SAFE YOURSELF FROM FRANKENAGILEMETRICS

METRICS THAT CAN KILL YOUR BUSINESS

THE HORROR
THE SHOCK
THE SHAME
IS IT ALL THE SAME?
Scaled Agile Metrics don’t have to be a horror show.
Larry Maccherone
@LMaccherone
LMaccherone@rallydev.com
SAFe
2.x
Metrics
SAFe 3.0 Metrics

Portfolio M1-M5

ART M1-M5
<table>
<thead>
<tr>
<th><strong>SAFe 2.x</strong></th>
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<td><strong>ART M5</strong> PI Metrics</td>
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<td></td>
<td><strong>Portfolio M4</strong> Portfolio Management Self-Assessment</td>
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</table>
Agenda

1. How does your creation “think?” (The 7 Deadly Sins of Agile Measurement)

2. What are the “body parts?”

3. How do the parts hang on the “skeleton?”
To avoid creating a monster, stay away from ...

**The 7 Deadly Sins of Agile Measurement**

1. Manipulating Others
2. Unbalanced Metrics
3. Quantitative Idolatry
4. Overpriced Metrics
5. Lazy Metrics
6. Bad Analysis
7. Linear Forecasting
Sin #1

Manipulating Others

Using metrics as a “lever” to drive someone else’s behavior
Feedback

Feedback measures are used to improve **your** own performance

Lever

Lever measures are employed to change **someone else's** behavior
Motivating folks to hide data
Heavenly Virtue #1

Self-Improvement

Using metrics as a mirror to improve your own outcomes
Time in Process (TiP) chart. No red lines. No red dots.
Sin #2

Unbalanced Metrics

Measuring one area and ignoring the effect on other areas
Heavenly Virtue #2

Balanced Metrics

Being aware of the interaction between metrics
Do it Fast
Productivity
Responsiveness

Do it Right
Quality
Customer Delight

Do it On Time
Predictability

Keep Doing It
Employee Engagement

Build-the-Right-Thing Metric
The Software Development Performance Index (SDPI)

An index in 4 to 8 dimensions

- Extracted from ALM/Kanban Tool
  - Responsiveness
  - Predictability
  - Productivity
  - Quality

- Acquired from lightweight survey
  - Customer Satisfaction
  - Employee Engagement

- Acquired from other tools
  - “Build-the-right-thing” metric
  - Code Quality
Sin #3

Quantitative Idolatry

Believing that metrics can replace thinking

{ trust is critical in this culture }
“Not everything that counts can be counted.”
Heavenly Virtue #3

Quantitative Perspective

Keeping metrics in their place
Sin #4

Overpriced Metrics

Data that takes too much time, effort, or money
Heavenly Virtue #4

Occam’s Metrics

All other things being equal, the simplest data collection system is the best.
Sin #5

Lazy Metrics

Using metrics that may be convenient, but are wrong
When NOT to take a shot.

Good Players?

Monta Ellis
9th highest scorer
(8th last season)

Carmelo Anthony
(Melo)
8th highest scorer
(3rd last season)
Heavenly Virtue #5

ODIM

Thinking through what you want and working backwards
Strategy fails one small decision at a time
Sin #6

Bad Analysis

Thinking you know statistics, when you don’t
Remember that control chart?
Bad application of control chart

Process Control (Average Cycle Time)

Cycle Time (Days)

- UPPER CONTROL LIMIT: 32.87 Days
- MEAN: 8.22 Days
- LOWER CONTROL LIMIT: 0 Days

Date Range: 12/2011 to 08/2012
What is normal?

- $0.1\%$ at $-3\sigma$
- $2.1\%$ at $-2\sigma$
- $13.6\%$ at $-1\sigma$
- $34.1\%$ at $\mu$
- $34.1\%$ at $1\sigma$
- $13.6\%$ at $2\sigma$
- $2.1\%$ at $3\sigma$
- $0.1\%$
Are you normal? No.
Heavenly Virtue #6

Informed Analysis

Partnering with experts in statistical analysis
Time in Process (TiP) chart shows the histogram
Risk Calculation Off

3x-10x assuming Normal Distribution
2.5x-5x assuming Poisson distribution
7x-20x using Shewhart’s method

“Heavy tail phenomena are not incomprehensible… but they cannot be understood with traditional statistical tools. Using the wrong tools is incomprehensible.”

