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LABOUR MARKET TRENDS

Manpower planning to maximise capital intensity

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**“Failing to plan is planning to fail”.
“Adventure is just bad planning”.**

- Proverb

**“Good fortune happens when opportunity
meets with planning”.**

- Thomas Edison

**“When planning for a decade, plant trees,
When planning for life, train and educate
people”.**

- Ancient Chinese Saying



1. Preamble

Manpower planning had its peak of corporate popularity back in the 1970s, then fairly rapidly went out of fashion. Its decline was not because it was less relevant within the large businesses where it had emerged, but quite the reverse. What it revealed often made uncomfortable reading and it was clearly better to dispose of a resource that was being sidelined and therefore divorced from any practical outcomes. Manpower planning was primarily a corporate function, distant from the majority of other operations, and was therefore easy to phase out. Its partial revival now is because of perceived acute labour shortages in many sectors and the need to quantify longer-term demands.

In this report we focus on the manpower requirements of multinationals as they seek to automate over the period from 2023 to 2035. Our attention is restricted to the advanced economies and particularly those where there is readily available and reliable manpower data – which means the UK, the EU and USA.

Our approach differs markedly from other studies because we take as our starting point the needs of an individual organization by asking the perennial question: (that should be asked by all businesses – and particularly multinationals) how can we take full advantage of what automation has to offer without the need to borrow heavily to pay for the necessary capital, or carry out any large-scale redundancies?

2. Introduction

In most jobs there is a significant proportion of non-productive working time. In fact, one test of a job's criticality is to view what happens to an individual's work activities when they are absent on annual leave. There are few organisations with 250+ employees where a saving of at least 15% of headcount cannot be made without any loss of work quality, or output. In the public sector this rises to 25%+.

Skill shortages certainly exist and in this issue of Labour Market Trends we shall explain why. However, in many cases the skills currently sought will be an entire mismatch against those that will be most valued over the longer term. Moreover, employers commonly undervalue the existence of training skills and experience coupled with technical or managerial skills - so that capabilities are impaired from multiplying within teams.

We do not anticipate that this issue of our report will be comfortable reading. Cutting a workforce to less than 20% of its original headcount is rarely an initiative that will come from within. Few insiders could conceive of such a saving, or would not fear of its implications for their own position. This is especially the case for HR professionals. However, although the initiative to automate may come from elsewhere, it is only the HR team that can deliver the necessary changes to make the investment possible without the need to borrow heavily to pay for it. Along the way, those HR professionals with the vision to see how revenue streams can be maintained whilst this transition takes place - and especially those skilled in job and workplace design - will be amongst those who form the top management of the future enterprise.



3. Part one: labour supply vs demand

Let us begin with a definition of manpower planning (MP) and then move on to justify the case for maximizing capital's share.

In essence, manpower planning is the process of deciding what human resources a business will require at fixed points in the future and how to secure and develop the right number of qualified employees to fill future demand. It is therefore a critical input to human resource management. HR colleagues then take its findings to constrain headcount and labour costs whilst seeking to secure appropriate individuals to fill key jobs and place these employees in the right jobs at the right time, and motivate them appropriately, so that an organisation can meet its evolving objectives.

Where are we? Evolution of the industrial and commercial landscape

3.1. The third wave

In advanced economies over the last four decades there has been an increasing move to displace labour, with first digital systems - as computerization spread to all industries and functions. This had a huge impact on many areas of activity. However, initially computerization was met with an adaption of roles away from repetitive office tasks to higher level professional and administrative activities. There was a rise in labour productivity as white-collar personnel, in particular, moved towards higher value-added functions. This was achieved without significant loss of manpower because it allowed for the expansion of services and an improvement in the quality of data used to manage business organisations. Meanwhile, on the shop floor, a similar trend was taking place with, for instance, the introduction of CNC machines to take over from manual lathes. The biggest loss was in the separate “tool rooms” of many manufacturing enterprises which had been occupied by highly skilled manual workers.

In other sectors, such as construction, this first digital revolution largely affected drawing offices (through CAD) and quantity surveying functions. For the rest, the biggest changes were in the cost, power and versatility of equipment – particularly in earth movement and lifting technologies. Agriculture was perhaps least affected by the revolution as it had been highly mechanised for the last half a century.

The second corporate revolution involved not just the application of computerization to individual tasks or equipment, but to the process of integration itself. However, the World had to wait for this revolution in most sectors of the economy (except, for instance, automotive) because of the discovery in the 1990s of low cost manual production opportunities in East Asia and Mexico and outsourced service centres in India and Brazil. This led to the belief that technology, with its up-front investment and uncertain reliability was less attractive when low labour costs were so readily available.

Gradually, the falling costs of completely automated production lines and the rise in labour costs in many outsourced countries – especially China - turned the tables. This second revolution has also had a huge impact on materials and goods handling – particularly in logistics and item sorting functions (as in airline baggage handling). Such technologies have been further aided by new productivity methods such as ‘just in time’ which, in turn, have called for even more effective communications between the remaining human operators of the systems. Automated warehousing, faster internet speeds and refined turnaround methodologies have also allowed for the revolution of retailing where, partly due to the COVID-19 pandemic, online sales have

developed rapidly – rising in the UK, for instance, from 19% of all retail sales in 2019 to 27% at the end of 2021. In office functions the advances of automation have been less visible – although many formerly administration-heavy jobs in the insurance sector have been streamlined by moving the process of calculating and issuing insurance cover online.

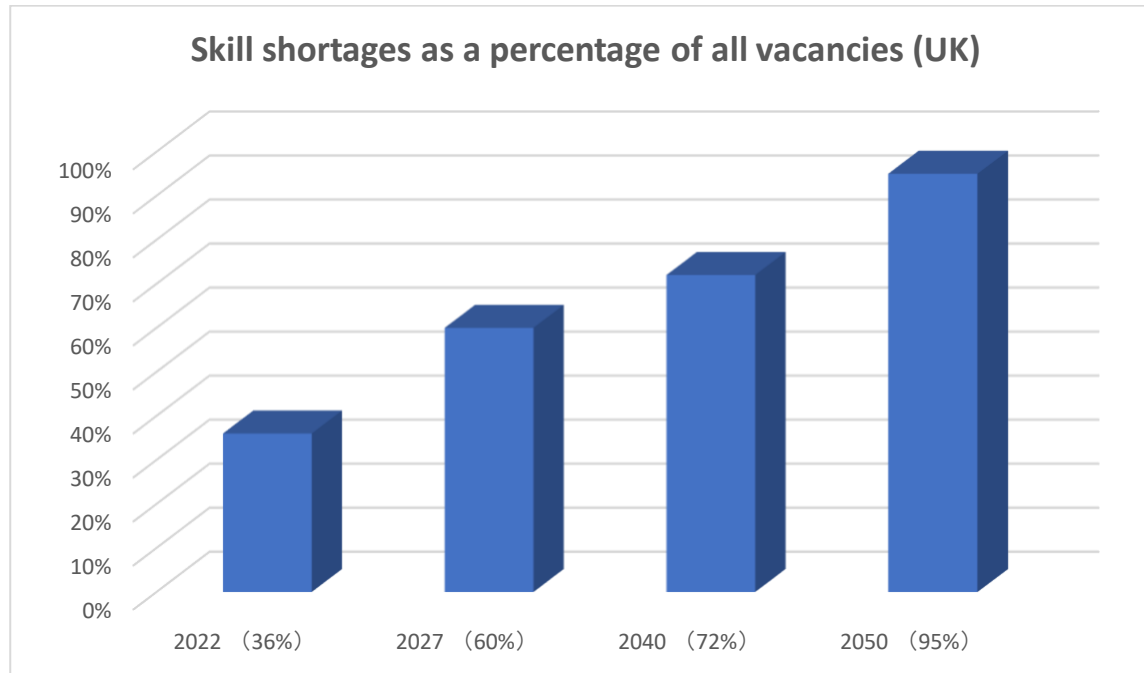
There are a surprising number of companies that have yet to optimise their systems through the adoption of currently available technologies and these can be expected to be forced out of business during the next few years by factors such as speed of response and delivery costs inherent in people-intensive services. Moreover, over time the cost of automation will come down even further and its range of applications grow until there will be few areas of human activity where it will not be the most cost effective route to fully automate – leaving a handful of highly critical human resources charged with maintaining and developing the systems and driving the business. Even in senior executive roles there will be a multitude of aids to assist decision making.

