

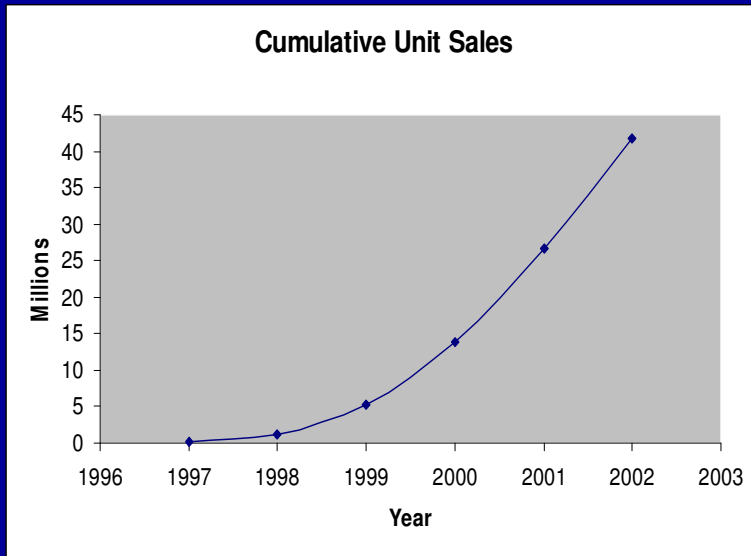
Conceptual Issues in the Study of IT Innovation Deployment: Going Beyond Simple Technologies

Rob Fichman
2002 DIGIT Workshop, Barcelona
December 15, 2002

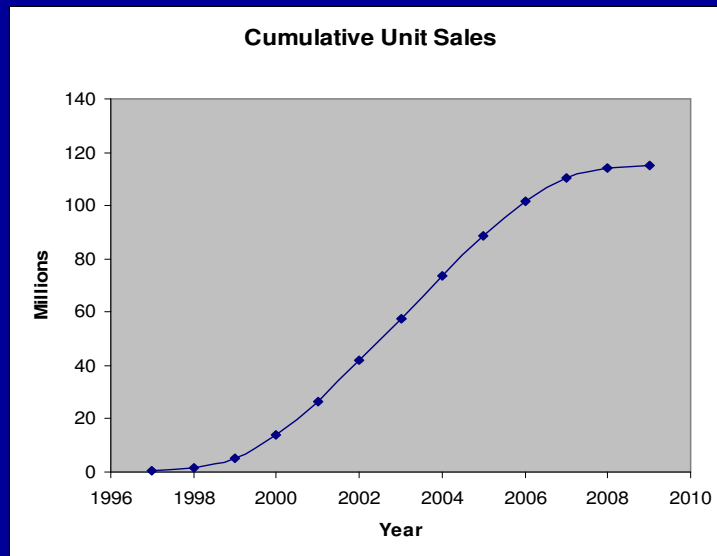
Agenda

- Simple vs. Complex Technologies
- Rate and Extent of IT Deployment within Firms
 - Why study this outcome?
 - Conceptual and methodological challenges
 - Proposed research designs
- Q & A

