

Gaming the Data

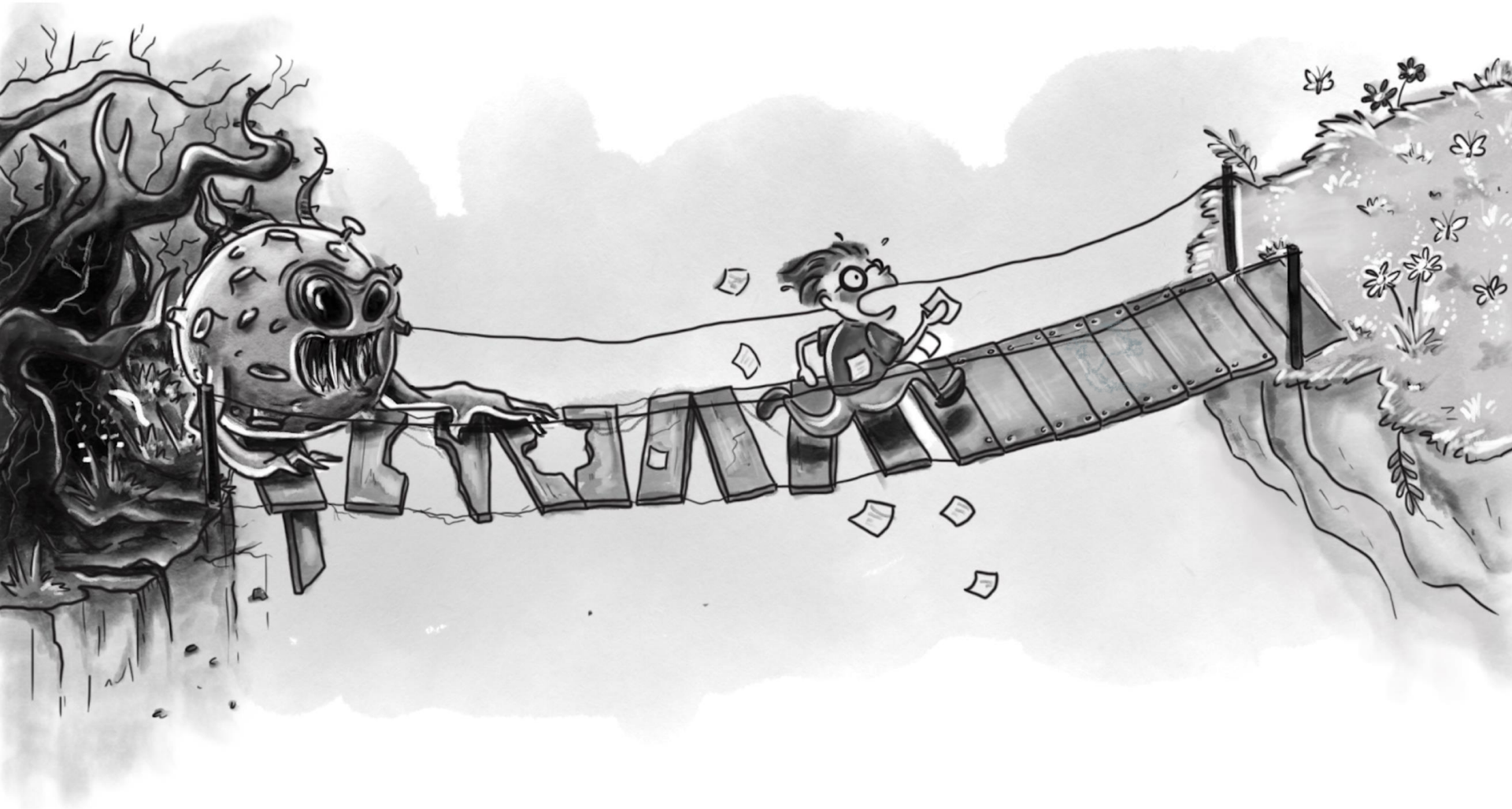
Brian Mark, WaTech
Byron Mukai, Employment Security Department
Tammi Leclerc, WaTech

