Modern industrial production processes are increasingly characterized by digital solutions in order to continuously increase their efficiency while taking sustainability aspects into account. Pneumatic components and systems have been and will continue to be an essential part of modern production plants and must face the special challenges posed by digitalization.

The mission statement of the Industrie 4.0 platform addresses the topics of autonomy, interoperability and sustainability as essential features of digital industrial processes and define special challenges for future pneumatic solutions. Technological competence is the prerequisite for ensuring long-term stable autonomy. This is the focal point of joint research activities, which are driven forward by the Fluid Power Research Fund, taking up essential challenges of great importance for integrated components, intelligent systems and services.

The communication ability of intelligent pneumatic systems is important for interoperability. Here the concept of the asset administration shell enables cross-manufacturing networking and simplified data exchange in a uniform format for a usage throughout the entire life cycle.

Against the background of the current sustainability and energy efficiency debate, the comparison of electrical versus pneumatic systems is addressed again and again. However, the preferred drive technology must be selected in an application-specific, holistic approach that is open to results. Nevertheless, it is necessary to rethink digital pneumatics in order to remain competitive in the long term.