Data Driven Coaching

Safely turning team data into coaching insights (Troy Magennis)

These slides available here: [link]
@t_magennis
troy.magennis@FocusedObjective.com
If it walks like a duck, and quacks like a duck, it could still be a rabbit.
Data is EVIL
Being judged unfairly is un-bearable...

Never coerce
Never embarrass
Make a difference, not just make a point.
Use data to tell a story...
Without a story, data is boring...
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Polio Vaccine Introduced
Measles

Battling Infectious Diseases in the 20th Century: The Impact of Vaccines
By Tyman DelBailo and Dev Friedman
Published Feb. 11, 2013 at 3:45 p.m. ET

The number of infected people, measured over 70-some years and across all 50 states and the District of Columbia, generally declined after vaccines were introduced.
Not compared with anything meaningful (to me.) Boring.
Are you over the hill?

See how many Americans are older and younger than you

Move slider to select your age

You are YOUNGER than 37.3% of Male Americans

On the 7th August

I WANT TO KNOW

But, I may not want you to know.

http://www.datarevelations.com/are-you-over-the-hill-in-the-usa
Makeover
How long does it take us to complete cards?

Where do we need to focus our improvement efforts?
Troy Magennis @t_magennis · Oct 2

"What types of work cause the most future variation in our process delivery rates and lead-time" - finding what work types cause chaos

Troy Magennis @t_magennis · Oct 2

"Is the age of work in process similar to the overall average age for similar types of work" - are we growing or shrinking our average

Troy Magennis @t_magennis · Oct 2

"Is the rate we are completing similar items of work sustainable?" - is the departure rate and arrival rate balanced, how transient.

Troy Magennis @t_magennis · Oct 2

"Are we completing similar work types at the same rate" - is our process getting to completion (done-done)

Troy Magennis @t_magennis · Oct 2

"Is similar work types taking longer to complete?" - is our process changing
Time and Pace related questions

1. Is it taking us longer to do the same type of work?
2. What is a good commitment cycle time to others? (SLA)
3. What is and how stable is our completed work rate?
4. Where should we focus improvement efforts?

• Compared to what?
  • Compared to the same type of work versus all work
  • Compared to the same time period last week/month/year
  • My work compares to others (only seen by me so I can improve)
Q. Is the process stable? First, do no harm.

“If anyone adjusts a stable process, the output that follows will be worse than if (s)he had left the process alone”

Attributed to William J Latzko.
Source: Out of the Crisis. Deming.
How long does it take to complete cards?
Demand on this team decreasing

Bulk close?

Stable distribution

Cycle-time stable
How long does it take us to complete cards?

To view card details, click on top bar chart area or scatter plot data points.
Its too hard and we don’t have the data
Q. What could I do with just start and completed date?

Or follow @t_magennis
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17 charts so far...

Throughput (planned & un-planned)

Throughput Histogram(s)

Cycle Time (planned & un-planned)

Cycle Time Histogram(s)

Work In Process

Cumulative Flow

Arrival vs Departure Rate

Un-planned work Percentage

Cycle Time Distribution Fitting
THROUGHPUT HISTORY TREND (COMPLETED ITEMS PER WEEK)

Count of closed items during week:
- 2015-04: 1
- 2015-05: 5
- 2015-06: 7
- 2015-07: 11
- 2015-08: 7
- 2015-09: 9
- 2015-10: 16
- 2015-11: 10
- 2015-12: 11
- 2015-13: 6
- 2015-14: 7
- 2015-15: 12
- 2015-16: 6
- 2015-17: 8
- 2015-18: 8
- 2015-19: 8
- 2015-20: 9

Year-Week Number:
- 2015-04
- 2015-05
- 2015-06
- 2015-07
- 2015-08
- 2015-09
- 2015-10
- 2015-11
- 2015-12
- 2015-13
- 2015-14
- 2015-15
- 2015-16
- 2015-17
- 2015-18
- 2015-19
- 2015-20