-- Roger Cooke and Daan Nieboer
Sin #7

Linear Forecasting

Forecasting without discussing probability and risk
Heavenly Virtue #7

Probability Tools

Discussing and communicating probability and risk
Monte Carlo Simulation

[Diagram showing Monte Carlo simulation with iteration on the x-axis and scope on the y-axis, indicating traditional burn up and projected burn up with Monte Carlo simulations.]
Always keep in mind ...

The Seven Heavenly Virtues

1. Self-Improvement
2. Balanced Metrics
3. Quantitative Perspective
4. Occam’s Metrics
5. ODIM
6. Informed Analysis
7. Probability Tools

The Seven Heavenly Virtues
Agenda

1. How does your creation “think?” (The 7 Deadly Sins of Agile Measurement)

2. What are the “body parts?”

3. How do the parts hang on the “skeleton?”

Credit: Andy Carlson for this “body” section
ART M1: Iteration Metrics
(M1 Iteration Metrics)

Description: The end of each Iteration is an opportune time for each Agile Team to collect whatever metrics the team has agreed to. This occurs in the quantitative part of the team Retrospective. One such team’s metrics is illustrated in Figure 1.‡

Intent: Team-level metrics, focusing on what/how a team would like to view their progress of the iteration. M1 is not prescriptive; the figure provides an example.

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Iteration 1</th>
<th>Iteration 2</th>
<th>Iteration 3</th>
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<tr>
<td>Velocity planned</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Stories accepted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Stories accepted</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Quality                       |             |             |             |
| % Unit test coverage          |             |             |             |
| # Defects                     |             |             |             |
| # New test cases              |             |             |             |
| # New test cases automated    |             |             |             |
| Total tests                   |             |             |             |
| Total % test automated        |             |             |             |
| # Refactors                   |             |             |             |

Fig. 1 ‡
ART M1 Iteration Metrics (M1 Iteration Metrics)

Rally’s solution:
- Iteration Burndown
- Iteration Cumulative Flow
- Iteration Summary
- Track→Release Metrics
ART M2: SAFe ScrumXP Team Self-Assessment (M2 SAFe ScrumXP Team Self-Assessment)

Description: Agile teams continuously assess and improve their process. Often this is via a structured, periodic self-assessment. This gives the team time to reflect on and discuss the key practices that help yield the results.

Intent: Team’s continuous improvement framework
ART M2: SAFe ScrumXP Team Self-Assessment (M2 SAFe ScrumXP Team Self-Assessment)

Rally’s solution:
● None

Future improvement:
● (soon) Rally Assessment and Tracking

Beyond M2:
● Planned product goes beyond SAFe M2/M3 with tracking, customization, and visualization
ART M3: Agile Release Train Self Assessment (M3 Agile Release Train Self Assessment)

Description: As Program execution is a core value of SAFe, The Agile Release Train also continuously works to improve its performance. The following self-assessment form can be used for this purpose. This can be used at PSI boundaries or any time the teams wants to pause and assess their organization and practices. Trending this data over time is a key performance indicator for the program.

Intent: Program’s continuous improvement framework for the PSI
ART M3: Agile Release Train Self Assessment
(M3 Agile Release Train Self Assessment)

Rally’s solution:
- None

Future improvement:
- (soon) Rally Assessment and Tracking

Beyond M2:
- Planned product goes beyond SAFe M2/M3 with tracking, customization, and visualization
ART M4: Release Progress Reports
(M4: Release Progress Reports)

Description:
(1) Release Train Program Level PSI Burndown: Given the criticality of release train PSI|Release timebox(es), status is important to assess in real time. Example: overall burn-down (fig. 4).
(2) Release/PSI Feature Progress Report: Burndown tells you overall status but not what to do about it, nor which features might be impacted. We need a feature completeness report (fig. 5), which shows what’s on track or behind. Together, these reports provide actionable data for scope and resource management.

