

# Uncooled Infrared Imaging Market : Commercial & Military applications

## *Sample report*



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# Definitions

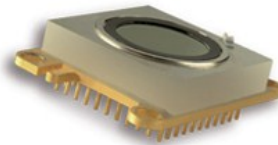
- An infrared thermal camera is a thermal system which converts infrared (IR) radiation into visible image.
- Main parts of an IR camera:



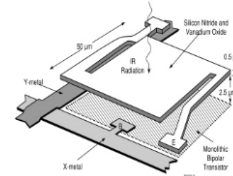
Camera



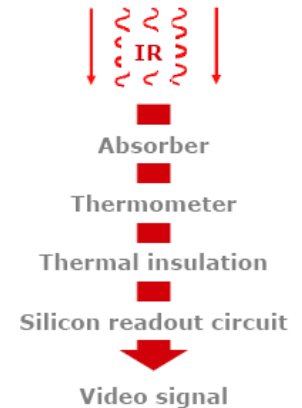
Camera core  
(with electronics and  
sometimes IR lenses)



Detector  
(Uncooled Focal  
Plane Array - UFPA)



Pixel (each  
sensor – retina –  
has thousands of  
pixels)



- Cores are the modules that include detectors + electronics and sometimes lenses. Without lenses it is called also video engine.
- Detectors are also called UFPA (Uncooled Focal Plane Arrays) or IR sensors.
- A detector can have various formats (1024 x 768 to 47 x 47) and pixel pitch (usually from 17μ to 40μ in 2010)

# Market Research Scope and Methodology

- **Market research scope**

- The report surveys the **Long Wave Infrared (called LWIR or FIR) uncooled camera and detector markets for both commercial and military businesses.**
- An overview of the Near Infrared (NIR), Short Wave Infrared (SWIR), and medium wave infrared (MWIR) technologies and markets is also presented.
- Market estimation are done for the 2009 – 2016 time period in \$ (with 1,3 \$ for one euro conversion)

- **Methodology:**

- This research has been prepared based on:
  - Primary information sources: direct interviews with companies all along the value chain (detector manufacturers, camera manufacturers, camera distributors, final users).
  - Secondary information sources: conferences, web sites, newsletters....
- All data, graphs, tables, and calculations in this report are based on Yole's investigation.

## **2011 report added content compared to 2010 version**

- **Full market analysis and forecast update on both commercial and military applications**
- **Analysis of military applications by application segments (Thermal Weapon Sight, Vehicle Vision, Soldier Vision, Remote Weapon Station, Other military applications), and competitive landscape.**
- **Latest industry news and analysis of the new market entrants and exits.**

# IR Technologies

## Wavelength segmentation

.72 – 10  $\mu\text{m}$

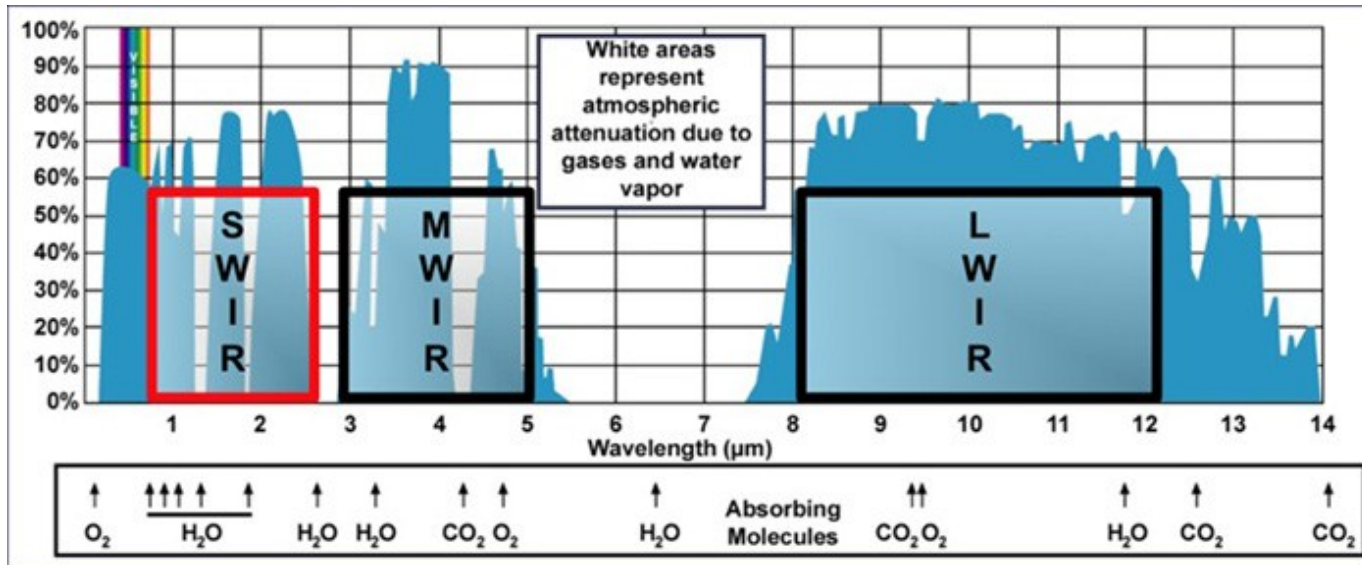
Short Wave  
(.72-1.5  $\mu\text{m}$ )

