How To Nurture Technology Innovation

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Overview

- Are there rules to guide technology innovation?
- Discovering innovative opportunities: Cisco, Google examples
- A Personal Journey: Comverse, SMARTS, Intercast
- Conclusions

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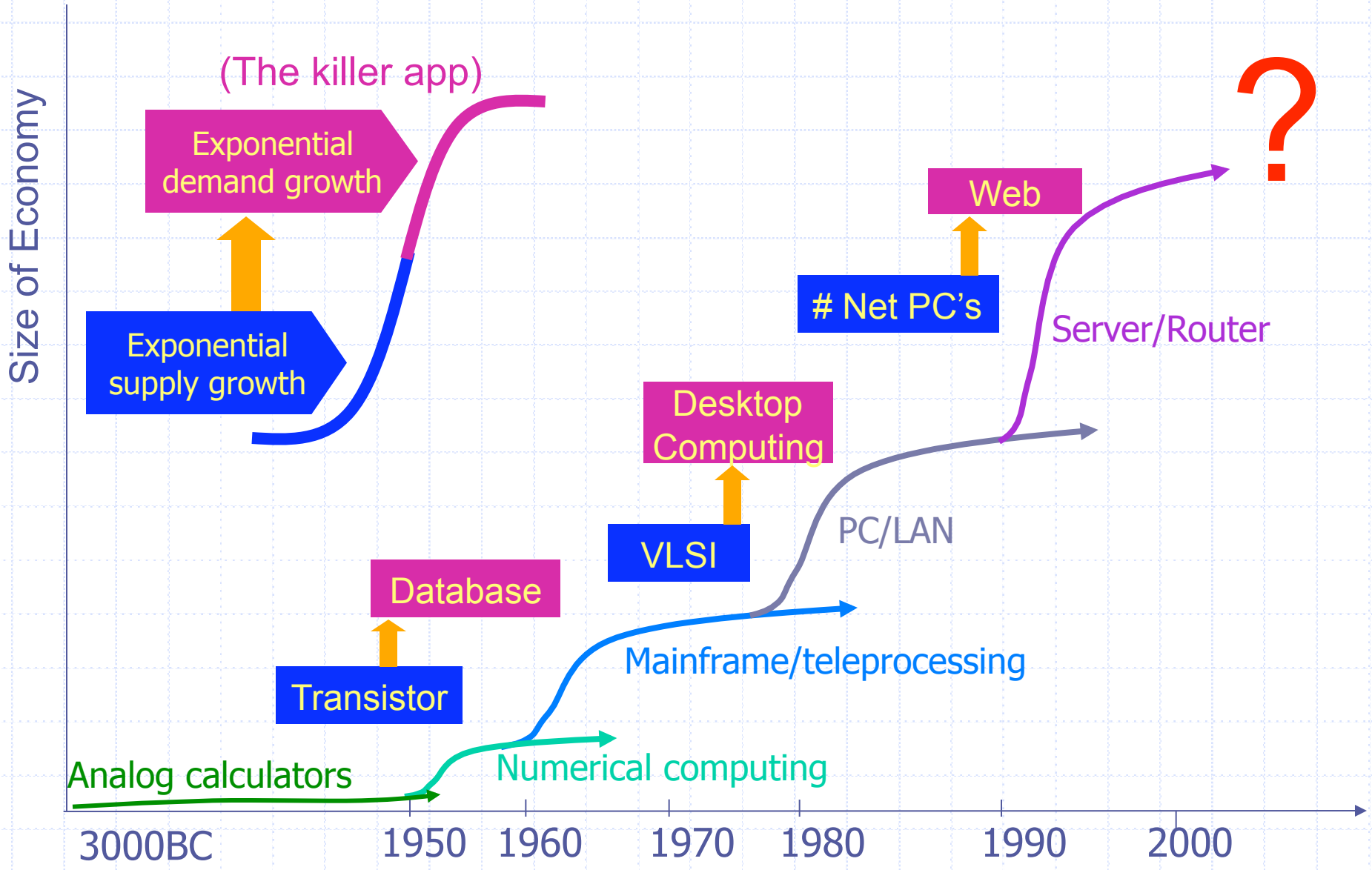
Kuhn's Theory of Scientific Innovation