UNPLANNED PERCENTAGE RATE (AVG: 25.85%)

Year-Week Number

Unplanned work rate (in addition to planned work)
1930 to 2012
National League MVP
23% = 19 out of 82 (last time 1988 - Carston)

1930 to 2013
All-American League MVP
19 out of 82 (last time 1984 - Hernandez)

Source: ESPN Playbook - SportsData (infographic at end of this deck)

1955-56 to 2015-16
NBA MVP
37% = 23 out of 62 (last time 2014 – Curry)

Hope Solo
Team USA
You can’t WIN by just having the BEST goalkeeper

A 0-0 draw is the best you can HOPE
The goalkeeper can’t win SOLO
Team versus individual improvement

• As professionals, we are expected to know our jobs
  • Just like in sports, NBA Kobe Bryant is expected to already know core skills.
  • We are expected to know our strengths and weaknesses

• Coaches and managers for professional teams deal more with
  • Balancing the skills available versus needed
  • Helping individuals work as a team in an effective way
  • Help the team focus on improvements based on recent performance
For each capability choose from the list of CURRENT skill level values. If in doubt, err low (left)!

<table>
<thead>
<tr>
<th></th>
<th>Know nothing</th>
<th>Can run and use the tools needed</th>
<th>Can tweak it or do easy bug fixes</th>
<th>Can start from nothing and create</th>
<th>Can teach others</th>
</tr>
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<tbody>
<tr>
<td>CSS</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Javascript</td>
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<tr>
<td>DB Backup/Restore</td>
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</table>

**Ready to Learn**  **Doers**  **Teachers**

---

**Captains: Ability**

| Ability | 5 | 11 | 5 | 3 | 5 | 9 | 4 | 4 | 2 | 8 | 3 | 4 |

**Players: Ability to**

| Ability | 9 | 11 | 9 | 6 | 8 | 9 | 8 | 8 | 6 | 8 | 5 | 6 |

**Bench: Ready to**

| Ability | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 |

**Person 1 - red**

<table>
<thead>
<tr>
<th>Person 1 - red</th>
<th>Create Video Content</th>
<th>Create Written Content</th>
<th>Using Tableau</th>
<th>Penopto Admin</th>
<th>Penopto Content</th>
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<td>2</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
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**Person 2 - blue**

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<td>4</td>
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**Person 8**

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<tr>
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**Person 9**

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**Person 10**

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<td>3</td>
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<td>1</td>
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**Person 11 - blue**

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<tbody>
<tr>
<td>Person 11 - blue</td>
<td>0</td>
<td>4</td>
<td>1</td>
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---

**Urgency (Redder = more urgent)**

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Doers</th>
<th>0</th>
<th>1</th>
<th>2+</th>
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<tr>
<td>0</td>
<td>9</td>
<td>7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2+</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Goals**

Have 2+ people who are Doer's for each skill on the team. If creating new innovations, have at least 1 teacher for each skill.

If a skill is in demand, have at least 1 (preferably 2) teachers on the team (or available), and know who is willing (or able) to be a novice in training to doer.

Know what skills might be needed elsewhere in the company, as your team members might be pulled off at short notice.

Know what skills might be needed to fix incoming defects or production issues when rolling to customer usage.

Know how long (and plan to reduce) the onboarding time from novice to doer levels, prioritized by the skills most anticipated in need for the future.

It's *not* a goal to have everyone at Teacher level for every skill! Your goal is to have a resilient team given un-planned disruptions and the next feature demands.
Find balance... In changing conditions And competing forces
Balanced competing metrics

• If you show just one metric, it will be hit...
  • At the expense of everything else

• Coaching is about seeing the bigger picture
• Coaching is about getting the team to recognize competing forces
• Coaching is about teach the team to make smart trades
• Coaching is about little adjustments
• Coaching is teaching how to adapt to changing conditions/pressures
1. Quality (how well)
   - Escaped defect counts
   - Forecast to complete defects
   - Measure of release “readiness”
   - Test count (passing)

2. Productivity (how much, delivery pace)
   - Throughput
   - Velocity
   - Releases per day

3. Responsiveness (how fast)
   - Lead time
   - Cycle time
   - Defect resolution time

4. Predictability (how repeatable)
   - Coefficient of variation (SD/Mean)
   - Standard deviation of the SD
   - “Stability” of team & process
Team Historical Agile Diagnostic Dashboard

Select your team...

