Dialectics in Automatic Production

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Dialectics in Automatic Production

Invited Lecture

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CONTENT

I. TERMS

DIALECTIC

The process of arriving at the truth by stating a thesis, developing a contradictory antithesis, and combining and resolving them into a coherent synthesis.

DIALECTICS

A method of argument or exposition that systematically weighs contradictory facts or ideas with a view to the resolution of their real or apparent contradictions.

The contradiction between two conflicting forces viewed as the determining factor in their continuing interaction.

Dialectics is based on the following concepts:

- Everything is transient and finite, existing in the medium of time (this idea is not accepted by some dialecticians).
- Everything is made out of opposing forces/opposing sides (contradictions).
- Gradual changes lead to turning points, where one force overcomes the other (quantitative change leads to qualitative change).
- Change moves in spirals (or helices), not circles (sometimes referred to as "negation of the negation").

DIALECTICS – DUALISM – CONTRADICTION – TRANSITION TO ... ?

PRODUCTION

Process of gaining artefacts (not necessarily material) that should fulfil human's needs and eventually perpetuate life.

Industrial production – the outputs are at the first glance material artefacts.

AUTOMATION

A task where automation is to be applied implies **repetition**.

In contrary to our tempocentric position automatian may be traced at least from times of old Egypt and Greece.

Aims and benefits in industrial production – rationalities:

– increasing productivity and quality,
– reducing costs and hazards,
– liberation of human potentials and creativity.

Advances in automation technology allow solving more and more complex tasks, from physical to mental processes.

A vast potential of automation everywhere: in work, living, joy, fun, or simply consumerism (which shifts from real human needs to provoked ones; Tamagochi-like technical widgets and gadgets appear to have their own interior life and calling us for further consumption – maintenance, or at least battery replacement).

About year 2005. the cost of robotic insertion was 50 % of that in year 2000.

The profit is always based on people, not machinery.

That means participants in automation industry are faced with the same rule as those in non hi-tech sectors.

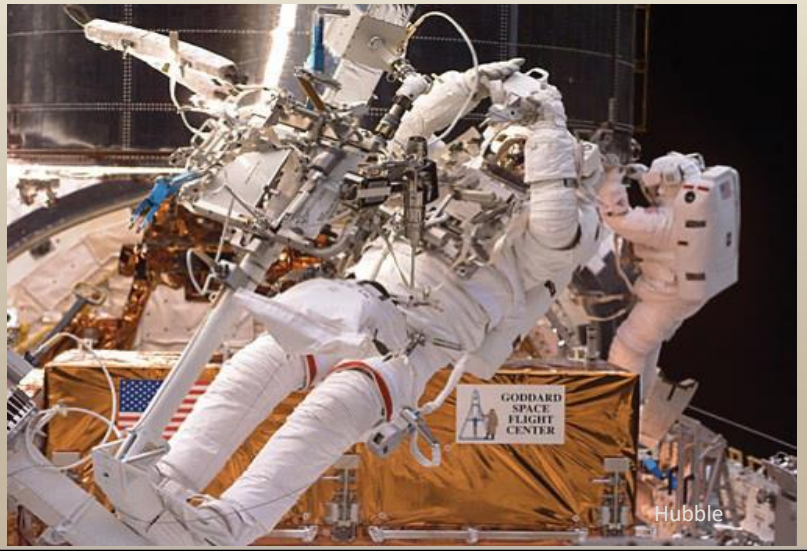
Beside sound technical content and entrepreneurial push, both automation and production require approval of individual and public benefits: "benefits to all of society and not just a select few" (W. Stadler, 1995.).

Today 's controversies urge that principle.

It is impressive contradiction, comparing vast technical possibilities and trivial outcomes regarding quality of life.

II. PRESENT SITUATION

OCCURRENCES OF PRODUCTION PROCESSES – range that covers all phases of human history – from manual to completely automatised work.



Hubble

2010.

around 1915.

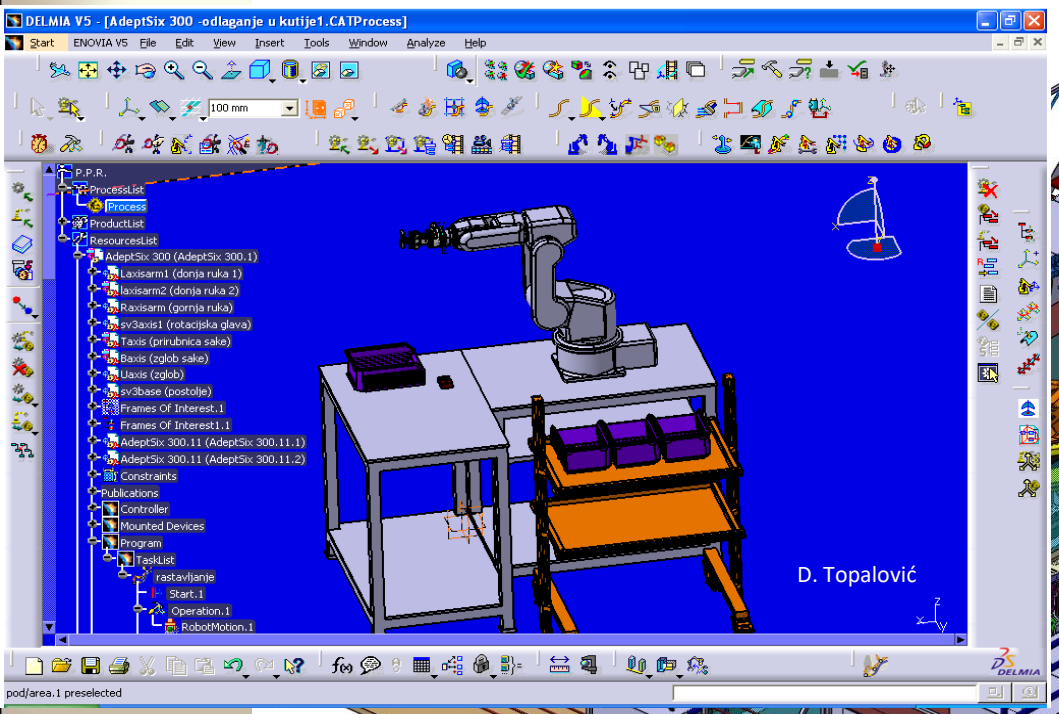
Boeing, moving line in final assembly of 777 Jetliners (2006.), a steady pace of 40,6 mm/minute.

