



Department of Safety and Production Quality,
Faculty of Mechanical Engineering,
Technical University of Košice

***Technological Development –
Challenge for Obtaining of New
Knowledge and Competencies in
Management of Safety and Health
Protection at Work***

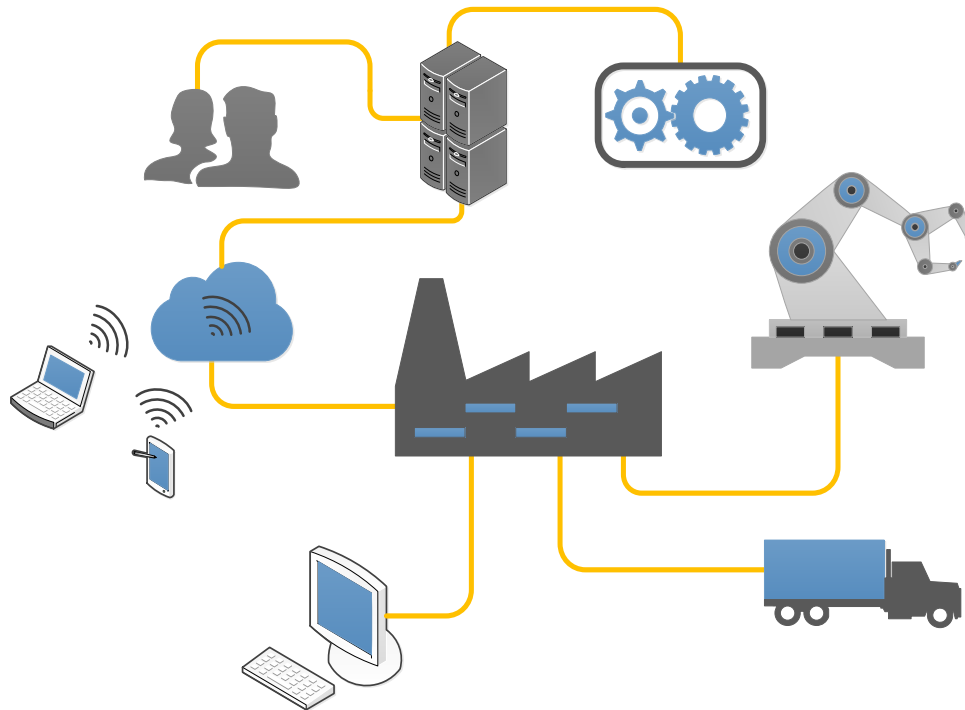
Automotive Industry Association of the Slovak Republic



- ***Industry 4.0 is a philosophy presently, however it will be an unavoidable part of future technological development***
- - It is a driving force for development of society – new technologies.
- - Change of thinking.
- - Side effect – negative impacts!
- - Managing system - Safety and Security.
- - There is developed an interconnection among the innovative methods of knowledge management and information systems in the area of machine design, production, logistics and maintenance.



Industry 4.0 – this method is used for control of technologies. It is already applied in some industrial production areas, where the machines and products communicate mutually and they manage individual steps within the production process autonomously.



- **Example** – cooperation of robots with the product itself in manufacturing process at production line.
- Robot identifies the product – it is able to find out machine with a free production capacity – it sets up and performs the corresponding operation, which is unique for the given type of product, e.g. car body.



