



# PROJECT MANAGEMENT CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING  
Civil & Environmental Engineering Department



# TRANSITIONING SOFTWARE DEVELOPMENT AND OPERATIONS LABORATORY TO AGILE

*Nikola Ivanov, Michael Pack*

*2016 Project Management Symposium*



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# CATT Lab

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The screenshot displays the RITTS Transportation System Status interface. The main map shows Montgomery County with various data overlays, including traffic cameras, incidents, and road conditions. Several pop-up windows provide detailed information about specific locations and incidents.

**Pop-up Windows:**

- Galthersburg 314 S Frederick Ave MD 20877:** Grade: 9-12, Type: High School.
- Shady Grove Center 9701 Medical Center Dr. Rockville MD 20850:** Phone: (301) 315-1660, Bld: 124, Status: N, Score: 100, Match Type: A.
- MD 200 West, past Northwest Rd of NP S.E. JCC:** MOVE OVER FOR EMERGENCY VEHICLES ON THE SHOULDER. UPDATE: 10/20/2014 12:04 AM.
- Grace House 3214 Norbeck Rd. Silver Spring MD 20906:** Bld: 32.
- Station 24 - Hillendale 13216 New Hampshire Ave Silver Spring 20904:** Phone: (301) 364-9000.
- District 4 (Wheaton) 2300 Randolph Rd Wheaton MD 20902:** Phone: (240) 773-5300.
- Disabled Vehicle 495 I-495 OUTER:** Disabled On Shoulder, Started: 10/20/2014, Updated: 10/20/2014, 1 Responders on the Scene.

**Charts and Data:**

- RITTS 4001 Detector (CHART) on I-270 SB Between Grosvenor Lane and MD 187:** Oct 20, 2014 - 2:44:26 PM. Shows Real Speed, Avg Speed, Volume, Lane(s), and Speed.
- INRIX Probe Data:** BACK TO LIST HERE. I-270 SPUR Southbound @ I-495. Length: 1.5 mi, Avg Speed: 61 mph, Real Speed Conf Score: 3, Travel Time: 0:29 min. Shows Confidence Score, Reference Speed, Average Speed, and Speed.

**Right Panel (Hide Layer List):**

- Traffic Cameras
- Incidents and Events
- Traffic Detectors
- Road Weather
- Radio Scanners
- KETH Plans
- Montgomery County Sub-Layers: Assisted Living, Evacuation Support, Public Transit, Fire Stations, Nursing Homes, Police Stations, Schools, Dam Foundation Areas.
- Radio Feeds: Montgomery County MD, Montgomery County Fire and Police, Wide Area Network Repeaters.