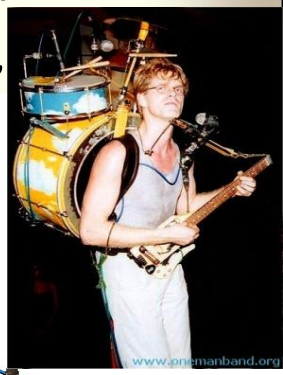
DEVELOPMENT OF TECHNOLOGY

– objectivisation/materialisation and mechanisation/automation of knowledge (software) – shift of focus from physical to mental exploitation

– concentration of processes (rapid prototyping, electronics, nanotechnology)

– integration of processes (networks – e-teamwork, Concurrent Engineering, Integrated Product Development)





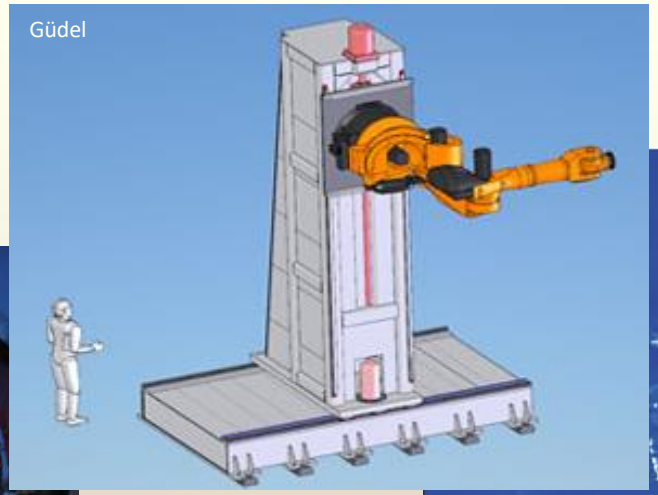
Bernard M. Snyder

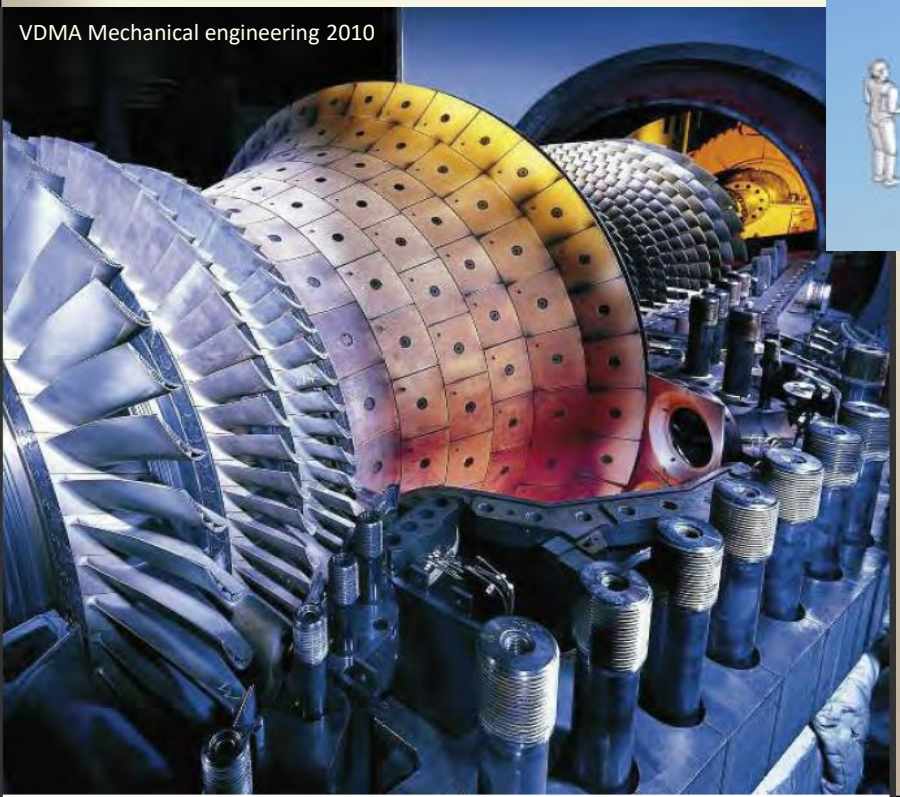
GKN Aerospace

DEVELOPMENT OF TECHNOLOGY (continued)

– new technical solutions (service & home robotics, collaboration man-robot, advanced sensorics – “emotional” systems, biological paradigms)

– more complex products.





Choose an industry:

