

PARIS - NOVEMBER 14, 2024

**FORESIGHT**

**FOR OCCUPATIONAL  
SAFETY AND HEALTH**



# Highlighting OSH Issues Arising from Work Transformations

Various Prospective Approaches  
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Conférence INRS - FOSH - 14/11/2024

# Watch and foresight mission of INRS

- Since 2013, it has been carrying out foresight exercises on changes in the workplace.
- At the same time, it is actively monitoring certain issues that have been identified as likely to have a major influence on changes in working conditions and, consequently, occupational risks.
- <https://en.inrs.fr/inrs/strategic-plan/foresight-exercise.html>

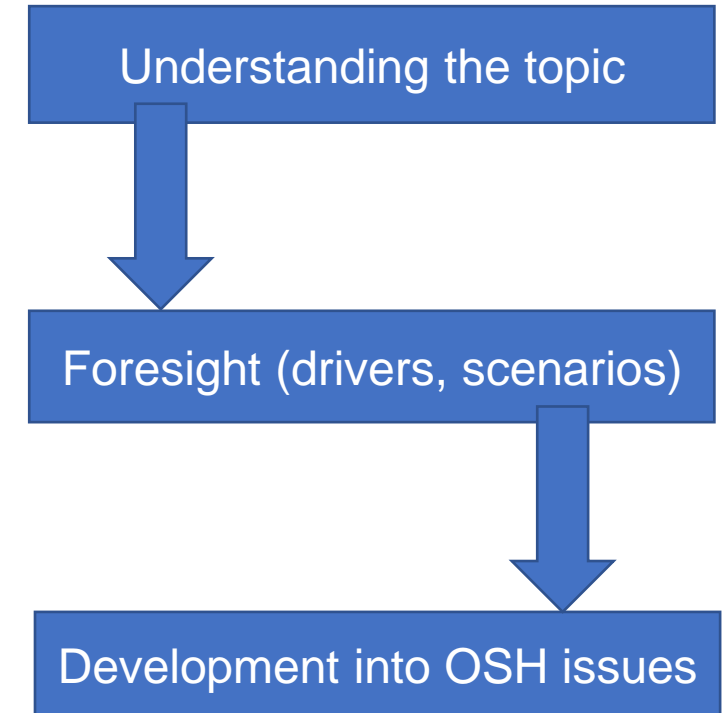


# Past exercises

1. Use of physical assistance robots by 2030 in France
2. Manufactured nanomaterials by 2030.
3. Production methods and processes in 2040: what consequences for health and safety in the workplace?
4. Platformisation 2027. Consequences of uberisation for health and safety at work
5. Circular economy 2040.
6. What kind of occupational health and safety training in 2027?
7. Work after the Covid 19 pandemic
8. The buildings of tomorrow. What are the OSH issues?
9. AI in the service of OSH: challenges and prospects in 2035
10. Work in 2040 - Management methods, OSH issues
11. Demographic trends by 2050 and OSH issues (in progress)

# Some permanent principles (1/2)

- Whatever the subject, the main output concerns health and safety in the workplace, and more specifically the prevention of occupational risks.
- Funnel logic



# Some permanent principles (2/2)

## A multidisciplinary approach :

- Creation of a working group - 8 to 15 people – from partner organisations
- expert group consultations
  - Work in 2040 : More than 60 experts, company directors and students were approached: 16 interviews, 6 company visits, 34 workshop participants
  - AI at the service of OSH : A 16 members project team, with experts in strategic foresight, OSH and AI specialists, INRS researchers and representatives of external partners. 7 meetings

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# Methodological approaches

# Method of the contrasted scenarios

- Mapping of the drivers :
  - Driver sheet : historical background, trends, and main perspectives of evolution
    - Definition of two to four hypothesis

|           |                      |                      |               |               |
|-----------|----------------------|----------------------|---------------|---------------|
| Driver #1 | Hypothesis #1        | <u>Hypothesis #2</u> | Hypothesis #3 | Hypothesis #4 |
| Driver #2 | <u>Hypothesis #1</u> | <u>Hypothèse #2</u>  | Hypothesis #3 |               |
| Driver #3 | Hypothesis #1        | <u>Hypothesis #2</u> | Hypothesis #3 |               |
| Driver #4 | <u>Hypothesis #1</u> | Hypothesis #2        | Hypothesis #3 | Hypothesis #4 |

- **Scenario #1** results from the combination of **hypothesis #1** of driver #1 with **hypothesis #2** of driver #2, and so on.
- **Scenario #2** results from the combination of **hypothesis #2** of driver #1 with **hypothesis #1** of driver #2, and so on.

