PHILIPS

Ultrasound

*n*SIGHT Plus

# Adaptable image formation

## Harnessing advanced GPUs for outstanding image quality

Ultrasound is becoming the first imaging modality used to diagnose patients. Clinicians also recognize its utility in planning and monitoring a variety of treatments and in follow-up imaging. Its wide variety of uses requires that ultrasound systems easily adapt to different applications and patients. Both diagnostic exams and image-guided procedures require superior imaging for visualization of anatomy and devices. Images must be easy to acquire, with clinically sufficient penetration, resolution and sensitivity. Images must also take minimal time to optimize, supporting efficient workflow.

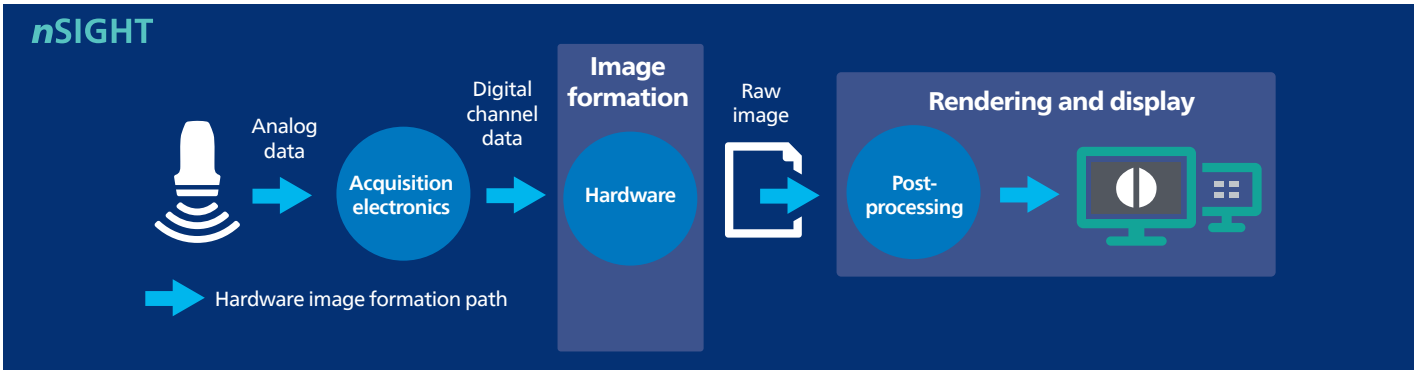
## The challenge

Image formation requires computational power and flexibility

### Image formation – the process of converting acoustic data from the transducer into a raw ultrasound image – is key to meeting all these requirements.

Image formation uses the data collected across multiple transmit events to reconstruct each voxel in the raw acoustic image. This computationally demanding set of mathematical operations must be done at very high speeds to achieve real-time performance (**Figure 1**). Traditionally, specialized hardware has provided the necessary computing power.

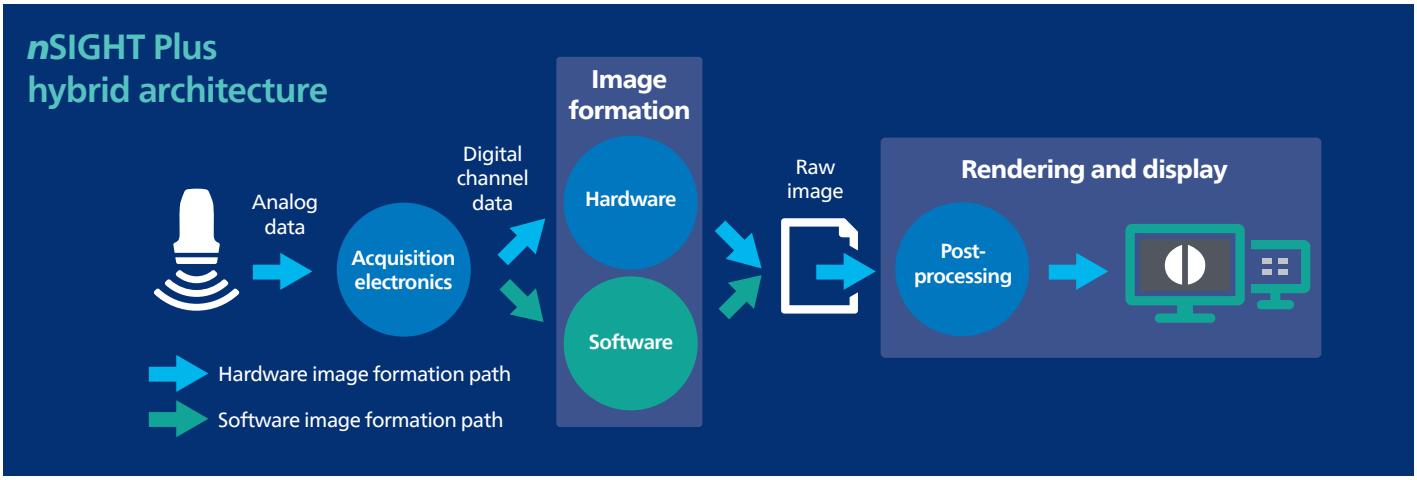
However, with such a fixed architecture, it is difficult to develop new and more complex approaches to image formation. A hardware-only solution cannot support the flexibility required by adaptive algorithms that improve image quality and often transform non-diagnostic images into diagnostic images.