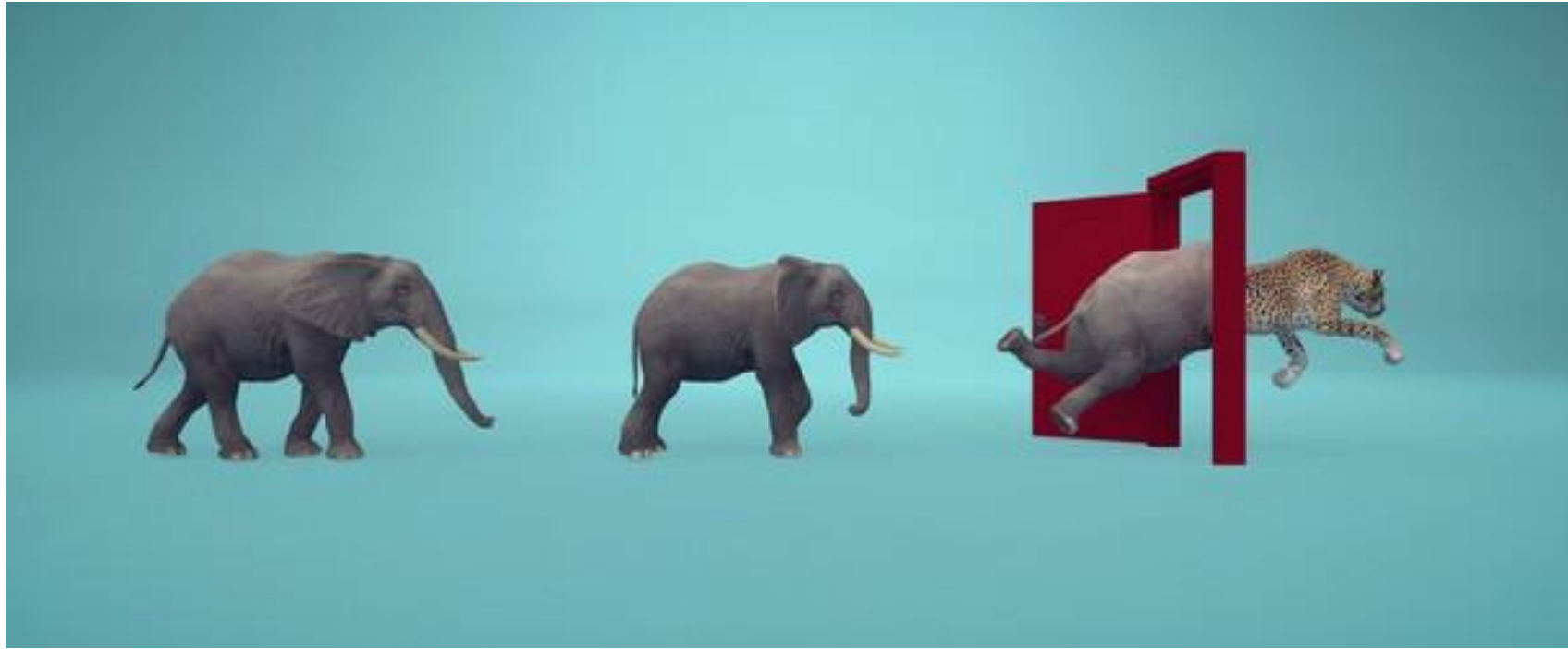
Round 1:

- When a picture shows up on the screen think about what that picture means to you, in relation to performance reporting.
 - The picture will be added to chat, when it is added respond with your MEME theme (a couple words that explains what it is saying – no more than 5 words).
- When you see CLOSED typed, we will move to voting on the top theme.
 - Put a Heart on the one that hit the heart.
 - A laughing Icon means it was the best because it made you laugh (and it connected).
- We will then move to the next one, this will happen really fast!!

After the meeting, you will receive a follow-up with the pictures and the responses AND the winner will be announced of the **MEME Throwdown! (Part 1 of Winning ResultsWa Socks!)**



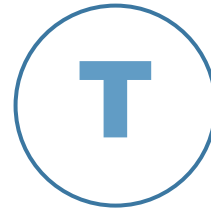






Where do you start?