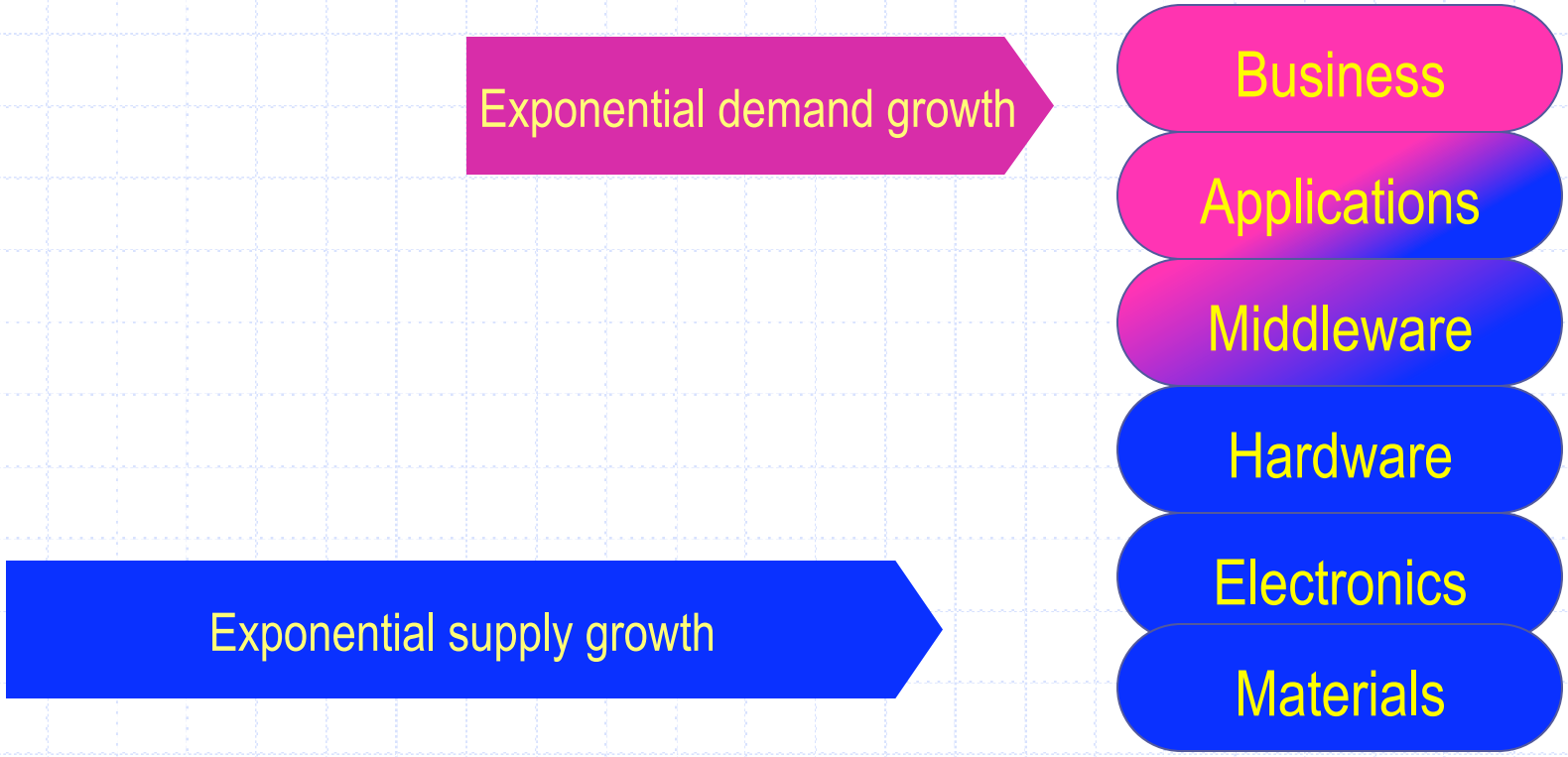
- A paradigm ~ problem-solving framework
- Science advances through alternating periods
  - Incremental evolution (normal science)
  - Revolutionary/disruptive paradigm changes
- Paradigm changes result from innovative discoveries
- Revolutionary clash between innovators and gatekeepers

