Achieving High Maturity and Agility using Kanban

dja@agilemanagement.net
A high maturity culture is described in GG5

“Optimizing the processes that are agile and innovative depends on the participation of an empowered workforce...”

* Chrissis, Mary Beth, Mike Konrad and Sandra Shrum, CMMI Second Edition: Guidelines for Process Integration and Product Improvement, Addison Wesley 2006, page 168 emphasis added
“...The organization’s ability to rapidly respond to changes and opportunities is enhanced by finding ways to accelerate and share learning. Improvement of the process is inherently part of everybody’s role,...”

The Generic Goals of CMMI do not provide any guidance on how to create a culture that delivers on the vision of a high maturity organization.
Kanban is emerging as an enabler of a high maturity culture
Recipe for Success

- Focus on Quality
- Reduce (or limit) Work-in-Progress
- Balance Demand against Throughput
- Prioritize

And for advanced credit...
- Reduce variability in the process and its flow
Map the value stream
Measure flow of valued work
Example: Corbis Sustaining Engineering

SLA = 21 calendar days from date added to "Engineering Ready" queue to date in Production

Legend:
- Queue: Status
- Activity: Status
- Status: Activity
- Off-Page: Reference

"Engineering Ready" queue will have a list of items; items can only be added to the queue if (1) a slot is open and (2) a release is scheduled within 21 days. Items added to the queue can be change requests or bugs.

Releases will be scheduled every two weeks.

Software Engineering - Managed
Example: Microsoft XIT

Virtual Kanban limit initially 8 = WIP + 7 days buffer

Virtual Kanban limit initially 8 = WIP + 7 days buffer
And chart the throughput through the value stream
Manage quantitatively and objectively using only a few simple metrics

- Quality
- WIP (work-in-progress)
- Lead time
- Waste / Efficiency
- Throughput

Across those five:
- Trend
- Variation
Hold a monthly Operations Review and present all the data, invite anyone who wants to come.
Educate the work force to recognize process problems that affect performance
Bottlenecks
Waste Identification and Elimination
Variability in processes and flow of work
Map the value stream and track work on a white board

Hold a standup meeting every day in front of the board
...and track it electronically

Results of Query 610 Dev –
Shows work items currently in
software development plus any
defects associated with work-in-
progress. Defects are not counted
against kanban limit

Queries and Reports – for
specific projects – in this case
sustaining engineering - can be
run from within MS Outlook with a
single click
... or create an application that looks like a whiteboard but provides the archival advantage of an electronic system
Kanban limits create a pull system and white board provides visualization of flow through to delivery.

**Kanban Limit** – regulates WIP at each stage in the process.

**Flow** – from Engineering Ready to Release Ready.

**Pull**
Kanban tickets hold a lot of information that enable decentralized control and local decision making when deciding priority of items to pull through the system.

- **Electronic ID number**
- **Issue attached to change request** – indicates management attention required
- **Assigned engineer**
- **Date Accepted** – clock starts on SLA
- **Hard delivery date** – for regulatory, legal, or strategic reasons
- **Signifies item that has exceeded SLA** – indicates that item should be prioritized if possible
Colors are used to designate classes of service for work items.

Change Requests and Production Bugs – Customer valued and prioritized by governing board.
Quantity of blue tickets on the board is an immediate indicator of development quality that is impeding flow of customer valued work and reducing throughput.

**Engineering Defects** – direct indicator of quality impact on productivity, *linked* to yellow sticky, not counted against kanban limit.
Non-customer valued but essential work is tracked as a different class of work.

IT Maintenance Work – Technology department reserving capacity for its own maintenance – difficult to prioritize with business – count against kanban limits.
Expediting – *the Silver Bullet*

- Process allows for a single *Silver Bullet* expedite request
- Silver bullet is *hand carried* through the system
  - Personal attention from project manager
  - Automatically jumps queues
  - Required specialist resources drop other work in preference to working the *silver bullet*
- Release dates may be adjusted to accommodate required delivery date
Quantity of pink *issue* tickets on the board directly indicates flow impacting problems that need attention from management.

