Forge Ahead or Fall Behind: The Imperative of a United Europe of Artificial Intelligence

# [ESIR Group, European Commission](https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/esir_en)

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## We urgently need good jobs

Good jobs are the foundation of inclusive growth and resilient societies. At the individual level, a good job provides the most basic human needs of food and shelter. It is also clearly a fundamental vector of social inclusion, self-esteem, and higher levels of fulfillment. The private sector is increasingly recognizing that and seeing the creation of great jobs as a way to create a clear competitive advantage in the attraction and retention of talent. But the issue of accelerating job quality is also high on the political agenda. Good jobs are key to creating healthy and safe communities. At the level of our whole society, good jobs mean that technological progress and economic growth are shared and no one is left behind. Shared prosperity via good jobs is not only a moral obligation – it is fundamental to avoid the rise of populism and dysfunction in society. The current levels of inequality in health, income, or happiness are largely driven by the deepening division of labor, technological change, globalization, and the huge resulting heterogeneity in jobs and tasks. The current level of inequality is simply unstainable. We urgently need good jobs.

In this post we hope to advance our understanding of good jobs by defining them conceptually, suggesting a new way to scan the DNA of jobs and derive new indicators of job quality and finally map where good jobs are in Europe. The goal is not to provide definitive answers on such a complex topic. Our intention is to inspire new thinking, research, and policy actions based on a new conceptual and methodological framework.

## What are good jobs?

It is hard to disagree with the fact that we need good jobs, urgently. But what makes a job ‘good’? Many frameworks attempt to measure the quality of jobs. Freedom, equity, security, and human dignity are put forward by the International Labour Organization Decent Work Indicators. The UNECE quality of employment framework adds specific indicators such as discrimination at work, work-life balance, and job satisfaction. The OECD job quality framework focuses more on economic elements and emphasizes three key areas of earnings quality, labour market security, and the quality of the working environment. These are all incredibly important elements and they should be jointly taken into account when assessing job quality and guiding policy actions. Our conceptual approach considers two key interconnected elements.

## The dual nature of good jobs

We believe that a good job is the combination of two key elements. The first element of a good job is fundamentally about human development. It empowers workers and leads to human flourishing. As labor divides when societies grow - the narrow and specific tasks that are executed by individuals, the set of relationships they entail, and the place where it takes workers should lift individuals. But a good job is not just about the individual, it is about the system itself. A second key element lies therefore in the fact that a good job should contribute to societal goals such as sustainable development, health, and global well-being. Although advertisement software engineering might qualify in terms of the first element and most frameworks discussed above, its net contribution to society is much more debatable. On the other hand, contribution to societal challenges can feed back into individual self-esteem and fulfillment. The famous encounter between President John F. Kennedy and a NASA janitor is a prime example. As JFK asked the janitor what he did for NASA, he replied, “Sir, I’m helping put a man on the moon”. The space race of our generation is to a large extent a race against ourselves to achieve a green transition and carbon neutrality. The graph representation below represents key technologies of the twin transition, in blue digital technologies and green environmental technologies. Many of the good jobs of the future will lie at the intersection of the blue and green dots to serve society at large. Using blockchain to create decentralized carbon market. AI to improve energy efficiency. Nuclear energy and geothermal energy to power data servers. As our society is incresingly interconnected good job needs to be defined both at the individual and system level.

## From technology policy to good jobs

We argue that good job policy should go beyond regulation on working conditions but also take into account this more systemic and societal approach by stimulating the creation of jobs in key areas such as the green transition. As such, good jobs and technology policy meet. As a matter of example and to illustrate this thinking the interactive below displays the creation of new green technologies (measured by international patents). What is clear is that Europe is leading1 - despite lagging behind the US and China in many other technological areas (digital in particular). We need to change the narrative. We need to track innovative potential beyond VC rounds and market cap, but also look at the societal relevance of innovation. From this vantage point, for instance, Europe has maintained a fairly stable dominant position in the green transition since early 2000. This is remarkable, in the sense that this stability happened despite the meteoric rise of China. In less than 20 years, China increased its production of green patents by almost 20x. The main loser in relative terms is the United States, from almost 30% to about 20% now. Japan is also on a declining trend since the 2008 financial crisis. The important point here is that looking at the societal level - technology policy and good jobs are intrinsically intertwined. No truly good jobs if the research & innovation policy is not set towards the triple imperative of people, planet & prosperity.