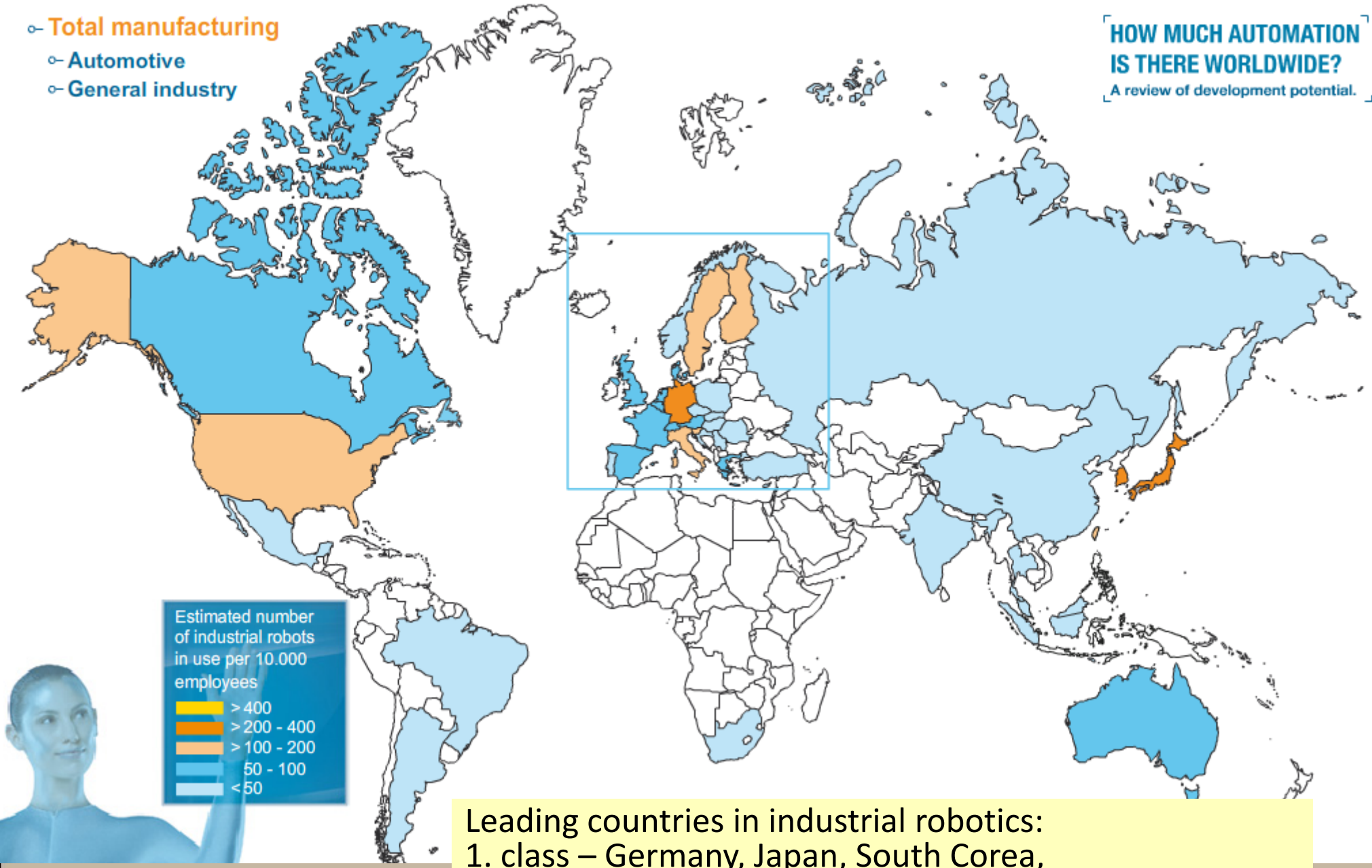
deutsch english

AUTOMATICA

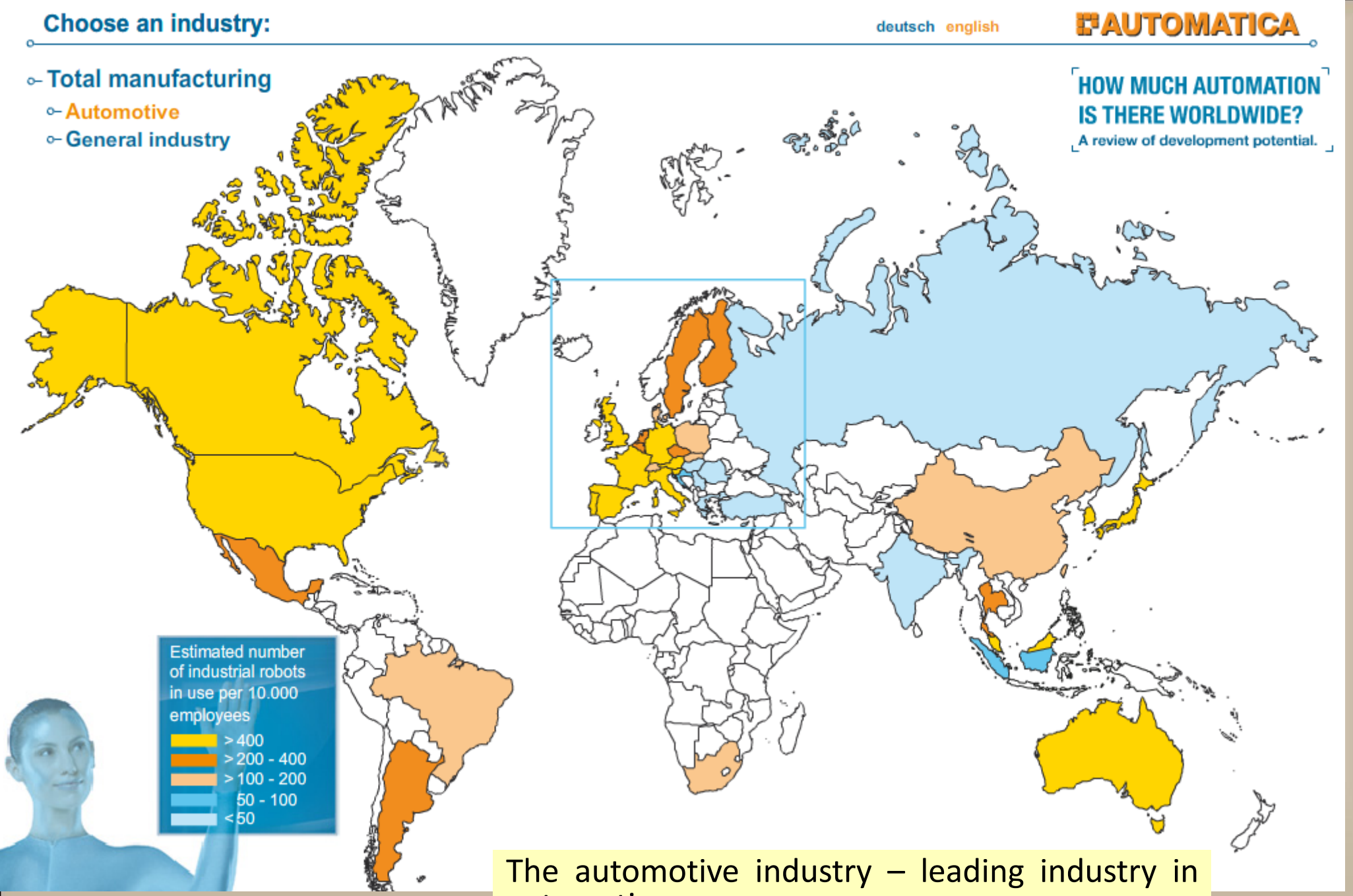
- Total manufacturing
  - Automotive
  - General industry

HOW MUCH AUTOMATION IS THERE WORLDWIDE?

