

Practice Lecture Series: Consumer Electronics Network Management

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Introduction to Consumer Electronics (CE) Supply Chain Structure

Agenda

- CE Products and Supply Chain Structure
- Product and Industry Characteristics
- Industry Drivers and Issues
- Future Trends in Products and in Industry

CE Products and Supply Chain Structure

End Product Offerings - Diverse Product Range

Digital Still Cameras

PV-SD5000



Plasma TV



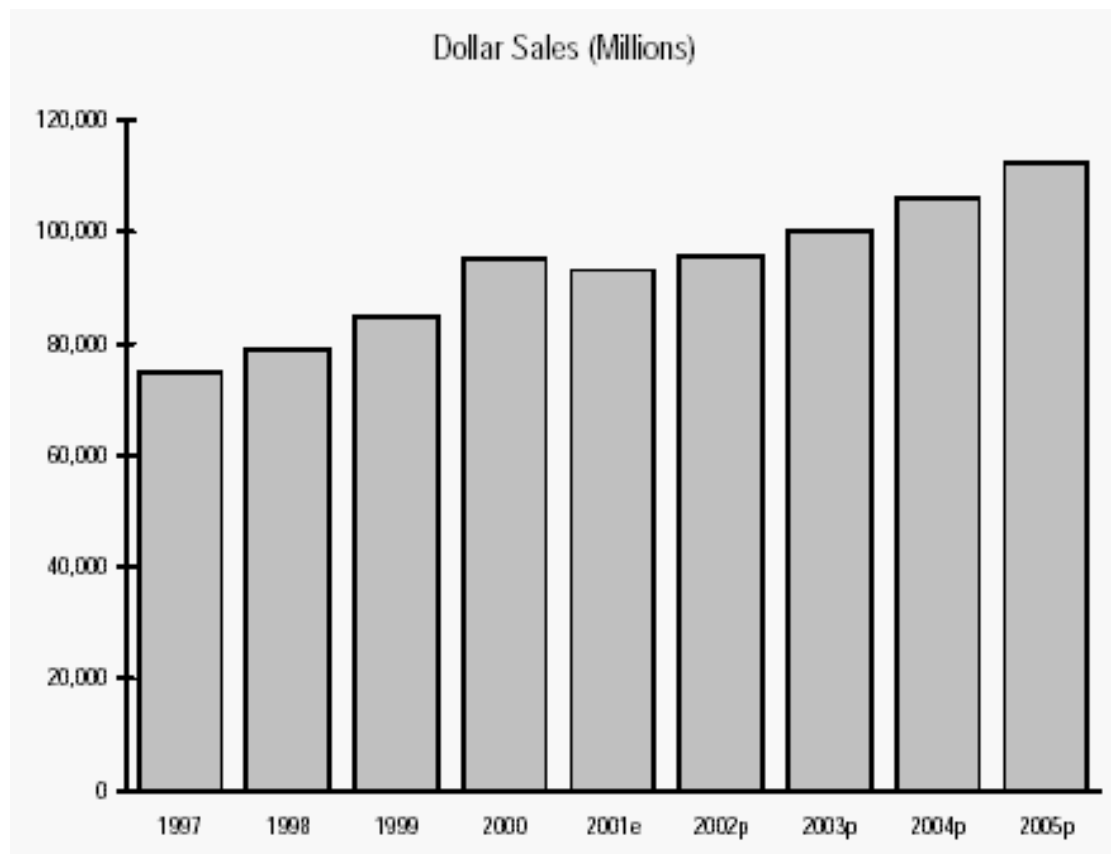
Electric Shavers



VCR'S



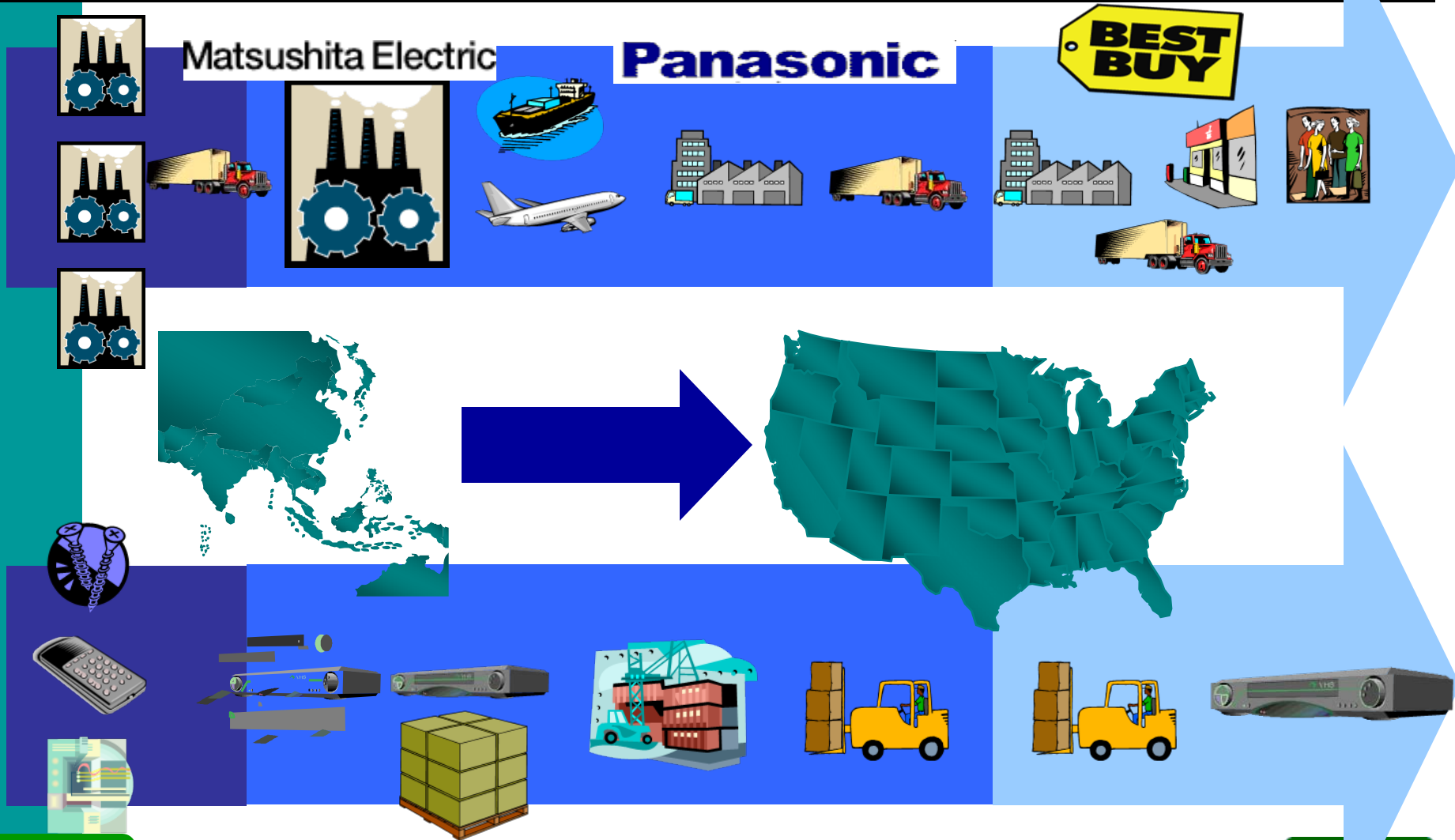
Consumer Electronics US Market Sales



US Consumers bought 95 billion dollars of CE product in 2002

What company do the CE slides focus on?

