IR SMART

Industrial Relations
for Smart-Workers in Smart Cities

IRsmart Final Report

Results integration and Key findings

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1. Introduction

The present project has had the objective of delving into several topics concerning remote working and smart cities through the lens of social dialogue and industrial relations. The multidisciplinary nature of the project emerges from its structure of analysis. The three main topics analyzed are: the regulatory framework concerning remote working in the EU; the effects of remote working for companies and workers through the analysis of case studies and the integration of the concepts of smart-working and smart cities, introducing the spatial dimension in our research. The heterogenous nature of the topics induced the team to resort to different methodologies of analysis. For the first line of analysis a desk methodology was adopted, while for the impact analysis of remote working on workers and companies, a case study methodology, with interviews, was used. For the last line of analysis, when we introduced the geographical dimension, we resorted to the data collection and systematization in order to construct meaningful indicators.

The Covid-19 pandemic hit the global labor markets in a far more penetrating way than expected, lasting after the mandatory containment measures during the pandemic peak, such as 'lockdowns'. The upsurge of remote working, often referred as smart-working in the project[1], spreading during the pandemic was one of the largest phenomena that hit the labor markets of several countries in the last decades. Such a phenomenon and its persistency, although we are currently in a sort of a 'reversal' phase with a call from many companies to come back to the offices, brought an urge to perform a vast research on it, from different perspectives (Barrero et al, 2020; 2023; Caldarola and Sorrell, 2021; EC-JRC, 2020, OECD, 2020; Sostero et al. 202; Sand de Miguel, 2020), One of these angles is given by the industrial relations point of view. Indeed, as explicitly stated in the project, Industrial Relations in Europe have undergone significant changes over the last decades due to the juxtaposition of globalization, technological progress, a generalized decline in trade union density and the recent pandemic (Eurofound, 2020a,b). Unions had to tackle the issue of remote working under a multiplicity of perspective (Countouris et al., 2023) which involved inequality, gender issues, sustainability, workers' rights and many other, presenting us with an increasingly complex picture. As a matter of fact the detachment of work activity and the place and time in which it is carried out entails significant opportunities for workers and for the society as a whole, favoring the balance between life and work times, but also increasing challenges and threats, going from the difficulty of quantifying working times, to psycho-social risks, already present in the workplace, that could be amplified by the physical distance and to increased inequalities given by the disparities in accessing to broadband. Beyond the individual consequences, an extensive use of smart work can favor changes of a social nature, linked to a lesser and different way of people interaction.

[1] For simplicity we call "smart workers" both teleworkers and ICT-based workers, but it is important to underline that there is a difference between the two. According to Eurofound (https://www.eurofound.europa.eu/it/topic/teleworking) teleworking refers to a form of organising and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises, on a regular basis. The characteristic feature of telework is the use of computers and telecommunications to change the usual location of work. ICT-based mobile work can be defined as the use of information and communications technologies (ICT), such as smartphones, tablets, laptops and/or desktop computers, for work that is performed outside the employer's premises. For most employees, mobile work could be considered a variation of telework, where workers carry out their job from a fixed location outside the employer's premises. The difference is that ICT-based mobile workers work in a range of locations and specifically use ICT to connect to shared company computer systems. Different levels of telework/ICT mobile work intensity and range of places at which individuals work might potentially have different consequences for working conditions.

The analysis conducted in the project has led to consider as fundamental a revitalization of unions, whose role in shaping the regulatory framework concerning remote working and the so called 'new normal' in which remote working will remain in its hybrid forms, is fundamental.

The report is structured as follow. The second section is dedicated to the summary of the project, which also depict its rationale. The following section presents a synthesis of the results coming from the three work packages devoted to the research activities. Section four provides insights on industrial relations practices when dealing with the two main topics analyzed in the project: smart-working and smart cities. The concluding section is left to some concluding remarks and to the presentation of key findings and takeaways.

2. Summary of the project structure

The main objective of this project has been to enhance the knowledge and expertise in industrial relations, particularly in the context of tripartite social dialogue involving social partners and public authorities. The project involved research combining quantitative and qualitative data analysis to examine the relationship between smart-working and smart cities across diverse countries. Particular attention has been given to the heterogeneity of regions and cities within the partnering institutions countries. The significance of industrial relations has been emphasized with respect to activities such as regional and national regulatory frameworks, negotiation and agreements among stakeholders, considering important aspects of the smart-city concept such as technological infrastructure development, mobility planning, and workforce training, including ICT usage.

The project identified three primary research areas explored at regional and local levels. These areas are interconnected through the topics of industrial relations and tripartite social dialogue. The first area focuses on the regulatory aspect of smart-working, including its definition and specifications. It examines the framework of industrial relations and smart-working, with a particular emphasis on collective bargaining. The second area builds upon the first by empirically analyzing issues related to labor organization, working conditions, and the skills required in the context of widespread adoption of smart-working. The third area takes a spatial perspective, considering topics such as mobility planning, environmental impacts, and technological infrastructures. It explores the relationship between tripartite social dialogue, smart-working, and spatial considerations. The goal of this project has been to provide local stakeholders with suggestions, best practices, and policy recommendations to effectively integrate smart-working conditions, leading to tangible social benefits.

