



**PHILIPS**

VesselNavigator

Endovascular procedures

# Making the difference with Live Image Guidance

## Reduce your need for contrast medium

### Key benefits

- Supports navigation through complex vessel structures, enhancing clinical outcomes
- Reusing a pre-acquired CTA or MRA reduces the need for contrast enhanced runs
- Philips CTA Image Fusion Guidance may lead to shorter procedure times
- Intuitive and easy to use by providing step-by-step workflow guidance

“With image fusion we can check that the position of the device is correct, with a very small amount of contrast. I use 6 ml for the renal arteries but it might be possible to perform the procedure with even less. By being precise we can place a stent graft without using so much angiography, which results in less radiation and less contrast.”

**Prof. Dr. J. Brunkwall, University Hospital Cologne, Germany**

Our Live Image Guidance intuitively integrates multi-modality imaging and workflow guidance to help you open doors to new procedures and techniques, and deliver relevant clinical value where it's needed most - at the point of patient treatment.

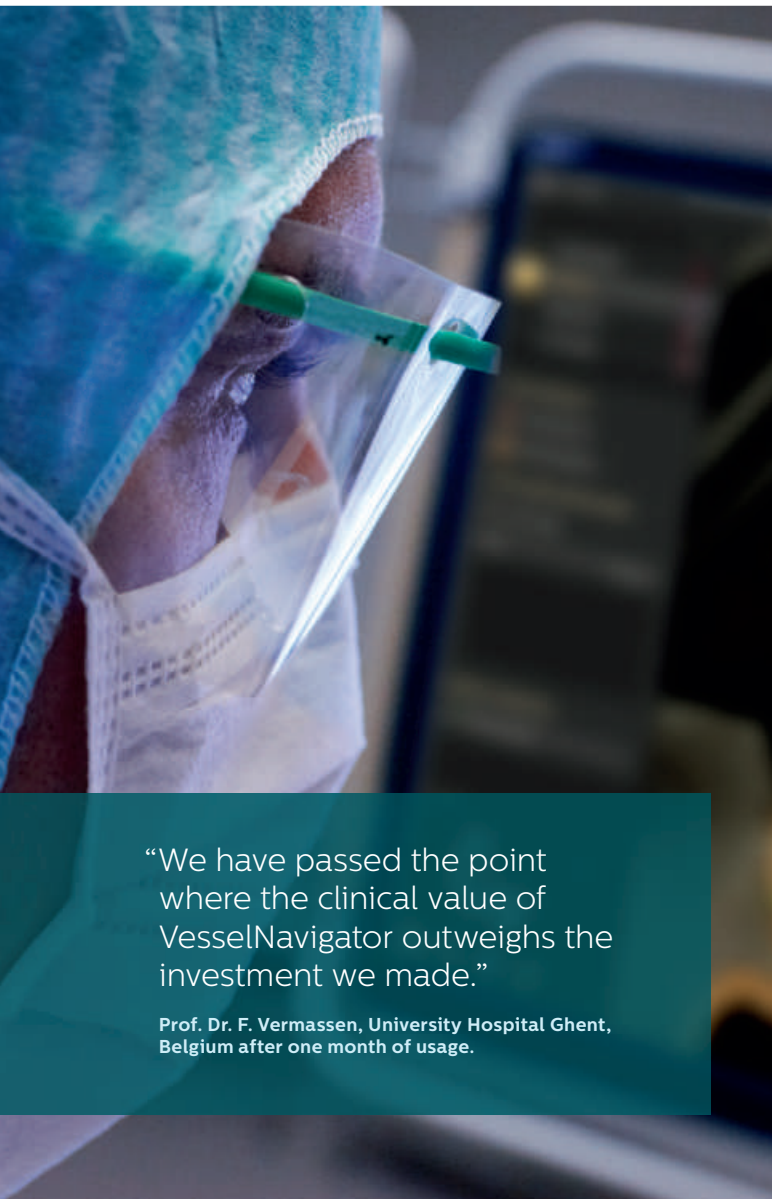
When delicately navigating a guidewire or inserting a stent in challenging endovascular, seeing the full perspective of anatomy is crucial. Using X-ray and contrast medium efficiently is also very important, especially for vulnerable patients. We've designed VesselNavigator to help you meet these challenges. Its images are your three dimensional compass during endovascular procedures. They allow surgeons and interventionalists to plan, perform, and follow-up procedures with confidence.

VesselNavigator, Philips next generation image fusion technology, allows reuse of 3D vascular anatomical information from existing CTA and MRA datasets as a 3D roadmap overlay on a live X-ray image. With its excellent visualization, VesselNavigator provides an intuitive and continuous 3D roadmap to guide you through vasculature during the entire procedure. This reduces the need for a contrast enhanced run to create a conventional roadmap.

