

36th Summer University on Ergonomics

Gyöngyös, 3-4-5 July 2024

What if the human factor was truly involved in Industry 5.0

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Reminder : organisation of the profession

What is FEES?

A Federation of European
Ergonomic Societies, including 26
national representatives

A purpose :

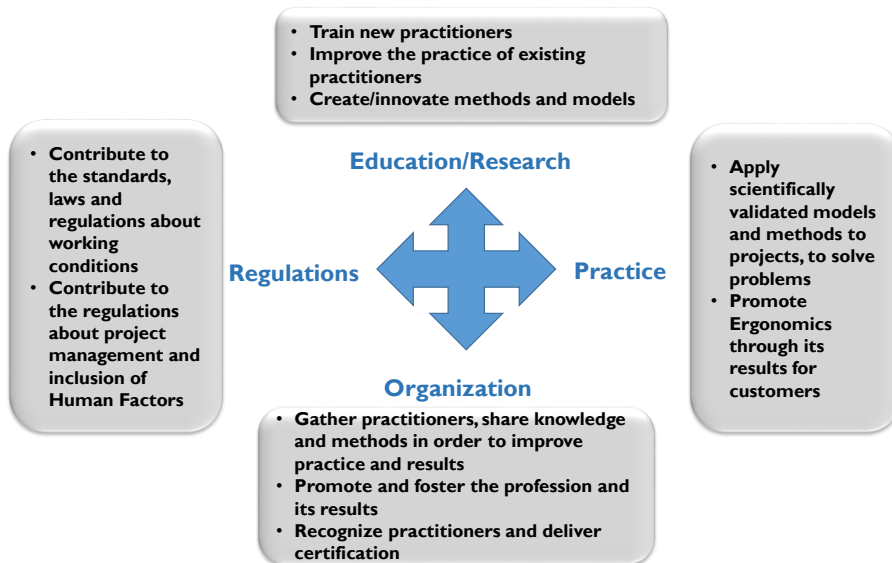
- Contribute to share knowledge,
- Foster the relations between practitioners, researchers and other stakeholders
- Establish relations with various organisations
- Give a hand to national associations as far as needed



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4 important pillars for our profession


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What if the human factor was truly involved in Industry 5.0

You said Industry 5.0????

	18° Industry 1.0	19° Industry 2.0	20° Industry 3.0	First part of 21° Industry 4.0	What's next?
Main technical change	Use of steam and mechanization of production. Steam engines replace human muscles and animal power	Electricity, gas, oil , internal combustion engine, chemical synthesis,... First production lines, industrialization	Information technology : electronics and computing Beginning of automation of production lines.	Production machines capable of exchanging information , triggering actions and controlling themselves autonomously without human intervention. Interconnected networks, algorithms, digital spaces	
Reliability, incidents, accidents,	Paris: explosion of the Grenelle powder factory in the middle of the urban area	Lyon, (Rhône, France), the Drerheims, a steamer, performs its first tests on the Rhône near the left bank. Its boiler explodes, and it sinks immediately, 28 dead and many injured	Seveso (Italy), the explosion of a chemical reactor causes a large-scale ecological disaster. 193 people are affected by chloracne and other symptoms. 70,000 animals will be slaughtered to prevent dioxin from entering the food chain.	Toulouse (France)- explosion of the AZF chemical plant. 30 dead and more than 2,500 injured, and also causes significant destruction throughout the southwest of the city; And... Beyrouth harbor, Lubrizol (Rockton, Rouen), Leverkuzen,...	

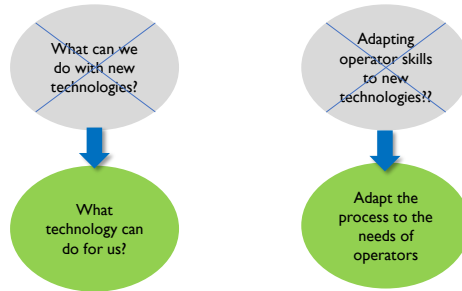
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You said Industry 5.0????

Human centered approach



<https://op.europa.eu/en/publication-detail/-/publication/468a892a-5097-11eb-b59f-01aa75ed71a1/>

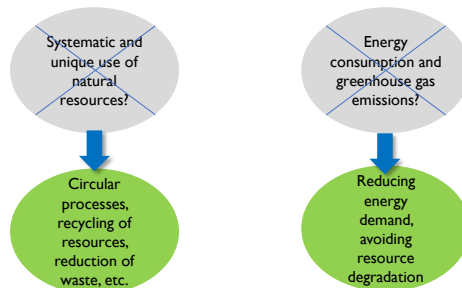
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Sustainable industry



<https://op.europa.eu/en/publication-detail/-/publication/468a892a-5097-11eb-b59f-01aa75ed71a1/>

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Resilient industry



Industry 5.0 will in fact be an application of **business strategies by companies**. The criteria for developing these strategies are recommended in the European Commission document

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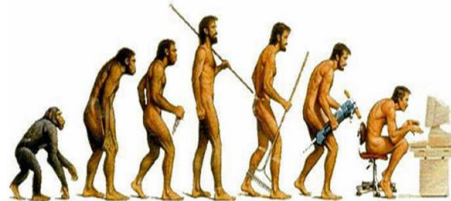
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What if the human factor was truly involved in Industry 5.0

What pragmatic changes for operators?

