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The simulation approach of labor realization conditions in the era of digital tools

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I - The stakes of simulation

II - The tools

III – The simulation approach

IV - Example

V - Issues / Outlook

- Change is part of companies' daily live
- Change has a lasting impact on working conditions
- The impact of changes must be anticipated
- Simulation should facilitate this anticipation

2D plans - sketches

Volumetric models (cardboard, up to scale 1)

3D Digital Simulation

AUTOCAD 3DS MAX SketchUp

Dynamic 3D Digital Simulation

FlexSim problem solved.

Virtual Reality

VIVE

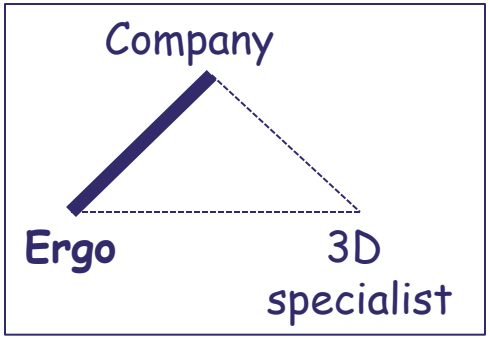
Public device 1:
Ergonception
Aract Basse-Normandie
2009-2010

Public device 2:
Simul&Ception
Aract Basse-Normandie
2011-2012

III - The simulation approach

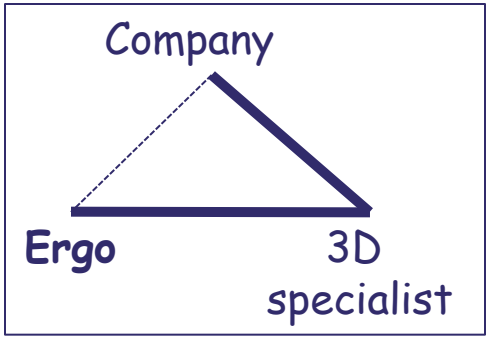
1. Analysis of the design project
2. The diagnostic
3. Scenario writing
4. Dynamic 3D Digital Simulation
5. Deliverables to the company

The diagnostic



- Interviews and observations:
  - Goals = characterize:
    - Flows
    - Process steps
    - The sequences of actions in time and space
    - The division of tasks
    - Constraints / Resources
    - The needs in work

Scenario writing



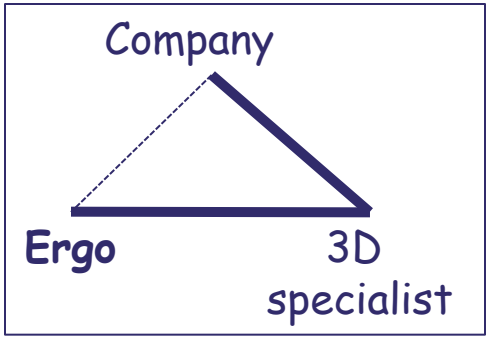
- Define what to simulate

- Propose changes (spatial, organizationnal)

- Transmission of additional informations/data required by the 3D specialist provider
  - process time,
  - Frequency and duration of hazards,
  - Chronicles of Activity
  - Photos, movies, layout plans…

- Many informations exchanges

Scenario writing



- Modeling the object to design (space, work station, tasks…), from:

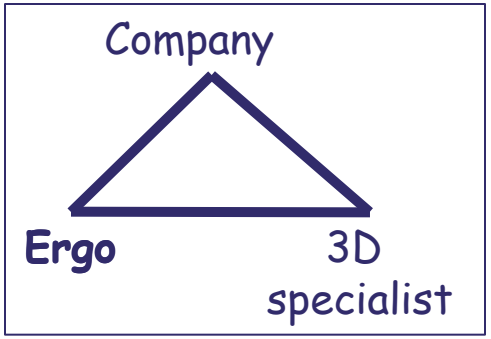
The current situation

Reference situation (s)