Intent:
Presents Actual vs. Planned burndown of story points for a PSI by iteration highlighting the HIP iterations. Provides teams with the ability to see if progress of a PSI is on, ahead, or behind plan. Is the PSI on track, to what extend does the actual story point burndown align with the planned story burndown?

Presents features in a PSI against percent complete with the number of planned vs. the actual story count completion.
ART M4: Release Progress Reports
(M4: Release Progress Reports)

Rally’s solution:
● SAFe Release burndown
● PI burn charts
● Custom Grid (Features Status report)

Beyond M4:
● PSI burnup (custom app)
● PSI Timeline
ART M4: Release Progress Report

Future improvement:
Monte Carlo simulation forecasting
ART M5: PI Metrics (M5: PSI Metrics)

**Description:** The end of each PI is a natural and significant measuring point. After all, that’s where the primary value is delivered (fig. 7).

To assess the overall predictability of the release train, aggregating the individual teams percent of business value achieved compared to plan creates an overall Release Predictability Measure (fig. 8).

**Intent:** To see and track the health and predictability of the Program over time (multiple PIs), both from the perspective of Features delivered and Business Objectives (value) met. Figure 7 provides an example of one program’s metrics, however it is not prescriptive and could be modified.
ART M5: PI Metrics (M5: PSI Metrics)

Rally’s solution:
- Overall Program metrics well covered by various reports

Future improvement:
- New Rally "Objective" entity with UI to allow evaluation of their accomplishment after the PI / PSI (2015?)
Portfolio M1: Lean Portfolio Metrics
(M7: Lean Portfolio KPI Metrics)

Description: If your program portfolio aggregates into a single business unit, product, or solution set, you may need a comprehensive set of Key Progress Indicators (KPIs) that you can use to assess internal and external progress. In the spirit of “the simplest set of measures that can possibly work” at this level, we offer the set in Figure 9.

Intent: Clearly this is just an example, but the idea would be to have a regular way to look at some overall baseline of information at the portfolio level.
Portfolio M1: Lean Portfolio Metrics
(M7: Lean Portfolio KPI Metrics)

Rally’s solution:
- Rally Insights

Future improvement:
- PI-level metrics added to Rally Insights
**Intent:** Visualize Portfolio WiP

**Description:** The portfolio Kanban board (Fig. 3) makes cross program business initiative Epics visible. Each column on the board represents a state within the Epic workflow. Epics with a "go" decision are promoted to the "Portfolio Backlog" state. As soon as there is sufficient capacity from the Agile Release Trains, the next highest priority Epic is "pulled" from the Portfolio Backlog and is moved to the "implementing" state; the Epic is then tracked using the Measuring Epics reports (See M2: Measuring Epics) below.

With a visual board such as that indicated in a Figure 3, Bottlenecks are easy to identify visually. When Epics pile up in a column or when they exceed the WiP limit. In this case Architectural and Business Epics are managed using a single Portfolio Kanban board to help ensure alignment. However each type of Epic has its own "swim lane" and WiP limits since the analysis is done by different groups of people with different capacities. ‡

**Fig. 3 ‡**
Portfolio M2: Portfolio Kanban Board (New for SAFe 3.0)

Rally’s solution:
- Portfolio kanban board
Portfolio M3: Measuring Epics (M6: Epic Success Criteria)

Description: Epics are key economic drivers for any Release Train. As part of the lightweight business case that is developed in the Architecture or Portfolio Kanban, each epic should have success criteria that can be used to help establish scope and drive more detailed feature elaboration. An example for an architecture epic appears in Figure 8.

Intent: Did we meet our objectives?

Exposed functionality in the form of Java API to 3rd party developers

1) API is secured and authentication methods are compatible with our partners’ protocols
2) API documentation released to the partners in the form of JavaDocs
3) All the domain logic in all systems, except our admin applications, should be exposed as Java APIs.