## Skills and tasks over jobs and career

Now zooming back to the individual level we need to go beyond jobs and careers and focus on skills and tasks. Jobs are a collection of tasks that require specific skills. AI automates tasks that happen to require human skills. Tasks are outsourced abroad when proximity is not needed to perform. This double disruption causes the boundaries of jobs to shift, their structure to change, and sometimes to disappear altogether if the entire portfolio of tasks can be performed by artificial brains or limbs. Looking at what elements characterize jobs and how they connect is highly informative of the overall quality of jobs. Below we present what we can learn from the clustering of elements such as abilities, education, knowledge, skills, work activities, work styles, and work values from O\*NET data. The clustering indicates the elements that are frequently associated with each other on the same occupational portfolio, for instance, complex problem-solving and working conditions. These elements and their connections represent the DNA of jobs. What is clear from this figure is the bimodal distribution of job elements, with the physical elements on one hand and the more mental/desk ones on the other hand. We observe the clear delineation of relationships, communication, cognitive skills, data analytics clusters, complex skills, and appreciation clusters (recognition, achievement, working conditions, independence). There is a strong structure in this data, and job boundaries will shift as these elements become automated. These clusters indicate elements that workers can recombine to re-invent themselves. What is interesting is that the elements sort themselves into groups intuitively indicating some sort of job quality with complex skills and elements of job appreciation at the extreme top right. Our intention here is to call for more research on the structure of elements that characterize jobs to inform about quality, risks of automation, resilience, and skilling & re-skilling policy.

## The structure of jobs & element complexity

Another way to explore how elements connect is with graph visualization. The interactive graph below shows the degree of relatedness (normalized co-occurrences) level between different elements. It means that if a worker shows a strong level in a given element, (s)he can easily move to another one. Skill-relatedness has been shown in the literature to be a powerful predictor of future skilling and upskilling and labor market resilience. At a finer-grained level, this information can be used to make useful personalized recommendations of what skills should be learned next to escape automation and poverty traps based on the very specific and unique skillset of workers. We can observe again the very sharp divide between the left side (manual) and right (cognitive) sides of the graph. The colors indicate the level of complexity of elements. More reddish colors indicate a high level of complexity, while bluer colors indicate less complexity. The complexity here uses a structural indicator from the field of economic complexity2. This structural indicator can be seen as an interesting proxy to think about the quality of jobs in the context of rapid task automation. Complex elements are the ones that are highly in demand by many but are hard to train humans and machines for.

## Complex elements are associated with better working conditions

Complex skills are the future of AI-human work but what is interesting is that the cluster of complex skills forming with elements such as complex problem solving, judgment & decision making, and deductive & inductive reasoning is strongly associated with the appreciation cluster that combines recognition, achievement, working conditions or independence. Complex skills tend to correlate with excellent working conditions because leverage is on the side of workers. Therefore, accelerating the development of complex skills and tasks is fundamental to improving human-AI complementarity rather than substitution.

## Where are good jobs in Europe?

Assuming one does a good job in measuring the quality of jobs, a maybe bigger question is good jobs for whom? Or where the good jobs are located. To produce the interactive map below we combined the previous O\*NET structural data with the EU Labour Force Survey of the International Labor Organization at the regional (NUTS2) level. What is clear is that border effects are smaller than expected. In fact, it is hard to even distinguish national borders. This leads to the idea that good job policy should not only be a national level matter but also of a higher level of governance (EU). Another striking result is the clear West/East divide, with the jobs requiring complex elements concentrating in the West and less complex ones concentrating in the East. To a much lesser extent but also visible is a North/South divide. But maybe the most striking pattern of all is the extreme concentration of good jobs in the capital EU cities. This is true for all countries, but the pattern is even stronger in less developed countries. This marked geography of good jobs means that we also need to take into account regional patterns of specialization to fully accelerate the creation of good jobs.

## Conclusion

Andrea: I’d be interested to read your concluding thoughts.

## References

1. Renda, A., Balland, P.A. et al. (2023) Industry 5.0 and the future of work, ESIR Policy Brief No 4, European Commission’s Directorate-General for Research and Innovation, Brussels.
2. Balland, P.A., Broekel, T., Diodato, D., Giuliani, E., Hausmann, R., O’Clery, N. & Rigby, D. (2022) The new paradigm of economic complexity, Research Policy, 51 (3): 1-11.

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