Although much has been made of AI as a key to the future, it is no more than an extension of current interactive IT systems development and thus essentially belongs in the second revolutionary era. It is also self-limited by a factor we shall later further explain – the fact that to provide a level of artificial intelligence that will justify the term AI it will take humans to develop it that are themselves both at the highest level of human intelligence and have the digital skills level to undertake the development. This makes them highly rarefied individuals who will always be short of supply, as the structure of intelligence across populations is largely fixed.

The third corporate revolution will not be particularly digital at all. Digital systems will just be its necessary backcloth. The most relevant change from a digital perspective will be the mainstreaming of advanced digital skills. Instead of large specialist IT teams there are likely to be a relatively small population of highly specialised consultants called upon to deal with advanced technical protocols and algorithms near the forefront of systems know-how, or to undertake trouble-shooting roles. Within companies virtually all remaining employees will be highly digitally literate and thus be in a position to produce higher quality systems than was possible when the user and IT ‘techie’ were separate people.

Over the next 12 years the lives of those in the advanced economies will be transformed by changes such as the electric car, driverless vehicles and artificially manufactured food products. Unless blocked by legislative intervention or supply shortages in key materials such as lithium, the proliferation of the electric car, for instance, will not only lead to cleaner urban environments and improved human health - but to reduced running costs and an end to reliance on imported fuels. There will be a gradual end to the petrol (gas) filling station and a shift in wealth away from the middle east to centres of population in North America, Europe and Asia.

3.2. Dealing with skill shortages



- Source DfE and FedEE projections

In most advanced economies severe skill shortages currently persist, in spite of the large existing pools of skilled labour. In China, for instance, there are estimated by the government to be 200 million skilled workers (26% of the total workforce), with 60 million classified as “highly skilled”. However, the government is planning to increase the pool of digital technology engineers by training over 80,000 a year and Chinese companies are the leading adopters of robotic systems. In the European Union there are 80 million skilled people employed, accounting for 44.2% of the total number of people employed in the 25–64 age cohort.

Whatever efforts are made by governments to improve the skilled labour pool the problem of short-term shortages is not going to be resolved without either crash programmes to improve vocational training, or attracting skilled migrants to move to areas of greatest need.

In Australia a five-year National Skills Agreement (NSA), which will take effect from January 2024, will inject A\$12.6 billion (US\$8 billion) into expanding and transforming access to the vocational education and training (VET) sector, support quality training and help address critical skills shortages. When combined with other state funding, the total investment will surpass A\$30 billion (US\$19 billion).

In Germany, there has been a remarkable achievement in producing opportunities for young people - either to follow ongoing educational programs, or enter apprenticeships. For this reason, the level of unemployment for those aged under 25 is now only 5.6% - well below any other EU country. However, there is a lack of young people to fill trainee positions, with 47% of companies claiming that many traineeships remain unfilled. In fact, this has led to a huge rise in training allowances. But not only is the

focus of training on the young not resolving skill shortages, but so is its exclusive youth focus. Across the rest of the population there is a relative absence of skill development – with just 16% of those aged between 50 and 60 being offered skills training. This lack of investment is forcing employers to look abroad for the skills they need and, towards that end, the German Chamber of Commerce and Industry (DIHK) has developed a special scheme called the 'Company Professional Recognition Project'. Those signing up to the 'UBAConnect Scheme' gain access to a plethora of data providing equivalents to nationally recognised qualification in Germany.

In Austria, a recent WKO 'workforce radar' survey has found that 82% of employers were experiencing skill shortages and that this had given rise to 200,000 vacancies across the country. This fact has encouraged the government to begin concluding agreements with governments in third world countries – and the latest deal has been reached with the Philippines. Some countries, such as Brazil and Uruguay, have established incentive schemes for skilled immigrants to relocate to their countries and other have sought to remove the barriers to immigrants taking up work. In Italy, for instance, immigrants with work visas may now commence work immediately without the need to wait for tax registration, whilst in Canada the Province of Ontario has banned any unfair qualifications barriers preventing professional immigrants to take up work. In Luxembourg the pool of available labour has been expanded by allowing family members of working age to take up employment when they accompany their parent or spouse who has a work permit.

Another problem with employers' concentration of training on young workers in advanced economies is that this group is often much less mobile than older workers. One reason for this is the fact that in the EU, for instance, young women do not leave their parental household until (on average) 25.4 years old, whilst young men do not do so until the age of 27.4 years. In fact, in Romania men do not leave until, on average, 29.9 years. Another barrier to cross border employment, especially in Europe, are linguistic barriers. Although, three quarters of the 25-34 age population in the EU know at least one foreign language this falls dramatically for those from Hungary, Romania and the former EU state of the United Kingdom. Moreover, only a quarter of working-age adults who know at least one foreign language know their best-known foreign language at a proficient level and, although the two most economically advantageous languages of English and German are the best known second languages, this is all too often not the case.

In the United Kingdom the easiest and most reliable figures to access are on the demand side of labour equation. Here, over the short-term there has been a significant change during the last year. Official vacancy figures are always well below the actual vacancies in the economy, as many jobs are filled without notifying the department of employment. Nevertheless, trends in official figures can be assumed to reflect the general pattern of movement in the overall labour market. In Q3 2023 there were

988,000 vacancies, which was 256,000 below the number in the equivalent quarter of 2022. Falls have taken place in all sectors - except 'mining and quarrying' and 'manufacturing' (where the increase was only slight). Amongst the largest falls have been in 'professional, scientific and technical services', 'administration and support' and 'real estate'. Moreover, the greatest shrinkage has taken place in organisations with 10-49 employees and 2,500+ employees.

Much of the focus of government policy concern has been on the growth of digital skills. In May 2021 this led to a policy paper published jointly by two UK government ministries. This observed that "very little in the existing literature provides a clear number specifying the demand for data jobs" although it can be assumed that in the future "virtually all white-collar workers will increasingly need to have a basic understanding of data". The researchers undertook their own survey of industry and concluded that the single most important role in demand was for "data analysts" – although this only accounted for 12% of digital-related roles. The other roles most in demand were for 'Head of data' (10%), 'Data Manager' (9%), 'Chief Technical Officer' (8%) and 'Data Protection Officer' (8%).

Filling available roles has posed a difficult task for around half of all companies and this had particularly affected medium-large companies. The biggest barriers identified were the salaries demanded by potential hires and the lack of available people in the labour market.