# An example of the scenario method

## Scenario 1: The digital giants impose their solutions and vision

- Technological exuberance continues in a context of competition to master AI, main players are the digital giants, who control innovation. Governments have to deal with these players,
- Regulation is fragmented between states and influenced by these giants.
- Automation is advancing and surveillance is becoming the preferred tool for workplace safety.

## Scenario 3: Democratic development

- Global economic growth, generating employment and enabling investment in training,
- Development of processes for democratic control of AI by workers and citizens, 2030s: Growth of hybrid AI systems
- The ethical principle of explicability is established as a key to appropriation.
- Collective trust in AI is put at the service of health and safety at work.

## Scenario 2: States guarantee a framework for AI development

- Rising environmental concerns and an increasing number of problems causing harm to individuals or businesses,
- Governments are tightening the regulatory framework for AI,
- Decision to develop sober AI systems, Better control of manufacturers,
- Supervised use of AI in the workplace, provided that the devices are not dangerous.

## Scenario 4: The decline of AI

- Technological advances, widespread digitization of society, new ways of organizing work,
- AI is generally well accepted because of the promises it brings : automation, productivity, quality for the employer ; reduced drudgery, safety for workers.
- 2030: Disappointment with applications in the field, system failures leading to incidents, accidents or crises, Rejection of AI systems in the workplace.
- Decline of this technology and its professional uses.



# Method of design fiction

- Design fiction is a discipline that use fiction (like stories, characters) and design (for instance creation of objects or documents) to embody future perspectives in a more concrete way.
  - The use of design fiction has several aims:
    - First to embody in concrete terms trends identified through fictitious workers and companies.
    - Secondly, to facilitate appropriation and open up conversation and debate with OSH experts.
- Design of fictitious personae and companies from 2040 and stories of working conditions most likely to encourage OSH risks in these organizations.
  - Method:
    - Retro & prospective analysis to identify current transformations, evolution of the main management trends, identification of 12 main work dynamics
    - Development of workers profiles, based on various characteristics : gender, age, status, qualification
    - Development of company profiles based on external drivers (climate change, automation, ageing,...) and new work dynamics (telework, new work organization, outsourcing,...)

# An example of design fiction : 8 companies and 10 personae





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accueil



emplois



réseau



actualités



messaging



s'engager

Humans@Work



CO-PEINT

COMPAGNONS COBOTISÉS

## Presentation of Co-peint:

Co-peint was founded in 2034, based on the observation that construction workers were being unfairly exploited by specialized platforms, and that self-employed workers and very small businesses were encountering difficulties to access the most high-performance cobotic equipment: tracked painting robots, equipped with high-precision spraying drones and articulated arms. We have chosen the Coopérative d'Activité et d'Emploi (CAE) status for an alternative, fairer and more humane model. Our workers are all salaried contractors, managing their worksites autonomously and contributing to a common fund. As such, they can use the cooperative's cobots on pre-booked slots. The availability of slots depends on the seniority of the journeymen and their status. Associate status in the CAE is open to companions from the third year onwards, and enables them to become co-owners of the cobots. Co-peint is committed to a more inclusive and supportive construction industry. Our model enables some painters to avoid losing their jobs at the end of their careers. That's why the public authorities pay for cobot training for senior journeymen.