Working draft

> Links with the potentialities of the tool(s) and the complexity of the object to simulate

Dynamic 3D Digital Simulation



- **Working groups**:

  Goals:

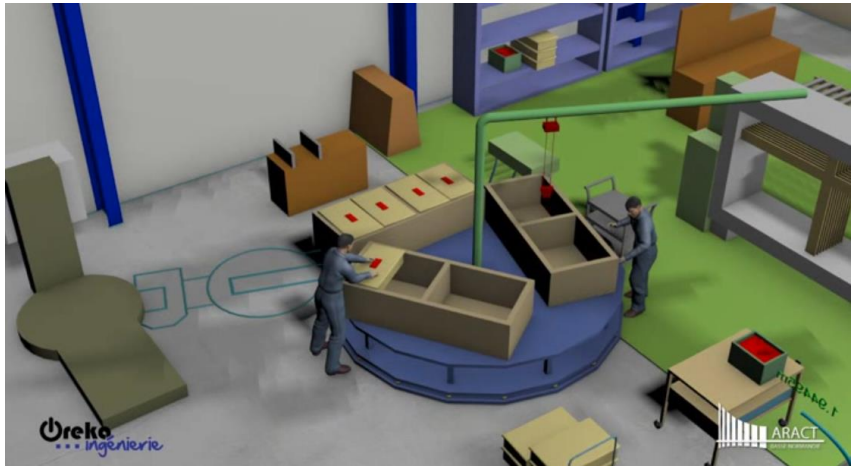
  - Testing scenarios, pre-defined in the previous phase, simulating the future activity in order to validate or invalidate them.

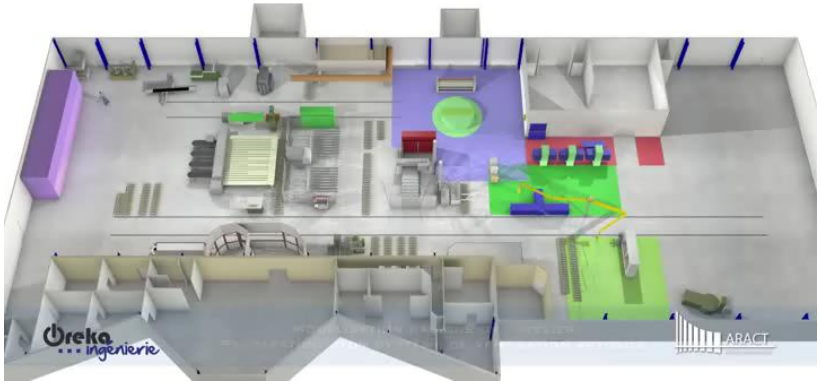
  - Promote the emergence of new scenarios, wich will then be tested in real time (or later, depending on he potentiality of the the simulation tool)

- Group composition:
  > Employees, management, company director (?), 3D simulation provider, ergonomist
  > + external partners: OSH Experts (Occupationnal physician, CARSAT, MSA…), Contractor (Architect)

Public device « Simul&Ception »

Reorganization of a kitchen production workshop




Oreka
ingenierie
ABACT

What are the advantages of 3D dynamic simulation ?

- Time saving

- Traceability of what has been simulated to report outside the working group.

- Best way to project in the future activity (immersion)
  - > fast adoption of the simulation tools
  - > fast adoption of the future work station/place

- A more global approach thanks to the multiplicity of variables that can be intergated into the tools.

- Taking account of almost all the dimensions of the working conditions.

- Promotes collaborative work with future users and co-design approach.

What are the « limits » of these digital tools ?

• Measurement of effects on productivity is easier than effects on health. Improvements are essential to bring our issues on working conditions to the top.

• Tools that can easily be used with wrong or partial data, based on prescribed work or an ideal mode.

> A vigilance to have on the integration of data based on the real work (taking account of malfunctions ans hazards)

• Technical abilities: limited control besides the digital simulation provider

THANK YOU !

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http://www.normandie.aract.fr