More Digital Revolutions

Thoughts and predictions on Displays, how they influence Digital Media and how they are influenced in return, for LatinDisplay 2010.

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Digital revolutions in three parts…

Part -1

Display Influence on Digital Media & Devices

Part-2

3-D View of Digital Media

- Technical
- Financial
- Social

Part-3

Digital Media Influence on Displays

Four quotes from a speech in 2000* highlight influences of digital displays on digital media

- "Pixels are free."
  - Unlike CRT or PDP, LCD can provide 200 pixels per inch, or more.
  - LCD can do this at low cost and enable new products.
- "Power to the picture."
  - People recharge devices frequently in order to see exciting pictures.
  - Better batteries and other parts allow better, high-power displays.
- "Policy drives price."
  - National aspirations stimulate LCD capacity investments.
  - Capacity drives supply and supply drives price; demand follows.
- "Price limits potential."
  - Continuous price declines make investments in alternative technologies unattractive.
  - Legacy technology transfers to new countries give new life to old technologies.

* David Barnes at an internal Philips Electronics display summit meeting in Eindhoven

Historical trends persist: AMLCD price/m² declines 19% a year.

The average size of AMLCD increased for years so the average unit price did not fall as fast as the area price did.

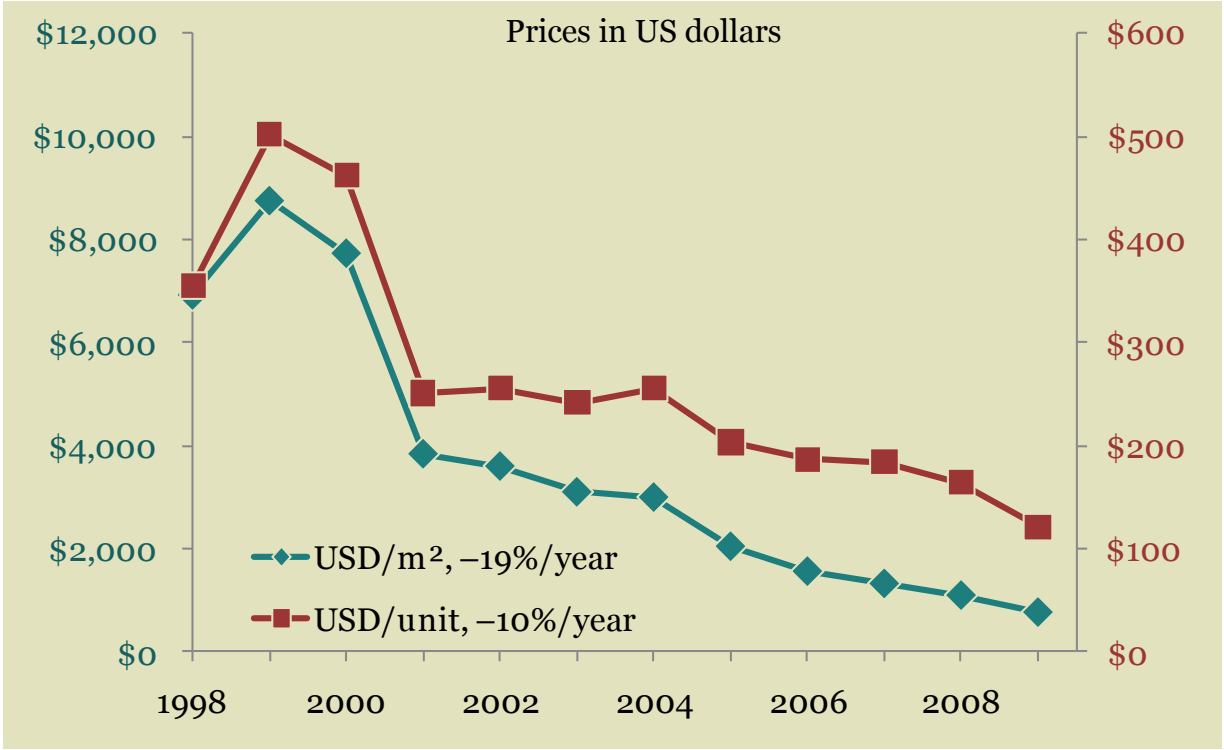
Area cost drives profit.

That is bad news for display makers. Existing AMLCD makers see diminishing returns to scale and entering display makers see rising barriers from low prices.

It is difficult to invest in new plants and risky technologies if the area price will be 50% less three years from now.

Few "LCD killers" have come to market. Few will.

