Future Vision
2030-2040

NHK STRL
Science & Technology Research Laboratories
A future vision for broadcast media—targeting the years 2030–2040

In the future, the increasing ubiquity of high-speed, high-capacity networks is widely expected to permeate societies with lifestyle-assistance services enabled by advanced IoT technology and artificial intelligence. What consequences will these trends have for the future of broadcast media? At NHK Science & Technology Research Laboratories (STRL), we are looking ahead in anticipation of the media environment in the years 2030–2040, and have developed this future vision to identify objectives and directions to pursue as the research arm of the public service media, NHK.

The novel user experiences we hope to deliver in the future will offer new adventures and emotional journeys beyond anything television has ever provided and deeper connections between people mediated by new forms of content, while ensuring safety and security for all.

Through R&D efforts targeting the development of new broadcast-media services 10–20 years in the future, we will continue to meet the challenges of the new eras to come.
Future Vision
Anticipating the media environment in the years 2030–2040

A wide variety of viewing styles
At all times, in all spaces and venues of daily life—indoors, outdoors, and even while automatically driving—viewers will be able to use devices of their choice to enjoy and experience content featuring immersive, edge-of-your-seat realism.

Via any viewing device
Sophisticated viewing devices will be infused with spatial design techniques to merge seamlessly with the surroundings of daily life. The same content can offer a range of distinct experiences depending on the delivery medium: breathtaking images and sound via large-screen televisions, three-dimensional shapes and textures for scenes via 3DTV, and the immersive, “just as if you were there” sensation provided by wearable displays. Advances in accessibility technology, such as sign language presentations enabled by computer graphics, will allow all viewers to enjoy and experience content that meets their individual needs.

In all spaces and venues of daily life
Viewers will be able to enjoy and experience content regardless of their location or environment—from public-viewing venues to the interior of vehicles while automatically driving.

Shared viewing experiences with friends and family in distant locations
AR technologies will enable viewing spaces to be shared with others in distant locations, leading to new viewing experiences that facilitate personal interconnections via shared content.
The evolving world of content creation

It will be possible to capture not just video and audio representations of objects but also information on their three-dimensional shapes, textures, reflection properties, vibrations, and three-dimensional sound properties—enabling new and captivating content to be provided to all viewers. The merging of real and virtual spaces will also give rise to novel content creation environments.

The production studio of the future

Studios will capture not only video and audio information but also a variety of spatial data, such as three-dimensional shapes and textures.

In real spaces, immersive, edge-of-your-seat video and sound will be captured.

Creators and directors will be able to produce video and audio content in which viewers as well as 360° panoramic images and performances are fused.
Our Primary R&D Strategy

At NHK STRL, we have identified three key R&D focal points that are needed to achieve our future vision to provide new user experiences: immersive media, to offer new adventures and emotional journeys beyond anything television has ever provided; universal services, delivered anytime, anywhere, to anyone; and frontier science, featuring cutting-edge scientific research for both future media creation and sustainable societies.

Promotion of external collaboration
- Contribution to standardization and worldwide dissemination
- Cooperation with broadcasting institutions both in Japan and abroad
- Open innovation

Intellectual property initiatives
- Appropriate retention of rights and privileges
- Giving back to society through technical collaborations, implementation licenses, and related programs

Forging ties with viewers and society
- Proactive dissemination of R&D results
- Emphasizing the importance of outreach to the viewer community
- Contribution to create sustainable societies

1. Immersive Media
   Experiencing more realistic worlds
   - Technology for enhancing experiences
   - Content creation technology
   - Transmission technology

2. Universal Services
   Anytime, anywhere, to anyone
   - Media accessibility
   - Content delivery and presentation technologies

3. Frontier Science
   Creating the media of the future through fundamental research
   - Computer science
   - Social science
   - Cognitive science
   - Materials science


Towards new adventures and emotional journeys

Experiencing more realistic worlds
Immersive Media
Experiencing more realistic worlds

Technologies for enhancing experiences featuring immersive realism

To offer viewers the opportunity to enjoy immersive content—that is, to make viewers feel as though they are transported to other worlds—we are conducting R&D on three-dimensional and omnidirectional image presentations, technologies for reproducing sound fields tied to images, and content delivery techniques capable of providing tactile sensations of three-dimensional shapes and textures.

