

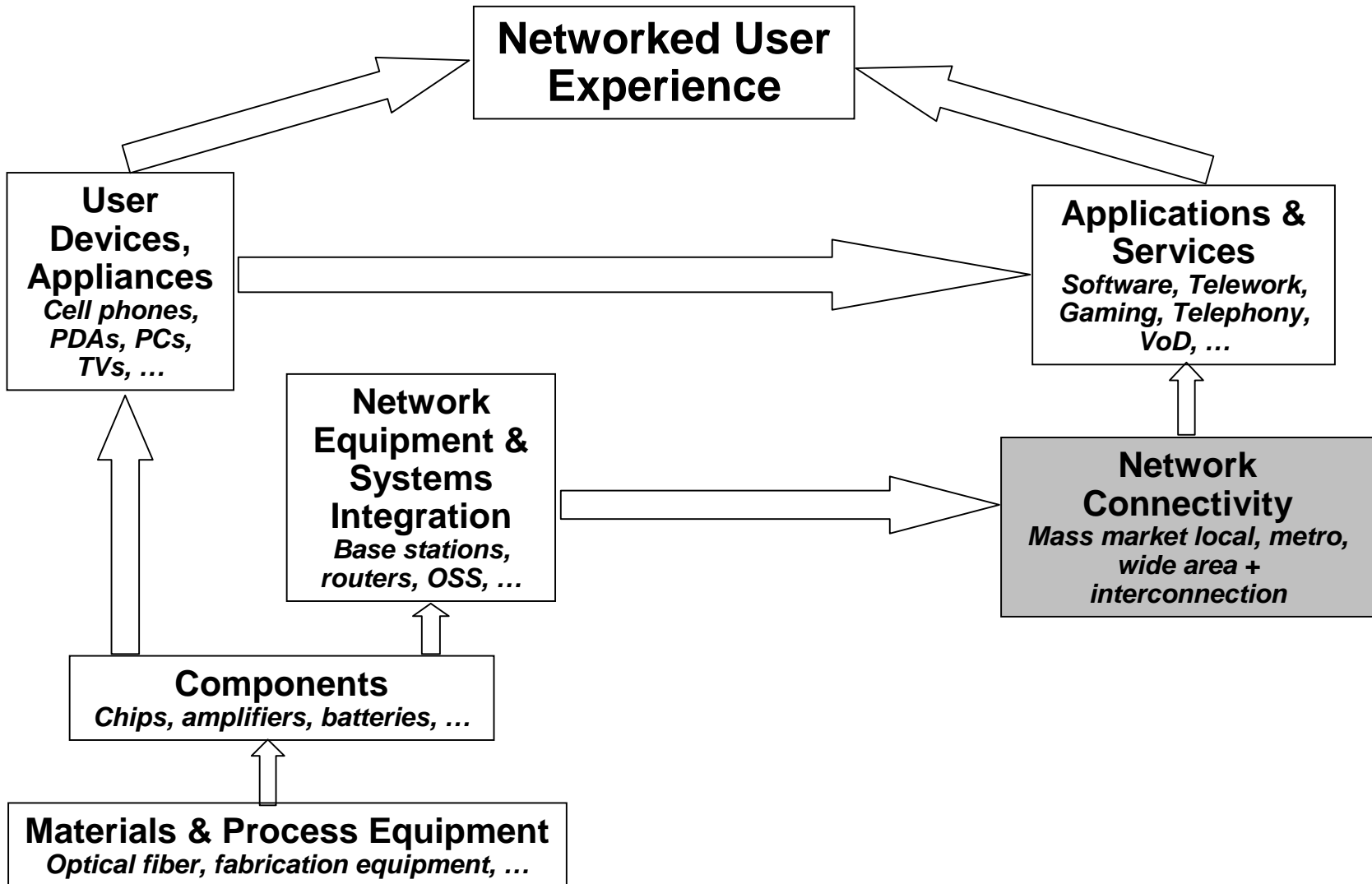


Roadmapping Broadband: Does Moore's Law Apply?

