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NUCLEUS

The smart digital imaging platform

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NUCLeUS™: The smart digital imaging platform

NUCLeUS offers a scalable, vendor-neutral platform, that streamlines the management and distribution of upgradeable video content – plus still images and patient data – across an entire network. Investing in the NUCLeUS platform brings a host of revolutionary benefits, from enhanced training and education to cost-effective networked content management.

Create an efficient, integrated imaging workflow

Ensure data quality, availability, and security

Enhance training and education opportunities

Create a flexible, scalable, upgradable platform

Maximize cost efficiency through networked management

Benefits

For clinicians

Images from endoscopes, surgical microscopes, room cameras and any other image source in the OR can be routed, recorded and viewed from anywhere across hospital-wide IP networks. This makes it easier for doctors and clinical staff to repurpose content for presentations and lectures.
The end-to-end IP workflow solution allows surgeons in the OR to capture and share live high-resolution video and patient data with other doctors and medical students on the hospital campus and beyond. And delivery of the right package of key information (live, processed, and offline video, audio and data) enables doctors to keep their focus on patient care and improve clinical workflow.

For medical staff

Today's hospitals are characterized by a large number of isolated AV-systems and processes. This complexity has an impact on efficiency and reliability, forcing medical staff to spend valuable time on non-care-related tasks.
NUCLeUS integrated IP solutions streamline the modern clinical AV-workflow, replacing incompatible data formats and connectors with the simplicity, cost efficiency and resilience of a single LAN-based connection between all system elements for quick configuration and simplified support.