Medium Wave  
(1.5-5.6  $\mu\text{m}$ )

Long Wave  
(5.6-10  $\mu\text{m}$ )

0.72  $\mu$     1.4  $\mu$     3  $\mu$     5.6  $\mu$     8  $\mu$     10  $\mu$     14  $\mu$     1000  $\mu$

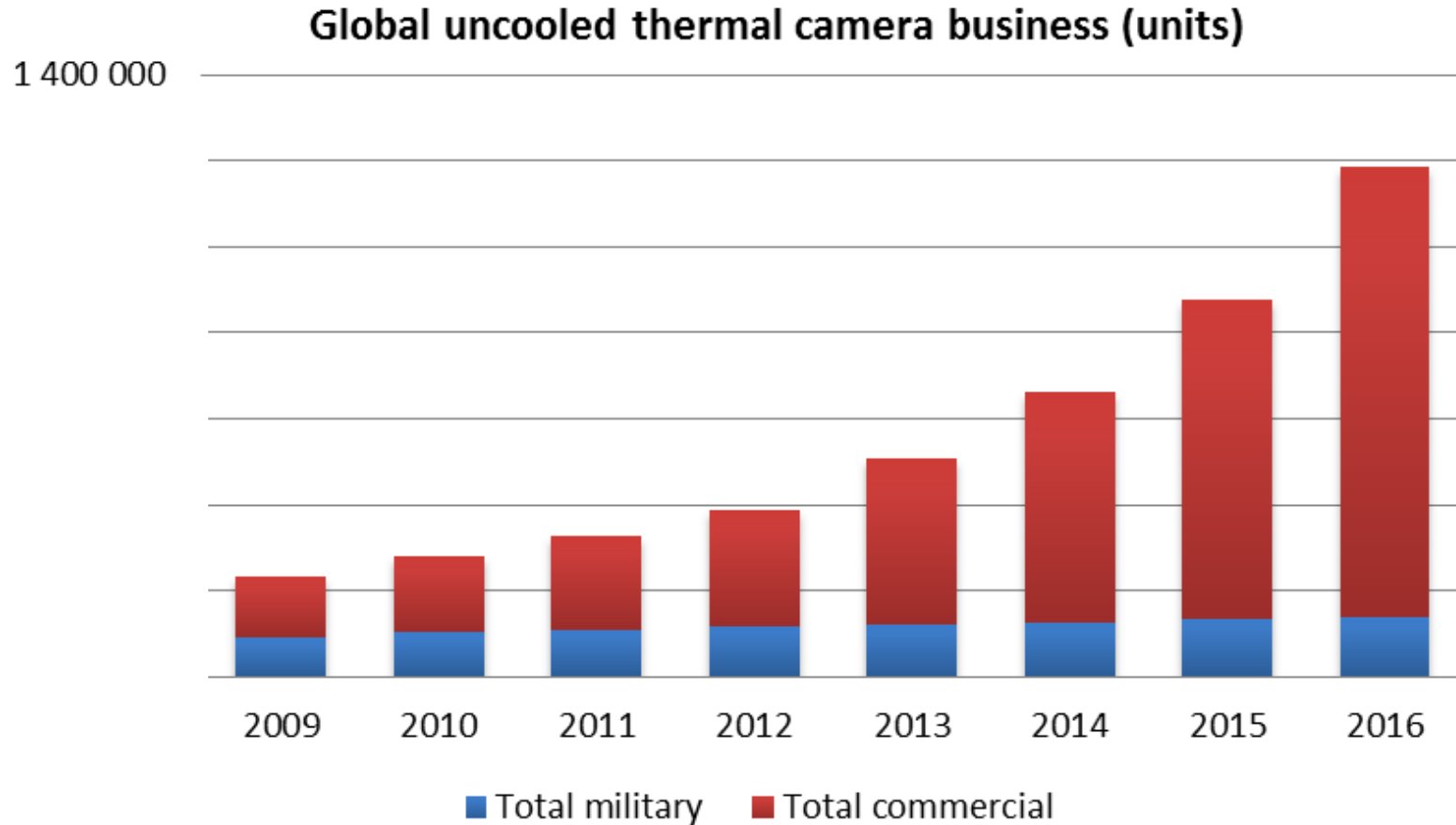
**NIR**    **SWIR**    **MWIR**    **LWIR**    **Far IR**