a-Si LCD Price Development, 1998–2009



Source: DisplaySearch, BizWitz analysis

The pace of AMLCD price reduction for eReader-sized panels

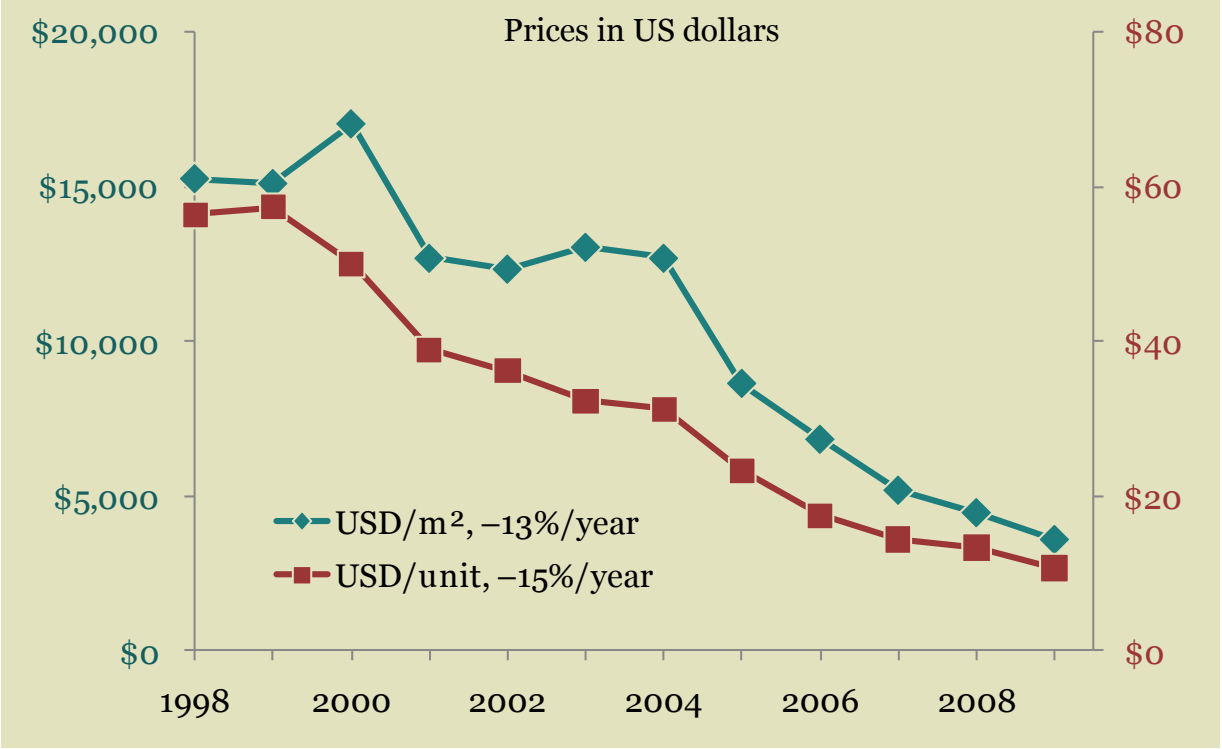
The price of panels smaller than ten inches falls slower than the price of large panels.

The price will be 50% less five years from today. That is a big challenge for new tech.

In addition, AMLCD makers have plenty of depreciated assets (old large-panel fabs) they can use to make more panels for phones or tablets.

Would you risk 2 billion reais on a plant to challenge LCD selling for half-price in 2012?

a-Si LCD Price Development for Small-medium Panels



Small-medium are less than ten diagonal inches; DisplaySearch, BizWitz analysis.

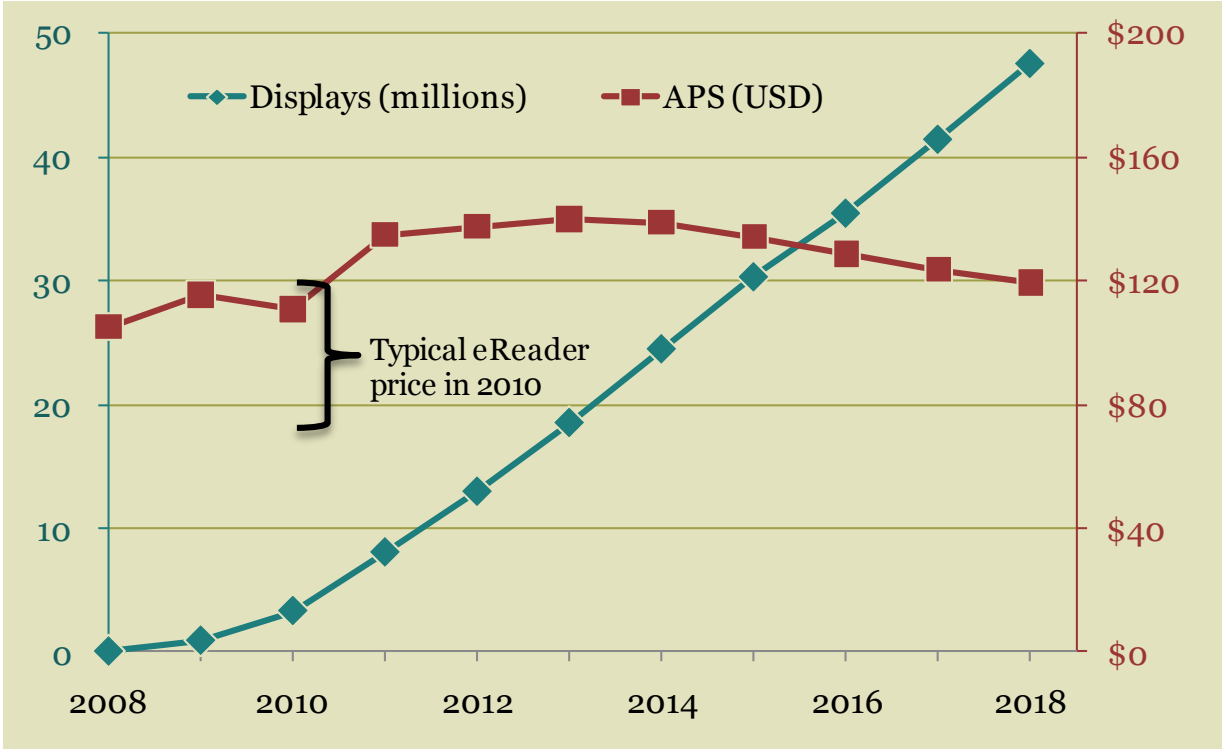
Cuidado: most forecasts are made for new-tech managers seeking money, not for most of us.

Be skeptical of forecasts from market research firms. Most of these are unrealistic. They are written to help clients, companies or departments seeking money for new things.

As shown, the forecast from 2009 was crazy. How can the price go up if LCD prices are going down so fast?

As we see today, the price of eReaders from big companies like Amazon or Sharp are less than the forecasted display component price, already!

eReader Display Forecast from 2009



Source: DisplaySearch, BizWitz analysis

Digital displays have enabled hand-held TV and internet commerce everywhere, everywhen.