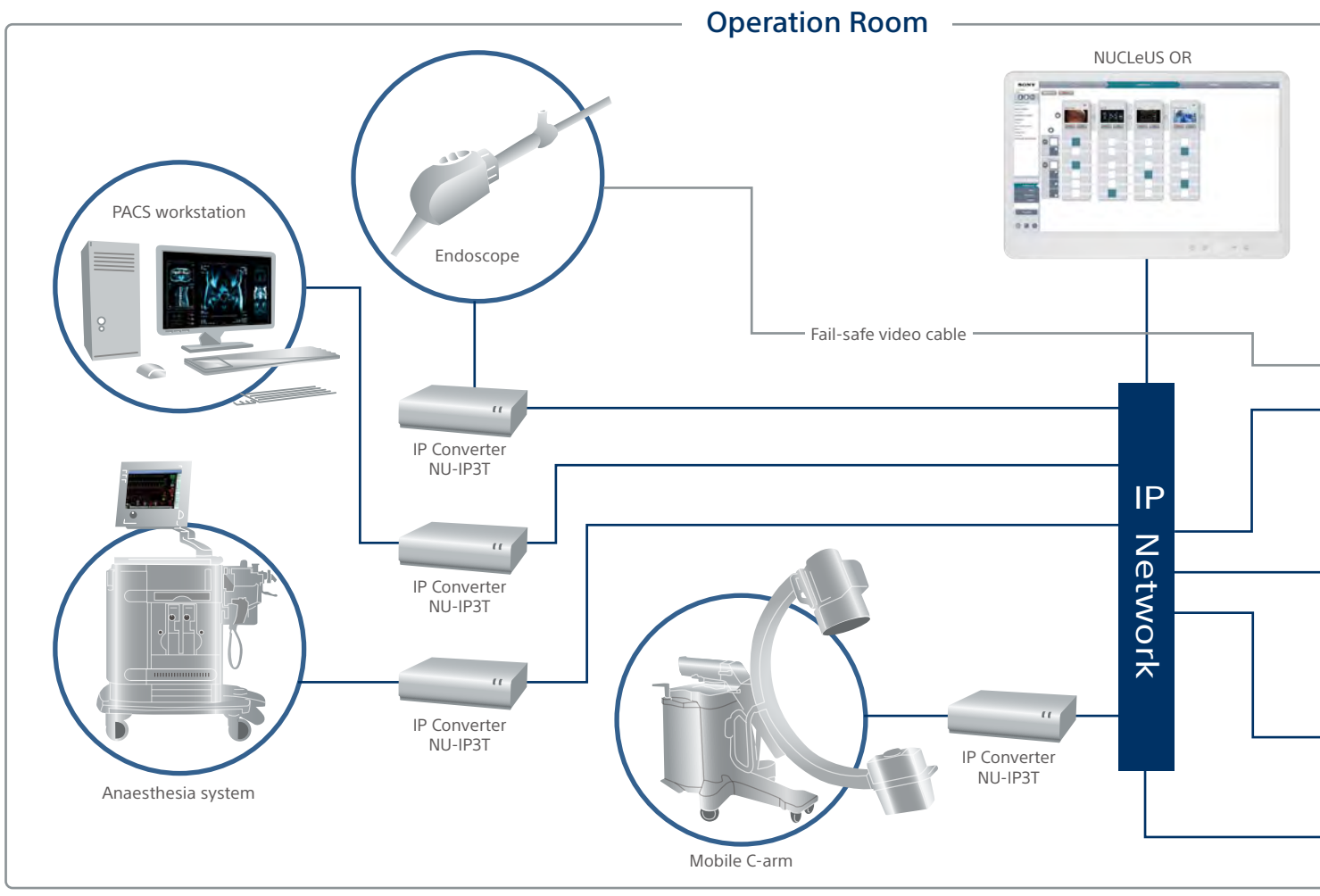
For hospital managers

Adding new medical devices and systems requires costly, time-consuming installation and training for hospital staff. What's more, extra hardware and file formats can mean headaches over the security and integrity of valuable clinical data.
Our IP workflow solutions make it easier to add new hardware and functionality as your needs grow. Moreover, NUCLeUS provides a safe and secure data management suite where recordings, along with all digital assets, can be stored on a secure server.

For system integrators

With video-over-IP systems, medical system integrators can offer hospitals a powerful, highly flexible video workflow solution with the capacity and versatility to meet today's and tomorrow's needs. These systems offer a low total cost of ownership and enable easy system integration and maintenance.
An all-IP architecture provides a seamless upgrade path from HD to 4K, while open APIs simplify rapid customization of OR controllers and integration with other hospital systems.

The smart digital imaging platform



Vendor-neutral IP platform and high image quality

NUCLeUS is device-, format- and resolution-agnostic, handling video sources from legacy SD right through to 4K 3D from a wide range of modality manufacturers.

- Video, audio, and associated patient information is distributed over secure IP connections.
- Compatible with the vast majority of video standards and formats over a wide range of modalities such as endoscopes, ultrasound scanners, light cameras, PACS, and more.

