

Touch Screens and the Mobile Phone Market

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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: *Small-Medium Touch Screen Panel Industry Trends (7/08)*

DisplaySearch: *2008 Touch Panel Market Analysis (5/08)*

IMS Research: *The Worldwide Market for Touchscreen & Input Technologies for Mobile Handsets (7/08)*

iSuppli: *Touch Screens: Emerging Displays Special Report (5/08)*

Touch & Mobile Phones

Multimedia & data services usage ↑
But ease of navigation & text entry ↔
Until a disruptive change happened...



The
Apple
iPhone

It's not just touch.
It's not just multi-touch.
It's not even really about touch.
Touch is just 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?



Apple 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!

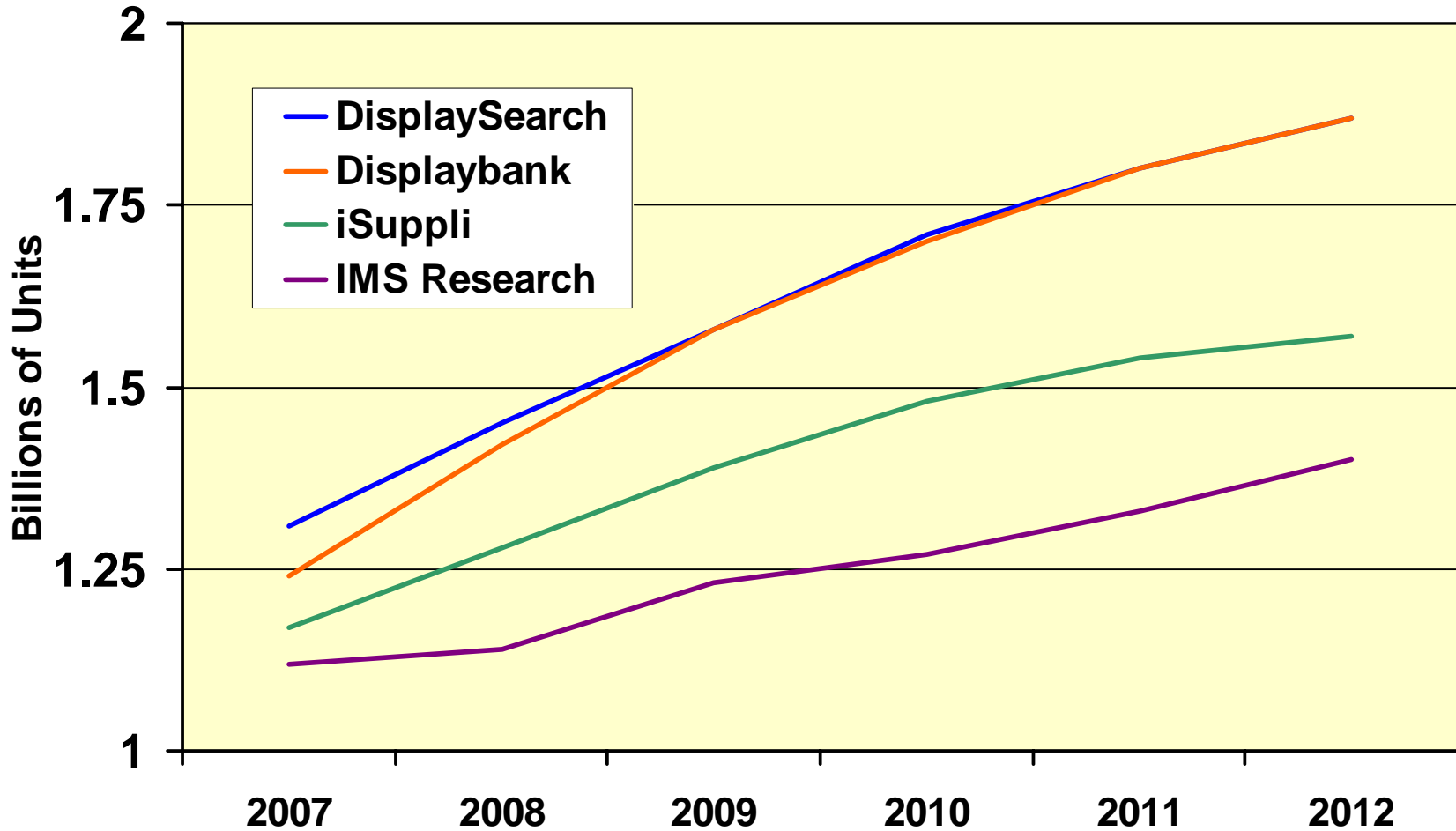
Market drivers

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

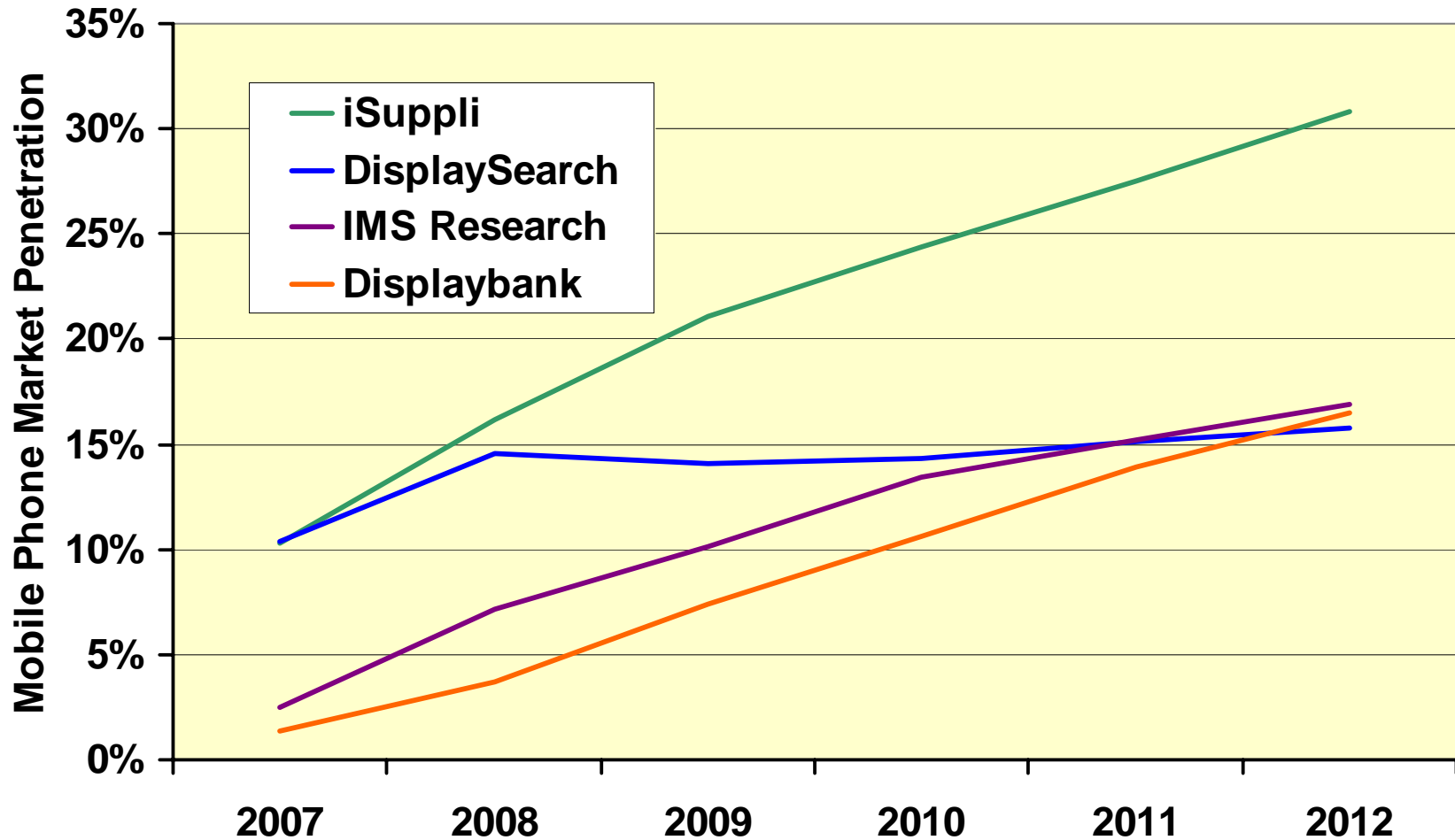
Market inhibitors

- ❖ 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”)
- ❖ The emergence of touch-optimized software
- ❖ The importance of handwriting recognition in Asia
- ❖ Emerging display technologies that defocus touch
- ❖ Competing input technologies such as voice
- ❖ The value of haptics in overcoming resistance to touch
- ❖ Convergence with other consumer devices
- ❖ The degree to which touch becomes ubiquitous