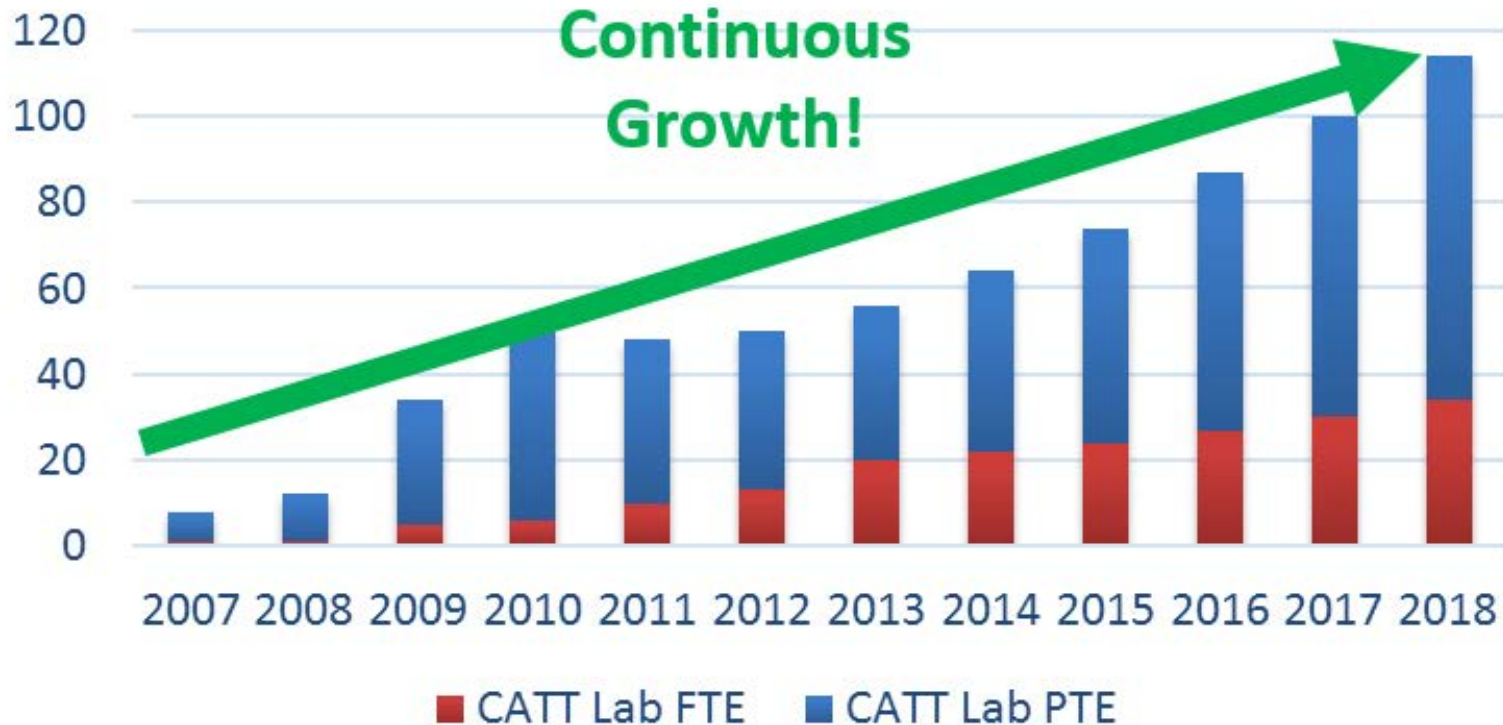
**Bottom Right Video Feed:** Shows four camera views of highway intersections, including I-270 - WEST BEARDO and I-495 - WEST BEARDO.

**Footer:** University of Maryland CATT Lab | Contact Us | Release Notes | © 2005 - 2014



# CATT Lab Growth

## Employment





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# GROWTH CHALLENGES





# Functional Organization

Team	Responsibility
DBA Team	Design, implementation, and maintenance of numerous relational databases.
Java Team	Extract, transform, load (ETL) tasks required to integrate new data sources into various CATT Lab databases.
Web Team	Development of front-end components showing real-time transportation data.
Analytics Team	Development of visual analytics using archived data sets using the Flex application framework.
IT Team	Hardware infrastructure to support development and operations.
GIS Team	Geographic Information Systems (GIS) related support services.



# Challenges

- Diversity of process
- Ad-hoc leadership
- Work-flow management
- Staffing distribution
- Management focus-shift
- Unified direction



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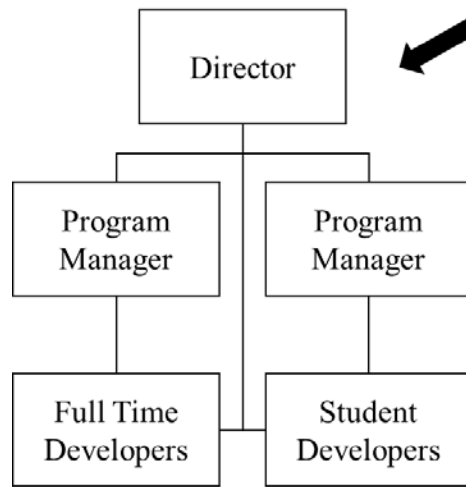
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# STAFFING SOLUTIONS

