



# Views of Technology Futures

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## An Internet Perspective

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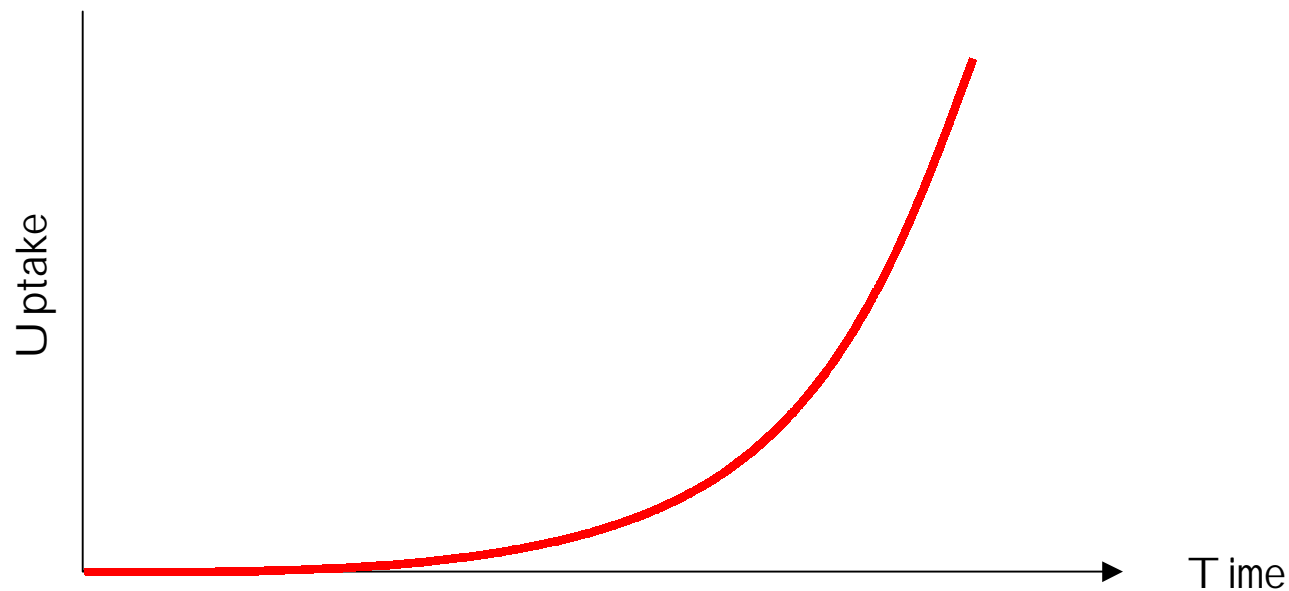