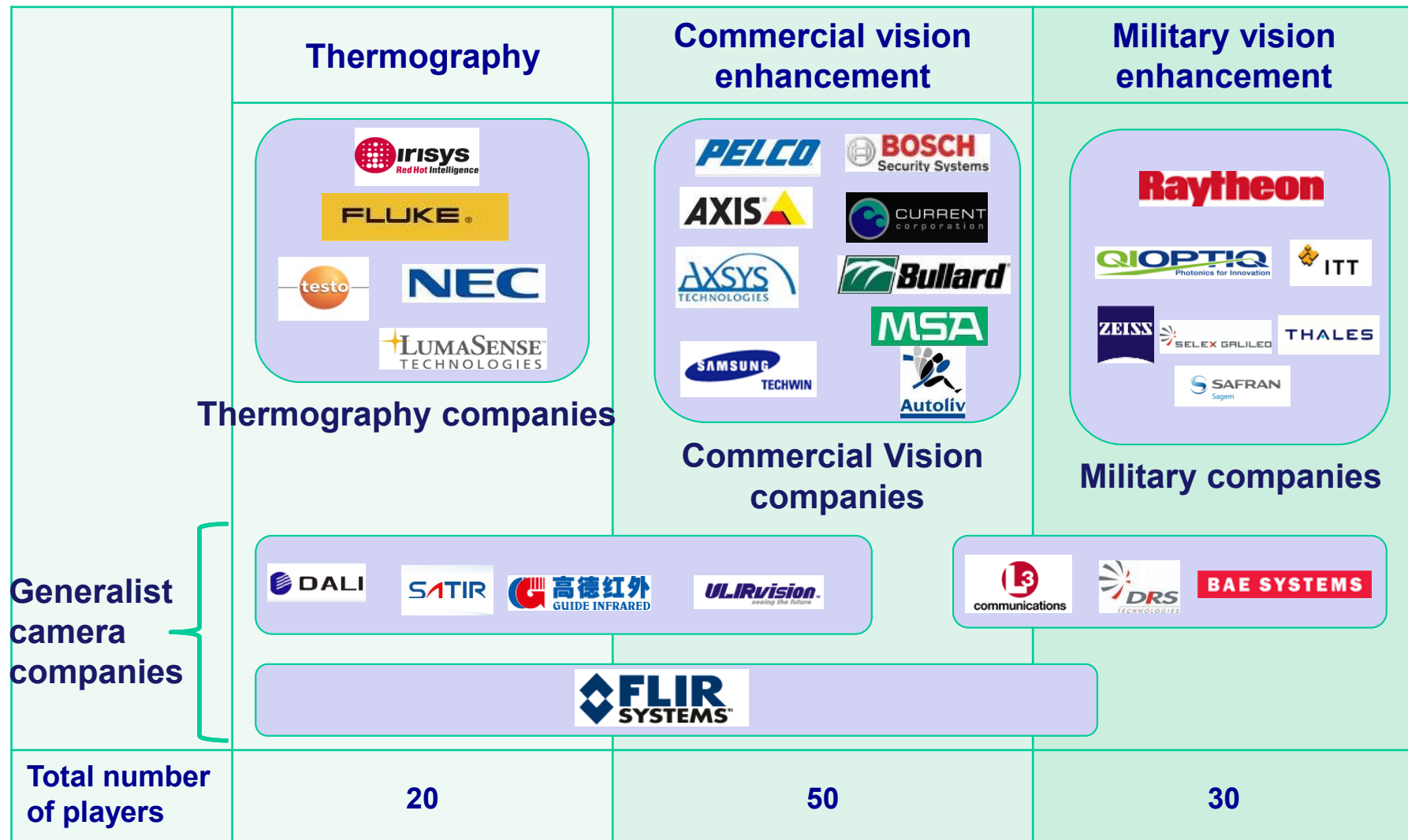
- Infrared technologies spectrum range from NIR to LWIR wavelengths. Each part of the spectrum provides different information and hence targets different markets:
  - NIR (Near IR) – SWIR : active vision enhancement (need an NIR light source), high temperature thermography, material analysis
  - MWIR (Medium Wave IR): thermography, passive vision enhancement, material analysis
  - LWIR (Long Wave IR) called also FIR (Far IR): Thermography and passive vision enhancement (no need for light source)



