Touch Market Overview

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Scope

- 5-year future view of all 12 of today’s “contact” technologies
  - More technology-trend focused than number-focused
  - Extracted from “Touch Technologies & Applications Report”

- Includes all transparent touch market segments
  - Interactive opaque whiteboards are excluded

- No gesture, motion or voice
  - Touch, gesture, motion and voice will all co-exist in cooperative & complementary ways

Source: Vissumo
2010 Touch Market Revenue

Total Market
- Pro-Cap: 58%
- Resistive: 10%
- Other Tech: 32%
- Total: $6B

Vertical Apps
- Resistive: 17%
- SAW: 7%
- Surface Cap: 15%
- Infrared: 6%
- Optical: 2%
- Total: $1B

Consumer
- Pro-Cap: 72%
- Resistive: 24%
- Other Tech: 4%
- Total: $5B

Source: IMS Research estimates
Context

- iPhones, iPad and other products using pro-cap have set the standard for touch in 100s of millions of consumers’ minds
  - Multiple simultaneous touches
  - Extremely light touch
  - Reliable, durable and transparent
  - Flush (bezel-less) surface with off-screen buttons
  - Fully integrated into the user experience – effortless & fun

Source: Apple
Key Assumption

- Since most vertical-application users are also consumers, this “pro-cap standard” is going to migrate from consumer applications into vertical applications.

- Current impediments
  - Sensor cost
  - Integration difficulty
  - Scaling to larger sizes
  - Wider range of requirements

Source: 3M
Pro-Cap Controllers

- **Latest controllers support stylus with 1-mm tip**
  - Stylus will become common – both active & passive

- **Rapid increase in the number of controller suppliers**
  - While the top three or four focus on CE, the other 25 can support smaller customers in vertical applications
  - More suppliers = more innovation = more capabilities
  - More suppliers = slower standardization = less commoditization
  - More suppliers = easier integration

Source: Atmel

Source: Maxim
Pro-Cap Sensors

- Pro-cap cost is driven by the fab cost; a fab is required because of ITO

- ITO-replacement materials are going to eliminate the need for fabs, which will drive down the sensor cost
  - It’s already started with Cambrios’ silver nanowires (“ClearOhm”) in Synaptics’ touch-screen in the “Cricket” smartphone in Asia
  - Within five years, as much as 50% of pro-cap sensors will be manufactured using ITO replacements
  - ITO replacements will also break the scaling barrier

Source: www.pvd-metallizer.com
Pro-Cap Summary

- In consumer electronics, pro-cap will totally dominate, cutting analog resistive down to a single-digit market share in five years.

- In vertical applications, pro-cap will grow to 50% market share in five years.
  - See presentations by N-trig, Touch International, Ocular LCD & Motion Computing.

Source: Verifone
LCD On-Cell

- “On-cell” locates the pro-cap electrodes on the color-filter glass, under the polarizer
  - It’s just pro-cap in a different location
  - The key difference is who’s in control of the manufacturing

- There are many business & operational issues
  - Touch-on-lens, performance, controller integration, CF-glass yield, controller confidentiality, LCD product-line management...

- On-cell will account for less than 20% of consumer pro-cap in five years, and much less in vertical applications
Analog Resistive

- Resistive limitations will become an increasing impediment in light of the “pro-cap standard”
  - No multi-touch
  - High touch-force
  - Poor durability
  - Poor optical performance

- The largest pro-cap supplier in the world has a division focused on driving pro-cap into vertical applications, replacing resistive

- Analog resistive’s share of vertical applications will be cut by more than half in five years

Source: TabletKiosk
Analog Multi-Touch Resistive (AMR)

- It’s not getting any traction in consumer electronics
  - Zero in tablets, close to zero in all-in-one desktops

- It has issues
  - It’s not significantly lower cost than pro-cap
  - It’s not easy to make properly, especially in larger sizes
  - It has all the same limitations as single-touch resistive

- It will remain an insignificant niche technology

Source: Photo by author
Surface Acoustic Wave (SAW)

- SAW has a broader range of vertical applications than surface capacitive
  - More suppliers, more durable, and easier to integrate

- SAW will have difficulty competing with pro-cap
  - Two-touch at most (Elo & General Touch), with more touch-force than pro-cap
  - Difficult to make bezel-less; Elo has done it but has patent protection (sole-source)

- SAW’s market share will drop by 40% in five years

Source: Kodak
Surface Capacitive

- **Main applications are casino games and kiosks**
  - Users increasingly will have pro-cap CE products and will therefore have pro-cap touch expectations

- **Application software developers are likely to respond to those expectations**
  - This will drive single-touch, moderate-durability surface cap out of those applications
  - Asian surface-cap vendors are already exiting the market because they see the pro-cap wave

- **Surface-cap’s market share will be cut in half in five years**

Source: 3M
Large-Format Technologies

- Traditional infrared will lose some share to camera-based optical because of cost

- High-finger-count (20-40) multi-touch infrared will remain a niche technology because there are no applications for it and it’s not good for whiteboards

- DST and APR will disappear

- Wire-based pro-cap will disappear when ITO-replacement materials scale to large-format
LCD In-Cell

- “In-cell” locates the touch-sensing elements between an LCD’s two sheets of glass

- It’s still in R&D!
  - Very slow progress

- Very few products
  - Samsung-Microsoft SUR40 (light-sensing)
  - Samsung digital cameras (voltage-sensing + capacitive sensing)

- In-cell is unlikely to account for more than 10% of consumer touch in five years

Source: Samsung
What’s Left

- **Force-sensing** *(not the same as pressure-sensing)*
  - Difficult to achieve multi-touch and bezel-less
  - It won’t achieve critical mass in five years and so will disappear

- **EMR pen-digitizer**
  - Will survive as a viable niche technology
  - Advantages outweigh disadvantages

- **Vision-based touch (with contact)**
  - Still in its infancy, but will survive as a viable niche technology

- **Combinations of touch technologies**
  - Major + minor will become more important

Source: Photo by author
## Conclusions

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Thank You!

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