Foresight Brief

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Algorithmic management and collective bargaining

Valerio De Stefano and Simon Taes
Institute for Labour Law, KU Leuven

The discussion around the future of work, which has become ubiquitous in law, policymaking and the media, has so far concentrated on 'quantitative' aspects, for instance how many jobs may be replaced by automation, or the introduction of new breeds of technologies, such as artificial intelligence. This mainstream discourse, however, neglects some issues that are crucial for workers. In particular, the risks of invasive work surveillance or discriminatory practices stemming from, or embedded in, algorithmic management and AI systems are too often underestimated, and the essential role of regulation and social partners in mitigating these risks is overlooked. This is the case, for instance, in the proposal for the EU Regulation on Artificial Intelligence recently presented by the European Commission.

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Editors of the Foresight Brief series:
Christophe Degryse
Philippe Pochet
Aída Ponce Del Castillo

Editor of this issue:
Christophe Degryse,
cdegryse@etui.org

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Introduction

First of all, the potential role of regulation in governing automation processes and their consequences has generally been ignored. Even if legislation concerning collective dismissals, including those related to technological changes in businesses, is a longstanding feature of employment regulation in many countries, any meaningful discussion of this legislation is absent in the most cited publications about the future of work. Nor do these publications refer in any way to the law and practice of information and consultation with workers' representatives when new technologies in the firms' organisation that could have an impact on the workforce are introduced. Information and consultation procedures can intervene well before any decision about collective dismissals is taken and can help anticipate the implications of introducing new technologies for labour. They can do this by mitigating the extent of future layoffs and assessing other consequences of these technologies for the quality of the jobs that would remain following mass automation. Therefore, the absence of meaningful analyses of these regulations and their potential role in the debate is all the more striking.

The mainstream debate is also missing concerns about the 'qualitative' side of technological advances. A widespread assumption is that new technologies will eliminate many monotonous and hazardous jobs, leaving countless workers without employment and enhancing the autonomy and creativity of the few people who retain an occupation. However, while it is undeniable that some of these technologies can replace people in carrying out activities that are either menial or dangerous (or both), other innovations may play an even more troubling role. A panoply of technological devices and IT-empowered tracking methods is being introduced in workplaces, affecting the conditions under which workers do their jobs, as well as invading their privacy. Wearable devices such as 'smart badges', measuring how fast people walk and complete tasks, where they move in the workplace, with whom they interact, and even the quality of their conversations, are a growing reality in the world of work. Artificial intelligence tools that scan work emails and texts to track productivity, identify the most innovative workers and detect deviant behaviours are also spreading (De Stefano 2019). The data collected are processed to manage the workforce in an automated fashion – decisions concerning the hiring and promotion of workers, but also their retention or dismissal, are increasingly shaped or nudged by automatic tools.

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New technologies can have significant beneficial effects, as already mentioned. But they also pave the way for enhanced and undesirable monitoring and stress at the workplace. Algorithmic-based management can also lead to insidious forms of discrimination by hiding the programmers' explicit and implicit bias behind a technologically 'objective' façade.

Sometimes, as discussed below, these tools are also used with blatant anti-union aims. Data collection informs management decision-making, not only in relation to disciplinary actions, but already during the recruitment of candidates, and thus even before the employment contract is drawn up.

The concept of 'algorithmic management'

This use of artificial intelligence (AI) tools for tracking and managing workers is known as 'algorithmic management' or 'management-by-algorithm'. Algorithmic management fits into a broader context of the implementation of technological tools and digitalised supervision systems aimed at governing the workforce (Moore et al. 2018; Ajunwa et al. 2017). Algorithms and AI-enabled tools are used to manage and to discipline workers and to evaluate their work performance. In a way, this can be considered as a form of automation of managerial roles in enterprises (Adams-Prassl 2019).

One of the crucial components necessary for these algorithms to function properly is a vast amount of data on workers.[1] Data need to be collected from different sources, which implies that almost every worker's activity is, in principle, to be subject to monitoring and tracking. These activities may concern the worker's use of computers (email, social media, etc.), their location, or even their health status. The data are then processed by software to assess, among other purposes, their productivity and engagement.

