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## 2010 Review and 2011 Preview

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We hope the next 16 slides provoke some questions about your strategy this year and in years to come.

Ian and I have an enviable record of predictions, though we are surprised from time to time.

We hope you can benefit from our insights and do something wonderful to surprise us!

– David Barnes, Feb '11

Seeing the future was difficult at CES 2011.

We offered better predictions for 2010 and we look back on them as we update our vision for 2011



In December of 2009, we predicted that panel prices would continue down their long-term path.

That happened late in the year as US and European consumers sought low prices. Asian demand was not strong enough to sustain 3D TV premiums.

We were correct in thinking AMLCD would remain the dominant tech but we were surprised by significant progress made in alternative materials and processes.

Still, the biggest surprise of 2010 was based on advances in AMLCD...

Let us be honest about the two big surprises of 2010. We did not expect the iPad to be so visible and the Que to be so invisible!

### Biggest Surprise



### Most Significant



- ❖ The tablet market never seemed to arrive. The forecast had fluctuated wildly over the past twenty years.
- ❖ Apple levered the software and web store development of its iPhone to create a healthy environment for iPad.

- ❖ The professional e-Reader market seemed ready for reality after the success of Kindle for consumers.
- ❖ Price-performance competition from iPad nullified the technical effort by Plastic Logic and Que never launched.

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In hindsight, both surprises could have been foreseen, at least in general terms. The events were in-line with visible trends.

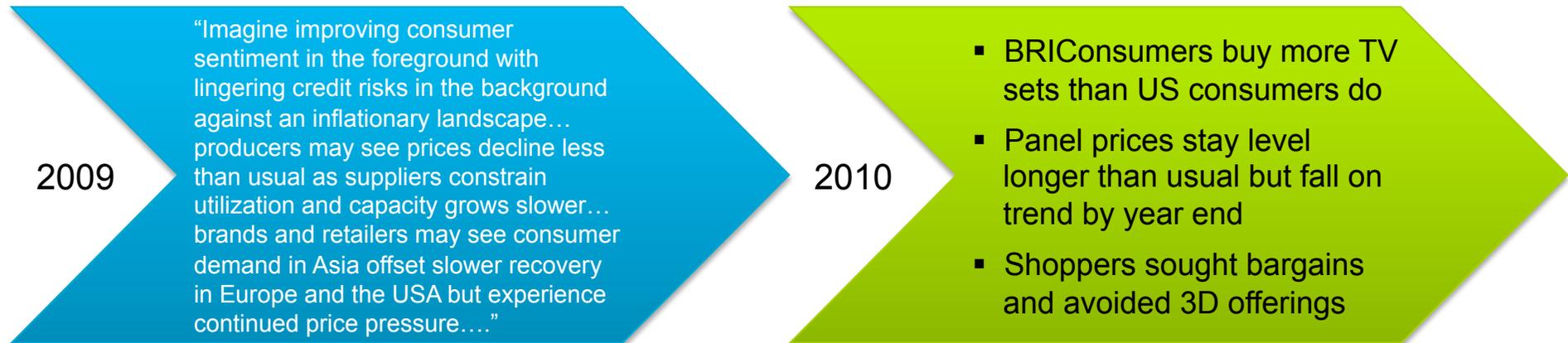
### Mobile Devices

- Both of us carry Blackberry phones. We use them as windows to the world, as many of you may do with similar devices.
- The thought of carrying a larger device with a display nine times bigger seemed silly... until we tried it.
- We discovered that having a larger display justifies carrying a larger device in some cases. (Yes, cases are important.)
- Progress toward 4G (LTE?) networks will make the user experience even more compelling. No wonder everyone wants to sell or buy a tablet device.
- We also note that dumb-phone prices are falling and demand growth is slowing.

### Flexible Electronics

- Long on promise; short on results.
- We have been skeptical about the value proposition in many market segments.
- Engineers loved the heroic efforts made by Plastic Logic and others in the field of plastic transistors and flexible substrates.
- Consumers may love the rugged nature of plastic substrates even if mounted rigidly.
- Otherwise, we see flexible electronics chasing low-cost, high-volume applications.
- How to survive the transition from high-risk investments to low-margin products is the question that keeps us up at night.
- Does that worry you, also?

