Leading Indicators

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Unused and underused technology remains a persistent problem in Information Technology (IT)

Leading Indicators as defined by the International Council on Systems Engineering (INCOSE)

Technology Models help us understand and influence technology acceptance

- The Technology Acceptance Model (TAM)
- Other models that may be interesting

Summary

Discussion
Unused and underused technology

- Negatively affects organizational performance
- Contributes to the IT ‘productivity paradox’ where return on some IT investment is murky at best and non-existent at worst
- Anecdotal evidence that some systems fielded for OIF were never used or only used once
- Wasted resources on unused or little-used acquisitions
- For fielded systems
  - Unnecessarily increases IT lifecycle costs
  - Design and fielding ROI limited
  - Hardware/Software maintenance and licensing
  - Logistics
  - Disposal
Leading Indicators

- Effectiveness measures for specific activities
- Provides information about factors that are likely to affect system performance
- Individual or collection of measures that are predictive of future SE performance which in turn may be an indicator of future system performance
- Predictive analytics that aid in avoiding wasted effort and rework
Leading Indicators can
- Help predict system performance
  - Poor accuracy at first measure with accuracy increasing as the model improves
- Increase the likelihood of delivering a complex system within project constraints
  - Another tool supporting effective SE Management across the phases of a project—may be particularly beneficial to integrate w/Project Management efforts
Technology Acceptance Model (Davis, 1989)

- Two variables influence user acceptance of technology
  - Perceived Usefulness
  - Perceived Ease of Use
- Ease of Use moderates Usefulness
- Introduced in 1989; a validated and well-used (critics say overused) quantitative model
- Hundreds of studies that validate and/or extend the model
- Populations studied include students, professionals, and the military
- Technologies studied span business software, consumer electronics, communications and network protocols, and specialized systems used by police and the military
- Data collection is via straightforward survey methods
  - Automating data collection (Use data) may inform test reliability
- Data is well suited to modeling with multiple regression methods
Other Models

- Unified Theory for Acceptance and Use of Technology (UTAUT)
  - Unifies 8 different models including the TAM
  - Accounts for 70% of the variation in technology acceptance
  - Eight variables—somewhat more complex than TAM
  - Reliable and valid model with multiple studies performed since 2003

- Task-Technology Fit (TTF)
  - Measures how task and individual characteristics moderate the relationship between technology and user evaluation
  - 32 question survey instrument
  - Reliable and valid model with multiple studies performed since 1996

- Technology Transition Model (TTM)
  - Attempts to explain what causes a group of technology users to become self sustaining
  - Four variables: Frequency of Net Value (F); Magnitude of Net Value (V); Certainty (C); Net Value of Transition (T)
  - Maturing model with potential—developed during research on Group Support Systems
INCOSE provides 18 Leading Indicators

- Technology acceptance measures might loosely fit in the Technology Maturity Trends Leading Indicator
- Current Leading Indicators for Human System Integration (HSI) offer only weak characterization
- We need better tools to perform SE for Human Factor Engineering (HFE)

The Technology Acceptance Model applied early in the SE process (as a type of Leading Indicator)

- A starting point for Leading Indicators suitable for evaluating technology acceptance
- A low cost, low risk, but effective method to validate user acceptance and subsequent use
- A way to initiate new conversations with the consumer community
- A methodology for Systems Engineers and Operations Researchers to track and evaluate how system interfaces evolve in the eyes of consumers
- Contributes to managing IT as the commodity it is
References

Discussion

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