

## I Can See Clearly Now: Talking OR Visualization

Mike Schmidt, Editor, Surgical Products

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**The development of products and devices designed to make it possible for hospital surgeons and staff to receive high-quality visual information in the operating room is always changing. Here are thoughts from three industry experts on the topic of OR visualization:**



**SP: Is there a minimum standard for quality of image that exists right now for hospitals?**

**Jens Ruppert, Vice President & General Manager, Surgical Business Unit, NDS Surgical Imaging:** Since HD or “high-definition” visualization was introduced to the surgery suite in 2006, hospital enterprises around the world have been rapidly adopting the more advanced HD imaging. The older SD or “standard-definition” technology has a resolution of only 480 lines. HD systems dramatically increase that to 1080 lines, making the image quality far superior. Studies have shown that surgeons perform tasks faster and with more accuracy when viewing a high-definition image. Medical device manufacturers and surgical staff recognize the benefits of HD visualization, and even though there may still be some legacy SD equipment in use, it is just a matter of time before it is upgraded to the higher-performing HD systems.

**Jake Isley, Product Manager, Berchtold Corporation:** To my knowledge there is no standard which hospitals must follow. However, where in-light cameras are concerned, most surgical lighting companies provide both a HD (720p or greater) and a SD system option. As long as the budget is there, customers will opt for HD systems.

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**SP: Please describe how the healthcare industry has reacted to the introduction to 3D technology for the operating room? What has the feedback been like? How does that compare to the response/feedback from the healthcare industry when HD was introduced?**

**Ruppert:** The migration from SD to HD did not present any major viewing challenges for surgical staff. With advanced HD systems offering affordability, longer life through LED backlight, and other cost saving features, the only hurdles to consider are technical in nature (signal inputs and outputs, connectivity, video formatting). With 3D technology, the surgical team must now adapt to viewing images with depth perception. Wearing 3D glasses of any kind during surgery can create challenges such as eye strain and fatigue. It remains to be seen how tolerable this will be for surgical staff, and how quickly the technology behind the glasses will evolve. Compared to the change from SD to HD, the transition to 3D visualization will require more testing, take longer to unfold, and demand a greater investment of budget.

**Isley:** There are some early adopters out there that have embraced 3D camera systems, but it feels more like a niche product right now. Whether widespread adoption of 3D technology will occur in healthcare is not yet certain.

(The feedback has been) positive, just not positive enough. Right now, surgical lighting companies have yet to implement 3D systems. It would necessitate two different image capture sources (two in-light cameras) and some sophisticated software modeling to produce a quality 3D image. Most healthcare institutions purchase high definition camera systems primarily for educational purposes. They use still images, or they stream video content so that it is available to others outside the OR. Streaming HD content or images requires a decent amount of bandwidth, and while this may be pure speculation, 3D images would be larger than their 2D counter parts.

The demand for a 3D images hasn't taken hold just yet. The market has not been as quick to respond to 3D technology as it was with high definition. The image quality of a high definition system over a standard definition system, particularly when viewed on a larger monitor (42 inches or larger) can be quite apparent and seemed to be a no-brainer for most institutions (if the budget allowed). There exists a trend for greater visualization as surgeries become more minimally invasive, so image quality is becoming more important as well. Selling internal stakeholders on high definition systems is much easier than on 3D systems. They understand and can justify to themselves why it is necessary, and they don't need any "help" from a surgical lighting company or video integration company to "sell" them on the idea.

3D systems have a higher price tag, and those companies that have pioneered its applications in healthcare are still working on the unique selling proposition or value statement that resonates with clinicians.

**David Colvin, Executive Director of Marketing, General Surgery and Imaging, Olympus Corporation:** Surgeons consistently observe that 3D helps them identify tissue planes. Another common comment we hear is that the 3D helps

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them perform challenging surgical steps like suturing or precise dissection. Our internal data suggests that in a simulated surgical model, 3D shortens the learning curve, reduces mistakes, and improves accuracy with regards to common surgical tasks. Accurate perception of depth is most critical at greater working distances, such as in foregut, bariatric, and colorectal surgery.

### **SP: What kinds of facilities are really and truly looking at 3D as a viable option these days?**

**Isley:** Speculating here, but the demand for 3D technology may start with the neurological department or cardiovascular specialty where 3D representation of the brain or heart become more important than a 2D rendering.

**Ruppert:** Initially recognized for accuracy and precision during prostate surgery, 3D visualization has many applications. Endoscopic surgery, laparoscopic procedures, and arthroscopic specialists will all benefit from such a dramatic enhancement to visualization. As 3D systems become more prevalent and affordable, a wide range of large hospital enterprises, surgical centers, and smaller clinics will have access to the technology.



### **SP: How do facilities justify the cost of the 3D technology? How do they leverage the technology?**

**Ruppert:** Improved patient outcomes, long-term procedural success rates, faster and more precise surgeries, and reduced patient recovery time will all play a role in justifying the future adoption of 3D technology. Healthcare enterprises must move forward in order to provide their communities with the best care. At the same time, facilities must remain cost-efficient. People facing surgery tend to want the least invasive and most technologically advanced solution. It is logical to assume they will seek out the facility with state-of-the-art equipment.

**Isley:** It would help if clinical data existed showing instances where 3D images were used to treat a patient either during or after surgery and proved more effective than a 2D image. The traditional metrics: improved patient outcomes, lower readmission

rates, staff satisfaction, etc. could be used to justify purchase of 3D systems.

### **SP: Has HD imaging reached a ceiling or is there a way to further develop this technology?**

**Colvin:** Right now high-definition 3D is the pinnacle of surgical imaging. Many experts believe that similar to the evolution from standard definition to high definition imaging, the next stage in that progression is the transition from high definition to ultra-high definition imaging, or 4K. We believe that is a technology that will become a gold standard in a relatively short period of time.

Similarly, the evolution from 2D imaging to 3D imaging is occurring now. The next step in that progression will be to build a high definition 3D system in a 5mm diameter laparoscope.

**Ruppert:** With only approximately half of all facilities currently upgraded to HD quality, we will see a lot more adoption of HD systems in the immediate future. Also, there is a strong possibility that 4K resolution will emerge as a superior HD standard. So the full potential of HD imaging has not yet been realized.

### **SP: Is the case for investing in 3D technology as strong as the case for investing in HD?**

**Isley:** It doesn't appear to be as strong. While there probably weren't many (if any) clinical studies to justify high definition over standard definition for the healthcare industry, the switching costs aren't very significant. Other industries have already done the work for healthcare facilities, and all but justified not just the demand for HD systems to replace their SD systems. One example of other industries where HD is extremely successful is the cable television industry. The same cross pollination hasn't occurred for 3D technology. Many people have HD televisions, but not many have made a strong enough case for 3D televisions. Do you have a 3D television? Do any surgeons you know have 3D televisions? The answers to those questions may help drive adoption or even extinction of 3D systems in the surgical environment.

**Ruppert:** Any advancement in visualization technology that improves patient outcomes must be taken seriously by the healthcare industry. The transition to 3D imaging in surgery will undoubtedly bring many benefits, but over the immediate short term, for many facilities, the video infrastructure expansion requirements may not be economically practical.

**Colvin:** I think it is even more compelling of a value proposition than HD was/is. In going from a 2D to a 3D environment, not only is the image quality improved but the surgeon's movements are more efficient, with greater accuracy and fewer errors. The surgeon is able to closely replicate the views obtained during open surgery in a laparoscopic environment. The 2D to 3D transition is truly revolutionary.

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