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Application of Bayesian Belief Network for Agile Kanban Backlog Estimation

Eric D. Weflen
Iowa State University, eweflen@iastate.edu

Kevin Korniejczuk
Iowa State University, kevink@iastate.edu

Sharon Lau
Iowa State University, slau@iastate.edu

Steven S. Kryk
Iowa State University, skryk@iastate.edu

Cameron A. MacKenzie
Iowa State University, camacken@iastate.edu

See next page for additional authors

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Abstract
What is Agile Kanban?

• Different from Kanban for JIT manufacturing!
• Visualization of workflow
• Limit work in process (WIP)

Disciplines
Industrial Engineering | Industrial Technology | Manufacturing | Systems Engineering

Comments

Authors
Eric D. Weflen, Kevin Korniejczuk, Sharon Lau, Steven S. Kryk, Cameron A. MacKenzie, and Iris V. Rivero

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Application of Bayesian Belief Network for Agile Kanban Backlog Estimation

Eric Weflen, Kevin Korniejeiczuk, Sharon Lau, Steve Kryk, Cameron MacKenzie, Iris V. Rivero

Industrial and Manufacturing Systems Engineering
Iowa State University, Ames, IA USA 50011
What is Agile Kanban? [1,2]

- Different from Kanban for JIT manufacturing!
- Visualization of workflow
- Limit work in process (WIP)

What is Agile Kanban?
Traditional Delivery Estimation

- Use “Story Point” estimation

0, 1, 2, 3, 5, 8, 13, 20, 50, 100

- Calculate Velocity (points/day)
- Use Velocity to estimate when task leave backlog

Traditional Delivery Estimation

- High level of maintenance
- Difficult to predict lead times
  - New tasks added constantly
  - Tasks cancelled
  - Reprioritization
- Current tools adapted to Agile Kanban
Bayesian Networks
(influence diagrams)

Graphical representation of a complex uncertainty
Research Question

Can a Bayesian Belief Network be used to estimate lead time for tasks to leave the backlog?
Model – Data Collection

- Need historical team data
- Tracked Kanban team at Andersen Crop.
- Team used Story Point estimation
- Collected data for 4 weeks
- Estimated conditional probabilities for 5 uncertainties
Decision – Backlog Position

- New project arrives
- Team needs to decide where in the ordered list the new project should be placed
- Alternatives: Position 5, 10, 15, 20, or 25
Results - Cumulative Density Function

CDF: Lead Time

- Probability Work Starts (%)
- Lead Time (Business Days)
- Position 5
- Position 10
- Position 15
Conclusions

- Account for risks missed by story point estimation
- Reduce maintenance overhead
- Further work needed to verify accuracy