# Intuitive and accurate 3D guidance

## Greater insight and confidence in finding and treating the problem

Our Live Image Guidance expands clinical capabilities through intelligent and intuitive integration of multi-modality images at the point of treatment, enabling confident diagnosis and real-time therapy monitoring.



“We have passed the point where the clinical value of VesselNavigator outweighs the investment we made.”

Prof. Dr. F. Vermassen, University Hospital Ghent, Belgium after one month of usage.

### 3D image fusion in advanced endovascular procedures

Studies<sup>1,2</sup> have shown that a 3D perspective of anatomy is desirable for catheter guidance and device placement because of its advantages over 2D imaging. Previously acquired diagnostic CTA and MRA datasets show the 3D anatomical structure of vasculature, in a way that's similar to an open surgery view.

Now with VesselNavigator clinicians can easily segment the 3D vessel structures from these datasets and fuse them with the 2D fluoroscopy image to get the 3D perspective of anatomy in the X-ray image.

### VesselNavigator real-time navigation

VesselNavigator can be used for any type of endovascular procedure. It is especially beneficial for complex and tortuous vasculature where it is challenging to accurately navigate and place stents or for procedures where contrast use should be minimized.

VesselNavigator's 3D image fusion offers numerous advantages compared to 2D imaging and 3D roadmap alone:

### Real-time navigation supports confident decisions during procedures

Unlike 2D angiography images which can be limited by vessel superpositioning or foreshortening,<sup>1</sup> VesselNavigator provides three dimensional views of vasculature that allow you to easily define the right projection angle<sup>2</sup> for optimal navigation and stent placement. With the use of ring markers you can easily indicate the ostia and landing zones.

# Lower barriers for minimally invasive interventions

We have a long standing commitment to reducing dose and contrast medium through a set of techniques, programs, and practices that focus on delivering equivalent image quality at a fraction of the dose.

## Contrast medium usage and procedure efficiency

VesselNavigator's roadmap covers the entire MR or CT volume, so you can navigate through the entire vessel without needing to make contrast runs at each step of the procedure. Reusing a pre-acquired CTA or MRA as overlay reduces the need for a contrast enhanced overlay.

A study of 23 patients<sup>1</sup> has shown to reduce average contrast medium usage from 235 to 65 ml (72%) during endovascular repair of complex aortic aneurysms with the use of Philips CTA image fusion guidance. No intraprocedural contrast agent injection was required

to create a roadmap. Contrast agents were mainly used before and after visceral stent placement and for the final control angiography.

Besides reducing contrast, VesselNavigator can potentially reduce procedure time significantly. A study of 62 patients<sup>2</sup> showed an average reduction in procedure time from 6.3 to 5.2 hours during FEVAR/BEVAR procedures with the use of Philips CTA image fusion guidance. This was possible due to more efficient target vessel catheterization under fusion roadmap guidance.

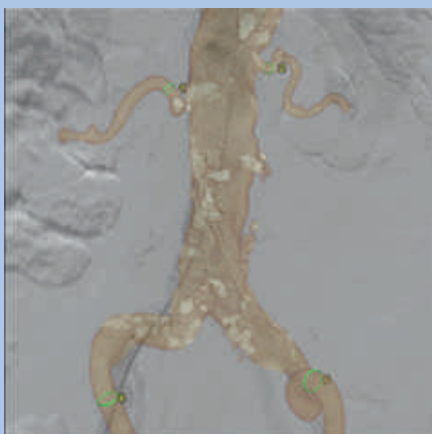


Figure 1: 3D anatomy fused with live 2D image. Courtesy of Prof. Dr. J. Brunkwall

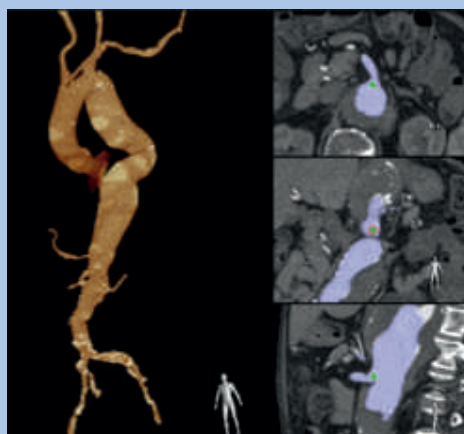


Figure 2: One-click segmentation of aorta and relevant side branches. At the right side CT orthogonal cross sections of selected side branch for accurate ring marker placement