The project is organized in 6 work-packages (WPs). While the first regards management and organization, WPs 2, 3 and 4 deal with the research-related objectives of the project.

Within WP2 the attention points to the regulatory frameworks. In particular, it aims at (i) exploring the definitions and the legal issues related to smart-working in Europe; (ii) assessing the level of smart-working adoption in the specific European countries of interest, both before and after the Covid-19 pandemic, in order to gain an understanding of its prevalence; (iii) examining the work organization practices pertaining to industrial relations in the countries of our partners, aiming to analyze their impact; (iv) conducting a comparative analysis of the regulatory frameworks surrounding smart working in partners' countries, so to investigate the influence of industrial relations in shaping these regulations; (v) identifying the advantages and disadvantages of smart-working in the countries of our partners, in order to evaluate the role of industrial relations practices in addressing them; (vi) at investigating the variations in the diffusion of smart-working and the involvement of industrial relations, considering both sectoral and regional disparities within the targeted regions and countries.

The WP3 deals with the organization of labor and how this is influenced by the diffusion of smart working practices. In particular it proposes six main objectives: (i) examine how smart-working affects work arrangements and working conditions, and understand the changes brought about by this practice; (ii) identify the potential benefits, obstacles, risks, and opportunities that influence effective work in smart-working, considering factors such as caregiving responsibilities, home-based workplace conditions, communication technologies, and infrastructure; (iii) evaluate the impact of smart-working on working hours, flexibility, employee engagement, motivation, work organization, and productivity; (iv) identify the skills necessary for a successful transition to smart-working and the skills required for its widespread adoption; (v) develop an occupation/skills-based indicator that assesses the level of "smart-workingness"

within different professions; (vi) explore the role of industrial relations and social dialogue in mediating the relationship between smart-working and working conditions within the heterogeneity of countries and regions within the project members.

Finally, WP4 tries to integrate the city-level perspective on sustainability on smart-working practices, with an eye on how this integration is mediated by social dialogue. In this WP the project identified 5 main objectives as follows: (i) to examine how the dimensions of smart cities influence the benefits and drawbacks of smart-working; (ii) to generate a meaningful analysis of data that establishes connections between working conditions, smart-working, and sustainability, in order to measure regional/local resilience; (iii) to investigate the environmental impacts of smart-working at the regional/local level; (iv) to identify the obstacles that hinder the adoption of smart-working, such as ICT infrastructure, national or local bureaucratic regulations, institutional framework, and organizational structure of firms, within specific spatial clusters (regions and/or cities); (v) to explore the role of smart cities as conducive environments for facilitating a tripartite dialogue, which aims to strengthen the interaction between public authorities and social stakeholders.

Overall, the project aims at improving the quality of industrial relations and the social dialogue, with particular attention at the heterogeneity of countries, regions and cities in which the partners of the project are located, so covering five different European countries (France, Italy, Poland, Romania and Spain). It also aims at identifying and diffusing knowledge about best practices across these territories so to formulate recommendations, improve the exchanges of practices and identify clear-cut implications. This last point will find fundamental insights from the main characteristics of the tripartite social dialogue in the geographical clusters analyzed within this project.

3. Main results of the WPs

WP2

The Covid-19 pandemic brought about significant changes in working and living conditions throughout the EU, affecting in particular the widespread adoption of remote working (Vargas Lave et al, 2020; Mandl et al 2015) by workers and companies. Before the pandemic outbreak, remote working was already prevalent in a few European countries, but for the majority, it became a massively diffused practice from 2020 onwards. The research activity carried out in WP2 highlights that many positive and negative aspects of remote working were already known before the pandemic, and the sudden shift caused by the Covid-19 outbreak confirmed these characteristics.

From a regulatory perspective the results of the thematic report highlighted the lack of an overall EU directive whose development would provide guidelines on how to safeguard the rights and improve the well-being of remote workers. It is worth noting that in most of the EU countries thus, the massive shift towards remote working occurred in a context where there was at least a partial knowledge of it and/or related legislation. Nevertheless, the significant increase in remote working adoption, particularly in countries where it was not widely practiced before the pandemic, gave rise to novel work arrangements. This shift compelled public authorities and companies to address remote working specifically and incorporate it as a customary and integral mode of operation.

In the comparative report two main perspectives emerged from the exploration of remote working practices across EU countries. First, the organizational perspective emphasized that many organizations implemented remote working for the first time without adequately knowing how to do that. Even after the initial difficult period, some organizations continued remote working without making the necessary investments or reorganization. However, if "traditional" hierarchical organizations are kept and remote working is adopted without modifying their organizational structures, it may exacerbate negative effects on workers. This highlights the need for smart organizations to adopt "smart-working," leading to a new paradigm in employment relationships. Time management, spatial arrangements, and a focus on results would instead provide higher benefits connected to remote working. Workers should have autonomy in managing their working hours, be equipped and trained adequately for remote work. On the other hand, organizations need to transform their processes, not only for on-site workers by adapting spaces and modes of work and interaction but also for those working remotely. Remote working poses challenges for organizations and regulatory frameworks. One critical aspect is the ambivalence surrounding remote working, where workers may experience improved work-life balance but also increased stress due to longer working hours. This ambivalence is influenced by how remote working is designed and regulated.