# The Phases of Technology Adoption

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## 1 - The Shock of the New

- Escalating uptake
- Disruptive impact on existing services



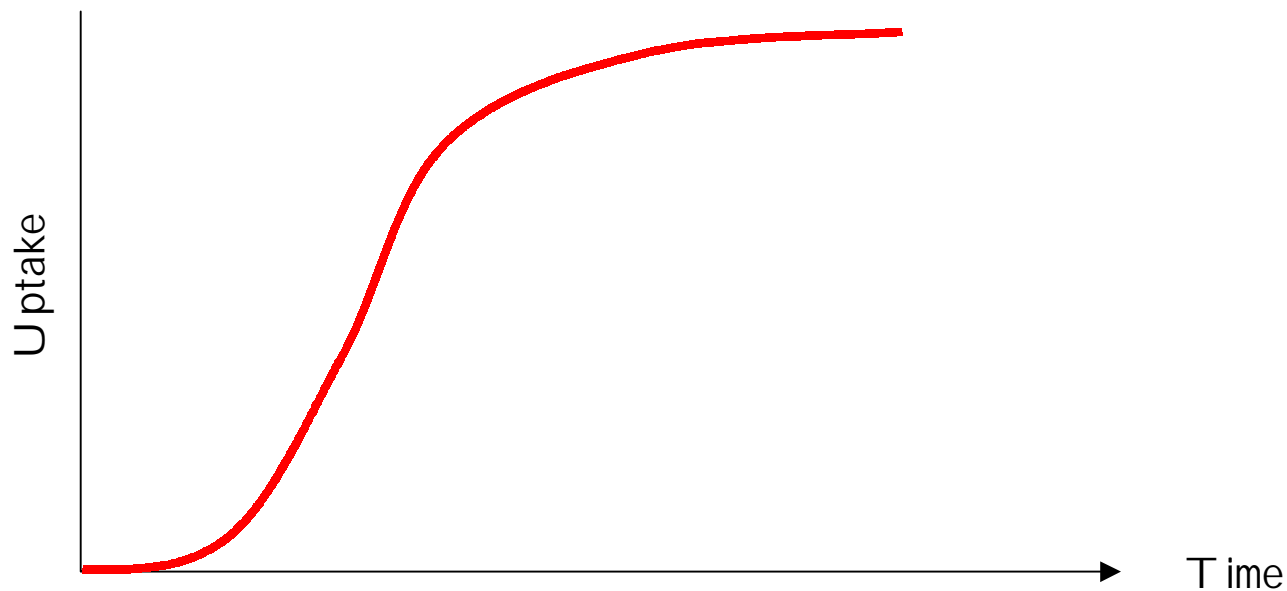


# The Phases of Technology Adoption

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## 2 - Market Saturation

- Uptake level slows as it maps changes population and relative wealth



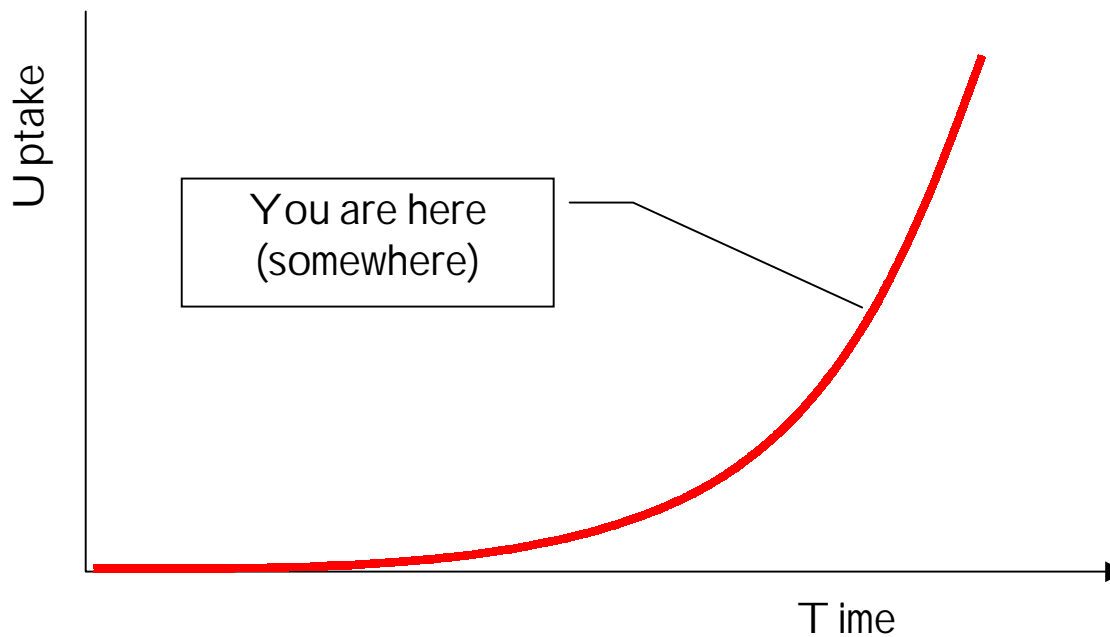
# The Phases of Technology Adoption

## 3 – Obsolescence

Technology is displaced by alternative offerings



# The Internet Today



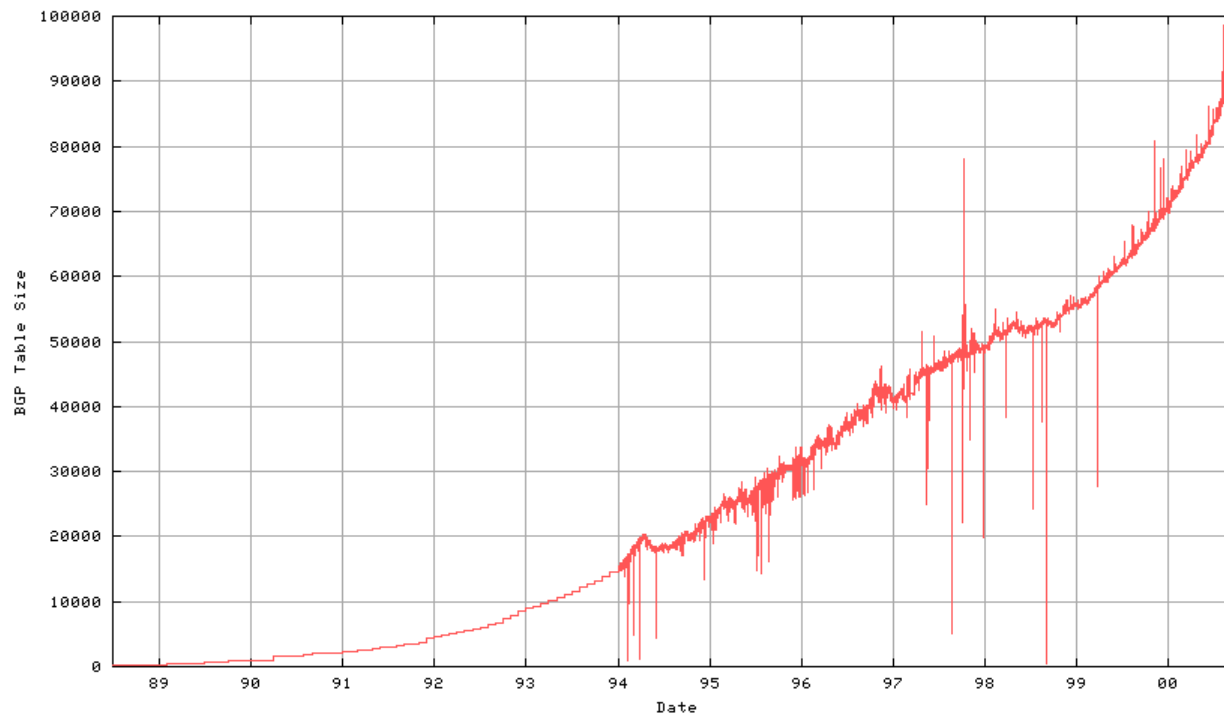
- Still in the mode of rapid uptake with disruptive external effects on related activities
- No visible sign of market saturation
- Continual expansion into new services and markets
- No fixed service model
- Changing supply models and supplier industries



