



▶ ILO Brief

▶ Sustainable Algorithmic Systems

According to European Commission, 2021¹, an artificial intelligence (AI) system means:

“...software that is developed with one or more of the techniques and approaches[...] that can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with”.

In broad strokes, for AI to work it requires three elements², (i) data, (ii) algorithm(s), and (iii) hardware: **Data** refers to information on which an AI tool could act on that is often collected from the environment. Data can be collected both by machines (e.g. through machine sensors) or a human (e.g. through employee interviews) and it can be in a structured (e.g. in a tabular form) or unstructured (e.g. textual data) form. An **algorithm**, or AI's operational logic, refers to an explicitly defined set of instructions describing how a computer

could perform an action, task, procedure, solve a problem using the collected data³. **Hardware** refers to the machine that is doing the computing.

However, many digital technologies in workplaces are often mistakenly bucketed under the term ‘artificial intelligence’. This is misleading. Many systems are neither artificial, nor particularly intelligent (Crawford 2021). Instead, a more accurate term is ‘algorithmic systems’. This term alludes to the human-constructed logic of these systems, which in turn opens the door to human agency over the design and instructions to these digital technologies.

This brief will firstly clarify the terms, then look at the most common algorithmic systems in workplaces, before examining the harms and impacts on workers. The brief ends with a discussion of the need for the co-governance of algorithmic systems and recommendations for union action.

Understanding Algorithms

There are many terms that describe the inner workings of digital systems. At the core of all digital systems are algorithms, hence from hereon we will refer to these digital systems as algorithmic systems. Algorithms are a series of mathematical operations: equations, algebra, logic, probability, calculus that are translated into computer code. This code is then fed with data, some of this data is from the real world (for example, information about your whereabouts throughout the workday), other data is “synthetic” – data that simulates the real world.

Definition of an algorithm

A set of rules, in computer programming code, or solving a problem or performing a task

Algorithms are a series of rules or instructions that from start to finish determine how to accomplish a task or solve a problem.

A helpful tip is to think of an algorithm as a recipe. The algorithm is tasked to make the best tomato soup. It has ingredients. It is instructed to cut 200 grams of onions,

¹ Page 39. https://eur-lex.europa.eu/resource.html?uri=cellar:e0649735-a372-11eb-9585-01aa75ed71a1.0001.02/DOC_1&format=PDF

² OECD, (2019). Artificial Intelligence in Society. Paris: OECD Publishing

³ More complexly in the case of machine learning, an algorithm provides parameters within which the AI would then engage/learn how to solve a problem as efficiently as possible depending on the definition of efficiency provided by the programmer to the algorithmic system. Machine learning algorithms improve automatically through experience or historical data.



fry them off, add the garlic, then use 2 cans of tinned tomatoes. The result of the algorithm will be very different if you change the order of the instructions, for example if you fried the tomatoes and not the onions.

So, what counts here is the 1. Data, 2. Instructions and 3. The order of those instructions. Hannah Fry (2018, pages 8-11)⁴ describes that there are an almost uncountable number of algorithms and that there is no consensus on how to group or classify them. She suggests to think of the real-world tasks algorithms perform, and lists four different categories:

► **Prioritising (Making an ordered list)**

You know these from your Facebook news feed - what posts do you see, which don't you? Or your Netflix or Spotify recommendations.

Ordered lists use a mathematical process to order all possible choices and return to you what it seems "best" or "fastest" etc. Think of the route recommendations you get when you ask your map app how to get from A to B

► **Classifying/ Profiling (Putting things in boxes)**

No matter what you do online, you are being classified/profiled. A student, a nurse, an engineer. A man, a woman. A union member.

You get classified by algorithms as someone most likely interested in what advertisers want to sell you. Baby clothes if you are a woman in your early 30s. Cars if you are a man in your 40s. This leads to stereotyping. Closely linked to the prioritising algorithms, these algorithms remove contents they do not think you would want. Classification/profiling algorithms are thus highly manipulative.

► **Associating (Finding Links)**

Dating apps run on associating algorithms. Matching folks to one another through connections of one kind or another. Amazon and other e-commerce sites also run association algorithms. Have you ever seen the "Other customers also bought x, y or z" message? Or the "People who bought this item also looked at this one"? These are association algorithms.