In the Middle East there is a deep concern in oil-rich States that their economies will collapse when either oil stocks deplete or, as is already happening, the World's dependence on fossil fuels progressively falls. This has led Saudi Arabia to focus on training its native population and forcing companies to establish - exclusively for nationals - employment quotas in respect to many skilled positions. Training activities by all companies are being made to be more transparent and Gulf States, such as Qatar, are actively encouraging diversification away from the oil-related sector.

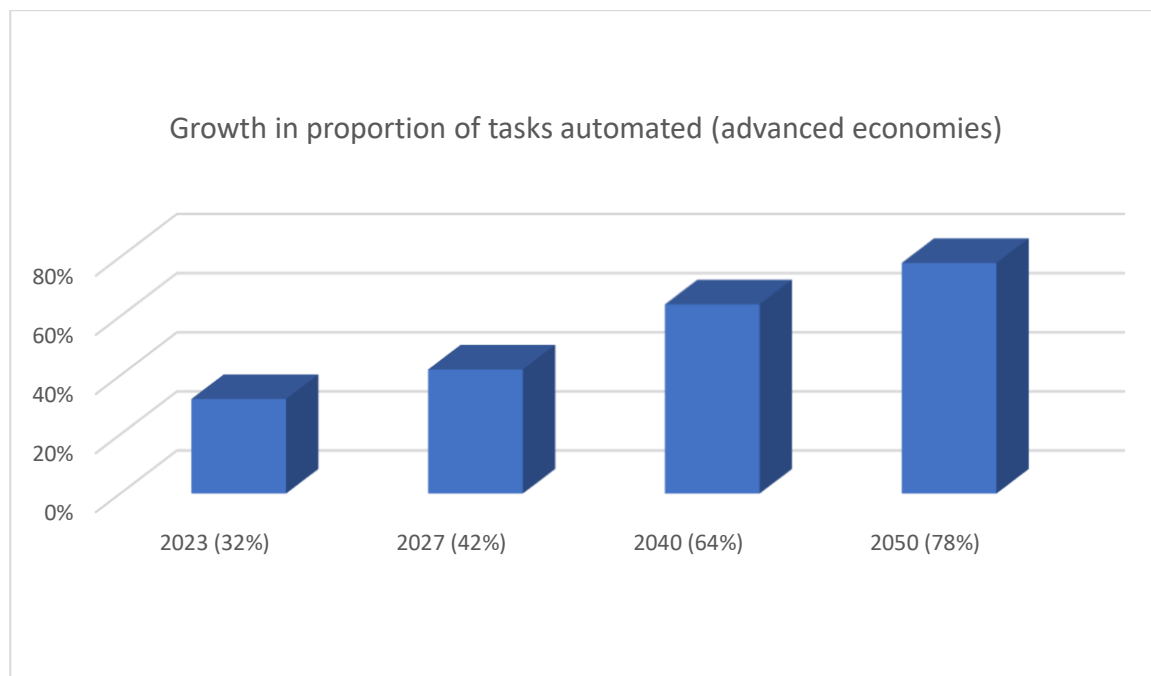
Finally, in the USA there are 1.5 million less people in the workforce today than in February 2020. What is being experienced is not just a skills shortage, but a general labour shortage. The principal reasons for this are a shortage of affordable childcare (27%) and persistent ill-health following the pandemic period (28%), the fact that during the pandemic over 3 million workers decided to take early retirement and finally because the number of immigrants over the last two years has fallen to only a quarter of its historical high point. The numbers leaving work and taking up new jobs remains virtually unchanged over the current year until September 2023, with the only significant change being a rise in terminations by companies employing 5,000+ people.

What is surprising is that there are few detailed analyses of actual skill shortages in the USA, or predictions of any kind projecting skill shortages into the medium to longer term. All that exists are statements that current shortages can be expected to persist into next year. One reason for this is that a high level of uncertainty exists, especially after the pandemic, about what employer plans are in respect to automation.

According to the OECD just 21.2% of jobs in the USA are at risk from automation, compared with an OECD average of 27%. However, what appears closer to the truth is that the majority of jobs in advanced economies are at ultimate risk of being lost. Not perhaps the apocalyptic future forecast by Elon Musk, but much closer to it than the OECD would suggest.



3.3. The significance of automation to the labour market



- Source: WEF and FedEE projections

The amount of tasks which have already been replaced by mechanised or automated systems is often underestimated and it will be through individual tasks rather than 'whole jobs' that the labour displacement process will largely take place.

Although the current media and political focus is on 'generative AI' this is just one part of the automation spectrum, albeit perhaps the most disruptive part. Although ultimately the biggest impact that automation will have on jobs will be to reduce demand for much of skilled labour, its initial greatest impact will be on semi-skilled jobs.

Fear and ignorance are unfortunately the major driving forces for political action in this field, with AI acting as a convenient mantra to justify legislative interventions. In reality, the panic about what is called 'AI' is not primarily about lost jobs per se - or any loss of human dignity or status - but a concern that automated decision making could undermine the political process itself, as well as pose a risk to tax revenues when jobs are lost. For this reason, in the USA measures to control AI are being introduced at a Federal and State level - such as the "No Robot Bosses Act (2023)". This is a Bill currently before the Federal Senate which would require employers to disclose when they are using automated systems to make employment decisions and also to set out how the systems will be used. It would become unlawful to use such systems without human intervention and necessary to test the systems for bias (such as discrimination). Employers would have to give special training in the use of such systems and the Federal Department of Labour would be required to form a specialist "Technology and Worker Protection Division". Moreover, US President Biden has also launched his "Blueprint For An AI Bill Of Rights".



Surprisingly, the current global picture for AI is one of sluggish growth, not being particularly held back by legislative barriers so much as a lack of clarity by companies about what course automation should take. Thus, although there is an increasing amount of venture capital going into AI-based projects, there is a declining amount of AI software development and AI represents a declining proportion of content in expert publications worldwide. There is also a seemingly stalled concentration of AI skills in the global talent pool. Arguably, the automotive industry is currently far ahead of other sectors with production plants. As far back as two decades ago, assembly lines were packed with industrial robots and few humans present - except for maintenance and final QC checks. There have also been pioneering hotels, warehouses and supermarkets where workers are not entirely absent, but are none too evident.

