

Next Round of Digital Camera Innovation – Latest Trends and Future Insights



Industrial Vision Days – Vision 2011

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Stuttgart – November 2011

Market Mega Trends 2012

Cost Down

- Interface: from proprietary to consumer (GigE and **NEW:** USB3)
- Sensor: from CCD to CMOS
- Electronics: from HW to SW



Size Down

- Trend toward more compact cameras

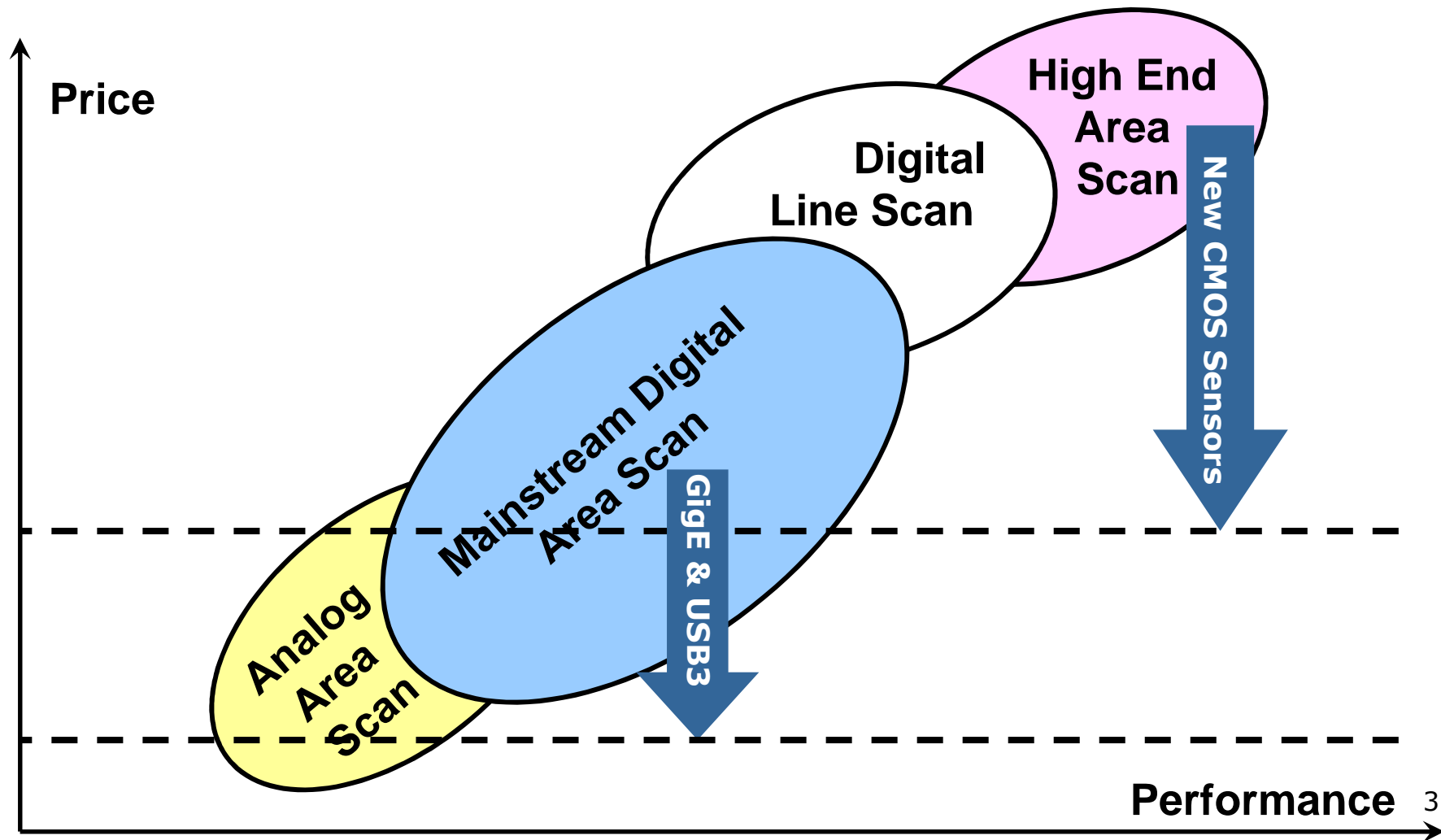


Features Up

- PoE
- Color Improvement



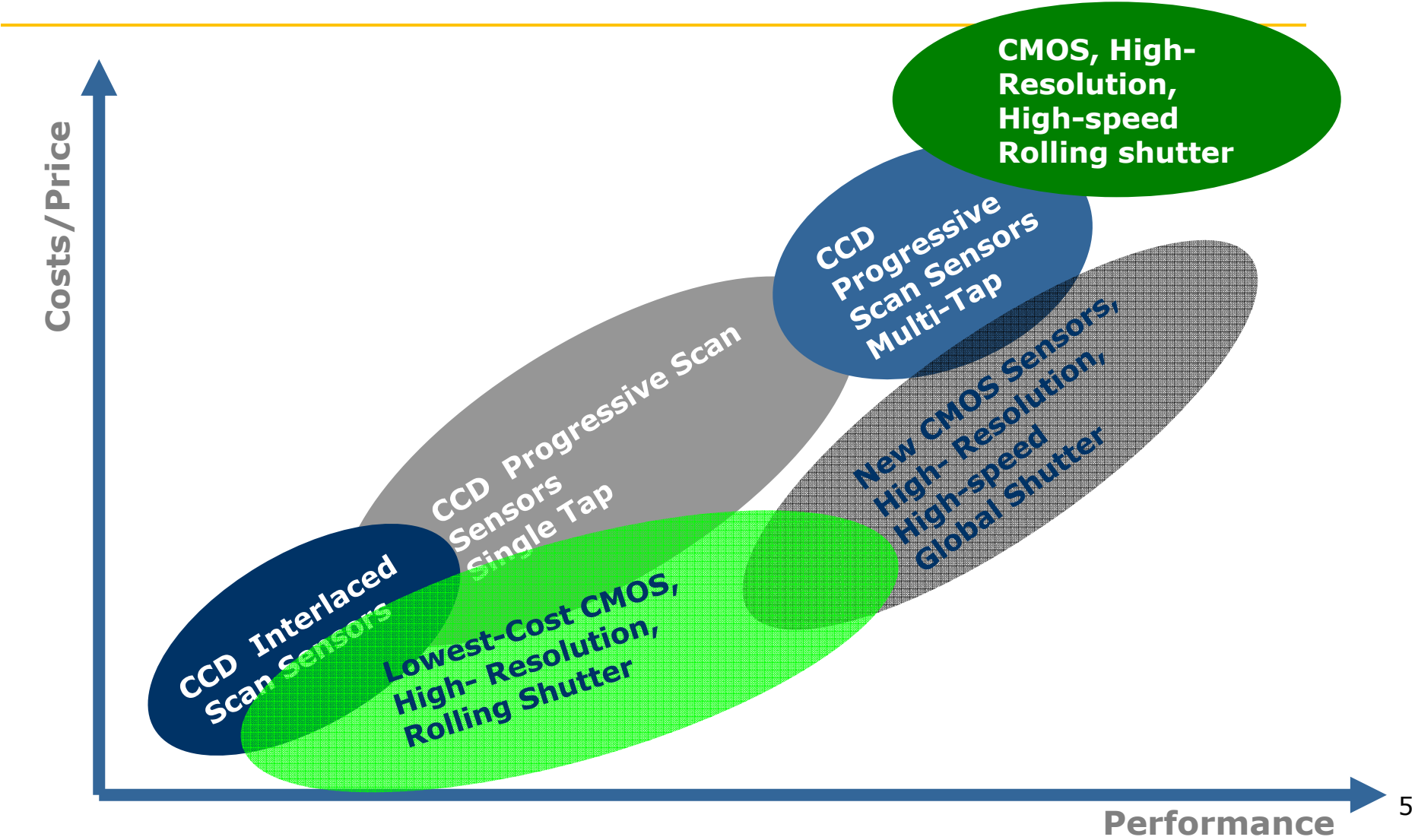