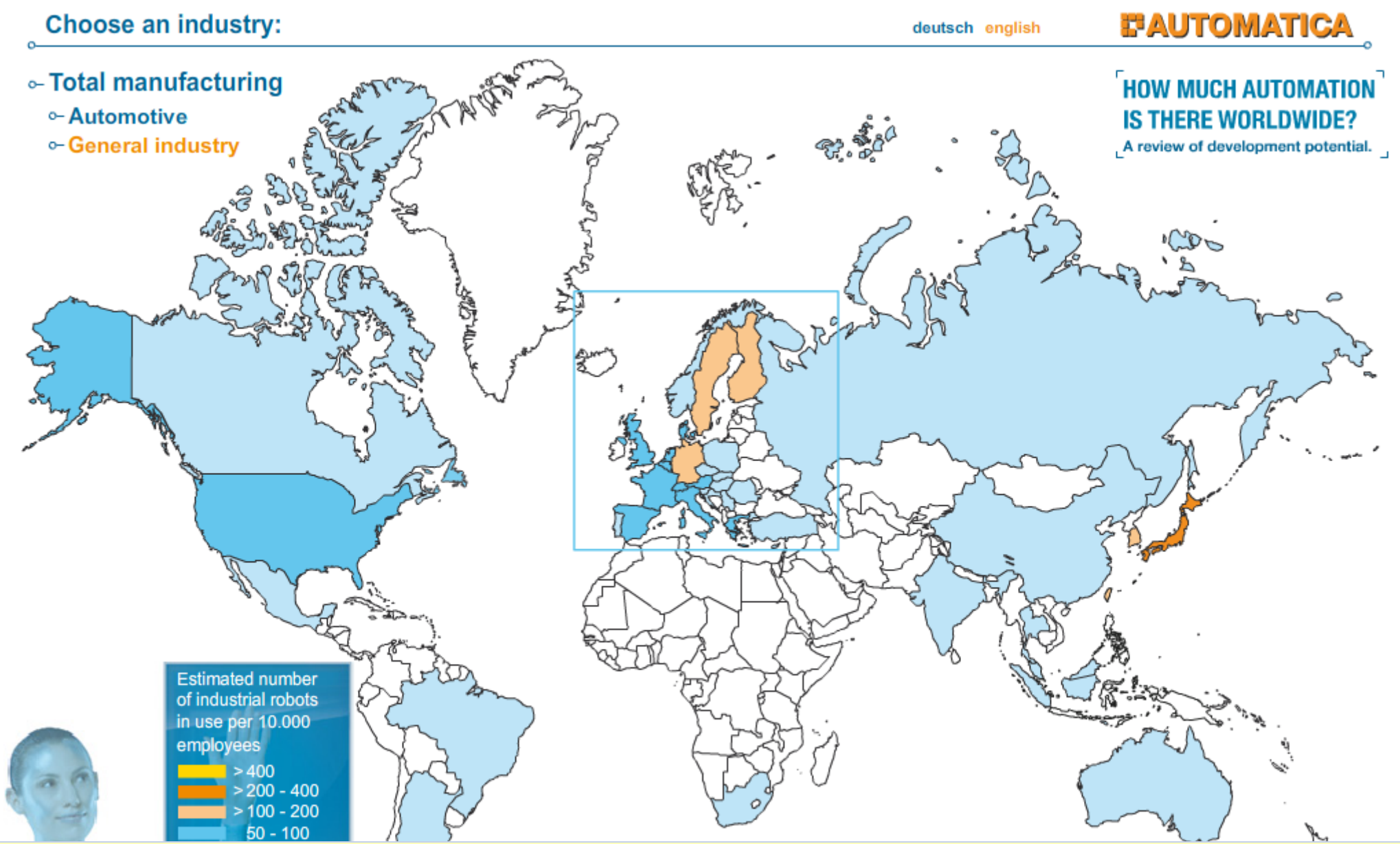
A review of development potential.



Leading countries in industrial robotics:
1. class – Germany, Japan, South Corea,
2. class – Sweden, Finland, Italy, Slovenia, Taiwan, USA.