Tension

- Innovation
- Control

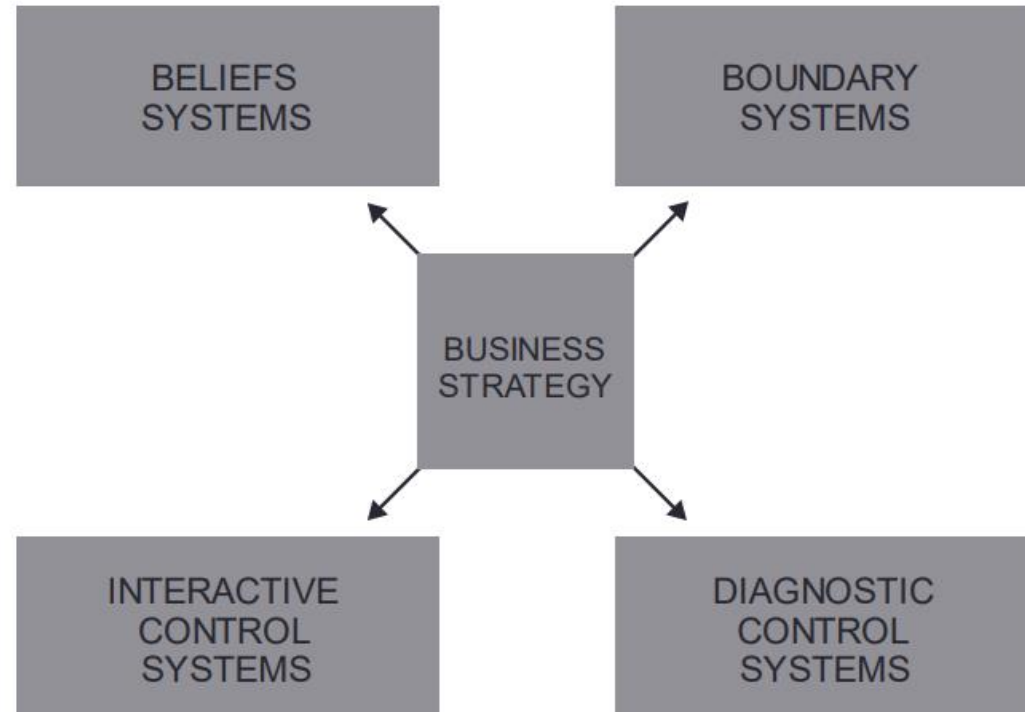
Motive	Organizational Block
People want to contribute	They don't understand how to make a difference. Strategy and direction isn't communicated. Unsure of the mission and vision and how they fit in.
People generally choose to do right	Performance pressures cause rules to be bent or information to be hidden. No internal controls or safeguards in place.
People strive to achieve	No resources to complete the tasks asked of them. Competing demands create a focus on too many things at once.
People like to innovate	Lack of resources. Afraid to challenge the status quo. They won't be supported if they step out in a new way.



Needs-Based (PDCA)

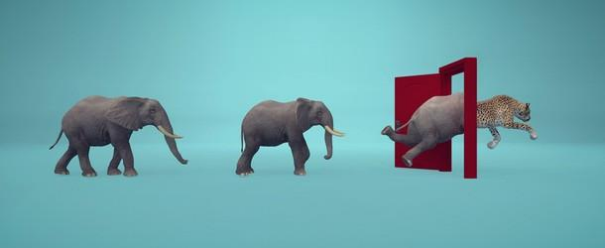
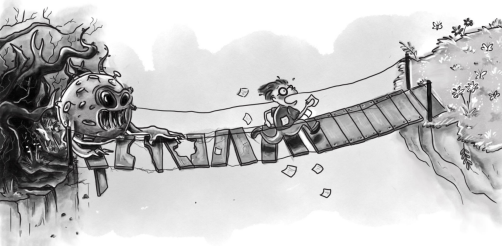
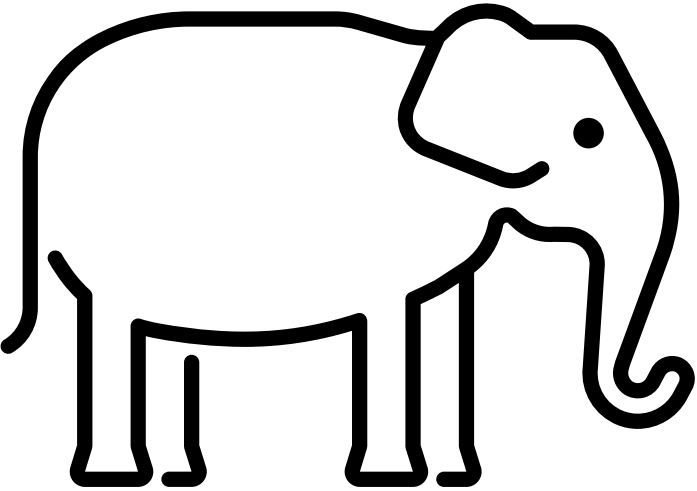
- Belief Systems
- Boundary Systems
- Diagnostic Control Systems
- Interactive Control Systems