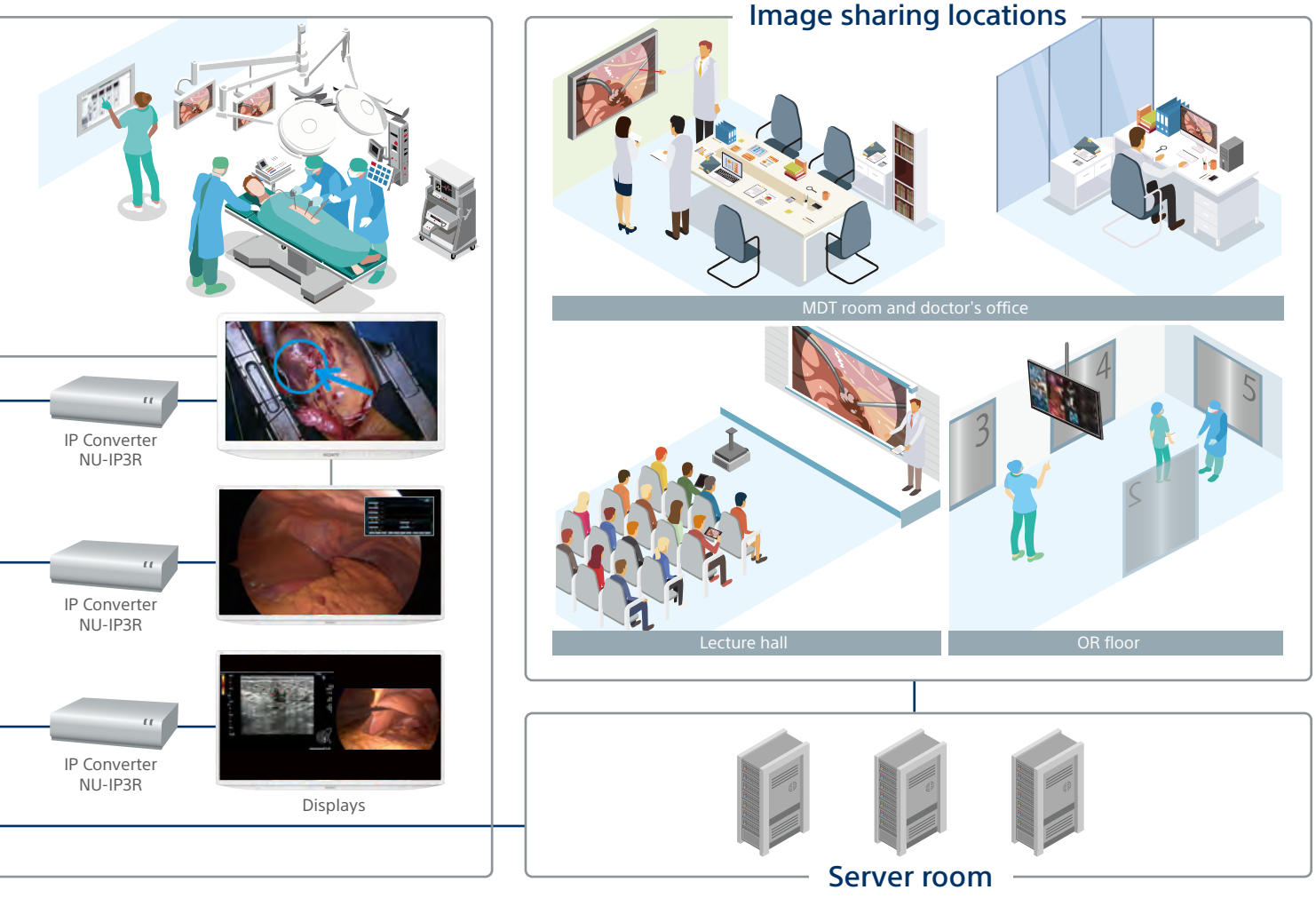
Touch screen user interface for seamless and intuitive imaging workflow

- Instantly route any image source to virtually any destination, with no need to re-plug equipment.
- Switch to multiple monitors in full screen, picture-in-picture, or multi-split (quad view).
- Record multiple video sources simultaneously on the network-based application using various combinations of format and resolution.

Advanced NUCLeUS smart applications

The NUCLeUS IP receiver has an embedded GPU which can run NUCLeUS Smart Applications for powerful real-time image processing features.

- Rotation Correction is an example of a NUCLeUS Smart Application that enables the surgeon to stabilize the 'horizon' in an endoscopic video feed while rotating the scope; it also implements a method to automatically detect and undo unwanted image rotations up to 4K resolution.



Enhance training and education

Achieve simultaneous recording of all OR video sources, in virtually any combination of formats and resolutions. Audio recording is also possible. Reach outside the OR and share an accurate live stream of surgical interventions at conferences and lectures.

- Centralized storage and easy, secure access across the hospital network to data linked to the patient ID.
- Streamed video and bidirectional audio enhance collaboration between clinicians in the OR and outside.
- Shared video and metadata that is transmitted outside the OR is encrypted for security.

Telestration and editing

This allows exchange of real-time video content with clinicians and remote annotation of live streams. Annotations made by the remote participant can be viewed in real-time on the live image in the OR. Also, video can be edited in the OR and from a client PC across campus.

- Integrates video editing functions such as multi-cutting, creates still images from video, and adds annotations.
- Bi-directional telestration function allows multiple remote users to simultaneously annotate, draw or highlight areas of interest in the live streaming video, which is shared by viewers in all locations. Optionally, a grid may be overlaid on the video to more easily identify parts of the scene.