Association algorithms can include and exacerbate biases (due to existing biases in the data). This can have severe impacts on minority groups as seen in [predictive policing](#) algorithms or [credit scoring systems](#).

► **Filtering (Isolating what's important)**

Siri, Alexa, Cortana and every other digital system you can talk to are speech recognition algorithms. They are designed to filter out "noise" and focus on what they think you, and not someone in the room with you, are saying that is important. Facial recognition works in the same way.

These systems can classify words/traits they do not recognise and filter accents/faces they are not trained on as noise. For example, women and people of colour in a US call centre were consistently scored lower than their white male colleagues, as the system did not recognise their accents and tone of voice.

⁴ FRY, H., 2018. HELLO WORLD. New York: W W NORTON.

Most algorithmic systems use a combination of the above 4 categories. For example, if previous profiling systems have shown that women are perceived as more trustworthy homecare workers than men (classifying/profiling), and that a male homecare worker is most likely to find another job if he is asked to work early hours (associating), then the likelihood that a male applicant for an early morning homecare job will be called for an interview is low.

It is important to note that algorithmic systems fulfil a purpose that has defined by the developers. "Find the best candidate for a job" or "arrange the schedules of field workers to optimise fuel usage and working time". How the systems fulfil that purpose depends on the instructions to the algorithms and the data. In machine learning systems however, the way the purpose is fulfilled is not determined by set instructions, but by self-learning based on huge amounts of data.

Regardless of the type of system, it is pertinent that the system's processes, instructions and outcomes are checked, governed and evaluated by humans. This not least to ensure that the systems are in legal compliance, are ethically sound and in line with local norms, cultures and habits.

Being familiar with these groups of algorithms will help workers in understanding how various algorithmic systems in force in workplaces actually work and impact labour conditions and rights. With that unions/workers can begin to form their responses.

Algorithmic systems in workplaces

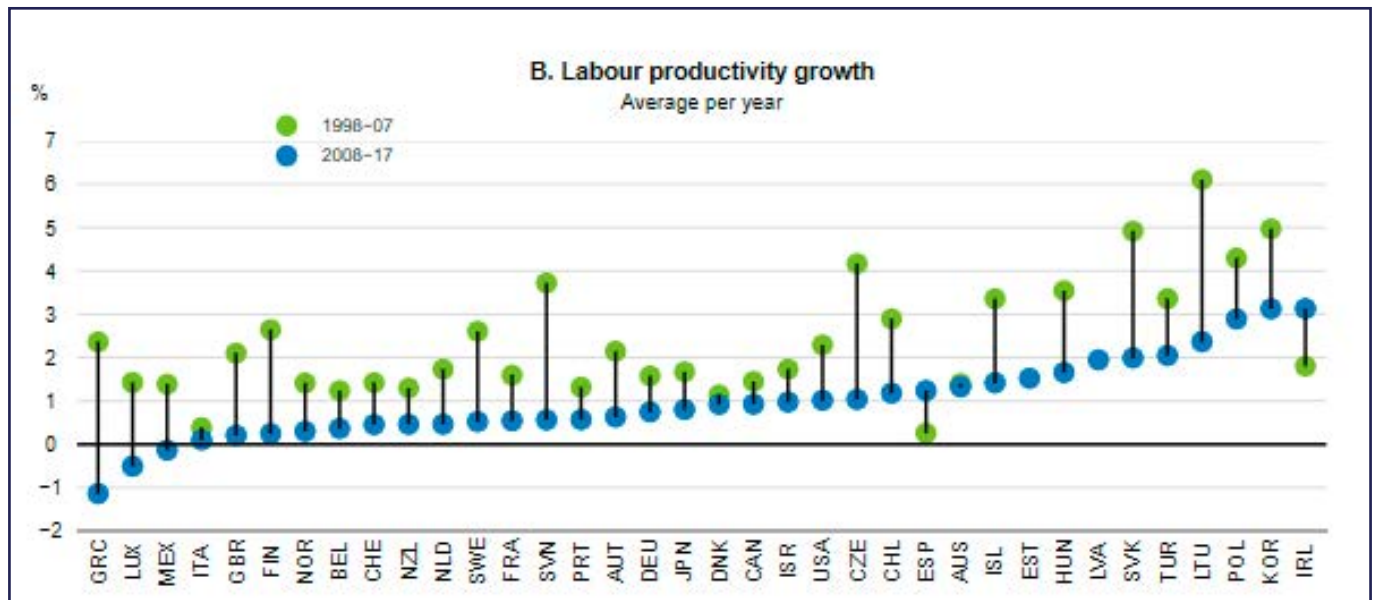
So, what algorithmic systems exist in workplaces? Here is an overview:

- 1 Candidate vetting, screening, selection (automated hiring/firing systems)
- 2 Scheduling tools
- 3 Keyboard tapping monitoring
- 4 PC use surveillance
- 5 Word & voice monitoring (evaluating tone of voice, words said, frequency of said words, "success" rate)
- 6 Workplace sensors
- 7 Productivity/efficiency measures
- 8 Facial recognition
- 9 Location tracking

It is often claimed that these systems will increase productivity and efficiency, but do they? The OECD published in 2019⁵ a report that shows that labour productivity growth in all countries bar two has declined

in the period from 2008-2017 relative to the decade before. This at the same time as digital technologies have been introduced in workplaces.

5 <https://www.oecd.org/economy/growth/digitalisation-productivity-and-inclusiveness/>



It's all about power

Some scholars, here amongst Yochai Benke,⁶ believe that the puzzle regarding the decline in labour productivity has more to do with the actual aim of digital technologies. Namely, whilst sold as being productivity and efficiency enhancing, the real effect of these technologies has to do with power and power asymmetries. This includes power over competitors, but also workers. Many digital labour platforms exemplify this. They gain significant market advantages through their business models which are built around the vast extraction of data; traffic data, consumer behaviour data, traffic flow data etc. At the same time, these business models undercut labour standards with the algorithmically determined oversupply of labour, keeping the platforms in control and labour costs down.

In other words, surveillance and electronic monitoring technologies generate data for firms that shifts power from workers to employers. Management hoards data, analyses it, and creates the narrative that is used to further consolidate power.

Working from home

Since the COVID19 pandemic, many workers have been working from home. This has led to a sharp rise in the demand for a new form of surveillance tools and systems - so-called "tattle ware". Systems that monitor workers' activity, check what internet browsing activity they have, what websites or tools they use and that can tap into phone calls. For example, the top three most popular tools are [Time Doctor](#), [Hubstaff](#), and [FlexiSPY](#), which account for almost 60% of global demand in surveillance software. [Hubstaff](#), [Sneek](#), [Prodoscore](#) and [TransparentBusiness](#) all reported an increase in customers between 400% and 600% in the first lockdown period of March to June 2020. This essentially means that the monitoring and surveillance of workers is entering into work areas and forms that are currently not adequately regulated either through law or social dialogue.

⁶ This speech by Yochai Benke is highly recommended: https://youtu.be/_YDsGSI_qUA

Harms and impacts on workers

Across the world, regulation aimed to limit the risks and rights abuses of algorithmic systems on workers does not exist, or it is not enforced. For example, the Universal Declaration of Human Rights protects workers' right to organise, yet some AI systems are used to target organising efforts. This lack of enforcement and/or regulation provides incentives for the usage of practices/algorithmic systems which have profound and often negative effects on workers' wellbeing. Even in regulated regions, such as the GDPR, unions report of the following:

1. A lack of transparency (they do not know what worker management algorithmic systems are in place). This is a breach of GDPR articles 13-157.
2. Non consultation in connection with employer's conduct of Data Protection Impact Assessments (DPIAs) - article 35. The consultation with a "representative sample of employees) is an opinion issued by the Article 29 working party⁸ and highlighted by some Data Protection Agencies, yet only a small handful of unions report that they have been consulted.