Supply Chain for End Product

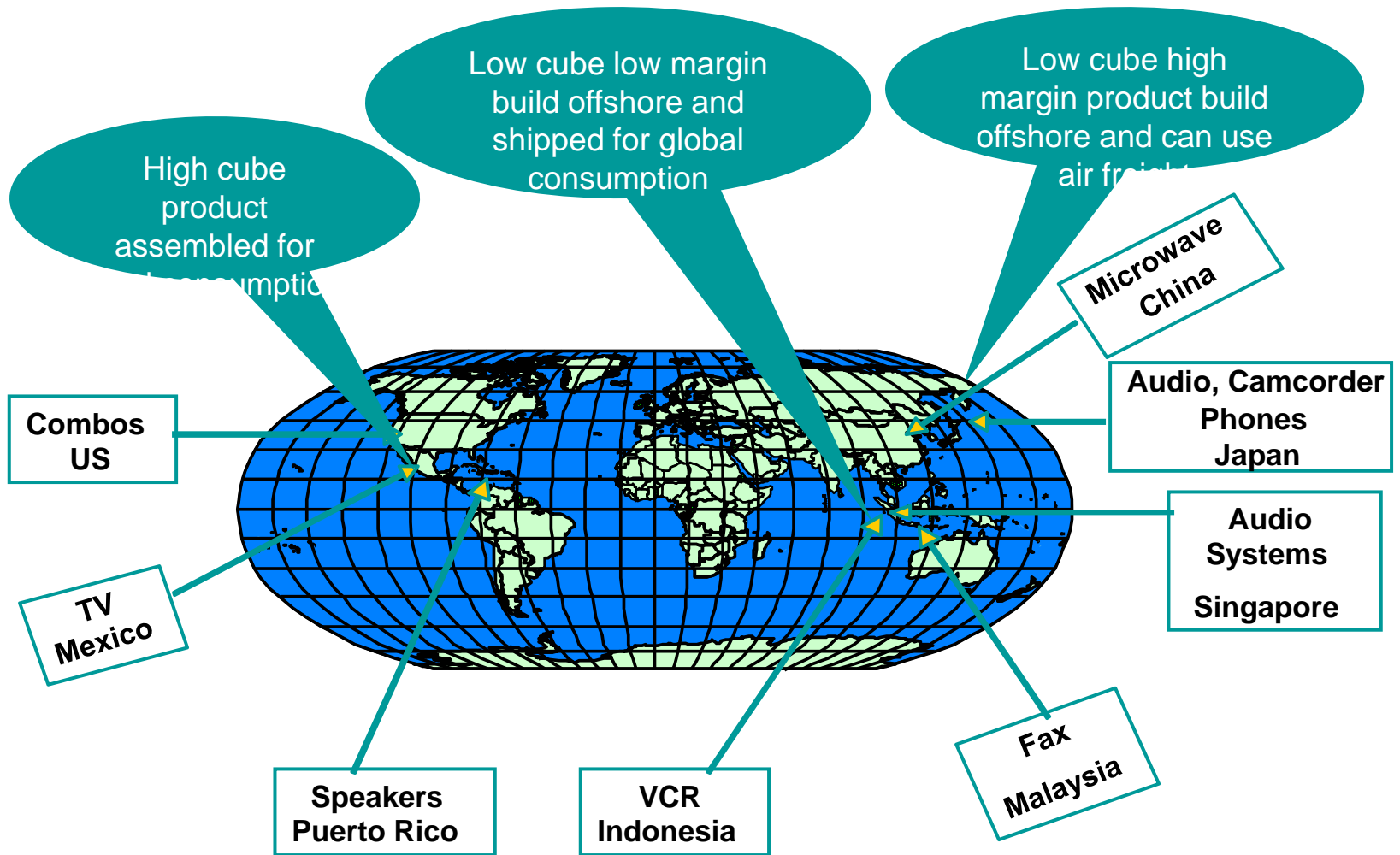


Supply Chain Structure for CE

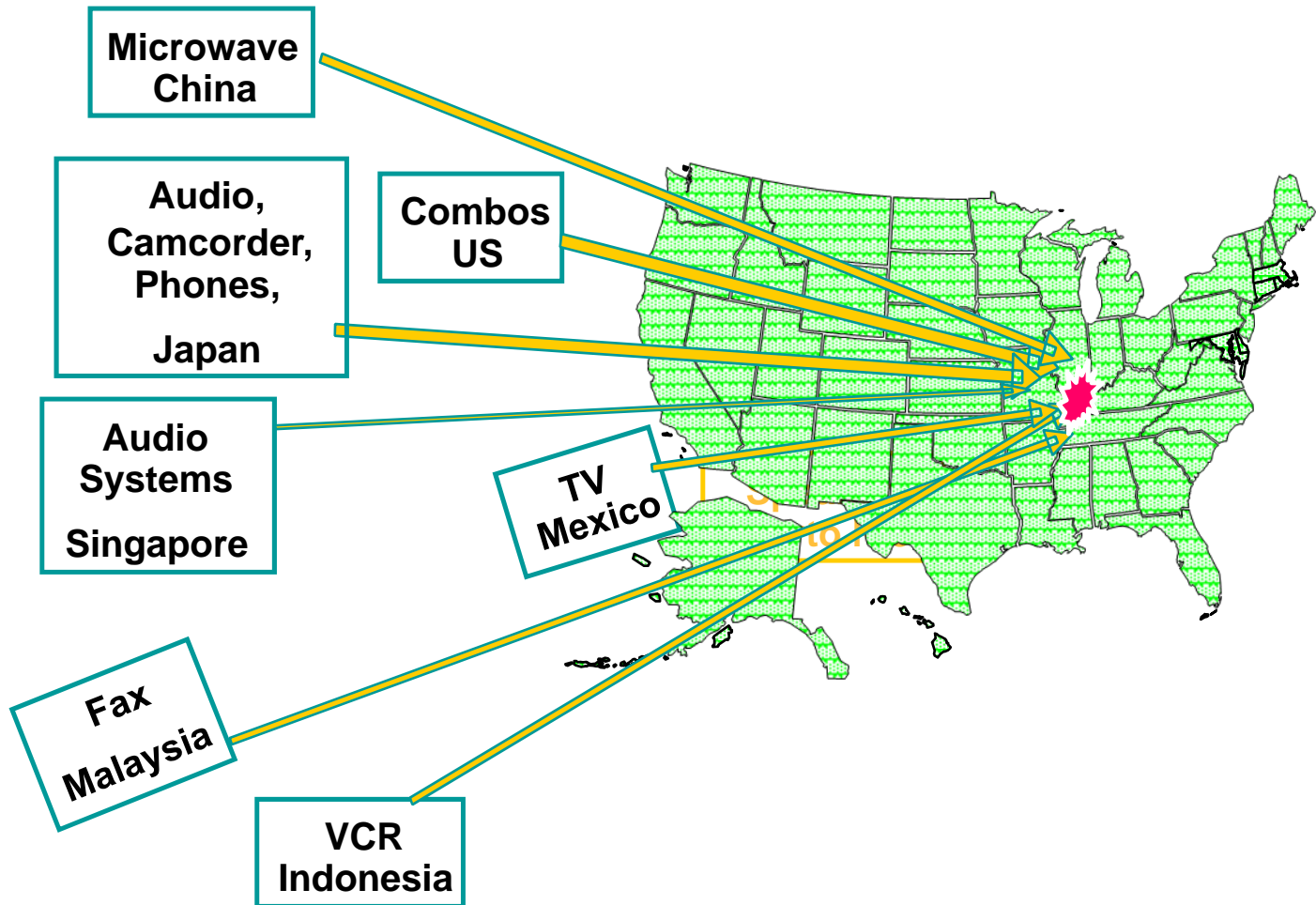
■ Defined by

- Important factors for Product manufacturing/sale
 - Lead time
 - Cube
 - Life cycle
 - Margin
 - Volume
- Geography
 - Sales Market
 - Manufacturing locations
 - Transportation / Logistics