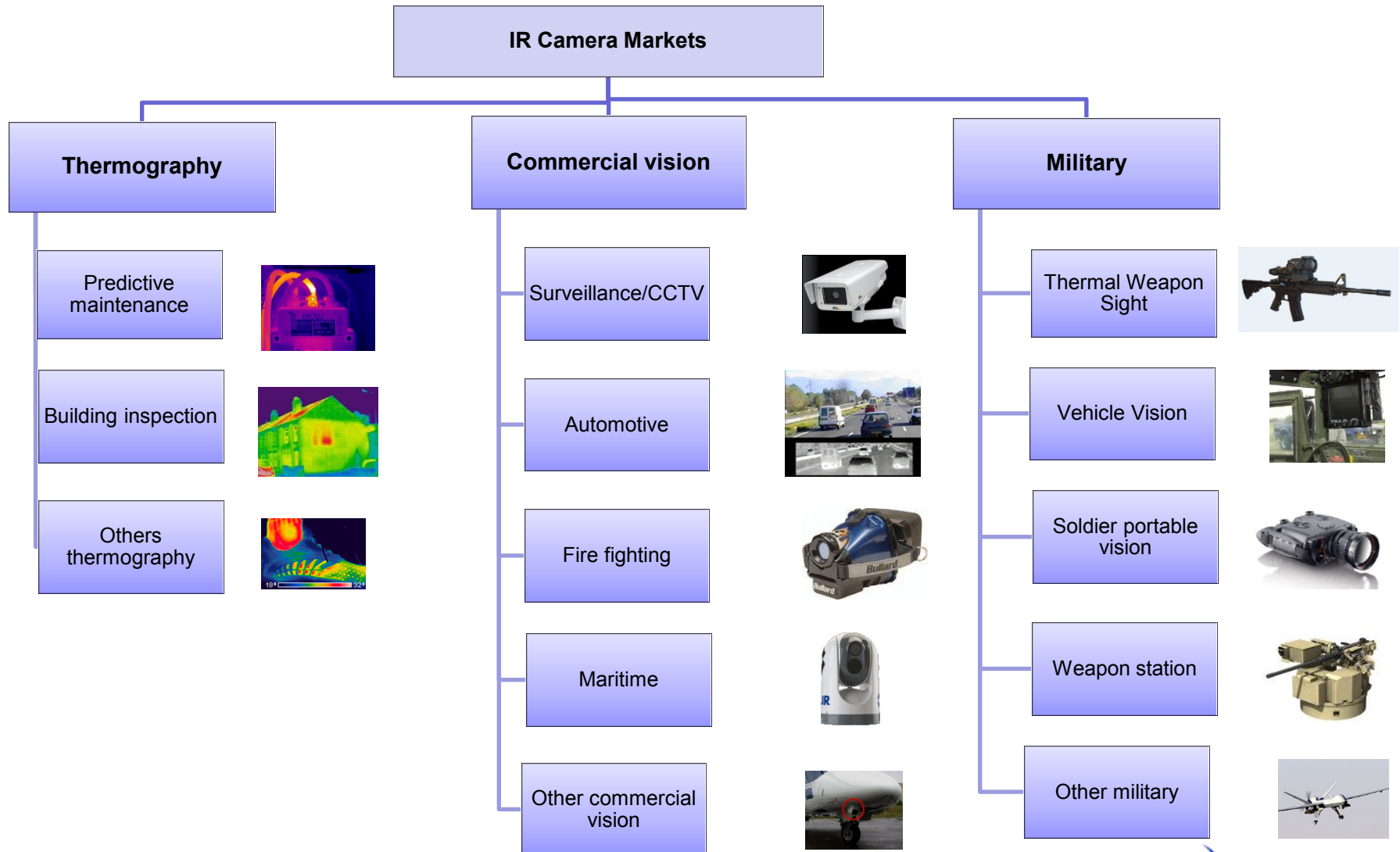
# Uncooled Infrared Camera Market forecast



