



Automation, digitisation and employment

Volume 3: The impact on work

Summary

Technological progress enables and results in modification of methods of production and distribution of goods and services, with consequences on employment, work and skills needs. Because they bring about changes in job content, because they help shaping new ways of communicating, collaborating and coordinating work, and because workers make use of them in and outside the workplace, dissemination of new technologies also helps changing the way in which work is carried out and experienced.

The Conseil d'Orientation pour l'Emploi report provides an assessment of current trends observed in work organisation practices and their connection with technological advances, as well as the implications they have for people's work situations.

December 2017



Context

In 2016, the COE decided to study the technological revolution's impact on employment. In carrying out this initiative:

- it showed that 10% of current jobs are **subject to cumulative vulnerabilities liable to threaten their existence due to automation and digitalisation** and that 50% should experience significant changes in their content over the next fifteen or so years: the issue is therefore not so much a “jobless future” but rather a massive, fundamental and rapid transformation of job content;
- it identified levers of job creation and showed that current technological progress should continue **to be biased in favour of skilled and highly skilled jobs**;
- it highlighted the need to encourage prospects for **locating new jobs in France or relocating jobs, enabled by the technological revolution**;
- it identified the “tomorrow's skills” (already of today's, in fact):
 - expert skills in “techs”, connected with development, dissemination and maintenance of technologies;
 - new professional skills employed in the context of job transformation (whether digital skills or new professional skills required by job recomposition);
 - and, for all workers, three groups of transversal skills (basic digital; social and situational; and cognitive: proficiency in the use of figures and words);
- it also showed that workers on the French labour market still have a long way to go in order to master those skills. France suffers from a shortage in “tech” skills (**80,000 job vacancies by 2020**); as for **basic digital skills, 8% of French workers have none at all and 27% need to make further progress in order to fully adapt to changing conditions. Regarding cognitive skills, 13% of employed workers don't have the basic proficiency level in numeracy and literacy and 30% need to improve.** And all this is without taking account of the shortage of the new professional skills required in the context of job transformation.

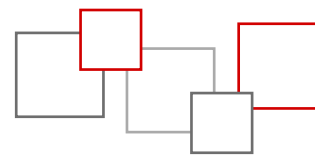
Volume 3 presents the final stage of work carried out since the summer of 2016. It is devoted to work organisation, methods thereof, and people's work situations.

Method

Sources of information

In a context of major uncertainty, the Council wished to draw on as many sources of information as possible. We made use of:

- the results of quantitative and qualitative studies in the fields of economics, organizational theory and sociology;
- the results of two quantitative studies carried out by the Council's General Secretariat;
- case studies drawn from company-level collective agreements, and interviews with companies' human resources and digital transition managers;
- and answers to questionnaires sent by the Council to OPCAs (Organismes Paritaires Collecteurs Agréés – Joint Commissions for Collective Training).



Field of analysis

Advances in the fields of artificial intelligence, big data and the Internet of Things are shaking up company strategies by creating new possibilities for tooling up production and workers as well as by contributing to the reconfiguration of competitive, social and cultural environments in a growing number of activity sectors.

Following an initial wave of digital innovation that continued into the 2000s and made initial contributions to diversification and improvement of technologies available to companies, at least three recent major trends are worth highlighting:

- **a widening in the scope of automation technologies** enabling the performance of increasingly varied and complex tasks in place of workers;
- **an increase in technological support possibilities** in the carrying out of physical and cognitive tasks alike;
- **an ever-greater capacity for networking** all resources and individuals involved in the value chain.

Two major disruptions in the competitive environment, both brought about by the digital revolution, have called traditional business models and company strategies into question: the emergence of new entrants or actors in the field of digital technology, who are shaking up sectors that were previously relatively protected, and a shift in sources of added value towards development of services based on the processing of big data.

In response to these changes in the technological and competitive environment, as well as in consumers' and workers' aspirations, many companies are questioning their strategic positioning and the way they organise production and work. This is leading them to experiment new organisation methods, with major consequences on job content and employees' work situations.

The report considers that the impacts of technological revolution on work content and ways of working are so far-reaching and interdependent that they require an overall analytical framework, to examine the changes for both companies and the people that work in them. This being so, this report:

- **selected a wide-ranging approach to work organisation.** This approach does not only include companies' organisation and their scopes of activity (outsourcing), but also production and work organisation *stricto sensu* (division, coordination and management);
- **deemed it useful to go beyond consideration of working conditions in the classical sense of the term (quality of life in the workplace) and also cover work content and the skills required to carry out work.** In order to encompass all these aspects, the report makes use of the all-inclusive concept of "*work situation*" as all of them are undoubtedly impacted by the ongoing technological revolution.



