

# OCT: Does it Have What it Takes to Move Beyond its Commercial Tipping Point?

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Medical Imaging  
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F R O S T  S U L L I V A N

# Today's Presenters



**Roberto Aranibar**, Principal Analyst  
Frost & Sullivan

**Particular expertise in the following areas:**

- Implantable cardiac device sales, maintenance, and training for clinical personnel
- Ocular disease pathology using light and transmission electron microscopy
- Glaucoma detection research using polarization-sensitive optical coherence tomography
- Automated test equipment software and hardware development for medical equipment testing

# Introduction

## Overview

- Growing interest in Optical Coherence Tomography (OCT)

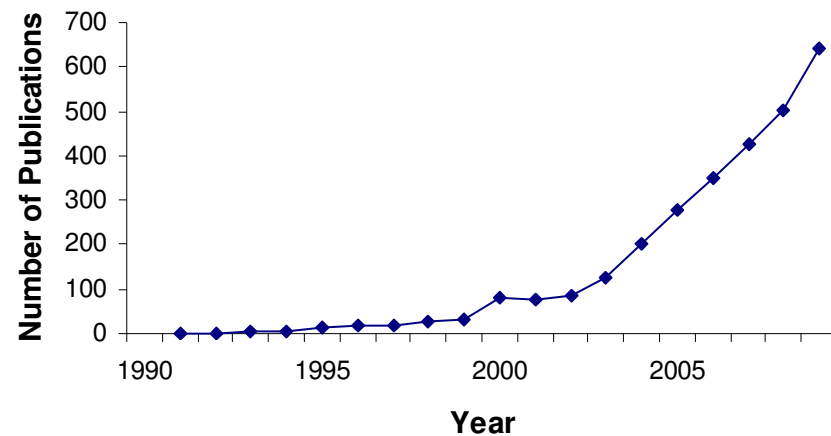
## Agenda

- I. Background
- II. Clinical Applications
- III. Market Profile

## Objective

- OCT: Is there potential for widespread adoption?

OCT Publications by Year



Growth of OCT scientific and medical research publications based on the number of publications per year with “optical coherence tomography” in the title as indexed in PubMed’s database.

# I. **Background**

II. Clinical Applications

III. Market Profile



# Optical Coherence Tomography (OCT)

## Principles of Operation

- Interferometry

## Modality Characteristics

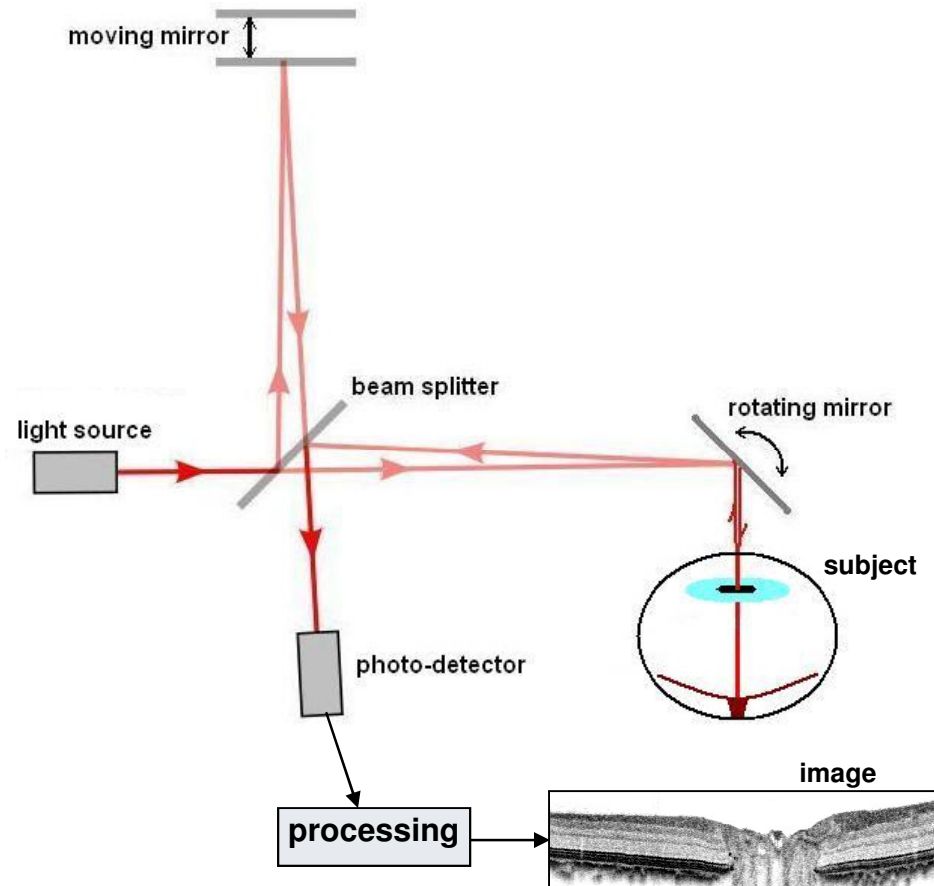
- Low-coherence NIR Light
- Depth of Penetration  $\leq 3$  mm
- Spatial Resolution  $\geq 3$   $\mu\text{m}$