This leaves scope for the introduction of algorithmic systems that intentionally or unintentionally harm workers. Here is a list of lived harms we already know that workers are experiencing⁹:

- Work intensification - increased working time and pace of work
- Discrimination/bias in automated HR practices
- Mental health, physical health pressures
- Deskilling and job loss - contingent work forms on the rise
- Lower wages, economic insecurity, less labour market mobility
- Suppression of organising
- Loss of autonomy and dignity due to monitoring and surveillance practices as well as a loss of privacy

What is clear is that these harms are traditional union concerns. What differs from prior times is that they are not harms that are inflicted due to a violation of existing labour laws, or an ill-willed or poor boss, but through opaque algorithmic systems that are not adequately governed.

Luckily there is a growing community of scholars and activists who are looking at the benefits of participatory algorithm design¹⁰. This refers to the co-design of algorithmic systems so management and labour can agree on the purposes of a system, the data that can be used, what should be measured, when, and what shouldn't.

Nothing prevents digital technologies from being introduced that could be a benefit for workers. The following purposes could just as well be actualised:

- Lowering of over-time
- Better distribution of working time and tasks
- Protection of workers' rights
- Collective agreement compliance check
- Better, more balanced worker evaluations
- Better control over worker competencies (soft and hard)
- Better understanding of workers' and customers wishes

To prevent harms on workers, the *purposes* of digital technologies in workplaces and the algorithms and data that enable these technologies should be defined with workers, and then continuously governed together with the workers. It is to the issues of governance that we will now turn.

Governance methods - ensuring a seat at the table

Algorithmic systems could be governed in a variety of ways, either through laws, regulations, collective bargaining and/or standards and good practices. The figure below indicates the various possible and actual models. Yet, laws on governing algorithmic

⁷ <https://gdpr-info.eu/art-13-gdpr/>

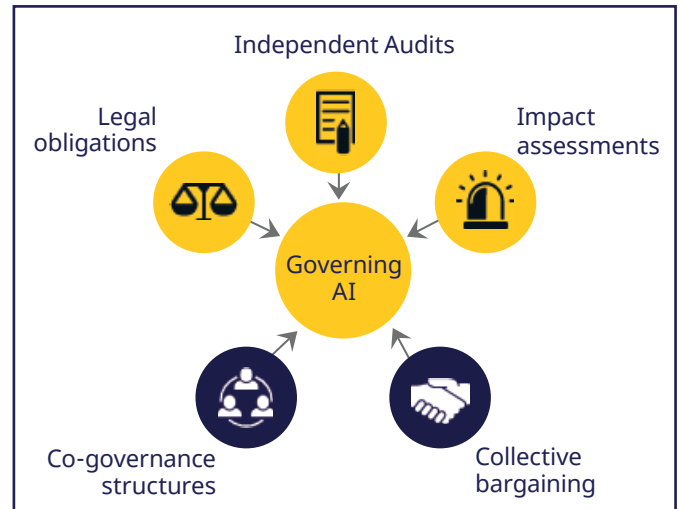
⁸ <https://ec.europa.eu/newsroom/article29/items/610169>

⁹ Moore P.V., (2019). OSH and the Future of Work: Benefits and Risks of Artificial Intelligence Tools in Workplaces. In: Duffy V. (eds) Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management. Human Body and Motion. HCII 2019. Lecture Notes in Computer Science, 11581. Cham: Springer. and <https://datasociety.net/library/explainer-algorithmic-management-in-the-workplace/> <https://laborcenter.berkeley.edu/data-algorithms-at-work/>

¹⁰ http://minlee.net/materials/Publication/2021_AIES-WorkerWellBeing.pdf

systems still do not exist in any country in the world. The EU and Washington State are in the process of drafting regulations¹¹, but these have not come effect. Whilst models for governing algorithmic systems exist¹² and mainly come out of academia and/or think tanks, strikingly few include the voice of those directly affected by these systems. This includes the EUs draft AI Act¹³, which doesn't mention workers with one word, nor social dialogue at European level. This means in turn that impact assessments, audits and ethical AI governance proposals, are unilaterally conducted by management without the involvement of workers or trade unions.