The second perspective that emerged from WP2 is the regulatory one. Remote working can serve various purposes, such as protecting vulnerable workers, addressing specific situations (e.g., public health, energy shortage, climate crisis), or redefining the work paradigm in general. Key considerations include eligibility criteria, degree of autonomy and teleworkability[2].

Looking at broader concerns, wellbeing and surveillance (particularly the right to disconnect) are crucial. Different approaches can be taken regarding the right to disconnect, either by allowing workers to be contacted at any time during their working day or by providing dedicated breaks during which they cannot be contacted. The availability approach is more protective of employee wellbeing. Regulations should also ensure protection from discrimination, providing necessary resources such as equipment, digital literacy, and

[2] We use the term teleworkability to intend the possibility for a job to be carried out remotely.

training for workers to effectively perform their remote work. Social partners play a key role in remote work regulation, going beyond mere normative rules and exercising control, approval, and dynamic involvement in specific arrangements. The relationship between collective bargaining and legislation on remote work issues has been positively reestablished during the pandemic, even in countries where collective bargaining had previously played a marginal role. The involvement of social partners varied across countries, with some highly participating in defining the regulatory framework (e.g., France, Spain, Italy) and others having limited involvement (e.g., Poland, Romania).

The pivotal key point concerns the fair treatment in areas such as working hours, rest periods, access to social protection and infrastructure, etc. However, a crucial aspect is that in parallel it has been observed that some countries had already implemented specific legislation concerning telework, or in the absence of such legislation, remote work was indirectly addressed through various, alternative laws not specifically conceived to treat remote working. In the vast majority of EU countries, the surge in remote working adoption across most countries, particularly those where it was not previously widespread, introduced novel forms of work arrangements and compelled public authorities and companies to proactively address it, integrating remote working as a regular and customary mode of work.

Moreover, the report emphasized how the Covid-19 pandemic affected remote working in the selected countries. It has been observed that the increase in the number of workers carrying out their activities from home significantly affected the vast majority of countries. In particular, Italy, Spain and Ireland moved from very low rate of remote working before the Covid-19 outbreak to a consistently higher percentage in 2020. As far as gender was concerned, the report has highlighted a heterogeneous picture across countries. Indeed, in Nordic countries also after the pandemic it has been noted that the percentage of men working from home was higher than the percentage of women. Opposite to this picture, in Spain, Poland, Italy, Hungary, Slovakia, Czech Republic, Romania and Bulgaria whereas before the pandemic they were not characterized by significant differences, after the pandemic female workers had higher shares of remote workers than male. Finally, discerning between the age of the workers, the deliverable underline that remote working changes significantly depending on the age group under analysis. Nevertheless, a jump in remote working practices has been experienced by most of the countries for both 25-49 and 50-64 age groups.

The last input provided by the activities related to the thematic report regard the extent to which remote working can characterize each country. Different elements emerged from this section. First, the overall share of potentially teleworkable employment in the European Union (EU) is approximately 37%, varying from 27% in Romania to 54% in Luxembourg. Second, teleworkable employment is more prevalent among women (45%) compared to men (30%), and it tends to be more common among native-born workers, those with open-ended contracts, and individuals working in large companies and urban areas, as opposed to suburban or rural regions. Remote working should be viewed as a dynamic concept rather than static, with companies encouraged to take actions to increase the level of teleworkability among workers. The issue of unilateralism versus voluntarism in remote working arrangements also needs attention, determining whether it is driven by worker's rights or agreement between employers and employees. Third, the disparity between potential and actual remote working is more significant for employees under traditional employment arrangements (37% potential vs. approximately 10% actual) compared to self-employed individuals (32% potential vs. 34% actual). Fourth, teleworkable employment is significantly large among white-collar workers than blue-collar workers, the latter characterized by physical requirements and location dependence. Among white-collar workers, the potential teleworkable employment ranges from 85% for clerical support workers to approximately 28% for service and sales workers, while the share is less than 2% among blue-collar workers such as craft and trade workers, machine operators, and elementary occupations. Finally, the service sectors with a higher prevalence of white-collar employees, such as financial services (93%) and ICT services (79%),

have higher proportions of teleworkable employment. Sectors like healthcare (30%), retail (27%), and accommodation/food services (16%) have lower shares of teleworkable employment. Primary sectors, manufacturing, and construction have relatively low proportions of teleworkable employment, ranging from 10% to 20%. Wage and education levels play crucial roles as determinants of teleworkability. Higher-paying jobs and greater educational attainment are associated with larger shares of potential teleworkable employment, with 74% of the highest-paying jobs falling into this category compared to only 3% of the lowest-paying jobs.

To conclude, the report focuses on the effects and desirability of remote working. The key finding that arise from this part of the deliverable underlined that both positive and negative aspects are associated to remote work. As for the former, higher quality of work as perceived by workers, flexible work schedule and higher degree of autonomy make remote working an acceptable practice for many workers. Autonomy becomes crucial when focusing on remote working, as it requires a reevaluation of how work is performed and evaluated. As for the latter blurred boundaries between work and home life and the tendency to work longer hours are two of the most relevant problems that remote working brought about. For instance, the analysis reveals that the quality of work and life conditions for remote workers is strongly dependent on personal and family circumstances, which are external to the work relationship. This highlights a failure of regulations that should ensure equal conditions for all workers. In some cases, remote working arrangements have been used to shift the responsibility of fulfilling work obligations from the employer to the workers.

