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NEW WORKPLACE PARADIGM?

FROM THE AUTOMATION ERA TO THE DIGITAL MEDIA PERVASIVENESS

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INTRODUCTION

CONNECTIVITY, TECHNOLOGIES & NEW MEDIA ARE DRAMATICALLY CHANGING THE WAY WE…

…COMMUNICATE

…BUY

…LEARN

…TRAVEL

…CREATE

…DRIVE

…SOCIALIZE

…LIVE

…TRAIN

…EAT

…READ

…WORK

COLLABORATION AS COMPETITIVE ADVANTAGE

- Manufacturing industries through collaboration will gain a competitive advantage.
- Companies will get:

FASTER PRODUCT CYCLE

FASTER SALES CYCLE

FASTER ECONOMIC GROWTH

…BUT ALSO TO A LESS WORK-LIFE BALANCE!

MANUFACTURING TECH & TRENDS

ICTs allow manufacturing industries to collect, process and measure big data in real time.

Electronic devices connect workers and factories through the Internet.

The Internet of Thing enables connected devices to talk to each other.

SMART MAINTENANCE

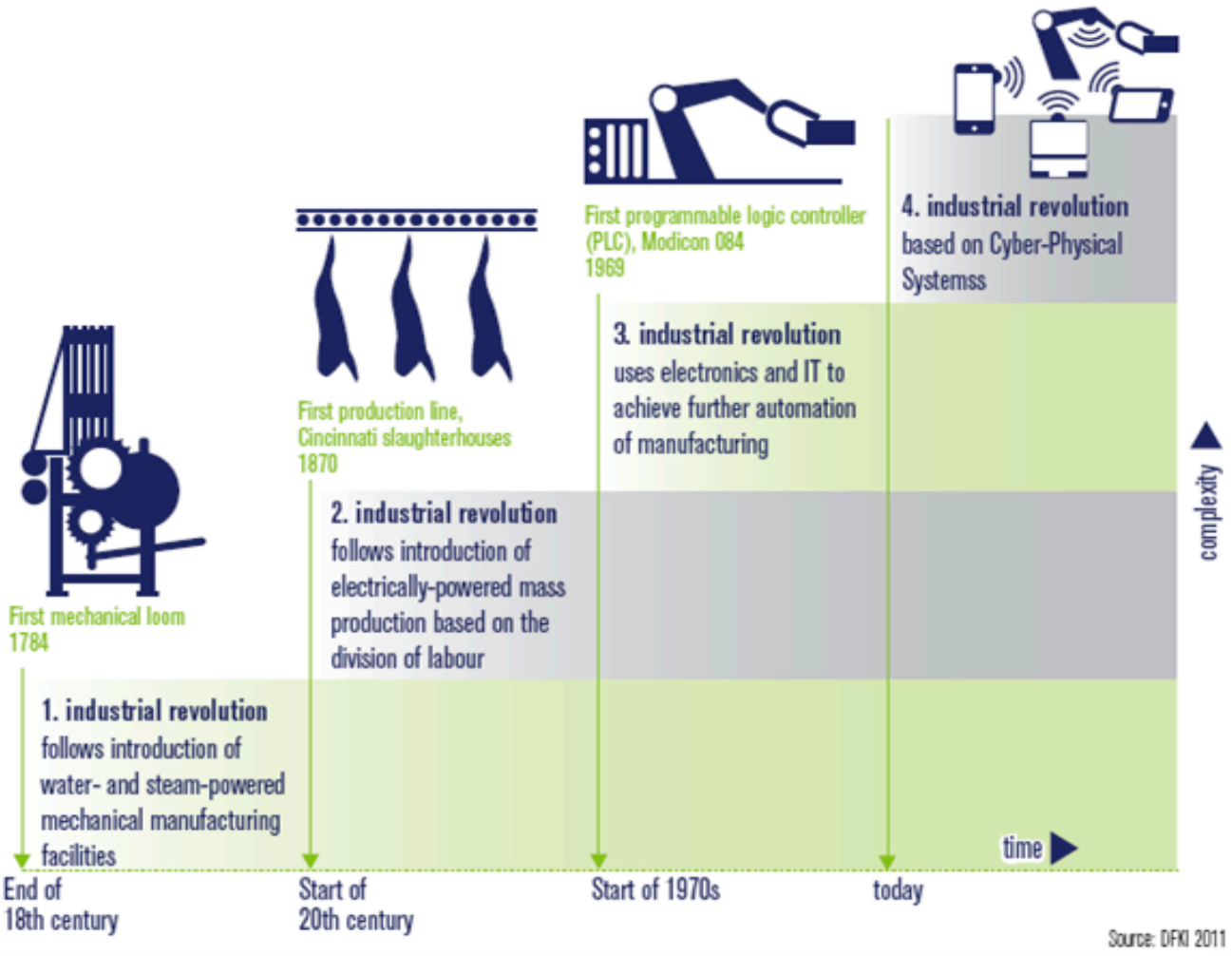
INFORMATION AND COMMUNICATION TECHNOLOGIES ENSURE

- Better performance of qualified staff.
- Continuous monitoring activity.
- Decision-making process optimisation.
- Possibility to perform predictive analysis.

INDUSTRY 4.0 PARADIGM

Synonyms | *integrated industry, innovative factory, smart industry, advanced manufacturing*

Figure 1:
The four stages of
the Industrial Revolution



INDUSTRY 4.0 PARADIGM

Concerns a different "rhetoric" for workers and workplaces.

Work content, work processes and the working environment will be dramatically transformed in a way that will have repercussions for flexibility, working time regulation, healthcare, and people's private lives.

PATTERNS

	SMART PRODUCTS	*"STUPID" PRODUCTS*
Smart technologies (processes)	**Industry 4.0**	**Process Innovation**
"Stupid" technologies (processes)	**Smart products**	**Old factory**

"SMART" means: "With high capacity to elaborate information", high level of information embedded in processes, things, places - high level of "digital cognition" embedded in processes and/or in products.

FROM ICTS TO DIGITAL MEDIA

From ICTs to digital MEDIA = From "service" technologies to inter-mediation between people, spaces and machines.

Worker's **digital *agency*** (Bruno Latour) | **Digital *habitus*** (Pierre Bourdieu):

TRIAL DIMENSION ››› products and actions become processes = open pathways

OPENNESS DIMENSION ››› flexibility, variability (due to the trial dimension)

RELEASE DIMENSION ››› incompleteness, improvement-oriented, based on a continuous "put to the test"