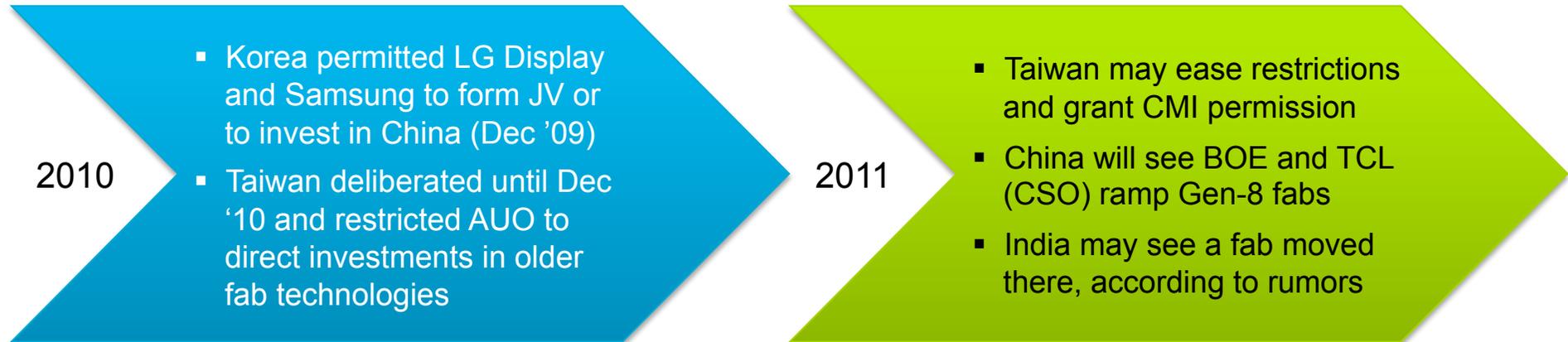
Looking back on 2010, seven of our eight strategic themes were expressed or confirmed. Our general expectation was fulfilled.



Theme	Scenario Statement	Scenario Development in 2010
Legacy Transfer	AMLCD remains dominant as fabs move to China	Taiwan permits AUO to go after Koreans in China
Commodity Races	“There’s plenty of room at the bottom”	PC panel prices reach or pass marginal cost
Shotgun Marriages	Ministers or shareholders become active	Governments stayed in the background
Ubiquitous Displays	Messages become visible everywhere	Toppan Forms prints OLED posters and more!
Blurring Edges	Market segments become less distinct	iPad... RIM intros 7” mobile... TV on your phone
Service Goods	Technologies become utilities	People buy devices to run apps; Netflix wins?
Biologic Interfaces	Users touch and become recognized	Touch is everywhere and now Kinect is here
New Competitors	Offshore suppliers become competitors	Google competed with its wireless partners

## Theme: Legacy Transfers

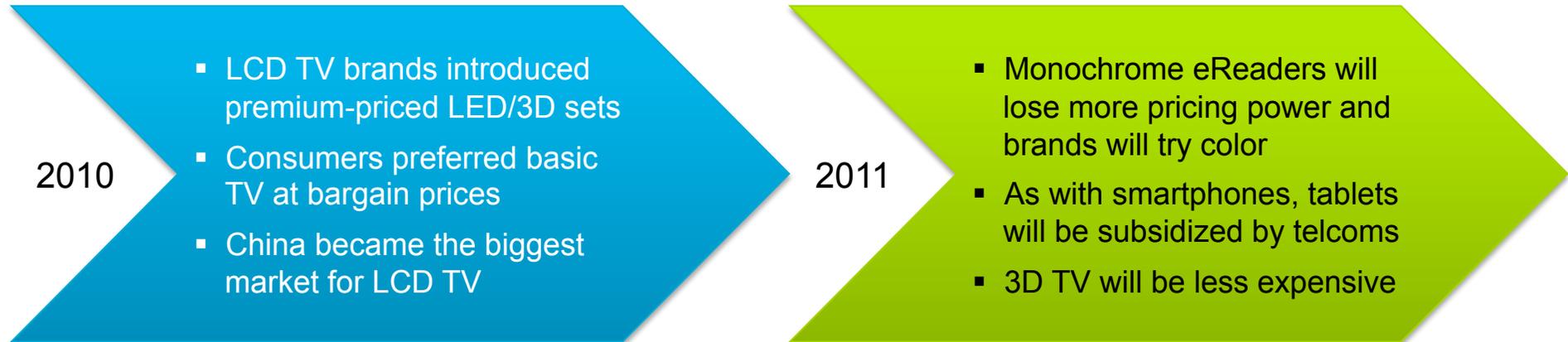
Old technology goes to new countries, so prices go down.