Date range to display...
10/1/2014 12:00:00 AM to 3/31/2015 11:59:59 PM

ZBB - Days to Close Active Bugs

Dev Days to Zero Bugs: 138.1
27 bugs would be resolved by 22 developers in 6.28 days

Responsiveness - Bug cycle-time average

avg forecast using recent bug cycle-time data. Lower is better.

How long it takes from opened to resolved for bugs. Lower is better.

Throughput - Close rate of work items

Predictability - Consistency of delivery pace

How many work items have been closed. Higher is better.

How variable is work throughput. Lower is better.

Responsiveness (how fast)

Quality (how well)

Productivity (how much)

Predictability (how repeatable)
Quality

“If OUR entire TEAM did nothing else but fix bugs this sprint, at OUR historical rate, we would have x days of work”

• Goal is to keep the TEAMS within 10 days of releasable
• Forecast has to be personal for the team
• Days = \frac{\text{Open Bugs} \times \text{Avg(recent cycle time samples)}}{\text{Number of Devs on team}}
Three ways to decrease bug counts and cycle time -
1. Triage bugs quickly. Set them to P1 (fix immediately), P2 (fix as soon as possible), or defer them.
2. Share expert knowledge. Consider having the “expert” who would normally be assigned a defect in a code area lightly assist someone else - now you have an expert in training.
3. Before calling code complete, demo the software to the product owner and testers. This helps obvious defects being found later (and means you don’t get disturbed six months from now).

Three ways to increase and stabilize work item throughput –
1. Stop starting, start finishing, stop starting. Avoid starting every story on day one of the sprint only to have everything ALMOST done at the end of the sprint.
2. Get early feedback on your work from the product owner and testers. This early feedback will avoid bugs and mis-understandings that inhibit “Complete”...

Throughput All - Close rate of work items / Devs

Predictability All - Consistency of delivery pace
Parallel and better

Started worse, but corrected

Improving, against company trend
Better and with company trend

Oops. Still good, but trending adversely

Creeping up...
Don’t Make it Personal

Beautiful + Engaging

Tell a Story

Compared to What

Keep it Simple

Balanced Metrics

Make GREAT tradeoff Decisions

1. Quality (how well)
   - Escaped defect counts
   - Forecast to complete defects
   - Measure of release “readiness”
   - Test count (passing)

2. Productivity (how much, delivery pace)
   - Throughput
   - Velocity
   - Releases per day

3. Responsiveness (how fast)
   - Lead time
   - Cycle time
   - Defect resolution time

4. Predictability (how repeatable)
   - Coefficient of variation (SD/Mean)
   - Standard deviation of the SD
   - "Stability" of team & process
@t_magennis
Troy.Magennis@FocusedObjective.com

Please consider doing the review
Focused Objective
software risk solutions

Conference Special:
Download the session slides, a free copy of our simulation software and a copy of this book in PDF format from http://bit.ly/agilesim

Troy Magennis
troy.magennis@focusedobjective.com
phone: 425 223 8097  skype: troy.magennis  twitter: @t_magennis
Forecasting and Risk
Helping teams see and understand risk impacts
Q. Could I make a simple forecast tool that worked?

Without macros or add-ins!