Broader integration

- NUCLeUS supports a wide range of integrations such as connecting to HIS/RIS, PACS and EMR systems, transmission of video streams to iPad devices, printing still images with a Sony medical printer and IP camera support to input the IP camera stream to NUCLeUS.
- Preventative solution maintenance, including self-monitoring capabilities of the system from outside the hospital.
- NUCLeUS is a software-based system that is constantly evolving to customer demand to improve imaging workflow in the OR. After deployment, customers can expand or increase functionality of their system as requirements grow.

NUCLeUS components

NUCLeUS is a unique combination of a user-friendly software platform, low-footprint hardware units, and a powerful server backend.

Switching and routing

NUCLeUS OR

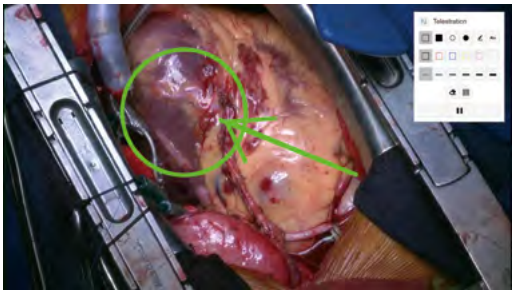
There is a lot of information to be handled within the OR, such as live video signals from an endoscope, ultrasound streams, PACS workstation data, and mobile C-arm modalities.
NUCLeUS OR provides an integrated UI of the NUCLeUS system to support OR workflows. The platform includes many flexible visualization options such as switching to multiple monitors in full screen, picture-in-picture, or multi-split.
This is advantageous for OR ergonomics and efficiency; it also delivers financial benefits.

The GUI image in this brochure is an example, displayed on 3rd party's touch panel device.

NUCLeUS Smart applications

Telestration tool

The software tool allows remote annotation of video streams outside the OR and sharing these annotations in real-time with the OR.
Clinicians can ask a colleague (located outside the OR) for a second opinion. Through a secure login, this colleague can access the telestration tool and annotate the shared live image remotely, and these annotations can be shown in real-time within the OR. Annotations include circles, lines, rectangles and text in different colors. Grid view and screen freezing is possible as well.

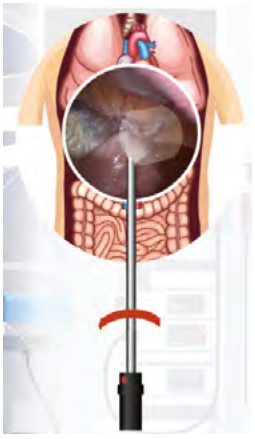


Color and structure enhancement

The Color and Structure Enhancement Application implements a real-time adjustment of color and enhancement of structural details on live surgical video in 4K resolution. This real-time image processing can reduce noise and emphasize different color tones of body tissue.

Rotation Correction

In laparoscopic surgery, angled laparoscopes are commonly used. To improve the viewing range, the scope is rotated, effectively changing the viewing direction. This application compensates for such shifts in the orientation of video from a handheld surgical endoscopic camera. Video remains stable and correctly oriented, irrespective of rotational movements. This is not only useful for assisting surgeons but is also a valuable asset for teaching.



Communication inside and outside the OR

Broadcast

Knowledge sharing is the key to better healthcare. Streaming in NUCLeUS is easy to access as no extra software or hardware is required. Live medical video and audio from the OR can be shared securely over a network. Medical staff can access feeds from anywhere in the hospital via the local intranet. You can initiate meetings with peers and even transmit outside the OR to share your surgical event with an audience. Broadcast supports bidirectional audio communication.

NUCLeUS Tiles & Static Mosaic viewing

Static Mosaic provides a clear overview of current activities in all of your operating rooms, ICUs, etc. Live video feeds from multiple rooms can be grouped together on one centralized display. This allows you to quickly & efficiently make decisions on the basis of real-time information.
Static Mosaic is ideally suited for viewing on a large wall-mounted display. NUCLeUS Tiles enriches this concept to allow the user to dynamically alter the perspective by switching views from an overview, down to a single room, or even a single video source, with a few clicks of a mouse. NUCLeUS Tiles allows the user to zoom in on ongoing activities in all of the areas under their responsibility.