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Algorithmic management can lead not only to monitoring workers to an extent that would have been unthinkable in the past, but also to collecting and processing an enormous amount of personal data on their life and work activities (Dagnino 2017). This collection and processing of data by machines exceeds the capacity of any kind of human supervision, past or present (De Stefano 2020: 435). The following sections discuss some applications of these practices.

Tools to track and surveil workers

Modern technologies are able to track the behaviour of workers in several ways. The type of activity that employers intend to monitor influences the way AI tools are implemented.

For example, AI tools can track and analyse the *physical* performance of work. In platform work, for instance, smartphones and GPS-based applications can be used to track the speed and other location-based variables of their couriers or drivers (De Stefano 2016: 477). But these surveillance tools extend far beyond platform work. Employers also track the location of their workers in the workplace by means of wearables. These devices can record the movements of workers, their work pace and their

1. For a thorough review carried out by a public authority of common enterprise performance management (EPM) practices, see Article 29 Data Protection Working Party (now, the European Data Protection Board), Opinion 2/2017 on data processing at work, adopted on 8 June 2017.

breaks (De Stefano 2019: 23). This tracking may become even more intense by combining this data with data collected by other machines that share the same physical workspace with human workers and require direct physical interaction with them, such as 'collaborative robots' (or 'co-bots') (Ibid. 29). 'Sociometric badges' are another example of combining data concerning people's location and movements with other data, concerning, for instance, the interaction of workers with their colleagues. These badges include a GPS tracker and a chip and enable the monitoring of workers' movements around the workplace as well as the tone of their voice during conversations with colleagues through the use of incorporated microphones (Fischbach et al. 2010). Advanced technologies may also be introduced for other purposes, such as time registration, while fingerprints, eye scans, facial scans or other tools to gather and process the biometric data of workers can be used to record working hours.

The *digital* behaviour of people can also be subject to extensive monitoring. Legions of workers use computers or other ICT-related technologies to perform their work, and computer-related activities, for instance the use of emails and internal chats, are commonly subject to monitoring (Moore et al. 2018). AI-enabled tools also allow for the expansion of surveillance to numerous other components of 'digital' behaviour. For instance, they can be used to track keyboard strokes, application usage and web history, and routinely take webcam photos or screenshots of workers' computers.[2] Web history and bandwidth utilisation can also be used to monitor worker's activities in this context.[3] These data are then analysed and displayed in a logbook or report, which is then made available to managers and supervisors to assess workers' productivity. They can also be combined with other information on the internet (such as personal information on social media websites) to make or suggest decisions about workers, including about retention or disciplinary action (Dagnino 2017). Shoshana Zuboff (2019) has highlighted how these forms of data collection also aim to predict the future behaviour of people before they even know themselves. 'Surveillance capitalism', as she brands this wealth of practices, can be operated at the workplace to predict workers' actions, such as applying for another job, having children, or concluding any particular transaction.

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Every type of ICT-based conduct can thus be captured and analysed by algorithms in order to make decisions about people's work. Notably, the use of surveillance software spiked during the Covid-19 epidemic as many companies reluctantly allowed remote working due to lockdown measures (Aloisi and De Stefano 2021a; Satariano 2020). Like other forms of electronic surveillance, these practices are not confined within the scope of the employment relationship. Crowdwork platforms have long used screenshots and keystroke monitoring to ensure that online freelancers stay on task while paid by the hour. Therefore, this kind of monitoring magnifies and extends the surveillance powers of management to new extremes.

2. See, for instance, the websites of the companies Crossover: https://www.crossover.com/worksmart/#worksmart-productivity-tool; and Interguard: http://interguardsoftware.com/web-filtering.html (accessed 26 March 2021).

3. Ibid.; see also Adams-Prassl (2019).

Tools to track workers' physical health and mental status

Some technologies introduced in today's world of work aim to provide access to workers' health and mental status. For instance, wearable work instruments may be equipped with sensors that measure biometric and other health-related data, such as heart rate and blood pressure (Fischbach et al. 2010: 6287, 6391; The Economist 2018). Some employers may even offer devices to workers (such as those by fitness electronics company Fitbit) or access to sleep-tracking platforms, as part of 'wellness programmes' and health benefits (Ajunwa et al. 2017; Lee 2017) – but the confidentiality of these data may be compromised by employers gaining access to them.

