



## FOR IMMEDIATE RELEASE:

### Sensor technologies enable the surgical robots’ revolution

Extracted from: Medical robotics technology & market analysis & Solid-State Medical Imaging 2017 reports, Yole Développement – 2017 Medisens Conference 2018 – February 26 & 27, 2018 – London, United Kingdom

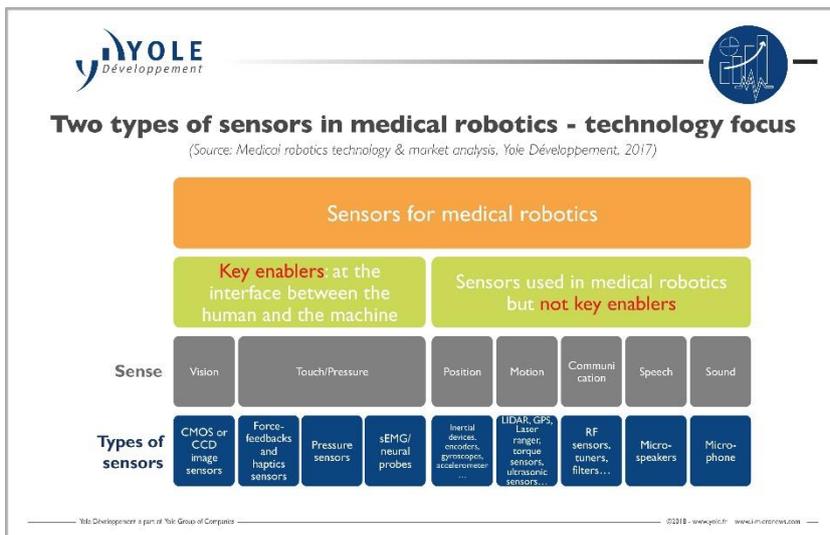
**LYON, France – January 31, 2018:** It is now a fact: sensors are step by step changing the medical industry landscape. Such technologies have already reshaped the huge US\$35 billion medical imaging market<sup>1</sup>. But what about the surgical robots market?

Robotics has only impacted the healthcare industry over the past 25 years. Unlike industrial or consumer robots, medical robots are facing challenges linked to regulations or healthcare organization: reimbursement policies, cost of entry, differences in healthcare systems. Studies have shown, however, that robotic surgery cuts down on the trauma and healing time for specific applications. As surgeons become more familiar with using robots for surgery, and as more companies provide medical robots, there will come a day when robots are used in almost every hospital.

According to [Yole Développement \(Yole\)](#), the surgical robotics market will experience an impressive 17% CAGR, from US\$3.4 billion in 2016 to US\$8.8 billion in 2022<sup>2</sup>. Each “participant” sees added value in this technology: minimal invasiveness for the patient, enhanced microsurgery and precision capabilities for the surgeon, and cost optimization for the healthcare system, due to patients’ shorter recovery time.

The market research and strategy consulting company Yole and its

partner [Knowmade](#), both part of Yole Group of Companies, are following the medical industry and related technologies continuously to identify technical breakthroughs, business opportunities and analyze the related patent landscape. The partners take part in numerous trade shows and conferences to meet industrial leaders, R&D players and present their



<sup>1</sup> Source : [Solid-State Medical Imaging report](#), Yole Développement, 2017

<sup>2</sup> Source : [Medical Robotics technology & Market report](#), Yole Développement, 2017

analyses. Next month, **Dr. Marjorie Villien** from Yole will present her vision of the medical robots industry with a relevant talk, titled “How will sensor technology impact the medical robots of the future?” at Medisens Conference (Feb. 26-27 – London, United Kingdom). [More information.](#)

Dozens of sensors are required for a robot to function and respond to its environment: position and torque sensors for articulations, gyroscopes and accelerometers for positioning and moving parts, pressure sensors, image sensors, etc. These sensors can be divided into two groups:

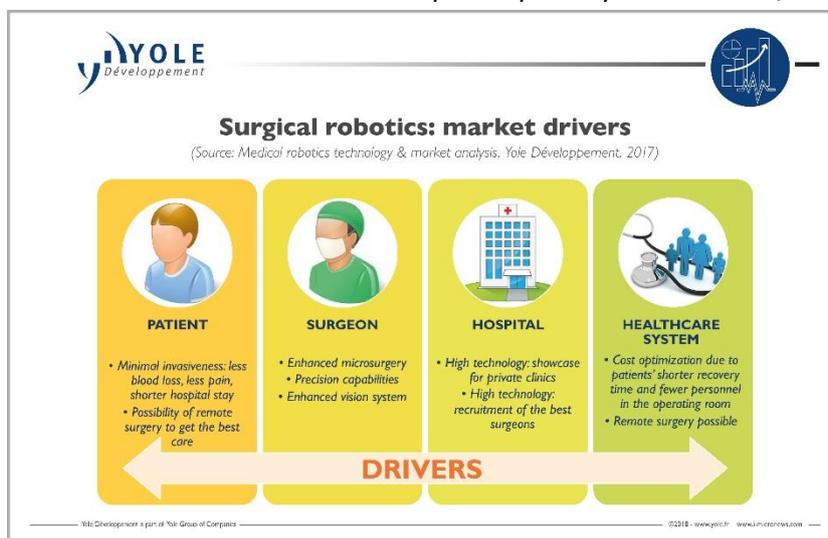
- Key enabler sensors at the interface between the human and the machine
- Other sensors not specifically developed for medical robotics applications.