Camera Market Segment Trends



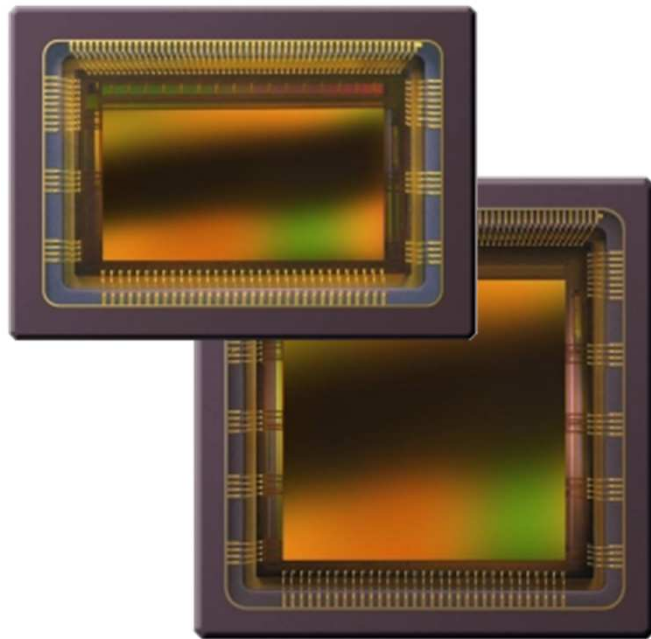
Trends in detail

New CMOS Sensors

CCD to CMOS



New Sensors - CMOSIS



Sensor Facts

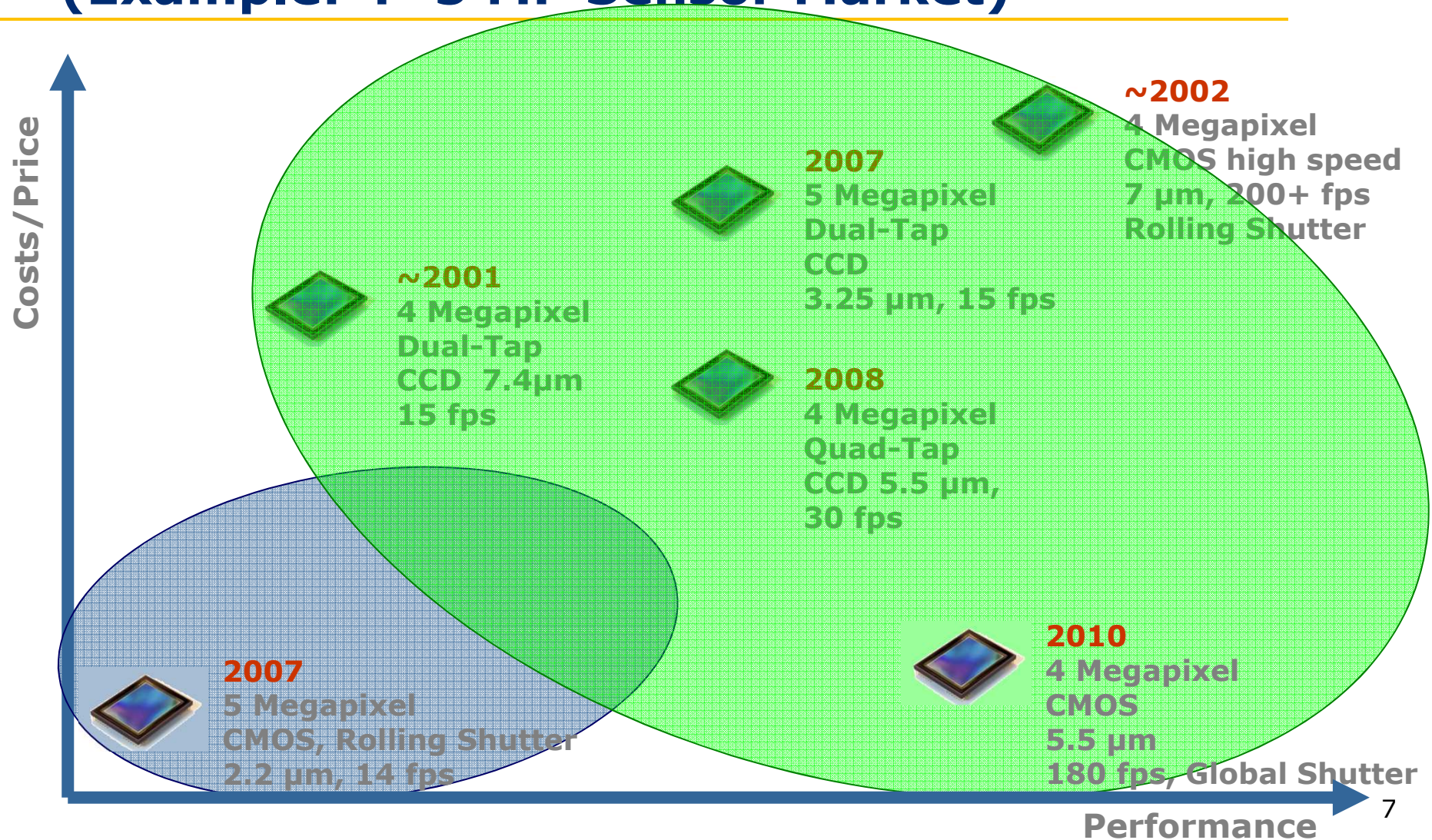
- CMOS technology, global shutter
- 5.5 μ m x 5.5 μ m pixel size
- Mono and color