Some devices attempt to track even the emotional and mental statuses and the stress levels of workers. This can be done by means of the above-mentioned 'sociometric badges'. Facial scans powered by artificial intelligence are increasingly used in workplaces and even before people are hired, during job interviews (Ajunwa 2019). In this context, AI is applied to analyse 'how a person's face moves to determine, for instance, how excited someone seems about a certain work task or how they would behave around angry customers' (Harwell 2019). In addition to these forms of 'neuro-surveillance' already in place, several tech companies are funding research projects exploring how to connect brains to technological devices (Samuel 2019), something that could have massive consequences for workers if these techniques are eventually introduced in workplaces.

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Mental and emotional data are also becoming increasingly available via the application of voice recognition software in microphones, or by monitoring the brain activities of workers[4] and using other neuro-technological tools (Gonfalonieri 2020). These forms of neuro-surveillance raise enormous ethical issues (De Stefano 2020:426).

Tools to make decisions about workers

Managing workers goes beyond monitoring them – this is in fact only one aspect of management. AI-enabled tools are also used when making decisions to hire, direct, evaluate and discipline workers (Ibid. 428).

Personal data gathered on the internet, often accessed via information available on social networks, is increasingly being used to make hiring decisions, and the practice of asking employees to disclose their social network passwords is also spreading, so that 18 individual states in the United States passed legislation explicitly banning it (Bodie et al. 2017). Aside from the already mentioned use of facial scanning powered by AI during job interviews, automated scanning of CVs is also widely used to hire and promote people (Ajunwa 2019).

Platform workers are assigned their next task by the app's algorithms, which are also designed to measure the workers' speed and diligence in

4. For instance, one Toronto-based start-up markets 'sensing headbands' that give access to real-time information about brain activities. The 'Corporate Wellness Program' of this company already promises to employers to 'help your employees lower stress, increase resilience, and improve their engagement.' See https://choosemuse.com/corporate/ (accessed 26 March 2021).

completing the tasks, including by factoring in the rating and reviews that customers assign to them. Bad scores or performance below the algorithm's standards can lead to a worker's exclusion from the platform and thus to 'dismissal' (Aloisi 2016). And this is not confined to tasks 'on-the-road'. Workers in online 'freelancing marketplaces' and domestic workers who are contracted on platforms to do work in customers' households live in constant worry over ratings and how the platforms' algorithms take ratings into account when assigning the next job (FEPS 2017).

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The way these management systems operate is rarely transparent, as companies do not share the methods by which ratings of and customer feedback on workers' activities are gathered and processed. 'Management by rating' is also increasingly spreading beyond platform work, for example in the restaurant sector, where individual waiters can be rated by patrons or their employers via an app (O'Donovan 2018; Fillon 2018).

Algorithms are often being used to implement 'just-in-time' work practices that involve offering workers shifts or contract work according to the expected business demand, thus contributing to a casualisation of work patterns and increasing job and income instability – and this goes far beyond the 'usual suspects' in the platform economy. A study conducted by various universities on retail workers, for instance, shows that algorithms aimed at fostering business efficiency can lead to suboptimal results as a consequence of these algorithms being based on a very narrow notion of efficiency which does not take into account the many hidden costs associated with schedule instability nor the pressure that this instability places on workers (Williams et al. 2018).

Data can also be processed through AI tools that rate workers on various performance metrics. In 2019, for instance, the Guardian reported that dozens of firms in the United Kingdom, including several law firms, employed AI to scrutinise staff behaviour and identify 'influencers' and 'change-makers' in the workforce (Boot 2019). Interestingly, this practice is not so new. Cathy O'Neill (2016) discussed the case of a company that in 2008 marketed a system to identify 'idea generators' in the workforce by analysing corporate emails and messaging. When the 2008 recession hit, HR managers began to lay off people by starting with those who performed poorly under these metrics. As O'Neill, a mathematician and data scientist, explains, among other things these programmes risk being highly inaccurate since they are based on limited data.