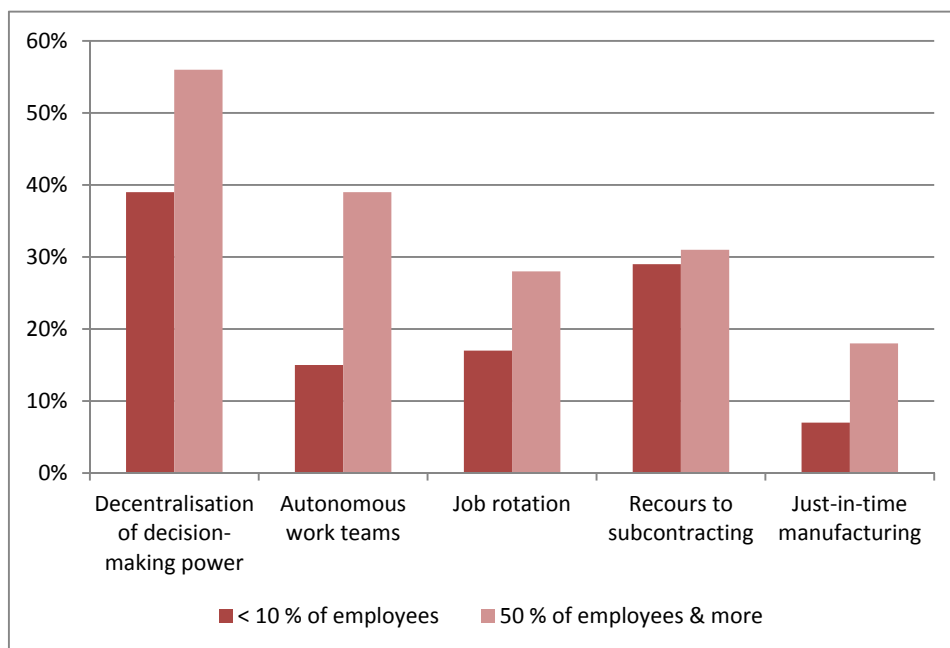
Assessment

Modes of work organisation

A quantitative study carried out by the COE evidences the connection between technological progress and so-called “flexible” modes of organisation

In order to quantify dissemination of flexible or post-Taylorian organisational practices as well as obtain an objective assessment of the relationship between such forms of organisation and employees' use of digital technologies, the Council produced quantitative analyses based on recent data. These analyses demonstrate that a connection exists between a company's digitisation and its implementation of such organisational systems (i.e. decentralisation of decision-making power, autonomous work teams and just-in-time manufacturing).

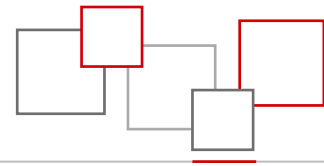
Comparison of the percentage of companies setting up various “flexible” organisational systems depending on their degree of digitisation



Interpretation: the percentage of highly digitalised companies (those in which at least half of all employees use digital technologies) that have set up autonomous teams is 2.6 times greater than it is among companies making little use of digital technologies (those in which less than 10% of employees use such technologies).

Source: DARES Working Conditions Survey, 2013 wave, employers section. Processed by the COE.

The company size is pivotal in explaining the strength of the link between flexible modes of organisation and the use of technologies: the larger a company, the stronger this connection. However, it is only in the industrial sector that such “usage complementarity” is proven for all the studied organisational systems.



But there is no technological determinism: the technological revolution goes hand-in-hand with pre-existing innovative organisational systems, both between and within companies

Currently, there co-exist:

- modes of organisation described as “new” but which often turn out to be **intensifications and renewals of post-Taylorian practices** theorised and implemented in the 1980s. A number of these practices are analysed as such in the report, including horizontal organisation, the liberated company, the learning company, intrapreneurship, and participative innovation;
- **neo-Taylorian practices taken to new heights by technological advances**. In particular, these advances have enabled greater task codification and standardisation, and increased monitoring of individual and collective performance. The report presents several case-analyses, including voice-picking and embedded computer systems.

