



DIGITAL

TRANSFORMATION

IN THE CONSTRUCTION SECTOR: CHALLENGES AND OPPORTUNITIES

Executive summary

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Digital Transformation in the Construction Sector: challenges and opportunities

EXECUTIVE SUMMARY

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1.

INTRODUCTION

- ▶ The world of work is changing due to significant ongoing pressures: the transition towards environmental sustainability and the evolution of digital technology.
- ▶ Digitalisation and technological change, and their combining with social and environmental issues, are major challenges for industrial relations and social dialogue in Europe.
- ▶ The construction sector, one of the largest industries in the Eu economy, has been revolutionised in recent years by these important drivers of change.
- ▶ The topic of digitalisation has become even more important in the context of the crisis provoked by the Covid-19 pandemic. On the one hand, it seems that the health and economic crisis might accelerate digital change (with the emergence of new technologies such as smart devices to reduce direct contact between employees, the extension of telecommuting and remote work procedures, of work platforms, etc.). On the other hand, it emphasises the issue of worker surveillance and the need to introduce new bargaining topics such as the use of digital technologies and the right to disconnect from work.
- ▶ The long-term path to a sustainable and inclusive recovery requires that businesses, workers and territories are accompanied in this process to ensure that digital and technological changes take place in a fair and socially acceptable manner.
- ▶ In this scenario, the social partners, and in particular trade unions, play more than ever a key role in managing a digital change in terms of a «just transition» that does not penalise employment and its skills (Clarke, 2020, Etui, 2019) in every production sector and in particular in construction.

- ▶ Collective bargaining mechanisms and social dialogue are fundamental tools in responding to the transformation arising from the ongoing digital transition, identifying and controlling the consequences (both expected and unforeseen) and the resulting risks (regarding employment, the health and safety of workers, inequality and social exclusion).
- ▶ The Discus project («Digital Transformation in the Construction Sector: challenges and opportunities»), a European Union co-funded research project (Dg Employment, Social Affairs and Inclusion, VS/2019/0078), aims to analyse and strengthen the role and contribution of innovative industrial relations structures, including social dialogue, in responding to the major challenges and opportunities brought by digitalisation and technological changes in the construction sector.
- ▶ Discus aims to reduce the lack of information, knowledge and mutual recognition of the different approaches between the social partners on a just digital transition. Despite the widespread academic interest and public debate on the impact of digitisation, there is a lack of in-depth analysis and data collection for the construction sector, especially as regards the role of industrial relations.
- ▶ The project focuses on analysis of and research into, at Eu level as well as in comparative terms, the rules and practices regarding industrial relations in the construction sector in six European Member States in order to compare experiences and trends from South, North, Central and Eastern Europe: Italy, Spain, France, Belgium, Germany and Bulgaria, considering convergences and divergences in digitisation and innovation processes and the role of industrial relations systems.
- ▶ The broad and systemic nature of digitalisation suggest that the digital transition is not a univocal socio-technical phenomenon and it needs a «broader scope of the notion» of what is meant by innovation, addressing not only a radical

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technological change, but a transformative societal change: in social practices, norms, industrial production structures, in the symbolic and cultural systems underlying them and in the role of the social partners.

- ▶ As emerged from the comparative analysis of the Discus case studies, trade unions are called on to take part in interventions that are not simply «reactive» in terms of justice or job protection, but «proactive», intervening to shape the nature of digital innovation in order to lead to a just technological transition.
- ▶ This executive summary aims: 1) to provide an overview of the main results of the Discus project; 2) to make recommendations and suggestions to strengthen industrial relations and social dialogue in the digital conversion processes of the construction sector at European level.

2.