The first extension was the tool directly manipulated by hand:
Biface, stick, hammer, pliers, blowtorch...



A few millennia for the first tools. Then a geometric increase in our knowledge and achievements. The estimate is a doubling of our knowledge every 4 years at present.

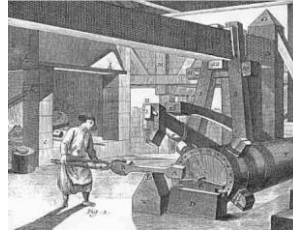
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What if the human factor was truly involved in Industry 5.0

What pragmatic changes for operators?

From the 17th century:
appearance of machines, for
example weaving looms, or
mechanical forges, which lead to
difficult developments that we
know for the professions
concerned.



Beginning of the alleviation of physical constraints. From this point on, the “strength” component of our activities diminishes. We mobilize external energy.

What if the human factor was truly involved in Industry 5.0

What pragmatic changes for operators?

From the 20th century:
appearance of controlled
equipment



Beginning of the reduction of cognitive requirements. The machine performs analyzes and issues commands without human intervention

What if the human factor was truly involved in Industry 5.0

What pragmatic changes for operators?

Second half of the 20th century:
Supervision rooms including
folded sheet metal synoptics
gathered information and
actuators.

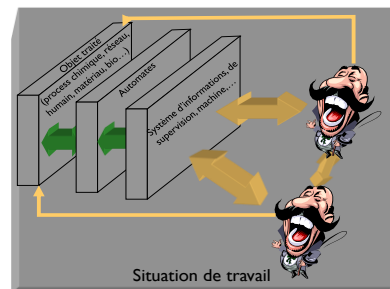


Distance between the operator and the system. A small number of operators can manage an entire factory. Human activity is transforming, with a sharp reduction in manual operations, in favor of system supervision activities.

What if the human factor was truly involved in Industry 5.0

What pragmatic changes for operators?

Today, we have several layers of systems that are interposed between the operator, the team and the components of the process.



New requirements for operators: what does the machine do?
What does it want to do? For what? – Need to understand the situation

What if the human factor was truly involved in Industry 5.0

An example of REX

- Steel industry
- Emergency call from director

Major renovation work was carried out on the galvanizing line, with changes to the galvanizing process, and a transformation of the control room for this process.

Former Mattes removing workstation



With the Mattes removing workstation, the installed robot should have improved working conditions, with support for operations carried out by the teams, and a significant reduction in the frequency of interventions.

But the robot does not work, and working conditions are degraded by a lowering of around 30 cm in the bath reception area.

Strike announced; degraded working conditions generate anger

What if the human factor was truly involved in Industry 5.0

An example of REX



New working situation, with the robot



What if the human factor was truly involved in Industry 5.0

An example of REX



**Short-term
“Agricultural”
solutions**



What if the human factor was truly involved in Industry 5.0

An example of REX

What missed in this new equipment

The designing process was based following the **written operative processes**, which are a good source to start understanding work situations.

But they lack information about the **operative strategies the operators build**

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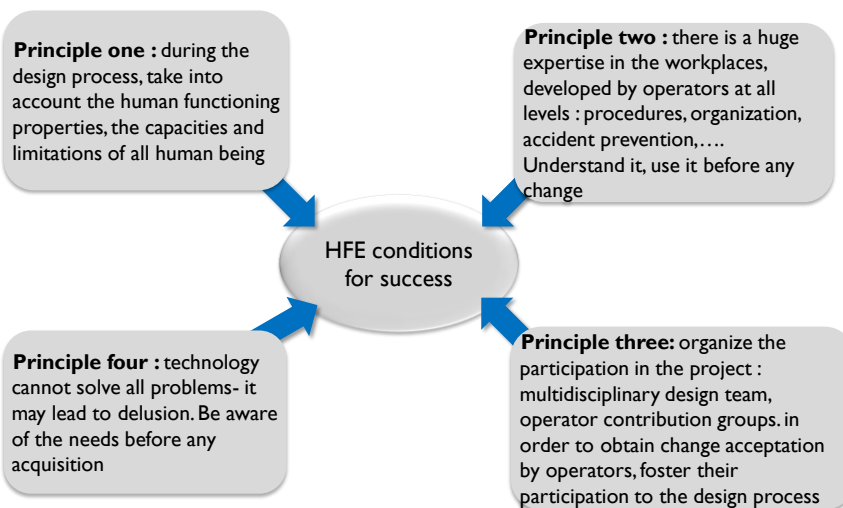
An example of REX

What a HFE specialist can do in this « too late » situation

- Understand the requirements of the task by direct observation and interviews
- Design solutions in cooperation with operators
- Design solutions with technical engineers
- Establish a requirement sheet in order to improve the robot as far as possible

What if the human factor was truly involved in Industry 5.0

But this kind of issue may be prevented





***What if the human factor was truly involved in
Industry 5.0***

**Thank you for your
attention**