FROM ICTS TO DIGITAL MEDIA

"NATURALNESS": The media provide ever more pervasive forms of natural interaction (natural interfaces), which refers to bodily habits.

IMPACT

Media-action between the worker and the machine becomes transparent to the employee: the natural and body-based interfaces of digital media create a relationship ***disintermediated*** within the relationship traditionally mediated between worker, task, machine (automated factory from '80s and '90s).

"ALWAYS ON": (connectivity) production becomes a continuous flow of interoperable informations

IMPACT ON "CONTROLLERS VERSUS CONTROLLED"

Hyper-connected actions/information/reactions of labor means: on one hand, to allow to re-act quickly and flexibly, but on the other hand, to eliminate any "private" spaces in the relationship between worker and work.

CASE STUDY

Alstom, *Savigliano Plant*

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DIGITAL FACTORIES

"A better understanding and design of production and manufacturing systems for better product life cycle management involving **simulation, modelling and knowledge management from the product conception level down to manufacturing**"

("Factories of the Future PPP. Strategic multi-annual roadmap". European Union 2010)

ALSTOM AT A GLANCE	SAVIGLIANO SITE AT A GLANCE
Multinational company, global leader (power generation, power transmission, rail infrastructure)	Products: sub-urban and regional trains + Coradia Meridian + high-speed trains (Pendolino + AGV)
• Present in around 100 countries	• Number of employees: 1.100
• Sales 2013/14: €20.3 billion	• Total area: 323.000 mq
• 93,000 permanent employees (at 31 March 2014)	• The average age of the engineers: 43

CASE STUDY

Alstom, *Savigliano Plant*

CONDITIONS

Complexity of the product produced in limited numbers

Production time: 15 years ago = 4 years; today = 13 months

Fluctuating workloads: the production has to adapt to a seesaw curve, from high peaks and intense work to emptiness

impact = to move from a traditionally craft industry in a digital industry

MEDIA TECHNOLOGIES

- **Integrated shop-floor simulation**

  CAD and virtual reality for the **design** (product + production processes)

  CAD and virtual reality for the **learning**

- **Mobile media**

  The workers use TABLETs to control the production machines and to perform their own work tasks. TABLET = easy to use, tablets are digital media that usually people use in their daily lives