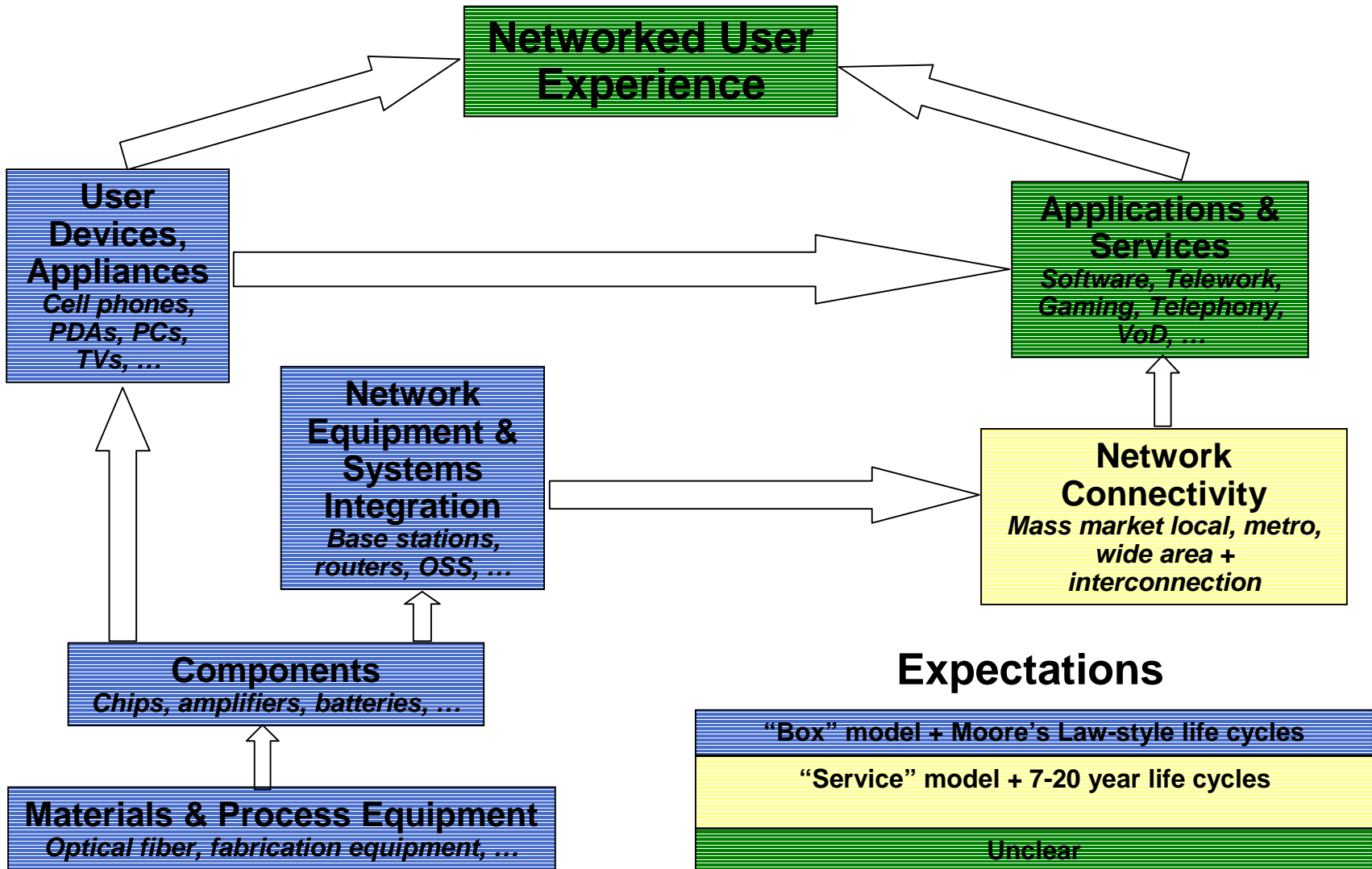
Sharon E. Gillett, MIT

January 25, 2005

Broadband Roadmap Matters Across Value Chain