METHODOLOGY

- ▶ Digitalisation and technological changes have specific impacts on the construction sector which involve new challenges for industrial relations and social dialogue, that the Discus project analysed at multiple levels:
 - employment, with an increasing polarisation between qualified and non-qualified professions; the emergence of new professional figures and, on the other hand, the risk of the substitution of competences and professions; the need for continuing education; a growing segmentation between craft and labour work which is typical of this sector (Build-Up Skills, 2014; Ilo, 2011);
 - organisation of work, with the emergence of new risks as well as new opportunities for involving workers, quality of work and health and safety (Eu-Osha, 2014);
 - sectoral, with the blurring of business borders and the traditional distinctions between sectors, with a greater integration between the phases of the value chain (with new relations between research and development, data management, the functioning of machinery and instruments, the provision of services) (Ilo, 2015);
 - territorial, with new relationships between the public players, the social partners, the scientific community and experts, the population and civil society in the direction of forms of multi-stakeholders in social dialogue to respond to the complex challenges of planning and territorial innovation (Broad Project, 2017);
 - socio-environmental, with more opportunities for energy efficiency in housing and the quality of living and urban spaces (Eurofound, 2013; Laurent & Pochet, 2015).

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- ▶ Specifically, the research methodology of the project included: i) desk analysis – at European and national level – based on a review of the literature, studies and reports from academia and institutions and official database focusing on the relations between digitalisation, technological innovation and quality of work; ii) in-depth interviews with «privileged witnesses» – key players in the field of digital construction (workers' union representatives, employers and representatives of employers' organisations, experts, professional associations) – conducted in each country involved in the project in order to reconstruct and describe the positions of the social partners and the structures and processes of industrial relations with regard to digitalisation and technological innovations; iii) national case studies selected to cover all the main digital technological innovations (Bim, robotics and automation, software and Ict tools) and their effects considering large and small companies, different phases of the value chains (on the building site and off-site), different sectors of the construction industry (private and public building, wood, materials).
- ▶ Case studies show the consequences of digitalisation on working conditions and quality-of-work issues, employment structures, new risks and new opportunities for individuals, companies and the environment exploring the policy and real practices that are emerging in this field, and the role of innovative industrial relations to respond to and anticipate the digital transition in the world of work from a comparative perspective.
- ▶ All the research results are described in specific reports available on the project website: <https://discusproject.eu/>.

3.

DISCUS EUROPEAN REPORT: MAIN FINDINGS

■ FROM THE 2007 CRISIS TO THE COVID-19 PANDEMIC

The economic and financial crisis of 2007 has had a major impact on the construction sector, particularly in almost all the Eu Member States. However, in recent years global construction production has recovered from the crisis and is expected to increase in the future, due to increased urbanisation, infrastructure renewal and a growing demand for water and energy. It is difficult to predict the new trends after the Covid-19 pandemic emergency, however, construction is a key sector for the national recovery plans. During the first wave of Covid, construction industries in the euro area were estimated to be operating at 25-30% below their normal capacity, but with significant differences between countries.

■ CONSTRUCTION OPPORTUNITIES FOR EMPLOYMENT

According to pre-pandemic data, the Eu construction sector provided 18 million direct jobs within the Eu and contributed around 9% to the Eu Gdp in 2019, with around Eur 1,216 billion (Fiec, 2020).

In general, construction-related industries account for 8,3% of the total number of persons employed in the overall economy, becoming the main source of employment in many Eu countries (EcsO, 2017). According to Eurostat (2017), the total number of construction workers at Eu level amounted to 21.1 million in 2015.

► Some key aspects of the construction employment:

- most of the workers employed in the construction sector are **low – and medium – skilled**;
- **the construction sector is an area typically dominated by men**;
- the majority of workers are between 25 and 54 years of age, but there is a continuous aging of the workforce;

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- **the sector is facing a growing lack of attractiveness among young people, but it may be the digitisation of the sector that reverses this negative trend** (Cenfim, 2019);
- most countries will face at least a labour shortage, and consideration also needs to be given to the **misalignment between Vet training and the demand for skills** in the construction labour market;
- there is a high incidence of migrant workers;
- concerning Eu-28 countries in 2015 and 2016, 91,9% of more than 3 million companies engaged in the construction sector have less than 10 employees each, while only 1% have more than 50 employees (even though these companies are engaged in 40% of the total activities).

■ DIGITALISATION IN THE CONSTRUCTION SECTOR

The construction sector has many difficulties to face in order to increase the digitalisation processes. At **Eu level, construction is second least digitised sector** after agriculture (Ecso, 2017). According to the results of the Digital Transformation Scoreboard survey (2018), 91,3% of leading construction companies say they are aware of the potential of digital technologies; 81% of European construction operators said they are not ready for the advent of digitisation, although 82% of them acknowledge that having digital skills will be partly essential in getting a job.

