Touch Screens and the Mobile Phone Market

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Elo TouchSystems

Business unit of Tyco Electronics

- $14B revenue in 2007
- 92,000 employees in 54 countries (34,000 in China)
- One of the world's largest electronic component suppliers

Elo TouchSystems

- Founded in 1971; invented the touch screen
- World's largest revenue for touch-screen products in 2007
- Widest selection of touch technologies
- Nearing a half-billion dollars in revenue with 450 people
- Manufacturing & integration in China, Japan, Brazil, Belgium, New York & California

Agenda

- Touch & mobile phones
- Market drivers & inhibitors
- Mobile phone market size
- Touch penetration
- Technology alternatives
- The holy grail
- The bigger picture

Displaybank: *Touch Screen Panel Industry Trends & Business Strategies* (11/07)
DisplaySearch: *2008 Touch Panel Market Analysis* (5/08)
iSuppli: *Touch Screens: Emerging Displays Special Report* (5/08)
IMS Research: *The Worldwide Market for Touchscreen & Input Technologies for Mobile Handsets* (7/08)

Touch & Mobile Phones

Multimedia & data services usage

But ease of navigation & text entry

Until a disruptive change happened…

It's not just touch.
It's not just multi-touch.
It's not even really about touch.
Touch is just an ***enabler***.

Touch Is an Enabler

What did touch enable on the iPhone?

A user interface that provides such incredibly intuitive access to a relatively complex set of functions that even a 7-year-old can use it without training or assistance

Say What?

changed the way people think about touch

- Touch went from something that you poke at in an airport check-in line to an enabler of a whole new way of interacting with devices.
- It's all about the ***user experience***, not the technology!