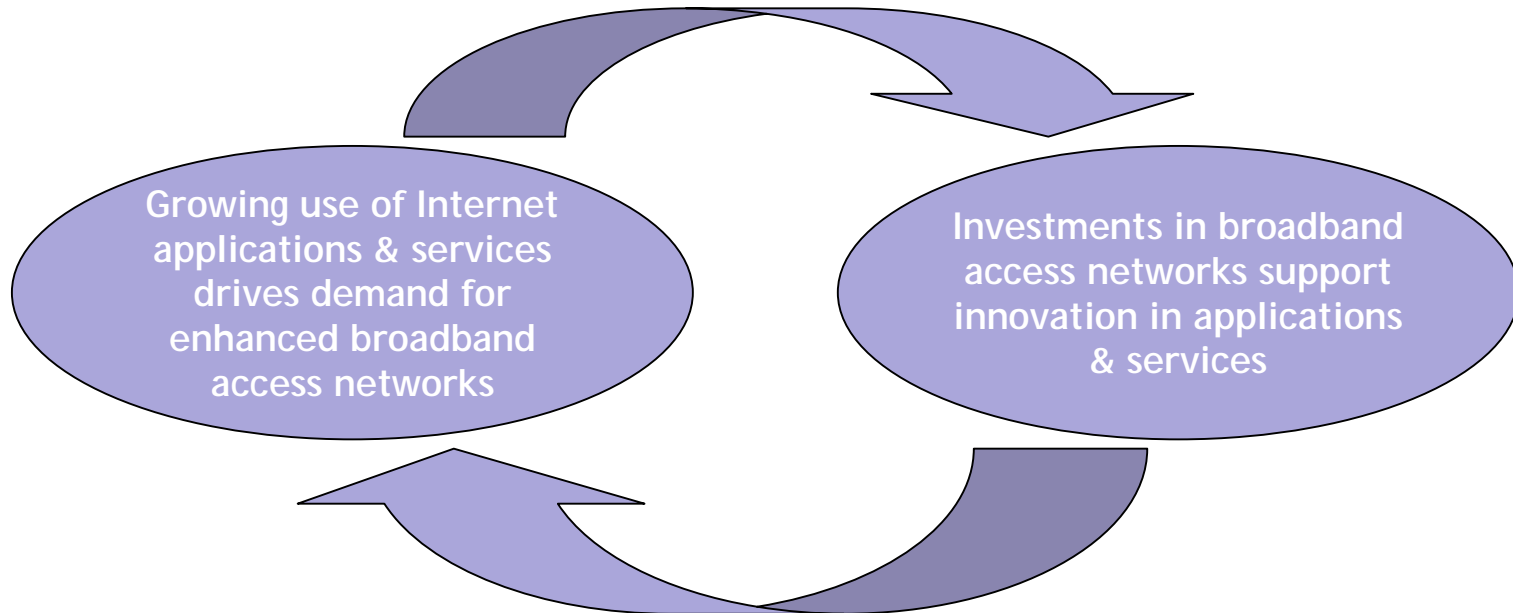


What Clockspeed to Expect?



Can Broadband Ecosystem Follow Moore's Law?