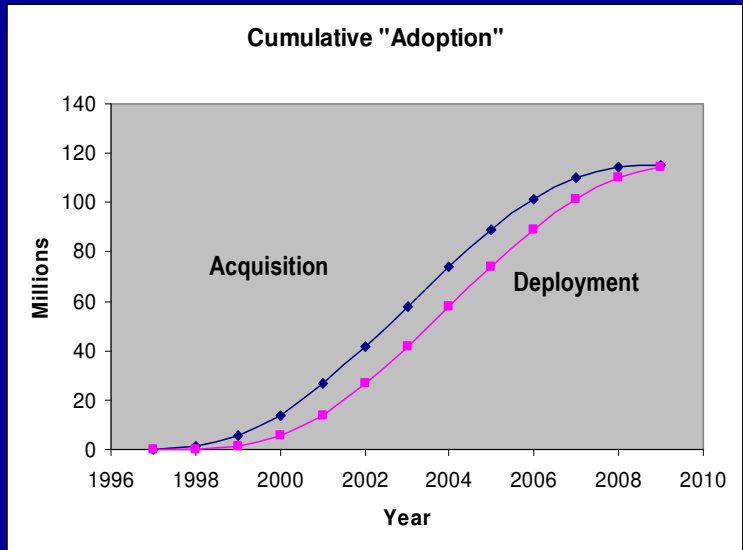
Diffusion S-curve



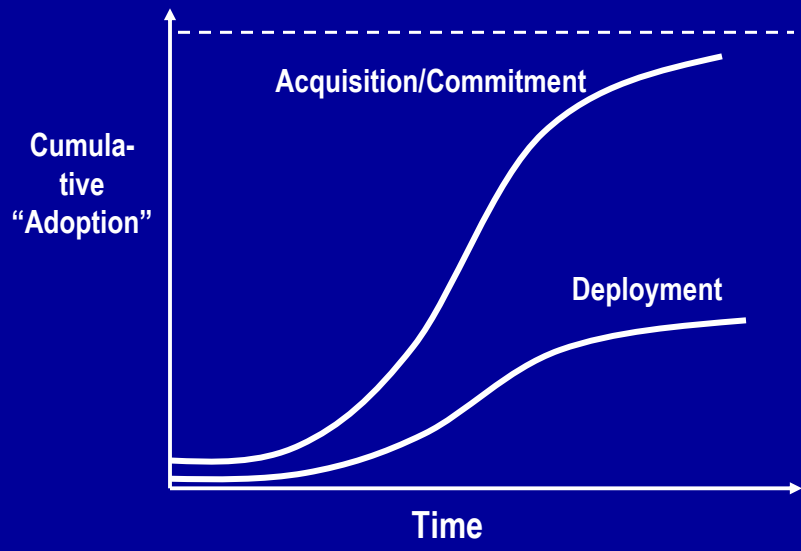
Diffusion S-curve



Diffusion S-curve



Assimilation Gap



Why Study Rate/Extent of Deployment of Complex Technologies Within Firms?

1. Technologies must be deployed to produce expected benefits for adopters, but deployment does not automatically follow acquisition
2. Network externalities (and associated positive bandwagons) flow from extent of deployment
3. Speed matters (sometimes)

Prior Work on Determinants of IT Deployment Among Adopters

- Unaggregated (single innovation)
 - Weak (or no) effects for “traditional” variables (e.g., Cooper & Zmud 1990, Fichman 2002)
 - Implementation tactics significant (e.g., Rai & Howard 1994)
 - “Recursive” variables significant (e.g., Purvis et al. 2001)
- Aggregated Studies (multiple innovations)
 - Few IT studies, weak effects (e.g., Grover & Goslar 1993)
 - Determinants of deployment \cong adoption (Damanpour 1991)
- Confounding with adoption (cross-sectional)

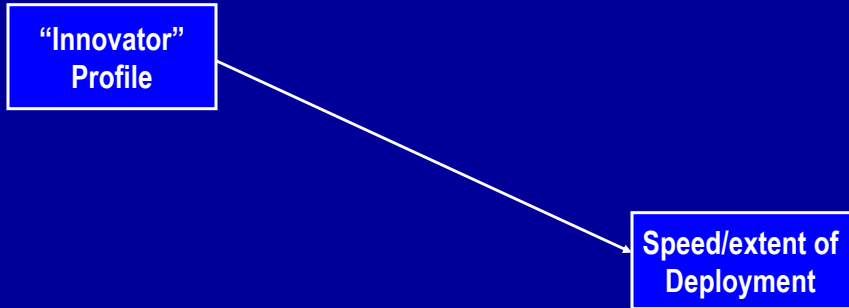
Do “Standard” Rationalistic Variables Affect the Propensity to Implement Complex IT Innovations?