# The Internet Today

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- No visible signs of demand saturation
- Current growth levels have been sustained for over two decades





# WHY the Internet?

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- A new network model: Dumb Network – Smart Devices
- The Internet is simply a collection of packet switches linked together by transmission elements:
  - Packets can be queued
  - Packets can be lost
  - There is no end-to-end time coupling and there is no end-to-end reliability coupling.
- This allows an Internet network to use basic and cheap transmission elements and basic and cheap packet switches.



# WHY the Internet?

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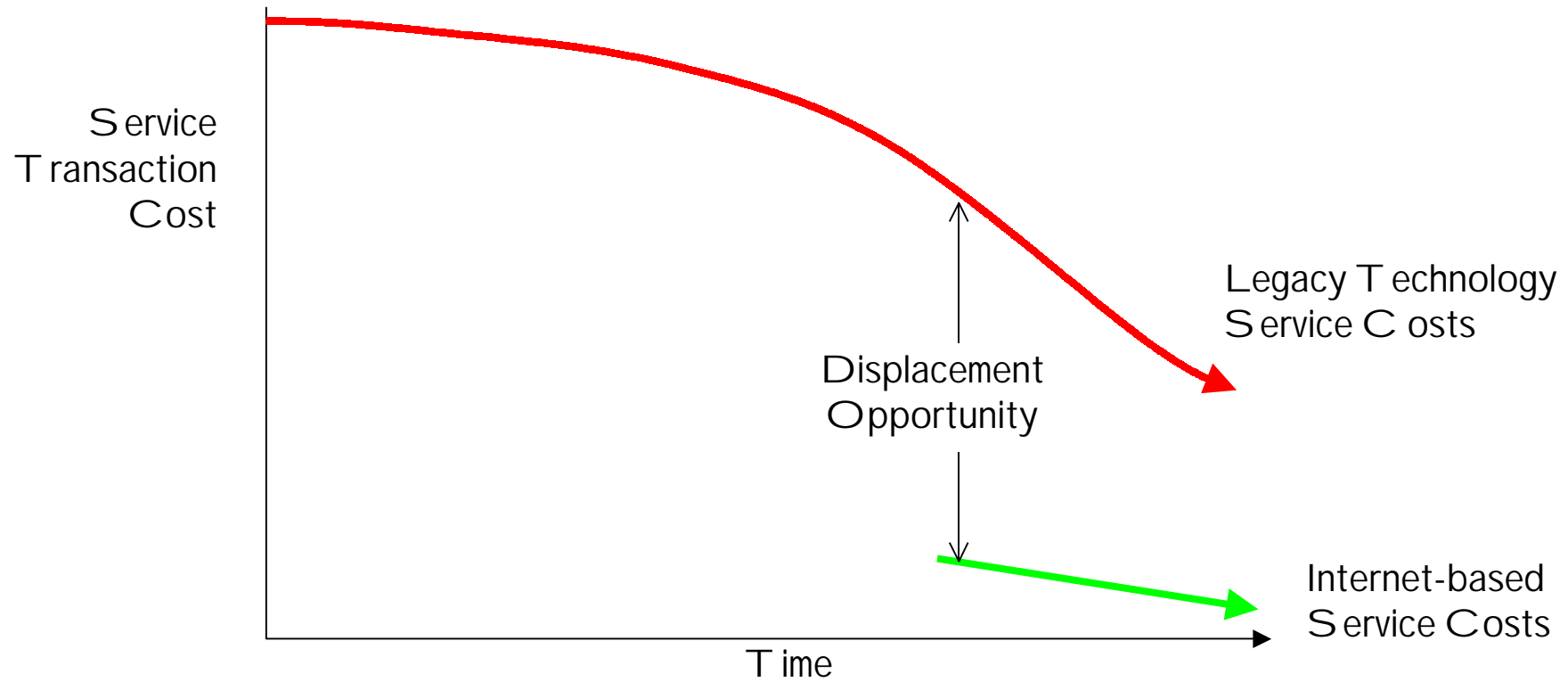
- **Cheap** to access and exploit
- **Adequate** service model