Or follow @t_magennis
Forecast Completion Date

1. Start Date
   - 4/1/15

2. How many stories are remaining to be completed?
   (enter the range estimate of stories. Tip: start wide and narrow as certainty increases)
   - Low guess: 20
   - Highest guess: 30

3. Stories are often split before and whilst being worked on. Estimate the split rate low and high bounds.
   (often the throughput in the backlog is pre-split, but captured throughput post-split. Adjust for this here)
   - Low guess: 1.00
   - Highest guess: 1.00

4. Throughput. How many completed stories per week or sprint do you estimate low and high bounds?
   - Throughput estimate/samples are per Week: 7 days
   - Use historical throughput data OR enter a low and high estimate below. Use:
     - Low guess: 1
     - Highest guess: 5

Can I use velocity rather than throughput?
Yes. If you do have estimates in story points, then you can sum all of the estimates and use that for input 2 and estimate or use historical team velocity for input 4. The benefit of using throughput (count of completed stories) is greater for it is an individual team throughput rather than individual story points.
### Results

<table>
<thead>
<tr>
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<th>Duration in Week's</th>
<th>Date</th>
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<tr>
<td>100%</td>
<td>25</td>
<td>9/23/15</td>
</tr>
<tr>
<td>95%</td>
<td>18</td>
<td>8/5/15</td>
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<td>90%</td>
<td>16</td>
<td>7/22/15</td>
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<td>85%</td>
<td>15</td>
<td>7/15/15</td>
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<tr>
<td>80%</td>
<td>14</td>
<td>7/8/15</td>
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<tr>
<td>75%</td>
<td>13</td>
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<td>7</td>
<td>5/20/15</td>
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</table>

- **Almost certain**
- **Somewhat certain**
- Less than coin-toss odds. But if you are game?

**Simulated Forecast Date Frequency**

What is this chart?
This chart shows how many simulated trials completed on or before the x-axis date. The higher the bar, the more likely that outcome.

**Simulated Burn Downs (first 50)**

What is this chart?
This chart shows the simulated burn-down trends. It shows the first 50 trials and visually shows the general hotspots and outlier dates. Enter actual stories remaining in the Remaining Stories Actual worksheet to see progress.

2 ½ Month Range

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Impact Low</th>
<th>Impact High</th>
<th>Description</th>
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<td>5</td>
<td>10</td>
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<td>10%</td>
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<td>20</td>
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~ 20 Day Range

<table>
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<th>Impact Low</th>
<th>Impact High</th>
<th>Description</th>
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<td>10</td>
<td>20</td>
<td>Performance tuning if w</td>
</tr>
<tr>
<td>0%</td>
<td>5</td>
<td>10</td>
<td>Bitcoin support?</td>
</tr>
<tr>
<td>0%</td>
<td>10</td>
<td>20</td>
<td>PCI Audit remediation</td>
</tr>
</tbody>
</table>
Cycle time analysis

How to interpret cycle time distributions in coaching
Q. Can historical cycle-time be used for coaching advice?

Probability Density Function

1997: Industrial Strength Software by Lawrence H. Putnam, IEEE, Ware Myers


Work Item Cycle Time or Lead Time Distribution Through the Ages

Approx 2010

Exponential Distribution, Weibull shape parameter = 1

Shape = 2
Scale = 30
~ 1 month

Shape = 1.5
Scale = 15
~ 2 week sprint

Shape = 1
Scale = 5
< 1 week

Batch Size / Iteration Length

Work Item Cycle Time or Lead Time
Lean, Few dependencies
• Higher work item count
• More granular work items
• Lower WIP
• Team Self Sufficient
• Internal Impediments

• Do: Automation
• Do: Task Efficiency

Sprint, Many dependencies
• Lower work item count
• Chunkier work items
• Higher WIP
• External Dependencies
• External Impediments