Type: CMV2000 – 2 MP
2048 x 1088 pixels
2/3" optical size
Max. 340 fps at 10 bits

Type: CMV4000 – 4 MP
2048 x 2048 pixels
1" optical size
Max. 180 fps at 10 bits

Type: CMV300 – VGA
640 x 480 pixels
1/3" optical size
Max. 600 fps

CMOS-Sensors Redefining Market Arena (Example: 4 -5 MP Sensor Market)



CMOS-Sensors Redefining the Market

- Speed demand in many applications can not be fulfilled with CCD Sensors
- The major disadvantage of CMOS sensors having rolling shutters is eliminated by global shutter now
- This is valid especially for 1-10 Megapixel sensors
- Situation is increased by lower costs for integrating CMOS sensors into industrial cameras (no ADC's and clock drivers)

New Product Concepts – ace CMOSIS



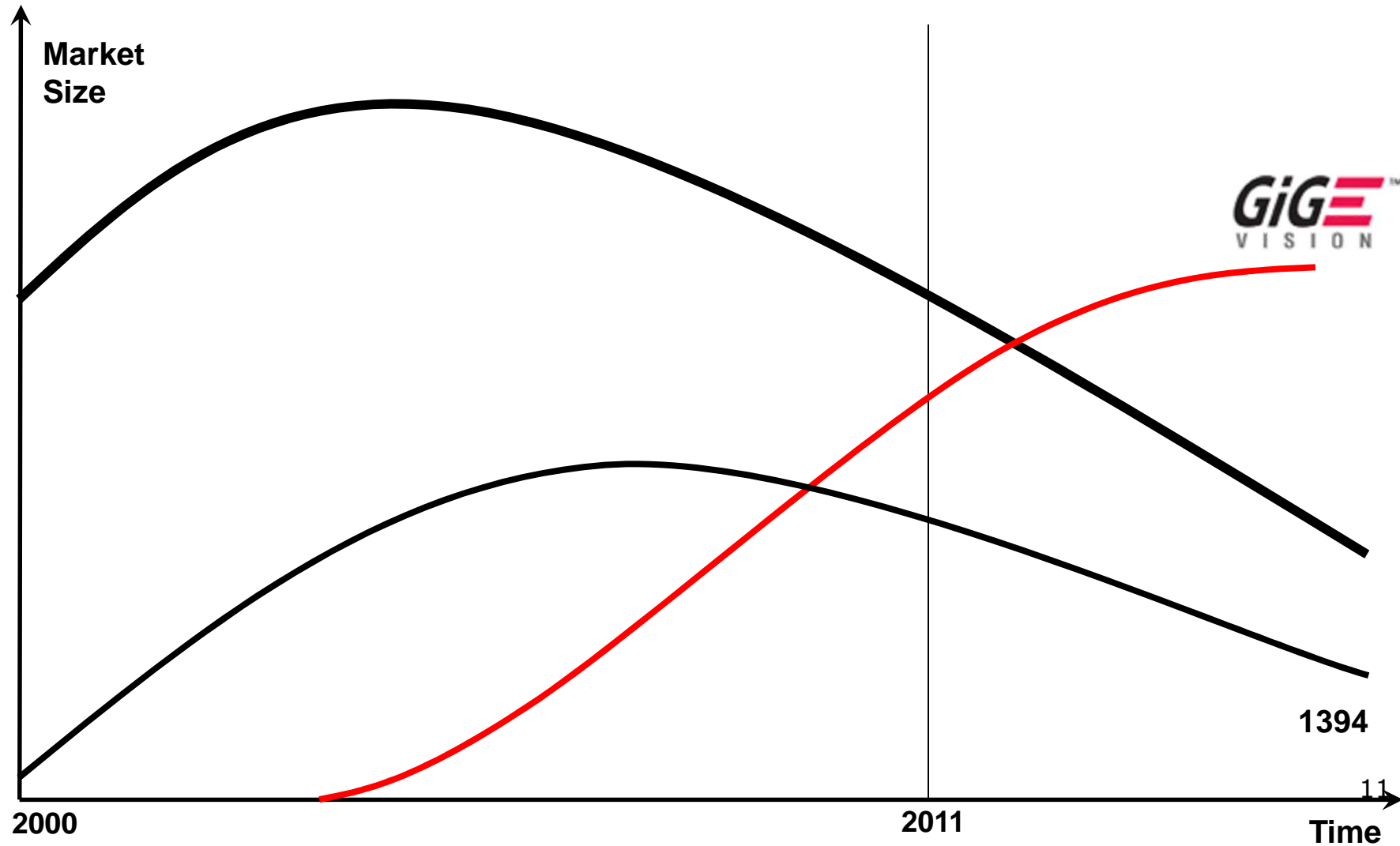
ace Camera Link

- Reuse of 42 mm x 29 mm x 29 mm, < 100 g ace standard housing
- CMOSIS sensors, CMOS, global shutter
- 2 MP and 4 MP resolutions, up to 340 fps
- Camera Link interface with PoCL
- Extra I/O Port, Power Connector
- **Strictly cost driven design**

Trends in detail

Interface Landscape

Interface Market - Change



How Did GigE Made It?

Conventional Analog Market

started 2006

- 29 x 44 mm footprint
- Analog output
- VGA – 1 Mega pixel up to 60 fps
- Up to 4 or more cameras on one PC