OEM Manufacturing Divisions are Typically by Product and Global



OEM Sales Companies are Localized by Geography and Focus on Local Markets



Product and Industry Characteristics

CE Product Characteristics

Digital Still Cameras



4-month life cycle

Plasma TV



Hi Tech
Low turn
High Margin

Electric Shavers



50 % sales done in December

VCR'S



Commodity
Low Tech
High Turn
Low Margin

Industry Characteristics

- Primarily built to (stock/order?), (push/pull process?)
- (Long/short?) supply chain lead times
- Customer service is a (big/small?) issue
- Typical CE OEM's in manufacturing are aligned along (product/geographic?) divisions and sales companies are aligned along (geographic/product?) divisions

Industry Characteristics

- Primarily built to stock, i.e., push processes
- Long supply chain lead times (e.g. 4 months)
- Customer service is a big issue
- Global manufacturing and market base
- Typical CE OEM's in manufacturing are aligned along product divisions and sales companies are aligned along geographies
- The supply chain requires coordination between Design, Manufacturing, Distribution and Transportation

Industry Characteristics

4 month lead time

Coordination

Built to stock

Delays,
Out of stock
Overstocked

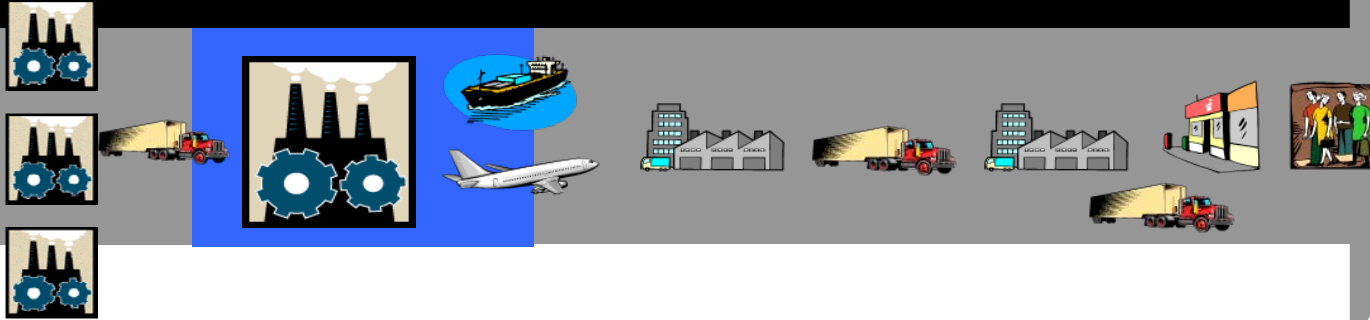
Industry Drivers and Issues

Industry Drivers for Suppliers



- Semiconductor (15%):
 - Strategic, capacity shared with other segments
 - Long lead-times, constrained material
- Electric and Electronic parts (35%)
 - **Core technologies**, such as laser pickups, ni-cad batteries, printing engines, light sensors, motors, etc.
 - Designed into the product
- Processed parts (25%)
 - Non-strategic, such as bodies, gears, fasteners, wiring
 - Either custom or standard
- Contract manufactured products (15%)
- Indirect and other (10%)

OEM Challenges



■ Asian OEMs

- **Lengthy supply chain** creates need for collaboration between centralized product divisions and regional distribution divisions
- Lack of transparency between product and distribution divisions worsens bull-whip effect

■ North American and European OEMs

- Shorter supply chains with more local assembly reduces internal collaboration requirements, but increases need for supply collaboration

■ General

- Slowing growth and **commoditization of core product categories** (home audio / video, home appliance) squeezing margins
- High competition in growth categories (personal electronics)
- **High degree of custom parts content and engineering centric culture** designs in extra cost and inflexibility to supply chain

Sales Company Challenges



- Own the channel relationship, compete on differentiated customer service, and content delivery
- **Panasonic is responsible** for customer service and inventory, **but depend on** product divisions for replenishment
- Dependencies and lack of transparency to true supply/demand situation leads to order/inventory manipulation that amplifies the bull-whip effect
- Vulnerable to **product obsolescence and clearance costs**, especially in short product lifecycle categories (personal electronics)
- **Transportation cost minimization** a major issue for bulkier categories (TV, appliance)

Industry Challenges



■ North America

- Rise of category killers (Best Buy) **consolidated purchasing and pressuring OEM margins**
- Growth of internet retail (Amazon, Buy.com, ApplianceOrder.com) offering electronics and durables pushed traditional retailers on the web

■ Europe and Asia

- More fragmented
- **Smaller stores with little in-store inventory** puts premium on efficient fulfillment and visibility to product availability commitments
- OEMs showroom and company stores act as independent channels