More than a radical shakeup in modes of organisation, we are witnessing a process of trial and error on the part of companies that are seeking the best ways of adapting their work organisation to the new economic reality – including by experimenting with various models. **Such experiments result in the coexistence of very different (and sometimes contradictory) systems within the concerned companies.**

The ambivalent effects of digitisation and automation on people’s work situations

Analysis of main quantitative and qualitative studies

Quantitative studies presented in the report make use of available surveys to highlight current major trends in work situations that are directly or indirectly connected with the technological revolution underway. They highlight the **breakup of traditional spatiotemporal work configurations, intensification of cooperation and collaboration both internally and externally, more numerous and indirect controls, a lessening of physical stress, and an increase in mental stress. Such work also shows that use of digital technology leads to greater isolation on the part of nonusers.**

Existing quantitative studies usually divide up work situations into sub-aspects and focus on policies bearing on health and safety in the workplace. Although such an approach can be useful, it is inadequate, or at least insufficient, when it comes to apprehending the full diversity of direct and indirect effects that technological advances may have on work.

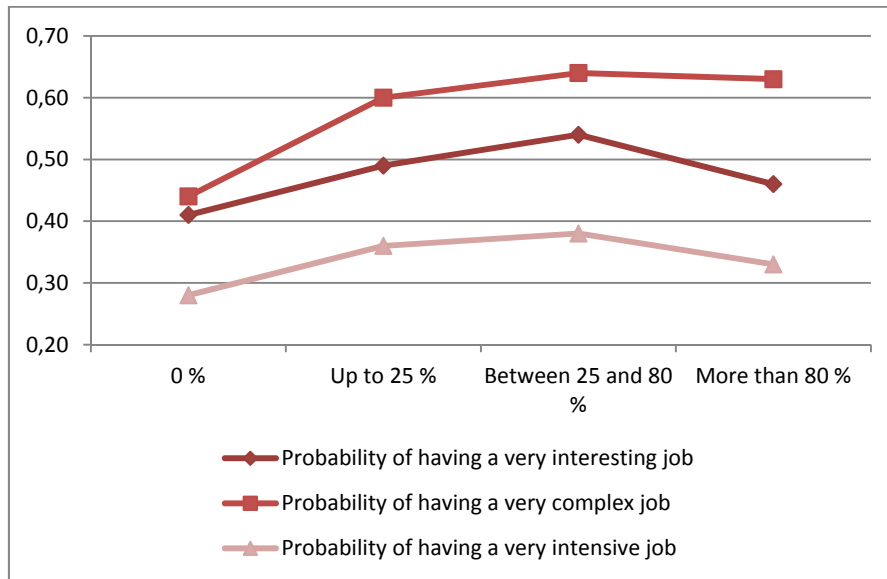
The COE’s quantitative study

This being so, the COE sought to obtain a less fragmented understanding of ongoing evolutions in people’s work situations and how technologies contribute to them. Three main crosscutting indicators were selected for the purpose, each of them grouping together sub-aspects of work situations: interest, complexity and intensiveness of work.

The study shows that the probability of employees regarding their work as interesting, complex or intensive increases along with use of digital technology. This contribution of digital technology is confirmed up to a certain percentage of worktime (around 60 to 80% on average, depending on case). Beyond this, its contribution becomes negative as regards interest and intensiveness of work and remains stable as regards its complexity. These overall findings are confirmed, with slight variations, when analysis focuses on level of qualification, socio-professional category and age.



Digital technology's contribution to the interest, complexity and intensiveness of work



Interpretation: In 2013, there was a 41% probability of having an interesting job if you did not use information technology of some kind (desktop or laptop computer, mobile phone/smartphone, email account, internet or intranet). The probability increased along with the time per week spent using such resources, up to the 75th percentile, when it decreased once more (remaining, however, above the value estimated for the 25th percentile).

Source: DARES Working Conditions Survey, 2013 wave. Processed by the COE.

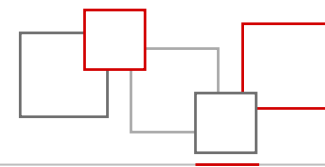
Qualitative analyses concur in showing that the effects technologies have on the actual working conditions depend on the purpose that a company assigns to them (are technologies used to support the accomplishment of intensive and complex work, to act as substitutes for or monitor human performance, or both?) and the associated organisational methods. They also depend on pre-existing work habits and factors that influence the way in which they are used in the workplace (Is technology acceptable? Does it meet a need? Can users see why it is necessary?).