The Levers of Control





What did we say?



Performance Examples

No matter what you are doing, it has to show up in a picture to be relevant.



Starting Point

0%

7 Months Later

HERO

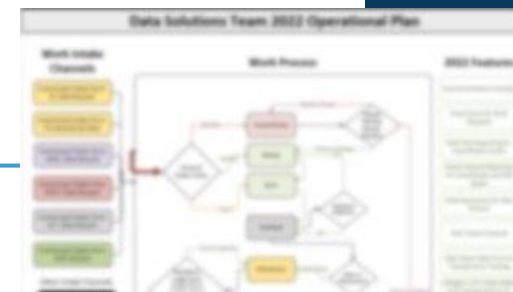


▶ Backstory



ESD transitioned to a new data system for the WorkSource offices, this actually reduced the ability to leverage operational data for >5 years.

ESD invested in a Data Solutions team. The team was formed doing business differently, as a result not only was the team able to produce data it created a data solution that earned it the Governance Above and Beyond Award.



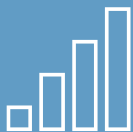
Starting Point

0%



7 Months Later

HERO



▶ Top Barriers

Internal Beliefs

Historical Norms

Self-Limiting "Rules"

Competency Gaps

WorkSource @ESD

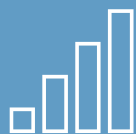
Starting Point

0%

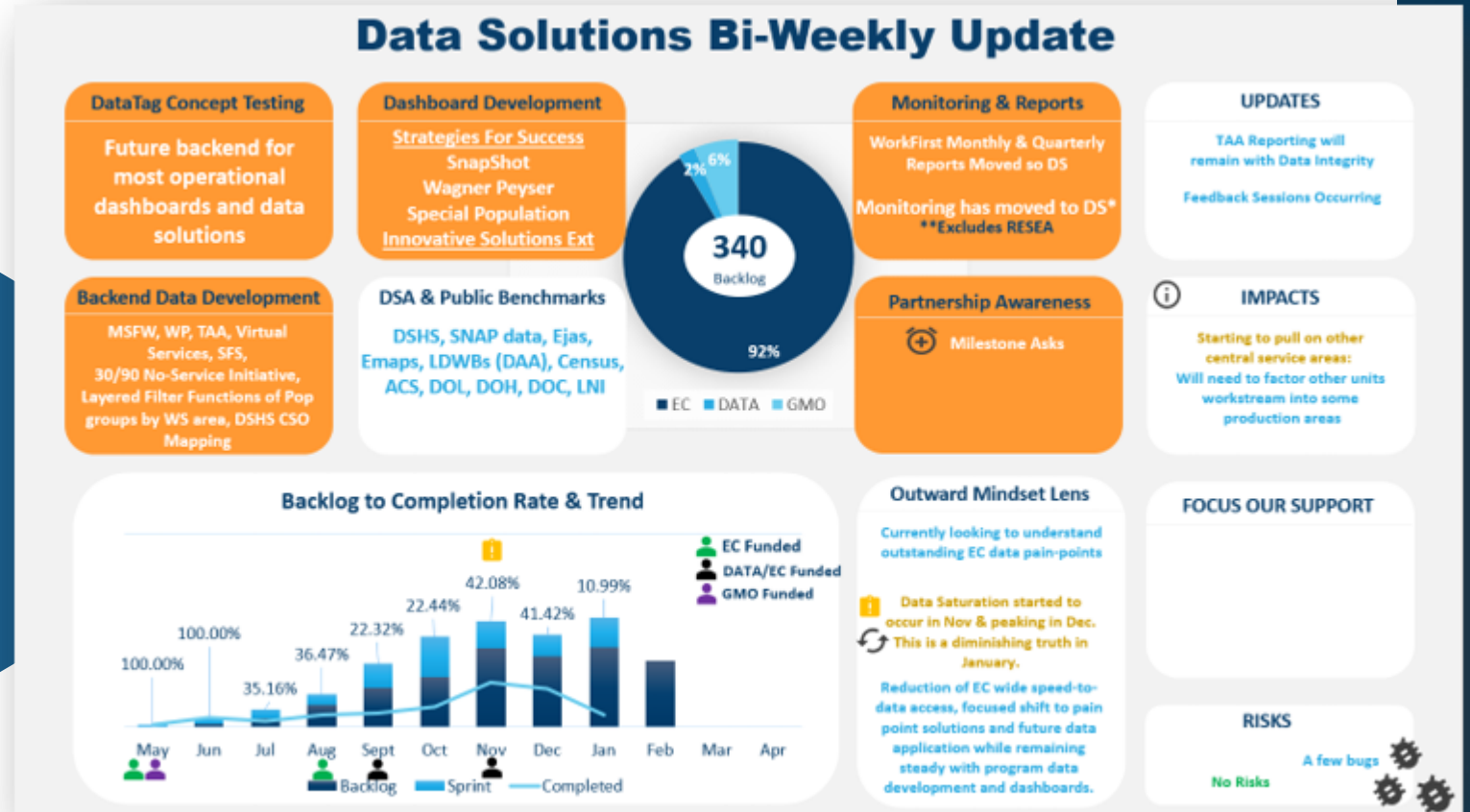


7 Months Later

HERO



Approach



Agile ~ Visualize The Work ~ Outward Mindset ~ Overcommunicate ~ Incredible Non-Traditional Executive Sponsorship

WorkSource @ ESD

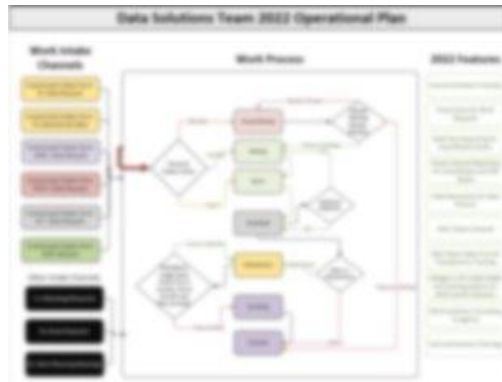
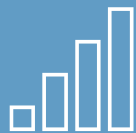
Starting Point

0%

As a result of this work the team earned the Governor's Extra Mile Award.

7 Months Later

HERO



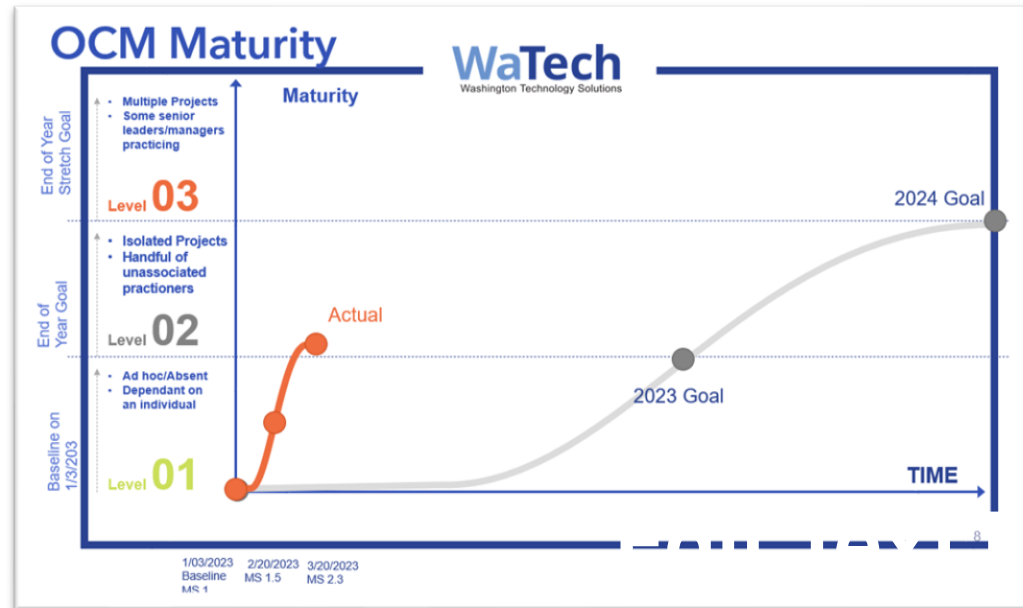
The Real Game?