Drivers & Inhibitors

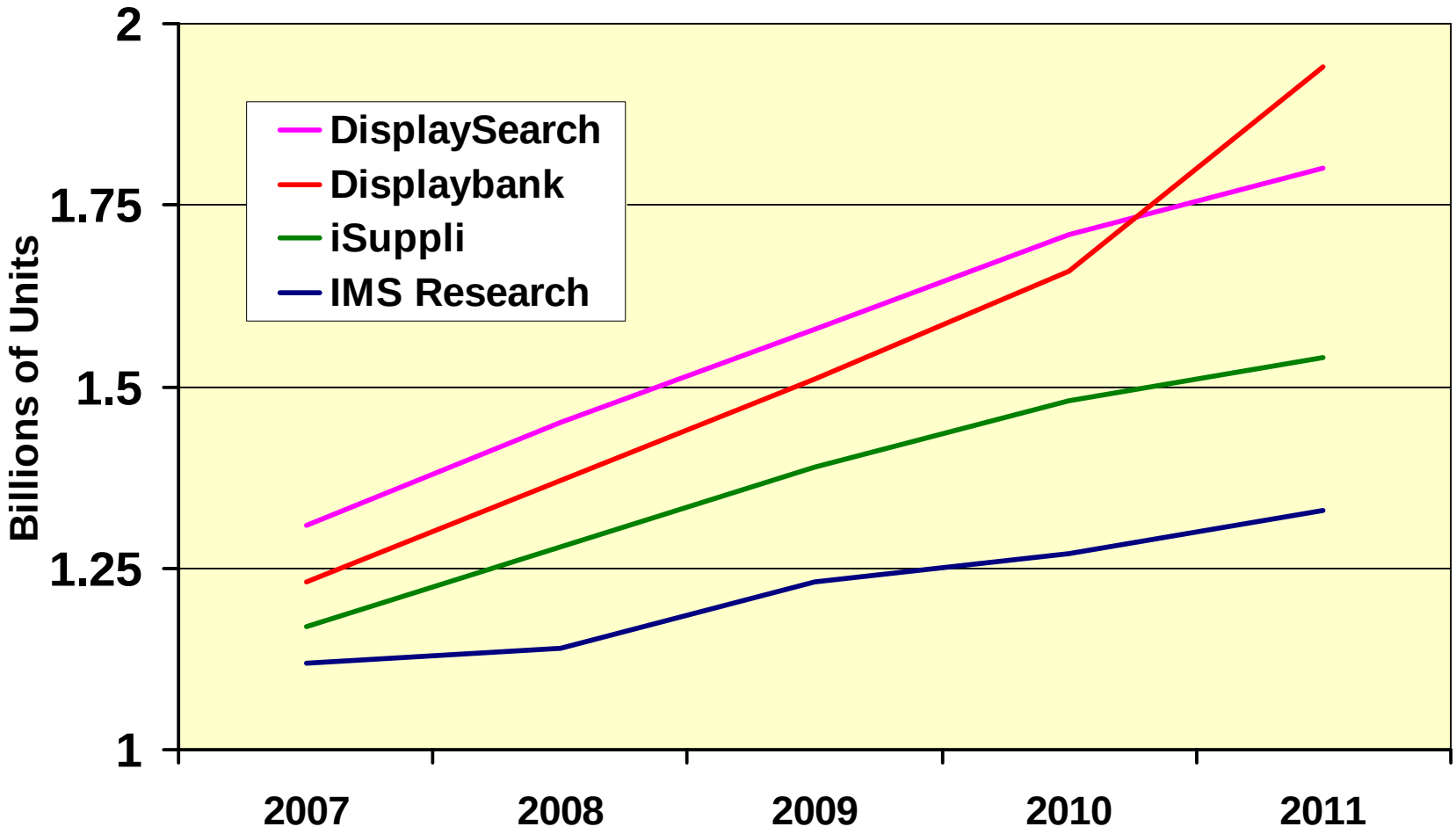
Market drivers

- Operators' desire to increase ARPU
- Mobile internet
- Convergence of consumer & enterprise applications
- Asian-language character entry