Mainstream Camera Link Market

started 2006

- Camera Link output
- VGA – 2 Mega pixels
- Kodak CCD sensors

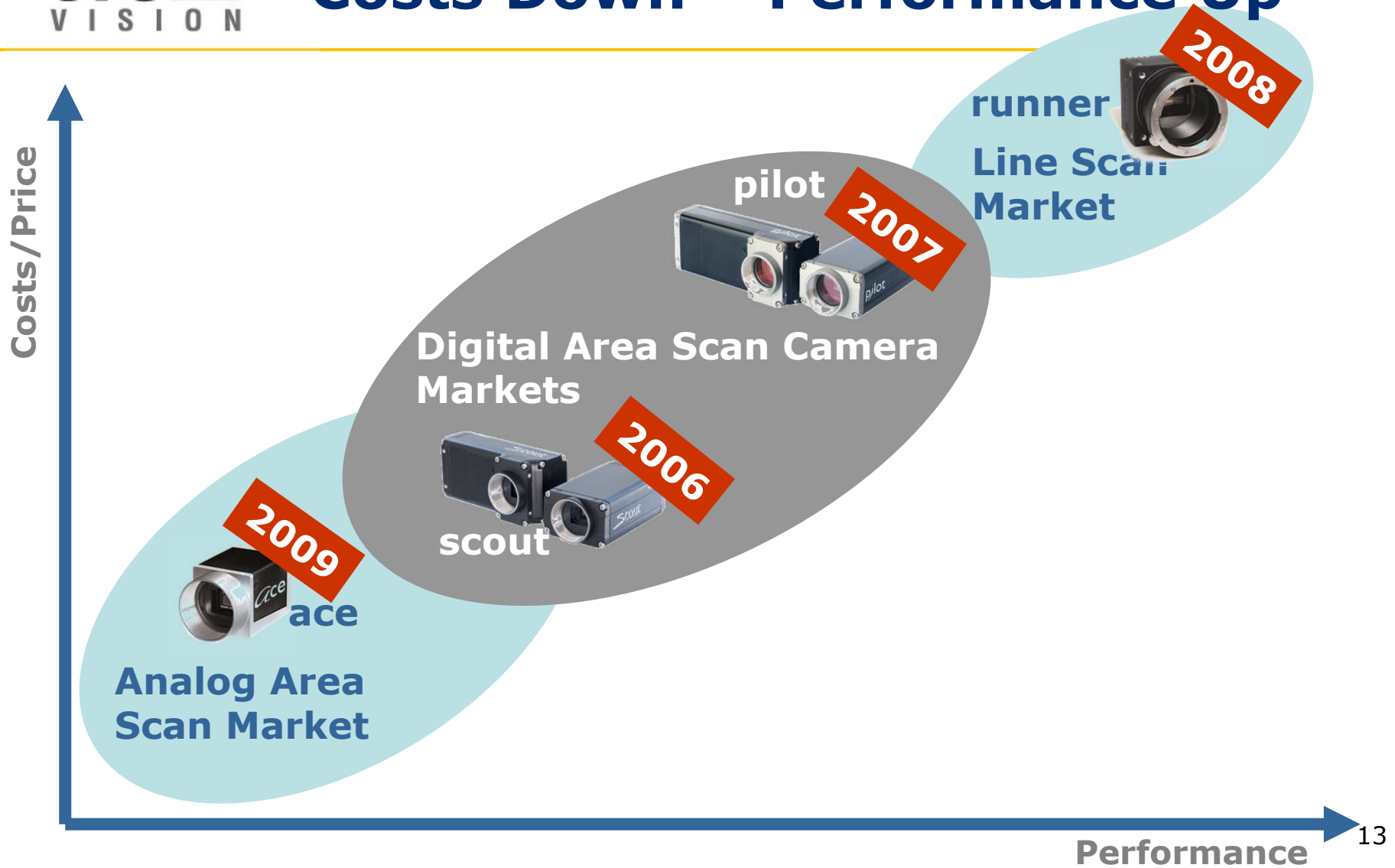


Mainstream Scan Market

started 2007

- Camera Link output
- 1.000 – 2.000 pixels, mono and color
- Up to around 60 kHz line rate