- **Implicit in “virtuous cycle” ideal of BBWG charter**



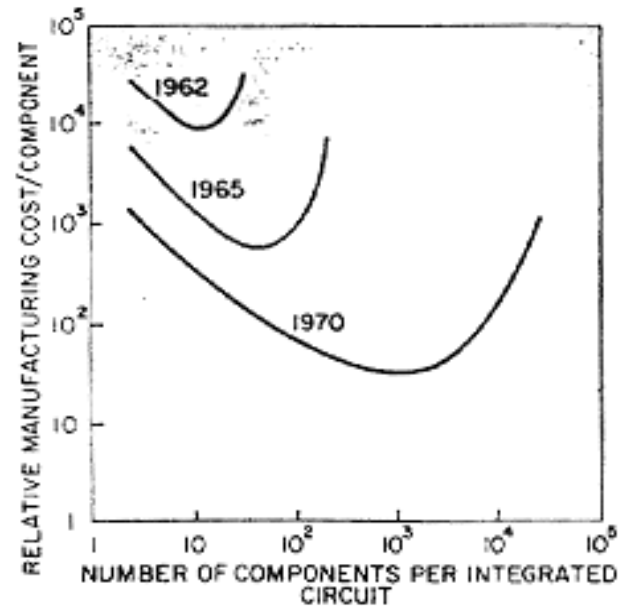
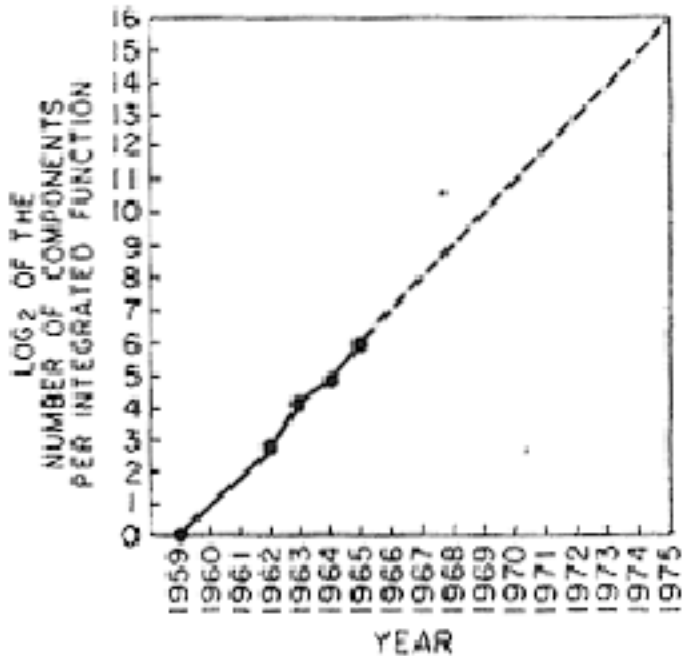
- **Previous talks identified specific barriers to virtuous cycle**
- **More general way to think about the problem?**
 - Make sure we have identified all the important barriers.

Methodology

- **Observe Moore's Law embodies implicit *dynamic* of ongoing ROI**
- **Characterize this dynamic explicitly**
 - Ex. System dynamics (causal loop) modeling
 - Quantitative calibration of underlying relationships where data available
 - Validate model by replicating reality
- **Map the dynamic to broadband ecosystem**
 - Deal with resulting questions
- **Assess where dynamic applies qualitatively**
 - Determine quantitative calibrations
 - Model can then suggest likely rate of evolution
- **Determine where it doesn't**
 - Consider potential for disruption that might change this – technical, regulatory, social...
 - E.g. viral nets convert “service provider” business to “box selling” business?