It is important to stress that these practices and tools go beyond the mere surveillance of workers. From hiring to firing, algorithmic management and AI-enabled tools are increasingly used to actually manage the workforce, replacing or 'assisting' human supervisors in their activities. To react to the most undesirable uses of these technologies, therefore, a comprehensive approach is required. This is not only about protecting privacy and data rights against invasive surveillance practices – which still remains a fundamental issue – it also calls for a reflection on other risks connected to their use and on possible strategies to limit and counter the enhancement

of managerial prerogatives via technology. The following section discusses some of the risks connected to algorithmic management.

The risks of algorithmic management

One of the recurrent justifications for introducing algorithmic management practices is that they can help eliminate the individual bias of recruiters and supervisors in managing the workforce, since these systems apply objective and neutral criteria (Bodie et al. 2017). However, a vast literature already exists refuting this claim and denouncing the risk of algorithmic discrimination.[5] This can, for instance, be caused by the biases of the human developers of these systems that are then reflected in them (European Economic and Social Committee 2017). In other cases, algorithmic decision-making systems are too rigid and unable to differentiate between situations that would warrant different decision outcomes. For instance, an Italian court recently ruled that the algorithm used by a food-delivery platform was discriminatory because it sanctioned couriers that missed their pre-booked time shifts, even though this could be due to a medical emergency or a constitutionally protected collective action (Aloisi and De Stefano 2021b).

This risk for bias in AI systems is also associated with a lack of transparency in these systems (De Stefano 2019: 24). Transparency is one of the crucial principles in data privacy law; its lack can lead to unfair processing of workers' personal data. Moreover, algorithmic management can lead to a very severe intrusion into workers' private lives when AI systems gain access to intimate information on workers (Ajunwa et al. 2017). This raises questions not only about the confidentiality of their sensitive data, but also about its quality. For instance, tracking mental states via sociometric badges, facial scanning or neuro-surveillance tools could be based on biased metrics and datasets and therefore highly inaccurate, besides being over-intrusive (O'Neil 2016).

Algorithmic discrimination threatens to propagate far beyond the single instance in which it occurs. A low rating assigned by a biased or flawed facial scanning programme during an interview, for example, could be recorded in the system and affect future recruitment processes for the employer and all other employers using the same programme. It is also indisputable that all the practices mentioned above will enhance managerial powers and prerogatives in ways unimaginable in the past.

All these practices will enhance managerial powers and prerogatives in ways unimaginable in the past.

Surveillance and strict monitoring has been a feature of workplaces since the spread of the factory in the Industrial Revolution, and it was spurred at the beginning of the last century by the development of 'scientific management', inspired by the ideas of Frederick W. Taylor. Nevertheless, the extent and pervasiveness of control that modern technologies allow represents a qualitative leap in the domination and subordination of workers. Firstly, the amount of data collected and processed by machines exceeds the capacity of any past human supervision. Secondly,

5. See, among others, Ajunwa (2019), Schubert and Hütt (2019), Eubanks (2018).

there is no technical boundary that prevents surveillance from going beyond working time and tasks – fitness and sleep-tracking apps are only the most evident example in this respect.

The fact that surveillance is continuous and relentless, as it is exerted through a panoply of tools and software that track workers' actions, also marks a radical difference from previous techniques. As already mentioned, contrary to the past, machines are now also entrusted with making decisions about people or suggesting those decisions. Data, in many cases, is not presented to human supervisors neutrally. Machines already make inferences through the data they collect and express a 'judgment' (O'Neil 2016). Recruiters and managers, meanwhile, do not typically know how inferences are made and why the algorithms suggest certain decisions, especially when companies rely on non-proprietary software and programmes (Pasquale 2015). Moreover, when these processes operate through machine learning, it is doubtful whether even their original programmer could know. But given the resources spent to acquire those programmes and software, and their technical allure (Ajunwa and Greene 2019), it is difficult to imagine a widespread resistance from supervisors to the decisions suggested by machines.

The continuous monitoring of workers may also cause an undesirable blurring of work and private life.