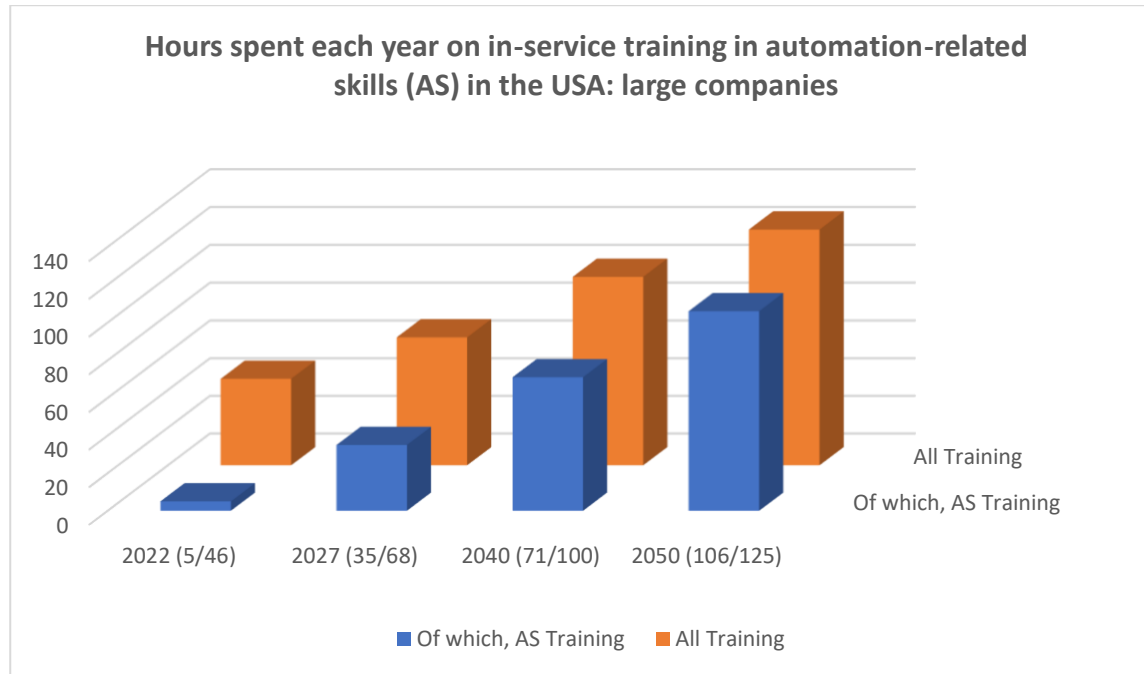
It is usual to outline a macro perspective on future automation in the form of distinct developmental steps. However, outside the individual firm it is not likely to happen that way, but rather through a complex of concurrent actions spread across sectors of the economy in a haphazard way. In the early stages of automation there will be a high demand for all types of manual and non manual skills as semi-automated systems need to be served by those with fairly conventional capabilities. The demand for analytical business skills will also grow - as the actual numerical abilities of IT personnel is found to be not up to the mathematical and statistical requirements to handle 'big data'. This will, however, be an intermediate phase which will gradually pass as the skills initially in demand are themselves automated.

In the short-term we will have to live with a widespread experience of skill shortages as every company tries to become knowledge rich and streamline their operations and processes. Tackling this will call for a major investment in training and development and, in advanced economies there will be all kinds of short-cuts sought – largely through ‘stealing’ from other enterprises and creaming-off talent from the top of less well-developed nations. Later retirement in the face of growing longevity is not going to ultimately solve the problem of aging populations and the poorly adapted educational system is going to require too fundamental a set of changes for academic staff to accept it in the near term – let alone the securing of the right mix of skills amongst academics. In the end, the greatest barrier will be the structural shortage of those at the highest levels of intelligence. IQ cannot be taught and imposes fixed limits for companies, meaning many will have to get by – as in the ant and bee kingdoms - with the collective effort of teams making up for the ‘individual’ IQ shortfall.

It would be wrong to assume that the future is to be defined by automation alone - as to achieve optimum productivity it is going to be necessary to transform consumer expectations and the way that goods and services are going to be delivered to end users. Those too close to existing products and processes are also not generally the best to inspire or lead a radically new development. To quote Henry Ford: “If I had asked people what they wanted, they would have said faster horses”. Moreover, those most vulnerable to changes will be the first to undermine them.

It is difficult to see how major savings are going to be made if automated systems are simply applied to existing processes. It will be necessary to reverse engineer many steps in the supply, production and distribution chains in order to find an ultimate solution. Very often, as in the practical case that ends this report, the outcome will itself be better for the end user than the traditional ‘drive into the blue’ planning approach.

3.4. The growth of technical training



- Source: US training Industry report (2022) and FedEE projections

Everyone in a commercial business must justify their employment by either helping the organisation to make money, or to save money. In the case of human resource management, for instance, the role is not one of passive ‘support’, but being directly concerned with the organization’s commercial objectives through, for instance, securing the best talents, training employees in automation-related skills, sponsoring automation technology courses in higher educational establishments, and by minimising general payroll costs to the bare limits possible in order to help generate profitability. A company is not a welfare organisation, although it must not allow any actions that endanger employee safety and wellbeing.

An HR professional not understanding the distribution of intelligence across their organisation is like driving a car, but having no idea whatsoever about either its power or fuel consumption - or purchasing a jewel and not knowing if its stones are precious, or just paste. Obtaining the IQ of each and every employee is a key task for HR, not some coincidental exercise that might be got around to if everyone concerned has the time. Ironically, the contemporary preoccupation with “talent management” is often conducted without any knowledge of what talent means, or any real and reliable effort to measure it. When companies secure gifted employees they are also often singularly unprepared for the consequences – as such personnel are invariably difficult to manage, being a step ahead of everyone else. They can also appear awkward and arrogant or, the case of the introverted high performer, will only exceptionally be a ‘team player’, meaning that it will be periodically necessary to keep them on track – strictly aimed at corporate priorities.

During the transformation spearheaded by automation the HR function will not entirely disappear, as the humans left in the system will be each more significant and require careful management to ensure they operate as effectively as possible. The HR function will also, however, transform – just as it has in recent years with the adoption of other spheres of responsibility, such as data protection.

One change that HR itself must undergo in advance of the changes outlined in this report concern the ways they perceive organisations. For instance, organisation charts – as conventionally displayed - are entirely drawn up in the wrong direction. They indicate vertical flows of seniority and control and not the direction of travel of the organization. A chart should, correctly drawn, indicate a left to right flow of accountability and activity aimed at business outcomes. Individuals and teams should be positioned along this line – with sales as the primary driving force and accounting classified as a line function.

We do not climb ladders to make our way in business, but move horizontally along paths of least resistance. Ladders are for careers within business hierarchies - and both concepts are about stasis and status rather than drive and problem solving. No productive job is fixed, but is defined by the flux it has to move successfully within.



3.5. Project zero – the necessary ‘unachievable goal’

Back in the early 1980s there were a few major corporations that operated with just a handful of top personnel. The major Swedish compressor and road drill company Atlas Copco, for instance, had a corporate head office based in a few rooms above a retail outlet in Gothenburg – with just a CEO, Finance Director and small team of administrative staff. In the future we can expect that there will be numerous multinational corporations that turn over in excess of \$100M, but with less than 50 employees. This will be done, in most cases, by outsourcing, encouraging employees to leave and sell their services back to the corporation, changing the way business is undertaken, maximising capital intensity and the heavy streamlining of operations. It will also be necessary to get away from the temptation to build in human intervention at every point in the structure. Much can be achieved by monitoring systems and small trouble shooting teams operating on stand-by.

Robotics is at the heart of flexible automation, but there are various estimates and projections for the robotics industry. Current estimates put the market at \$25bn to \$90bn, with projections through to 2032 ranging from \$152.9 Bn to \$349bn, giving rise to annual growth rates of between 14.7% and 19.8%. It should be remembered that this is the size of the sales market and not the installed base – which is already huge. The fastest growing area of applications is also in the services functions – meaning robots are already entering the office-work heartlands of labour intensity. Although this fourfold to sixfold increase in robotic penetration over the next decade will make automation a lot more visible to the general population, there will also remain substantial psychological barriers to its adoption.

The principal objections to automation are the social consequences of the displacement of labour. It is argued that it will lead to widespread unemployment, increased social unrest, poverty and alienation. However, the principal issue facing policy makers will not be increased leisure time, but how to replace work as the major mechanism through which wealth is distributed across societies. A simple “social wage” will not suffice - as this would mean that most people would face a dreary mediocrity where they do not actually starve, but where there are few opportunities for variation in income. In truth, humans not engaged in traditional work obligations will find other areas of activity to excel – such as sport and the arts. It will also be up to governments to invent new ways for populations to compete for rewards outside the conventional employment sphere, especially in health and social care.

