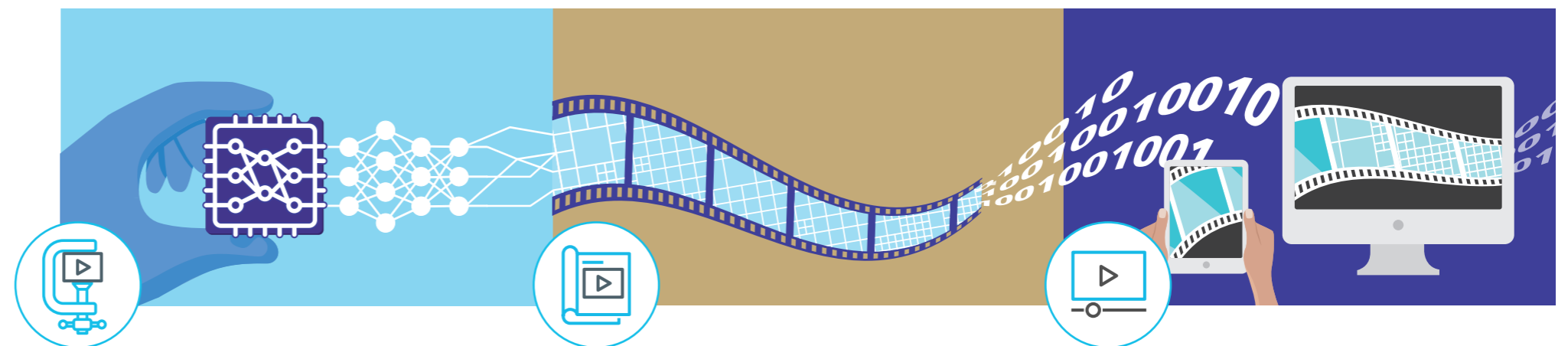# Compression
at Fraunhofer HHI

Today, video data make up by far the highest percentage of bits on the Internet and in mobile traffic. Fraunhofer HHI is continuously developing video compression technology to master this challenge. Together with industry leaders, Fraunhofer HHI is contributing its compression technologies to international standards. Such standards allow interoperable transmission and storage of multimedia content and are used worldwide in billions of devices. With the advent of neural networks in almost every application, the focus of compression widens towards using neural networks in video compression as well as compressing the neural network itself.

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Competences at Fraunhofer HHI

Fundamentals

- **Broad fundamental research in the field of image and video compression:** Research on all aspects of state-of-the-art compression systems: From classical source coding techniques to the use of machine learning methods for compression.

- **Application-oriented focus already in fundamental research:** Compression tools are designed such that the demands of **standardization**, in particular low decoding complexity for implementability, are met.

- **Neural network compression:** New methods to compress and efficiently represent deep neural networks. Huge data reduction without loss in accuracy.

Standards

- **Central roles in international standardization committees:** Lead editors of standard specifications, software coordination and hosting, coordination of core experiments and chairing of ad-hoc groups.

- Fundamental contributions to technical specification of **three generations of international video coding standards: H.264 | AVC, H.265 | HEVC, H.266 | VVC**.

- Key contributions to standardization for transmission of emerging content types: **MPEG-OMAF** as first standard for 360-degree video content and **MPEG-NNR** as first standard for compression of neural networks.

Solutions

- **Field-proven fast encoding techniques:** Live encoding solutions for HEVC on air in multiple broadcast deployments. VVenC, a fast open source software encoder that fully exploits the unbeaten compression of VVC.

- **Real-time decoding:** Prototypes for specialized hardware with low power consumption as well as open source software (VVdeC) that enable efficient real time decoding of the latest video coding standards.

- **System integration:** Solutions that enable the application of the latest video coding standards within a broad range of multimedia scenarios like adaptive streaming.

Achievements and Awards

- **Every second bit on the internet** is generated and processed by compression technology designed by Fraunhofer HHI.

- **Billions of devices worldwide** use the AVC and HEVC video compression standards, which contain key contributions from Fraunhofer HHI.

- **Ultra-High-Definition (UHD) TV** over satellite and HD TV over terrestrial broadcast in Germany has been enabled by Fraunhofer HHI's HEVC live encoder.

- **High academic impact** through highly cited papers on video compression standards and related Fraunhofer HHI technology.

- **4 Emmy Engineering Awards** honored Fraunhofer HHI's contributions in international video coding and system integration standards.

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