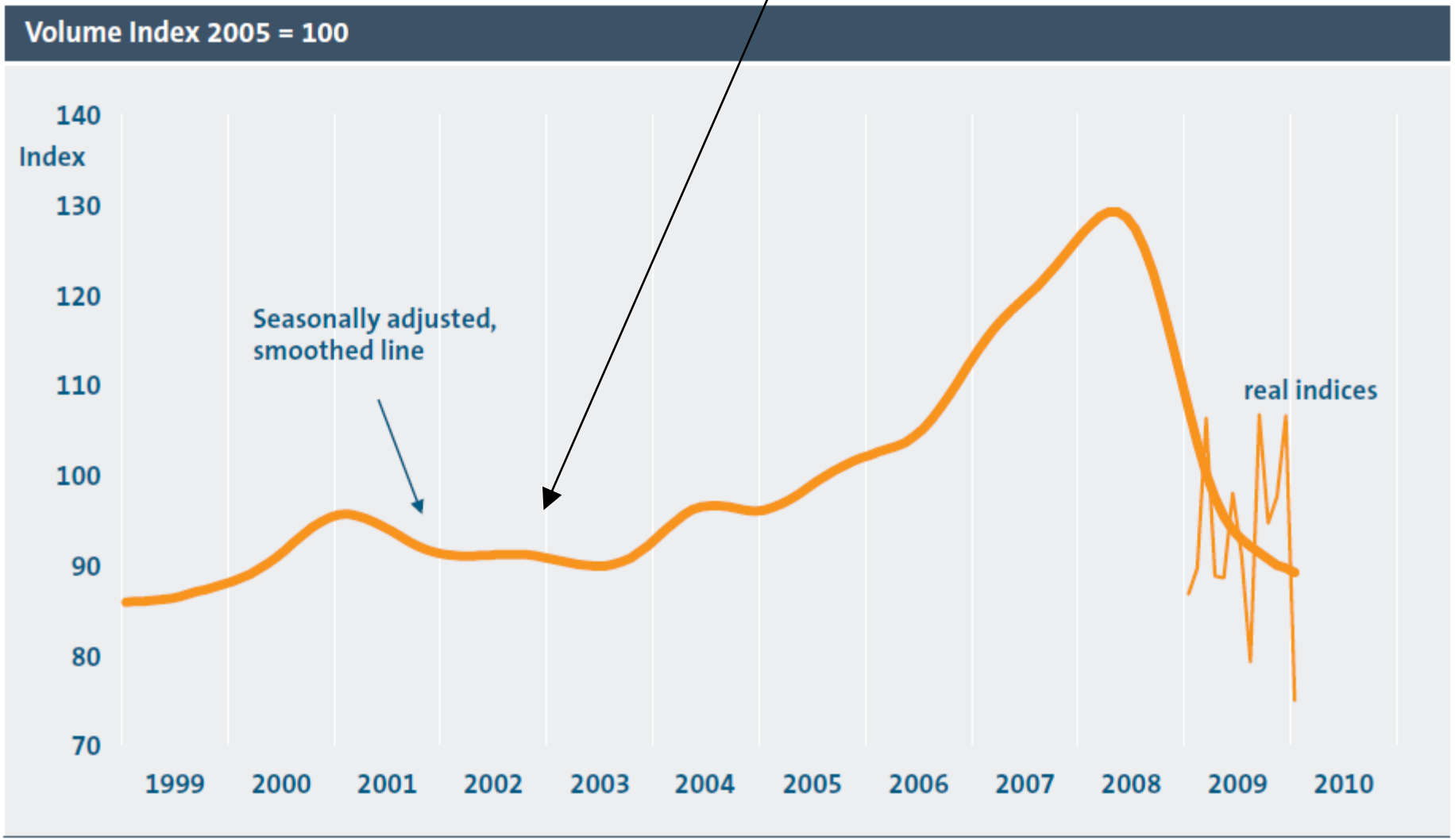


The automotive industry – leading industry in automation.



The IFR statistics on industrial robots: In 2009., the number of sold units worldwide slumped dramatically by about 50 % compared to 2008., one of the most successful years. But as of the third quarter of 2009. sales figures have been improving.

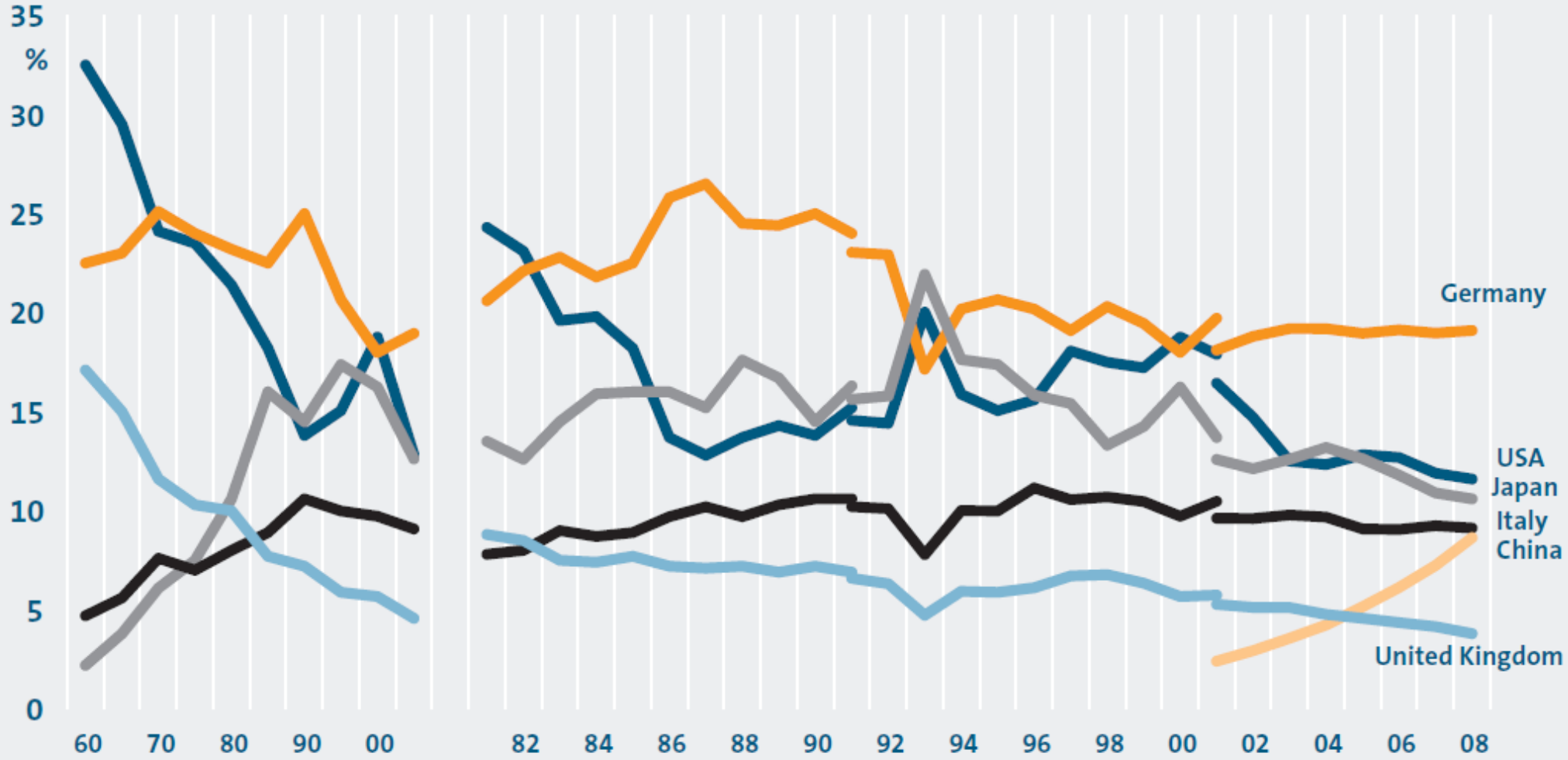
Someone decided to stop outsourcing?