3.6. Quantifying potential

Successful manpower planning cannot be achieved unless a company first maps out its current critical capabilities and looks at the manpower implications of medium to long-term business plans.

Although there are many who will deny the importance of human intelligence as the critical factor in industrial and commercial development it is nevertheless the biggest single determinant of business success – as measured by earnings, problem solving ability and status. What's more, the single most reliable and valid measure of general human intelligence is the IQ test.

Since the IQ test was first used 120 years ago – and especially in the last 30 years - it has come in for an increasing amount of criticism, largely on the grounds that it does not measure all aspects of intelligence - such as “reasoning, verbal acuity and something called “emotional intelligence”. However, much of the criticism is not aimed at the validity of the tests themselves, only that it is missing a few other important factors. Curiously, much of the criticism is based on research with low sample sizes. Moreover, as women perform better on verbal IQ tests and men on non-verbal tests much of the gender bias in such tests can be removed by simply asking job candidates to take both types of test – or a hybrid version.

What such criticism misses is the need for employers to have one set of tests that can be used with the limited time they have available that will produce a comparative, consistent outcome - so that a shortlist of candidates can be readily produced. Hopefully a job interview will reveal other abilities, such as reasoning and verbal acuity. IQ is thus a valuable measure that is ‘necessary’ but not sufficient to determine hiring outcomes. As such, it is surprising how relatively few employers rely on IQ tests and instead seek to rely on qualifications as a substitute – a very unreliable guide, for reasons that we shall explain.

The biggest study examining factors that determine career success was the ‘Understanding Society’ Programme, an ongoing longitudinal survey of more than 56,096 UK households that started in 2009. This broke its data down into 367 occupational groups.

The researchers measured personality and general mental traits. These were not only general intelligence (IQ) per se - but also agreeableness, conscientiousness, extraversion, neuroticism, openness, delayed gratification, self-efficacy, mental health and willingness to take risks. The team also profiled different occupations in terms of these factors to produce some - perhaps not surprising – correlations. For instance, the job function with the highest preparedness to take risks was found to be ‘marketing and sales directors’, whilst amongst the group least prepared to take risks were ‘finance officers’ and ‘legal secretaries’. On the

extraversion scale came 'travel agency managers and proprietors' at the top and 'civil engineers' at the bottom. Because of the usually large sample sizes and virtually random selection, the correlations were often significant to the $p < 0.001$ level, meaning that they were valid to one in a thousand.

What is most relevant to this report is the fact that the measures which had the highest and broadest correlation with income and status were those that quantified cognitive skills. Furthermore, factors usually associated with career progression – agreeableness and extraversion – actually correlated negatively with emotional intelligence and income.



3.7. The perennial supply dilemma

If IQ is an essential measure that should act as a cornerstone to employment selection and the movement of industry and commerce is towards a situation where it is almost exclusively reliant on a core of highly intelligent personnel - then how can companies resource the individuals they most need when they will be increasingly in short supply?

If we take even the 'moderately clever' category scoring 115 – 130 IQ points then we find just 14% of the population. 'Gifted' individuals scoring 130-145 account for just 2% of the population and 'highly gifted' individuals with IQs above 145 - that business requires to develop its AI systems - account for a mere 0.1% of the population. This means that certainly all multinationals (which account for 33% of global output and 25% of employment in the global formal economy) are competing for a tiny proportion of those capable of meeting their most critical future requirements. The pity is, moreover, that so many of these organisations do not know that they are even in the chase, or that so many in their top jobs are currently filled by the far from "gifted".

The single most relied upon indicator of individual capability for new employees is currently their formal qualification. As their career progresses this broadens to include the relative prestige of the companies that they have worked for and the nature of the jobs held. If qualifications alone are to be taken as a substitute for IQ to indicate intelligence then we may assume that University graduates will necessarily need to have at least an IQ of 115. This means that the proportion of University graduates to those in the population will not exceed 16-17%. However, if we compare this with the proportion of the aged 25-34 population in most advanced economies who actually complete 4 years of University education we find that there is a huge mismatch. The proportions graduating are, for instance, 49% in Switzerland, 47% in South Korea, 44% in the Netherlands, 42% in the UK and 41% in the USA. This indicates that only one third of University graduates in Switzerland have IQs in the bracket that would mean they are worthy of consideration for most professional or executive positions – especially in a multinational enterprise.

Of course, in practice, employers partly overcome this problem by only recruiting from the top Universities, although this is still no guarantee that the best potential candidates are selected for shortlists. This is because many even high status Universities score much lower for some disciplines – especially in vocationally-orientated subjects such as production management, architecture, HRM, marine sciences, purchasing and supply and certain branches of engineering. For instance, according to the Times Higher Education (THE) rankings for 2024 Aalborg University has a global ranking in the 200-250 bracket, but is ranked for engineering in the range 101-125. This can also work in reverse, with UCL being ranked 22nd in the World, but 45th in Engineering.

3.8. Consequences of the supply gap

The surprising feature of the last four decades is how little the increased productivity brought about by digitalization and improved production methods has altered either the labour share of national incomes, or net corporate profitability. Labour productivity has certainly improved, but not as fast as technological advances should, or could, dictate.

Although corporate profitability did rise in many advanced economies during the immediate recovery from the great recession (post-2009), the record since then has been very mixed. In the USA, the COVID pandemic did little more than temporarily disturb net profit levels (after removal of government subsidies), although a slight rise - post-covid - occurred in large companies. In fact, in the USA, UK and Eurozone there has been a general return in 2022/23 to previous levels (but not beyond). The same also applies to the proportional labour share of national income – which has also now virtually returned to pre-covid levels.

Clearly, this lack of movement has not been because corporate objectives have been to limit profit levels. The principal reasons why improvements in digital technology have not resulted in large scale improvements in corporate profitability have been because companies have given away any gains made in the form of employee rewards (especially benefits) and they have not been able to recruit enough employees at the IQ115+ level to help achieve the necessary transition to the point where a further jump towards complete automation would be tenable. It is also because of the low level of digital literacy and technological vision that often exists at senior management levels.



3.9. Developing a manpower plan

The starting point for any manpower plan must be the conversion of business objectives into manpower terms. However, many organisations do not have clear objectives, or just have overgeneralised aims. For instance, they may be too short term or not congruent with external events that could potentially frustrate them. For this reason, manpower planning often needs to elaborate and improve on existing corporate plans. It is also essential not to flinch from perceived business outcomes that may be difficult to accommodate.

Line managers will always present a barrier to the process of manpower planning as they are often too attached to the familiar comforts of present practices (and incentivised around restrictive targets) to see how the future could pan out. It should also be noted that effective planning only remains effective if it is constantly being reviewed. New facts and outcomes will change either the course to be taken, or the objectives themselves - and this should not undermine the credibility of the planning process.

Changes to manpower plans do not mean that past projections were “wrong”, but that often chance factors have intervened. In fact, if even ten criteria were used to produce a forecast, then the percentage of variance can never exceed around half of the actual final outcome. As predictive factors are added they will each produce a declining contribution to this variance until an absolute limit is achieved at around 60%. This means that chance factors will always account for around 40%+ of outcomes – however much we try. This is well illustrated in horse racing where the favourite wins around 30% of the time, the second favourite 19% and the third favourite 13%. So the sum chance of any one of them winning is just 52% and around half of all winners will be outsiders and extremely difficult to predict.