- ▶ Moreover, the construction sector presents some specificities related to the impact of digitalisation on overall working activities.
- First of all, the strategic role of digitisation in the transition to a sustainable and circular economy needs to be considered. The new construction sector, with its more targeted production, should significantly reduce waste (Ec, 2016; Ellen MacArthur Foundation 2015).
- The construction value chain is a network of multiple organisations whose performances depend on a comprehen-

sive information flow between clients, architects/engineers, general contractors, subcontractors, suppliers, and consultants (Hu, 2008). So, for the building sector, this means moving from a model based on the individualism of the actors to a **new model of the supply chain based on the integration of the different phases** and a more effective process of communication between the subjects.

- One of the most promising technological trends currently acting as a primary driver for skills is linked to the **standardisation** and **industrialisation** of the construction process.
 - The construction sector adopts a wide range of technologies including **off-site** construction (or off-site modular assembly), which consists of assembling buildings from off-site prefabricated components and using standard and reusable product catalogues as well as **new forms of management**, such as Building Information Modelling (Bim), one of the most important innovations introduced in the sector.
- ▶ Covid-19 could encourage the digitalisation of the construction sector:
- building information modelling has been used more widely during the Covid-19 lockdown because it allows projects to continue in a digital and virtual environment, even without the companies involved meeting in person;
 - in addition, the existing trend for the prefabrication of building components in factories has attracted attention because controlled factory settings are much easier to manage from an occupational health and safety perspective, which is a key priority during the pandemic for employers and workers;
 - on the one hand, it seems that the health and economic crisis might accelerate digital change in companies in making the building site a safer place. In fact, there are many technologies that have emerged in the context of the pandemic: smart devices to reduce direct contact between employees and the extension of telecommuting and remote work pro-

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cedures implying a change in business culture and ways of working. On the other hand, it emphasises the issue of worker surveillance and the need to introduce new bargaining topics such as the use of technologies and the right to disconnect from work;

- recovery plans oriented towards a just transition and digitalisation support the digitalisation of the construction sector and it is recognised as a key sector to restart the national and local economies.
- ▶ Training, supported by institutions and social partners, seems a key issue:
 - in order to encourage the recruitment of highly qualified staff, training initiatives are needed to make the sector attractive and to transform theoretical knowledge into useful and applicable skills (Cetem, 2017a), such as, «Construction 2020» (Ec, 2012), «Build up Skills projects» (Ec, 2016b);
 - however, it is necessary to reconsider training from two points of view: for employed people and future workers. In the first case, there is a need to increase lifelong learning and; in the second case, the participation of new workers in the sector should be encouraged, especially through training programmes that are better integrated with the school curriculum.

4.

CASE STUDIES AND COMPARATIVE ANALYSIS: MAIN FINDINGS

- ▶ 17 case studies have been undertaken overall, covering each country partner in the project (Italy, Belgium, Bulgaria, France, Germany and Spain).
- ▶ The case studies seek to consider the whole spectrum of digital innovations and their effects along the entire value chain. In each country, case studies were selected with the aim of covering all the main digital technological innovations (Bim, robotics and automation, software and Ict tools) considering large and small companies, different phases of the value chains (on the building site and off-site), different sectors of the construction industry (private and public building, wood, materials).
- ▶ The comparative analysis of the 17 case studies shows that digital innovation in the construction sector is a consequence of multiple technologies (such as Bim, robotics and automation, software systems) with some general macro-trends and not univocal impacts.
- ▶ In particular, our findings show some significant challenges for social dialogue introduced by digitalisation:
 - a strict relation between social and technical aspects;
 - the affirmation of lean production and network economy along the construction value chains;
 - multiple consequences on professions, work organisation and working conditions;
 - the need for the trade unions and social partners to adopt a proactive role.

■ THE STRICT RELATION BETWEEN SOCIAL AND TECHNICAL ASPECTS

Digitalisation is a socio-technical transition involving economic, social, technological, environmental and cultural change from a multilevel perspective (Bijker et al., 1987; Smith and Stirling, 2010; Geels, 2002). In the construction sector, digitalisation connects the evolution of technical tools to the transformation of the social life at company, local, national and global level. This socio-technical change has many impacts on the labour market, professional paths, work organisation and working conditions as well as on public policies and urban development models, in particular considering the affirmation of a sustainable and circular economy (Rugiero et al., 2017; Clarke 2020).