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messengerie



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Humans@Work



### About me :

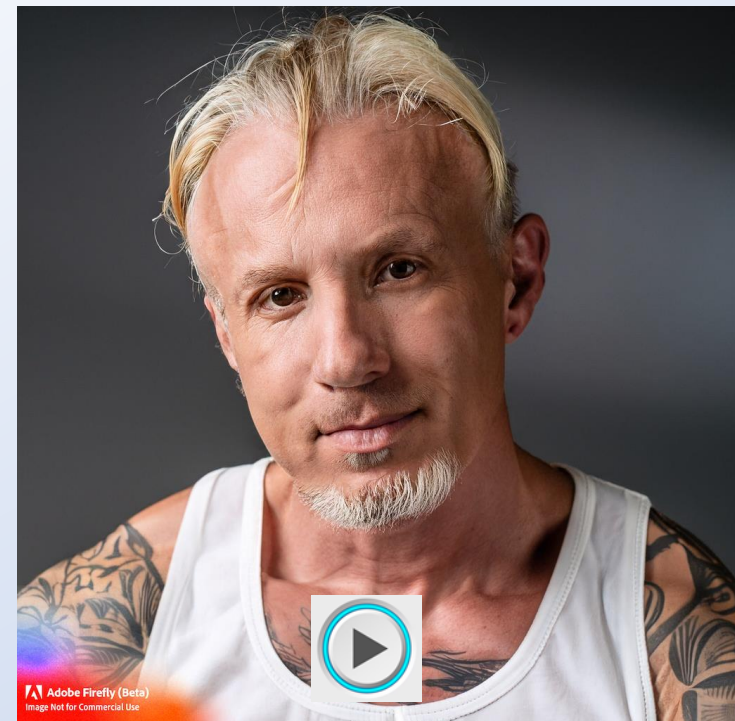
I love building sites: I love renovating or giving a soul to houses, flats, offices, shops and so on. Each site is also a new human adventure made up of new encounters. To think that I almost gave up this job because of the physical problems it caused me... Since I joined Co-peint, I can rely on the latest generation of cobots to carry out the most difficult tasks. Professional equipment. I concentrate on what I like best in this job: working with my clients, helping them choose the right paint, the right materials... Controlling my cobot to the millimetre. And listening to loud techno-metal while I work. It's a blast! Co-peint is also a great human adventure, where everyone contributes their bit to the edifice, and the community pays you back in kind. One for all, each to his own project, but all for one: a common crate and cobots to share !

### Expérience :

- Since 2038: Contractor house painter employed at the Co-peint cooperative: carrying out interior and exterior painting work.
- 2037: Rehabilitation / reintegration
- 2029-2036: Manager of a very small building painting business. Up to 3 employees under my responsibility.

### Training :

- CAP (vocational training certificate) as a coating applicator
- 2037: Further training leading to a qualification: "Working with a Cobot", option "painting in the building trade".



**Guillaume M.**

**Cobot pilot house painter**

Age : 63 years old

Town : Strasbourg

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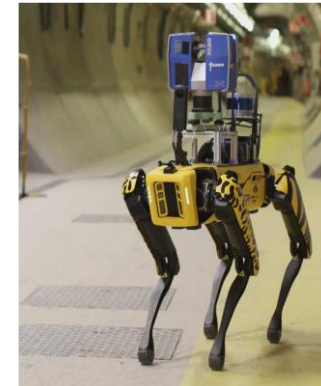
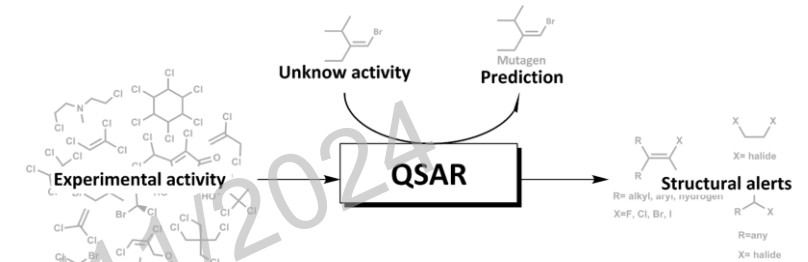
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Following steps :  
OSH developments



# Tech, population or sectoral case studies

- Exemple : Foresight study on AI at the service of safety and health
  - Three main areas of uses :
    - applications in toxicology, epidemiology and accidentology
    - technologies for securing work environments
    - advanced robotic



# OSH workshops

Discussion with multidisciplinary experts studying work to collect their analysis based on our foresight production (20 to 30 OSH experts)

## 4 Steps:

- Preliminary introduction meeting by video
- Scenarios and/or design fiction sent out
- Instructions for each expert to produce a note on risks and opportunities for prevention
- A physical workshops to:
  - Discuss future challenges identified
  - Develop some potential courses of action for OSH players

To conclude: Conference on our results

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# Results & benefits



# Three main transformations studied (1/3)

## Technological transformation

- Long process of automation since the 80's : Automation, robotisation, AI
- Several associated risks already identified:
  - Fear of dequalification or even job loss (more specifically for medium-skilled employees).
  - Threat on privacy as well as on workers autonomy (algorithmic management)
  - Declining workers' confidence due to unpredictability and lack of transparency
  - Workers losing their sense of responsibility and their ability to exercise caution.
  - Intensification and increase in the complexity of work.

But, tech innovation can also bring some progress to the working conditions (environment surveillance, prevention of accidents, limitation of arduous tasks)

# Three main transformations studied (2/3)

## Climate change

- 7 categories of hazards, which may expand in the future:
  - Increased ambient heat ; air pollution ; exposure to ultraviolet (UV) radiation ; extreme weather events ; vector-borne diseases and the expansion of (vector) habitats ; industrial transitions and the emergence of new industries ; and changes in the built environment.