Fig. 8
Portfolio M3: Measuring Epics (Added in SAFe 3.0)

**Description:** The Epic Burn-Up report in Fig. 4 shows the Epic’s budget, actual story points done, and cumulative story points completed over time. This provides visibility into how much effort is being expended on the Epic across programs, teams, and time (sprints). The actual and cumulative story points completed are rolled up from the Epic’s child features and stories.

**Intent:** Are we on track for one epic?
Portfolio M3: Measuring Epics (Added in SAFe 3.0)

The Epic Progress Report provides an at-a-glance view of the progress of all Epics for a particular Program Portfolio. The length of the bar represents the total current estimated story points for an Epic’s child features/stories. The dark green area represents the actual story points completed; the light green area depicts the total story points that are in the “in progress” state. The initial estimate shows the story points that were approved in the Epic’s lightweight business case and is depicted by a vertical red line.‡

**Intent:** Are we on track for all epics?
Portfolio M3: Measuring Epics (M6: Epic Success Criteria)

Rally’s solution:

- Success criteria: Put acceptance criteria into description of the Epic
- Epic burn-up: Portfolio Item burn chart
- Epic progress: Portfolio Item status (on grids)

Future improvement:

- New Rally "Objective" entity with UI to allow evaluation of their accomplishment after the PSI (2015?)
Portfolio M4: Portfolio Mgmt. Self-Assessment (New for SAFe 3.0)

**Description:** The Program Portfolio Management team continuously assesses and improves their processes. Often this is done using a structured, periodic self assessment. When the PPM team completes the spreadsheet, it will automatically produce a radar chart such as Fig. seven, which highlights relative strengths and weaknesses.

**Intent:** Continuous improvement framework for portfolio management.
Portfolio M4: Portfolio Mgmt. Self-Assessment (New for SAFe 3.0)

Rally’s solution:
- none

Future improvement:
- (soon) Rally Assessment and Tracking

Beyond:
- Planned product goes beyond SAFe with tracking, customization, and visualization
**Portfolio M5: Enterprise Balanced Scorecard**

*(M8: Enterprise Balanced Scorecard)*

**Description:** If yours is a larger enterprise, and your company focuses on comprehensive measurements, then you might want to gather a set of “balanced scorecard” measures for each business unit, and then map them into an executive dashboard like figures 10 and 11.‡

**Intent:** KPIs at the organization level

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Fig. 10 ‡

Fig. 11 ‡
Portfolio M5: Enterprise Balanced Scorecard
(M8: Enterprise Balanced Scorecard)

Rally’s solution:
- Rally Insights

Future improvement:
- Two more dimensions
Agenda

1. How does your creation “think?” (The 7 Deadly Sins of Agile Measurement)

2. What are the “body parts?”

3. How do the parts hang on the “skeleton?”
SAFe 3.0 Metrics

Portfolio M1-M5

ART M1-M5
## Rally Scaled Agile Metrics Rollout

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<th>SAFe 2.x</th>
<th>SAFe 3.0</th>
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</tr>
</tbody>
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### Rally coverage

- **Now**: Available now.
- **2014**: Planned for 2014.
- **Planned**: Future release.

**Rally coverage** includes:
- **Full GA**: Full General Availability.
- **Open Beta**: Open Beta.
- **Not Present**: Not present.

- **Exceeds specification**:
  - Green square indicates Rally coverage that exceeds specification.
  - Red square on the diagonal indicates changes from 2.x to 3.0.
SAFe 3.0 metrics quick stats

- 3/10 "self-assessments"
  from surveys
- 5/10 polar charts
- 1/10 NOT a metric
(Portfolio Kanban)
An alternative skeleton
Scaled Agile Metrics

**Do It Fast**
Productivity, Responsiveness

- Epic/Initiative
- Throughput Velocity TiP

**Do It Right**
Quality, Customer Satisfaction

- Customer Satisfaction

**Do It On Time**
Predictability

- On-time Delivery

**Keep Doing It**
Employee Satisfaction

- Financials
- Cash Flow

---

**Organization**

- Epic/Initiative
- Throughput Velocity TiP
- Customer Satisfaction
- On-time Delivery