- Estimates for the full year indicate the areal price of AMLCD continued down its 19% annual decline in 2010. The price of LCD TV sets stayed on course, also.
- The good news for alternative technologies, such as EPD (e.g. E Ink) on TFT backplanes, is that more capacity in older AMLCD fabs becomes available.
- The bad news is that AMLCD price declines force alternative technologies into less profitable market segments (or kills them as with the Que).

## Theme: Commodity Races

There is no such thing as a mass-market, premium product.



- As with the Que, the price-performance of iPad pushed Amazon to cut Kindle prices. We saw a Nook-Kindle price war as eReaders raced to the bottom.
- TV brands missed their targets in 2010. They tried and failed to sustain premium prices but they managed inventories well. 3D TV remains a confusing mix of competitive claims but better prices may make 2011 a better year.
- We may see log jams upstream in Tablet supply as more models try to get through to consumers. Component inventories may be difficult to control in 2011–2012.

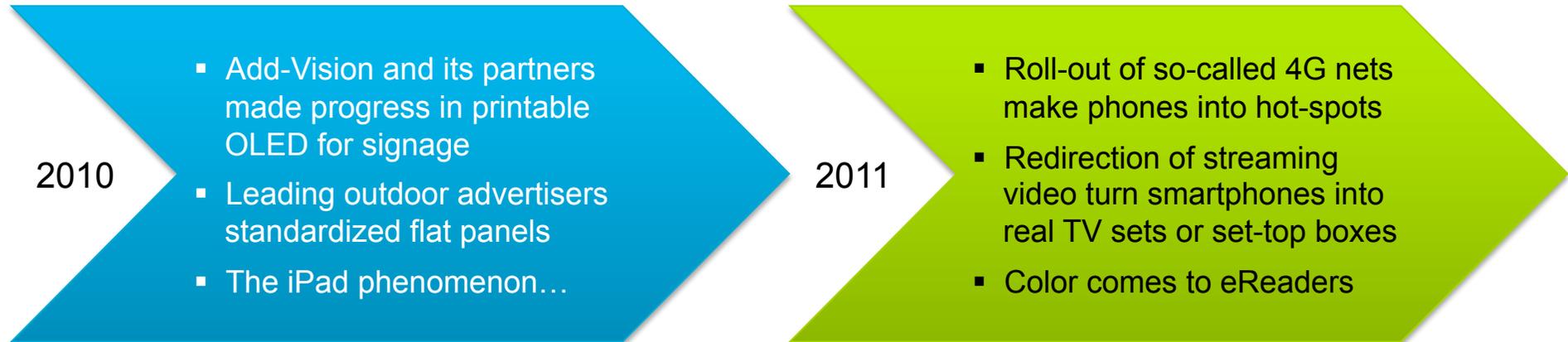
## Theme: Shotgun Marriages What's love got to do with it?



- We imagined that governments and shareholders would take a more active role in consolidation. The only evidence was Tatung's \$1.1b capital reduction for CPT.
- CPT and HSD are restricted to funding new Chinese fabs smaller than they have in Taiwan by themselves, which is uneconomic, so they need new rules or mergers.
- Chinese officials played an active role rationalizing BOE, IVO and SVA in 2007–09 but Pou Chen's sale of IVO to AUO is prohibited by Taiwan's current rules.