A first consideration is that industrial relations and social dialogue needs to address and govern these extensive socio-technical changes, with the involvement of public and private players at every level.

■ LEAN PRODUCTION AND NETWORK ECONOMY ALONG THE CONSTRUCTION VALUE CHAINS

Focusing on the changes in working conditions and work organisation in the construction sector, digitalisation favours the affirmation of lean construction models, accelerating a process that began in the 1980s (Howell, 1999) based on a mix of standardisation and flexibility (Björnfot & Stehn, 2004; Girmscheid, 2005; Liu et al., 2016; Sacks, 2016). In particular, as emerged from the case studies, these digital innovations aim to standardise the activities in flexible processes and to improve communication and control between all the phases of the value chain.

Lean construction is strictly linked to the transition from an economy segmented into phases to a network economy in which the various players are connected along the value chain (Kalleberg, 2001; Castells, 1996; Di Nunzio, Rugiero, 2019; Eurofound, 2018; Rifkin, 2014; Huws, 2014; Brynjolfsson, McAfee, 2015; Schwab, 2016) and digitalisation is adopted to strengthen relations and communications between the players.

A second consideration is that industrial relations need to deal with complex workplaces and fragmented working processes, with many companies, many professions, off-site and on-site phases, along the value chains.

■ MULTIPLE CONSEQUENCES ON PROFESSIONS, WORK ORGANISATION AND WORKING CONDITIONS

As emerged from many studies in different sectors, digitalisation has multiple and not univocal impacts on the labour market and the quality of working life (Degryse 2016; Valenduc & Vendramin 2016; Eurofound 2018).

Our case studies shows that in the construction industry as well there are differentiated impacts on the labour market, with the emergence of new professions and the need for re-skilling and continuous training for many others, for both white- and blue-collar workers.

Digitalisation can influence each phase of the value chain, with new professional specialisations and new relations between professions. Digitalisation can foster horizontal coordination as well as, on the contrary, vertical centralisation. In particular, the planning phase assumes a key role for all the phases of the value chain to favour a more or less participative process and a dialogue between project management, team leaders and workers at off-site and on-site level.

Regarding working conditions, there is a trend towards a general intensification in work for white- and blue-collar workers. On one hand there are new risks, such as the increase in the pace of work, work-related stress, new risks associated with new machinery materials and procedures. On the other hand, there are new opportunities, especially considering the collective use of data and information for Ohs prevention; a reduction of workload due to the use of robotics and automation; an opportunity to programme the workload and monitor irregular work and accidents.

A third consideration is that these processes are the result of the use of technology, and all the actors (employers' associations, workers and trade unions, institutions, etc.) play a fundamental role in planning the adoption of digitalisation and governing its impacts.

■ **STRENGTHENING THE ROLE OF THE TRADE UNIONS AND SOCIAL PARTNERS: FOR A PROACTIVE ROLE**

Thus, the role of the intervening players is fundamental to govern and address the impacts of digitalisation. Focusing on the role of the trade unions, we observed, in the majority of cases, the risk of the marginalisation of workers' representatives (in favour a merely technical approach led by management) with a passive role for the workers' representatives. On the other hand, there are some trade unions attempted to assume a reactive role, or, in a few cases, a proactive one. A proactive role is based on the search for agreements and formalisation of the role of trade unions and workers' participation, and it is based on approaches oriented towards the anticipation of changes and on the participation of workers and their representatives starting from the planning phases.

However, in the majority of the cases, our case studies show a fragmented dialogue, a lack of involvement of the trade unions and limits to workers' participation.

For this reason, the final consideration is about the importance of strengthening the formalisation of social dialogue and industrial relations to support the digitalisation of the construction sector. Public regulations have a key role in affirming the role of the social partners, in a sector where trade unions have a passive role and where legal and public regulations on the construction activity are a determining factor. Employers' associations and trade unions needs to define shared procedures at national and company level to support the participation of workers and their representatives, with a focus on the planning phase and on the relation between different companies in the value chains at off-site and in-site level.