The continuous monitoring of workers may also cause an undesirable blurring of work and private life. AI systems are able to collect data on workers at work and outside working hours because of their constant engagement with IT devices and the internet (De Stefano 2019: 27). Some examples of this are information about workers found on social media or records of workers' sleeping patterns from wearable devices.

Moreover, algorithmic management raises vital issues concerning the occupational safety and health of workers. Dedicated studies have already argued that workers can experience high levels of stress when monitored continuously (TUC 2021). These practices, therefore, can also imply severe psychosocial risks (Moore 2019).

All of the above confirms that algorithmic management poses fundamental challenges that go well beyond the question of data protection. Algorithmic management can nullify the distinction between private life and working time, and may have discriminatory implications as well as detrimental effects on people's wellbeing. As already argued, adequate responses to these challenges must consider the entire range of risks that these practices imply and the whole set of managerial prerogatives magnified by technological tools. Crucially, collective responses are of the essence.

'Negotiating the algorithm': the essential role of trade unions

Collective bargaining is arguably still the most effective tool to provide safeguards against the rapid technological developments in algorithmic management (De Stefano 2020: 442). Collective rights have traditionally

proved essential to limiting managerial prerogatives, such as the monitoring of workers (Aloisi and Gramano 2019). They can offer solutions for particular challenges in this area in a rather flexible way – at both the sector and company level (Estlund 2018) – by taking into account the interests of workers and employers, and applying the general principles laid down in legislation in specific contexts.

Collective agreements could, for instance, lay down the specific limits of AI-enabled surveillance of workers (De Stefano 2020: 440). They could also provide criteria to improve the transparency of AI-based decision-making processes (Dagnino and Armanoli 2019) to allow for an understanding of how their outcomes are reached (TUC 2021). A recent agreement concluded by the Spanish government and social partners could lead the way here. Under the agreement, as explained by Aranguiz (2021), 'digital platforms will have to make available to trade unions an algorithm, or any artificial intelligence of sorts, which may have an impact on such conditions – including individuals' access to, and maintenance of, employment and their profiling. This right to information is granted to everyone working through a platform [...] and thus the transparency requirement applies to all digital platforms equally'. This may also help to mitigate the risk of unfair and discriminatory algorithmic decision-making.

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The importance of collective agreements in processing data rights and governing algorithmic decision-making is also recognised in Article 88 of the EU General Data Protection Regulation (De Stefano 2020: 441). This article defines collective agreements as important sources for ensuring fair and lawful data processing in the context of employment. It refers explicitly to data processing for recruitment and management purposes, which means that collective agreements could provide for adequate safeguards when AI-enabled tools and algorithmic-management practices are implemented in workplaces (Dagnino and Armaroli 2019; Hendrickx 2018). For example, they could require information on how employers use workers' personal data and how data are processed by AI systems (TUC 2021). They could also ban the most intrusive applications of technology, including neuro-surveillance (De Stefano 2020).

To conclude, the introduction of AI and algorithmic management in the workplace is enabling a pervasive surveillance of workers' activities and performance and triggering grave risks of unfettered exploitation, discrimination and OSH hazards, to an extent that even most employers would currently find hard to envision. This calls for the urgent engagement of collective actors: workers' representatives and unions must be involved in the decision-making that leads to the definition and implementation of algorithms. An *ex ante* approach is unquestionably more effective than an *ex post* damage-control approach, given the transformative use of technology in the world of labour. Crucially, collective agreements can mitigate the risks of AI-enabled surveillance and decision-making based on algorithms. They

can ensure the interests of workers are represented and emphasise the need for essential safeguards to protect fundamental labour rights. They can also offer the required flexibility to cope with the sector- and company-specific application of technologies. Consequently, it is vital that trade unions are aware of the risks of algorithmic management and that they plan adequate responses to these risks. To do this, we call on trade unions in Europe to reflect on the following questions:

— Do you know if and to what extent algorithmic management is being introduced in your country?
— Are you aware of the risks associated with these developments? Are there other risks related to algorithmic management that should be considered, besides the ones discussed in this brief?
— Does your national legislation provide sufficient safeguards to counter the risks of algorithmic management? Do you think that this legislation has to change in light of technological developments?
— How can information and consultation rights impact algorithmic management?
— How can collective agreements better provide adequate safeguards in the context of algorithmic management?
— What role can trade unions play in the regulation of algorithmic management, and how can workers be involved in tackling these practices?
— Are you aware of the draft EU Regulation on a European Approach to Artificial Intelligence (see below)? If so, are you acting or planning to act on it and, if so, how?