## Notable Variations

- Fourier-Domain OCT (FD-OCT)

## Commercial History

- 1991 - First Demonstration
- 1996 - Commercial Release
- 2002 - First FDA Clearance



Schematic illustrating the main components and basic functionality of a time-domain Optical Coherence Tomography (OCT) System

- I. Background
- II. Clinical Applications**
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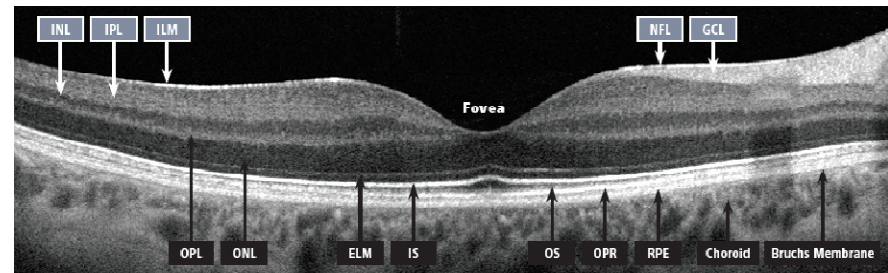
# OCT in Ophthalmology

## Applications

- Retinal Imaging
  - Reimbursable
  - Becoming Gold Standard
- Anterior Segment Imaging
  - Not Reimbursable

## Notes

- Commercialized in 1996
- FDA Cleared in 2002
- Over 9,000 System Installations Worldwide



Cross-sectional image of retina (top) acquired using Zeiss's Cirrus™ HD-OCT system (bottom); Source: Carl Zeiss Meditec, Inc.