- Many small, orthogonal pixels put clear text and good video in the palm of your hand. Held close to your eyes, it is as good as HDTV at home.
- Recharging handheld devices is normal. At home, recharge is easy.
- Korean and Taiwanese makers are rushing to China. Brazil wants them.
- AMLCD prices will fall further. Displays are good enough already.

If your eyes are young enough and you hold the display close enough, you can see anything you want, whenever you want, wherever you are.

3D view of Digital Media: three aspects of current trends and potentials.

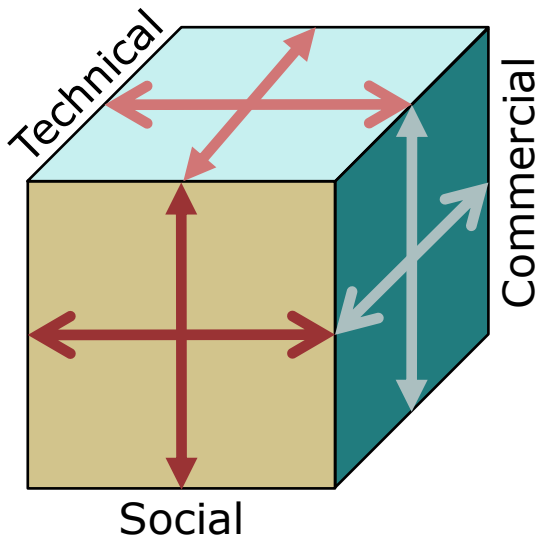
Social aspects include the tension between public and private use of data. Who owns what information about you?

Technical aspects concern design and function. Is the device universal or dedicated to a specific purpose?

Commercial aspects include open or closed networks. How free are you to access, modify or redistribute information or entertainment?

Each aspect affects the other two, of course. The following slides present examples.

Three Aspects of Digital Media



Source: BizWitz, conceptual

Commercial versus Social interests: significant regional differences and changes

Brazil has requested the most restrictions from Google.

Germany has complained the most about Google maps.

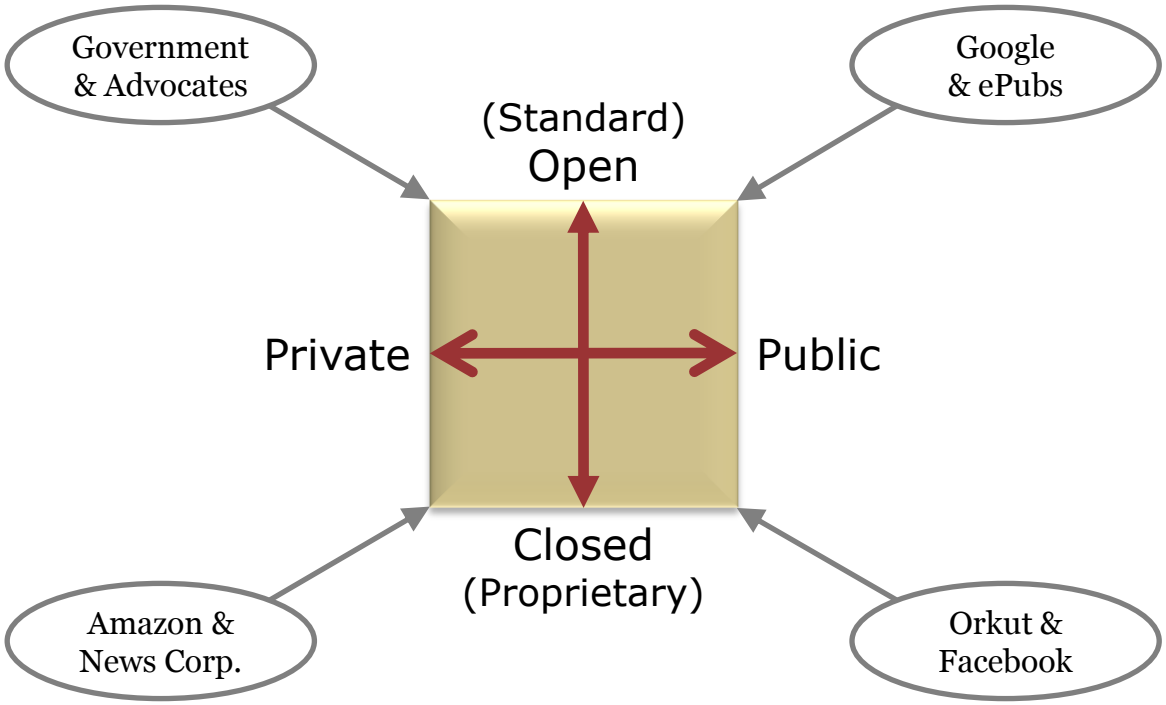
US churches worry about morality and pornography.

Consumer groups complain about html-5 gathering data on citizens… identity theft.

Amazon, Apple, News Corp and others want subscribers to stay in “walled gardens”.

Social networking sites want personal information inside their systems for commercial purposes while Google wants even larger open systems.

Front face: Commercial (y) and Social (x) Aspects



Source: BizWitz, conceptual

Digital consumption and Social participation vary from person to person.

The Social effects of Digital Media depend on how much a person participates: viewing, commenting or creating.

People at the top of this seven step ladder create content that does not come from TV or movie studios. They tend to have the most interest in open networks.

Most people just comment or consume content, however. They may be satisfied with closed, proprietary networks.

Social Technographics® Ladder

7–Creators: publish web pages; upload videos, et cetera.

6–Conversationalists: update social status weekly; Tweet.

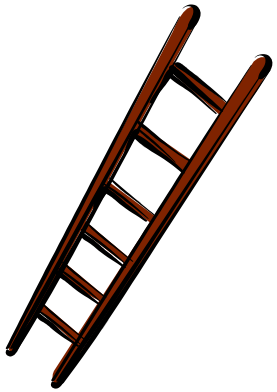
5–Critics: rate products or comment on blogs, et cetera.