Technology Alternatives

Mainstream

- ❖ Analog resistive
- ❖ Projected capacitive



Emerging

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

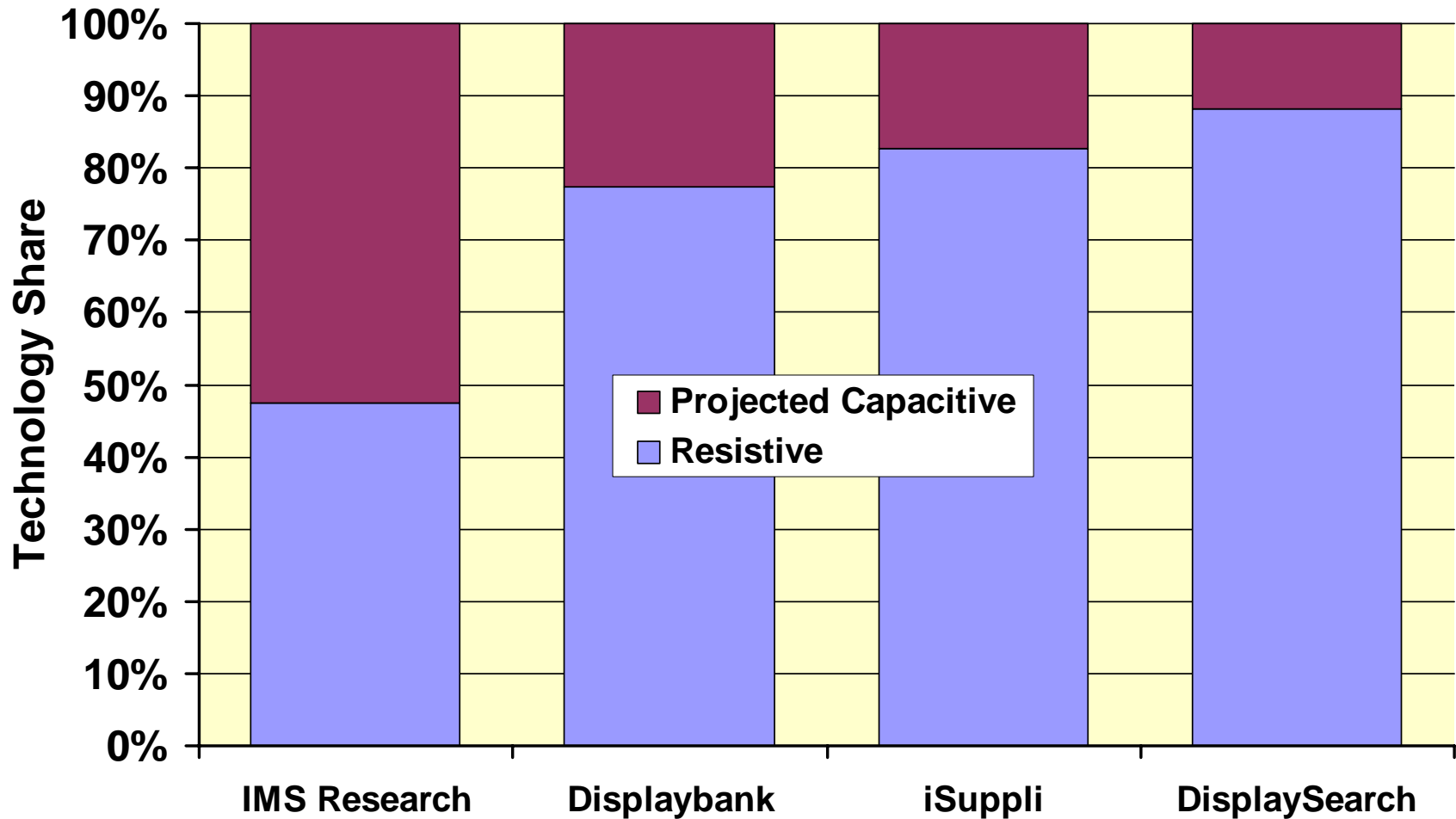


Mainstream Technologies Compared



	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 2012



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



	 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 2012
(assumes **30.8%** 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)	365,530	117,036		482,566	67.9%
Gaming/Entertainment		76,539		76,539	10.8%
Navigation System		63,222	8,126	71,348	10.0%
MP3/PMP	3,554	27,556		31,110	4.4%
Small-Screen PC			23,280	23,280	3.3%
Others	8,550	4,298	3,618	16,466	2.3%
PDA		4,380		4,380	0.6%
Retail		1,077	1,717	2,794	0.4%
Office Printer	681	121	1,359	2,161	0.3%
Medical			423	423	0.1%
Industrial/Financial		34	70	104	0.0%
Grand Total	378,315	294,263	38,593	711,171	100.0%
ASP (\$)	2.5	5.8	19.4		
Mobile Phone TAM (000 \$)	\$913,825	\$678,809	\$0	\$1,592,634	
Non-Mobile Phone TAM (000 \$)	\$31,963	\$1,027,917	\$748,704	\$1,808,583	

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!

It's everywhere!



Thank You!

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