Layout Examples

Content management

Content management and editing

This is a safe and secure data management suite allowing recordings to be reviewed, edited and annotated. NUCLeUS simultaneous recording function provides convenient archiving of all patient and image data, while recordings can be seamlessly integrated with PACS, EHR, and HIS. The surgeon can record multiple sources at the same time and also record audio with timecodes for the synchronization of video and audio. A web-based video editing tool with an intuitive user interface enables you to do multi-cutting, create still images from video, and add annotations. Any recorded HD resolution video content can be converted to 4K using algorithms far superior to simple upscaling technology.

Open platform and scalable

Smooth integration with third-party systems

NUCLeUS is designed to integrate easily with other hospital systems and third-party ICT through business APIs (application programming interfaces). This allows for very close integration of third-party systems with NUCLeUS and enables additional applications to be built on top of the NUCLeUS platform. Business APIs even allow the deployment of NUCLeUS as an OR-operating system to build a completely customized, integrated operating room on this proven foundation. NUCLeUS provides even tighter integration with the ability to centrally control medical devices such as surgical lights and other equipment in the OR.

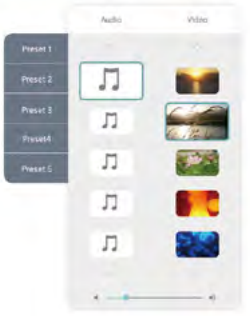
Upgradeable and flexible

Thanks to a powerful GPU embedded in the IP converter, the functionality of NUCLeUS can be easily extended with APIs. As new collaboration technologies arise in the industry – such as intelligent NUCLeUS Smart Applications — you can immediately use them for your advantage. NUCLeUS offers a scalable platform which enhances clinical workflow and supports better clinical decisions. NUCLeUS is a scalable solution which allows users an easy path to add more ORs to the solution without redesigning the system or replacing expensive IT hardware and cabling infrastructure.

Patient distraction

Selectable patient-friendly atmosphere

This patient distraction tool is designed to reduce patient anxiety and create a selectable patient-friendly atmosphere with videos and still images on displays. When entering the operating room, patients are understandably nervous. The Patient Distraction feature helps patients to relax and reduces anxiousness by playing videos on all screens and playing music through the OR speakers during the preparation phase. By registering multiple items in advance, medical staff can select the most suitable content for each patient.



IP Converter

NU-IP3T*1 IP Converter (Transmitter)

NU-IP3T handles 4K, HD, SD and 3D, 2D sources from a wide range of modality manufacturers. The NU-IP3T converts video sources into a low latency IP stream which can be transmitted on either standard copper or fiber network interfaces. If using a fiber interface, the IP Transmitter can deliver a 4K uncomprhessed IP stream*. A native video stream as a primary output is mainly used for live viewing by surgeons in the OR. Bandwidth-optimized streams (so-called proxy streams) as a secondary output enable medical teams in offices and lecture halls to view the same surgical image as the surgeon in the OR.

NU-IP3R*1 IP Converter (Receiver)

NU-IP3R receives the IP stream from the NU-IP3T and decodes this back into a video signal for visualization on a (surgical) monitor in full screen, picture-in-picture or multi-split (quad view). NUCLeUS has been designed to allow for more advanced applications; the receiver has overlay capabilities and is equipped with a powerful graphics processing unit (GPU). It processes NUCLeUS Smart Applications for transparently overlaying any kind of value-added information on live video.

*1 This product is distributed to EU and US as a medical device and satisfies product safety standards (e.g. IEC 60601-1).

NUCLeUS Back-end server

Scalable NUCLeUS backend

The power of NUCLeUS lies in the scalable architecture. As project demands increase with more ORs, investing in a scalable platform has many benefits.

* Availability may vary depending on the country.

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