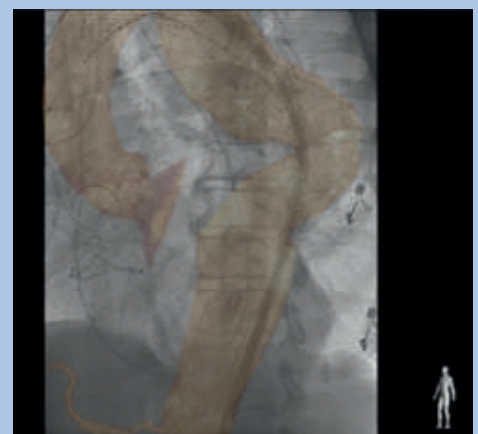
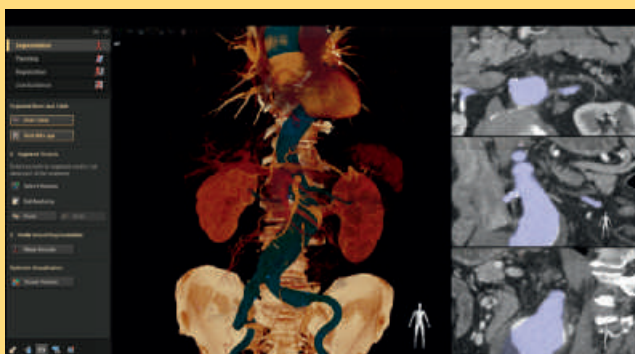


Figure 3: Snapshot recorded during live three-dimensional navigation with VesselNavigator. Live fluoroscopy was superimposed on a preacquired CTA dataset, showing the deployment of the stent graft in the aneurysm of the thoracic aorta. Courtesy of Prof. Dr. J. Brunkwall

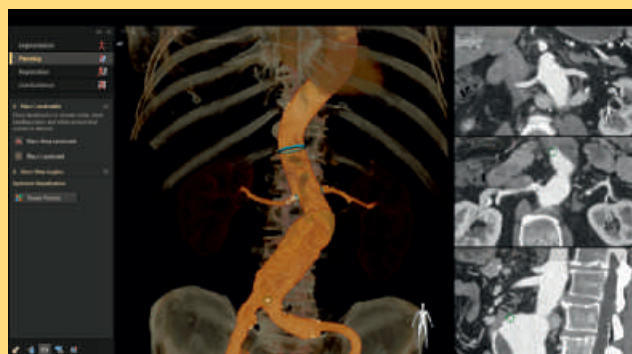
# Better user experience

## to promote consistency and efficiency

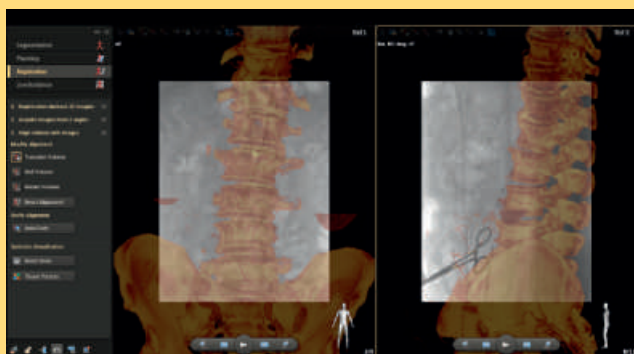
We are committed to optimizing the user experience to support clinicians in each of their procedures by combining disease centric tools, patient data, and procedural protocols in a single suite.



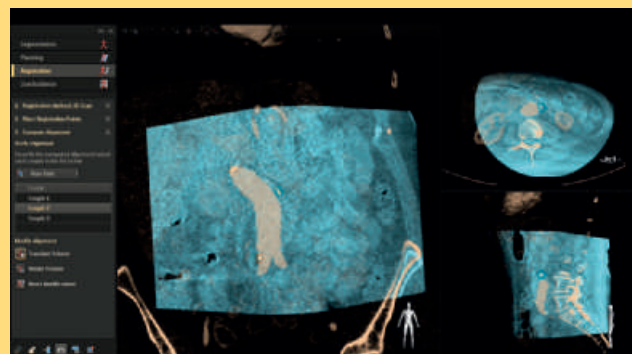
1: Select vessels for overlay with a one-click vessel segmentation



2: Add ring markers for ostia and landing zone indication and to define planning angles



3a. Fuse the CT or MR dataset with the 2D images by matching bony landmarks on two fluoroscopy or X-ray runs



3b. Fuse the CT or MR dataset with the 3D images by selecting three points in both datasets

“The tool is so self-explanatory that we could use it without additional instructions on the second day after installation, and now after a couple of weeks it is fully integrated in our routine.”