4–Collectors: read RSS feeds or tag web pages.

3–Joiners: maintain a profile on Orkut or Facebook…

2–Spectators: watch or listen to postings or podcasts.

1–Actives: do some social activity on the web each month.



Source: Forrester Research

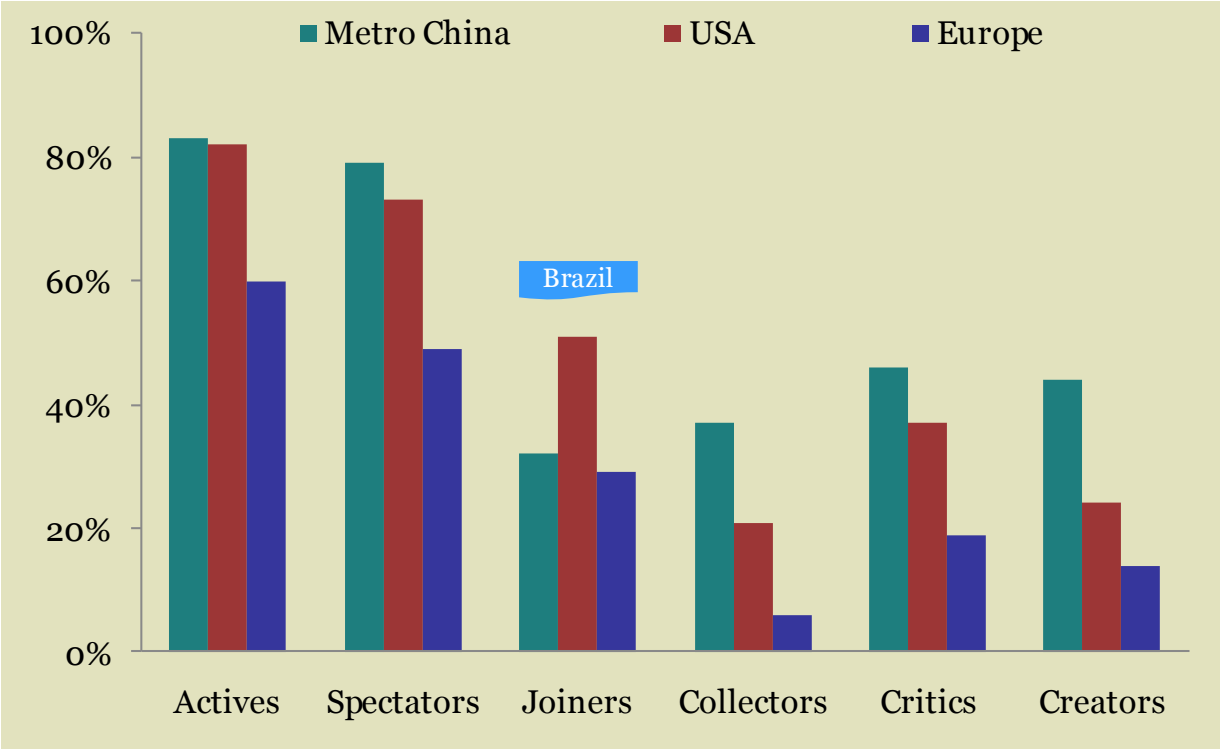
Digital consumption and Social participation vary from place to place.

Metropolitan China has the greatest share of collectors, critics and creators. The great firewall is somewhat closed but inside, people are active.

Metro Brazil has a large portion of Joiners (63%), a greater share than in China or the USA.

Europe has relatively less participation among adults. It has an older population, also. Perhaps this is why European governments protect personal data more than others do.

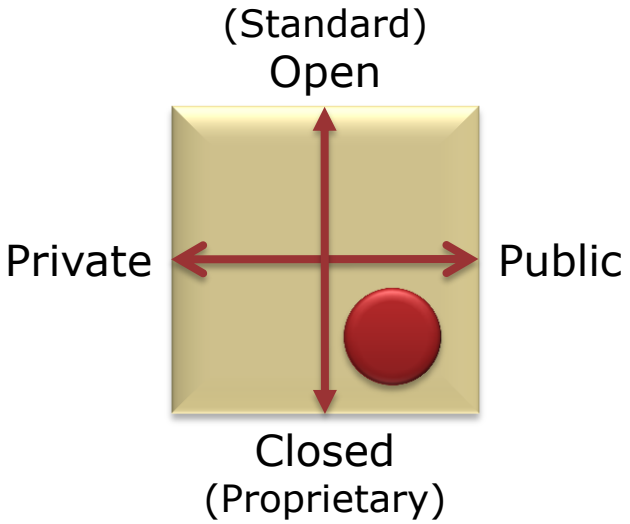
Social Technographics® Distribution by Region



Source: Forrester Research, BizWitz analysis

Public faces in proprietary networks appear most likely to dominate for a while.

- Social networks aggregate valuable information and that wants to be exploited some way. People seem willing to share their lives.
- Content owners (e.g. movie studios or TV networks) want security for their property.
- Apps are channels. Most content will be repackaged for new channels.
- Paid subscriptions and public info will stimulate self-publishing within commercial networks such as Amazon's Kindle. A Facebook reader seems obvious…



Technical versus Social interests: general-purpose devices for the young at heart.