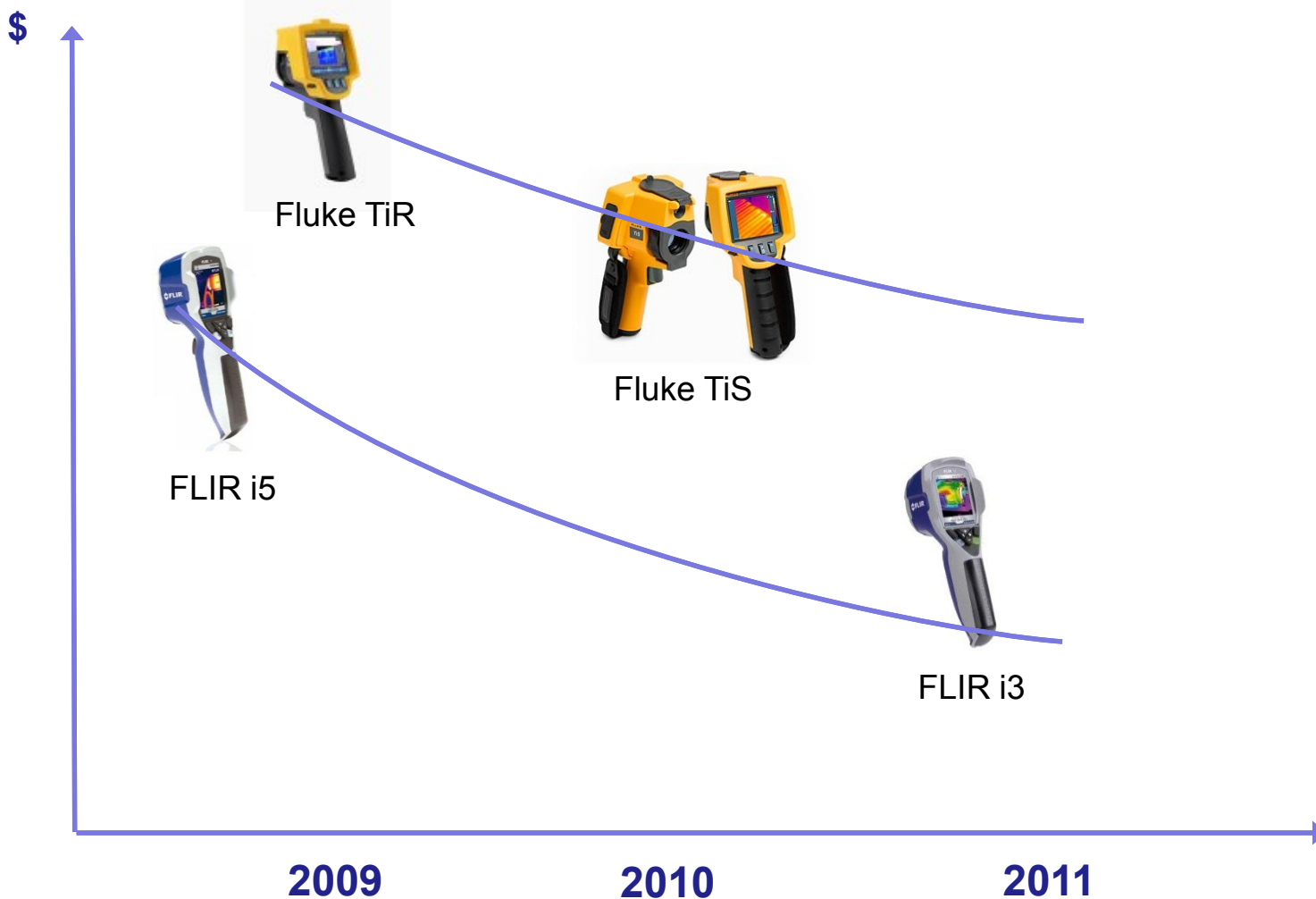
# Main IR Uncooled Camera Manufacturers Positioning