The final stage before a plan can be put in place is to compare the resources required with those that the organisation currently has – bearing in mind the location of resources, demographics, competence levels, trainability and natural turnover. A future change will not affect all functions equally and change will be likely to also alter the structure, nature, scope and size of different functions as well as reporting relationships.

3.10. How should a plan work?

Business plans generally boil down to an aim to achieve consistent, profitable growth. What will change over time is the means to achieve that target and that, in turn, will only be as good as the analysis of evolving resources and opportunities - and the astuteness of a 'contingency risks' assessment.

Of course, a business will have its own distinct cyclical pattern of growth and contraction over time and if it is in its first ten years of corporate life these oscillations will be potentially more severe, and gaps shorter than in a mature business. A great deal will also depend on a company's competitive position and whether its principal goods and services are temporarily or fundamentally under threat. For instance, the leading Hungarian light bulb company, Tungsram, failed to predict the rapid replacement of conventional bulbs (which they had pioneered) by LED lighting. In spite of a massive investment by General Electric, the company was unable to survive and filed for insolvency last year. For decades it had held the lion's share of its market, but size and past stability are no guarantee of ongoing survival. A radical business plan may appear to pose a fundamental threat, but the absence of any plan (or one that predicts a future too close to the status quo) is always a far more risky approach.

Competition (often through not responding quickly enough to changes in technology or consumer tastes) is therefore the biggest contingency threat. How vulnerable a company is can be assessed by looking at the maturity of its main products/services. Those that have existed largely unchanged for more than a decade will be highly vulnerable. It may also be logically deducted from current technological trends what threats will undermine a business – such as can be seen from the past changes from cassette tapes to floppy discs to CDs to broadband online and then cloud technologies. Once the move was to pack as much memory as possible into devices, but today memory is largely outsourced to 'the cloud' – as are Apps. Any company investing too heavily in one stage of this evolutionary process would have been thrown out of business in a very short period.

The other principle contingencies that need to be factored-in are twofold:

1. Major fraud/litigation/reputational loss, and
2. What are sometimes referred to as "acts of god".

In the UK alone £2.46 billion was lost by businesses and individuals by fraud in the financial year 2021/22. This was a 17% increase on the year 2020/21. There were 3.7 million incidents of fraud in England and Wales during the year ending December 2022. Many frauds were on a small scale, but one crime could be on a scale sufficient to hamper the best laid business and

manpower plans. Similarly, a legal action, especially concerning intellectual property rights or data loss, could cost a business up to a year's revenue, whilst the discovery of company wrongdoing, a "MeToo" incident, [Bhopal](#), or [Townsend Thoresen](#) scale disaster could have a major impact on reputation and lead to a scramble for commercial survival.

Major physical or health incidents will hit organisations differently according to the nature of the disaster. It will therefore be possible to rank possible exposure to known threats. Earthquakes, for instance will have a purely local impact – although this could have global consequences if a major production facility is located on a vulnerable geological fault line. As we have seen with COVID-19, a pandemic can have a rapid global impact which hits most those reliant on human resources (the hospitality sector) and physical mobility (such as international transport companies). A manpower planner should list all these significant potential risks and rank order them in terms of likelihood and impact level. A section of their plan should also include a set of key actions (such as recruitment freezes, furloughs, PR campaigns etc) in the case of each kind of risk.

The next step in the plan should be to project employee numbers by function on the basis of several assumptions.

The fact that skill shortages exist in country does not mean that it effects shortages in particular company, or its ability to continue functioning if it adapts its systems, methods and approaches to meet the shortage.

When drawing up manpower plans for the period up to 2035 it is necessary to firstly create separate subplanning periods covering the short, medium and longer term. These must be consistent with each other and realistic about chance factors. The further ahead projections are made the less precise they can initially be. **One way to minimize uncertainty is to begin at the end point of a business strategy and work backwards to the present. What do we need to do now to make the plan work?**

The critical trick is to maintain a desired level of ongoing growth, whilst undertaking the surgery necessary to gain planned reductions in manpower, in order to keep on track with the final objective. Fortunately, all companies are naturally shedding labour constantly – through retirements, resignations, ill-health, voluntary and disciplinary terminations. This means that the priority is to predict the skills that will be lost and train remaining staff to fill the gaps. Recruitment to fill departures should be an act of last resort and only contemplated when no alternative - such as temporarily using the services of contractors - can be found. For this reason, although an absolute hiring freeze will not need to be in operation, a tough set of hurdles must be put in place to gain authorization to replace any but those with the rarest - or difficult to train - skills and a strict quota for such hires adhered to at all costs.

One thing that we can be sure about is that our business is not going to look the same in a decade's time as it does now. It will not be possible to know in advance what technological, fiscal and other innovations will have taken place, but it is realistic to forecast certain things where trends can already be seen, or are the logical outcome of probable changes – such as the move away from income tax as automation advances and the imposition of a tax on capital intensity – or its proxy.

A manpower plan must, of course allow for the securing of new skills quite independent from the process of normal labour turnover. Although it would potentially benefit an organization to hire the best available talent, a talent pool will not be stable or benefit the organization unless the individuals concerned can be given challenging roles that have profitable and engaging objectives. One direction of travel that every organization can take is the streamlining of its operations and automation of every function that lends itself to capital substitution for labour. However, there is no point in simply automating the status quo.

For instance, a supermarket currently operates with a series of counters offering a facility to buy certain food items that are pre-cut to specific weights. However, ultimately there is no need for such a labour intensive activity when the quantity of items requested are analysed. These could be prepared automatically prior to each working day and be on display for self-service. Likewise, there is no need to replace check-out personnel with humanoid robots when the whole need to check out could be replaced by the automatic registration of payment cards on entering a store, the use of digital devices as individual purchases are made and the keying in of credit card codes prior to departure with the goods. The integrity of the entire process can also be monitored by attaching RF tags on high value items and cross checking that with items in the shopping basket and on the digital device. Knowing that this will be the shape of things to come will help the retail sector manpower planner to forecast a huge drop in employee numbers at store level.

The real challenge for automation is the conventional office. It is unlikely that the various jobs and divisions of labour found here will simply be replicated. What will happen will be the absorption of successive activities into automated sub-routines with the removal entirely of activities that only had meaning in a largely manual system. A lot will be achieved by increasing the level of self-service by end users – as in bank telling machines and on-line retailing.



One useful approach is to highlight jobs that it will be difficult, or maybe impossible, to automate out of existence – at least in the short-term. These are remarkably few in number in the private sector, although there will always be SMEs trying to compete with heavily automated larger companies to provide something they seek to typify as attractive – human service. This is just the same approach that was used in the era of early mechanization when items were claimed to be “hand made”. This approach always had a limited appeal as ‘hand made’ usually meant “more expensive” and also more questionable from a hygiene perspective.

The ultimate justification for all manpower changes must be cost. Hiring highly skilled technocrats is an expensive proposition and automation costs must be offset against overall labour displacement. It should be also noted that if a mistake is made with capital equipment then it is too late, whilst with human capital there is always the option of dismissal (although not always cheaply).