A Brief History of Paradigms



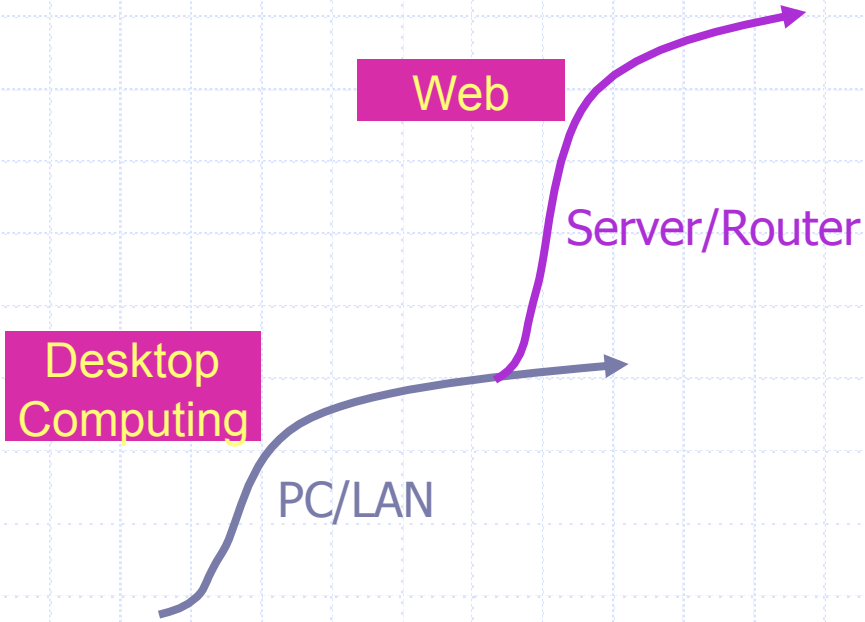
Why Do Technology Paradigms Change?

- Inventions empower re-scaling of infrastructures supply
- Inventions of killer apps stimulate re-scaling of demand
- New economic/business scales empower new eco-systems
- Innovators win (and often become tomorrows gatekeepers)