- Has not really been addressed conclusively
- Methodological challenges
 - Statistical power
 - Range restriction
 - Confounding with time of adoption
- Theoretical challenges
 - Different predictors
 - Differently-directioned effects
 - Technology vintage
 - Technology destiny

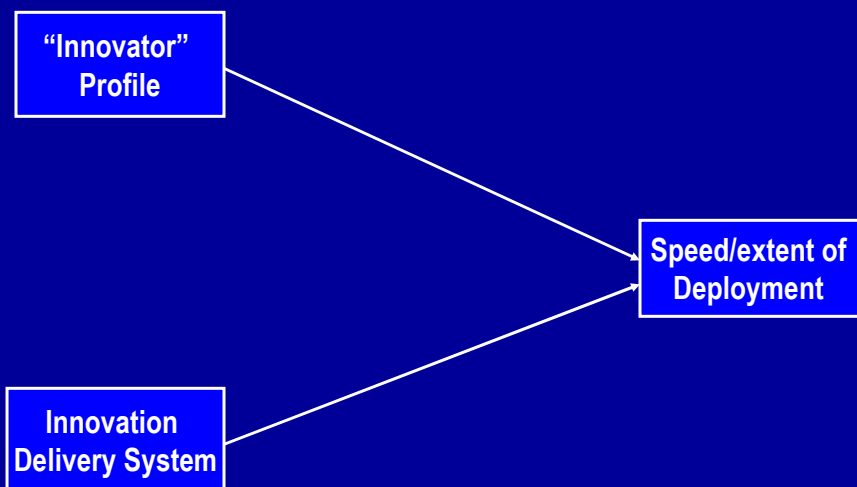
Sketch of How to Proceed

- A general conceptual model
 - Includes vintage and destiny effects
- Methods
 - Use survival analysis in unaggregated study
 - Use new kinds of measures that avoid confounding with adoption an aggregated study

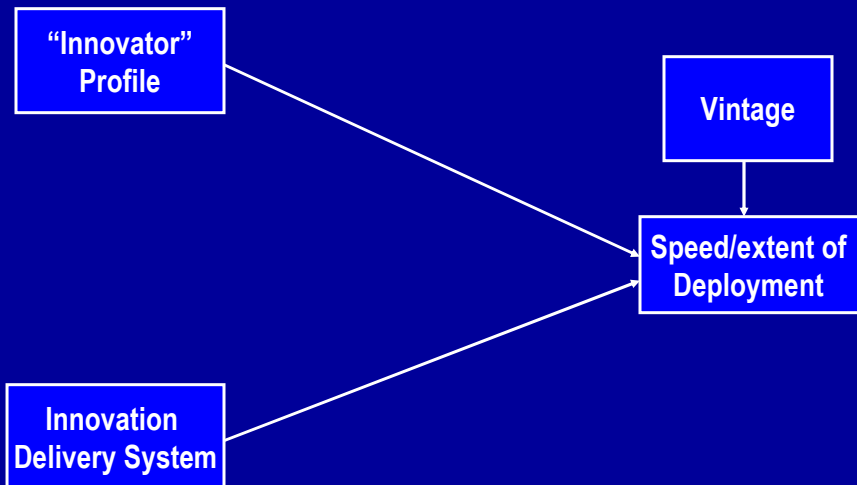
A Model of Complex IT Innovation Deployment Among Adopters