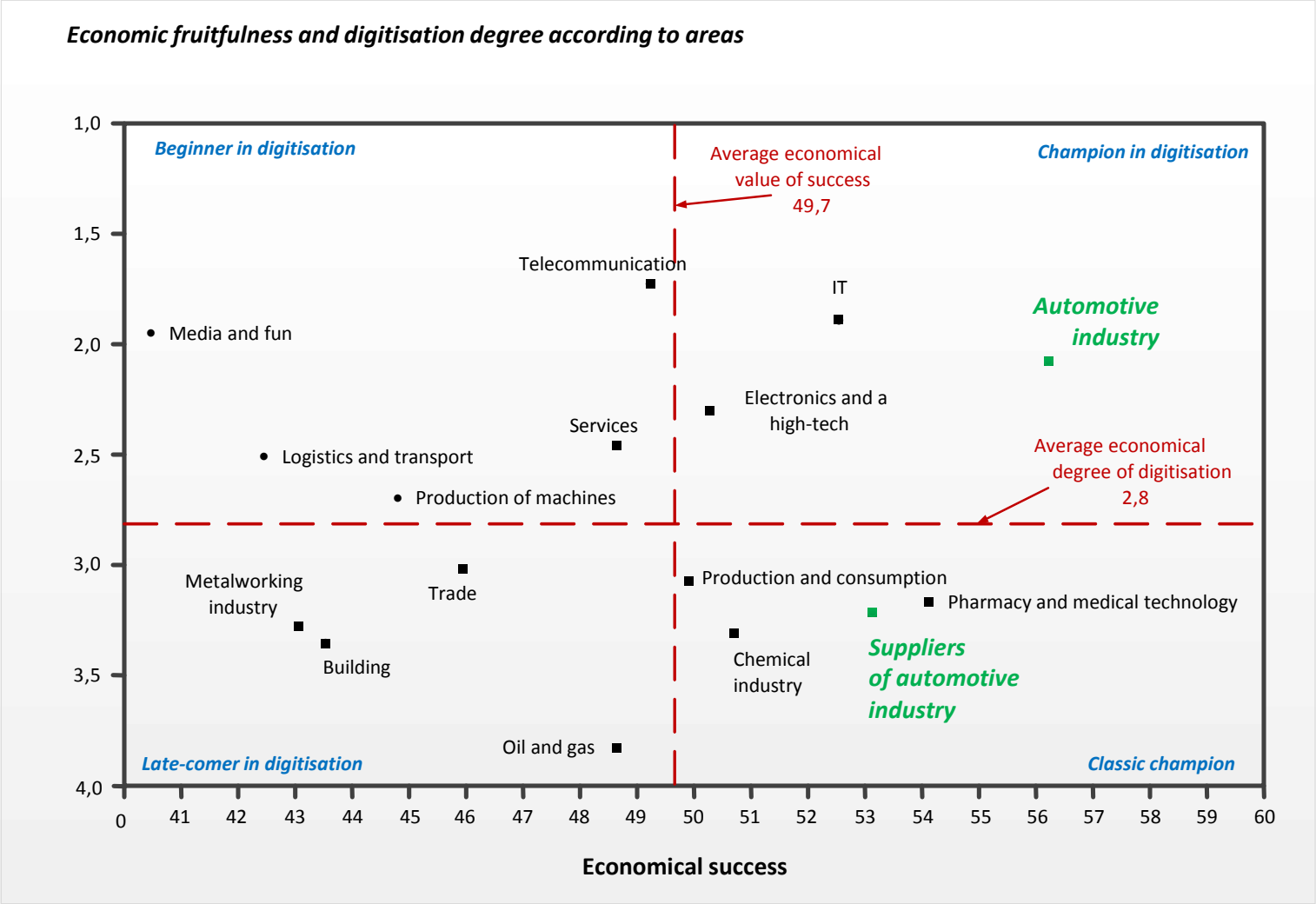
- **Basic aspect of technological development**
- **digitisation in production.**

- There are created new organisational structures of companies in order to increase value of the product within the production process **according to the client's requirements.**

- *Increasing of the product value includes **the whole life cycle of product**, beginning with idea, continuing with production, delivery to client, current operation, maintenance and recycling, finally.*



- Digitisation level of production, assembly processes and services determines possibility of their efficient realisation



- **Strategy Industry 4.0** – is based on automated communication among the individual objects.
- **Consequence** – reduction of risks in working environment!
- Health improving of employees, **increasing of their performance** and well-being during working and personal activities.
- Technological development induces new challenges for **prevention of risks.**
- Integrated part of the Strategy Industry 4.0 is the **Prevention 4.0!**
- Actual question:
- „If the people will be managed according to the requirements of machines, what about their time for a creative work?“



- Technological development (also in application of the strategy Industry 4.0) can be performed and accepted only if:
 - - analyses of risks are applied already in the phase of
 - **projection and construction,**
- *In the past the protection against external interventions was realised by means of the physical measures – control of entrance or other central protective measures. In the production systems, which are based on the principle CPS, solution of safety in the form of Security is insufficient. The active and passive components of safety must be implemented already at the beginning of the technical life of equipment (technology).*
- - there are developed and applied safety concepts of IT,
 - together with their architectures and corresponding
 - standards simultaneously.