In particular, considering the continuous evolution of digital innovations, it is important to enhance cooperation and mutual learning between research institutes and institutions, employers' associations and workers' representatives with a specific attention on the social aspects of technological innovation.

5. RECOMMENDATIONS

- ▶ Industrial relations and social dialogue can play a central role to support and orient digitalisation and innovation in the construction sector, contributing **to promote economic growth and social equality in line with the objectives of the “*European Pillars of Social Rights*” (Eu-Commission, 2017)**, as well as with those of the Commission Communication “A Strong Social Europe for just transition” (Eu-Commission, 2020).
- ▶ The transformations needed for digital and sustainable construction strictly require the inclusion and participation of workers and trade unions as key active agents of change in the labour processes in order to guarantee a transition, inside and outside the workplace, based on: decent work as a necessity, the need for inclusivity, a just transition for those affected.
- ▶ The need for a fair and socially balanced digital transition is becoming even more important with the pandemic emergency to face the distributional effects of the crisis. Social partners are requested to play their role in the governance of the European Recovery and Resilience Facility Plans and a full involvement of the trade unions is essential to lead to a greater acceptance of the transitions themselves.
- ▶ However, it emerges that in most of the case studies analysed in the Discus project, the negotiation about digitalisation in the construction sector is still incipient and collective bargaining has so far only marginally addressed the topic of digital transition.
- ▶ Therefore, in line with the need to strengthen the role of industrial relations, including social dialogue, the Discus project provides some suggestions and lines of action in order

to support and orient a “just transition” pathway to digitalisation in the construction sector.

- ▶ The suggestions we present below collect the indications that emerged during the research activities of the project at national and European level (desk analysis, interviews with stakeholders and conduct of country case studies).
- ▶ The recommendations and suggestions are articulated in a number of relevant actions organised in four areas of priority intervention concerning, as outlined in the following paragraphs: Policies and the regulatory framework, Work organisation, working conditions and new skills, Industrial relations and social dialogue, the Cultural dimension.
- ▶ The proposed suggestions are a first attempt at strengthening the important role that industrial relations and social dialogue can have in the democratic governance of a fair digital transition in the construction sector, as affirmed in the recent “European Social Partners Autonomous Framework Agreement on Digitalisation” (2020).

1. POLICIES AND REGULATORY FRAMEWORK

- ▶ Regarding policies and the regulatory framework, the actions to strengthen industrial relations and social dialogue are related to:
 - the **need for European, national, regional and local trade unions to be consulted** on the design and implementation of the economic, employment and social policies of digital transition as digitalisation will seriously affect all workers in all value chains and territories of the construction industries;
 - the promotion of **active employment and social protection policies to facilitate a fair transition** in the digitalisation of the sector: **taking into consideration the**

most vulnerable groups, those figures and trades with a lower capacity for adaptation to a digitalised construction sector or affected by the negative effects of digitalisation, and including a gender dimension;

- the need **to improve the legislation to support digitalisation**, in particular, considering the role of the public institutions for the definition of tenders in order to establish effective criteria to affirm sustainability, innovation and quality of work;
- the **adaptation of data privacy legislation** at European and national level in order to ensure the occupational health and safety, on the one hand, and the privacy and new digital rights of professionals in the sector;
- the **strengthening of public investments** (governments and public bodies should be role models for large contractors) for the innovation and digitalisation of the construction industry;
- the **activation of public-private partnership mechanisms**, facilitating the rules governing procurement and increasing attractiveness for investors;
- the **coherence of public policies in the Member States** on the digitisation of construction;
- the **provision of funding for public research** on the digitalisation of the construction sector.

2. WORK ORGANISATION, WORKING CONDITIONS AND NEW SKILLS

- ▶ With respect to new work patterns and systems of work organisation as a result of digitalisation, actions of intervention could address:
 - the **impact on working conditions of the transformations and the reorganisation of productive chains** due to digitalisation with the aim of improving the quality of work;