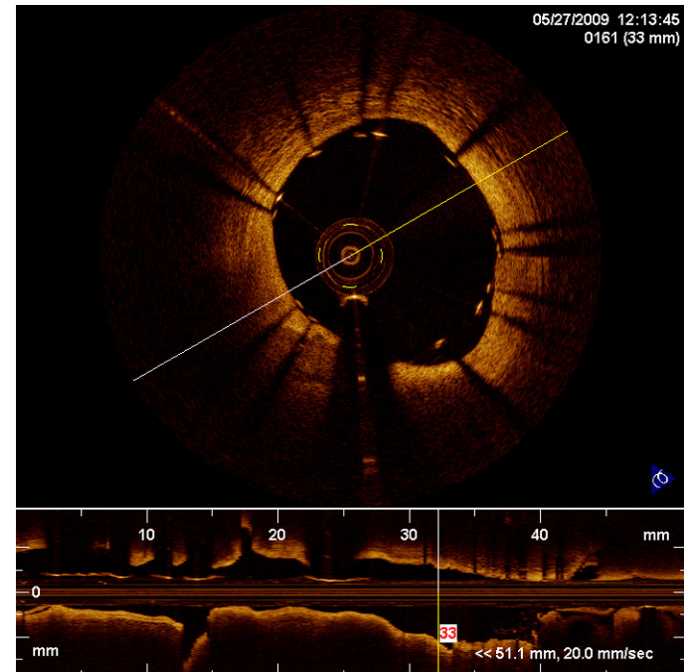
# OCT in Cardiology

## Applications

- Intravascular Imaging (Coronary Arteries)
  - 10X Resolution and Speed Improvement over Intravascular Ultrasound (IVUS)

## Notes

- Commercialized in 2004
- Cleared for Sale in 40 Countries
- FDA Cleared in May 2010
- Over 300 System Installations Worldwide
- Over 10,000 Clinical Procedures Performed
- Reimbursable only in Japan



Intravascular stent struts (right) visualized using LightLab's C7-XR™ OCT imaging system and Dragonfly™ imaging catheter (left);  
Source: LightLab Imaging, Inc.

# OCT in Other Potential Clinical Applications

## Dentistry

- Early Detection of Oral Disease

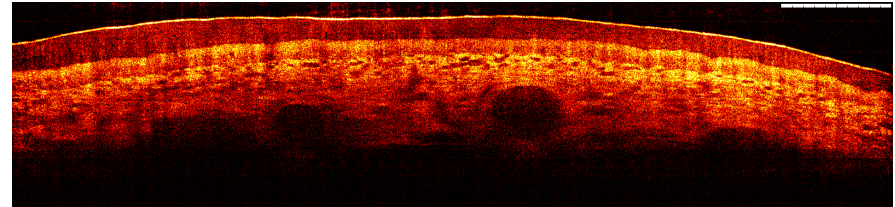
## Endocrinology

- Glucose Level Monitoring

## Cancer Detection & Treatment

- Skin Cancer Diagnosis & Margin Determination
- Oral & Esophageal Cancer Detection
- Assurance of Complete Surgical Resection