# The Disruptive View of the Internet

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# The Disruptive View of the Internet

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- **Adaptable services** quickly migrate to use a cheaper cost base
  - Personal and Group Messages
  - Data transfer
  - Information Services
- **Other services** migrate based on exposure of opportunity
  - Commerce transactions (X.25)
  - VOIP (PSTN)
  - Music distribution (media distribution)
  - Video distribution (media distribution)
- Continually decreasing unit costs and increasing penetration of access devices work together to continually expose new applications and new markets for the Internet



# Internet Drivers

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- Expansion is continuing at an exponential growth rate.
- Growth of access channels:
  - Desktop services
  - Personal services – Laptops and PDAs
  - Mobile communications services
  - Appliances
- Use Drivers
  - Information
  - Commerce
  - Entertainment





# Futures for the Internet

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- Same basic model:
  - dumb network, smart devices
  - Packet-based model of network sharing
  - Packet reordering, loss and jitter to remain
- Same drivers:
  - Continued growth in users
  - Continued broadening of the utility model through growth in overlay applications
  - Continued unit price drop in service costs for Internet-based services



# Futures for the Internet - Transmission

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- Megabit Wireless Bandwidth
  - 802.11 wireless networks are gaining market share as a flexible solution for office and access
- Megabit Mobility
  - 3G wireless efforts gathering momentum as a wide area mobility solution for PDA devices
- Gigabit Fixed Bandwidth
  - Moving to a trunk and access architecture of packets placed directly into the optical plane



# Futures for the Internet – Coping with Scale

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- Billions of addressable devices
- Either: back to the multi-protocol world:
  - ‘Walled garden’ domains of rich functionality
  - Inter-domain basic functions undertaken with application-level boundary gateways
- Or: we get serious about coherency of communications
  - Adoption of IPv6-based architectures
  - Reduction of use of network boundary-ware in favour of end-to-end architectures



# Futures: The Content Model

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- Finding information is not the problem
  - Finding too much information of dubious relevance and dubious authority is the continuing problem
- An environment of **Content Abundance**



# Futures: The Content Model

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- Internet Content Abundance
  - Information publication will continue to be driven into cheaper and easier to use models
  - Single point content publication architectures will fade to be replaced by reference-driven distributed cache models
  - A content URL becomes in effect an index used to query a cache, not a lookup performed at a nominated unique location
    - This has implications for the DNS as know it today





# Futures: The Content Model

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- The issues:
  - Generating **information navigation models** that have tight focus properties in terms of relevance of outcomes
  - Generating **mutual trust models** that can be used to create information filters that generate trustworthy outcomes
  - Adopting a **content economy** that funds quality of content
- Lets look quickly at these three issues:...



# Futures: Information Navigation

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- Currently in the early stages in combining formal systems with natural language interpreters and generators and flexible format interfaces
- Will the storage structure of information need to change to aid effective content navigation?
  - Is XML a productive direction to make implicit structure of information explicit to the navigation system?
  - Are there other approaches with greater promise?



# Futures: Trust Models

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- What is the trust model of the Internet?
- What do end-consumers want the trust model of the Internet to be?
- What do media providers and media intermediaries want the trust model of the Internet to be?
- Are these three views consistent?

Trust is difficult to impose and difficult to sustain. If you want a peer-to-peer content publication model then it has to be accompanied with a peer-to-peer trust model to sustain trust in content



# Futures: Content Economy

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- What does a robust content economy look like?
  - Pay-per view?
  - Free – content provider funded?
  - Free - third party funded?
  - Bundled – access provider bundles content provision?
  - How do cache intermediaries fit into the model?



# Thank You

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- Questions?