# The solution

## Combine hardware and software for power, flexibility and speed

Recent advances in the processing power of graphical processing units (GPUs) make it possible to build a platform that enables software to run image formation calculations. Coupling the flexibility of software with the power of advanced hardware provides many advantages. It supports sophisticated image formation as GPU capabilities increase, higher frame rates, and improved image quality from adaptive algorithms that are customized for specific applications. Benefits include crisp 3D volumes at high frame rates or 2D images with significantly reduced clutter.



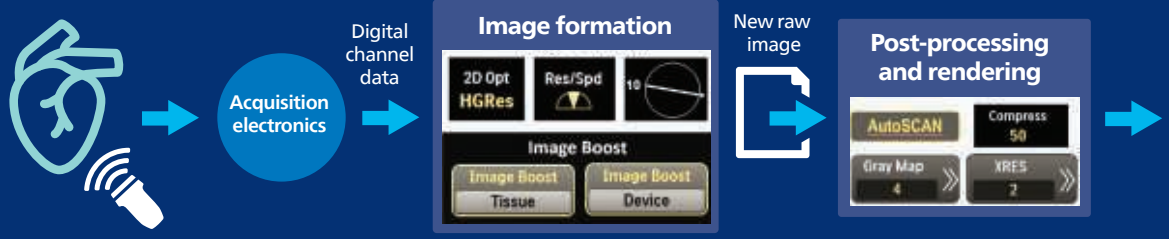

# The result

## *n*SIGHT Plus platform unlocks adaptive image formation

***n***SIGHT Plus harnesses the power of hardware and the flexibility of software to bring new capabilities to image formation. Its advanced, intelligent algorithms use the available acoustic data early in the imaging chain to decrease artifacts and suppress interference. Because data is more abundant earlier in the image formation process, 2D, 3D and multiplanar reconstruction (MPR) image quality can be enhanced greatly.

The Image Boost function for ***n***SIGHT Plus is just one example of adaptive processing made possible through the power of advanced GPUs. Image Boost is an adaptive clutter suppression algorithm that reduces undesired artifacts while boosting desired signals from the myocardium and other cardiac structures. Because it produces a clean raw image, downstream processing can enhance the visual characteristics of the final ultrasound image.