## Theme: Ubiquitous Displays

New business models arise as displays are always available.



- Smartphones can play streaming content or redirect it to a TV/monitor. The CD rental business dies as streaming service models are born.
- Smart TV combine with smartphones to create 4G video networks. Conventional cable/DSL/satellite business models are threatened.
- Expensive devices are subsidized by network contracts. Networks move from *all you can eat* to *a la carte* pricing. Bandwidth and social interaction increase.

## Theme: Blurring Edges

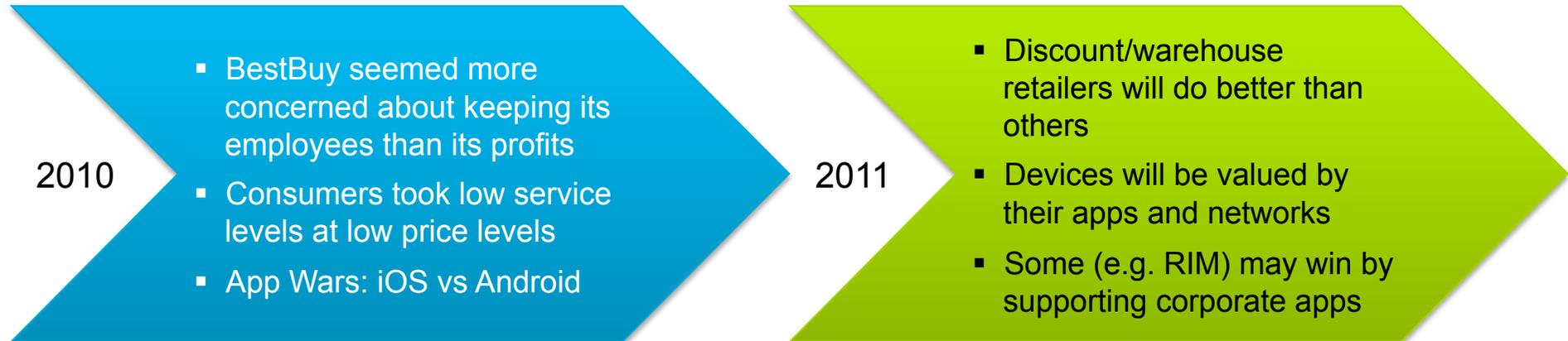
No boundaries—everyone (and everything) is your competitor.



- The blurring of display categories in netbooks, notebooks, games and navigation devices supports a variety of new value propositions.
- Corporate IT purchases may compensate for consumer preference of tablets in '11 but the general preference for portable computing will slow desktop growth.
- Brands that are not category creators (e.g. Sony in the past, Apple today) will struggle to defend profit margins as everyone piles into the next big thing.

## Theme: Service Goods

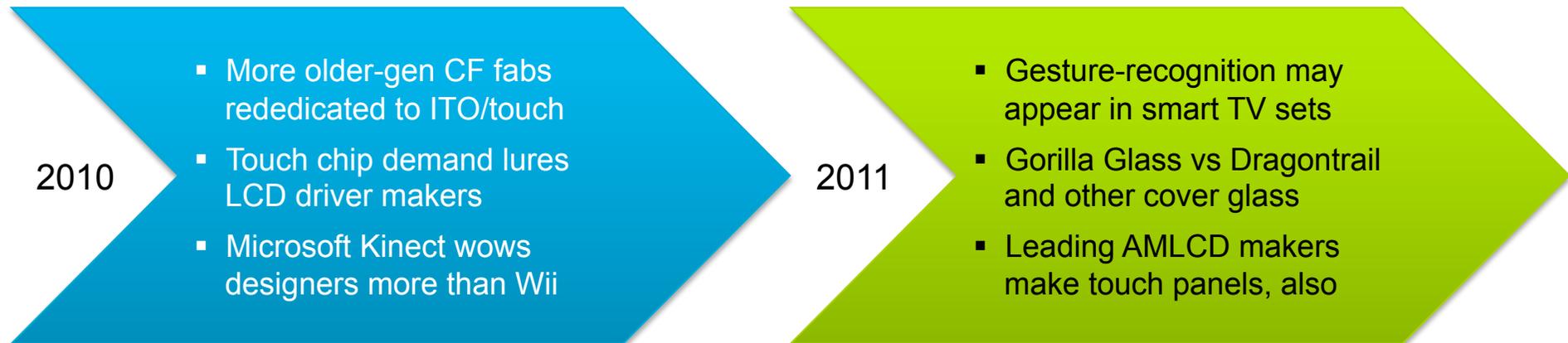
### How many apps does it have?