# IR Camera Markets Analysis



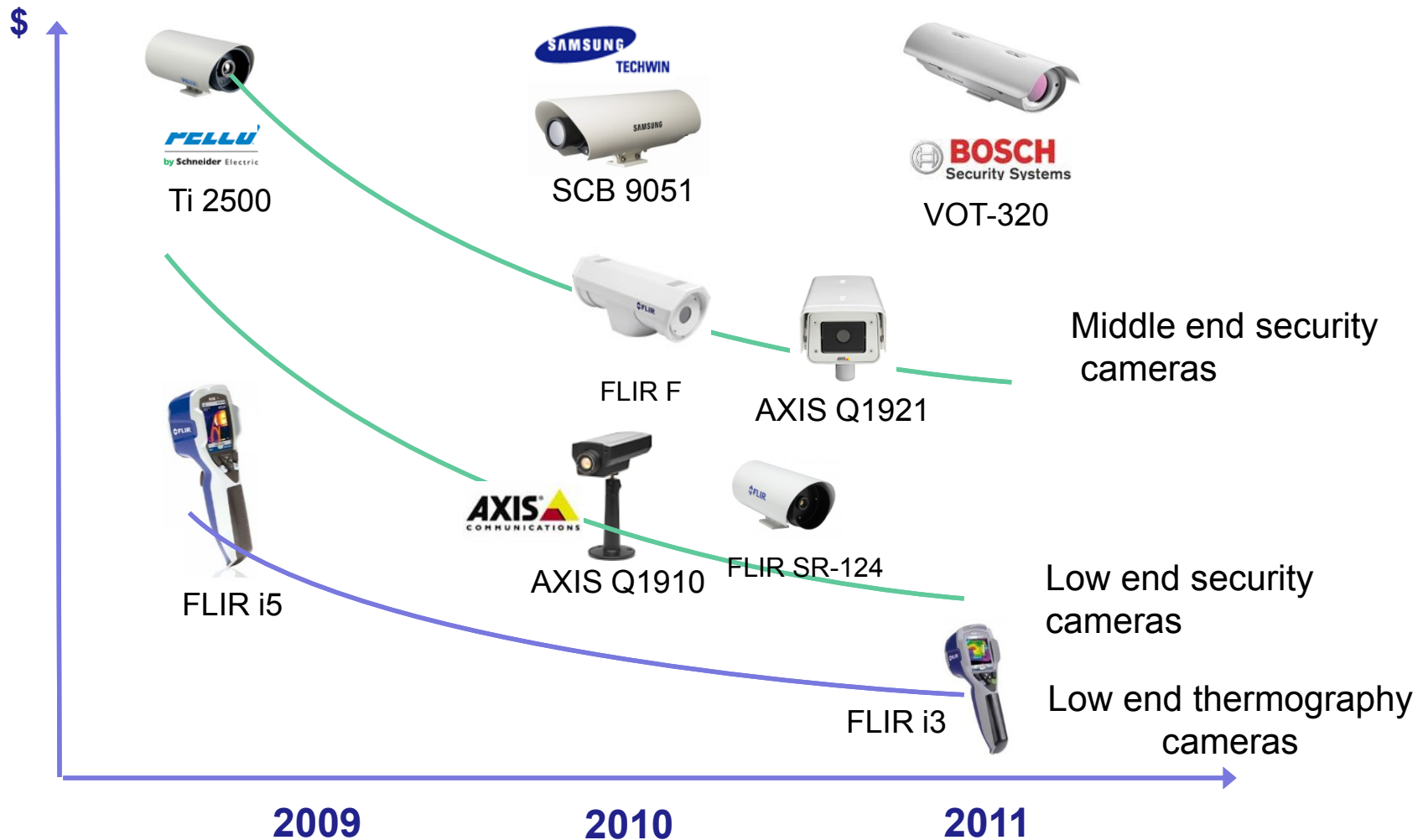
# Lowest price camera from FLIR and Fluke : Cheaper and cheaper



Flir is heading the price battle for low price camera but Fluke is just behind

# Surveillance CCTV

## Prices are coming close to thermography cameras



Surveillance cameras are following the same price reduction rate than thermography camera

# FLIR automotive detectors sales : large take off in 2013



## Projected Automotive Volume/Cost



Source : FLIR

# Main infrared military systems market players positioning and rankings

## Main infrared military systems market players positioning and rankings

	Thermal Weapon Sight (TWS)	Vehicle Vision Enhancer	Soldier Vision	Remote Weapon Station	Other military applications
	2	1	2		
<b>BAE SYSTEMS</b>	1	2	1	1	
Other Infrared military systems suppliers	             				