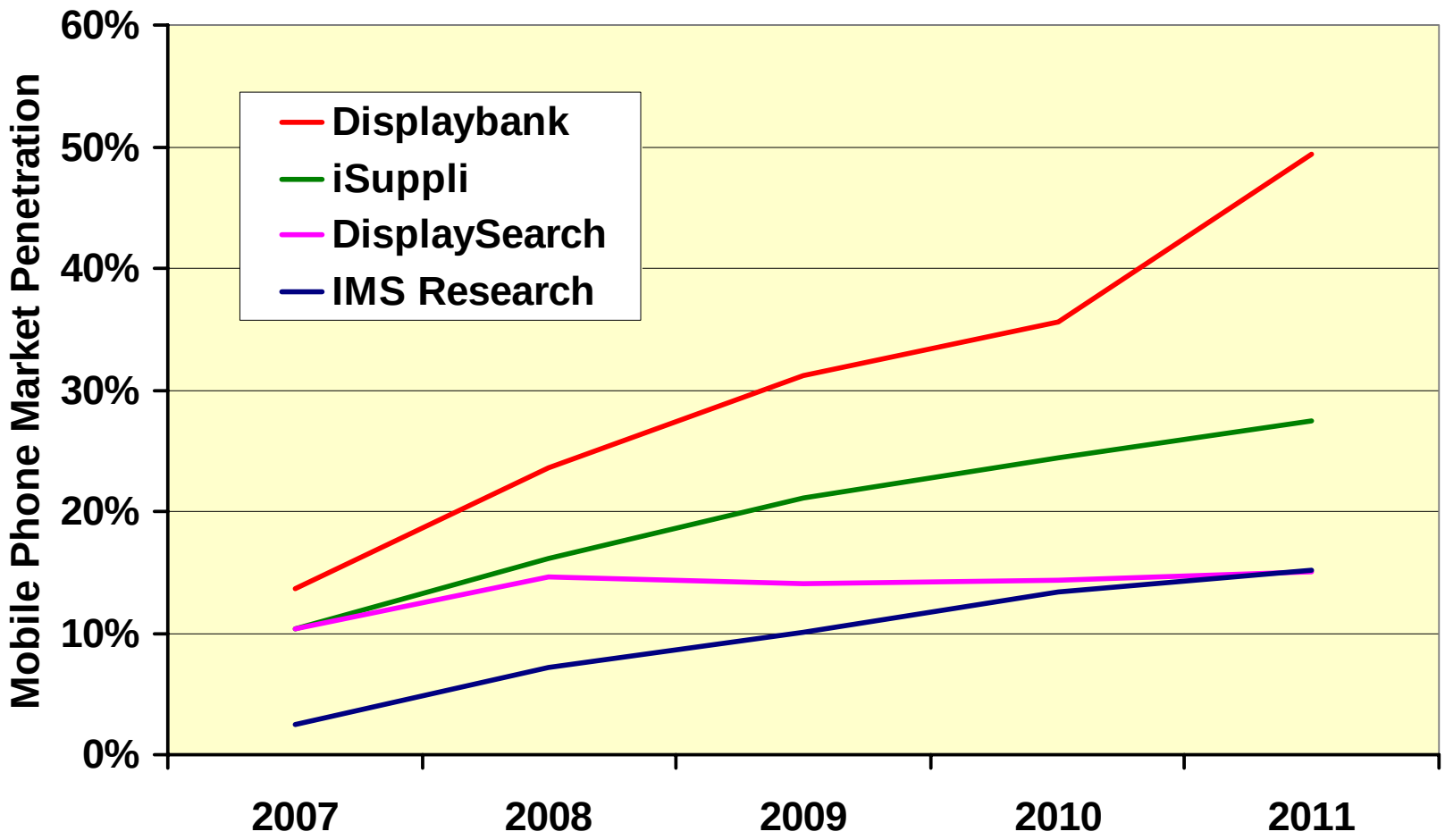
Market inhibitors

- Higher cost
- Western operators' need for ROI (subsidy model)
- Technology uncertainty

Forecasted Mobile Phone Market Size (Units)



Forecasted Touch Penetration



Many Different Assumptions…

- Smartphone demand & growth rate
- Expansion of touch into the “feature-rich” segment
- Touch becoming a standard feature on mobile phones
- Adoption rate for projected capacitive (the “iPhone effect”)
- Emerging display technologies that defocus touch
- Competing input technologies such as voice
- The emergence of touch-optimized software
- The importance of handwriting recognition in Asia
- The value of haptics in overcoming resistance to touch
- Convergence with other consumer devices
- The degree to which touch will become ubiquitous