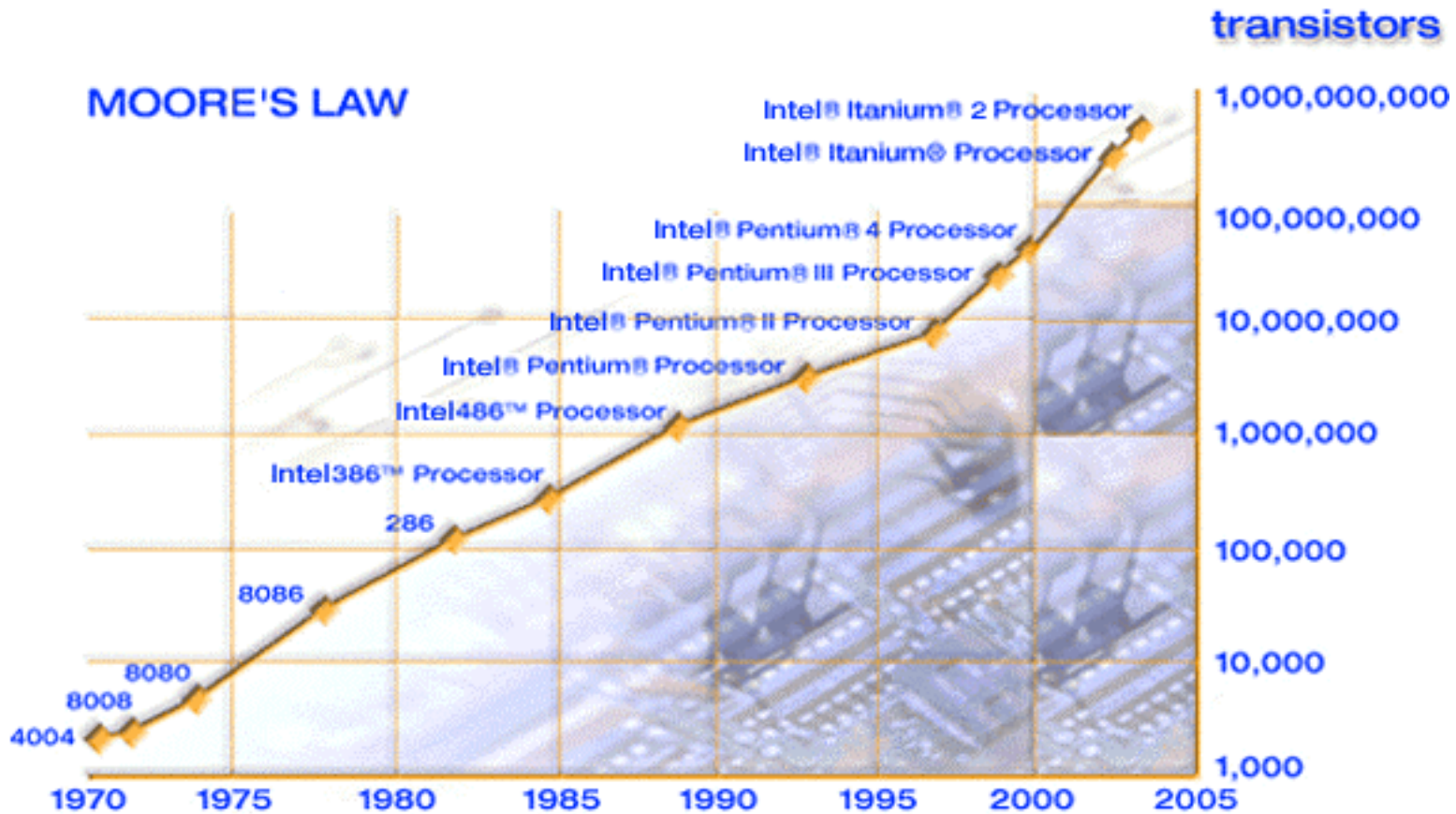
Moore's Original Observations

- Transistor density doubling annually
- Cost per component declining exponentially



“Cramming more components onto integrated circuits.” Gordon E. Moore, Director, Research and Development Laboratories, Fairchild Semiconductor. Published in *Electronics*, Volume 38, Number 8, April 19, 1965.