WP3

WP 3 surveyed the extant literature in order to identify the drivers of remote working in the pre- and post-pandemic period from a managerial and employee perspective. The readiness to offer remote work is influenced by the characteristics of the organizational culture. Favorable features include a focus on productivity, openness to technological innovations, employee ties to the company, and an emphasis on creativity. On the other hand, an emphasis on physical presence at work, employee participation in the organizational culture, limited working hours, and interruptible work processes hinder the implementation of remote work. The leadership style within the organization, characteristics of the employee, and nature of the tasks performed also impact managers' readiness to accept remote work requests. Cultural factors play a crucial role as well. Power distance and uncertainty avoidance play a significant role in how managers approach the lack of control and uncertainty associated with remote work.

As for the employee perspective motivations for remote work include work-related factors such as minimizing workplace stress, gaining a sense of independence and control, etc. Family-related factors like spending more time with relatives and flexibility in caregiving also contribute to the desire for remote work. Other important aspects related to the employee perspective concern the possibility to reduce greenhouse gas emissions, and commuting-related factors like long travel duration, inconvenience, and costs, also play a role in choosing remote work. On the other hand, limits to remote work arise from the lack of awareness or misconceptions about available solutions, unsupportive attitudes of managers or employers, and job nature. However, the authors note that the fitness for remote work is not a binary issue, and technological progress can expand the range of tasks suitable for remote work. Psychosocial costs, such as the desire for workplace interaction, social recognition, and the potential for distractions or conflicts with household members, are also considered. Some individuals may lack discipline or prefer the separation between work and private time provided by commuting. However, alternative options like telework centers can address social interaction needs. Risk aversion and concerns about professional promotion were noted as potential constraints but may be less prevalent today.

The research activity carried out in WP3 has also concerned the identification of case studies in France, Italy, Poland, Romania, and Spain revealed a coherent picture of out-of-office work (OOOW) (Dingel and Neiman, 2020; Czarzasty and Mrozowicki, 2023; Errichiello and Pianese, 2023; Molina and Pedersini, 2022). From the comparison between the case studies remote working was primarily introduced for three reasons: modernization and market adaptation, addressing workers' preferences for improved conditions, or as response measure during COVID-19 lockdowns.

In addition, the case studies highlighted that telework had a significant impact on working conditions, leading to reduced commuting, increased work flexibility, greater autonomy, and changes in the organization and content of work. While it provided protection against COVID-19 infection, it also had negative effects on physical and psychological health. The impact on work-life balance was ambivalent, with interviewees reporting contradictory findings, highlighting the existence of a work-life balance paradox. However, OOOW had no significant impact on other working conditions, such as wages, working time, job stability, job security, social protection, or employment contracts.

Moreover, the interviewees unanimously emphasized the need for specific skills in OOOW and noted that employers had expectations for workers to develop these skills. This included both digital skills, such as using digital programs, remote drives, and communication applications like Zoom and Teams, and organizational skills related to autonomy, self-discipline, task planning, remote collaboration, and separating work from home activities. Larger companies that had already implemented OOOW prior to the pandemic provided training opportunities, both online and face-to-face, with employees generally preferring the latter.

However, companies that experienced remote working for the first time during the pandemic, such as schools, universities, and banks, often faced delayed training that did not address immediate needs.

The case studies also emphasized that the role of collective worker representation in shaping OOOW conditions was significant in the majority of the analyzed cases, although some variations were observed. The analysis findings align with the existing knowledge of industrial relations systems/models in the covered countries, ranging from the absence of collective labor relations to well-developed social dialogue structures. Social dialogue and engagement with social partners played a more prominent role in Western European countries, larger private and public sector organizations, compared to Central and Eastern European countries and small to medium-sized organizations.

Prior to the COVID-19 pandemic, regulations on OOOW were already in place across the countries analyzed, primarily stemming from the EU-level social partners Framework Agreement on Telework (2002). During the pandemic, additional framework agreements on digitalization were signed, and the European Parliament passed a resolution on the right to disconnect and fair telework, urging the European Commission to introduce an EU-level Directive on the matter. A review and update of the 2002 Framework Agreement on Telework is planned, aiming to adopt a legally binding agreement through a directive, integrating the experiences gained, particularly during the COVID-19 period. According to the interviewees, OOOW is expected to remain a significant aspect of the work experiences of companies and workers, predominantly in hybrid forms. The long-term consequences of OOOW adoption are yet to be fully observed in the future.

WP4

The objective of the WP4 is to compare the five countries partnering in the project – France, Italy, Poland, Romania and Spain – in terms of relationship between smart-working and smart-cities (Albino et al., 2015; Caragliu et al., 2011), so to delineate overall and specific lessons with respect to industrial relations. Indeed, the heterogeneity among the countries involved in this comparative report highlight striking differences across all topics analyzed, and specifically the regulatory framework, the labor and technology-related environment, and the productive context.