Circular economy, is part of the mitigation strategy. Main challenges for occupational risk prevention have been identified:

- Companies to modify their manufacturing processes,
- Extending the life of products will have an impact on maintenance and repair operations frequency,
- Development of first- and last-mile operations,
- Traceability of recycled components is critical to risk management.

# Three main transformations studied (3/3)

## Demographic evolutions

2050 in France:

- Over-50s will be 44% of the population ; over-65s : 27% (22% in 2024).
- There will be 4 million dependent senior citizens (compared with 2.5 million today).
- The stability of the working population depends on our society's ability to keep ageing people in work
- Other levers are: migrant workers, automation, young workers.

Main challenges:

- Some sectors already enduring severe pressure will become at risks (eg. health / ageing sectors)
- Preventing arduous work as soon as people enter the labour market is key to keeping people in work
- The integration of migrant population has to be organized, this population has to be trained to our prevention culture,
- Transmission of safety knowledge and know-how may become more complex
- Recruitment pressure could become an opportunity to develop occupational risk prevention policy,
- New innovations will emerge to maintain people at work ; they may bring new risks and need to be assessed

# Main Results

No new risks, but development of existing risks via new risk factors:

- Growing importance of PSR due to:
  - Work intensification ; Lack of autonomy ; Lack of meaning
- Polarisation of working conditions
  - Qualified workers benefits from more opportunities, less dangerous work, social advantages
  - Less qualified workers more vulnerable to job loss, lack of social protection, intensification (eg. platform workers)
- Increasing complexity of risk prevention activity
  - A more and more fractured world of work facing rapid and numerous technological and organizational changes
  - Increasing overlap between public health and occupational health issues

# Main area of action

- Work transformations also offer us opportunities for preventive action
- Work to ensure that OSH principles are taken into account in the standards and regulations
- Enabling working conditions to be improved **on the basis of real work.**
- Social dialogue
  - Integrate **collective discussion forums** on work into all forms of activity management in order to establish effective social and professional dialogue
  - Role of prevention experts could evolve in supporting social and professional dialogue within the organisations in which they work,
- Training:
  - of the workforce ; management and equipment designers ; prevention professionals
- Pursue research effort on the impacts on work conditions of the ongoing transformations

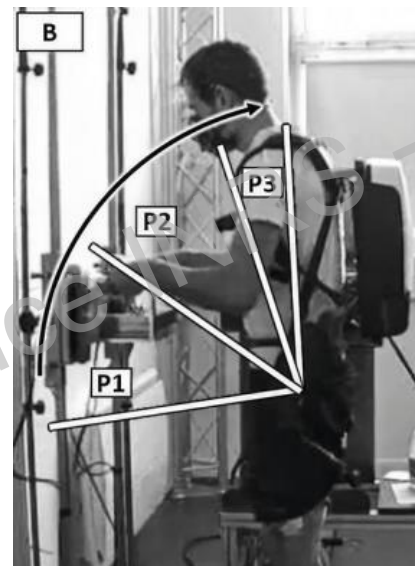
# Practical benefit of foresight exercises (1/3)

On a direct field: the exoskeleton example

Foresight

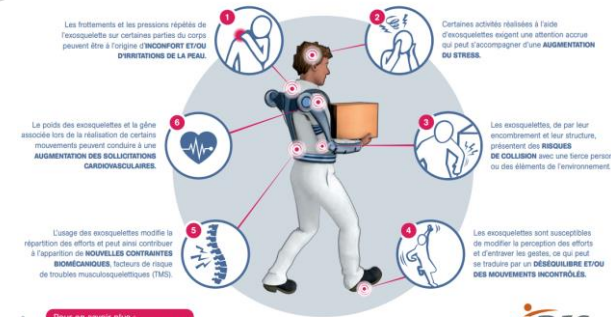
Research

Support



## Exosquelettes au travail : 6 points de vigilance

Les exosquelettes peuvent soulager les opérateurs mais... leur usage n'est pas sans risque.



- Information
- Advice
- Standardisation

# Practical benefit of foresight exercises (2/3)

On a direct field: offsite construction example

Foresight

Instruction

Support



- Involvement in standardisation process



# Practical benefit of foresight exercises (3/3)

## On an indirect field: partnerships

### OSH Players



### Research institutes in other fields



### Public authorities



### Companies



### Foresight experts





# Conclusion

We don't do foresight to tell stories, even if it's very pleasant...

The aim is always to continue and improve our occupational risk prevention mission in the future.

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**Thank you !**