Typical Representation Today: Doubling Every 18-24 Months



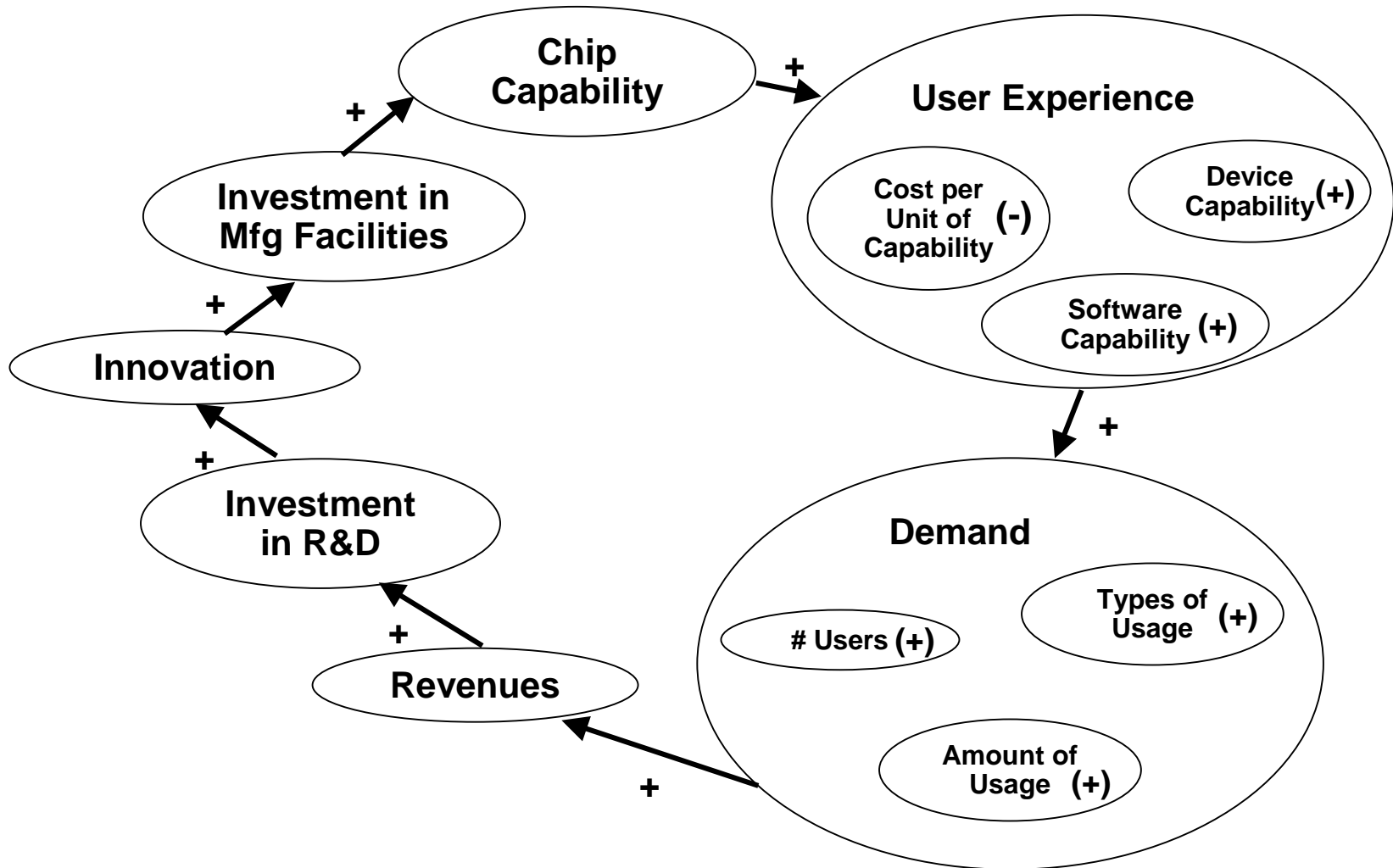
<http://www.intel.com/research/silicon/mooreslaw.htm>

Why Moore's Law Matters



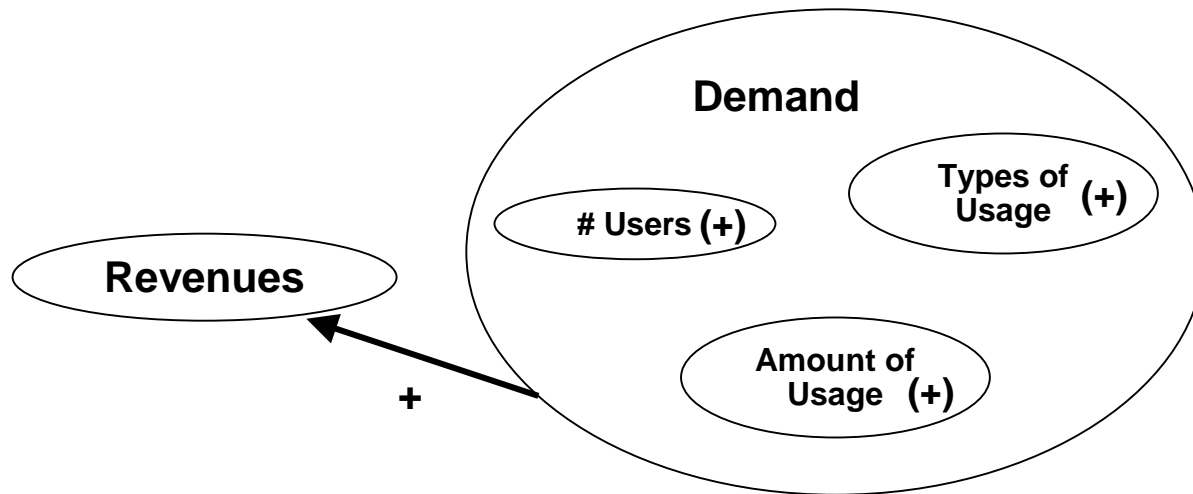
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Moore's Law as Dynamic Model (Semiconductors)