In order to accomplish such comparison, we firstly adopted some common terminology and concept definitions by referring to the scientific literature and international reporting activity. Each country partners therefore produced one national report that was subsequently put in comparison so to have a broader picture of the entire European context: indeed, the countries partnering in this project span across the whole European territory, making possible to deepen the contextual intrinsic heterogeneity. Each national report was based on as much similar as possible quantitative data and qualitative data.

In general, the collective findings from the five countries indicate that discussions surrounding smart cities are still in their early stages. This is likely due to the absence of a well-defined framework for the concept. The lack of a clear operational definition for smart cities poses challenges for implementing effective policies and also makes it difficult to establish connections between the smart city concept. The vague nature of this concept's definition impedes further exploration into the relationship between smart cities and intelligent work systems, even at regional levels. Pertaining to the context of smart working, the outbreak of the COVID-19 pandemic inevitably prompted the adoption of such arrangements as a response to the crisis. However, examining national reports reveals that the five analyzed countries were situated differently in terms of their adoption of smart working before the pandemic.

For instance, in France, remote work setups had been supported since the early 1990s, and by 2017, about 25% of employees were covered by smart working agreements. Conversely, Spain exhibited a low prevalence of out-of-office work before the pandemic, with nearly 76% of employees having never worked remotely. Even after the pandemic, Poland continued to have the lowest percentage of employees working from home among EU countries. In both Romania and Italy, employees possessed lower levels of ICT skills, largely due to a digital divide that persisted between different regions within the countries.

It's notable that all five countries display a certain degree of division between northern and southern regions, often tied to economic specialization and development. Disparities in smart working accessibility across regions can be attributed to differences in infrastructure and economic orientation. In many cases, smart working is concentrated predominantly in the capitals of these countries. Indeed, certain hubs exhibit heightened accessibility to smart working. These hubs are identifiable within the respective capitals of each country (Rome, Madrid, Paris, Bucharest, Warsaw), as well as in other prominent urban centers that are economically predisposed towards smart working (Barcelona, Constanta, Lyon, Milan, Wroclaw).

It turns out that a main layer of diversity, shared across all five nations, pertains to the distinction between urban and rural regions. These geographical disparities align with the divide between rural and urban territories. Regions where non-smart working employment prevails tend to be situated in rural zones. Conversely, poles exhibiting robust smart working accessibility predominantly correspond to urban locales, particularly in the cities mentioned earlier.

In the realm of internet access for the populace, variations are observed, with certain countries, such as France, offering greater broadband access. In contrast, countries like Romania and Spain demonstrate an internet speed discrepancy following the north-south divide. Italy showcases the slowest internet speed

within its central regions, excluding the central hub of Rome. Despite these trends, internet usage remains polarized. France and Poland exhibit higher internet usage rates in specific areas (Île-de-France, Mazowieckie, Lower Silesia, Marseille). Conversely, Spain boasts a 90% nationwide internet usage rate.

Regarding mobility and environmental impact[3], a uniform pattern emerges across all countries. Mobility decreased during the full lockdown months in each nation. Interestingly, a majority of the workforce across all countries returned to physical offices when permitted. This shift influenced the emission pattern of greenhouse gases, specifically nitrogen dioxide (NO2), which began to rise again from April 2020. Some variations surface, particularly in cities with strong tourism inclinations (Constanta in Romania) or pronounced industrial focuses (Katowice, Krakow).

In conclusions, important bottlenecks arise for the diffusion of smart working in smart cities. An important impediment to the widespread adoption of smart working lies in the unequal distribution of broadband access and high-speed internet connectivity across the five countries. While urban areas follow a trajectory of digital integration and swift connections, bolstered by the emergence of smart working and co-working spaces, non-urban regions face substantial hurdles in evolving into smart territories. In these non-urban settings, fostering dialogue among diverse stakeholders becomes particularly crucial, serving as a means to surmount obstacles and lay the groundwork for digital progress, ultimately attracting smart workers.

A parallel challenge shared among the five countries, with Poland, Romania, Italy, and potentially Spain facing it most acutely, pertains to the issue of digital competences within the population. Insufficient digital skills can hinder the promotion and seamless integration of smart working within smart cities and territories. Nonetheless, when examining aggregated country-level data, nuances in demographics might elude detection. For instance, consider a nation like Italy, where the elderly population has steadily grown over recent decades; lower scores in the DESI (Digital Economy and Society Index) indicators for population digital skills compared to the EU average could be attributed to the higher proportion of elderly individuals. The digital proficiency of the workforce may be better suited to address the current demands of digital transformation.

Turning to the environmental considerations tied to worker mobility, the analysis conducted across the five countries underscores the need for further exploration in this realm. Smart working necessitates increased employment of ICT-based technologies, leading to elevated demands for computing power and data storage capacity. Consequently, a greater energy supply is required to sustain these technologies. While smart working may diminish commuting, transitioning to such working arrangements could potentially amplify energy consumption. Additional research in this field should incorporate the concept of system dynamics to comprehensively examine the actual impact of smart working on reducing environmental footprints. Such insights could then guide policy initiatives towards a more sustainable approach to smart working.