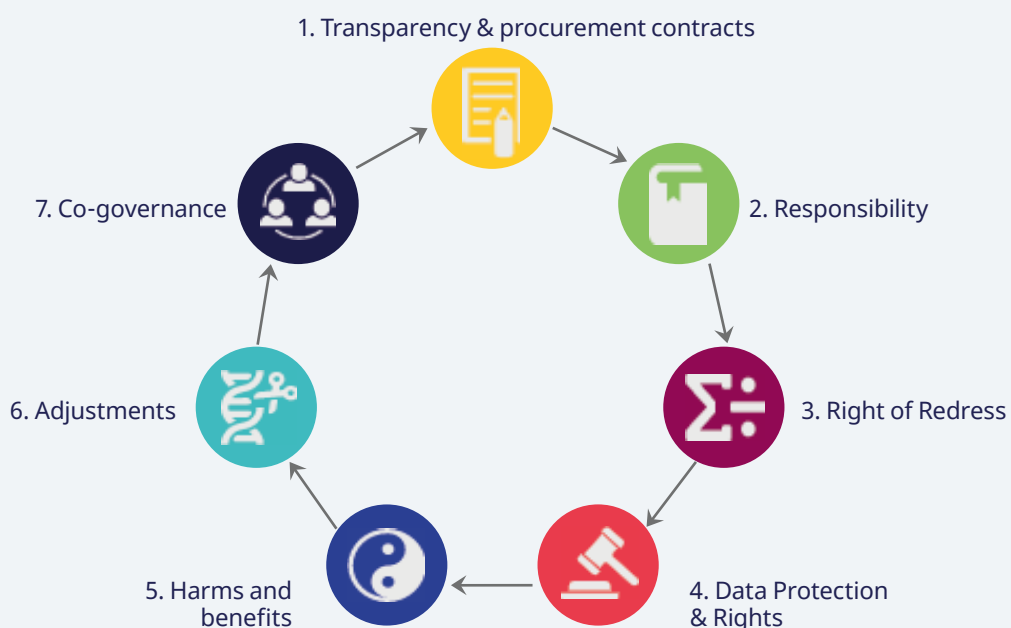
The following chapter will focus on how workers and unions could address these regulatory and practical gaps. It is important that management is held accountable to and responsible for the systems they are deploying and that the workers have clear rights of mitigation, redress and influence over what systems are used, for what purpose and with which data.



Solutions - co governance

To prevent harms to workers, to hold management accountable and responsible and to further the possibilities of co-designing these algorithmic systems so they also benefit workers, workers need to push for workplace and national regulation through campaigning and bipartite/tripartite social dialogue.

7 Governance Themes (from the Why Not Lab's Guide)



11 For EU: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206> For Washington State: <https://oag.dc.gov/sites/default/files/2021-12/DC-Bill-SDAA-FINAL-to-file-.pdf>

12 E.g. <https://royalsocietypublishing.org/doi/10.1098/rsta.2018.0080> and https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3478244

13 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206>

To support this push, Colclough (2021) has created an algorithmic co-governance guide¹⁴ that consists of seven themes and a range of questions that workers can use to begin these vital conversations. The seven themes are:

The actual questions to be asked are offered in the next sections, here follows a rundown of why they are needed.

1. Transparency and Procurement Contracts

- Workers are not always aware what algorithmic systems are in force in their workplaces.
- In addition, many of these systems are third party systems that the deploying organisation either licenses or buys the rights to use. Depending on the contract between developer/vendor and deployer (the employer implementing the system), the rights to adjust the algorithm(s) can vary. Also, it is pertinent for workers to know who (developer/vendor and/or deployer) has access and control over the data extracted.

2. Responsibility

- It is clear that the introduction of human resource algorithmic systems in workplaces is influencing and shifting managerial responsibilities. Many shop stewards report that it is unclear who they should turn to for answers and responses following automated/semi-automated managerial decisions. Is it the local/central human resources department, or the IT department? Who is doing the impact assessments and governing the effects of the technologies? Workers have a right to know.

3. Right of redress

- Given the impact of algorithmic systems on workers, workers must have the right to challenge actions and decisions based solely or not on these systems.

4. Data Protection and Rights

- In line with the recommendations in Brief 1, workers should as a minimum have certain rights to know what data is collected, for what reasons and what happens to the data post extraction.