- the **development of procedures (qualitative and digital) able to connect the actors along the value chain**, considering different professional categories as well as companies, to improve democracy at work with more opportunities for the exchange of information and discussion among the players;
 - the **regulation of the subcontract chain and direct employment**, considering that digitalisation is reordering the value chain and its relationship with subcontractors with the growing need to be client-oriented, and of integrated team-working;
 - the **strengthening of opportunities for relations between project management and on-field work**, considering that digitalisation overcomes traditional forms of division of work, planning and execution and the professional-operative divide;
 - the **improvement of open-data systems** to share all the information among the actors.
- ▶ With respect to **occupational health and safety hazards** actions of intervention could be in relation to:
- the **strengthening of the Ohs prevention system** for the introduction of new technologies;
 - specific **training focused on the relation between Ohs and digitalisation**;
 - **impacts of digitalisation on the Covid-19 pandemic Ohs procedures in terms of control** of the quality of working conditions, monitoring of the workforce, teleworking.
- ▶ To address the **issue of skills shortages** the successful digitalisation of the construction industry requires to:
- guarantee all workers **access to quality and effective training, as well as the right to retraining and lifelong**

learning, in order to ensure equal opportunities and that «no one is left behind» in adapting to green economic transformation and digital, tailoring workers' training to specific Ict tools knowledge, depending their professional needs;

- **strengthen vocational training, education and training (Vet) systems for high – and low – skilled professions**, with particular attention to the most vulnerable workers (migrants, elderly and low-skilled people), who may have greater difficulties in using devices, and also to the inclusion of young people and women in order to reduce the gender employment gap in a highly masculinised sector.
- ▶ Digitalisation has a multilevel impact on all the aspects of and players in the construction system with the emergence of specific needs and, consequently, differentiated training policies.
- ▶ Actions regarding industrial relations and social dialogue on training could take into account, in particular:
 - **for workers**, training for high – and low – skilled workers on the Ict tools in the construction sector, also considering the technical skills to use Ict, a systemic vision of the digital productive processes as well as the socio-relational, communicative and cognitive skills to cope with the growing complexity and interconnectivity of the value chain;
 - **for employers and management**, training on the adoption of digital innovations, also considering processes, methodologies and Ict, as well as the specific professional figures and workers' further training;
 - **for employers' association and trade unions**, training about the role of industrial relations at company and local level based on the exchange of concrete practices to support digitalisation with the aim of improving quality of work;

- **for institutions**, training about digitalisation both on the technical procedures (certification, public procurement, etc.) and the real operative functioning of the digital technologies to support their conscious use and the qualification of the construction sector, especially to overcome the backwardness of the public administration.

The field of vocational and continuing training for construction workers also represents an instrument for multi-stakeholders' social dialogue on innovative, digitalised and sustainable construction (Broad, 2018). Actions regarding national social dialogue on new skills and training could take into account the integration of innovation and digitalisation issues with contents related to changes in the field of sustainable building in the curricula of vocational, continuing and academic training relevant to the sector.

3. INDUSTRIAL RELATIONS AND SOCIAL DIALOGUE

- ▶ With regard to industrial relations and social dialogue the actions could relate to the following topics:
 - **the need**, considering the broad and systemic nature of digitalisation as a socio-technical transition, **for a broader partnership, multi-level governance and a long-term strategy** (Broad project, 2018);
 - **the importance of increasing the role of social dialogue**, which can intervene on the transition to digital construction, both as an instrument and as a form of governance, **first and foremost by strengthening its inclusive nature through the promotion of an enlarged (multi-stakeholder) vision based on the involvement of a wide range of potential protagonists** (first of all, the associations representing the world of work, businesses and public

- institutions, but also those of experts, professional and environmental organisations and civil society);
- in particular, the establishment of a **tripartite institution for social dialogue** in the field of digital construction to guide and coordinate actions on European and national policies from consultation and dialogue between the various stakeholders (bottom-up approach) and not only on the basis of the issuing of European Directives and national laws (top-down) (Broad, 2018);
 - **the importance of having a cross-sectoral perspective** on digitalisation (both at the level of impact on the entire economic system and the fragmentation of the policies involved), covering the different sectors involved in construction activity value chains **and of a cross-sectoral social dialogue** (strengthening relations at federal level, in particular between construction, wood, industry, Ict, public sectors, etc.);
 - considering the value chain, it is relevant to identify well-tailored measures to implement industrial relations and social dialogue **considering the digitisation processes taking place on and off the construction site** (production of building material, prefabrication, administrative tasks, etc.) as with the establishment of coordination centres and work groups;
 - **the need of a more proactive role for labour relations:** for interventions that are **not simply reactive in terms of justice or job protection**, but proactively intervene to shape the nature of the digital transition, **leading to a just technological transition**, providing special attention to vulnerable groups most affected by the challenges of the green and digital transition;
 - **the adequate, informed and continuous involvement of the social partners** at all stages of the processes of digital governance (definition, implementation, monitoring, evaluation and implementation of strategy);