Alright.... What was the REAL Game?

▶ Backstory

WaTech invested in developing an Organizational Change Management pathway first investing in Prosci training for most of leadership, investing in a OCM Manager and standing up a program.



Within 7 weeks moved from a 1.2 to a 2.3, meeting the end of year maturity goal.

Starting Point

1.2



7 Weeks Later

2.3



OCM @
WaTech

▶ Top Barriers

Internal Beliefs

Historical Norms

Self-Limiting “Rules”

Competency Gaps

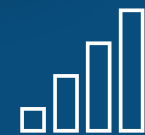
Starting Point

1.2



7 Weeks Later

2.3

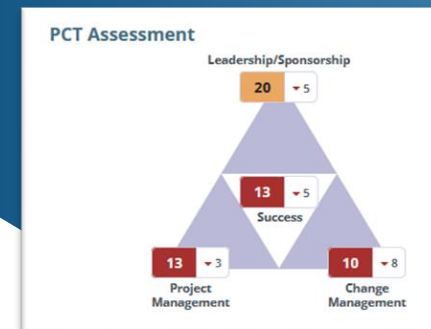
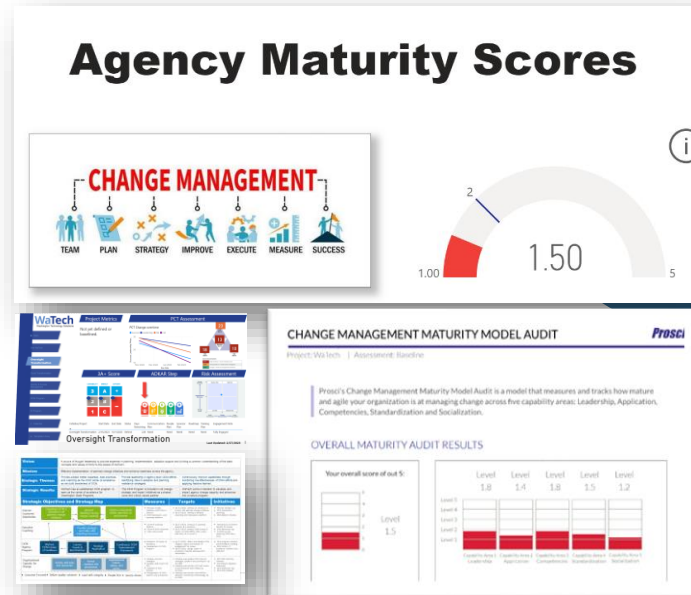