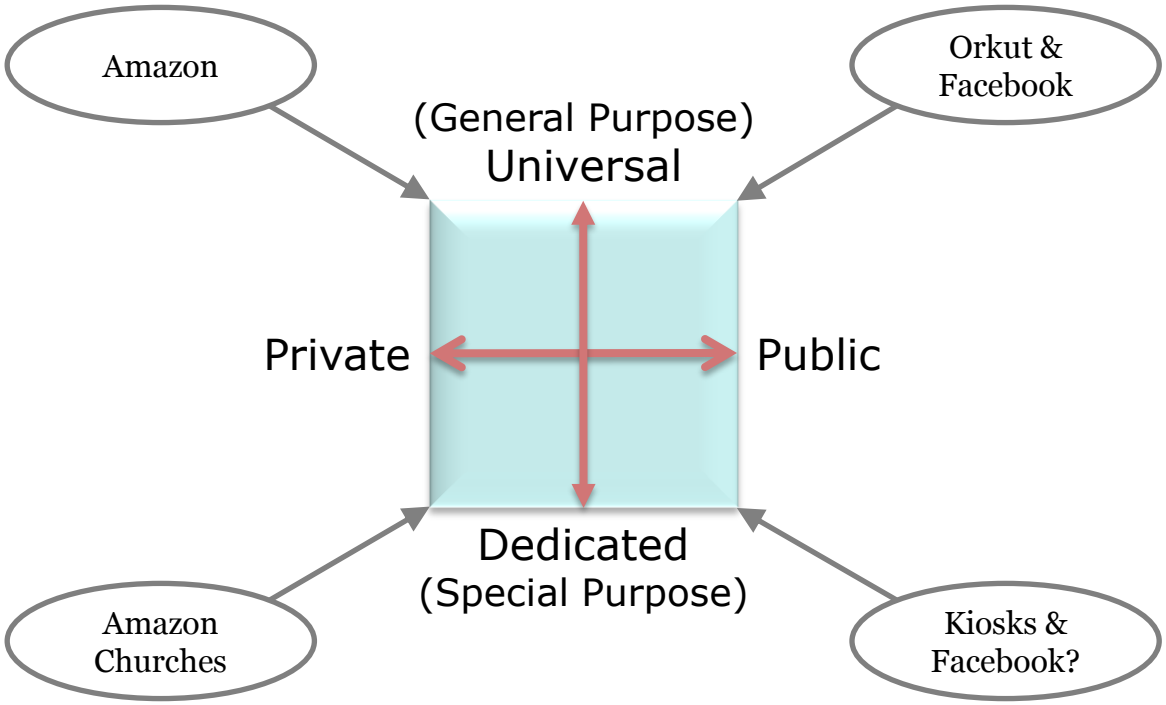
Age influences preference for general purpose devices such as smart phones or dedicated devices such as eReaders.

Older people think universal devices are confusing. They may prefer church-sponsored readers, for example.

Amazon plays both sides. It benefits from universal access to the internet and from its private network eReader.

Social networks benefit from scale and therefore from universal device but Facebook could offer its own tablet…

Top face: Technical (y) and Social (x) Aspects



Source: BizWitz, conceptual

General-purpose, multi-functional devices are most popular, even in aging populations.

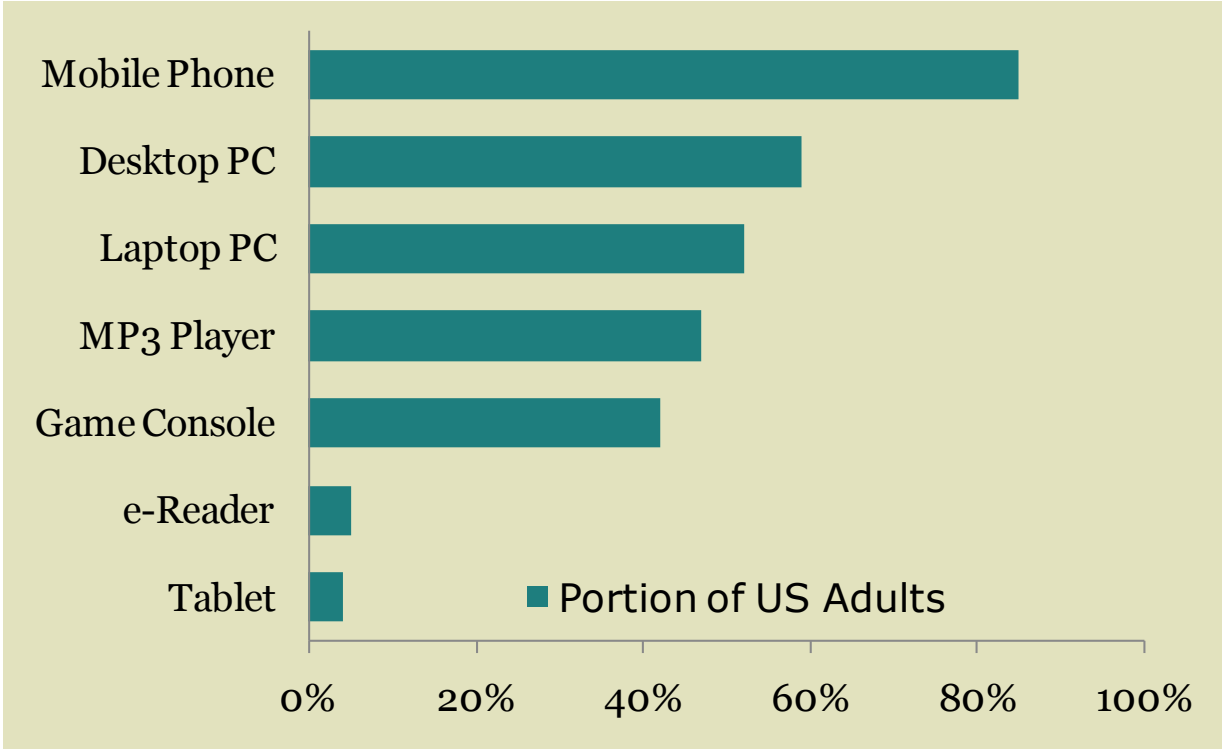
Recent surveys reveal that the portion of adults in the USA who think TV is “essential” decreased from 64% in 2006 to 42% in 2010.

Only 29% of adults less than 30 years old consider TV as essential while 59% consider hand phones essential.

Ownership of other dedicated devices such as e-Readers is also low and most owners earn more than $75,000.