# Thermal Weapon sight (TWS)

## BAE products evolution from 28 to 17 microns detectors

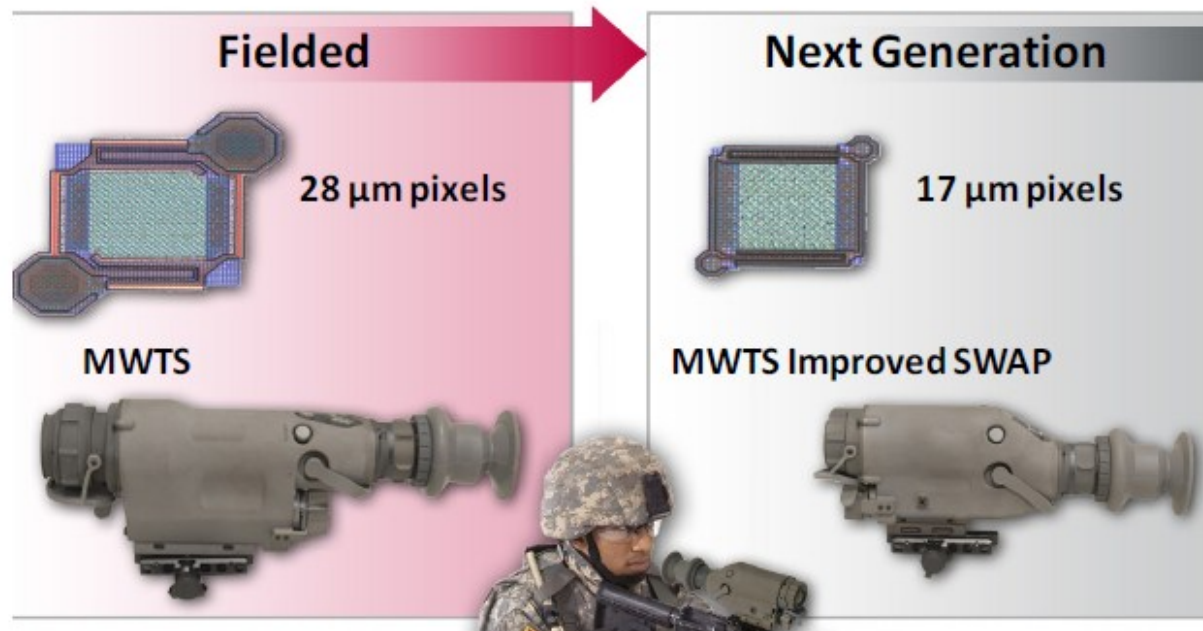
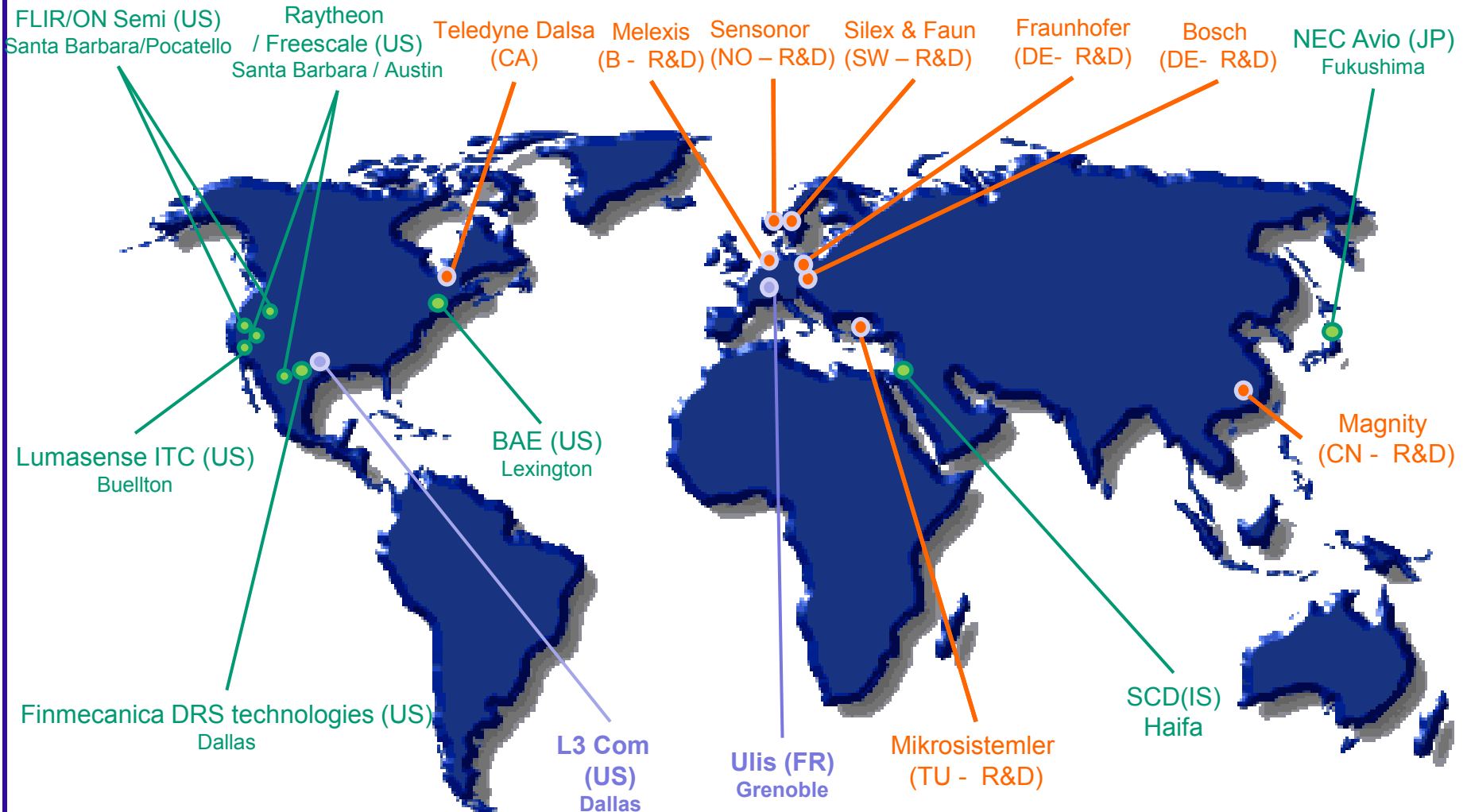