- The iPhone architecture replaces conventional (PC) motherboard construction and enables many functions. Software makes all the difference.
- The sort of contest for third-party developers seen between game console brands will become more prevalent in other markets such as tablets or televisions.
- The availability of (Apple) iOS and Android devices on competing networks will let us measure the relative importance of hardware and services this year.

## Theme: Biologic Interfaces

Touching moments lead to rapport and more premium products.



- Excitement about Kinect, about the user-device interactions it enables at least, may lead to gesture-recognition features in smart TV sets this year or next.
- At the least, smarter TV sets, more tablets and tablet-style interfaces for notebooks implies more demand for cover glass. Asahi Glass will complete with Corning this year and others, such as Hon Hai affiliate G-Tech Optoelectronics, will expand.
- We expect to see more vertical integration by leading panel makers such as LGD and by leading touch suppliers such as Nissha.

## Theme: New Competitors

### Will your supplier enter your market directly?



- Google chose to keep peace with US wireless partners but it competes with other Android platforms in unlocked markets overseas.
- Chinese manufacturers were busy moving West (e.g. Hon Hai) and creating new provincial clusters (e.g. in Chongqing) last year. TCL and TPV Technology formed panel JV that may prepare them to enter markets overseas (e.g. TPV's AOC brand).
- We imagine that policy constraints on lending in China will stimulate domestic manufacturers to enter markets overseas. We expect to see offshore deals in '11.

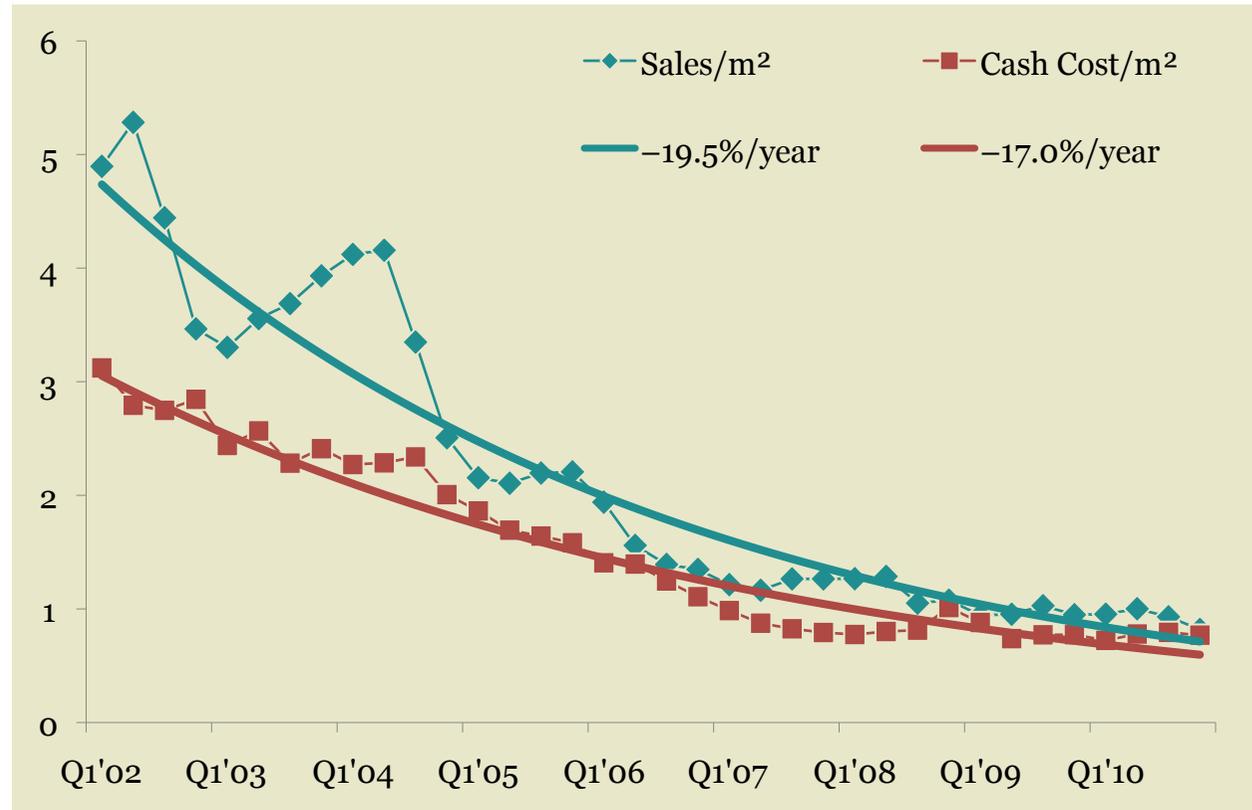
## Focusing on AMLCD, the dominant display technology, 2010 started out well but ended badly for producers.