We are studying methods for efficiently creating and delivering video and audio data customized for terminals of various formats—including large-screen displays and high-resolution head-mounted displays.

We are also investigating novel technologies for enhancing experiences, such as methods for virtually sharing spaces. These technologies can facilitate social communication through the provision of new experiences and interpersonal connections mediated by content.
The evolving world of content creation

With the goal of providing content capable of delivering immersive, edge-of-your-seat experiences in which viewers feel just as if they were there, we are investigating content creation technologies that capture all available elements of three-dimensional spatial data—including information on shapes, textures, reflection properties, vibrations, and sound source properties—as well as wireless communication techniques capable of transmitting that information from any arbitrary location.

We are developing video and audio formats and scene descriptions to facilitate AR/VR schemes and a variety of other content representations appropriate for any given viewer environment.

Transmission technologies underpinning content distribution

In addition to further advancing the fusion of broadcasting with communications, we are exploring novel transmission pathways, methods for efficiently transmitting three-dimensional volumetric data and other immersive content, and robust transmission methods capable of transmitting all necessary information with high reliability.
Universal Services
Anytime, anywhere, to anyone

Media accessibility

To make content available to all viewers—including blind, deaf, hard of hearing, or visually impaired people, elderly viewers, and viewers from foreign countries—we are conducting R&D on information transmission technologies that use a wide variety of data-delivery devices to provide content and accurate information in ways that are easily understood.

We are also studying techniques to help viewers understand the content. Based on the specific needs of viewers, content may be augmented by the addition of subtitles, audio descriptions, or sign-language presentations enabled by computer graphics.

We are conducting research on robots and other mechanisms for identifying the interests and behavior of viewers while viewing content. We are also investigating methods and technologies to enable sophisticated communication between these robots and humans.

We are working with NHK’s Broadcasting Culture Research Institute (BCRI)* to test and analyze the impact of universal services on viewers; this R&D initiative is expected to have tremendous potential to address societal needs.

*https://www.nhk.or.jp/bunken/english/
Universal Services
Anytime, anywhere, to anyone

Content delivery and presentation technologies

To accommodate a broad range of user lifestyles and environments, and to ensure timely delivery of critical information in emergency situations, we are conducting R&D on the use of Internet and web technologies in addition to broadcasting technologies.

We are developing delivery and presentation technologies that allow viewing devices to receive content with ease, irrespective of differences in broadcast channels or internet, as well as technologies for delivering maximally appropriate content via IoT devices of varying capabilities.

We are also developing technologies for providing content based on personal data maintained independently by users, as well as post-quantum cryptography to ensure safe and secure content delivery.
Frontier Science
Creating the media of the future through fundamental research

Computer science
Our computer science R&D initiatives focus on technologies such as automatic content creation and expression transformation, image analysis, speech recognition, speech synthesis, multilingual translation, and language processing.

Social science
To facilitate the creation of trustworthy, dependable content, we are working with BCRI to explore approaches grounded in social science for analyzing and addressing the ethical, legal, and social issues (ELSI) of AI and big data technologies.

Cognitive science
We are utilizing methods developed in cognitive science—particularly the science of human visual, auditory, and sensory perception—to study content expression techniques that have a greater impact on viewers. We are also applying these insights to develop new content delivery and presentation technologies that can offer greater quality of experience (QoE).
Frontier Science

Creating the media of the future through fundamental research

Materials science

We are studying new device technologies, including imaging devices capable of capturing all available light information in three-dimensional spaces and storage devices capable of high-data-transfer-rate recording and playback of enormous volumes of content data.

We are also researching flexible displays offering immersive content viewing experiences in any desired style; optical devices capable of controlling the intensity, phase, direction, and other properties of light; and holographic three-dimensional display technologies.

To create new types of value-added content, we are conducting sophisticated fundamental research on sensing and display technologies that augment the usual visual and auditory experiences by adding tactile and olfactory capabilities.

We are also conducting research on further reduction of the device power consumption and new materials with low environmental impact.
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