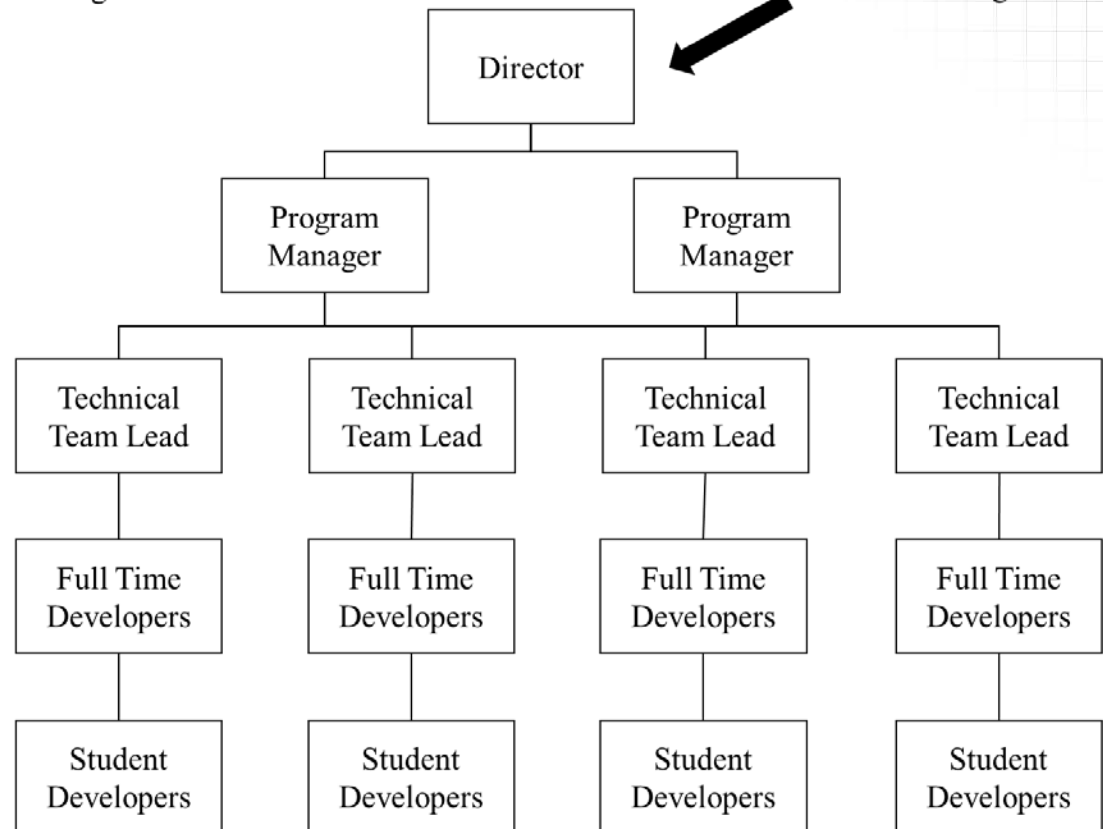


# Hierarchy and structure

“Flat” Org Chart



Hierarchical Org Chart







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# Staff diversity



Photo by: Matylida Czarnecka



Photo by: Masa Israel Journey

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# Staff empowerment

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Photo by: Harsh Patel



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Work-Flow Solution

# TAILORED AGILE PROCESS



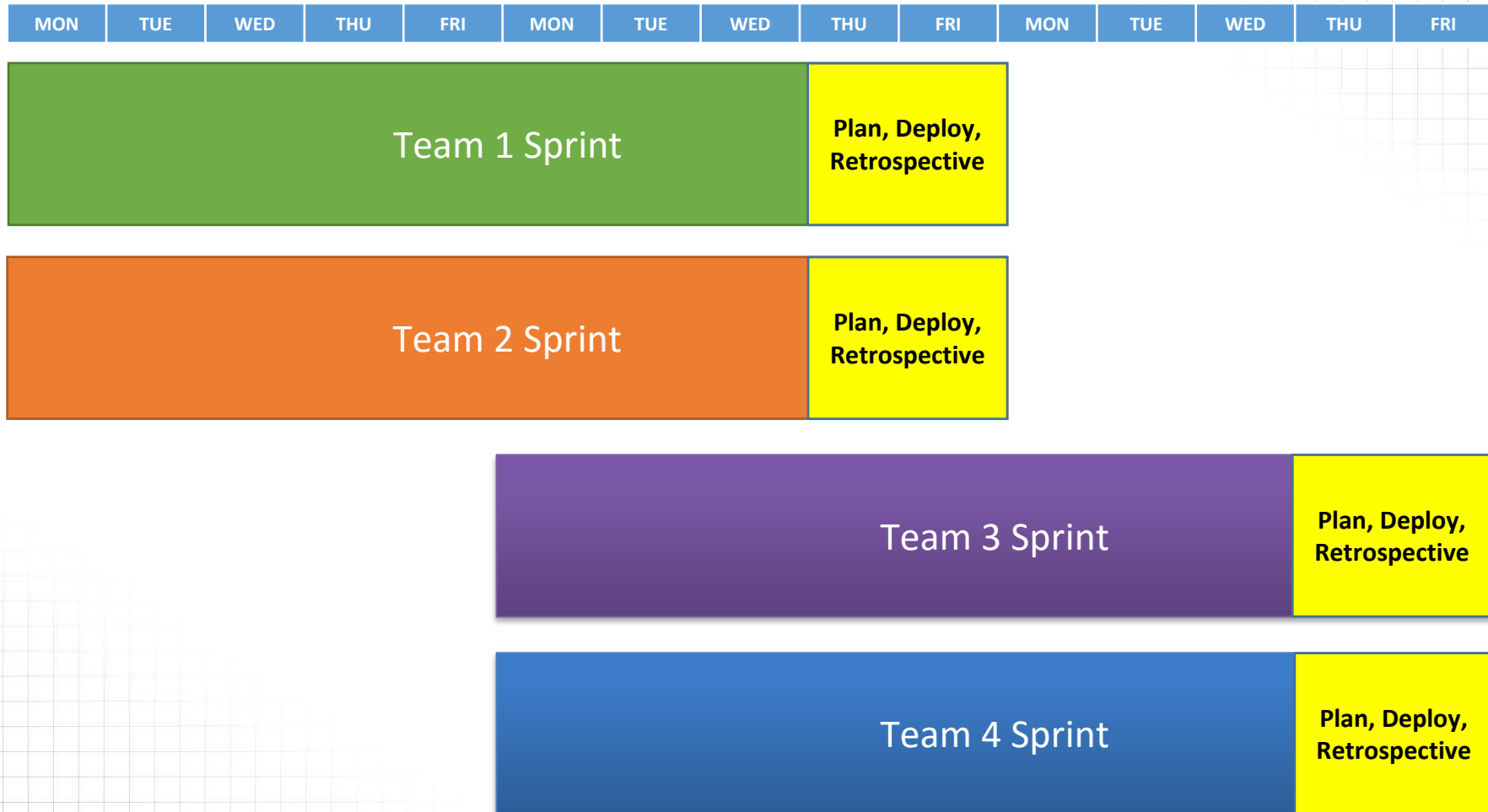


# Cross-functional teams and co-location

Team 1	Team 2	Team 3	Team 4	IT	Art	Support	QA
Team Lead	Team Lead	Team Lead	Team Lead	Team Lead	Team Lead	Team Lead	Team Lead
DBA	DBA	DBA	DBA	Sys Admins	Students	Students	Students
Front End Devs	Front End Devs	Front End Devs	Front End Devs	Network Admins			
Back End Devs	Back End Devs	Back End Devs	Back End Devs	Students			
Student Devs	Student Devs	Student Devs	Student Devs				



# Two week sprints





# Sprint planning

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JIRA Dashboards Projects Issues Capture Service Desk Agile Create Search

If your email is incorrect on your profile, please notify IT and ask them to update your Active Directory email address.