Planning on the ground will also need to determine how to overcome political barriers represented by unsympathetic members of senior management and, where works councils exist and/or unions have an active role in representing the workforce, it will be essential to find pathways that neutralize or get around them. Working with employee representatives to achieve radical technological change will always be counter-productive as it will lead to such a dilution of any plan that the objectives will be frustrated. The UK coal industry would not have been virtually eliminated in the 1980s if Margaret Thatcher had asked the National Coal Board to negotiate closures with the National Union of Mineworkers. The process would have slowed to a stand-still and ended up with closure of a few marginal pits. Looking back, the impact of this virtually overnight change by governmental executive order appears almost visionary from an environmental (global warming) perspective, even though its human impact was initially profound for the coal miners concerned.



4. Part two: an illustrative manpower plan

In the following example we seek to show how rapid technological change can be achieved virtually effectively 'for free' by drawing up a manpower plan that is carefully staged to run in parallel with necessary investments. The savings made for companies that follow such a plan are huge and yet at no stage would it be necessary to undertake any large-scale redundancy exercise.

For manpower planning purposes it should be safe to assume an ongoing median level of real revenue growth (deflated for the changing value of money), with variations around the median as rises and falls take place due to economic cycles.

Unless changes in structure or business focus have occurred following the pandemic period then the median ongoing level of annual growth should be taken as that achieved during the period of 2013-19.



4. Part two: an illustrative manpower plan

We can also forecast growth/contraction cycles in national economies, although these have been distorted in recent years by the massaging of GDP figures in several leading western countries in order to avert public perceptions concerning the existence of a recession in 2022-23. GDP figures generated in dictatorial regimes are perpetually engineered – especially in China and Russia. During the period from 2023 to 2035 we can assume the following overall cyclical movements in OECD countries.

Cycle low point	2023-24
Cycle high point	2027
Cycle low point	2031
Cycle high point	2036

According to this projection, then in 2035 the economic cycle across the advanced nations of the OECD would be nearing its high point. This should be taken into account as our starting point in 2023 – which is at, or close to, the bottom of an economic cycle. Therefore, allowance must be made for higher than median growth at our target date than if an economic cycle did not intrude.

The next step in the plan should be to project employee numbers by function on the basis of several assumptions. Many employers will feel the need for a fine grained headcount approach for day-to-day manpower planning purposes - such as [‘Charthop’](#), as this will mean that labour costs and structural changes can be controlled down to the level of individual teams and then consolidated each year without the need for numerous spreadsheets. Nevertheless, a broad overview would be useful at this stage as courageous changes are unlikely to be achieved at the granular level when radical cuts need to be made.

Our aim here is to determine what headcount savings could be made by allowing normal depletion rates to operate. To achieve this it is necessary to first state our fundamental assumptions. In the following example we are deliberately oversimplifying to make the calculations clear.

The starting point for our fictitious company is a total FTE payroll of 1,000 employees. We also assume a fixed resignation/dismissal departure rate of 5% (without replacement) and an absence rate (principally of consisting of annual leave, parental leave and sickness) of 12%. In practice we would break this down by department and job function, but let us just look at the broader picture for now. We further assume that the average entry point is age 30 and retirement age is 60, with employees evenly distributed by age. Once again, in reality, although most employees would be leaving at close to a fixed age the entry



4. Part two: an illustrative manpower plan

points would be scattered between age 18 and perhaps age 55, whilst concentrations of staff would exist at different ages - reflecting recruitment activity in past years.

There would also, in practice, need to be two final adjustments. One for the fact that the projections began at the bottom of a business cycle and ended near the top of another. This would probably force some replacement to take place along the way - even though a virtual recruitment freeze would otherwise apply. The second adjustment would be for the recruitment of necessary specialists to undertake the automation of operations (although some of these roles could be met by outside consultants).

Finally, for consistency's sake, we express all monetary amounts in euros.

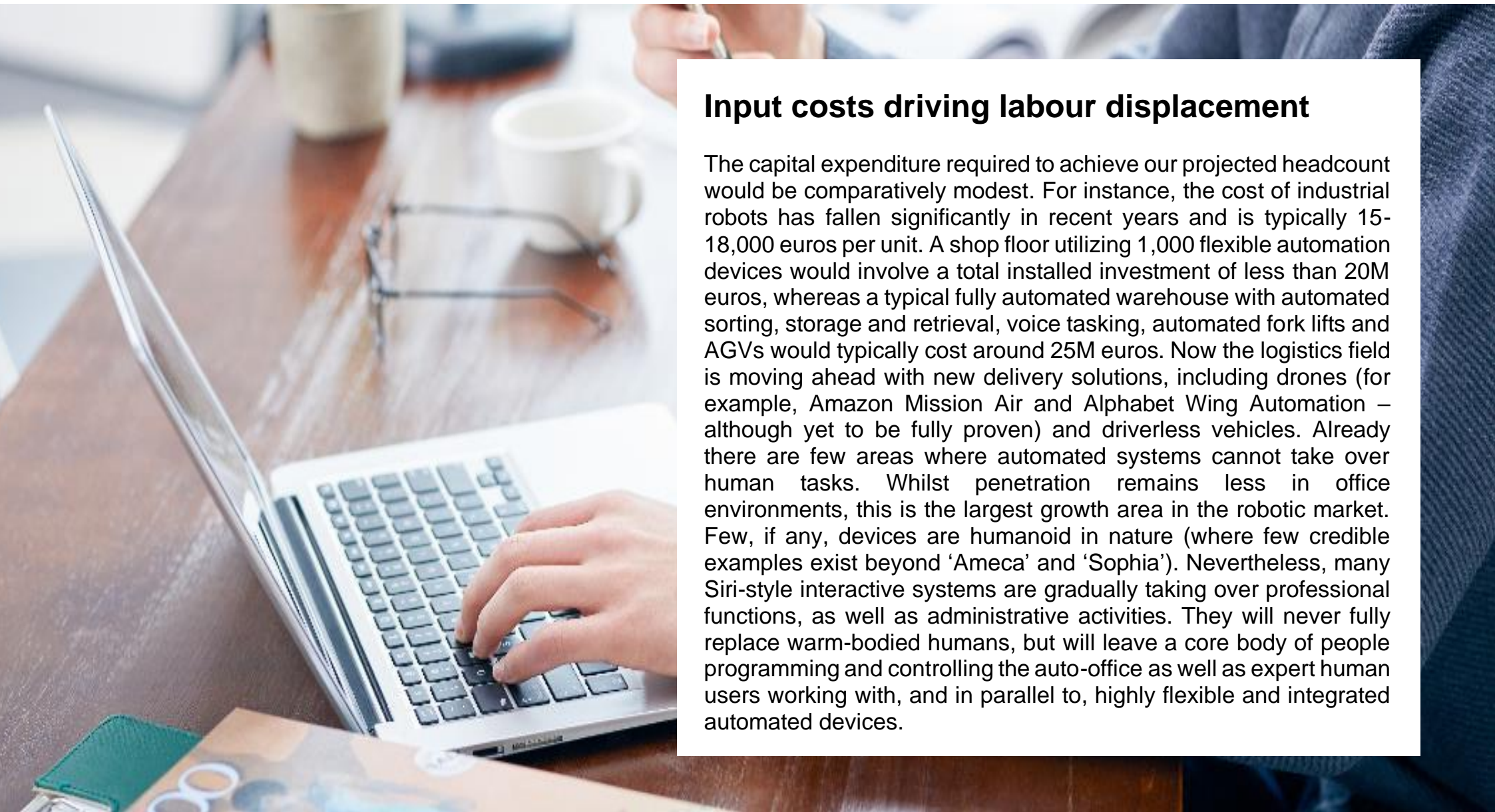
This is what the calculations would broadly look like by July 2035 if we begin our calculations in January 2024.

