

ENGINEERS FOR KNOWLEDGE BASED SOCIETY

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Abstract: In this article are main characteristics of engineers for in industrial based society discussed and their changes for the knowledge based society. Knowledge based society opens new perspectives such as: chance to decrease the gap between developed and developing countries; more chances for individual development; respect to individuals; freedom of selforganisation instead of subordination pressure.

Key words: knowledge based society, engineer knowledge, megatrends, education

1. INTRODUCTION

Our civilisation is a technology based civilisation. Without technology our civilisation could not be a global phenomenon. Our society is interested to get maximum of benefits from existing technology. Organisational form of the society is in continuous change, and adapting to the permanent changes of the technology.

In modern history we can see following periods: Agricultural society with technology based on raw materials and agricultural products; Industrial society with technology based on industrial production; Information society with technology based on information products, and next knowledge society with technology based on knowledge products. At the moment there is the transition from the information based society to the knowledge based society.

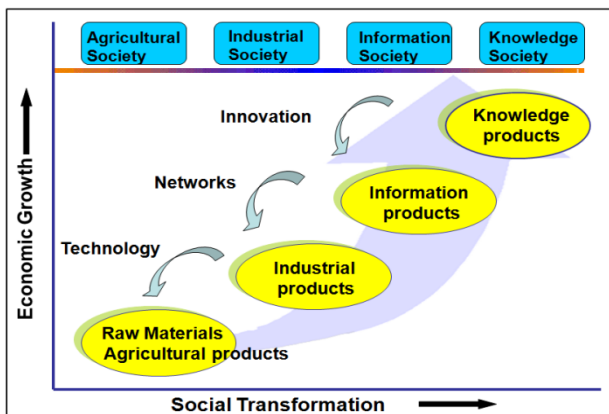


Fig. 1. Social transformations

Computer integration is one of the most important megatrends in the development of technology with extremely high impact on the societal transformation. It started in 1970 and will finish in some 20 years. Computer integration has many faces and forms: from internet, mobile phone, computer integrated manufacturing, e-technologies and many many others. This megatrend is the foundation for the development of knowledge based society, with knowledge as key resource for economic growth. Knowledge as resource is very fascinating and in some elements total different from the resource used before. Main characteristics of knowledge: knowledge is not a natural resource; knowledge is not limited; we can produce it

by thinking and acting; it is a very individual resource; everybody who wants to think and act can produce it.

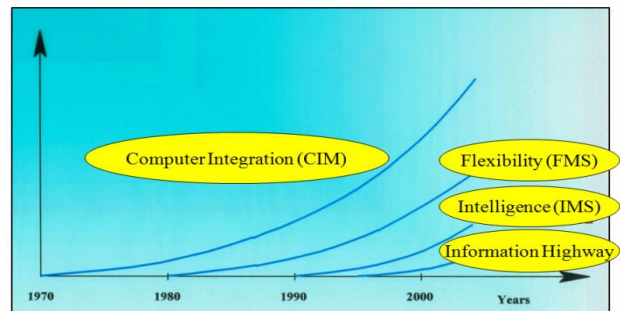


Fig. 2. Main Megatrends since 1970

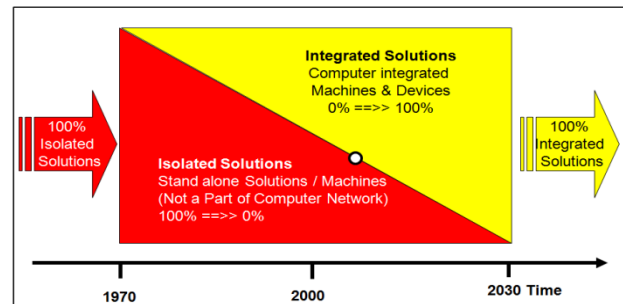


Fig.3. Implementation of computer integration in new machines

To integrate one machine/device in a larger computer integrated structure it is necessary to have the possibility to connect it to digital computer. Integrated machine/device can exchange information with other parts of structure it can be controlled or it can control. In 1970 all standard-made new machines/devices were isolated stand-alone units. Today about 2/3 of all new machines/devices have the possibility to be connected to digital computer and integrated in larger structures and networks. Existing nets are oceans of unlimited possibilities to reach different aims. Individuals and groups of people can in such nets selforganised follow own targets and interests. Total networking includes three kinds of interaction: person-to-person; machine-to-machine and person-to-machine. Total networking decrease hierarchy and improve selforganisation.

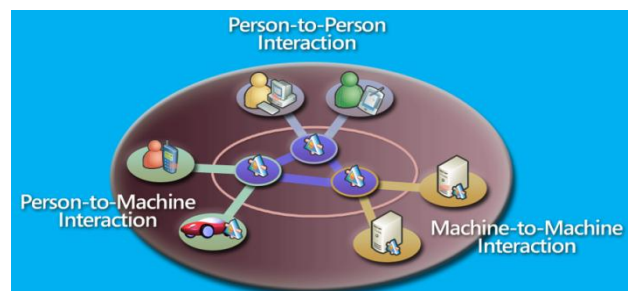


Fig. 4. Total networking

2. QUALIFICATION IN INDUSTRY

Industry needs continuously increase of the qualification of workers. On Fig. 5 is the change of qualification structure needed by industry during 150 years shown.