Source: Statistisches Bundesamt, VDMA

German production volume in mechanical engineering

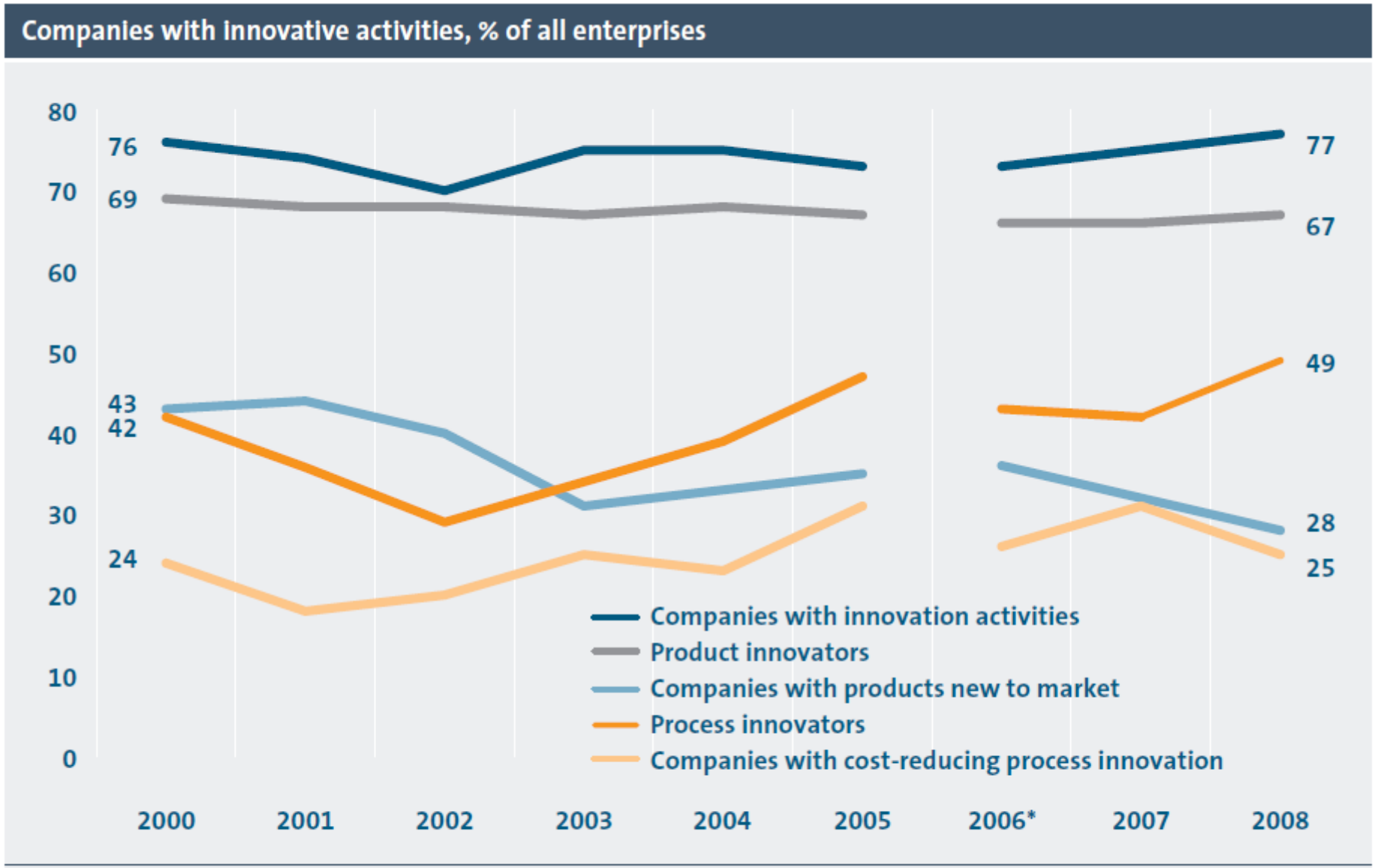
Shares* in world trade of mechanical engineering of the most important exporting countries



Source: Statistisches Bundesamt, VDMA

*) in 1991 and in 2001 shares have been decreased due to the integration of further countries

China advances, Germany near stagnation, the share of other countries in decrease or stagnation. (The situation before slump in 2009.)



Source: ZEW/ISI (2010), Mannheimer Innovationspanel, Survey 2009

* Due to changes in industry definition not comparable with previous years

In Germany, decreasing of products new to market, increase of process innovations without cost-reducing yet.

GLOBAL SOCIETY AND ECONOMY

– global population growth but aging and depopulation threat in developed countries

– energy shortages expected; pollution, deforestration and climate changes

– broadened gap between rich and poor countries

– pauperisation of middle class in developed countries

– outsourcing of production from developed countries and stagnation of the rest of their production

– global distribution of work, not necessarily including automation technology, allows mass production, so even the poorest may enjoy in some kind of consumption and self-forget for a while

– atomised individual value systems are formed, preserved and linked into larger clusters as needed

– variability and velocity of communication networks facilitate top-down transfer and amplification of simple control signals, while suspending others

– upcoming of new industrial megaforces such as China and India, which will soon, on the basis of their own (not only *insourced* but also self-developed) production, take leadership in global trade also

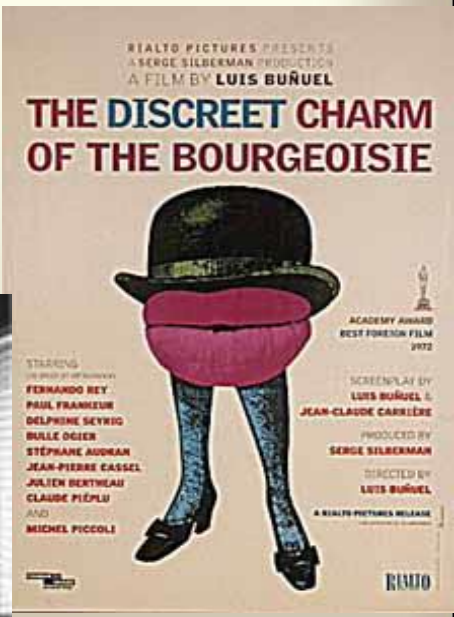
– in developed countries, degradation of democracy and civil value system beneficial for public (as well citizen) wealth; outsourcing (privatisation) of functions traditionally under state/public jurisdiction to international and parastate institutions (agencies) – privatisation of the public profit

GLOBAL SOCIETY AND ECONOMY (continued)

– in developed countries, a hypertrophy of: state and bussines administration and all kinds of managerial/mediating layers as well unproductive social groups, irresponsible and hypocrisical life styles and behaviours

Daniel Kasap

Television Will Soon Watch You (for Instructions)



VIRTUALISATION OF PRODUCTION

– financial sector separation apart from production (“real”) sector

– living standard is not based on own work and results, but on political powers and financial monopol – the exploatation of the others or passive use of foreign accumulation

– free market often occurs as faulty parole – first-class capitalistic countries remind to former real-socialist

– avoiding of real questions and problems (Chomsky, 2002.) continues, and a way out is searched in forms of forced behaviour, creative accounting and serious regressions of all kinds, supported by advanced technology, rather than in approaches that listen old voices of knowledge, create real progress, and promote humanity and responsibility, with longer term anticipation

Particular successful companies, regardless of their real traditional production excellence, cannot cope with global flaws, without wider social support, so decisions on production does not solely appear as a matter of knowledge and idealised market-fair-play but also politics.