Given the importance of universal devices like smart phones to youngsters, this type of device will dominate.

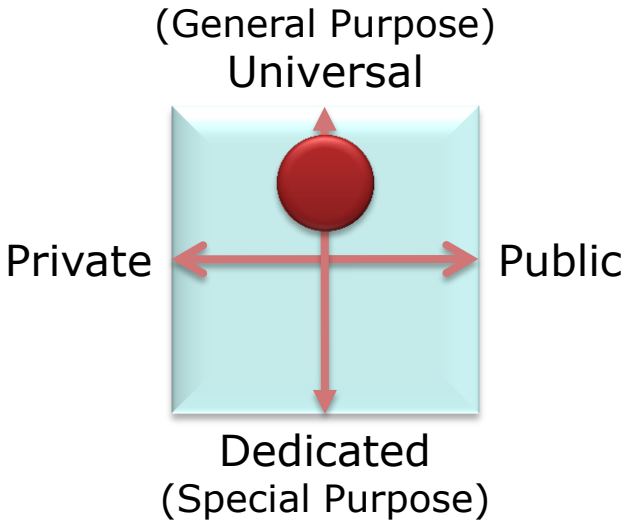
Portion of Adults in the USA Owning Devices



Source: Pew Research Center, Aug ‘10

Universal devices may dominate Dedicated ones but Public/Private may be balanced.

- Demographics favor the young. Old people may remain the largest group in Western Europe or Japan but the young will drive demand even there.
- Potential for e-Textbook business models strengthens private (college or publisher) networks.
- Continued interest in social networks may offset the power of private use.
- Overall, then, it looks like the trend is toward universal devices but this seems neutral relative to Public or Private network use.



Commercial versus Technical interests: internal and external conflicts.

On-line retailers such as Amazon support anything that creates sales.

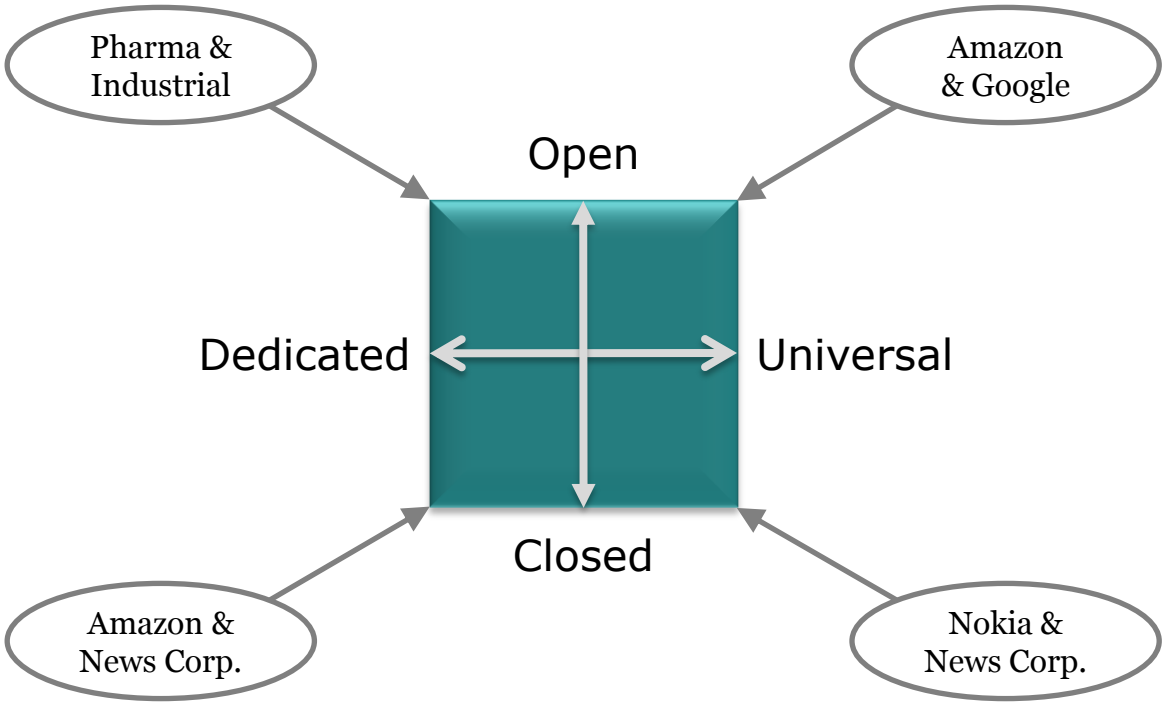
More focused media firms support both dedicated and universal devices.

Drug firms and industrials may support open access on dedicated devices.

It appears that some firms are playing both sides in order to reduce long-term risk.