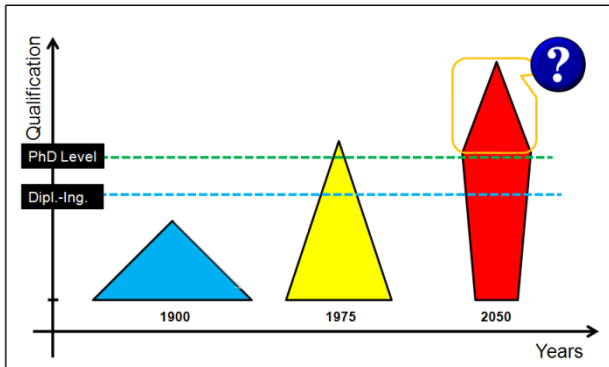


Fig. 5. Industry needs for qualified workers during 150 years

3. ENGINEERS KNOWLEDGE

Engineers' knowledge in the new technologies losing own actuality rapidly. The velocity of this process is continuously increasing. One hundred years ago it was 50% in 40 years, today is 50% in 4-7 years. This fact changed the paradigm of education from classical to live long learning.

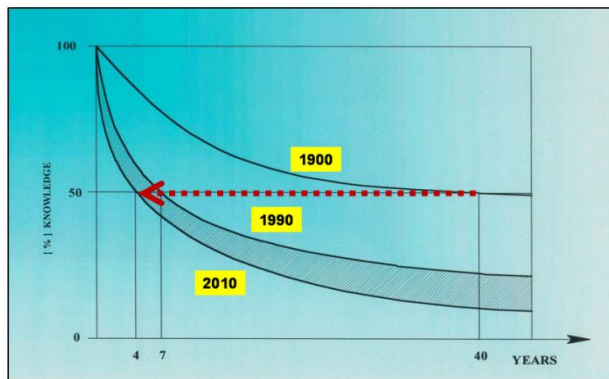


Fig. 6 Engineers high-tech-knowledge and its usability

4. ACADEMIA AND INDUSTRY

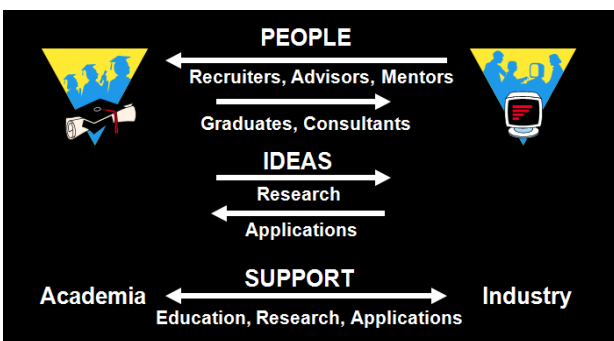


Fig. 7. Interactions between Academia and Industry

5. EVOLUTIONS OF ENGINEERS

At the moment there is transformation from industrial / information society to the knowledge society. There are deep changes in the acting of engineers. The main seven are show on Fig. 8. Additionally to the old tasks modern engineers get two new: Help (global) society adapt to new technology, and to act in changing (global) society.

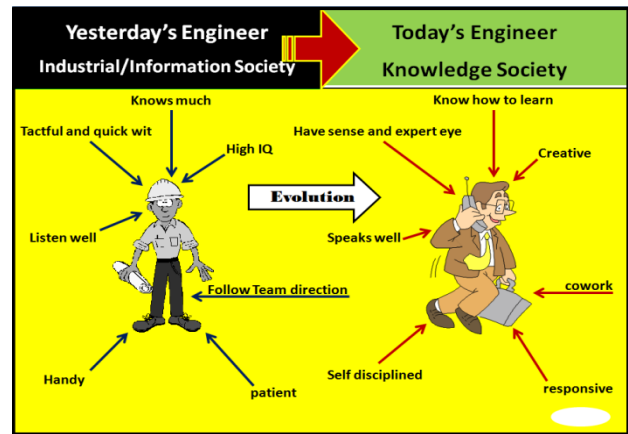


Fig. 8. Evolution of engineers from Industrial to Knowledge age

Profession	Period				Tasks
	I	II	III	IV	
Technicians	■	■	■	■	Apply known technology
Engineers	■	■	■	■	Apply known technology
	■	■	■	■	Develop new technology using known science
	■	■	■	■	Use many new sciences and technologies
	■	■	■	■	Research and develop new engineering science
	■	■	■	■	Help (global) society adapt to new technology
	■	■	■	■	Do all these in a changing (global) society
Scientists	■	■	■	■	Develop new science

Key problem: Engineering as a profession is becoming much more complex, and current engineering education institutions and practices are increasingly inadequate

Fig.9. Tasks of engineers

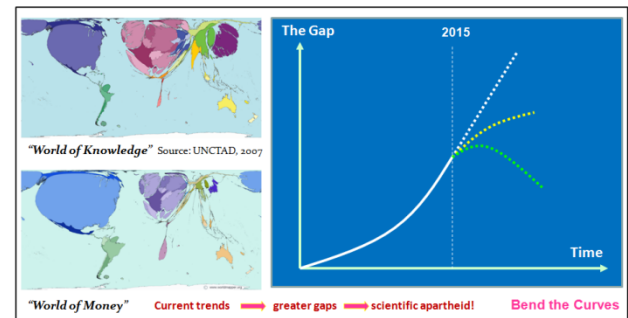


Fig. 10. Unbalance of modern world

6. CONCLUSION

Computer integration opens the development of knowledge based society. The changes will be deep and irreversible. Also Engineers are changing. The individual human being is coming in the focus of knowledge based society. Knowledge based society opens new perspectives such as: chance to decrease the gap between developed and developing countries; more chances for individual development; respect to individuals; freedom of selforganisation instead of subordination pressure.

7. REFERENCES

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