Figure 6. A new generation of smaller, lighter thermal sights enabled by 17 $\mu\text{m}$  microbolometer technology will enhance mission capability.



# Microbolometer Players Locations



Microbolometer technologies: a-Si, VOx, others (R&D)

# Technical Evolution for Microbolometers

Technical evolution for microbolometers are at 4 different levels: IR optics, packaging/ROIC integration and at the pixel level.

Main motivations are to reduce cost and to increase integration.

## ***At the IR optics level:***

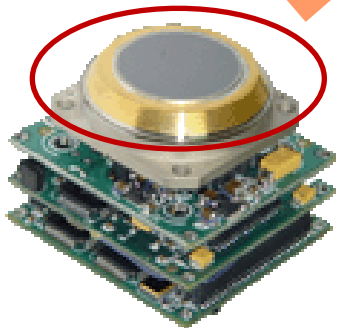
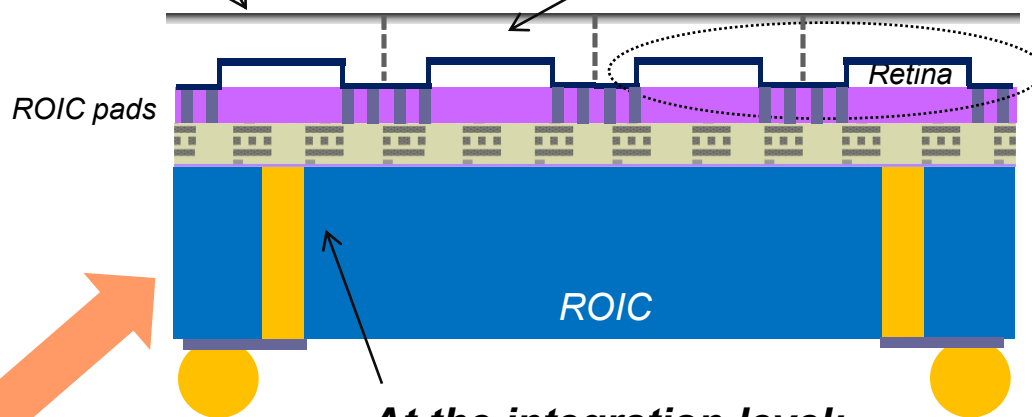
- Chalcogenide lenses
- Wafer Level Optics

## ***At the packaging level:***

- Wafer Level Packaging
- Pixel level packaging

## ***At the pixel level:***

- Pixel size reduction
- New materials (than VOx, aSi)
- New design



# Microbolometer WLP roadmap

R&D

Production

WLP



**Raytheon**

**FLIR**

**sdi**  
SemiConductor Devices

**NEC**

**ULis**  
Infrared for you

**cea leti**

*Pixel Level Packaging (PLP)*

**sensoror**

**L3**

communications

2002

2009

2010

2011

2012

2013

2014

2015