...and Several Others

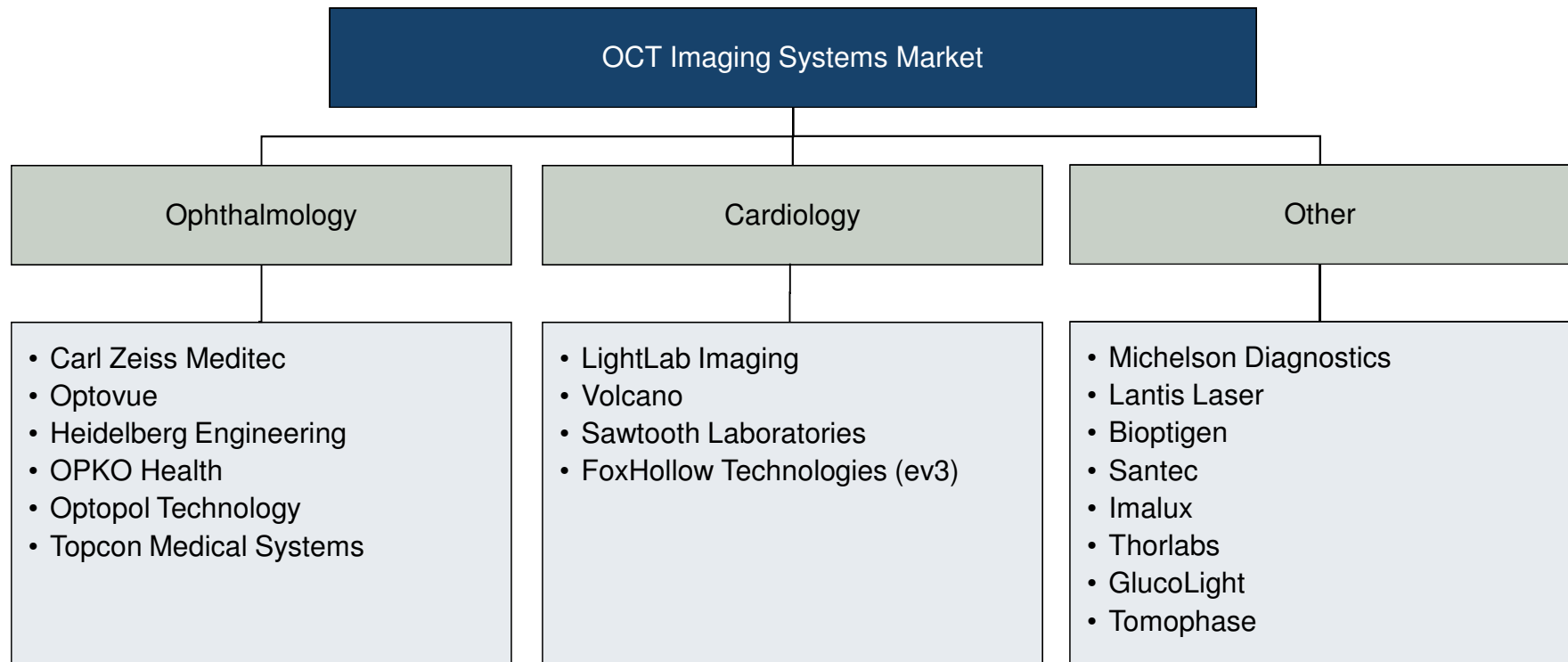


Layers of the skin (top) visualized using Michelson's VivoSight OCT System (bottom); Source: Michelson Diagnostics Ltd.

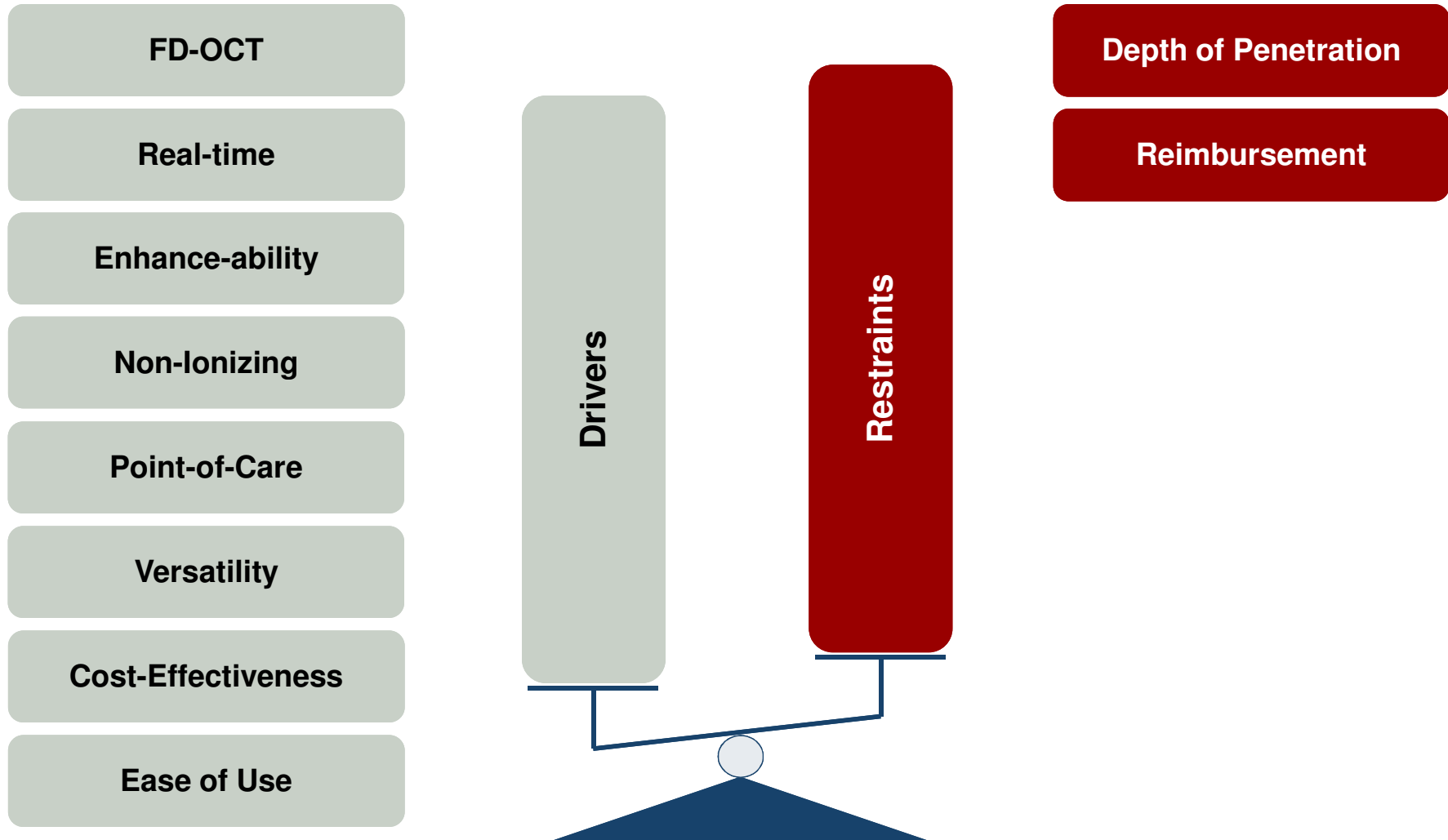
- I. Background
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# Competitive Landscape