Issues are the exception – attached to work items that are blocked for external reasons and call attention to problems preventing smooth flow.
Temporary classes of work may be introduced tactically to maximize exploitation of the system.

**Extra Bug** – Special class of production bug, worked by slack developer resources and specially selected not to impact solutions analysis. Tested by developers not testers. Allows maximum exploitation for improved throughput.
Kanban delivers *iterationless* development

- Releases were agreed and planned for every 2\textsuperscript{nd} Wednesday
- Prioritization Board meetings were held every Monday
- Release content is bound and published only 5 days prior
- Prioritization meetings are required only to answer the question, “Which items from the backlog do we want to select this week to fill any empty slots in the input queue?”
- Prioritization holds change request selection until the *last responsible moment*
- It keeps (real) options open
Kanban innovates on typical agile/iterative development by introducing a late binding release commitment

- Kanban system breaks constraint of typical agile/iterative 2-4 week cycle
- Requests can take up to 100 days to process but releases still made every 14 days
- Average item takes 14 days of engineering
- Input and sizing is decoupled from cadence of releases
- Decision on content of release made 5 days prior to release
- No estimation is done on individual items
- Effort to estimate is turned back to productivity (analysis, coding, testing)
Kanban uses a daily standup meeting as a central enabler of a Kaizen culture

In this example more than 40 people attend a standup for a large project with 6 concurrent development teams. The meeting is usually completed in approximately 10 minutes. Never more than 15.
Look how the board has changed by March! Empirically adjusted Kanban limits reacting to industrial engineering issues. Much neater presentation – pride in the process is forming
And again in April, more changes to Kanban limits and forward extension of the process to business analysis.
Waste bin spontaneously introduced by team to visually communicate rejected CRs that wasted energy and sucked productivity.
A report was created to detail rejected or canceled work items.

<table>
<thead>
<tr>
<th>ID</th>
<th>Work Item Type</th>
<th>Title</th>
<th>Business Dept.</th>
<th>GTM-Related</th>
<th>Business Priority</th>
<th>Submitted Date</th>
<th>Approved Date</th>
<th>Closed Date</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>2470</td>
<td>OR</td>
<td>Test  OR</td>
<td>Creative Resources</td>
<td>Not related to GTM</td>
<td>1 - High</td>
<td>4/2/2007</td>
<td>4/15/2007</td>
<td>4/16/2007</td>
<td>Overseen by SWTR</td>
</tr>
<tr>
<td>1462</td>
<td>OR</td>
<td>Employee - &quot; registration not possible for big firm&quot;</td>
<td>Customer Experience</td>
<td>Not related to GTM</td>
<td>2 - High</td>
<td>11/28/2006</td>
<td>4/12/2007</td>
<td>Released</td>
<td></td>
</tr>
</tbody>
</table>
Spontaneous Quality Circles started forming

- Kanban board gives visibility into process issues – ragged flow, transaction costs of releases or transfers through stages in process, bottlenecks
- Daily standup provides forum for spontaneous association to attack process issues affecting productivity and lead time
- For example, 3 day freeze on test environment was a transaction cost on release that caused a bottleneck at “build” state. This was reduced to 24 hours after a 3 person quality circle formed to investigate the policies behind the freeze. Result was improved smooth flow resulting in higher throughput and shorter lead time
Other spontaneous quality circle kaizen events

- Empirically adjusted kanban limits several times
  - E.g. test kanban too small, causing ragged flow
- UAT state added
  - Prompted by test who were experiencing slack time
- Expanded kanban limit on Build Ready state, added Test Ready state
  - Introduced to smooth flow post release due to environment outage transaction cost
- Introduced kanban board, daily standup, colored post-it notes for different classes of service, notations on the post-its
- Poor requirements causing downstream waste resulted in an upstream inspection to eliminate issues with poorly specified requests
September 2007 – Business Analysis and Systems Analysis merged eliminating 25% of lead time consumed as queuing waste
And the technique is being introduced to major projects with much longer time horizons. This example has a monthly “integration event” rather than a release every two weeks.
5 months later significant changes are evident
Major project with two-tiered kanban board
Major Project with two-tiered kanban board using swim lanes for *feature sets*
Less mature major project in trouble adopts kanban to bring a focus to daily routine and visibility to work-in-progress to team and management.
Next Day – Team is maturing quickly and has refactored the board with swim lanes for functional areas.
Bargaining, Democracy & Collaboration

- First 8 weeks prioritization board would bargain against the available slots and WIP limit
  - I’ve got two small requests can you treat them as one?