Prof. Dr. F. Vermassen, University Hospital Ghent, Belgium



4: Start with live 3D image guidance



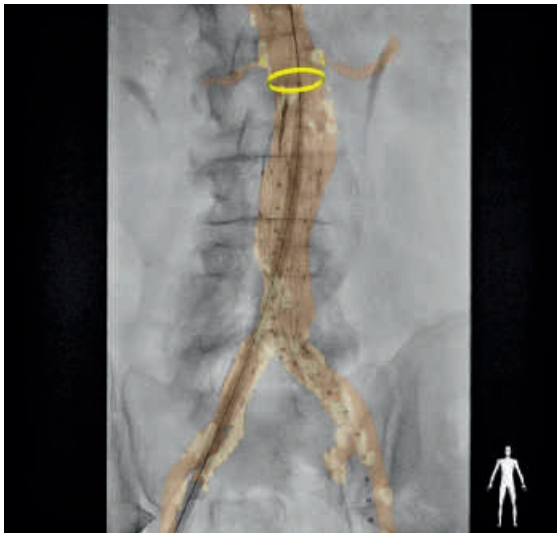
## Intuitive use stay focused on your patient

During a procedure it is critical to maintain full focus on the patient and the treatment. So the intuitive use of VesselNavigator is of utmost importance. 3D navigation should be easy to use for all clinicians, no matter what level of experience they have with image fusion. Through its advanced imaging capabilities, VesselNavigator is the tool that creates a seamless clinical workflow. It guides you through four simple steps:

- 1: Select the vessels for overlay with a one-click vessel segmentation
- 2: Add ring markers for ostia and landing zone indication and define planning angles
- 3a: Fuse the CT or MR dataset with the 2D images by mapping on bone structures or
- 3b: Fuse the CT or MR dataset with the 3D images by selecting three points in each dataset
- 4: The fused image can now be used as Live Image Guidance during the procedure

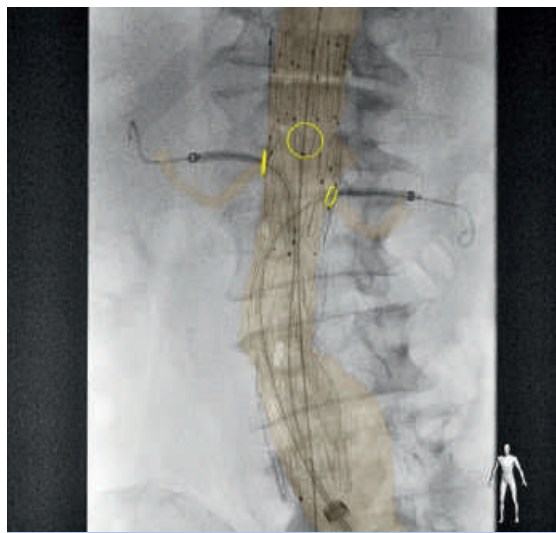
During the procedure VesselNavigator provides a real-time overlay in any projection and any table and system position. You can also choose from a variety of superior volume rendering visualization options, customizable per physician preference.

# Case gallery



69Y/M, Endovascular aortic aneurysm repair  
Contrast medium: 36 ml  
Air Kerma: 410 mGy  
Fluoro time: 11 min  
Procedure time: 45 min

Courtesy of Prof. Dr. M. Schermerhorn



70Y/M, Endovascular repair of juxtarenal abdominal aortic aneurysm  
Contrast medium: 115 ml  
Air Kerma: 2165 mGy  
Fluoro time: 57 min  
Procedure time: 2:14 hours

Courtesy of Prof. Dr. M. Schermerhorn



71Y/M, lower left peripheral in stent restenosis  
Contrast medium: 40 ml  
Air Kerma: 86 mGy  
Fluoro time: 7 min  
Procedure time: 1:30 hours

Courtesy of Prof. Dr. F. Vermassen



77Y/M, Left common carotid stenosis  
Contrast medium: 40 ml  
Air Kerma: 55 mGy  
Fluoro time: 9 min  
Procedure time: 50 min

Courtesy of Prof. Dr. F. Vermassen



## References

1 Tacher V, et al (2013). Image Guidance for Endovascular Repair of Complex Aortic Aneurysms: Comparison of Two-dimensional and Three-dimensional Angiography and Image Fusion, *J Vasc Interv Radiol*, 24(11), 1698-1706. Doi: 10.1016/j.jvir.2013.07.016.

2 Sailer AM, et al (2014). CTA with fluoroscopy image fusion guidance in endovascular complex aortic aneurysm repair, *Eur J Vasc Endovasc Surg*. 2014 Apr;47(4):349-56. Doi: 10.1016/j.ejvs.2013.12.022