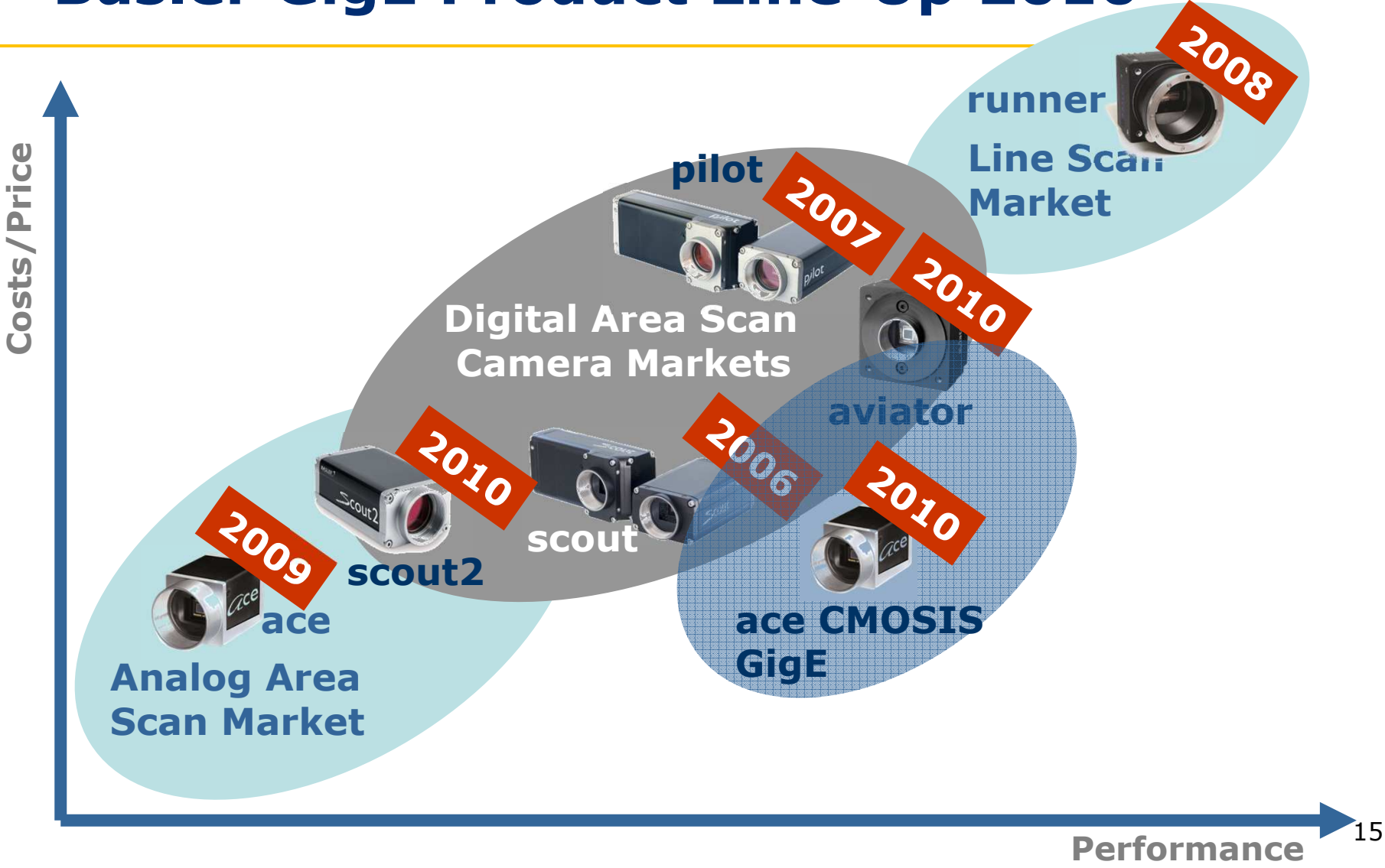
Costs Down – Performance Up



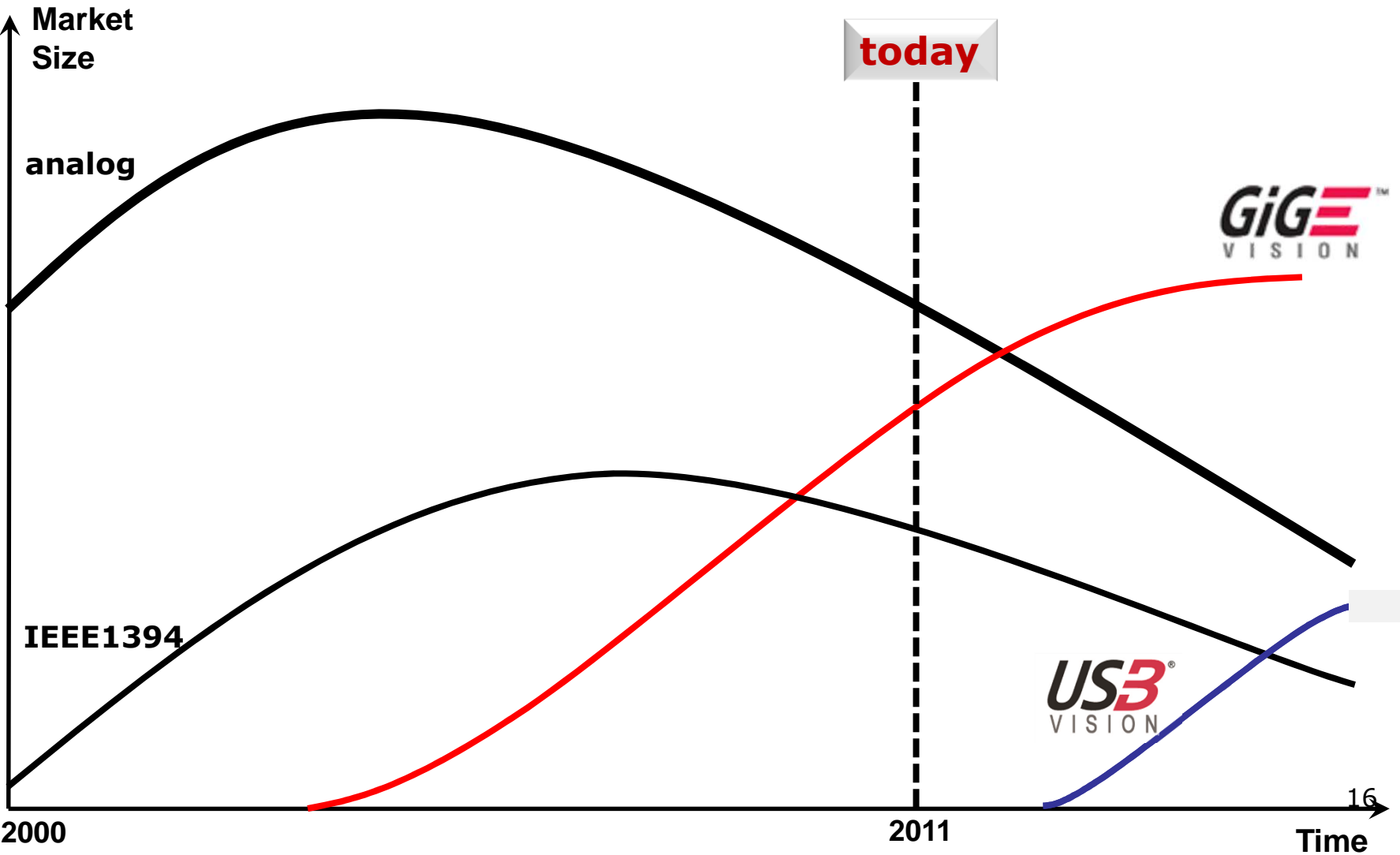
Conclusion

- Gige Vision is already a mature technology
- GigE Vision is now present in all market segments
area Scan and Line Scan
- Basler offers products for all segments
- The performance per € is increasing
- GigE has technically reached the 29 x 29 mm footprint
- GigE cameras will meet the price point of analog cameras

Basler GigE Product Line-Up 2010



Interface Market – USB3.0



Why USB3.0 Technology?

- Potential to become the next „big“ interface in the consumer market (PC, Consoles, TV,..)
- USB3.0 also has the potential to enable Basler to go for mass markets in mid- and long-term.
- USB3.0 is also able to close the gap between Gigabit Ethernet (100MB/s) and Camera Link (850MB/s)
- Technical and commercial advantages that perfectly fit to Basler`s strategic direction
- Co-Existence with GigE and round-up of Basler`s interface landscape

Technical Advantages of USB3.0 in Machine Vision Markets

- High Bandwidth of about 300 MB/s in one-to-one connections
- „Real-time“- capability due to the time-slot transmission (like IEEE1394)