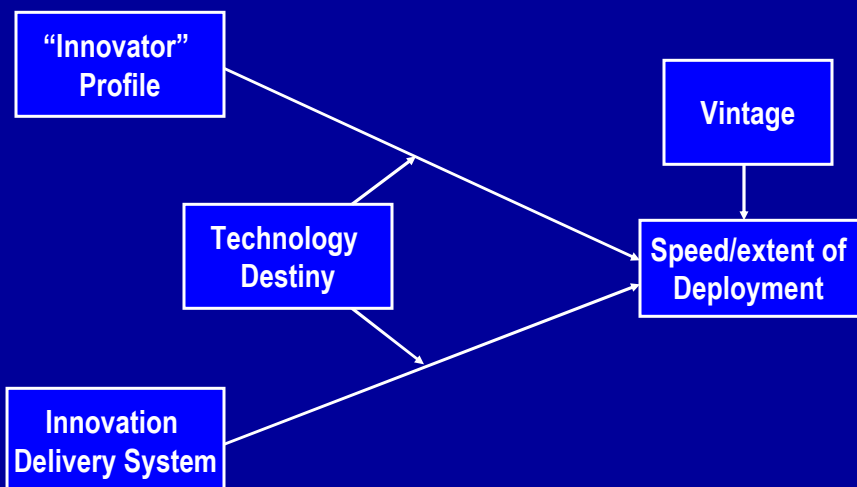
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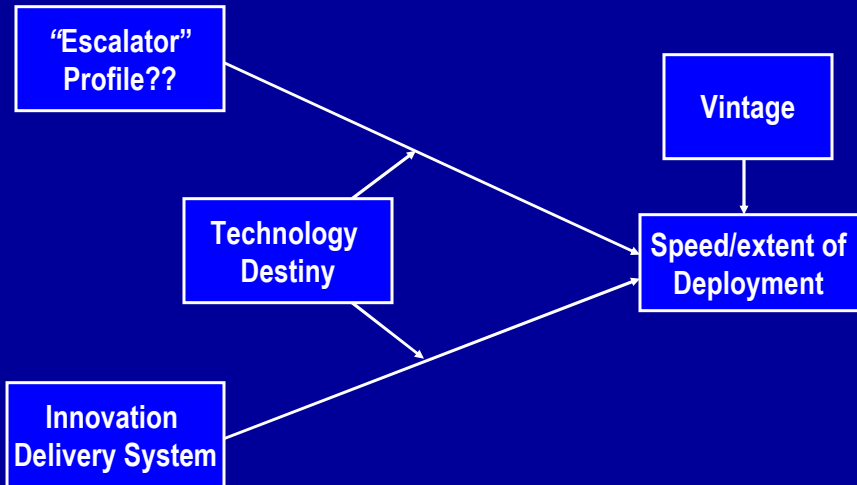
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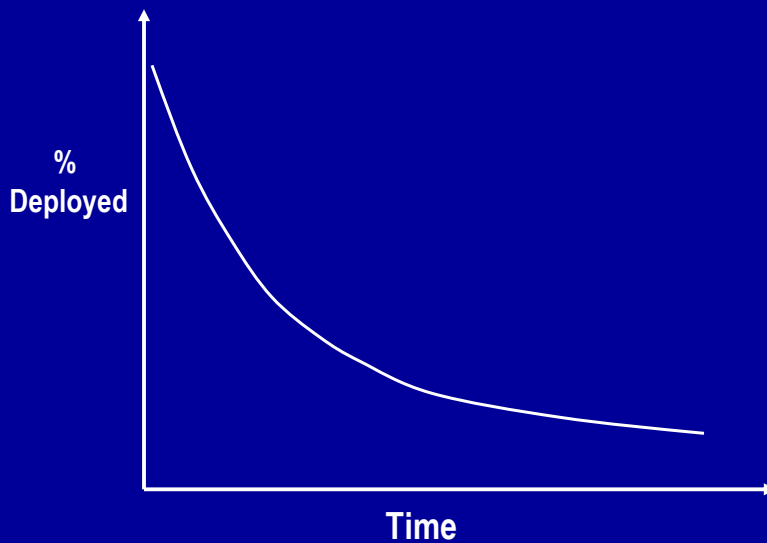
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A Model of Complex IT Innovation Deployment Among Adopters



Single Innovation Design: Survival Analysis



Aggregated Innovation Design

1. Create rich, innovation-specific measures of deployment extent
2. Trichotomize (high-med-low) within technology and within adoption time period among adopters; non-adopters assigned neutral score
3. Convert to aggregated score (e.g., for 3 techs)

-1 -1 -1 => -3 (0 for 3)

-1 -1 0 => -2

-1 0 0 => -1

1 1 -1 => +1

1 1 0 => +2

1 1 1 => +3 (3 for 3)

Aggregated Innovation Design

- Features
 - Deployment measures can be technology-specific
 - Deployment extent is relative to other adopters within time period
 - Controls for vintage
 - Avoids confounding with time of adoption
 - Counters range restriction

Candidate IT Innovations

- Web “presence”
- Component reuse platforms
- “Extreme” programming/Agile systems development
- Web Services: Microsoft.NET, Sun One
- XML
- ISD Process metrics
- Peer-to-peer
- Mobile internet

Conclusions

- Rate & extent of deployment of IT within firms is a key outcome for complex IT innovations
- Most prior studies have had limitations
 - Confounding with adoption
 - Range restriction
 - Pro innovation bias
- But there are some potential remedies
 - Include technology destiny
 - Single innovation design: use survival analysis and control for vintage
 - Aggregated design: develop new kinds of measures that don't confound with adoption