In this context, where structural impediments hinder the spread and acceptance of smart working, the role of industrial relations assumes a pivotal position. Industrial relations should be conceived in a broader scope, encompassing agreements among industries and pertinent stakeholders to define shared territorial objectives.

[3] See Mori et al. (2012) for indices and indicators concerning sustainability in a urban context.

4. Smart-working, smart cities and industrial relations

Within the IRSmart project, industrial relations are a cross-cutting topic and a perspective from which to investigate remote work issues before and after the pandemic and its relationship with the concept and organization of smart city. Remote (smart) work and smart cities are strictly interconnected concepts due to the vision of smart society they both imply, and because of the potentially radical impact on labor issues and work organization. While remote work allows to break the space and time constraints with the workplace, a smart city implies a redefinition of the relationship between the work time (individual and collective) and the times of the city.

Furthermore, both remote work and smart cities represent different expressions and implementation of digitalization processes and technological transformation. And like all forms of technological transformation, also digitalization, in its different forms, is not neutral with respect to existing power relations and distribution of resources. New technologies, therefore, have both an emancipatory potential, to help contribute to better working conditions, a more equitable distribution of wealth and greater inclusion, as well as the potential to worsen working conditions, further exacerbate wealth inequality and lead to greater exclusion. The process of technology-enabled change is both social and technical. New technologies are always implemented within a specific political and organizational context, with existing norms, relationships and ways of working. The implementation of new technologies, therefore, is, on the one hand, heavily influenced by the social and political context and, on the other hand, influences the social and political context. Given this context, social dialogue can make the difference. Industrial relations, in all its forms of representation, are required to take on a relevant role in ensuring that remote work and smart city develop while respecting labor rights and improving living and working conditions.

With this purpose, what should be avoided in terms of industrial relations is the techno-determinism, which often accompanies the introduction of a new technology in the workplace (Contouris et al., 2023). One of the greatest strengths social partners have about digitalization is the ability to intervene on the social side of change: the context which determines how new technologies are used, and to whose benefit. Since each change has multiple economic and social effects, what industrial relations should reject is the passive adaptation to change through the construction of a process to demystify the various narratives that usually accompany digitalization: digitalization in its premises and effects is not neutral and is not immaterial.

While remote work and smart city certainly pose new challenges for industrial relations, also in terms of technical competence, social partners should not feel intimidated by them. Governing the coming changes may require new approaches to organizing, dialogue, worker participation and collective bargaining. It is of crucial importance, as emerged in the case studies in WP3, to create a common vision around digital change and developing inclusive industrial relations for the joint design and implementation of change, that takes into account both the technical and social aspects of change.

The acceleration of remote work prompted by Covid, as highlighted in WP2, has certainly heightened the pressures on existing industrial relations practices, raising different priorities depending on whether it concerns remote work or the smart city. While about remote work the priorities to be addressed seem to be more defined, the role of industrial relation regarding smart city are more blurred.

In the context of remote work, it's essential to challenge the false trade-off (Kantor and Sundaram 2022[4]) that suggests a choice between remote work and increased management control through surveillance.

[4] Kantor J. and Sundaram A. (2022) The rise of the worker productivity score, The New York Times, 14 August 2022. https://www.nytimes.com/interactive/2022/08/14/business/ worker-productivity-tracking.html

Studies indicate that successful remote work relies on trust and worker autonomy (Messenger, 2019). Assuming that physical management control must be replaced with intrusive surveillance tools like keystroke monitoring and spyware is a mistake. The availability and affordability of such tools don't legitimize their use. A techno-determinist approach isn't acceptable and all efforts of industrial relations should be invested in showcasing how labor regulations already prohibit many surveillance practices. The focus should be on limiting invasive control tools that evade these regulations. This requires collective reflection on managerial powers and their compatibility with modern societies and implies a better understanding on how to combine the company level of industrial relations regulating and designing remote work with the collective needs of a territory, such as space, mobility, and public services.

Another risk of an unleashed regulation of remote work that industrial relations should try to limit is the "phantomization" with businesses outsourcing parts of their activities to bogus (online) freelancers available on the global online labor market and controlled by technology. As emerged in WP2, the first and temporary reaction of industrial relations under the pressure of both workers and businesses during the Covid-19 outbreak was the use of remote work as a measure to prevent the spread of the Covid-19 infection. Conceived as a work arrangement to stimulate working performance (productivity) and facilitate work-life balance, remote work during the pandemic has been mainly used as a measure of public safety. The remoting of the work performance without a redesign of the organization of the work process intertwined with digital technologies risks putting remote work in competition with the digital job market, the so-called online freelancing. In digital work, the low transaction costs offered by the capacity for intermediation and parceling out of work by crowd-working platforms undoubtedly favor the outsourcing of work on a global scale: "*Local remote work is the beginning of a new era that is opening up the service industry to telemigration*." (Baldwin, 2019).