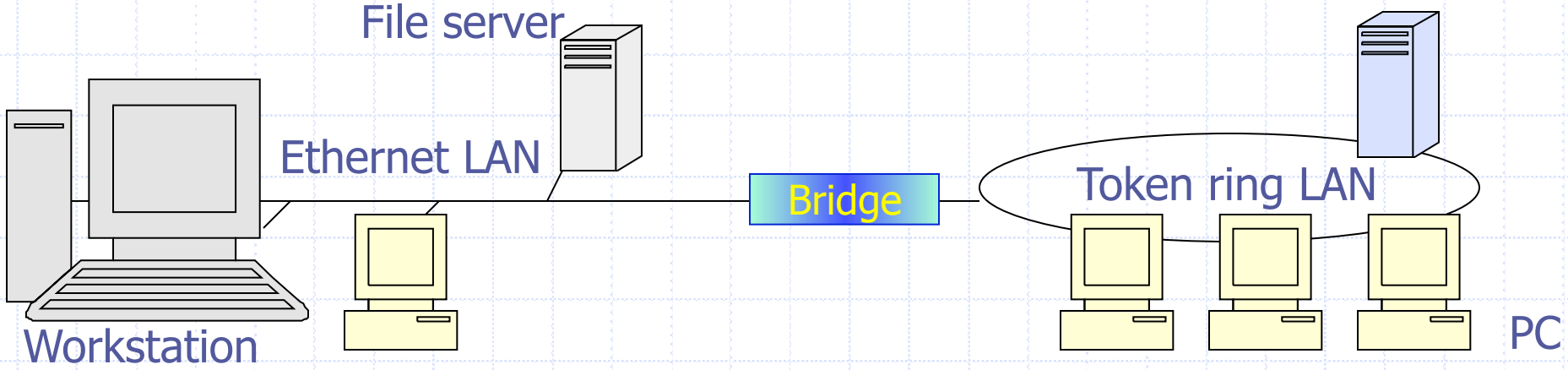


The Mechanisms of Innovation: The Cisco & Google Examples

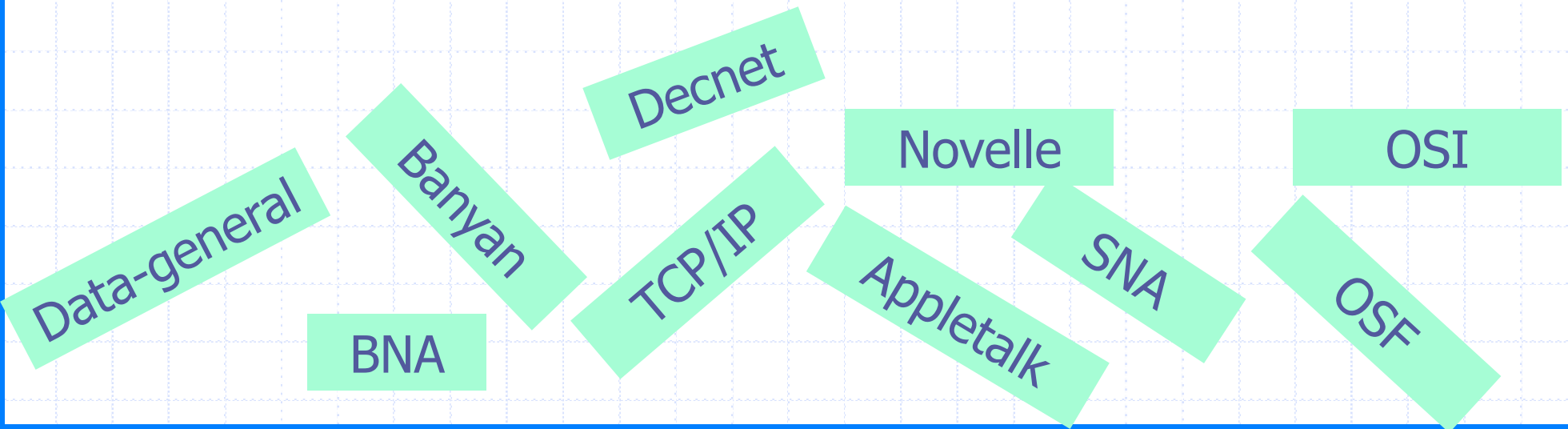
The Technology Paradigm Shift



Routing Circa 1988



- LANs provided client-server connectivity
- LAN technologies were diversifying rapidly
- Bridges provided layer-2 routing + interoperability



The IP Stack Was "Academic"

- The Novelle/Xerox stack dominated LANs, not IP
- The IP stack: technology-driven academic research
- The Internet used software routers (gateways)
- The OSI stack was a widely heralded "standard"
- ATM "was destined" to become the mother-of-all-standards
- Interop attracted 300 participants

Any market-driven logic would conclude:

IP-routers are a bad idea

The Five Questions (Mayfield)

	IP	ATM
Do you have a team that delivers?		
Is your product a vitamin or a painkiller?		
Do you know your users?		
Who are your competitors?		
How far will this money take you?		