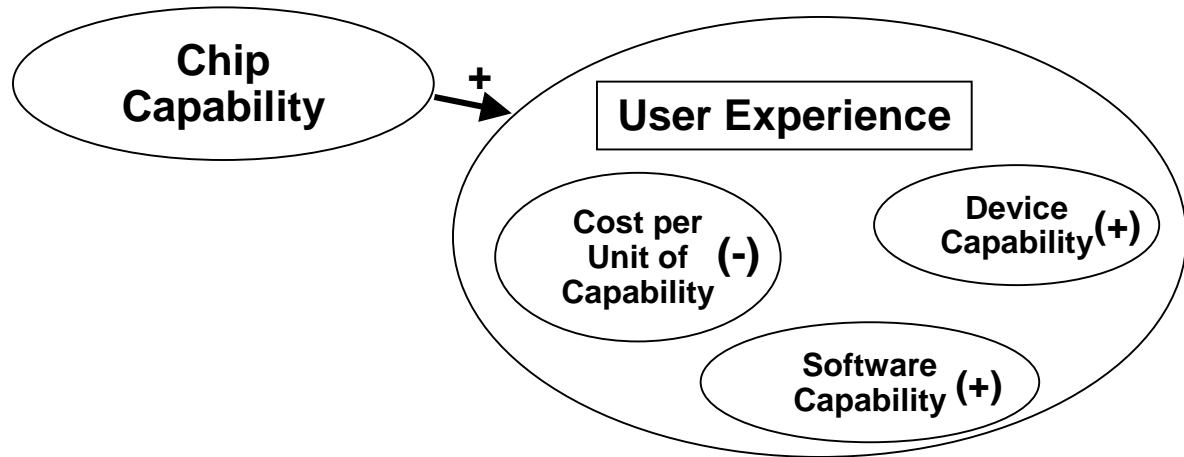


Application to Broadband: Revenue Flows

- Issue addressed by “Broadband Usage Cost Recovery” White Paper
- Relating demand growth to revenue growth
 - Links must be there for positive feedback loop to work
 - For all forms of demand growth?
 - Revenues to *whom*?



Application to Broadband: User Experience



- Issue addressed by proposed “Personal Broadband” White Paper
- “Classic” technical performance metrics and monetary cost are not the only important aspects of user experience
 - User choice, convenience, ease of use, trustworthiness etc. are also important dimensions
 - Can the “box”-oriented chip model capture such dimensions adequately?