In the field of surgical robotics, the robot functions are the surgeon’s hands and eyes. Surgeons want technology that allows them to “feel” the body’s tissue remotely, a process called “haptic sensing”, as well as better camera-image quality. Both issues can be addressed using new sensor types: haptic sensors and high-resolution CCD<sup>3</sup> or CMOS<sup>4</sup> cameras.

“Haptics is probably the technical feature most requested by physicians in the surgical robotics field,”

explains Dr. Villien. “Of the five senses, touch is the most proficient, the only one capable of simultaneous input and output. Touch is at the core of personal experience. Despite persistent effort, reliable solutions for haptic feedback in robot-assisted minimally invasive surgery have yet to find their way into practice.”

TransEnterix is the first to propose a surgical robot with



haptic feedback capabilities and they are beginning the commercialization of the product.

Another trend, already observed in the endoscopy market is the move towards disposable image sensors to achieve a disposable laparoscope. This trend is not yet visible in the surgical robots market, but will probably surface in the future as regulations evolve towards more disposable scopes. This would completely change the number of

<sup>3</sup> CCD : Compact Camera Module

<sup>4</sup> CMOS : Complementary Metal-Oxide Semiconductor

cameras sold to surgical robot-makers, shifting from a single camera per robot to as many as one camera per surgery.

In a more distant future a breakthrough will come from software development with automation of some aspects of the procedures.

The medical robotics supply chain is mainly organized in 4 segments: the sensor providers, such as AMS, Sony, Panasonic; the manufacturers of the mechanical part, where the main player is Kuka; the integrators, such as Intuitive Surgical, Stryker, Accuray; and the distributors, such as Medtronic.

In 2000, the field's current main player, Intuitive Surgical, was one of the first firms to bring a surgical robot to market. It is still difficult for new-comers to compete with Intuitive Surgical directly as they already have a solid installed base, over 33,000 surgeons trained in its use, and are used by 100% of the top ranked US hospitals in the key specialty they are targeting. But newcomers are arriving with new features asked for by physicians, such as haptic feedback introduced by TransEnterix. The neurosurgery surgical robotics field has evolved a lot since 2016 with major changes in the leaders' corporate strategies. Medtronic, a giant of the medical device industry, is investing a lot in Mazor Robotics, whereas MedTech was sold to Zimmer Biotech.

Indeed, since 2016 Medtronic has made two major moves into surgical robotics: its acquisition of Covidien for US\$50 billion, and its emergence as Mazor Robotics' lead investor. Medtronic-Covidien owns an extensive patent portfolio in the surgical robotics field, and the company should be watched closely over the next few years since they are probably working on a new product. They could also make a big splash by acquiring one of the leading companies in the field.

Another threat for Intuitive Surgical is coming from the collaboration of Johnson and Johnson, a giant from the biopharmaceutical industry, with Google, a leader in the data science field. Verb Surgical is very secretive about the technologies they are developing, but we can be sure that the surgical robots developed through this collaboration will make a significant impact in the field.

Sensors are fostering the development of new products to improve people's life in every domain from automotive to consumer goods and healthcare. 2018 is just the beginning. Tomorrow will see more and more disruptive technologies and product innovations.

Stay tuned with Yole Développement and Knowmade to better identify the latest innovations and understand their impact on the industry!

*Full article is available on Medisens Conference website or click [Here](#).*



#### ABOUT THE REPORTS:

##### **MEDICAL ROBOTICS TECHNOLOGY & MARKET ANALYSIS**

*Medical robotics is opening a new wave of opportunities for sensor makers, established medical devices manufacturers and also newcomers.* - Produced by Yole Développement.

**Companies cited in this report:** Accuray, AIST, AlerG, AMS, AOT, Auris Surgical Robotics, Awabot, Awaiba, Axo Suits, Bama Technology, Bee Healthcare, Biometrics, Bioness, Bionik Laboratories, BioServo, Blue Belt Technologies, BrainLab, Broadened Horizons, B-temia, Camanio Care, Cambridge Medical Robotics, CEA, Covidien, Cyberdyne, CyberGlove, Daiya, Ekso Bionics, Elekta... [Full list](#)



##### **SOLID-STATE MEDICAL IMAGING 2017**

*Advanced solid-state technologies are disrupting the medical imaging industry 6* - Produced by Yole Développement.

**Companies cited in this report:** Abbott, Acteon, Ajat, Aloka, Analogic, Ambu, AMS, Avinger, Belmont, BioVision Technologies LLC, Bioptigen, Boston Scientific, Caeleste, Canon, CapsoVision Inc., Carestream Health, Circon, Covidien, Corindus, Cmosis (AMS), Crystalvue, Cyber Medical, Dectris, Dexis, Dongbu, Dpix, e2v (Teledyne Dalsa), EndoOptiks, Esaote, Excelitas, ExO System... [Full list](#)



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Knowmade's experts provide prior art search, patent landscape analysis, scientific literature analysis, patent valuation, IP due diligence and freedom-to-operate analysis. In parallel the company proposes litigation/licensing support, technology scouting and IP/technology watch service. Knowmade's analysts combine their technical and patent expertise by using powerful analytics tools and proprietary methodologies to deliver relevant patent analyses and scientific reviews.

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Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS and image sensors, Compound Semiconductors, RF Electronics, Solid-state lighting, Displays, software, Optoelectronics, Microfluidics & Medical, Advanced Packaging, Manufacturing, Nanomaterials, Power Electronics and Batteries & Energy Management.

The "More than Moore" market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit [www.yole.fr](http://www.yole.fr) and follow Yole on [LinkedIn](#) and [Twitter](#).

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