

# Human Factor Analysis in the ALCHIMIA Project

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## Introduction

The ALCHIMIA project has elicited the requirements of stakeholders, including shop-floor workers, to provide a digital solution (consisting of AI and Big Data) that will be human-centered. The project also aims to adopt the principles of ALTAI for ethical AI, and aspires to the goal of Industry 5.0 (I5.0).



Cardiff University social scientists are leading the work packages which are aiming to understand organizational and employment implications (e.g., work organisation, worker autonomy, decision-making, tacit knowledge use, skill use, safety) of the ALCHIMIA system, including emerging skills and training needs, which will serve as key requirements for the whole project. The optimization of production processes approach of the project seem to imply minimal impact on workers. However, potential workplace issues that could arise from the ALCHIMIA system include increased surveillance, skill needs, and job displacement.

## Methods

- Phased approach with an ex-ante and ex-post framework
- The first phase (ex-ante assessment) included completed desk research to scope the field and then surveys and qualitative interviews (individual and group) to understand current perspectives at each of the four case sites of the ALCHIMIA system
- The second phase (ex-post assessment) will build on phase one to deliver a post-insertion survey and evaluation interviews
- All aspects are being quantitatively and qualitatively assessed and summarised in a theoretical model of green technological effects and acceptance.

## Results

- The evaluation indicated that the ALCHIMIA project is well aligned with the human centered design (HCD) principles
- In general, interview and survey respondents indicated strong support for the aims and objectives of the ALCHIMIA project
- However, there were both positive and negative imaginaries of a future with the AI platform:
  - Positive: upskilling, augmenting workers capacities, helping with tasks and decision-making
  - Negative: de-skilling, blurring accountability for decision-making
- Negative imaginaries mean there is more to do to meet the guiding principles of the project:
  - ALTAI - human agency and oversight; technical robustness' data governance; transparency; accountability
  - European Trade Union Institute - 'ensuring the exercise of the 'right to explanation' regarding decisions made by algorithms or machine learning models...[and] boosting workers' autonomy in human-machine interactions

## HCD Recommendations

- More structured, frequent and intense communication and collaboration between users, stakeholders and developers - to prevent misunderstandings affecting the technological design
- More general information for workers within plants, ensuring that workers (users) have clear and honest explanations as to why a new technology is needed and the likely consequences for the company and their jobs
- More interdisciplinary working between the social science and technical partners to ensure a newly developed technology can work as intended and align with HCD principles.



## Next Steps

- Conduct ex-post phase fieldwork (qualitative interviews and survey)
- Produce guidelines for trust, safety and human use of AI tools in heavy industrial environments, including recommendations for human-centered technology development and insertion
- Produce skills development strategy, training, education plan and products.