Real Life Risk Based Project Management for LEAN and Agile Development

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The way software is being developed is changing

- "Waterfall processes have become obstacles to speed, quality and predictability" – Forrester Research
- 2014 CIO Magazine - 85% of CIO's using or planning to pursue Agile
- 2015 industry survey - 94% of organizations use agile

Change from Waterfall is difficult for government

- Waterfall tends to be the way that contracts are constructed
- Agile is challenging because of flexibility, cost effectiveness and results being immediately visible

Even with agile, structure still needs to be retained

- “In large organizations … you can’t just apply agile as you do at the team level, you need to scale it. That is where some of the principles and practices of more traditional techniques come into play, and agile alone won’t cut it” – Forrester Research
Background

- Key tools need to be retained
  - Project plans and Gantt charts used by senior leaders
  - Risk registers for whole project must still be created and maintained
  - Expenditure plans are made years ahead of time and are not flexible

- Tools are not always used to best effect
  - Microsoft Project plans become large, complex and unwieldy
  - Predicting and managing risk is not an exact science
    - Especially in software development.
  - Risk register required part of project management but
    - Often not used as a tool
    - More about ‘ticking the box’
Background

- Project description
  
  *What is the way ahead for improving and upgrading G081/MAF LOG C2 system technology so that AMC can continue to support first rate maintenance of the Strategic Airlift of the United States?*

- Issue:
  
  - How to manage risk and project in a DOD environment
Background

- We implemented a hybrid approach that works in practice

- A practical approach for:
  - Delivering real incremental solutions and
  - Meeting project management requirements

- Hybrid approach using
  - Standard project management (Gantt, Critical Path, etc.)
  - Risk based tracking and decision support
  - Kanban and other LEAN principles
  - Agile development

- Built on previous work
Project Management Approach

**Project Control**
- MS Project
- Critical Path Analysis
- % Completion
- Regular reviews

**Details Planning Tools**
- Kanban (LEAN)
- Manage backlog
- Track completion
- Regulate maximum workload

**Project Execution**
- Burn down charts
- SCRUMMs
- Teams – developers, AMC, Partners, IV&V
- Lessons learned

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RISK ASSESSMENT AND MANAGEMENT

The 27th Annual IEEE Software Technology Conference, Long Beach, California
Approach Taken

- **Overview of approach:**
  
  • Begin with risk analysis of project to determine
    
    - Areas that require further investigation (mitigate technical risk)
    
    - What order to do things in
  
  • Develop project plan MS Project Gantt
  
  • Create a Kanban
  
  • Assign tasks to the development team
  
  • Development team break tasks down into sprints

- **Approach requires regular meetings and reviews**

- **Each meeting takes same format – risk, Gantt, Kanban, Progress on development, issues to change risk**
Previous work

- Risk based decision support
  - “A Methodology for Providing a Quantifiable Comparative Risk Analysis for Evaluating Business Alternatives” - 11th World Conference in transport Research, June 2007, Berkeley University,
  - Approach that uses risk to evaluate various alternatives
  - Used successfully with the UK Ministry of Defence (MOD), FAA and DOD
  - Uses a risk index
  - Everything can be described as a risk
  - Used to compare stages in a project

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Previous work

- Successful use of “agile development” for government work
- Used on a project for the UK MOD
  - Project was having difficulty delivering
  - Used ‘agile’ approach – backlog, rapid development, etc.
- Adapted to focus on what was critical in government work
  - Forming a partnership between developers, users and project managers
  - MOD staff defined the requirements & the vision
  - Short ‘Sprints’ that delivered incremental functionality
  - Willingness to change and adapt increments based on feedback
- Recognized by Harvard Kennedy School of Government as a ‘Bright Ideas’ project
Risk Analysis

- For current project, developed a risk based approach to project tracking and management
  - Risks cover all aspects project, technology, staffing, etc.
  - About 15 risks are looked at individually
    Looked at in context of AS-IS (now), In Dev and final system (TO-BE)
  - Reviewed every meeting (6 weeks) by entire IPT team
Risk Analysis

- Tool is cloud based – available to all members
- IPT teams is multi-disciplinary with deep knowledge of all aspects of project (not just technical)
- Risks are evaluated individually – deliberately hide the ‘big picture’
- Analysis is ‘baselined’ before each meeting
- Risks can be added or removed – all is documented
- Each risk has a description, issue and mitigation information
- Team asked to evaluate:
  - Likelihood:  E = near Certain   D = Highly Likely   C = Moderate   B = Low   A = Not likely
  - Consequences:  1 = Minimal impact  2 = Minor, able to maintain same approach  3 = Moderate shortfalls, workarounds exist  4 = Unacceptable, workarounds exist  5 = Unacceptable, no alternatives exist
Risk Summary

- Summary tab displayed after going through risks (discovery)

- Can go back over previous risk summaries to check trends
The risk summary goes from April 15 to August 14, typo?