- People started to lobby each other and build business cases to get items selected

- Familiarity with the system led to the consensus decision to adopt a democratic process

- 3 months later it was evident that democracy didn’t always select the best candidate

- And it was replaced with a collaborative process based on strategic and current tactical marketing objectives
The process has shown remarkable robustness to gaming from the business

- Prioritization board consists of VPs from 6 business units
- Understanding that expediting costs throughput and lead time has resulted in an expectation that only critical items qualify for *Silver Bullet* status
- Attempts to game prioritization by setting a delivery date are tightly scrutinized by the board
- As a result the process is self-regulating with the prioritization board enforcing the anti-gaming rules
- As a result the *Silver Bullet* and delivery date options are seldom used
Achieving *high maturity* requires a shift in culture and mindset.
The Agile community has been slow to embrace objective, quantitative techniques that drive for predictable results (CMMI Level 4)
Predictability requires a focus on reducing variability.
Predictability can be used to drive competitive advantage through shorter lead times
High Maturity allows a team to be more agile – to respond to change faster.
Measures used in Kanban to facilitate quantitative measurement and predictability...
WIP growth due to additional resource allocation (good) and some sloppy management of kanban limits (bad).

Business encouraged to re-triage backlog.
Issue Management Cumulative Flow

Issues and Blocked Work Items

How many issues and blocked work items do we have?
Revisiting Cumulative Flow

Lead Times are lengthening again due to environment rebuild and business requested delay waiting for expedite request.

Cumulative Work Item Count

Backlogged Requests
Work In Process
Released
Due Date Performance Detail

**MARCH**

Lead Time Distribution

- Majority of CRs range 30 -> 55

**APRIL**

Lead Time Distribution

- Outliers
- Majority of CRs range 30 -> 55
Kanban summary

- **Culture Change**
  - Trust, empowerment, objective data measurement, collaborative team working and focus on quality

- **Policy Changes**
  - Late-binding release scope, no estimating, late-binding prioritization

- **Regular delivery cadence**

- **Cross-functional collaboration**
  - Previously unheard of VP level selfless collaboration on business priority

- **Self-regulating process robust to gaming and abuse**

- **Continuous Improvement**
  - Increased throughput, high quality, process continually evolving, kanban limits empirically adjusted
Kanban is emerging as a method to achieve agility and high maturity.
Kanban creates the desired cultural shift to an objective, consensus-based, empowered *kaizen* culture.
Kanban has enabled agile teams to break through to CMMI Level 4 behaviors
Learn More about kanban

- Join the Kanbandev Yahoo! Group
- Leading thinkers
  - Corey Ladas
  - Karl Scotland
  - Aaron Sanders
  - Eric Willeke
  - Eric Landes
  - Kenji Hiranabe
  - Alisson Vale
- Kanban Collected Knowledge
  - http://availagility.wordpress.com/kanban/
- Agile Management Blog
  - http://www.agilemanagemeent.net/Articles/Weblog/blog.html
Thank you!

dja@agilemanagement.net

http://www.agilemanagement.net/
David Anderson is a thought leader in managing effective software teams. He leads a consulting firm dedicated to improving economic performance of knowledge worker businesses – improving agility, reducing cycle times, improving productivity and efficiency in technology development.

He has 25+ years experience in the software industry starting with computer games in the early 1980’s. He has led software teams delivering superior productivity and quality using innovative agile methods. He developed MSF for CMMI Process Improvement for Microsoft. He is a co-author of the SEI Technical Note, CMMI and Agile: Why not embrace both!


David was a founder of the APLN, a not for profit dedicated to promoting better standards of leadership and management in knowledge worker industries. Email… dja@agilemanagement.net