Technology Alternatives

Mainstream

- Analog resistive
- Projected capacitive

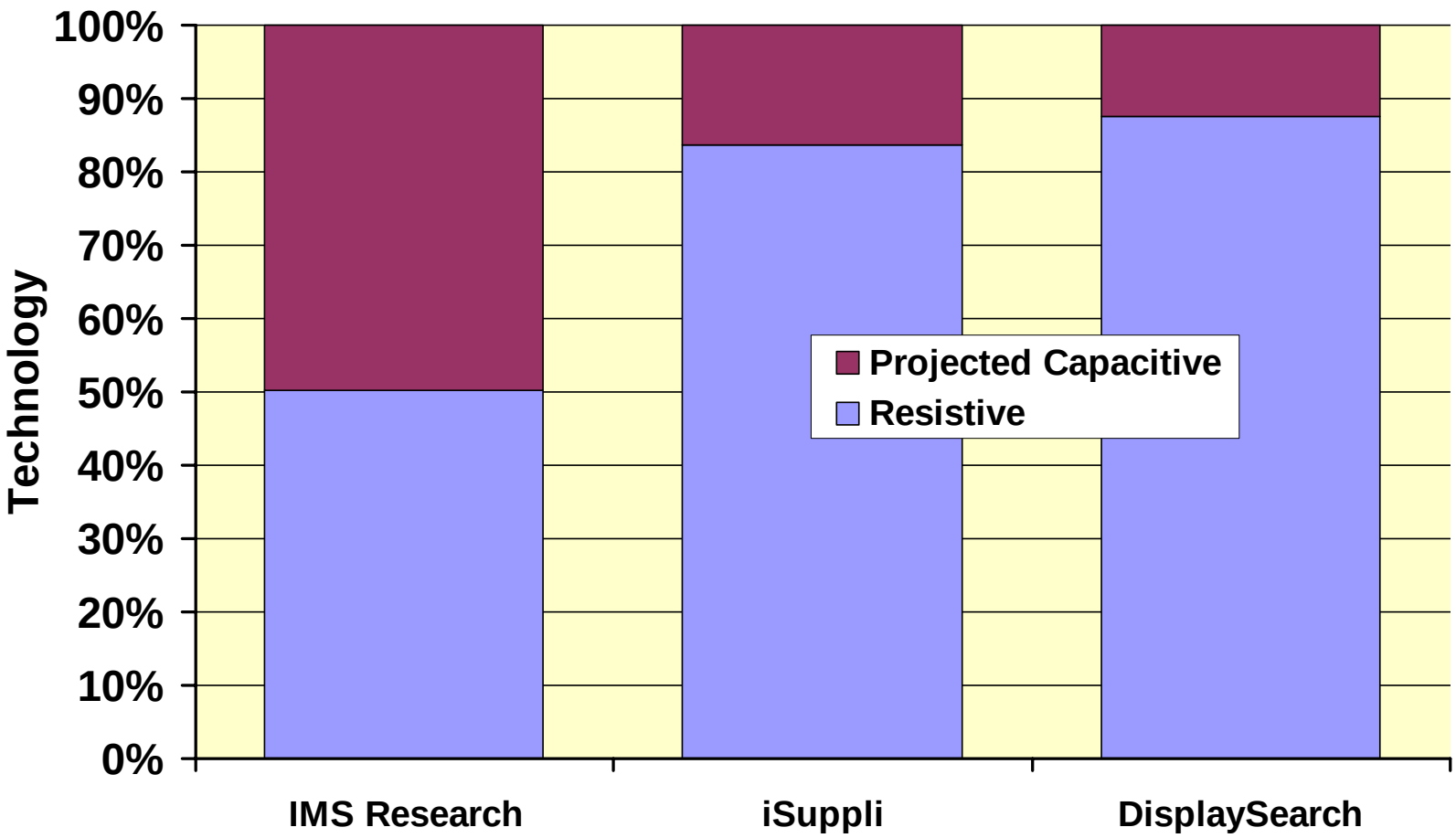
Emerging

- Acoustic Pulse Recognition [APR] (Elo TouchSystems)
- Waveguide infrared (RPO)
- Traditional infrared (Neonode)
- Digital resistive (Wintek, others)
- LCD in-cell (AUO, Sharp, others)

Mainstream Technologies Compared

	Analog Resistive	Projected Capacitive
Touch Object	Stylus & finger	Finger-only
Multi-Touch	No	Yes
Durability	Poor (plastic)	Excellent (glass)
Clarity	Fair	Very good
Flush Surface	No	Yes
Power Consumption	Very low	Moderate
Stable Calibration	No	Yes
Cost	Very low	High

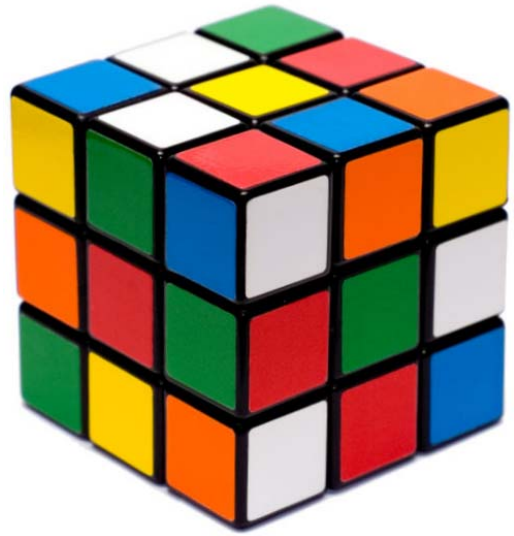
Forecasted Mainstream Technology Share in 2011