- **the consolidation of the relationship between activities of information, consultation and negotiation with the decision-making phase:** as a precondition for outlining directions and guidelines by making shared decisions, on the one hand, and, on the other, to allow for the concrete implementation of the actions and measures established;
- **the importance of involving workers' representatives at all levels and stages of the transition phase** (Vet, collective bargaining and implementation of actions), **participating in the anticipation and not only the management of changes** at both company and sector level. In particular, the **planning phase** becomes a key moment to define the work organisation and working conditions along all the value chain, with a profound impact as well on on-site activities;
- **the need for the social partners to develop innovative negotiation practices:** with new matters such as new digital rights (e.g., workers' data protection rights, the right to digital privacy, teleworking, the right to disconnect). In particular, proactive role for the unions are needed in deciding on the means of production, management, sharing and use of data on the basis of the difference between the improvement of safety and productivity conditions, the issue of surveillance (data minimisation and transparency along with clear rules on the processing of personal data) limiting the risk of intrusive monitoring and misuse of personal data. Companies must establish criteria for the use of new digital devices with the prior participation of worker's representatives and the workforce has to be clearly informed of them in advance;
- **the adoption of a holistic and integrated approach** which, on the one hand, considers the whole value chain of the construction sector, the circular economy paradigm and the perspective of the life cycle of the product and

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process with an ever-greater interaction between construction-regeneration-maintenance-services and, on the other hand, the social dimension associated with digital and sustainable construction, often mentioned but, in fact, less practiced (Broad, 2018);

- **the strict interconnection between digital transformation and sustainability issues**, considering that digitisation and the transition towards sustainable construction are the main drivers of change in the sector and that construction plays an important role with respect to urban regeneration, housing, management of the territory, and the needs of people in their living and working environment.

▶ Moreover, there are some recommendations to support the **renewal of trade union action** considering its own organization:

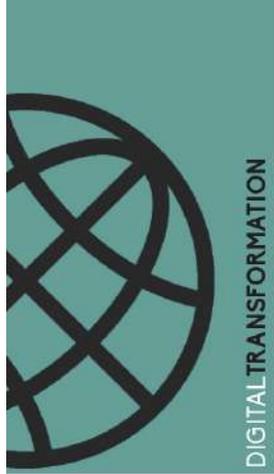
- to support the **training of trade union representatives** on issues of digitalisation and sustainability in the sector, especially considering Bim and the digital construction site;
- to strengthen **exchanges with other categories** which intervene directly and indirectly on the construction supply chain in order to encourage joint development and negotiation paths, with an integrated vision of bargaining at national, territorial and site level;
- to strengthen **relations with the professional associations and civil society** for the promotion of environmental sustainability, innovation and the quality of work and social life;
- to encourage **exchanges of experience and good practices about digitalisation of work** at European level, both between construction federations and, more generally, between trade union representatives from other sectors.

4. THE CULTURAL DIMENSION

The cultural dimension is a further area of action for European industrial relations and social dialogue insofar as it constitutes the broader context in which the transition towards digitalisation in construction is taking place. It plays an important role with regard to access to and the circulation of knowledge.

- ▶ Actions in this area could relate to:
 - the implementation of interventions intended to **foster the cultural change** needed to transform the construction industry toward technological innovation and digitalisation mobilising positive attitudes to change among companies and workers;
 - the spread of a **new organisational and management culture** of construction companies characterised by the formalisation of knowledge, planning of activities and measurability of results;
 - the **dissemination of information** on innovative and digitalised building between citizens and businesses, **to raise awareness** of the opportunities and benefits, incentives, constraints and procedures, etc., including the opening of **public offices and/or helpdesks** also run by the same players involved in the social dialogue;
 - the **training of decision-makers and stakeholders** in the sector.





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