Work organisation and situations: opportunities and risks for companies and workers

Technologies can have positive and negative effects on companies and their employees. The positive effects expected *a priori* are of great importance but cannot be taken for granted. Modifying ways of producing and working may also carry risks for companies and employees if all possible consequences of introducing technologies have not been anticipated and thought through.

The report therefore provides an overview of all possible consequences that might be foreseeable given the current state of technological progress – both those that have been highlighted by surveys and others that may seem less evident, whether long recognised or only now emerging.

Basing its findings on the study of actual cases in which new technologies were introduced or organisational changes made, the report identifies conditions contributing to improvement of a company's economic performance along with its employees' work situations. Such levers, which depend on a structuring regulatory framework, primarily concern companies with regard to their ability to design, implement and accompany changes.



Technological and organisational innovations: potential drivers of company performance improvement and innovation capacities

Opportunities and risks of neo-Taylorian and post-Taylorian practices developed by companies in order to make the most out of the technological revolution underway

	Opportunities	Risks
Neo-Taylorian practices		
Codification of tasks and segmentation	Reduction of margins of error and consequent improvement of costs and lead times	Rejection of individuals; inadequate employee skills resulting in loss of time and efficiency
Performance monitoring and assessment	Identification of unproductive time; smart management; rectification; permanent improvement	Climate of mistrust; attempts at hijacking systems; risks of attrition and recruiting problems
Outsourcing of standardised tasks	Reduction of research costs and workforce management; access to expert skills; recentring on the company's core business	Loss of control over quality and lead times; lock-in; loss of responsiveness and image management (Corporate Social Responsibility)
Revival of performance-based remuneration	Motivation maintenance and involvement in expected direct productivity gains	Collective opposition; climate of mistrust; risks of attrition and recruiting problems
Post-Taylorian practices		
Break-up of company time and location, and openness		
Outsourcing and extended company	Competitiveness; responsiveness; workforce management adapted to variability of demand	Dependence on partners; loss of control over quality and lead times
Open innovation	Reduction of R&D costs; watchfulness in an uncertain context	Few radical innovations; volatility of startups (risky partnerships)
Intrapreneurship	Appropriation of internal innovations; productivity; motivation maintenance	Competition within teams; misfunction (reassignment of tasks); wastage in the event of failure
Flattening and suppling up of organisation structures		
Horizontal organisation and liberated company	Responsiveness (faster decision-making); productivity increased by maintenance of involvement	Destabilisation of managers and loss of efficiency; poor coordination of teams
Project mode	Competitiveness; flexible workforce management	Poor coordination; lack of cohesion due to absence of shared rules; loss of productivity
Agile methods	Reduced risk of failure; greater customer satisfaction	Dismantling of procedures and loss of coherence in actions
Employee participation		
Participatory initiatives	Capitalising on employees' knowhow; employee empowerment and maintenance of motivation and involvement	Frustration management in the event of rejection or ideas put forward not being taken up
Policies on wellbeing/happiness in the workplace	Fostering creativity; keeping employees and attracting fresh talent	Waste of resources; employee frustration if discourse does not match reality
Learning organisation	Greater responsiveness and increased adaptation capacities in the event of shock or innovation	Waste of resources; employee frustration if discourse does not match reality



Technological and organisational innovations: possible sources of improvement of people's work situations

Analysis of technological and organisational innovations shows, both *a priori* and *a posteriori*, that their effects are not unequivocal and may even be contradictory:

- enriching work and making it more interesting, but, in some cases, impoverishing it and voiding it of meaning;
- reducing physical effort and awkward work postures, but also creating new constraints or increasing cognitive attention levels and work complexity;
- making work more intensive – in particular as regards rhythm constraints – or providing greater freedom by fostering better management of employees' worktime;
- encouraging autonomy, but also leading to increased control;
- making organisation of work locations and time more flexible;
- increasing cooperation and collaboration within a company and with its external partners, or, on the contrary, resulting in isolation.

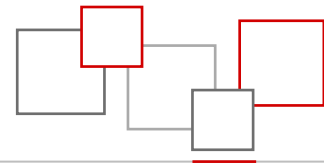
Using social dialogue to get the best out of the technological revolution underway for companies and workers alike

The report identifies the conditions under which technological innovation may be used to foster organisational practices that are of benefit both to companies and their employees. Of course, there are no "mutual benefits" without compromise and transition periods, above all when contrasting work situations coexist within the same company or function.