CATT Lab Board All sprints Board

QUICK FILTERS: Stickers Only My Issues Recently Updated

To Do	In Progress	In Code Review	QA	Done
<ul style="list-style-type: none"> <li>RAPT-102 Raptor PM Validation (4h)</li> <li>RAPT-104 Compare results against current Production PDA (4h)</li> <li>RAPT-105 Fix any errors found in Validation (1d)</li> <li>LDR-190 Update to CHART R15 without changing framework (Chart R15 Loader) (0m)</li> <li>RF-638 active-during filters not working properly (3h 30m)</li> <li>RF-655 Refresh all events in the production historical cache (7h 30m)</li> <li>TIM-326 Sections with no data available should say (0m)</li> </ul>	<ul style="list-style-type: none"> <li>LDR-110 Chart R15 Loader (0m)</li> <li>TIM-320 Add DMS popup to each DMS map icon (Modern Timeline) (1d 6h 55m)</li> <li>PDA-2903 Refill INRIX national data from 2015-05-05 through recent (0m)</li> <li>TIM-257 Create UI "Speed readings section" section (Modern Timeline) (0m)</li> <li>TIM-345 Make mile marker axis (1d 1h)</li> <li>TIM-350 Create the legend for the speed plot (2h)</li> <li>PDA-2990 Use (0m)</li> </ul>	<ul style="list-style-type: none"> <li>RAPT-87 Pull out some of the InrixPMMath functions into a math utils class (30m)</li> <li>RAPT-166 Identify a way to load invalid data (5h 30m)</li> <li>RAPT-154 Handle empty speed and confidence values (2h 30m)</li> <li>RAPT-173 MAP-21 LOTTR Map Reduce Job (Raptor MAP-21) (0m)</li> <li>RF-670 Add road status to events (1d 5h 59m)</li> <li>TIM-348 Draw the event location line (1h 30m)</li> <li>TIM-349 Retrieve the speed data from the server (0m)</li> </ul>	<ul style="list-style-type: none"> <li>RAPT-182 Reference Speed Metadata (7h 30m)</li> <li>RAPT-187 Inrix National TMC Serialization (0m)</li> <li>PDA-3207 Honor widget type ACLs in widget endpoints (0m)</li> <li>PDA-3532 Cache MAP-21 queries (1h 30m)</li> <li>SUPPORT-7105 INRIX bottleneck questions (1d 6h 20m)</li> <li>TIM-282 Set up Loggers (Modern Timeline) (0m)</li> <li>LDR-174 Update CHART HAR loader to framework 4.1 (CHART Loader Fram...) (2d 3h)</li> </ul>	<ul style="list-style-type: none"> <li>RAPT-102 Raptor PM Validation (RAPT-103) Write Unit Tests (0m)</li> <li>RAPT-180 Refactor Raptor Jobs for more generic names (0m)</li> <li>TIM-294 ChronoAxis Labeling (Modern Timeline) (0m)</li> <li>RF-647 Add weather condition to event data (0m)</li> <li>RF-654 Open/close events based on CHART event state (Chart R15 Loader) (0m)</li> <li>LDR-243 VDOT duplicate DMS messages (0m)</li> <li>TIM-339 User should get tool tip (0m)</li> </ul>