LG Display discloses more than most producers and it is second largest; its results are a barometer for the industry.

Prices strengthened mid year as retailers replenished unusually low inventories. Premiums for LED and 3D features also helped.

Consumers sought bargains in the second half, which forced prices down. A mismatch between product plans and demands led to less profit in 2H'10. Legal fines added to the problem.

We find that long-term trends were little changed. Areal prices still fall faster than areal costs. Cash margins are decreasing over time.



Sales and Cash Cost in millions of Korean won per square meter  
Source: LG Display disclosures

2011 looks better, but not great.

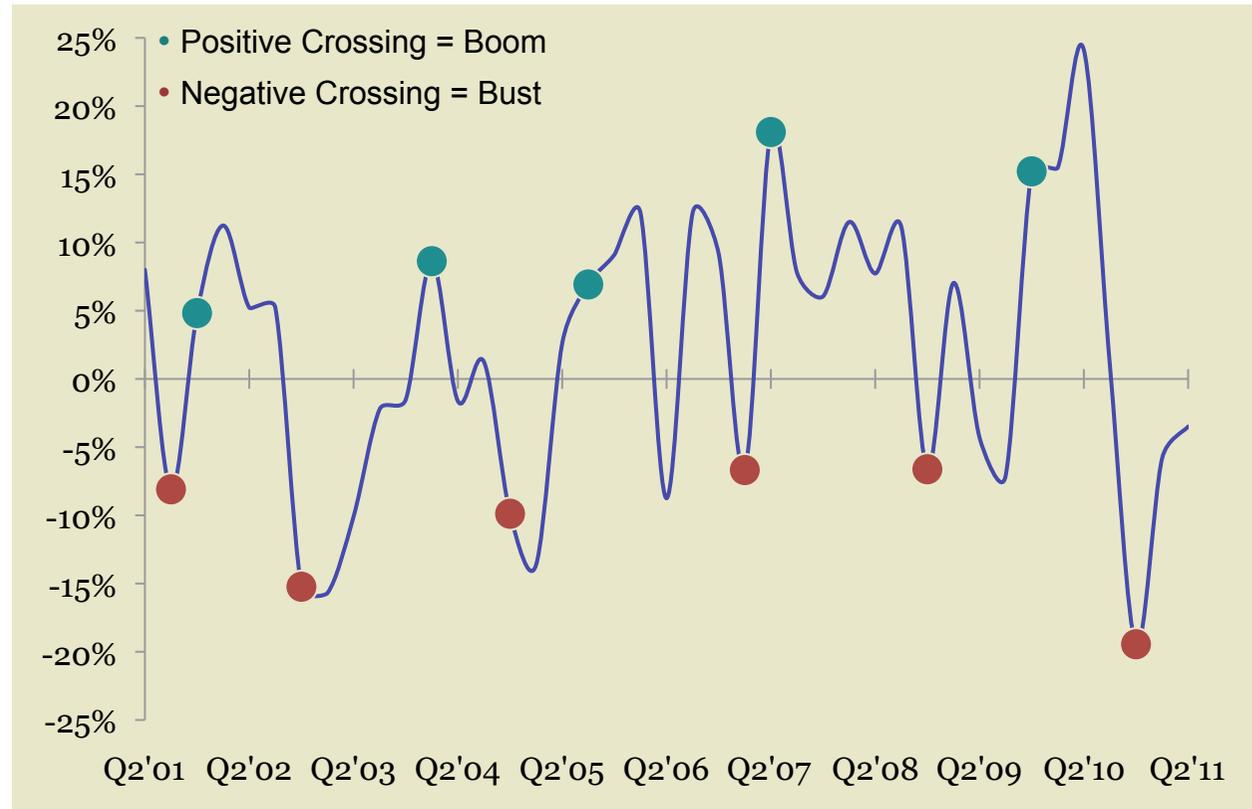
We wait for DisplaySearch's capacity forecast in March. That will let us update the Capacity-Acceleration Price Indicator (CAPI).

