Legal challenges facing the use of autonomous systems

Scientific research as part of the "AUTONOMIK für Industrie 4.0" (in English, "AUTONOMICS for Industry 4.0") technology programme is addressing important cross-cutting issues related to IT security, the future of work in Industry 4.0, standardisation, business models and legal frameworks. Data protection and IT security are just as important here as are issues of liability, e.g. in accident scenarios.

But often the questions (especially the legal ones) being asked are new and complex so that the technicians working in the projects have difficulty understanding them and putting them into the right perspective. They have to be able to state whether or not the system or product developed by them could come into conflict with legal norms or violate applicable law.

The first version of a "legal" reference model for Industry 4.0 should make it easier to understand the legal risks inherent in digital production. Ju-RAMI 4.0 is designed to allow people who are not versed in the law to identify specific legal risk areas, damage and hazards across the entire value chain. Just like the RAMI 4.0 reference architecture model, Ju-RAMI 4.0 comprises a three-dimensional coordinate system that maps the key areas of law and legal risk areas in conjunction with "AUTONOMIK für Industrie 4.0" along the value chain. The aim is to help Industry 4.0 project stakeholders to identify existing legal loopholes and to offer first solutions to these problems. The individual legal layers are filled with practical case examples. The infographic on the next page provides a simplified overview.

- **Legal risk areas**
  - Personal injury
  - Damage to property
  - Breach of contract
  - Misuse of personal data
  - Loss of control on machines
  - Violation of employees' rights
  - Risk of injury and damage
  - Infringement of intellectual property

- **Legal risk areas**
  - Personal injury
    - If people are injured, this is referred to as personal injury. These injuries can range from minor to fatal.
  - Damage to property
    - Damage to property can apply to all kinds of things. A "thing" is defined by law as any corporeal object (section 90 of the German Civil Code), i.e. anything that you can touch. This includes machines, utensils, as well as clothing worn on the body. The human body itself and its parts are not things.
  - Breach of contract
    - A breach of contract is when a contract was made and entered into between two or more contract parties with mutual consent. It expresses that the parties to the contract fail to fulfil their obligations under the contract. A breach of contract does not have to be intentional.
  - Loss of control on machines
    - Machines normally run according to rules defined by their creators and programmers. A loss of control is when these rules are no longer observed and returning to the original rule-based status is extremely difficult or not possible at all.
  - Violation of employees' rights
    - Employees are not only entitled to payment of the agreed wage, but must also be protected in many ways at the company. This includes observing certain safety standards and maximum working hours, as well as co-determination and other participation rights which employees can claim especially through the works council.
  - Risk of injury and damage
    - A risk of injury or damage must be assumed if a situation exists that makes the occurrence of damage or injury likely. The likelihood of damage or injury occurring can differ, ranging from a minimum risk to a hazardous situation in which the likelihood of injury or damage is almost certain.
  - Infringement of intellectual property
    - "Intellectual property" is understood to be any results of intellectual work that are protected by law. Intellectual property can refer to special knowledge, inventions and other intellectual creations.

The programme

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  - Elements of the value chain
  - The positions of the icons can be found in the graphic on the next page.

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