The Five Questions (Mayfield)

	IP	ATM
Do you have a team that delivers?	??	Yes
Is your product a vitamin or a painkiller?	Neither	Painkiller
Do you know your users?	No	Yes
Who are your competitors?	Proteon	None
How far will this money take you?	??	Customers are lined up

Cisco was offered for sale at $3M

IP Routers Circa 1993

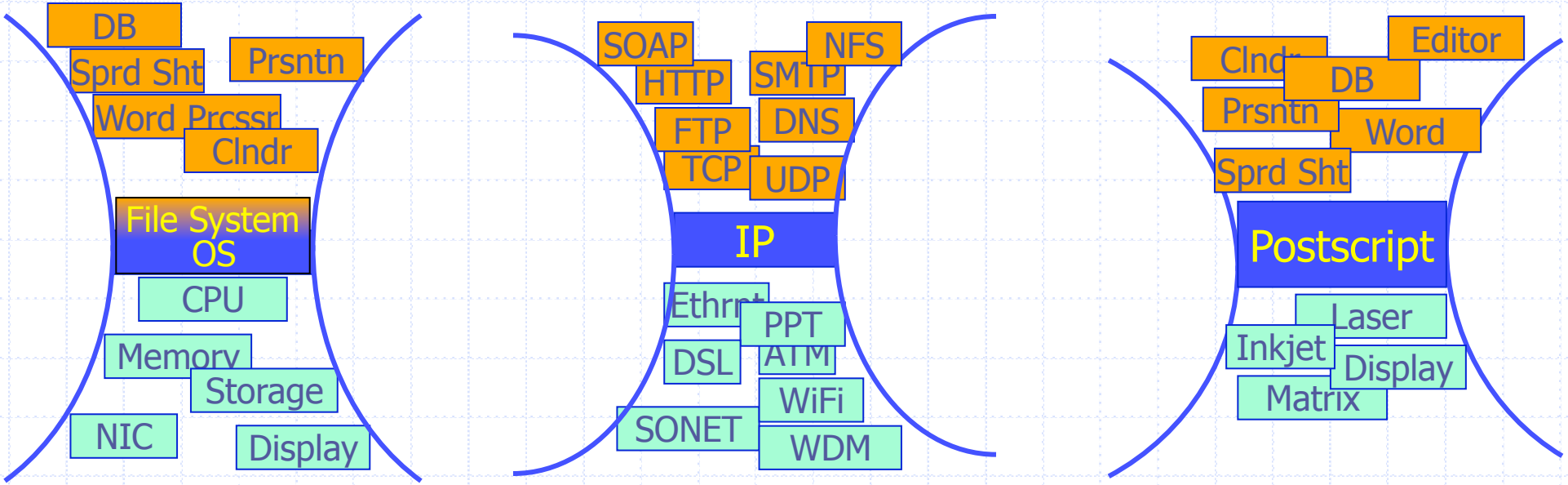
- IP routers replaced bridges as the interconnection paradigm
  - LAN vendors skidded towards disappearance
  - Cisco became the leading networking company
- The IP stack was rapidly replacing all other stacks
  - OSI vanished without trace
  - InterOp attracted some 80k participants
- The Internet was growing at an exponential rate

WHAT WAS WRONG WITH THE LOGIC OF 88-90?

Are there principles that could have predicted this in 1988?

IP Empowered Scale + Eco-system Model

- Scaling is a central driver of new infrastructures paradigms
  - IP scaling: network-of-networks paradigm
- Eco-systems require interoperability model
  - IP interoperability: hour-glass paradigm
- Bridges offered neither scaling nor interoperability



Cisco Business Model: Nurture Innovation

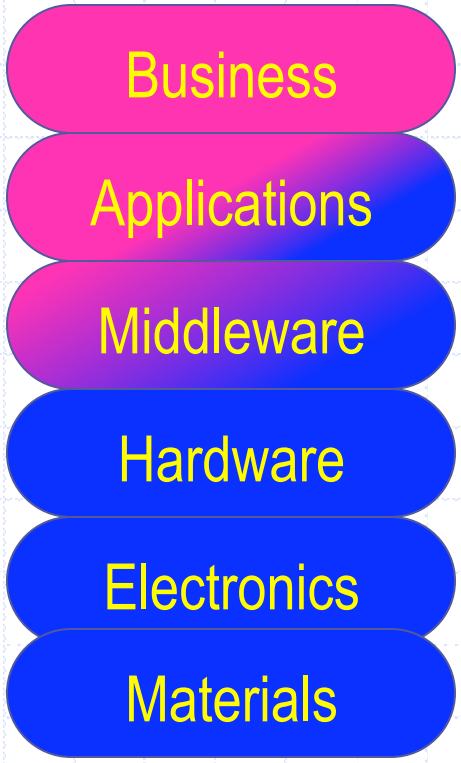
- Lead the eco-system by adopting innovation
- Create a marketplace to stimulate and integrate innovation