The Holy Grail

The ideal touch technology for a mobile phone

1. Stylus & finger usage
2. Multi-touch
3. High durability
4. High transparency & clarity
5. Completely flush top surface
6. Low power consumption
7. Stable calibration
8. Narrow borders
9. Substrate independence
10. Low cost



There Is No Perfect Touch Technology

	Characteristic	Analog Resistive	Projected Capacitive	APR	Waveguide Infrared	Traditional Infrared	Digital Resistive	LCD In-Cell
1	Stylus Independence	☑	🕷	💰	☑	🕷	☑	🕷
2	Multi-Touch	🕷	💰	🕷	☑	☑	💰	💰
3	Durability	🕷	💰	💰	💰	💰	🕷	☑
4	Optical Performance	🕷	☑	💰	💰	💰	🕷	💰
5	Flush Surface	☑	💰	💰	☑	🕷	☑	💰
6	Power Consumption	💰	☑	💰	☑	🕷	💰	🕷
7	Stable Calibration	🕷	💰	💰	💰	💰	🕷	💰
8	Narrow Borders	☑	☑	💰	☑	🕷	☑	💰
9	Substrate Independence	☑	💰	☑	💰	💰	☑	💰
10	Cost	💰	🕷	☑	☑	🕷	☑	🕷

💰	Best
☑	OK
🕷	Worst

Why Just Mobile Phones?

iSuppli's forecast for <10-inch touch screens in 2011

(assumes 27.5% touch penetration in mobile phones)

Touch Screen Application	<3-inch	3.x-4.x-inch	5.x-9.x-inch	Total	Share
Mobile Phone (000 units)	**324,435**	**100,731**		**425,167**	**68.1%**
Gaming/Entertainment		68,338		68,338	**10.9%**
Navigation System		59,825	7,484	67,309	**10.8%**
MP3/PMP	3,385	24,758		28,143	**4.5%**
Small-Screen PC			14,246	14,246	**2.3%**
Others	7,420	3,728	2,928	14,076	**2.3%**
PDA		4,690		4,690	**0.8%**
Retail		953	1,396	2,349	**0.4%**
Office Printer	667	110	1,235	2,012	**0.3%**
Medical			302	302	**0.0%**
Industrial/Financial		32	65	97	**0.0%**
Grand Total	**335,240**	**263,025**	**26,053**	**624,318**	**100.0%**
ASP ($)	**2.7**	**6.3**	**21.2**		
Mobile Phone TAM (000 $)	**$875,975**	**$634,608**	**$0**	**$1,510,583**	
Non-Mobile Phone TAM (000 $)	**$29,174**	**$1,022,447**	**$552,327**	**$1,603,948**	

Mobile Phones Aren't Easy

The mobile phone touch-screen business

- Extremely high volumes
- Very small number of customers (OEMs)
- Limited opportunity for new technologies
- Rapid product introduction cycles
- Difficult to differentiate products
- Many new competitors
- Very low average selling prices
- Intense pressure on margins

The Bigger Picture

- Appliance
- ATM
- Automotive entertainment
- Automotive in-dash system
- Bedside entertainment
- Blood glucose meter
- Casino gaming machine
- Copier
- Desktop touch monitor
- Digital still camera
- Digital video camera
- e-Book/dictionary
- Electronic cash register
- Entertainment device
- Gas pump
- Handheld industrial device
- Home automation controller
- Home healthcare device
- In-flight entertainment
- Industrial controller
- Insulin delivery controller
- Interactive digital signage
- Internet access terminal
- IP phone
- Jukebox
- Lottery terminal
- Machine control panel
- Media player
- Medical monitor
- Mobile internet device
- Mobile phone
- Notebook
- Patient monitor
- PDA
- Photo kiosk
- Point of information kiosk
- Point of sales terminal
- Portable game
- Portable GPS
- Portable industrial device
- Price-checker
- Printer
- Projector
- Self-service terminal
- Shopping cart tablet
- Signature capture device
- Solar power controller
- Tablet computer
- Ticketing machine
- Touchcomputer
- UMPC (Ultra-Mobile PC)
- Voting machine
- Wind power controller
- X-ray machine

Touch Is Exploding!

Thank You!

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