MOEN, SHERYL L GS-12 USAF AMC A4/A4PI, 9/17/2015
Experience with the tool has shown
- Risks are evaluated at every IPT they are not ignored
- IPT team members have different skills (e.g. project management, technology, development, etc.) so risks also cover multiple areas
- Tool is easy to use and cloud based, it is not time consuming
- Individual risks are looked at before any summary is considered, so there is discovery – avoids ‘cooking the results’
- By making history integral to the tool, an overview is possible to check that project risks make sense and are being managed
- Since risks cover every aspect of the project, the tool can be used to prioritize next steps and develop mitigations

Bottom line: Risk Analysis is being used to ‘analyze’, ‘monitor’ and ‘react to’ in order to underpin and support project management
Project Control

- Project control is key - required by funding authorities
  - Need to understand what the project is
  - What to ensure that there is a plan that will deliver
  - Have a duty of care to ensure to maximize return on funds
  - Need to make sure that project is following the plan

- Typically use traditional project management tools such as
  - Microsoft Project
  - Critical path analysis
  - Financial reporting and Key Performance Indicators (KPI)
  - Risk register

- For this project, these are all provided in a form that matches expectations
Project Execution

- Using agile development
- Principles include
  - Active user involvement
  - Flexibility as requirements evolve over time
  - A backlog of tasks to be done
  - Rapid development of small increments
  - Iteration, re-use and ability to reject and ‘start again’
  - Daily short stand up team meetings (SCRUM)
- Agile and traditional project control are not a good match
  - 5 year budget plans versus rapidly evolving technologies
  - Requirements that evolve as they are better understood versus requirements fully documented before start
  - Teams made up of developers, users and managers versus contract out and wait for product
Project Execution

- Government environments do not have sufficient flexibility
- We consistently struggle to find a way to allow agile development to proceed while also supporting traditional project control

Involves:
- Regular IPTs with users, developers, project control and managers
- Using risk to control and determine what needs to be done next
- Using small Proof Of Principle (POP) tests when required – e.g. to validate a technology
- Using Kanban to tie project control and agile development
  - A way to visualize tasks in a project by dividing them into columns and rows
  - Originally developed by Toyota – part of LEAN
  - Graphical and intuitive
  - Being increasingly used with agile development
Kanban example

- Tasks map to Microsoft project plan
- Columns indicate backlog, in progress or done
- Swim lanes group similar tasks together
- Provides powerful visual view of what is complete, what is being done and what remains

<table>
<thead>
<tr>
<th>Task</th>
<th>Backlog</th>
<th>Work in progress</th>
<th>Done</th>
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<tbody>
<tr>
<td>Conduct Annual Project Reviews</td>
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<tr>
<td>Regular IPT - inc. risk review (ID 1)</td>
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<tr>
<td>Maintain and update dashboard (files, kanban and risk)</td>
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<td>IV&amp;V of on-going tasks</td>
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<td>Modify training documentation</td>
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<td>Change management</td>
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<td>Program management documents</td>
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<td>Acquire necessary batch hardware, software</td>
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<td>Conduct external technical Support</td>
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<td>SQL Server</td>
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<tr>
<td>Evaluate and select best automatic functional testing tool</td>
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<td>Prove IMS data source can be accessed via ADO.Net</td>
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<td>Prove that SCL Server can perform well enough to handle</td>
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<td>Prove that we can build Data Structures on SQL to Match</td>
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<tr>
<td>Evaluate reporting and user self-service report generation</td>
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Project Management Approach

Project Control

- Waterfall approach
- Provides % completion, critical path, milestones, etc.

Details Planning Tools

- One to one mapping with MS Project tasks
- Logical grouping into swim lanes
- Powerful visual overview of project
- Insight into potential work overload

Project Execution

- Individual Kanban task split into multiple Sprints
- Feed back completion and burn down to Kanban and MS Project
- User involvement

RISK ASSESSMENT AND MANAGEMENT

- Provides risk register
- Helps determine what to do next
- Highlights technical risks
Conclusions

- Project is proceeding well
  - Initial skepticism replaced by enthusiasm
  - Able to supply the information required at all levels in government environment
  - Delivering rapid, incremental steps
  - Regular multi-disciplinary IPTs vital to keep things on track
  - Risk tool has become a real project asset
  - Kanban has provided visualization of how things are going

- But not without its challenges
  - Not a ‘magic bullet’
  - Change management and expectation management a real challenge
  - At times, traditional and agile approaches difficult to integrate
  - Successful so far because in-house teams are being used
  - May require new levels of partnerships between contractors and government agencies
Questions?
Acronyms & References

- CIO – Chief Information Officer
- DOD – Department of Defense
- DOT – Department of Transportation
- FAA – Federal Aviation Administration
- IPT – In Process Team
- KPI - Key Performance Indicators
- MOD - UK Ministry of Defence
- POP - Proof Of Principle

References

Backup slides
LEAN and Kanban

- Kanban used to join the traditional PM and Agile
- LEAN\(^1\) – combination of risk, agile, traditional PM and Kanban work together to support LEAN principles:
  - Identify value from the standpoint of the end customer
  - Identify all the steps in the value stream, eliminating whenever possible those steps that do not create value.
  - Make the value-creating steps occur in tight sequence
  - As flow is introduced, let customers pull value from the next upstream activity.
  - Begin the process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

1. From the LEAN Enterprise Institute