Discovering Innovative Opportunities

1. What is the target paradigm change?

2. Are there opportunities to create:

- new infrastructure scaling?
- new killer app?
- new eco-system?
  - New interoperability infrastructures
  - New business model



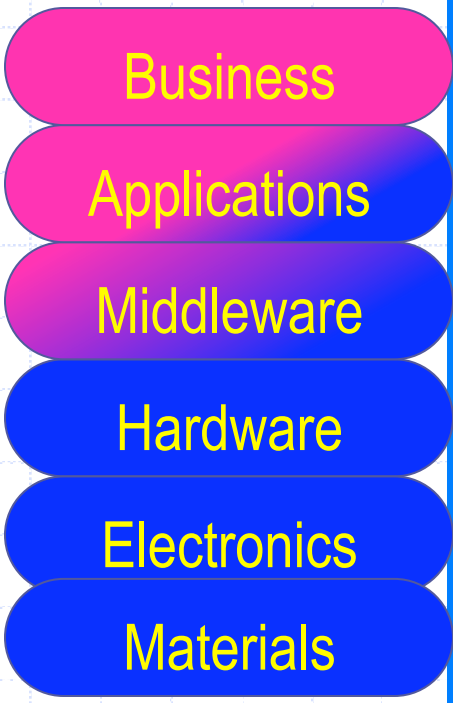
- Is there a winning pathway through the gatekeepers?
  - Go-to-market + business model

Google

1. Target paradigm change: Internet content consumption

2. Opportunity: Internet scale search engine

- new killer app + infrastructure scaling
- new eco-system: search-directed advertising
  - New interoperability infrastructures
  - New business models



- Is there a winning pathway through the gatekeepers?
  - Smaller focused advertisers

- Build an eco-system to nurture a culture of innovation

A Personal Journey:
From Comverse to SMARTS to Intercast to…. ???

Comverse Circa 1983

- Personal answering machines
- Early voice-mail systems: closed vertically-integrated systems
  - Limited scalability; limited interoperability; limited functionality
- Target paradigm: programmable voice-messaging platform
- Trilogue:
  - Scaling: 100-4M users
  - Interoperability: programmable platform

Is There A Winning Business Model Pathway?

- The “free voice mail” business model
- Fundamental challenge:
  how to avoid growing a gatekeeper culture
- Missed opportunity: open platform for mobile services

SMARTS Circa 1993

- Network management: a costly non-scalable black art
  - Element-centric: monitor instrumentation and handle events
  - Labor-intensive, non-scalable, costly (70% of budget) paradigm
- The Netmate project
  - 85-88: simplify/scale net-mgmt through network abstractions
  - 88-92: create self-managing autonomic network systems
- Target paradigm change: autonomic management
  - Network vs. element management
  - Automate functions

Is There A Winning Business Model Pathway?

- Fundamental dilemma: how to focus narrowly without “niching”
- Root-cause analysis: Netmate model + Codebook correlation
  - Scaling: codebook reduces event-rates & problem isolation time
  - Interoperability: through programmable model abstractions
- Missed opportunity: open platform for autonomic management