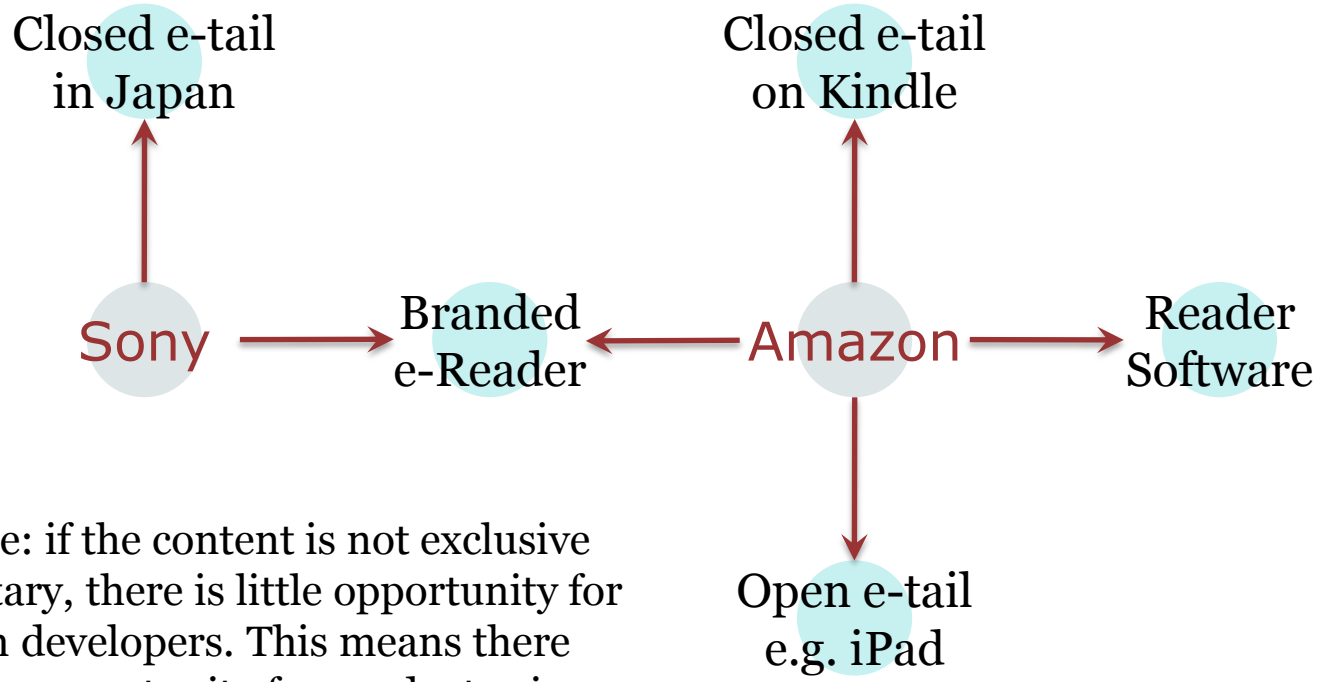
Competitive positions will depend more on business models than on products in the next few years.

Side face: Commercial (y) and Technical (x) Aspects



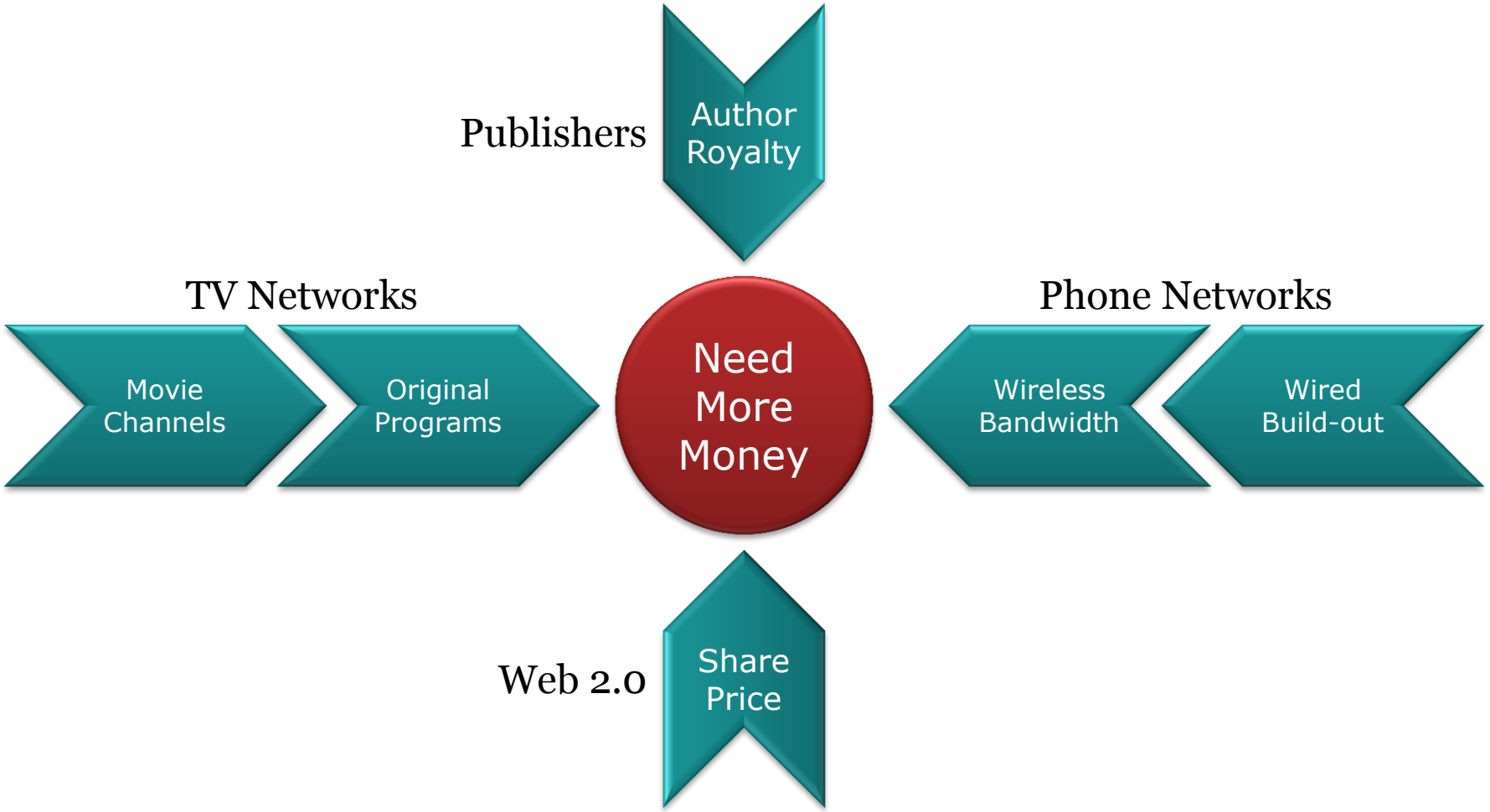
Source: BizWitz, conceptual

Winners and Losers: Sony retreated to Japan while Amazon entered at several points.