■ General

- Looking to improve collaboration with key suppliers

Industry Drivers - Consumer Behavior



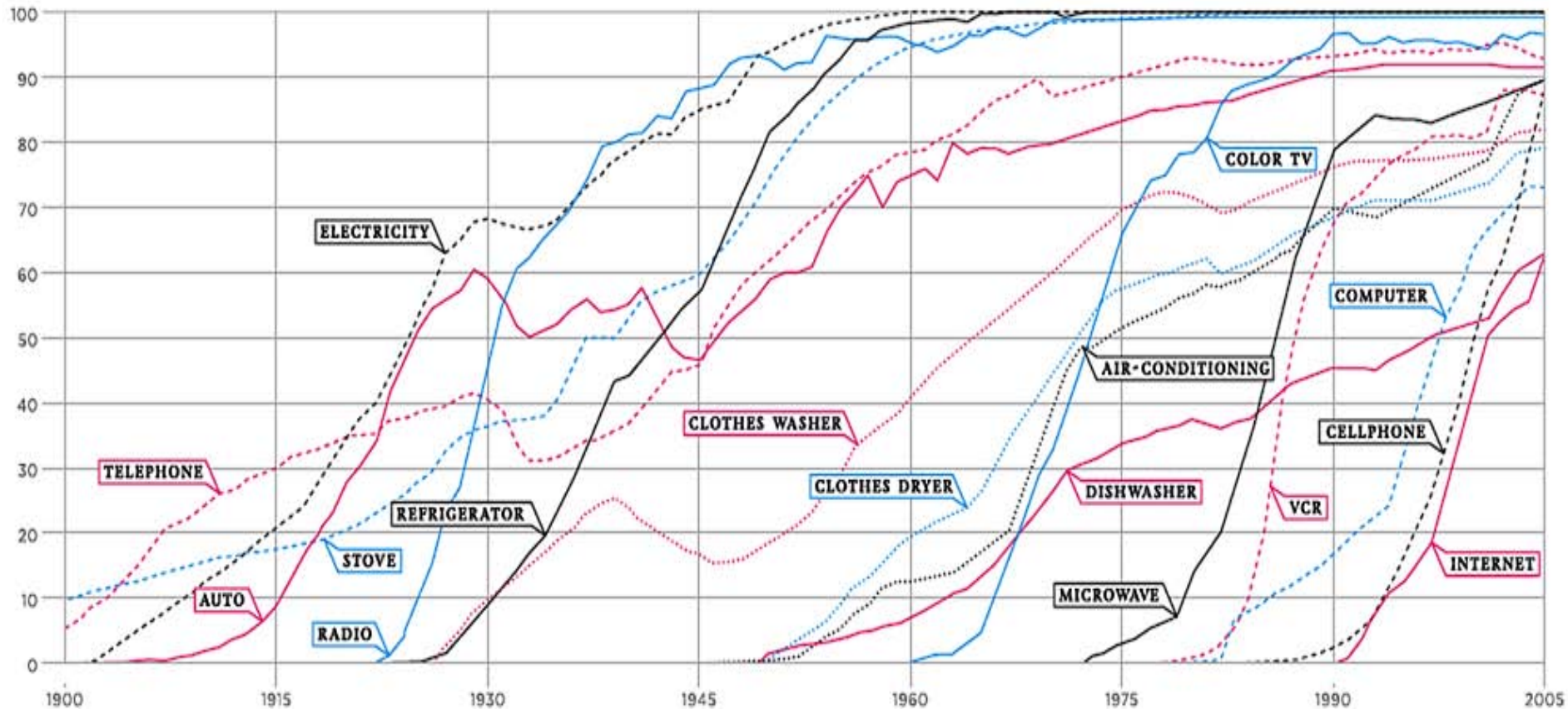
- Men in general are more interested in CE products than women
- Overall type of CE products owned by men and women do not differ
- Both are equally likely to initiate a purchase
- Men tend to contact manufacturers for product help while women look for help at home
- Both are showing a trend of decreasing interest – commodity

Future Product and Industry Trends

Starting from the Past

PERCENT OF
J.S. HOUSEHOLDS

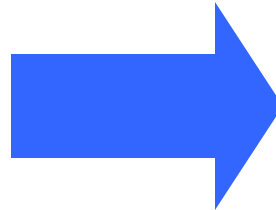
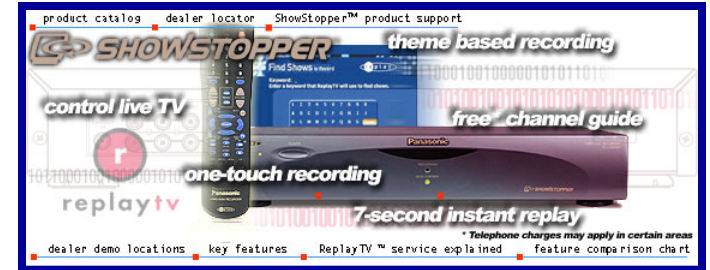
CONSUMPTION SPREADS FASTER TODAY



Source: NYT Feb 10, 2008 article "You Are What You Spend"

by W. Michael Cox and Richard Alm both with Federal Reserve Bank of Dallas

The Shift From Analog to Digital



New Digital Products

Digital Imaging



Emerging Digital Technology

Prepare Yourself for a Revolution

Audio/Video

Mobile

Home Appliances

Telecommunications

Personal Computers

64MB

CE Product Trends

Five Fastest Growing Product Categories in 2001

(year-over-year growth in units)