Finally, the countries with more structured industrial relations have experienced during the pandemic a new and vital relaunch of the relationship between collective bargaining and legislation, even in those countries in which the legislative reference to the regulatory function of collective bargaining on remote work was marginal before the Covid19 outbreak (Italy). Also, with the aim of updating some information that was current at the time when the different WPs were carried out, it is possible to observe that since the beginning of the Covid-19, permanent (and not only temporary solutions) legislative initiatives on remote work have been passed in 7 countries in EU (Austria, Greece, Latvia, Portugal, Romania, Slovakia and Spain) with a view to regulating or adjusting the existing legislation because of the unprecedented increase of remote work. Social partners have played an uneven role in the legislative changes; while they have been involved either through tripartite agreement or in consultation processes in some countries (Austria, Portugal, Slovakia and Spain), in others, legislative changes were unilaterally designed (Greece, Latvia and Romania) (Eurofound, 2022). To avoid that remote work can be used to worsen working conditions and attack labor rights and to make remote work regulation more binding, it is of crucial importance to establish and strengthening a mutual relationship between industrial relations and legislation. The current discussion for updating the Telework framework agreement (2002) on telework seems to be moving in this direction as it is planned to put forward for adoption in the form of a legally binding agreement implemented through a European Directive.

Furthermore, If we compare the national legislative reforms with what has been recently included in the European Framework Agreement on Digitalization for Central Government Administrations signed by EPSU and EUPAE (2022) and the current discussion on the renewal of European Framework Agreement on telework, it possible to see that the thematic priorities in terms of workers' rights are a better regulation of the right to disconnect, voluntary nature, equal treatment, an inclusive access to training, a more adequate

health and safety protection (extended liability in case of accidents and participative risk assessment), a more human in-command approach to surveillance.

If now we shift our focus on smart cities, the priorities for industrial relations, as highlighted in WP4, imply an innovative function of social partners at the local and national level and a re-organization of roles and responsibilities within the social partners in a changed arena of dialogue and conflict. If the connection between industrial relations and remote work has been established, initially in an atmosphere of skepticism and later during emergency management, engaging with the concept of smart cities demands a forward-looking transformation in industrial relations. The reference scope now expands beyond the company to encompass the territory. The territory therefore gains heightened contractual significance because it is here that negotiation must effectively address the tangible and intangible disparities progressively exposed by the acceleration of remote work, as shown in WP4 analysis. It must also manage the complexities presented by smart cities in terms of planning, sustainability, transparency, knowledge, and the quality of life and work.

The challenges presented by smart city strategies to industrial relations primarily pertain to either the increased contractual significance at the territorial level or a more efficient confederated alignment of national sectoral collective bargaining concerning digitalization-related matters. These challenges encompass the following:

- Coordination and Dialogue with Multiple Stakeholders: Smart cities necessitate collaboration among diverse stakeholders, including businesses, governments, citizens, and technology partners. Industrial relations must navigate these intricate relationships to ensure effective cooperation and communication going beyond the company boundaries.
- Widening access to Digital Potential in a Smart Society: Whether in the context of smart working or smart cities, the accessibility to the digital potential of a smart society remains constrained by significant territorial and sectoral disparities. An approach to collective bargaining focused solely on the sectoral or company level could potentially worsen these differences rather than alleviate them, as it adopts a partial and non-confederated (territorial) perspective;
- Incorporating Sustainability and Environmental Impact in a new local Pact: Smart cities strive for sustainable development and minimized environmental impact. Industrial relations must focus on integrating eco-friendly practices and advocating for environmentally responsible approaches within industries. Similar to smart working, the concept of a smart city also reshapes urban and suburban mobility. This includes reducing commuting and altering the relationship between work schedules and the city's services such as public, commercial, local transportation, social, and family services. Managing mobility is a public concern that necessitates regulatory involvement from public entities aligned with an environmental sustainability strategy, rather than relying solely on individual company negotiations;
- Advocating Transparent Governance: Transparent decision-making and governance are pivotal in smart cities. Industrial relations should encourage and set up participatory processes that involve workers in shaping the future of their industries and communities;
- Transforming Digital Networks into Public Assets: Digital networks should serve the public's interest, and the data they transmit should be considered a common resource, accessible to all citizens. The concept involves creating a public platform using data generated by citizens, enabling the establishment of a public governance framework for cities;
- Citizen-Generated Data: The data gathered by a smart city, encompassing aspects like mobility, crowd density, parking occupancy, territorial networks, and tele-assistance, derived from citizens, should be returned to the citizens. This transition aims to create a "sustainable digital city" where data serves citizens not only as a service but also as shared knowledge. This approach enhances

transparency and facilitates the exchange of information, ultimately reducing people's hesitancy to share personal data;

- Promoting Inclusivity and Equity: Smart city initiatives should prioritize inclusivity, ensuring that every member of the workforce can participate and benefit. Industrial relations must advocate for fair and equal access to opportunities and resources, guaranteeing improved working conditions for everyone. With this purpose, industrial relations are aimed at addressing Digital Platform Dynamics: the management of a smart city should also consider its relationship with large digital platforms and the influence they have on working conditions and job quality.
- Decentralized Work Locations: In a smart society, work is not confined to a specific physical location but is distributed across the territory. This calls for the establishment of a network of coworking spaces that foster social interactions and promote inclusivity. In this context, industrial relations should support the concept of proximity coworking, aligning with the vision of a proximity city;
- Fostering Lifelong Learning: The rapid pace of technological advancements necessitates a continuous learning approach. Industrial relations should collaborate with employers to promote upskilling and reskilling opportunities for workers to adapt to evolving job demands.