One of the future strategic tasks is interconnection of **adequate education** with the results obtained from the applied research and innovations

Strategic challenge for systems of company's **management** in order to create a competitive and sustainable surrounding.



Taking into consideration requirements of society and national economy it is necessary to manage safety as an integrated part of the safety management – i.e. Safety + Security – and consequently as a part of the complex management systems.



Professional, who is working in the area of safety and health protection at work or in the safety of technical systems (i.e. Safety), as well as in the area of civic safety (i.e. Security), should dispose of knowledge and skills from the next various professions:

- mechanical engineer,**
- electrician,**
- physics,**
- chemist,**
- psychologist,**
- sociologist,**
- medical doctor,**
- or other professionals.**



Activities of the risk management require information about complex (multi-parametric) relations among the next items:

- technology (**machines and machine systems**),
- organisation of work,
- human factor (**operating personnel, employees and third persons**).

Intensity of these activities is determined by the requirements of social systems, degree of development and level of existing knowledge, as well as by the results of research in the area of risks.



User of machines and machine systems is obligatory to:

- identify risks at the workplace,**
- to perform measures in order to eliminate or minimise the risks,**
- to create conditions for application of efficient preventive measures.**

Ability to perform these precautions requires a multidisciplinary approach, which is based on implementation of training systems for preparing of professionals in order to gain adequate competences.



The competences are relating not only to a concrete profession or activity, but much more to general human abilities (dispositions), concerning mastering of important requirements with regard to application of the efficient preventive measurements.

These competences are oriented not only to **theoretical knowledge** obtained in the educational process, but they are taking into consideration the practical **experiences**.

The term „**key qualifications**“ is sometimes used as a synonym to the term „**competence**“.



Competencies:

theoretical knowledge obtained within educational process

+

practically gained experiences.

The term „key qualifications“ is used as synonym to the term „competencies“.



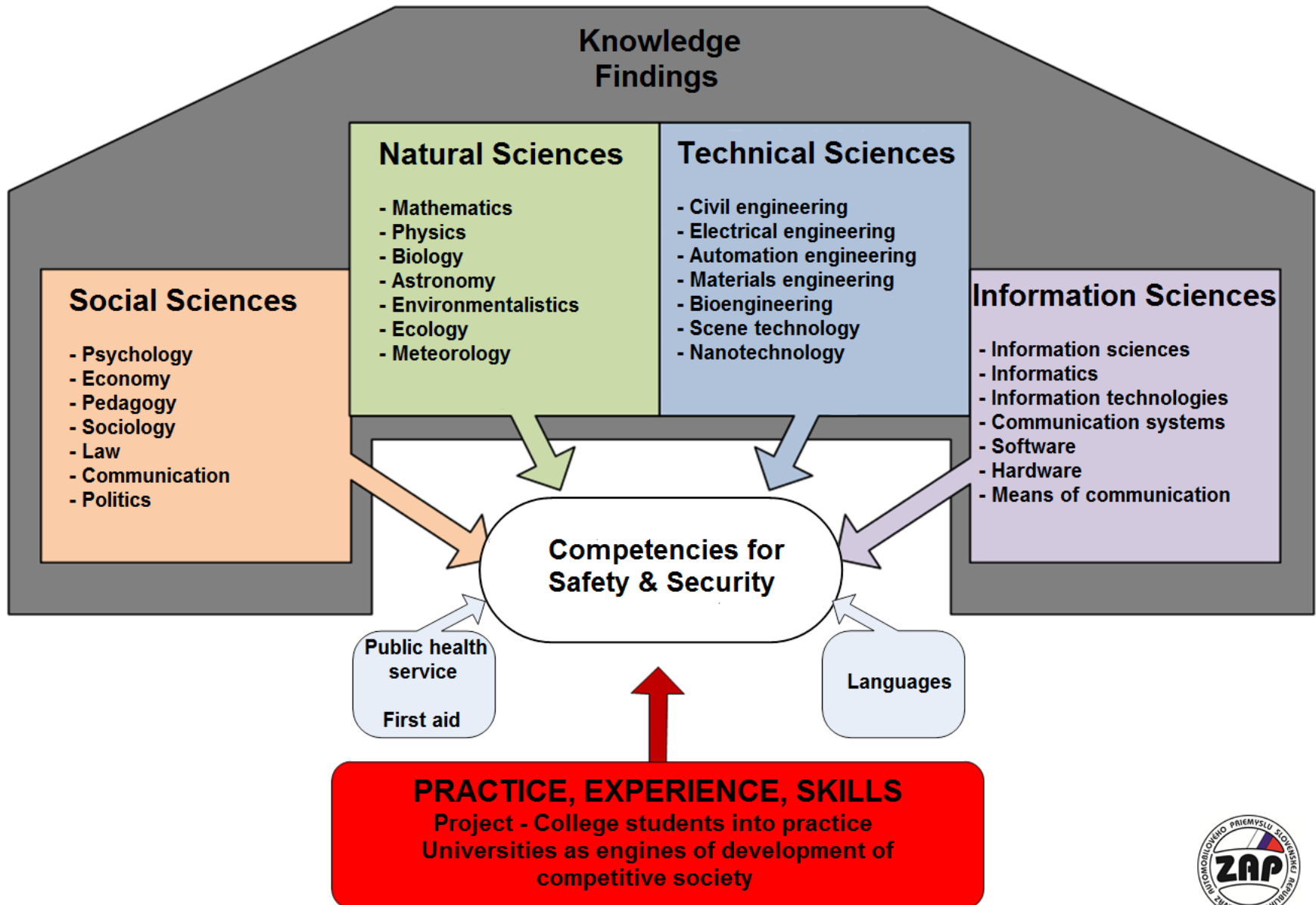
Competence includes:

- experiences,
- skills,
- knowledge as a part of qualification, know-how and communication abilities.

One of the decisive competencies is the so-called **professional competence** or competence in branch.



Competencies in risk management



Competencies in the risk management area have to take into consideration:

- a fact that risks do not respect the state boundaries, because they are part of globalised labour markets,
- the European educational and research area,
- identification of minimal requirements to the core of competencies – they must create a base of knowledge with regard to:
 - the European legislation on the EU-conditions,
 - the national legislative rules.



Professionals in the area of risk management are using **their competencies** in the following areas:

- management of risks (management of safety and health protection at work) in the company according to company's culture,
- effective protection of health for all people in a close cooperation with the company's top-management and national authorities in the area of safety and health protection at work,
- elimination and minimisation of risks as a part of preventive measures.



Some of modules, which are specified for **obtaining of competencies** within the risk management area, can be defined as follows:

- identification of risks – multidisciplinary approach,
- analysis and estimation of risks – interconnection between the natural-scientific approach (mathematical statistics) and technical approach,
- application of methods specified for minimisation of risks, i.e. prevention,
- training and education with regard to the legislative framework,
- management of critical situations – experiences and skills in the risk management area,
- **effective communication** (contact with community and mediation of information concerning impacts of risks on society).



There is expected in the modern society an obvious fact that **safety**, which is a relevant attribute of all products and technologies, is a **priority objective of all activities**.

In order to achieve this objective it is necessary to implement into the all study programmes not only knowledge and experiences that are specific for the **classic engineering study branches**, e.g. study branches of mechanical engineering, production technologies, building, mining, electrotechnics etc.

+

but also knowledge from the **risk management area**.



The obtained competencies must be defined and acquired in such a way so that the experts, who are working in the risk management area, **will be able to create conceptions of systems** determined for :

- minimisation of risks as an effective form of prevention,
- implementation of them into the everyday practice in companies,
- monitoring of their future development,
- modification with regard to the new technologies, including machines and machine systems.



Managing of safety (Safety and Security) must be performed as a part of **integrated approach** within the frame of risk management, i.e. in the Safety + Security.

It is necessary to adjust systems that are used for transfer of competencies to the professionals and top managers in order to integrate them **into the complex managing systems in company.**



Managing of safety must be implemented into the integrated management of safety – i.e. Safety + Security – and consequently it has to be involved into the complex management systems, taking into consideration requirements of the whole society and national economy.



Thank you very much for your attention



TECHNICAL UNIVERSITY OF KOŠICE
DEPARTMENT OF SAFETY AND PRODUCTION QUALITY
FACULTY OF MECHANICAL ENGINEERING