- Plug and Play (at least in future)
- Power over the cable is standard in USB3.0 (like IEEE1394)

Technical Limitations of USB3.0

- Very limited cable lengths of below 5 meters
- Multi-Camera-Setups are rarely supported and yield in massive bandwidth decrease
- New interface: major compatibility issues between devices, software and driver
- So far low acceptance in professional applications (like Machine Vision)

Commercial Aspects of USB3.0

Advantages

- Price-Level of GigE can already be reached with USB3.0 (at this early stage)
- Future potential for USB3.0 to become a low-cost interface such as USB2.0 today definitely possible

Limitations

- Relatively low number of devices (PC, Consoles,...) do support USB3.0
- Still additional cards (like USB3.0 PCI-Express) needed to run USB3.0 on standard PC hardware
- Price level of companion products like cables

What is USB3 Vision?

- USB3 Vision is the standard for USB3.0 in machine vision industry (like GigE Vision for GigE)
- USB3 Vision standardization group has founded in 2011
- USB3 Vision is supported by major players in the machine vision market (camera, grabber and software manufacturers)
- The aim is to define a standard such as GigE Vision for USB3.0
- That standard will be finalized by VISION show 2012

Why USB3 Vision?

- Customers can combine cameras, drivers, and vision libraries from different vendors
- Customers get a standardized camera behavior (feature level)
- Customers get standardized way of access to custom features
- Customers experience plug & play
- Customers can expect stability on camera and system level



+

USB
3.0

+

USB[®]
VISION

=

Reliable System

**future proof
technology**

**Highest investment
security**

USB3.0 product development timeline

August/September 2011

- Formation of USB3 Vision standardization group in Ahrensburg
- Pre-development for USB3.0 ace started

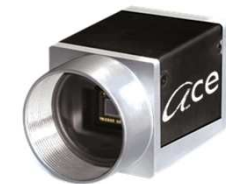


November 2011

- Basler will announce USB3.0 products (no product launch) and stressing the importance of the standard before launching cameras

December 2011

- Basler will start product development for ace USB3.0 family



November 2012

- Finalization of USB3 Vision standard
- Basler will launch a full ace USB3.0 camera line



Questions?

See you at Basler's booth!



Thank you for your attention!

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