The "favourable conditions" detailed in the report are brought about by a variety of actors. The company itself, at its various levels – management (overall strategy), team (middle management) and individual (manager and employees) – along with social partners and the State, both as legislator to set a framework and as actor to guide public policies and social actors. The report particularly stresses the need to rethink management.

The Council considers that **social dialogue is essential to accompany the definition of companies' strategy and to ensuring the required collective appropriation of the challenges involved, with all its consequences in terms of job-profile changes, work organisation, work content and work situations.**

This is why collective bargaining on **predictive management of jobs and skills**, which would seem particularly suited to the challenges involved, should finally find its rightful role. All too often reduced to a form of relatively short-term job management, it must regain its predictive purpose if it is to deal with the implications that digital transition has on the evolution of jobs and professions as well as on skills connected with the necessary evolution of modes of management. In order to take full account of the fact that technological transformation is an ongoing process that inevitably creates a context of major uncertainty, a **shared overall strategy** must be agreed upon. It should take the objectives, conditions and expected results of such transformation into consideration, along with the multiplicity and diversity of consequences on work content and the ways in which it is carried out. Predictive jobs and skills management should also **equip itself with tools and indicators for continuous monitoring, adaptation and action**. This is essential if the evolutions underway are to be anticipated and accompanied under the best possible conditions, even though this may prove hard to do in a context where company visibility



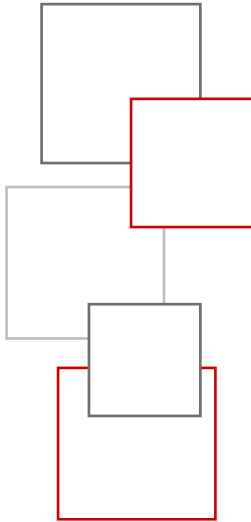
tends to diminish and strategic plans are assigned shorter timeframes. In this regard, one of the first requirements is to **better identify tomorrow's jobs and skills**. Professional branches and sectors have a key part to play here, in particular through sector observatories and predictive jobs and skills management.

But the debate does not end with such shared thought on employment and skills, however essential it may be. Beyond predictive management of jobs and skills, **a new dialogue within companies, bearing on work, its organisation, content and ever-greater plasticity, would also appear necessary**. Such dialogue must not simply focus on themes already covered by collective bargaining but also extend to the fundamental deontological (not to say ethical) considerations that must dictate the future of work and the means by which a yet-to-be-organised “good man/machine complementarity” might be achieved. In parallel with the process of “trial and error” that goes alongside dissemination of new technologies in many companies, another advantage of social dialogue is indeed that it enables the experiment and development of future regulations and ensures that they are fully appropriated by the whole working community.



Reports and Advices

- Automation, digitisation and employment - Volume 2: the impact on skills
- Automation, digitisation and employment - Volume 1: impacts on job numbers, structure and location
- Supporting workers towards and in employment
- Labour market reforms in Europe
- The Internet's impact on labour market operation
- Lasting estrangement from the labour market
- The evolution of forms of employment
- Job vacancies and recruitment difficulties
- Aids to companies in favour of employment: overall assessment
- Aids to companies in favour of employment: assessment of main schemes
- Summary of COE analyses and proposals
- Employment and employment policies since the crisis: an international approach
- Long-term unemployment
- Employment in VSEs
- Diagnosis of youth employment
- Illiteracy and employment
- Economic changes: ensuring transitions for displaced workers and revitalising affected territories
- Green growth and employment
- Proposals for "anti-crisis" measures in favour of employment
- Professional trajectories and mobilities
- Educational and vocational guidance for youth
- Advice on the Earned Income Supplement (*Revenu de solidarité active*)
- Advice on a lifelong training reform
- Advice on social contribution exemptions and the SMIC (minimum wage)
- Causes of unemployment
- Safeguarding and dynamising career paths
- Advice on the broadening of employers' social contribution base
- Public aids to businesses



The Conseil d'Orientation pour l'Emploi (Employment Advisory Council) is a pluralistic consultative body tasked with expert assessment of issues falling within its purview. Placed under the aegis of the Prime Minister, it brings together all labour market actors: in addition to its President and Vice-President, it includes representatives of social partners, public employment service managers, heads of central government agencies operating in the field of work and employment, economists, labour market experts, and representatives of Parliament and local authorities.

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