### *n*SIGHT Plus hybrid architecture

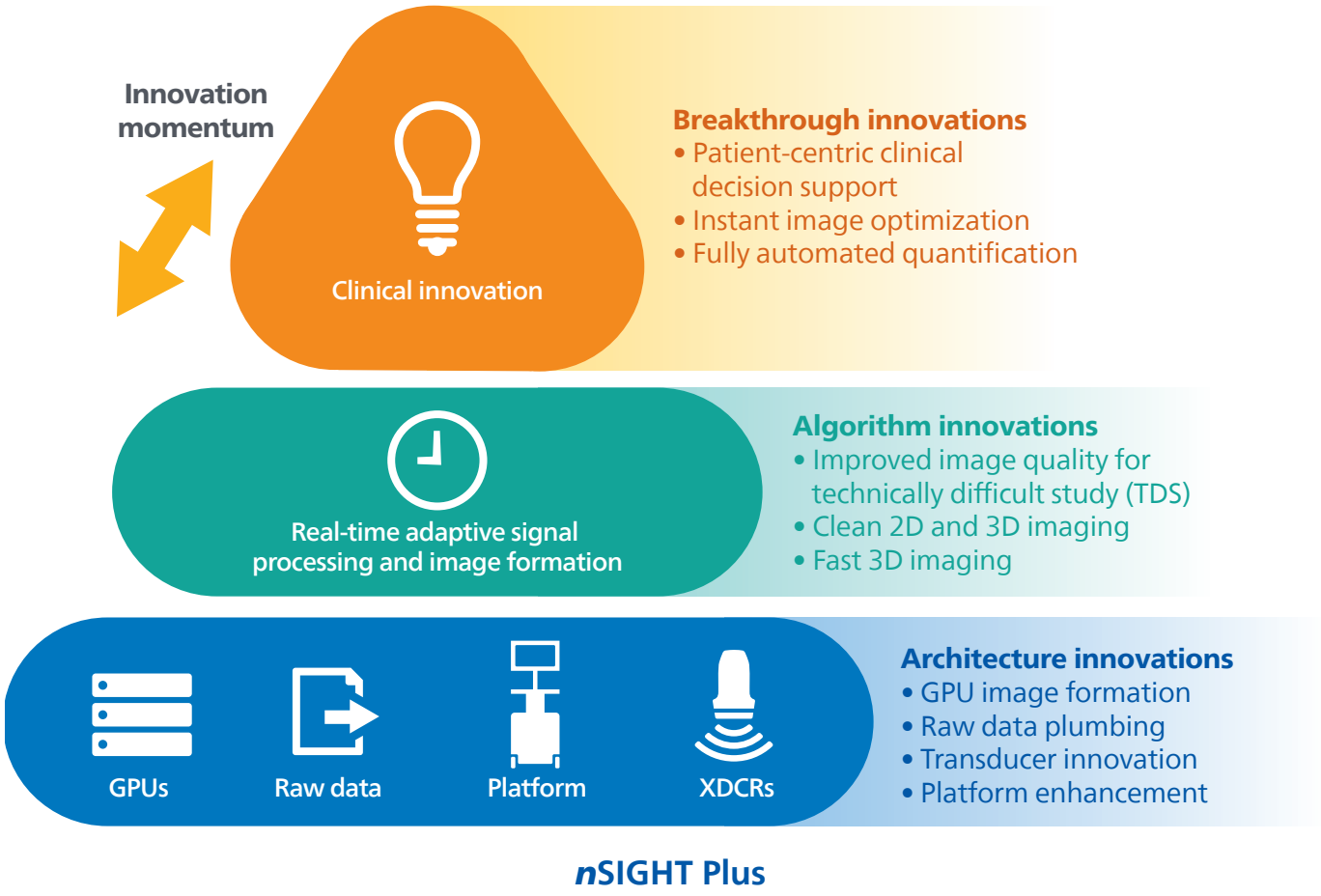



- Improved 2D image quality
- Enhanced MPR image quality
- Improved 3D image quality
- Higher frame rates
- Data-intensive, AI-enabled quantification

Not available for all transducers at Release 9.0

## Beyond beamforming

Software image formation algorithms are at the foundation of future innovations.




***n*SIGHT Plus**

# A platform for the future

The ***n***SIGHT Plus platform is designed to usher in a new era of ultrasound utility. Creation of a clinically rich raw image allows premium quality image quantification tools and visualization tools to perform at their best level, providing high-quality images that clinicians need for confident diagnosis and treatment, even for difficult patients. In the future, ***n***SIGHT Plus will facilitate clean color flow, expand the reach of improved image formation to other transducers and applications, push the envelope on acoustics with high frame rates, and enhance contrast imaging.

## The conclusion

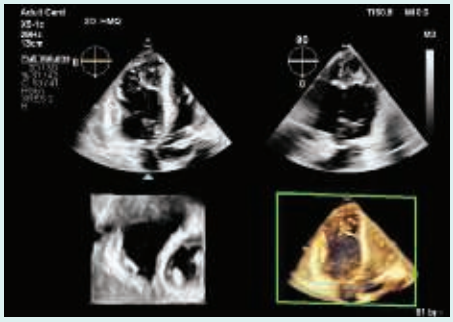
The X5-1c transducer combines with ***n***SIGHT Plus for improved clinical information in 2D and 3D transthoracic imaging

When ***n***SIGHT Plus image formation is combined with the data acquisition of the X5-1c transducer, clinicians can see clinical information in 3D transthoracic imaging, supporting an improved diagnosis while visualizing.

- Pulmonic valves
- Tricuspid valve
- Mitral valve
- Apical thrombus

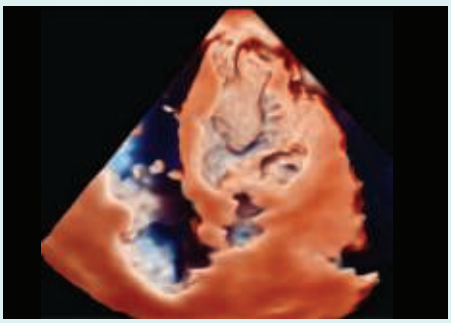
Clinicians' diagnostic confidence in 3D LV function quantification was improved in 80% of patients undergoing transthoracic imaging exams using the X5-1c transducer powered by ***n***SIGHT Plus.[1]

***n***SIGHT Plus-powered Image Boost on the X5-1c transducer also enhances the visualization of tissue in 2D imaging while reducing clutter and noise.



MPR imaging using X5-1c

PLAX using X5-1c



TrueVue rendering of AP4 using X5-1c

**Reference**

1 External study at UCMC using Release 9.0 and X5-1c.



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