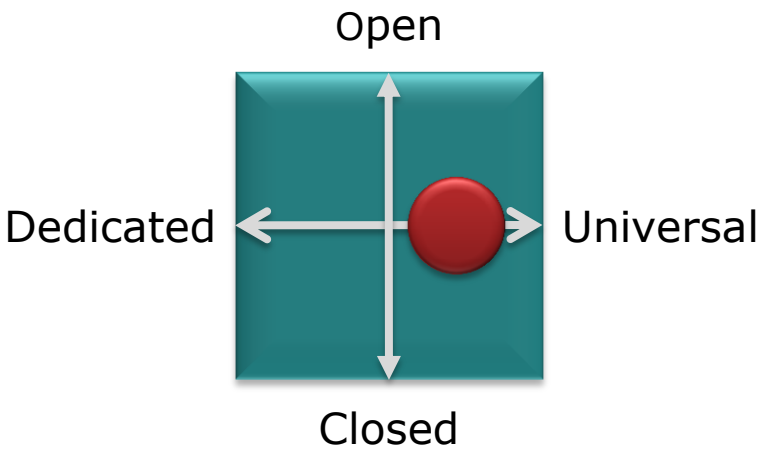
Bottom line: if the content is not exclusive or proprietary, there is little opportunity for application developers. This means there will be little opportunity for product price premiums, either.

Winners and Losers: all contestants need more money and consumers want to spend less.



Universal devices may dominate while Open and Closed networks have equal strength.

- Closed networks such as broadcast or other content owners may have more power than open ones near term.
- Longer term, they may loose power if new media/content sources arise.
- Until then, younger populations will pull business to universal, multi-purpose devices.
- For example, smart phones can access open and closed networks, depending on user subscriptions.



Social aspects give closed networks some power but otherwise, open networks seem viable.

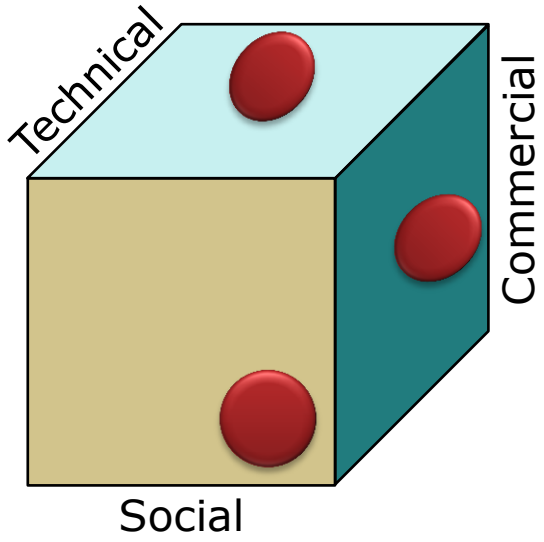
Looking at all three aspects, the Social one seems to have the most bearing. Much will depend on how societies resolve the tension between public and private interests.

We see more potential for universal, general-purpose devices than for dedicated, special-purpose devices.

Other trade-offs depend on national policy, demography.

Power may swing back toward closed, propriety systems in the next few years. It is easier to develop new business models that way (e.g. Apple).

Likely Positions on Three Aspects of Digital Media



Source: BizWitz, indicative

Looking forward: digital media influences on displays in context of the 2000 viewpoint.

- "Pixels are free."
  - We may soon see quad-density HD TV sets. TV will become a big, 3D monitor.
  - Young people will see HD TV on their wrist or in the palm of their hand.
- "Power to the picture."
  - New battery and solar cell technology will enable extended viewing everywhere.
  - Brightness and color range may exceed our comfort levels.
- "Policy drives price."
  - Broadband connectivity will become a commodity.
  - The cost of hardware may need support from software or subscription services.
- "Price limits potential."
  - Flexible displays may not become cost competitive in the foreseeable future.
  - Nanotechnology may change the world, but when?

Looking forward: cloud computing may change the nature of device intelligence.

Function	Past	Present	Future
Computation	One Big Brain	Bunch of Brains	Billion Brains
Application	Database	Data mining	AI (artificial intel.)
Connection	Thick wire	Thin wire	No wire
Operation	Dumb terminals	PC (thick clients)	Thin clients
Revolution	Standalone PC	Peer networks	Implants

- The processing power of early computers is now in our hands.
- Cloud processors will increase this power by thousands or millions.
  - Increasing wireless bandwidth makes local processing power less important.
  - Effective AI is within reach, which could bring us new ways of working/playing.
- Device computation power will increase but consume less power. This will enable more bionic interfaces in the device and smarter interaction with the cloud based on motions and emotions.

Some bold predictions about displays from three aspects of digital media.

Social

- Privacy and security will be more difficult to defend.
  - People may seek safety in private networks but they may want the benefits of sharing their views/news.
  - Expect social tension and large-scale cyber attacks.
- Integration of bio-sensors (e.g. retinal scanners) with displays may be necessary.
- Children will develop short attention-spans and their thoughts may be limited by group (tribal) affiliation.

Technical

- Smart surfaces will be a key area of innovation.
  - Facial expression and other imaging methods will join touch/haptics.
  - Some of these features will combine with displays.
- Research will remain ten years ahead of development and twenty years ahead of mass production.
- Inorganic materials may win over some organic ones.
- Flexible, organic displays will develop slower than you expect but change markets more than you imagine.

Commercial

- LCD prices will keep falling 20% a year and keep raising market entry barriers for alternative technologies.
- Brands will try to tie their products together with hardware and software but consumers will recognize the value in interoperability.
- New brands will create ways of finding content and re-directing it to any device.
- e-Textbooks may stimulate more professors to create their own materials.
- e-Readers will fade away as PDA did last decade.

Thank you for listening…

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