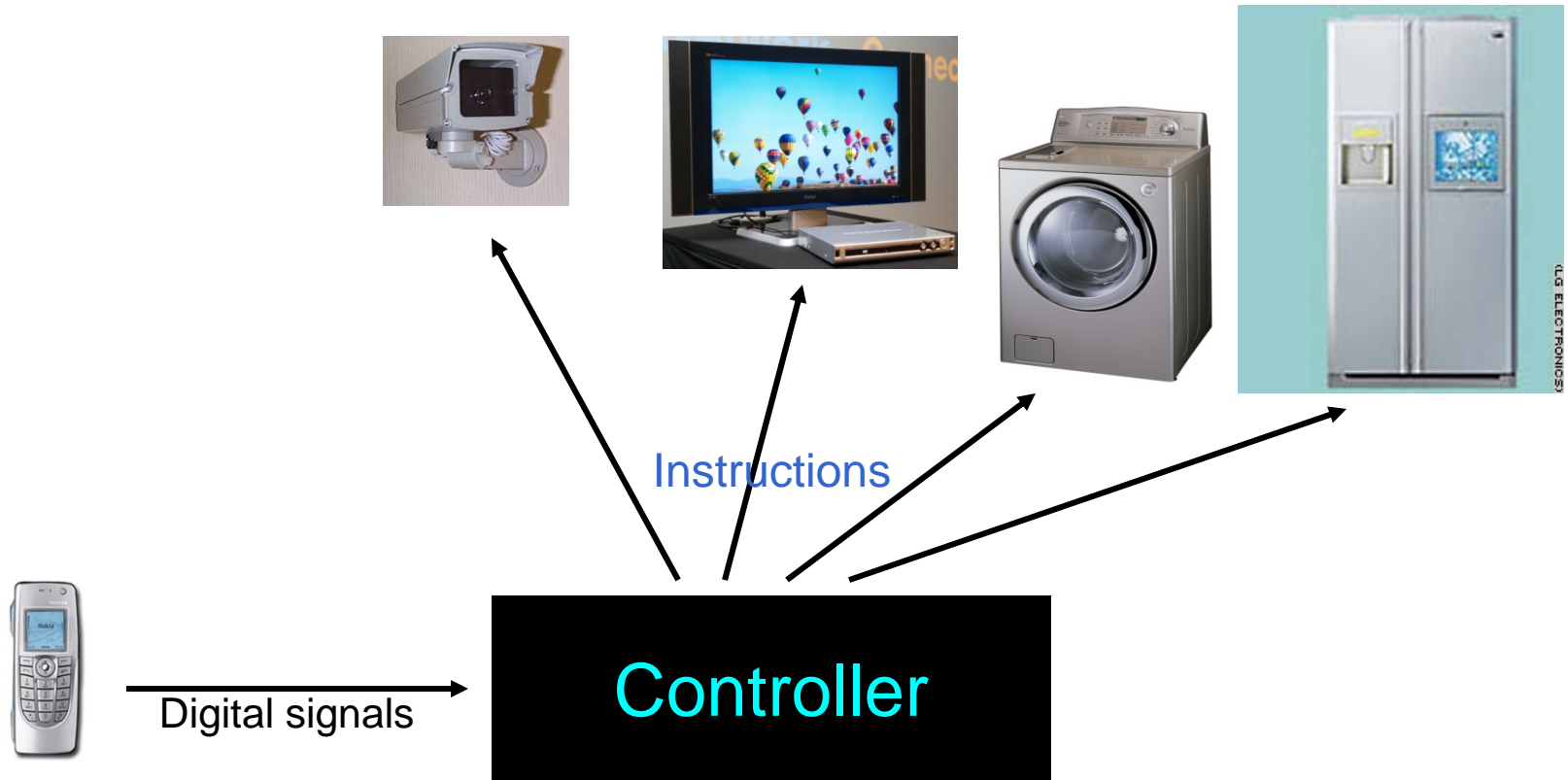
 DTV	125.1%
 Home-Theater-In-a-Box	99.2%
 Headset Radio/CD Players	91.1%
 DVD Players	49.5%
 Digital Cameras	44.5%

Source: CEA Market Research, 1/02

CE Products not only at home but also in your car

- **New market: Car Audio Systems**
 - **Panasonic** approached **Honda** to provide audio systems for Honda Acura in 2003. This system is called DVD-A playback capability.
 - **Bang & Olufsen** developed sound system for **Audi S8** 2007 model - available at the retailers in Nov 2006.
 - **BMW's** patented "centerbase" concept, to deliver bass (low frequency sound) to both the front- and rear-seat occupants by installing a woofer (typically for 40-1000 Hz sounds) in a special sill under each front seat. There is no subwoofer because BMW can deliver low frequency sounds (20-200 Hz) with a "centerbased" woofer.
- **Would you care about the audio system in your car?**