► Approach

37 Interviews
12 State Agencies

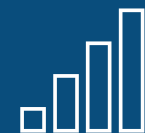
Starting Point

1.2



7 Weeks Later

2.3



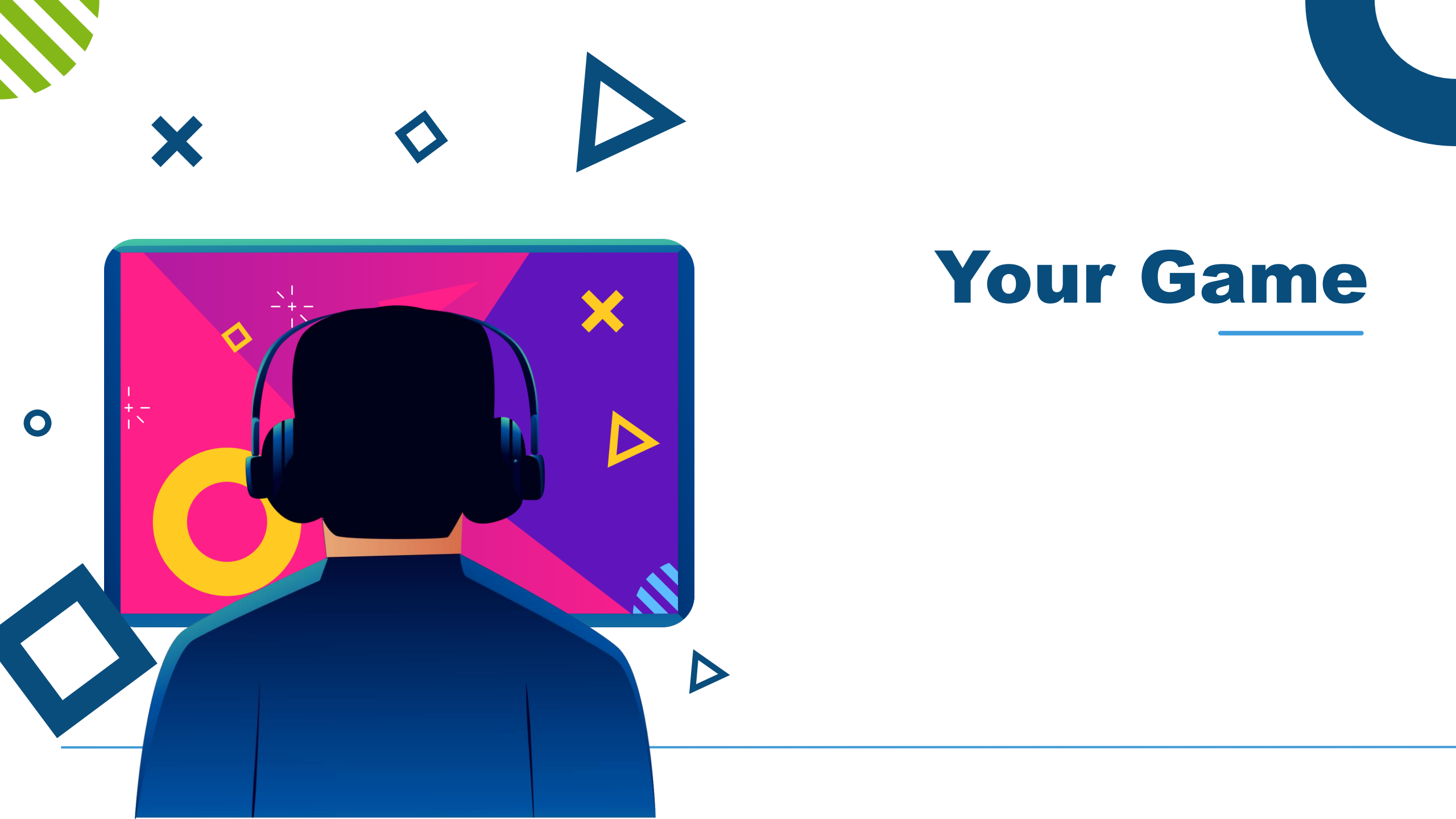
Agile ~ Visualize The Work ~ Outward Mindset ~ Overcommunicate ~ Incredible Non-Traditional Executive Sponsorship

OCM @
WaTech

The Real Game?



Alright.... What was the REAL Game?



Your Game

QUESTIONS?