SCIENCE & EDUCATION

Academic work, not sufficiently profitable in today's terms, switches from theatre or classic chamber drama environment to much more impersonal mass-media auditorium.

– knowledge and education standardisation and bureaucratic measurement

– abstraction and (in)completeness proper to atomised work division

– cost-cuts and tendency toward profit only

– teaching students sound knowledge, principles and approaches, is too frequently in direct collision with tendencies of real life

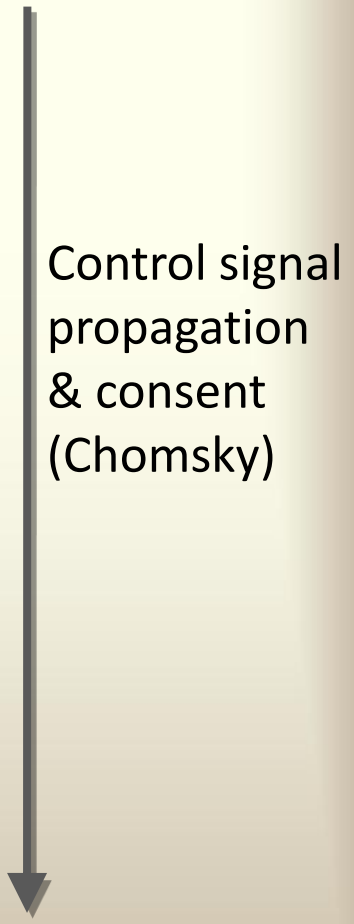
– **rapid changes of content, stresses importance of wider, well established foundations in education in order to bring forth mature and creative young persons able to responsibly, joyfully and bravely cope with challenges in a future**

– too often researches and academic institutions are an isolated class of/for their own kind, without sufficiently expressed creative criticism

– sometimes they appear as nothing more than another consumer group, which is satisfied with lean transfer of terms, ideas and technology announced regularly by a few globally accepted paramount academic institutions

– after so many years and eras, there is so much knowledge – so much, that is occasionally forgotten and must be found again (and therefore cannot be applied just in time)

Participants and roles	propriators (stockholders)	Primarily control function
	administration, institutions and politicians	Primarily mediating function
	entrepreneurs, media & entertainment	
	researchers and educators	
	manufacturers	Primarily executive function
	consumers (individuals and groups)	
	general society	



When the formal and real-life frames do not fit sufficiently, ideology – control mechanism, where science has important place, appears as an awkward decoration of an exploitation system.

III. DISCUSSION ON AUTOMATON DESIGN

Inventions and technological progress allow technical systems to deal with more and more complex tasks.

The technical systems also become more and more complicated, on hardware and especially control levels, requiring enlarged realisation effort from its creators.

A task and related work division require harmonic establishment of executive (operative, outcome/artefact-carrying function) and control (process initialisation, corrective and adaptive function) parts of a system.

The planning of technical systems includes several aspects, such as their design, integration into environment, process planning and programming.

At the operational level, it is necessary to anticipate that future systems would be required to have much more **autonomy** in their acting, so the humans would be only first “ancestors” of several generations of a system.

The autonomy, or large-scale automation, or automatic behaviour, implies comparable machine intelligence and increased requirements for **symbolic reasoning** that will eventually evolve to artificial life.

Desirable and undesirable behaviour of the technical system depends on current situation which may be difficult to anticipate. Common technical **criteria of effectiveness** (productivity, costs, time etc.), should be rather considered as dialectical criteria of construction and deconstruction (love & fear – Braitenberg, 1984.; Orwell).

One may think about highly automated – intelligent – system as a single, isolated, almost self-sufficient system that possesses some self-management abilities in an unordered environment.

However, the full potential of intelligence arises in integration of engineering activities and technical systems, including general principles and concurrent engineering approaches (Prasad, 1996.), and very important, in integration with other, non-engineering, domains, using even unconventional approaches.

In that sense, it may be interesting to explore the possibilities of using psychological concept of **transactional analysis** for automaton design.

IV. AUTOMATON BASED ON TRANSACTIONAL ANALYSIS

Humans are sufficiently efficient, because they still exist.

Industrial production, products and technical systems are materialisation of humanity.

Therefore, the structure and behaviour of technical systems may have features that are inherent to humans.

If the majority of people behave as robots, then really it would not be hard to produce robots similar to humans. (Fromm, 1968.)

Human survival, playful intellectuality, conscience of its own limitations, loneliness and imperfection have always been mirrored to creation of “deus ex machina”.

Transactional analysis was introduced by Eric Berne in the fifties years of the 20th century.

Transactional analysis (TA) is (Steiner, 2003.):

1. an easily understandable yet sophisticated psychological theory about people's thinking, feelings and behaviour, ...

3. People's **interactions are made up of transactions**. Any one transactions has two parts: the **stimulus** and the **response**. ... Stroking is the recognition that one person gives to another. ... are essential to a person's life. ... positive strokes like praise or expressions of appreciation, or negative strokes like negative judgements or put downs. ... the exchange of strokes is one of the most important thing that people do in their daily lives.

The further details & arguments on the possible use of TA:

- growing complexity of technical systems assumes that their behaviour should have several layers, as humans have, in the sense of efficiency (id, ego, super-ego),
- TA offers a concept of 'GAMES' – **structured behaviours and scenarios**,
- though TA concept is not a paramount of the human capabilities and qualities, it is very applicable for implementation within a technical system.

V. FURTHER DEVELOPMENTS

Today's exploitation system has come into its selfconflict, resulting with disfunction and inefficiency.