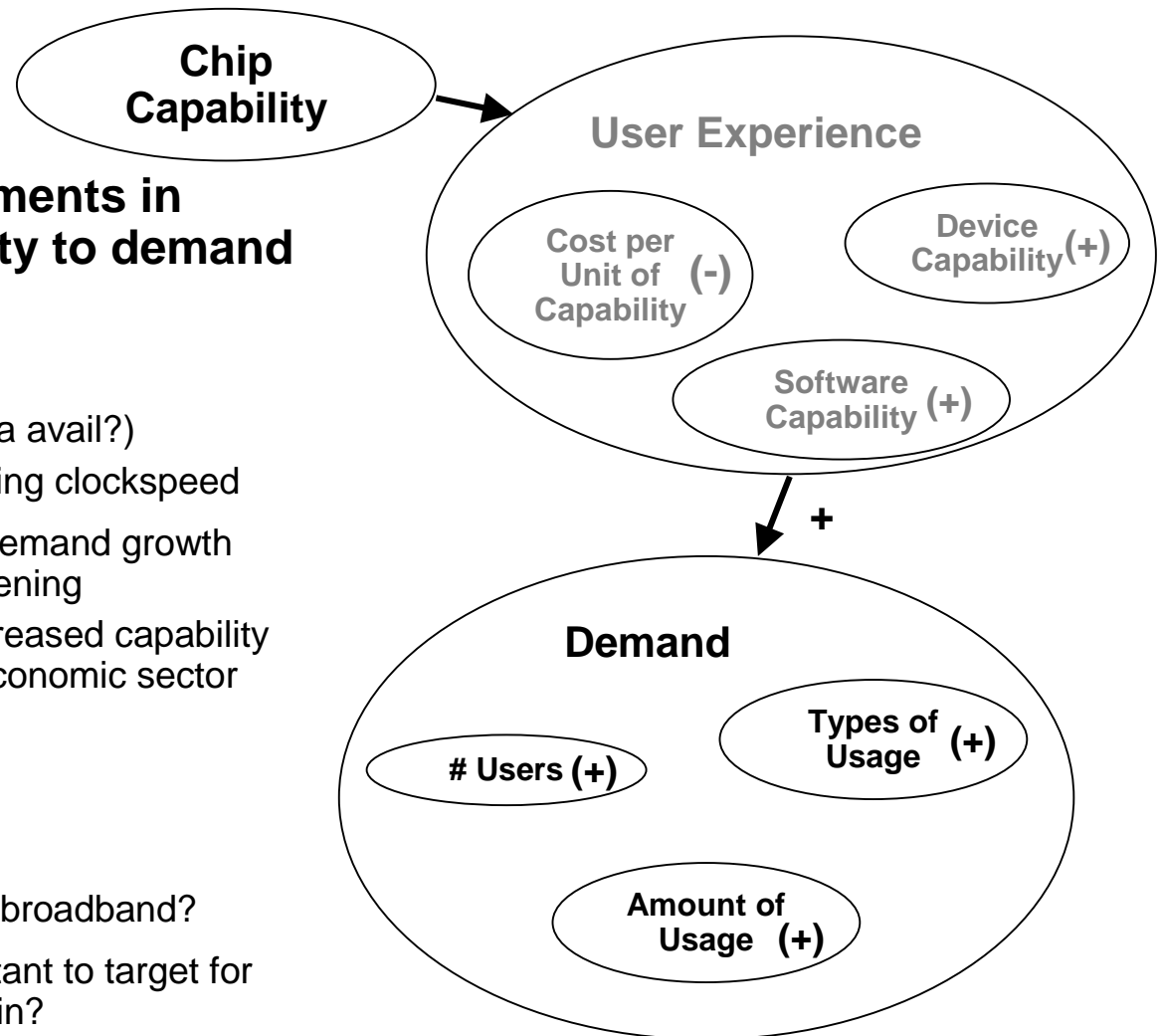
Proposed Application to Broadband: Demand Growth

- **Objective: Map improvements in chip/broadband capability to demand growth rates**

- Calibrate with data for chips
- Compare with broadband (data avail?)
 - Key variables for determining clockspeed
- Qualitative understanding of demand growth dynamics may also be enlightening
 - Ex. Case study of how increased capability drove adoption in a new economic sector

- **Issues**

- Defining system boundaries
- What “capability” metric(s) for broadband?
- Are some metrics more important to target for coordination across value chain?
 - Ex. Chips focused on transistor density, but power consumption also important to portability



In-feed from BBWG Participants

- **Are we asking the right questions?**
- **What other questions are important?**
 - To your company
 - To overall health of value chain
 - Not adequately addressed elsewhere
- **I want to participate in small group focused on**