The proposed EU Regulation on a European Approach to Artificial Intelligence

While this foresight brief was being finalised, a Draft EU Regulation on a European Approach to Artificial Intelligence was leaked to the press.[6] This Draft Regulation raised many concerns about the use of AI at work, which were later confirmed in the final Proposed Regulation,[7] presented by the EU Commission at the end of April 2021. Recital 36 of the Proposed Regulation mentions that 'AI-systems used in employment, workers management and access to self-employment, notably for the recruitment and selection of persons, for making decisions on promotion and termination and for task allocation, monitoring or evaluation of persons in work-related contractual relationships, should also be classified as high-risk, since those systems may appreciably impact future career prospects and livelihoods of these persons'. It takes note, albeit very generically, of the potentially discriminatory impact of AI in the world of work and the risks it poses to workers' privacy. Unlike the Draft Regulation, the final proposal also explicitly mentions self-employed and platform workers, to cover them regardless of their employment status. This is a step forward.

It takes note, albeit very generically, of the potentially discriminatory impact of AI in the world of work and the risks it poses to workers' privacy.

6. https://drive.google.com/file/d/1ZaBPsfor_aHKNeeyXxk9uJfTru747EOn/view
7. https digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence-artificial-intelligence://

However, while classifying AI systems used in the context of work as high risk is appropriate, the Proposed Regulation is far from being sufficient to protect workers adequately. Annex III of the Proposed Regulation references 'AI systems intended to be used for recruitment or selection of natural persons, notably for advertising vacancies, screening or filtering applications, evaluating candidates in the course of interviews or tests' and 'AI intended to be used for making decisions on promotion and termination of work-related contractual relationships, for task allocation and for monitoring and evaluating performance and behavior of persons in such relationships'. As stated above, the Regulation provides that these systems shall be classified as high risk and, therefore, subject to specific safeguards. At the same time, it mentions that the assessment of conformity of these systems will take the form of self-assessment by the provider. This is, disappointingly, a lower-level safeguard than that put in place for those high-risk systems that require stricter conformity assessment procedures through 'the involvement of a notified body'. Furthermore, given the extraordinarily severe consequences these systems can entail, it is highly worrying that this provision was not subject to any form of social dialogue at the EU level.

If adopted, this Proposed Regulation risks prevailing over this more restrictive legislation and triggering an avalanche of deregulation in labour and industrial relations systems around Europe.

The Proposed Regulation seems to take for granted that if AI systems used at work comply with the procedural requirements it sets forth, these systems should be allowed. However, the use of AI to hire, monitor and evaluate 'work performance and behaviour' is highly problematic. Several EU national legislations ban or severely limit the use of tech tools to monitor workers (Aloisi and Gramano 2019; see also above on the new Spanish provisions on algorithmic transparency at work). If adopted, this Proposed Regulation risks prevailing over this more restrictive legislation and triggering an avalanche of deregulation in labour and industrial relations systems around Europe. This is all the more serious because these national legislations often require the involvement of trade unions before introducing any form of tech-enabled surveillance, while the draft Regulation does not once specifically mention the social partners or their role in regulating AI systems. If this proposal is not corrected, more protective national legislation may be overtaken by this EU instrument: the Regulation, in other words, risks functioning as a 'ceiling' rather than a 'floor' for labour protection.

The draft Regulation also does not explicitly take into account the need to provide the people that are entrusted with the control and operation of AI systems with specialised training and powers to counter the harmful implications of their use in the context of work. Again, any national legislation that provides for more safeguards and protection risks being trumped by the Regulation. For all these reasons, it is therefore extremely urgent for trade unions at the European and national level to be aware of these risks and to act upon them.

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