# Retrospective meetings



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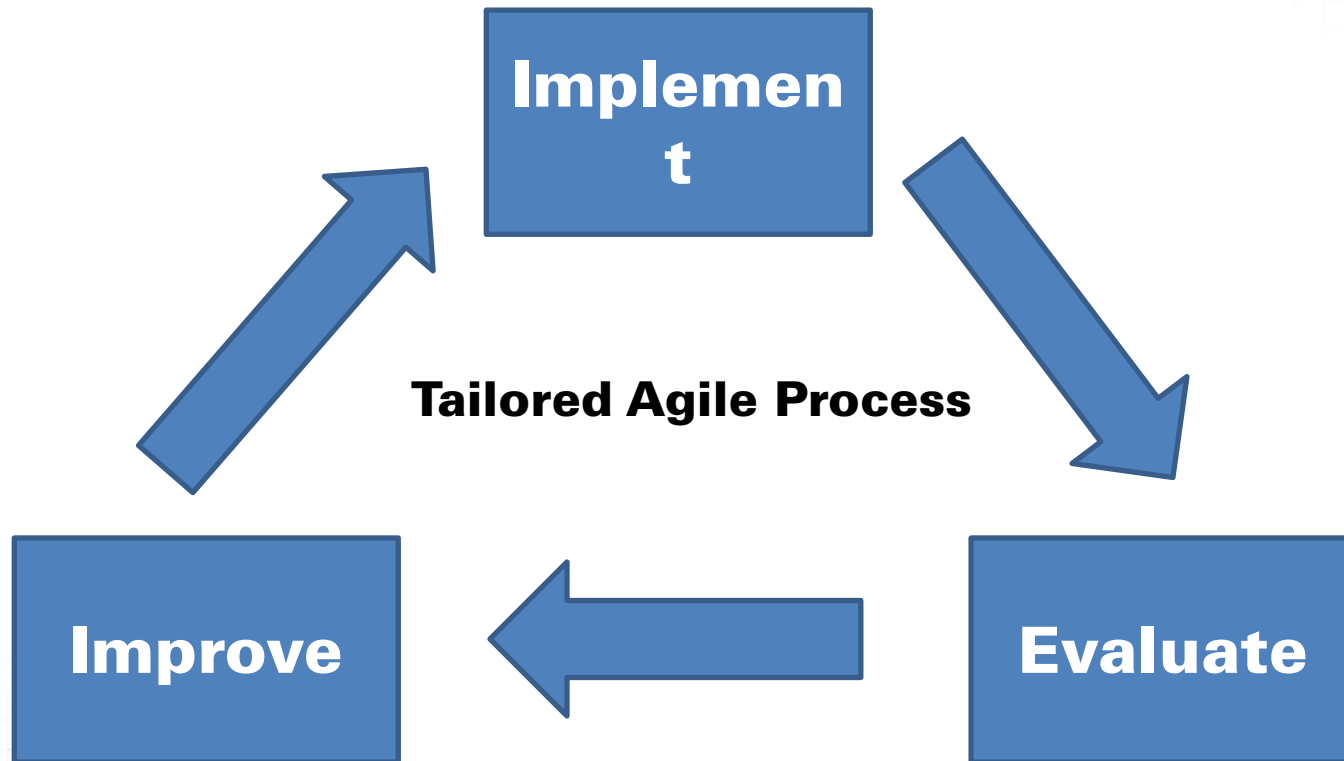
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# LESSONS LEARNED



# Living process



# Work estimation

- Estimation Techniques:
  - Analogous
  - Proxy
  - Parametric
  - Three Point
- Planning Poker



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Photo by: Adam Binslev

# Changing priorities

- Proactive communication
- Reserve technical lead capacity
- Reduce team size



Photo by: Joan M. Mas



# Diverse sprints

- Balance versatility and productivity
- Move towards product based cross-functional teams
- Introduce team rotations

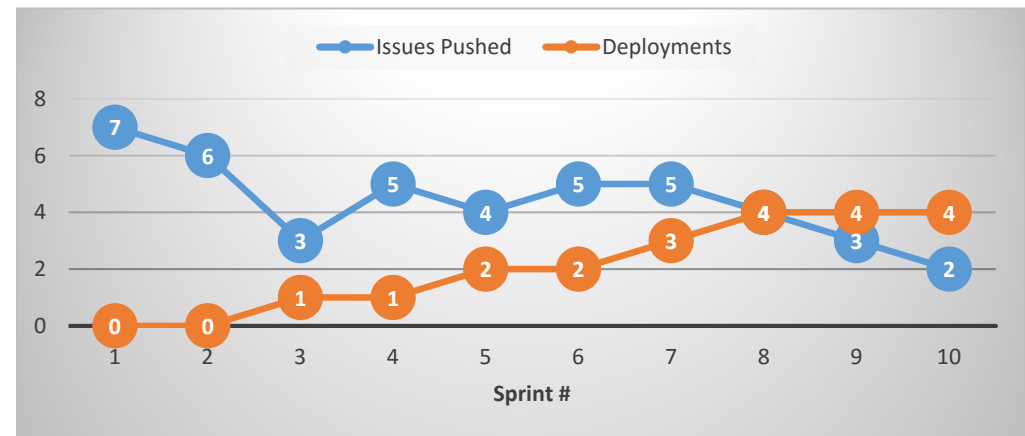


Photo by: Chris Potter



# Performance measures

- # of issues pushed to next sprint
- # of deployments
- # of issues resolved per developer per sprint
- # of issues resolved per Team Lead per sprint
- Estimate accuracy





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# Questions?

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