Speculation: Remote Control of Home Appliances with Phones

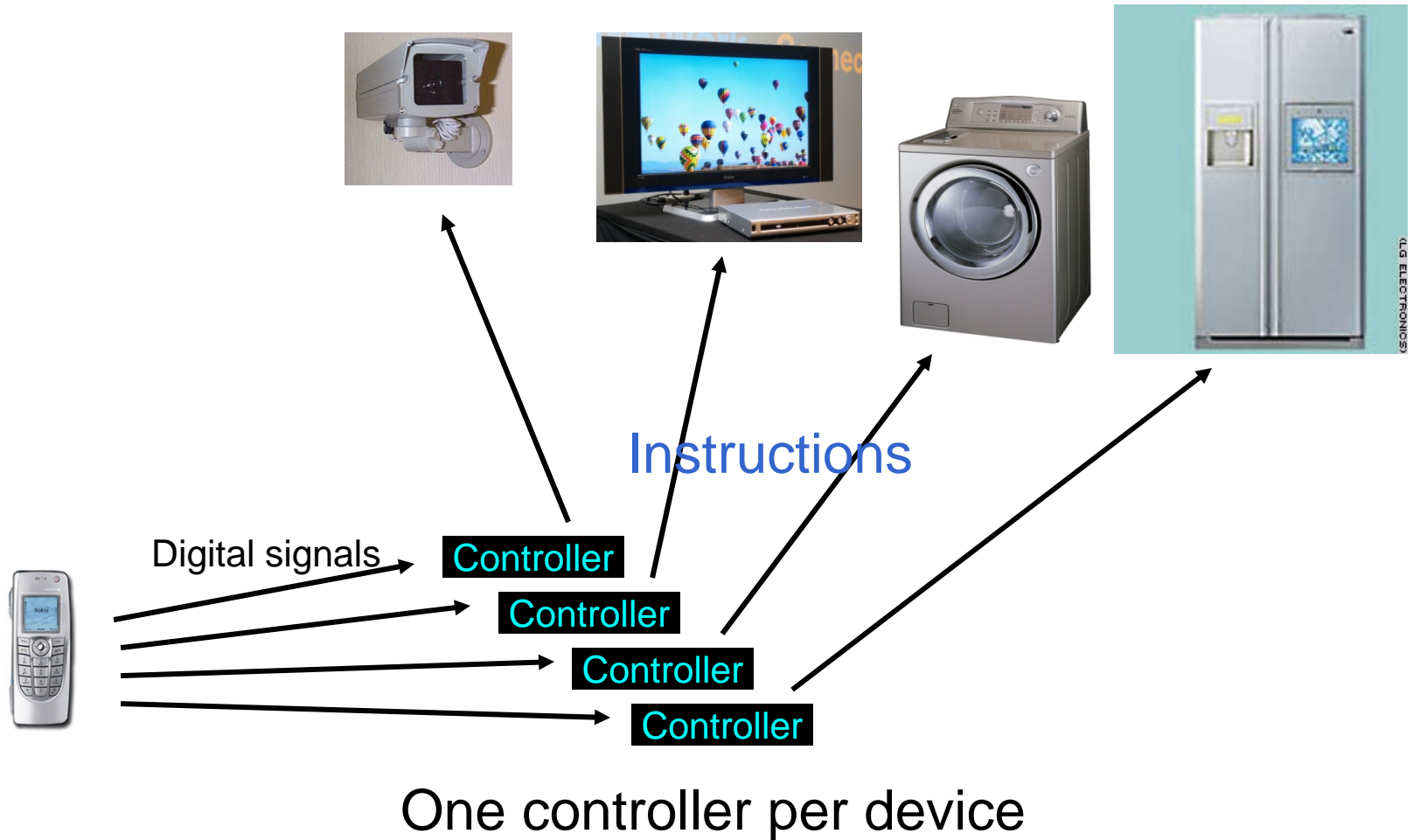


One controller per home

Speculation: Remote Control of Home Appliances with Phones

- Use a phone to control home appliances
 - Convenience
 - Wash clothes remotely
 - Record sport games remotely
 - Cook dishes remotely
 - Security
 - Monitor the home remotely
 - Monitor the babysitter remotely
 - Adjust and control
 - Adjust and control the sprinkling system while on vacation
 - Monitor and add water with a remotely controlled pump to the swimming pool while on vacation

Speculation: Remote Control of Home Appliances with Phones



Remote Control of Home Appliances with Phones

Comparison of Two Alternatives

- Suppose that the industry has the one controller per device model
 - Implication for suppliers
 - Implication for OEMs
 - Coordination of different controller manufacturing
 - Can we produce fridge controller without paying attention to camera controller?
 - Amount of integration in the controller production
 - Quality concerns
- Suppose that the industry has the one controller per home model
 - Implication for suppliers
 - Implication for OEMs
 - Coordination of different controller manufacturing
 - Can we produce fridge controller without paying attention to camera controller?
 - Amount of integration in the controller production
 - Quality concerns, who is responsible for the defects?
- Who manufactures the controller?

Environmental Trends

■ Reduced Energy Consumption

- Energy Star program: To identify and promote energy-efficient products.
 - E.g., on average, Energy Star qualifying imaging equipment is expected to be 30 percent more efficient than conventional models.
- Energy Star focus
 - Existing focus on stand-by mode
 - New focus operating mode
- How to save power?
 - Variable speed motors for fridges
 - Power management circuits

■ Hazardous Materials

- Restriction of Hazardous Substances (RoHS) is another legislation started in July 1, 2006. It limits the amount of several elements that can be used in products. Some examples of hazardous elements are lead, mercury, cadmium.
 - RoHS principles and reach are global and indicate that any product or component covered by RoHS entering the EU must be in compliance, which includes cables made in China, parts molded in the U.S. and flame retardants made in Japan.
- The Waste Electrical and Electronic Equipment (WEEE) is a EU directive on recycling regulations became effective in Aug 2005.

■ Retrieval of used products

- What do I do with my old washing machine?