In-service depletion	-539
Retirements	-337
Residual employees	+124
Adjustment 1: (Business Cycle: 12%)	+15
Adjustment 2: (Tech Staff) 10% of mid-year*	+46
Final Headcount	185
Available staff (Net of absence)	163

*2029

Once we have this figure we can begin to calculate cost savings (principally labour + office real estate) and thus reveal what would be available for capital investment (including interest on sums borrowed ahead of future savings). For instance, at the end of year two the headcount savings would be 163. If the annual average per capita labour cost is 55,000 euros in 2024 then the savings, purely on headcount, would be 8.97M euros in that year alone.

Assuming that labour costs grow by an average of 4% pa over the period to 2035, the per capita labour costs would have risen to 83,041 euros and total savings would be 407.9M euros by 2035. This is in a company of just 1,000 employees. In most multinational companies the savings would amount to billions of euros per annum.



Input costs driving labour displacement

The capital expenditure required to achieve our projected headcount would be comparatively modest. For instance, the cost of industrial robots has fallen significantly in recent years and is typically 15-18,000 euros per unit. A shop floor utilizing 1,000 flexible automation devices would involve a total installed investment of less than 20M euros, whereas a typical fully automated warehouse with automated sorting, storage and retrieval, voice tasking, automated fork lifts and AGVs would typically cost around 25M euros. Now the logistics field is moving ahead with new delivery solutions, including drones (for example, Amazon Mission Air and Alphabet Wing Automation – although yet to be fully proven) and driverless vehicles. Already there are few areas where automated systems cannot take over human tasks. Whilst penetration remains less in office environments, this is the largest growth area in the robotic market. Few, if any, devices are humanoid in nature (where few credible examples exist beyond ‘Ameca’ and ‘Sophia’). Nevertheless, many Siri-style interactive systems are gradually taking over professional functions, as well as administrative activities. They will never fully replace warm-bodied humans, but will leave a core body of people programming and controlling the auto-office as well as expert human users working with, and in parallel to, highly flexible and integrated automated devices.



4. Part two: an illustrative manpower plan

What our illustration has hopefully demonstrated is that the labour market is only currently in its present state for a very limited time. Typical cuts of 80% of the workforce can be expected to eventually take place. Not necessarily in every sector by 2035, but certainly everywhere by 2050. **If we are to avoid very large-scale redundancies the starting point for this development must be now**, so that automation can gradually replace key functions at a manageable pace and without the need for companies to borrow heavily to introduce automation or make sudden changes which will invariably have unacceptable social implications. Alternative funding of the necessary investments by borrowing at current commercial rates would be prohibitive and impractical. For instance, a sum borrowed at just 6% or 7% for a 12-year period (with payment at the end) would result in around a 100% rate of interest over its term. This would make the capital investment necessary to achieve full automation not at all attractive, whilst maintaining a revenue stream whilst cutting staff levels by allowing natural turnover and retirements to do all the work would allow automation to be less painful and virtually constitute a “free lunch”.

Those individuals left in the business will be older than the mix of individuals at the start year of the project. This will be partly overcome by gradually hiring those experts and the few staff allowed for to deal with the business cycle. A company could also decide to pause the hiring freeze at one or two points in order to improve demographics. This would reduce the level of headcount savings, prolong the plan and pain by necessitating periodic redundancy exercises along the way.

One important consequence of such a severe cut in headcount is that greater scope would be given to raise the salary levels of talented individuals remaining in employment and offer those highly skilled individuals required to achieve automation very attractive packages to secure and retain their services. A number of important structural changes will be essential too within the organization as automation takes root. As we earlier pointed out, one important move will be to increase the digital skills of all those who remain and thus reduce reliance on a substantial IT department. In fact, those specialist IT skills that cannot be mainstreamed could be bought in on a temporary or consultancy basis.

5. Conclusion

The principal reason why changes in technology to date have not significantly raised productivity is because as wealth has been generated it has been sucked into “labour shares” by rising levels of employment, the growth of highly paid specialist jobs, improving living standards, reduced working hours, and a huge hike in the cost of employee benefits – often due to statutory rights changes. In many countries the costs of dismissal and redundancy have risen – which absorbs funds into payments which deliver no benefit whatsoever to the business.

In the post-pandemic era there is an increasingly strong case for minimizing labour costs. After all, fully automated systems do not contract diseases, get injured and need time off to recover or, indeed, have to be subject to rigid labour laws. They do not involve removing or redeploying non-performing individuals, threaten companies with the uncertainties of ongoing labour relations, impose the constraints of working time rules, generate the need for operatives to be motivated and given adequate heating and lighting – or presenting enterprises with the massive cost of social security. Highly skilled workers who remain in employment must necessarily be in short supply and holding onto them will be increasingly expensive -.but companies will be able to afford this outcome when such huge savings on general labour costs have been achieved.

In the short-term there will be critical hires that companies will need to make in the interests of the longer term. The priority for all multinational companies that have not already taken the step is to recruit a Board level “Automation Systems Director” to make the revolution actually happen. The case for minimizing the labour share in companies is, however, not entirely indisputable. Back in 1958 the union leader Walter Reuther was taken for a special tour of a newly automated automotive plant. When the plant’s Production Manager jokingly asked: “Aren’t you worried about how you’re going to collect union dues from all these machines?” Reuther replied: “the thought that occurred to me was how are you going to sell cars to these machines?”


At some point governments are going to react to falling income tax revenues by taxing the use of automation. Until that time comes there is **an opportunity that should not be missed**. Meanwhile, in many non-manufacturing sector companies the question uppermost on executive’s minds is how can automation possibly apply to many of our naturally labour-intensive jobs, especially when it is an immediate solution to maintain operations simply by filling job vacancies? Ironically, it is going to take one of the most vulnerable functions – HR – to dislodge such thoughts and offer alternative perspectives.

6. Appendix

A NOTE ON CEDEFOP

The European Union has its own agency to forecast skill requirements. CEDEFOP produces detailed projections of the labour market for each European Union Member State up to 2035. These make interesting reading, but it is not made clear how the figures are derived. It is clear, moreover, that - as with economic forecasting bodies - the starting point is the current structure of the labour market. Although change is envisaged, it is very conservatively estimated.

There are many reasons why we should not depend upon the figures which CEDEFOP produces in its projections. Just a few examples will suffice to indicate the problems of assuming that the forecasts could act as a basis for manpower planning at a company level. For instance, in Romania the top of the chart for jobholders to be “replaced” in the national economy are 445,710 “market orientated skilled agricultural workers” – which is another name for those who grow produce and sell them on stalls. However, by the year 2035 it is highly unlikely that this form of subsistence economy will survive. Similarly, in Spain the top skills category for future growth is forecast to be “assemblers”, with an annual growth rate of 3.8%. This means that over the period of the projection the number of those undertaking this role will have grown by 68.5%. This is a remarkable assumption, given that Spain’s legislative and labour relations environment is not conducive to high growth in payrolls - and that industrial assembly is one of the most highly vulnerable to automation. In fact, directly contradicting this forecast is another element of the forecast profile for Spain where those with the lowest (of three levels of) qualifications are predicted to virtually disappear by 2035.



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