- **Always-on connection** (all connected, always connected)

  Critical innovation: from a "public-private" to a "shared" idea of The Control

CASE STUDY

Alstom, *Savigliano Plant*

KEY POINTS OF THE TRANSITION FROM A BIG HANDCRAFTING INDUSTRY TO A LARGE DIGITAL FACTORY:

1

INTEGRATION OF MANIFACTURING ENGINEERING IN THE DESIGN PHASE

The design phase has expanded because it must be able to anticipate, to predict, to solve any single aspect before going into production)

IMPACT = **growth (in terms of employees and skills) of the engineering department**

CASE STUDY

Alstom, *Savigliano Plant*

MANAGEMENT OF THE COMPLEXITY: FROM THE TACIT KNOWLEDGE TO THE FORMALIZED KNOWLEDGE

Passage from the centrality of the *tacit and informal knowledge* ("non-communicable") of the "artisan" workers to the centrality of a *hyper formalized* but extremely easy to use knowledge, This new knowledge is made very easy for the workers of the production line by the means of media simulation and natural interfaces.

IMPACT ON THE MANAGEMENT OF THE COMPLEXITY: from the worker on the **production line** to the engineer during the **design phase**; from (the moment of) **pratice** to (the moment of) **simulation**

"In the eighties and nineties the trains were produced starting from a relatively small number of technical drawings and designs and a whole series of things got developed in the factory. The staff had to be of very high level, that is, with a long-term experience on the line, which was a "handcraft" line in fact. Now it is not so: following the market, the workloads vary enormously, and therefore a big amount of the factory's staff is temporary, and may have a relatively low level of competence.

The figure of the worker-craftsman that held a tacit knowledge and high competences, but not easy to be transmitted in a formalized way, is inevitably endangered"

(Excerpt from an interview in Alston Savigliano)

CASE STUDY

Alstom, *Savigliano Plant*

WORKER'S ROLES AND INDUSTRIAL RELATIONS

a- Central role of the " Special Processes School"

aim: to qualify people, to qualify processes (= innovation)

IMPACT: continuous cycle of learning-innovation involving the worker

b- Role of the team, workers = mentors

IMPACT: co-responsibility in the management of human resources,

co-responsibility in the relations between workers

c- Collective bargaining agreement "ad hoc"

As a consequence of the ample fluctuations of the workloads there is a growing tendency to make fixed-term employment contracts, and flexible work conditions (modularity in time work, flexible stop and go) established in "ad hoc" arrangements.

CASE STUDY

Alstom, *Savigliano Plant*

SOME FINAL REMARKS

1. **WORKPLACE = INNOVATIVE SOCIAL ORGANISATION (not only innovative production system)**
   Worker = from reactive position to proactive position

2. **What we LOOSE, what we GAIN** (two different forms of "embodied cognition in action")
   - the traditional figure of the craftsman-worker (high craftsmanship, tacit knowledge that has been acquired over time through experience)
   - the “augmented” worker, augmented/increased by embodied digital media (tacit knowledge acquired through the use of media in everyday life)

3. **MEDIA = universal language (visual) for DIVERSITY** (new human-machine interactive cooperation, through digital media)
   Key point: Development of natural interfaces and visual language for a manufacturing environment that interlink the personal skills of humans with machines in such a way that human intuition and learning are enhanced and changing working conditions

"Future worker's skills will be more and more linked to computer literacy: we need "computerized" workers because we use tablets at the workplace, we litterally put them in the workers' hands. This choice has allowed us to remove the written information, wich is not always understood and "stored" by persons whose education levels, nationalities and biographies are extremely different. Here we have people from all over the world - India, Africa, Asia, the East - there is a mixture of things, people and cultures that requires teaching and acting more visually"

(Excerpt from an interview in Alston Savigliano)

THE RESEARCH

"Industry 4.0. The needs of companies and skills training in the digital industry"

WAS CARRIED OUT BY TORINO NORD OVEST SRL

FOUNDED BY IAL AND FIM-CISL PIEMONTE

METHODOLOGY

QUALITATIVE SURVEY (IN-DEPTH INTERVIEWS) ON A SAMPLE OF 15

ITALIAN BASED MULTINATIONAL COMPANIES (MANIFACTURING SECTOR)

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