- However, workers must also have the right to co-determine the purpose and use of these data and edit them.

5. Harms and Benefits

- These questions relate very much to probing management for what assessments or audits they have conducted on these algorithmic systems. But also, to what remedies management have in place if unintentional or intentional harms are identified.

6. Adjustments to algorithmic systems

- This theme relates to theme 1 on transparency and procurement and aims to bring into the open what rights management and workers have to amend the algorithms if harms or other adversarial impacts have been identified. This is pertinent in the cases where the deploying firm uses 3rd party systems.

7. Co-governance

- The last theme leads on from all the others and opens up for the sensibility of workers and management co-governing these algorithmic systems through collective agreements^{15,16}. Given that the managerial lines of responsibility can be far-removed from the affected workers, it is pertinent that those who have the closest contact to workers are party to the governance of these systems.
- This theme also addresses the question of whether management and workers have the necessary skills and knowledge to successfully co-govern algorithmic systems. There is a dangerous assumption in many governance models that management actually understands the potential impacts of the algorithmic systems they are deploying.

Each of the themes addresses gaps in current workers' rights and managerial responsibilities. Whilst in some regions of the world, workers will have, for example, some data protection, the issues are generic for all workplace discussions with management.

¹⁴ <https://www.thewhynotlab.com/hive/#comp-kgnmaxe1>

¹⁵ See also Moorte, P (2020) for European Parliament STOA Committee: Data subjects, digital surveillance, AI and the future of work

¹⁶ De Stefano, V (2018): "Negotiating the algorithm": Automation, artificial intelligence and labour protection

Recommendations

The threats to workers' wellbeing, working conditions and wages caused by the deployment of unregulated algorithmic systems are felt by workers across the globe. In addition to negotiating for much stronger workers' data rights (see brief 1), workers' representatives and unions must begin to negotiate the algorithm.

The guide translates into the following questions that unions/shop stewards should be asking management. Slightly modified, they are equally applicable to discussions with policy makers.

Transparency / Procurement

1. Which algorithmic systems is the employer using that affect workers and their working conditions? What are the purposes of these systems?
2. Who designed and owns these systems? Who are the developers and vendors?
3. What are the contractual arrangements between developer, vendor and the employer with regards to data access and control as well as system monitoring, maintenance, and redesign?
4. What transparency measures can be established to ensure disclosure of any algorithms being used in the digital system?

Responsibility

5. What oversight mechanisms does management have in place? Who is involved?
6. What remedies are in place if a system fails its objectives, harms workers, and/or if management fails to govern the digital system?
7. How do you ensure the system is in compliance with existing laws?
8. Which managers are accountable and responsible for these systems?

Right of Redress

9. What mechanisms can be established to ensure that workers have the right to challenge actions and decisions taken by management that are assisted by algorithms?

Data protection and rights

10. If personal data and personally identifiable information are processed in these systems, what legal and/or company protections for that data currently exist? What additional protections are needed?
11. Are datasets that include workers' personal data and personally identifiable information sold or moved outside the company?
12. What mechanisms can be established to ensure workers have the right to access and correct personal data and personally identifiable information?

Harms and benefits

13. What assessments have you and/or a third party made of risks and impacts (positive as negative) on workers' wellbeing and working conditions?
 14. How do you control for and monitor possible worker harms in these systems, e.g. health and safety, discrimination and bias, work intensification, deskilling?
 15. What is your plan for periodically reassessing the systems for unintended effects/impacts?
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Adjustments	16. What are the mechanisms and procedures for amending the algorithmic systems?
	17. How will you log your assessments and adjustments?
Co-governance	18. What mechanisms can you put in place, so workers' representatives are party to this governance?
	19. What skills and competencies do management and workers need to implement, govern and assess the digital systems responsibly and knowledgeably?

In addition, it is recommended that unions:

1. Capacity build shop stewards/staff reps and union staff on AI and data.
 - a. Consider creating a cohort of “digital shop stewards”
2. Link up with digital activists more broadly to fully grasp the technologies on the horizon as well as to know what risks and rights challenges these systems can pose to workers.