The crisis will continue and become deeper.

– postmodern deindustrialised countries will be faced soon with increasing prices of imported goods that people have used to have cheap

– over-seas shipping costs will be of more influence, not to mention ecology and necessity of world-wide balanced development and goods-exchange

– those who produce goods have natural right to sold them as well, without numerous mediators

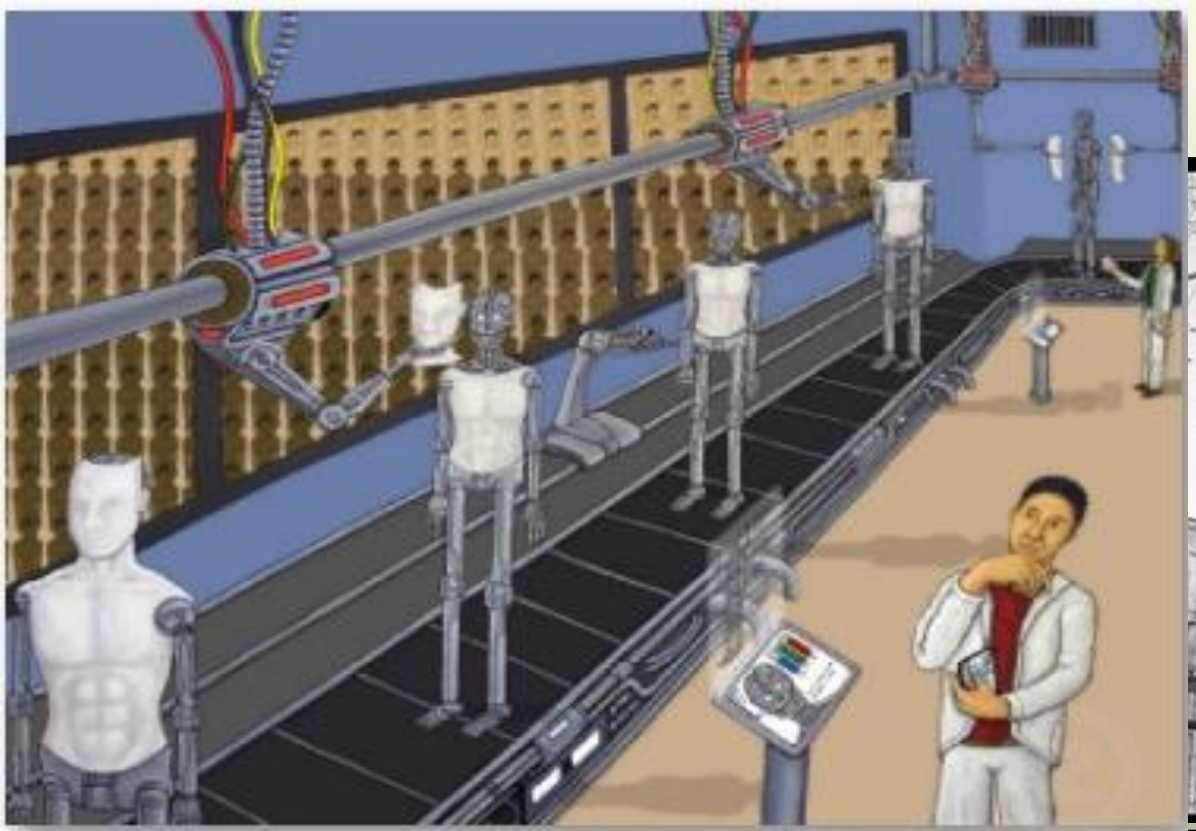
– for those who are lacking own production, their overdeveloped managerial, sales and advertisement functions are coming into question

– neglecting traditional aims and aspects of education would create much more movable pauperised work force having in mind few simple life-goal functions

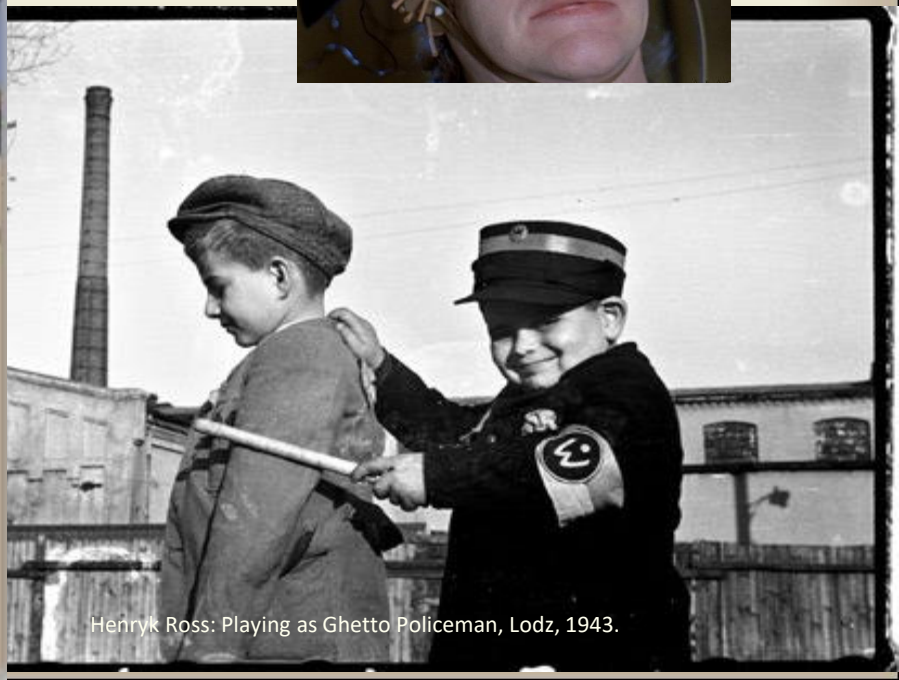
– changes that are to occur should include more democracy and freedom, but with more responsibility and discipline as well, the latter especially for the bearers of control functions

– technology and financing are to be treated without fetishism

– work division becomes obsolete due to possibility of employing work force with more versatility natural to human creative potentials (That includes operative and managerial roles, as well as a question of property.)



Malcolm McDowell in S. Kubric's *A Clockwork Orange*, 1971.



Henryk Ross: Playing as Ghetto Policeman, Lodz, 1943.