5. Conclusions and Key Findings

The two-year IRsmart project has dealt with several topics concerning remote working, smart cities, industrial relations and social dialogue.

Our research activities focused on three main dimensions. The Analysis of the regulatory dimension of remote working and its definition and specifications (general framework relating industrial relations and smart-working from a regulatory perspective, and specifically focused on collective bargaining); the study of the internal labor market dimension with implications for working conditions, labor organisation, training and skills endowment (issues related to labor organization and remote working as well as the skills needed in a context of large adoption of remote working); the analysis of the spatial dimension, which brings related issues such as mobility planning, environmental benefits/costs and technological infrastructures (spatial perspective on the issues related to the tripartite social dialogue, smart-working and spatial topics in order to give to local actors an array of suggestions, best practices and policy recommendations to make effective and socially beneficial the integration between smart-working and smart cities).

What emerges from the research activity is that remote working is a tool that shapes labor organization needs, and must be managed through the dialogue among social partners and in the sphere of industrial relations. This likely involves a change in culture and perspective both for managers and for unions when we consider the company as the work filed of the social partners. From the managerial side the culture of control should be replaced by a culture mostly rooted on autonomy and trust, which in turn may create high levels of commitment from the employees, even when they do not work on the employer premises. On the side of unions they need updated competences and perspective to answer the challenges that a model of remote working presents them with, especially when the boundaries for their activity moves from the company to the territories, as we point out in the research part concerning the integration of smart cities and remote (smart-) working.

In addition to the above issues touched upon by the project research activity we also dealt with the one concerning the relation between remote working and environmental sustainability, which is of the utmost importance. The new ways of labor organization have an impact on the environment and on urban life, but the dimensions and metrics to be taken into account to measure such an impact are so many that it is of extreme difficulty to make meaningful evaluations. The role of social dialogue in this context may be that of mitigating the potential exacerbation of inequalities and polarizations in working conditions and occupations (Countouris et al., 2023).

Given the results obtained we stress the fact that the role of unions should be revitalized in order to answer the complexity of the new framework they have to deal with and in order to be able to cope with, through the instrument of social dialogue, the new emerging phenomena that are going to revolutionize the labor organization. To do that, strengthening the role of social dialogue is a policy objective of primary importance as well as designing complementary industrial and labor market policies.

Finally, we have to underline that in consideration of the various research domains investigated in the analysis the project was conceived as an interdisciplinary network of partners with different competencies, which were functional in dealing with the complexity emerged during the research activities. The idea of complexity slowly permeated the research and lead us to highlight the phenomenon of ‘complexity in industrial relations’, which also emerges from the key findings (Tab.1), some of which ought to be considered the cornerstones upon which to construct a future research agenda.

Tab.1 – Results and key findings

Key findings
Industrial Relations and Social Dialogue
Social dialogue essential in shaping the new normal
The use of remote work does not imply a change in **workers' rights**, so that social dialogue must govern the implementation of the new way of labor organization in order to guarantee the workers' rights are respected
Remote work introduced a **complexity** which needs to be **managed at different level of governance by the social partners, firms, public institutions**.
The integration of **smart-working and smart cities** implies a **systemic type of analysis** and further challenges for industrial relations, such as the shift from a company-based perspective to a territorial one, incorporating environmental and sustainability issues in new local pacts, etc…
Industrial relations practices are **required to react to the technological blurring of the boundaries between self-employment and subordinate work**, that an increased 'phantomization' of remote work is producing.
General Considerations
Regulations and Labor Laws
There is a need to adopt and update labor laws to address remote work-specific issues, such as work hours, employee rights, and protections. Clear guidelines on remote work arrangements, rights to disconnect, and addressing work-life balance concerns are essential. Moreover, remote work contracts, including employee protections, benefits, and dispute resolution mechanisms, are relevant issues required to maintain fairness in employer-employee relationships. Policymaking must be active in this regard.
Taxation and remote working
With remote work blurring geographical boundaries, policymakers must address tax implications for remote workers and employers. Additionally, social security systems may need adjustments to ensure adequate coverage and benefits for remote workers.
Technology and equipment
Policymakers need to invest in digital infrastructure and high-speed internet connectivity to increase the adoption and performance of remote work activities. This includes both urban and rural areas, ensuring equal access to opportunities. In addition, providing access to advanced technology would enhance productivity and innovation in knowledge-based industries.
Gender inequalities
It is pivotal to consider that women perceive larger negative effects of remote working in terms of high intensity of work, emotional effects, long working time, work-life balance problems. The efforts in terms of policy making must be directed to reduce these negative impacts.
Training
A digital gap may put at risk the effectiveness of remote working. It is therefore required to promote digital literacy and provide training programs to provide workers with the necessary skills for remote work.
Employment
There are jobs with more potential for remote working than others. This heterogeneity should be considered in terms of contracts and regulations.
Environmental sustainability: the diffusion of remote working may have positive externalities (but not only) on the environment and especially on the urban life (e.g., reduction of road congestion in the rush hours)

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