This chart from BizWitz Commentz (20 Sep 10) shows how CAPI predicts booms and busts in AMLCD pricing when the signal falls below zero.

The poor results of early 2009 and late 2010 were predicted without knowing about the financial crisis or the legal crisis (ITC and EU fines for price fixing).

Last year's capacity forecast for 2011 indicated rising prices. We wait for confirmation at the US FPD Conference in March.

Rising supply and falling costs for LED components suggest that AMLCD makers will have a better year in 2011.



Capacity-Acceleration Price Indicator by BizWitz  
Source: DisplaySearch, AUO + LGD disclosures, 2Q'10

Overall, we view 2011 as a year of blocking and tackling. The 4G iPhone looks exciting, but like American football, the next holiday season looks questionable.



- We think all the themes remain valid in '11.
- If brands and retailers stick to the basics, we will see many 2009 and 2010 CES introductions fulfill their promises in 2011.
- The year will start fast, but like the 2011 football season, it may run into economic difficulties: Inflationary pressures in BRIC countries, jobless recovery in the rest.
- As in the early PC era, winners will rely on potent combinations of platforms, programs and branded content. Back then, the new mantra was "Quality Is Free." Today's new mantra may be "Hardware Is Free."
- Unsurprisingly, we expect no surprises in 2011. It should be better than 2010.

## Appendix

### Three-letter acronyms (TLA) for some display producers

TLA	Symbol*	Company	Business
AUO	TPE:2409	AU Optronics	Qisda (former Acer) affiliate; #3 in AMLCD sales
BOE	SHE:00725	BOE Technology Group	Largest native AMLCD maker in China
CMI	TPE:3481	Chimei Innolux	Hon Hai (Foxconn) affiliate; #4 in AMLCD sales
CPT	TPE:6116	Chunghwa Picture Tubes	Tatung affiliate; #6 in AMLCD sales
CSO	private	China Star Opto. Technology	TCL affiliate ramping a gen-8 fab in China
HSD	TPE:6116	HannStar Display	Walsin Liwha affiliate; #8 in AMLCD sales
IVO	private	Infovision Optoelectronics	Pou Chen affiliate; makes AMLCD in China
LGD	SEO:34220	LG Display	LGE affiliate; #2 in AMLCD sales
SEC	SEO:05930	Samsung Electronics	#1 in AMLCD sales with Sony and SDI JVs added
SVA	SHA600637	SVA Information Industries	Exited SVA NEC JV in AMLCD; restructuring in 2011
TMC	SHE:00050	Tianma Microelectronics	Chinese AMLCD maker; acquired fab from SVA NEC
TMD	TYO:6502	Toshiba Mobile Display	Subsidiary of Toshiba; formerly a JV with Panasonic

\* Google Finance style