• Do: Collapse Teams
• Do: Impediment analysis

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>0 to 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 30</td>
<td></td>
<td></td>
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<tr>
<td>Weibull Shape Parameter</td>
<td>(Exponential Range) 1 to 1.3</td>
<td>(Weibull Range) 1.3 to 2</td>
</tr>
<tr>
<td></td>
<td><strong>Traits:</strong> Larger unique work items.</td>
<td><strong>Traits:</strong> Larger work items. Large WIP. Many external dependencies. Poor predictability.</td>
</tr>
<tr>
<td></td>
<td>Medium WIP. Few external impediments. Fair predictability.</td>
<td></td>
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</tbody>
</table>

@t_magennis | Bit.Ly/SimResources
References, Sources and Links
Tools

• Excel or Google Sheets Spreadsheets (all free)
  • General metrics spreadsheet (17 charts) –
  • Team Capability Matrix
  • Forecasting –
  • 10+ other spreadsheets tools all free –

• Visualization Tools
  • Tableau ($995-$1995) – Tableau.com
  • PowerBI (free) –
  • Plotly (free) –

• Online Lean/Kanban Tool
  • Leankit.com
Cool Visualization Resources and Websites

• My blog – FocusedObject.com/blog
• WindyTy.com – weather
• NY Times
• Tableau Public

• Books
  • Tufty
  • Few
Source: JumpPlot.com (total kudos to Tom VanBuskirk and Chris DeMartini)
Coaching professional teams

• Is about team performance, not individual
  • If they don’t know it by now, they self improve it

• http://www.landofbasketball.com/awards/nba_season_mvps_year.htm

• 23 championships + MVP / 60 ~ 1/3


• http://national.suntimes.com/nba/7/72/1237030/lebron-james-stephen-curry-nba-finals-mvp
SDPI Dimensions

- Productivity = throughput avg / team size
- Predictability = variability of throughput / size
- Responsiveness = time in process average
- Quality = released defect density / throughput

Example, team over time -

Source: Rally Dev.
Responsiveness

“If something urgent comes along, how fast can we turn that around”

• Average or median of the number of days between two dates for items closed within a period

• Cycle time or Lead time of ???
  • If reliable first touch date, use that
  • If just created date, then use P1 and P2 bug
Completion Rate

“What is holding us back on completing more. Lets discuss dependencies and blockers in the retrospective”

• Team goal is to maximize number of COMPLETED items, not started items
• Count of items completed each period
• Don’t celebrate bug throughput (as much)
Predictability

“How consistently do we deliver value?”

• How much variation there is each week in throughput, normalized by “team size” in a rough way
• Coefficient of Variation = Mean/SD
Data is evil, but it doesn’t have to be

- Manipulate behavior by
  - Embarrass
  - Coerce
- Make a point rather than make a difference
  - No action,
  - just data to classify someone is good and someone is bad

- They can tell a story that helps balance and improve where time and energy is best spent
  - Metrics tell a story
  - We learn from the story and make actions
  - Through these action we improve
Purpose of coaching dashboards

• **Improvement – what to change**
  • To help **teams** identify their weakest area comparable to other teams in similar circumstances
  • To confirm improvement has been achieved after a process change experiment
  • To identify what was **traded** to achieve that improvement

• **Avoidance – what to watch (sense)**
  • To identify what internal team factors most disrupt team momentum
  • To identify what external factors most disrupt team momentum
Data is un-necessary...

• When there is unlimited time and money, or the journey to a destination is well known, perhaps.
  • But this isn’t the most common case
  • And even when data isn’t captured on paper, its assumed in peoples heads

• There is always more demand than supply
• There are always insights that are missed
• There is always room for improvement

• You can try and guess. You may be often right, but how do you know?
What makes a good metric?

- **Is relevant to the team or individual** - personalized
  - To compare against others, and to see progress
- **Is within the teams ability to move** (or get moved)
  - Has value in being diagnostic
- **Passively captured** (low cost and effort)
  - Look for cheapest correlated metric to a more costly metric where possible
- **Balances another metric** – demonstrates tradeoff and impacts – trends adversely to another metric
  - Look for cheapest metric that will likely be negatively impacted by movement of another metric