CE Industry Trends

- Continuous Downward Price/Margin Pressure
 - Increased Pressure on Inventory Levels
- Increased Competition
- Retail Consolidation
 - Strong Regional and National Retailers
- Shorter Product Lifecycles

- Business is Rapidly moving to Digital & Networking Products

Summary

- CE Products and Supply Chain Structure
- Product and Industry Characteristics
- Industry Issues
- Future Trends in Products and in Industry

OEM's are the Major Players in CE

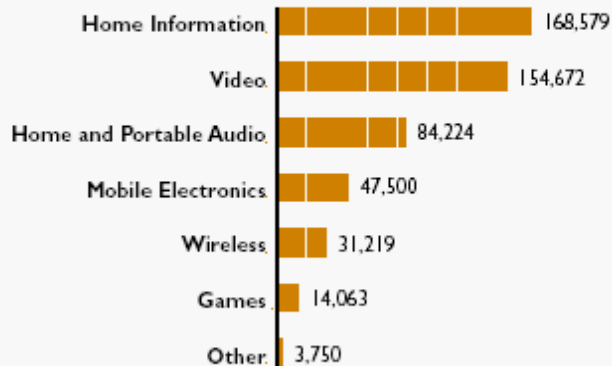


Industry Drivers – Consumer Behavior

CE Consumer Statistics by Product Category

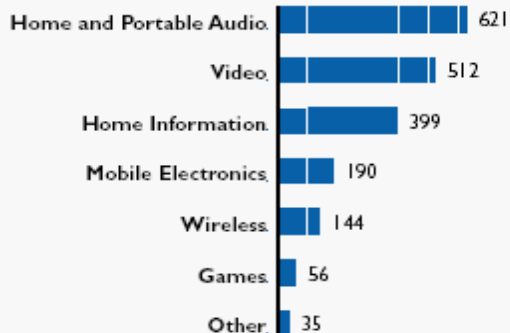
Consumers Invest in CE Products

Total Consumer Investment by Category
(in millions of dollars)



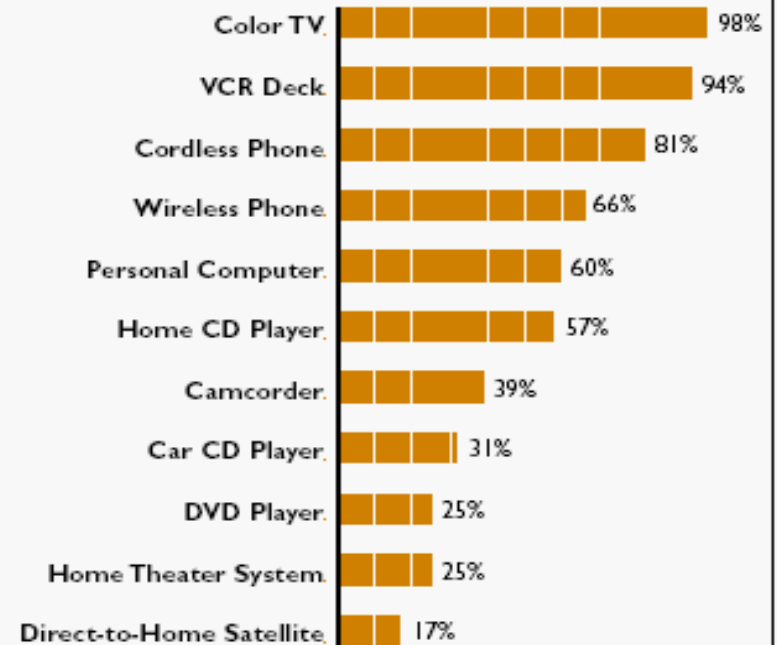
Americans Own More Than 1.9 Billion CE Products

Total Units Owned for Selected Categories
(in millions)



Source: CEA Market Research, 1/02

U.S. Household Penetration of CE Products



Source: CEA Market Research, 1/02

Supply Chain Structure Trends in CE Industries

- Elimination of layers – reduce DC-DC flow
 - Direct Ship (Factory to retailer)
 - VMI (Manufacturer manages shelf inventory)
 - Air Freight (Typically direct ship)
 - Internet sales
- Increased information sharing across the supply chain
 - Multi-enterprise planning
 - Sharing of information on new products , Sales & Mktg., etc. across the supply chain
- Outsourcing
 - Assembly to third parties
 - Kitting to Retailers
 - Kitting is the process of preparing an order for shipment.

Summary: Dynamics in the CE Industry

Technological Developments

- **Shortened product lifecycles**
Digital Camcorders have lifecycles of less than four months
- **Convergence of industries**
Convergence of TV and PC
- **New business models**
Driven by non-consumer electronics companies e.g., Down stream revenue sharing

Competitive Pressures

- Widely different **dealer needs and expectations**, e.g., varying SCM requirements
- **Broad channel strategies and distribution models**, e.g., internet selling, electronics super stores, warehouse clubs
- **Increasing price pressures** due to:
 - global production
 - accelerated price erosion
- Traditional analog categories becoming a commodity – **loss of customer brand loyalty**
 - Informed customers investigate the components rather than blindly buying a certain brand

CE Industry Issues



- High degree of parts customization
- Long R&D design process times
- Long lead time to create additional capacity for custom parts
- Poor customer service / supply flexibility
- Low re-use of parts
- Short component life cycles leading to service issues
- High supply risk due to reliance on custom parts
- Short product lifecycles
- High demand unpredictability, inflexible manufacturing
- Unresponsiveness to demand signals due to manual monthly planning
- Fragmented procurement across factories
- Inventory boom-bust cycle (bull-whip effect)
- Low customer service levels
- Geographically fragmented supply chain
- Margin erosion
- High spares inventory, inconsistent availability
- Stock outs
- Reducing margins
- High logistics costs
- High inventory, store level stockouts
- High promotions costs