# Growth Factors



# Market Potential\*

## Revenue Estimates and Projections\*

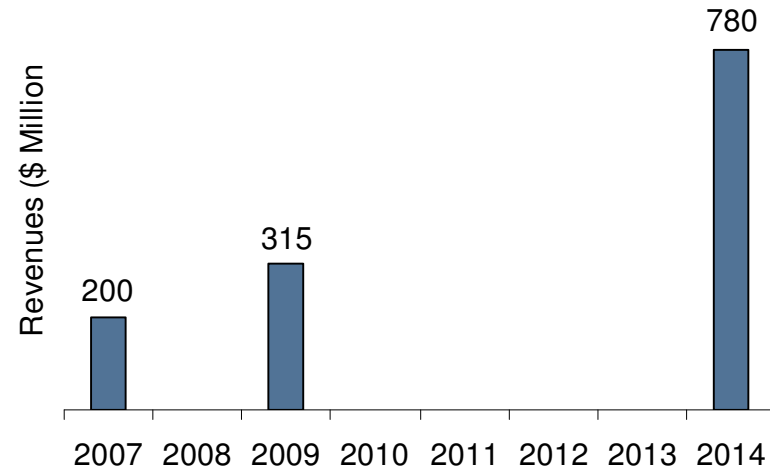
- 2007 Revenues = \$200 Million
- 2009 Revenues = \$315 Million
- 2009-2014 Revenue CAGR = 20%
- 2014 Revenues = \$780 Million

## Feasibility Analysis

- Potential Customer Base
- Reimbursement
- ROI

## Conclusion

- Is there potential for widespread adoption of OCT?



\* Estimated and projected revenues, revenue growth rates and CAGRs were published by Strategies Unlimited, the research unit for PennWell (Mountain View, CA), and Frost & Sullivan has not carried out any independent research to validate these estimates and projections.

## Next Steps

- Request a proposal for or **Growth Partnership Services** or **Growth Consulting Services** to support you and your team to accelerate the growth of your company. ([myfrost@frost.com](mailto:myfrost@frost.com)) 1-877-GoFrost (1-877-463-7678)
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Competitive Structure?

Emerging Trends?

Strategic Recommendations?

Other?



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