Conclusions

Take Away

1. What is the target paradigm change?

2. Are there opportunities to create:

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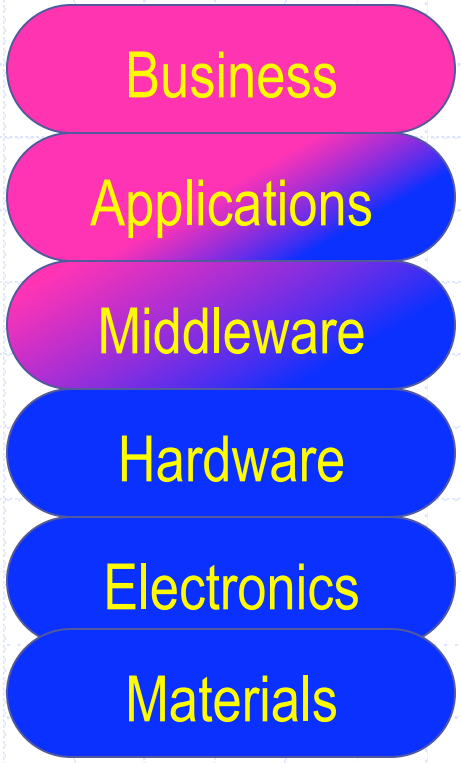


- Is there a winning pathway through the gatekeepers?
  - Go-to-market + business model

Emerging Innovative Opportunities

Look for emerging paradigms

- The rise of personal storage & media-on-demand access
  - ?Storage TV?
- Collapse of financial market paradigms
  - The fundamentals of intermediation
  - ? Can financial services networks provide efficient intermediation?
- The rise of utility (cloud) computing
  - ?Can dynamic virtual service networks provide new efficiencies?

Thank You!!

Intercast: The Rise of Storage

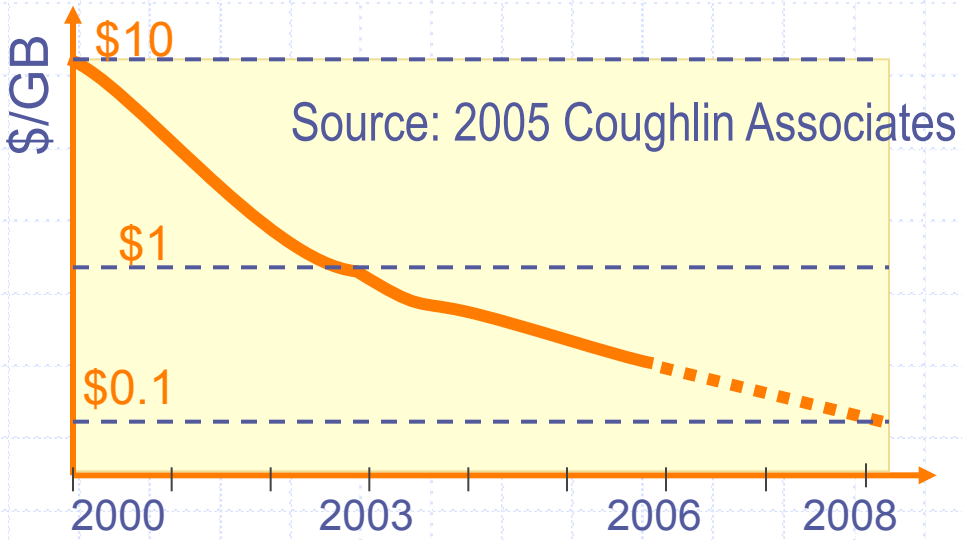
The Killer App:

Media Download & Play

iPod; Tivo; P2P; Netflix….

The 1TB drive

in our future



How Much Data Do Users Consume?

- An average user consumes 100-125GB per month
  - Mostly video (TV, rental)
  - A 1TB drive can store content of interest with 1:8 selection
  - A 12Mbps link can refresh 1TB a month during off-peak hours
- But unicast does not scale to deliver this volume
  - Technology: optimized to multiplex bursty traffic
  - Business: based on oversubscription

Intercast: Personal Storage TV

- Multicast-2-storage distribution
  - Orders of magnitude improvements in bandwidth use
  - A 1Gbps link can circulate the entire Netflix library every month during off-peak hours
  - Empowers personalized content delivery
  - Empowers new, storage-based personalized advertising
- Challenges
  - Formation of new eco-systems
  - Handling the crash