tackled since the traditional ways of acquiring new knowledge by recruiting young and skilled staff will in future be increasingly obstructed.
- The possibilities and limits of developing career paths within and outside an enterprise represent a field of action for enterprises and intermediaries. What can be mentioned here are lifelong learning concepts and also appealing changes in tasks, independent of mounting the hierarchical ladder. What must be examined from this perspective is company and social areas of activity which could be used in a targeted manner for a “mixed” (horizontally, vertically, diagonally) shaping of career paths. It is open which structural and institutional changes are required for this.
- Employees must recognise their share of responsibility for shaping their careers: Appropriate measures can only then be effective if they are linked to the vocational inclinations of the employees and existing interests and resistance is taken into account. Scarcely any systematic findings are so far available about the individual planning of career paths.
- Associations and enterprises must rethink old models such, for example, as the deficit model of ageing.
- By means of the services they offer, intermediary organisations must support enterprises and employees in coping with socio-demographic change. They could, for example, set off a public discourse about the advantages of employing older persons in various areas of activity.

"Demographic Change" Advisory Committee

Prof. Dr. Fritz Böhle

University of Augsburg

Prof. Dr. Hans-Jörg Bullinger

Fraunhofer Institute for Work Planning and Organisation

Norbert Feith

Federal Ministry for Family, Senior Citizens', Women and Youth Affairs

Dr. Fritz-Jürgen Kador

Federal Union of German Employer Associations

Prof. Dr. Karl Kuhn

Federal Institution for Occupational Safety and Health

Dr. Dagmar Lennartz

Federal Institute for Vocational Training

Prof. Dr. Gunda Maintz

Federal Institution for Occupational Safety and Health

Prof. Dr. Gerhard Naegele

University of Dortmund

Dr. Margaretha Neudecker

Federal Ministry of Employment and Social Affairs

Gerd Peters

Institute for Labour Market and Occupational Research,
Federal Employment Institution

Prof. Dr. Anita Pfaff

University of Augsburg

Prof. Dr. Hedwig Rudolph

Berlin Science Centre

Prof. Dr. Gernot Weißhuhn

Berlin Technical University

Ulrike Zuehlsdorff

DGB National Committee

INIFES, Stadtbergen

Subjective components of the long-term development of employment opportunities

Ernst Kistler, Markus Hilpert, Dorit Sing

ISF Munich

In the shadow of innovation

Volker Döhl, Nick Kratzer, Dieter Sauer

SÖSTRA, Berlin

Innovation ability and changing age structures

Jürgen Wahse, Reinhard Schaefer

Future Factory/ Hamburg Chamber of Trade

Strategies for the craft trade sector

Christine Ax, Marianne Ludewig

ISF Munich

A chance for work

Hans Gerhard Mendius, Stefanie Weimer

Lower Rhine Polytechnic

New demands on personnel development

Lutz Packebusch, Birgit Weber

ISO, Saarbrücken

Promotion of health in enterprises and age-integrative employment policy

Martina Morschhäuser

FfG, Dortmund

New models for working hours for older persons

Gerhard Naegele, Frerich Frerichs, E. Zimmermann

ISIS, Frankfurt/Main

Limited occupational lifetime and career in enterprises

Johann Behrens

ZeS, Bremen

Financial consequences of working hour models in enterprises

Holger Viebrok

IAO, Stuttgart

Innovation ability in the manufacturing and service sectors

Jochen Pack, Hartmut Buck

BTU Cottbus

Innovation ability in the area of software development
Klaus Kornwachs, Stefan Berndes, Uwe Lünstroth

Chemnitz Technical University

Innovation ability in product assembly
Hartmut Enderlein, Armin Reif, Jens Täubert

Society for Occupational Safety and Humanisation Research, Dortmund

Composition of age structures and changes in enterprises
Annegret Köchling

a&o research, Berlin

The working environment as producer of subjective experience and the readiness towards innovation of younger and older employees
Gerda Jasper, Werner Duell

Neubrandenburg Polytechnic

Typical career biographies of younger and older employees
Adelheid Kuhlmeier, Tanja Hitzblech

HDZ RWTH Aachen

Shaping work systems and technical aspects towards career biographies
Ernst Hartmann, Silvia Schmid

ISO, Saarbrücken

Socio-structural composition and changes in enterprises
Josef Reindl, Hans Günter Grever

Hamburg-Harburg Technical University

Support structures for younger and older innovators
Klaus-Dieter Fröhner, Kerstin Nawroth

VDI/VDE-IT, Teltow

Innovation as an integral process
Michael Astor, Ulrich Brasche

PROGNOS, Basle

Ageing and Work
Heimfrid Wolff, Henrike Mohr, Katharina Spieß

Further information on the contents of the research programme can be obtained from:

DLR-PT

Günter Neubauer, Tel. ++49-228-3821-145, e-mail: guenter.neubauer@dlr.de

FhG-IAO

Jochen Pack, Tel. ++49-711-970-2019, e-mail: jochen.pack@iao.fhg.de

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