**Program**

- Features
- Throughput Velocity TiP
- Defect Aging
- Defect Arrival / Kill
- Stakeholder Satisfaction
- PSI Release / Timebox Burn
- On-time Delivery
- Feature Burn
- Feature Probability

- ROI
- "Build the right thing"
- Funnel

**Team**

- Story/Defect
- Throughput Velocity TiP
- Defect Arrival / Kill
- Defect Density
- Test Case Flow
- Iteration Burn
- Predictability
- Iteration Say / Do

- Employee Engagement

---

**LEGEND**

- SDPI Now
- SDPI Planned
- ALM Now
- ALM Planned
- PPM Tools
- Assessment & Tracking Planned
What?, So what?, Now what?
Another aspect of "coverage"
What?

So what?

Now what?
What?
History of O-Ring Damage in Field Joints

<table>
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<th>O-Ring Temp (°F)</th>
<th>Development Motor Number</th>
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<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

**Static Test Motors:***
- Horizontal Assembly
- Some putty repaired

**Code:***
- S = Heating of Secondary O-Ring
- B = Primary O-Ring Blowby
- E = Primary O-Ring Erosion
- H = Heating of Primary O-Ring
- = No Damage

**O-Ring Temp (°F):***

- SRM 1: 68°, 70°, 69°, 68°, 72°, 73°, 70°, 70°, 58°, 69°, 69°, 68°, 72°, 73°, 70°, 70°
- SRM 2: 67°, 67°, 67°, 67°, 65°, 63°, 63°, 63°, 63°, 63°, 63°, 63°, 63°, 63°, 63°, 63°
- SRM 3: 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°, 75°
- SRM 5: 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°, 58°

**Not Erosion:**

Information on this page was prepared to support an oral presentation and cannot be considered complete without the oral discussion.
So what?
Extrapolation of damage curve to the cold Challenger launch: 31° forecasted temperature for January 28, 1986

Dots indicate temperature and O-ring damage for 24 successful launches prior to Challenger. Curve shows increasing damage is related to cooler temperatures.

Visualization is like photography. Impact is a function of focus, illumination, and perspective.

— Larry Maccherone
Now what?
Don’t launch!
Prevent your own disastrous decisions with better visualization and insight
ALM Charts
Monte Carlo Forecasting
What-If Analysis

Assessment & Tracking
Survey Design
Transformation Plan Development

Performance Index
Benchmarking & Economic Model
Recommendation Engine

What? What is this?
So what? Why is this important?
Now what? What can I do about it?

Delivering
Understanding
Improving

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Making great decisions

- Every decision is a mini prediction.
- You are predicting that your choice will outperform the alternatives.
- So, the quality of a decision is a function of:
  1. alternatives considered, and;
  2. the predictive power of the model you use to evaluate them.
We don't see things the way *they* are.

We see things the way *we* are.

~The Talmud
How to win data and influence people

Top tips

Effective visualizations:

- Answer the question, “Compared to what?”
- Show risk, uncertainty, and probability
- Show causality, or are at least informed by it
- Leave in the numbers
- Leave out the glitter
- Allow you to see the forest AND the trees
- Progress from “What?” to “So what?” and then “Now what?”

Soft skills that help make the case:

- Tell a good story
- Become known for being right
- Avoid wars about semantics
- Imperfect evidence is better than no evidence

Changes the nature of the conversation

Remember the Monte Carlo Simulation?
What's next?

- Get your SAFe big picture
- Visit the Rally booth:
  - Book signing (Jean Tabaka 1-2pm)
  - Questions answered
- Come to my talk at 3:45 in Tallahassee to see the latest research -- pulp-fiction detective style …

The Impact of Agile Quantified: 2014 edition
Replace FOLKLORE with FACTS
Upgrade ANECDOTE to EVIDENCE
Swap INTUITION for INSIGHT