Round 2:

- When a picture shows up on the screen think about what that picture means to you, in relation to the work you do.
 - The picture will be added to chat, when it is added respond with your MEME theme (a couple words that explains what it is saying – no more than 5 words).
- When you see CLOSED typed, we will move to voting on the top theme.
 - Put a Heart on the one that hit the heart.
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No data received

More

Reload



IN31C - 1508

Interferometric Synthetic Aperture Radar (InSAR) Scientific Computing Environment on the Cloud

Paul A. Rosen, Eric Combs, Khairiga Mamed, Brent George, David Kligler
Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109



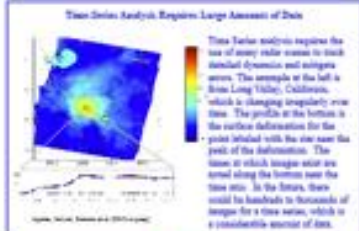
Overview

The InSAR Scientific Computing Environment (SCE) is a modern framework for accurate, efficient processing of interferometric and polarimetric synthetic aperture radar (SAR) data. SCE was developed at NASA/JPL and funded under a NASA Advanced Information Research and Technology program effort that started in 2011. Integration with cloud computing is achieved through an effort called Cloud Enabled Scientific Computing Research Environment (CESCRE), under the NASA Computational Modeling Algorithms and Other Information program. SCE provides a computing environment for geospatial image processing for SAR sensors that will enable scientists to reduce measurements directly from radar satellites and avoid in-situ processing products without their resulting loss of detailed expertise in radar processing methods. The environment serves as the core of a reconfigurable processing system to bring SAR/0 raw data sets up to Level 0 data products that is adaptable to alternative processing approaches for various users interested in raw and different steps to exploit their data. SCE enables a new class of analyses that take greater advantage of the long time and large spatial scales of raw data sets than their current approaches.

There is a large quantity of raw data being acquired over the globe from the international constellation of radar satellites. These raw data sets are too large to store in large computational facilities. The cloud environment offers the potential to open up the possibilities in exploring large data sets to the community at large. The CESCRE effort will accelerate the collaborative usage of raw data sets through an efficient integration with cloud computing leading to increased productivity of the scientists. As a first step, however, we have prototyped the migration of SCE to the cloud environment, and quantified performance.

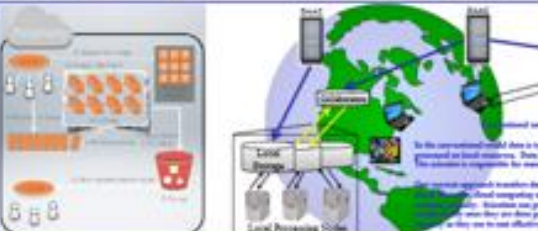


Step	Current Status	Cloud Status
Raw Data Ingestion	Done	Done
Raw Data Preprocessing	Done	Done
Raw Data Archiving	Done	Done
Level 0 Data Processing	Done	Done
Level 0 Data Archiving	Done	Done
Level 1 Data Processing	Done	Done
Level 1 Data Archiving	Done	Done
Level 2 Data Processing	Done	Done
Level 2 Data Archiving	Done	Done
Level 3 Data Processing	Done	Done
Level 3 Data Archiving	Done	Done



Sample Sliding for 300,000 ALOS PALSAR scenes

Processing Step	Processing Time (min)	Processing Time (sec)	Processing Time (hr)
Raw Data Ingestion	1:00	60,000	16.7
Raw Data Preprocessing	1:00	60,000	16.7
Raw Data Archiving	1:00	60,000	16.7
Level 0 Data Processing	1:00	60,000	16.7
Level 0 Data Archiving	1:00	60,000	16.7
Level 1 Data Processing	1:00	60,000	16.7
Level 1 Data Archiving	1:00	60,000	16.7
Level 2 Data Processing	1:00	60,000	16.7
Level 2 Data Archiving	1:00	60,000	16.7
Level 3 Data Processing	1:00	60,000	16.7
Level 3 Data Archiving	1:00	60,000	16.7
Total	12:00	720,000	33.3



Traditional Scientific Computing Environments

- Open source software systems
- Hard to discover
- Distributed via various code that has to be
 - Compiled + with all dependencies
 - Configured with proper resources for dependencies
- Requires complex installation process
- Lacks administrative for consistency constraints
- Interoperability, consistency, and guidance
- Science Data is
 - Hard to discover
 - Dispersed around the world
 - Grinding in a sluggish rate
- Science Data Processing
 - Requires manual data transfer before processing
 - Rates on local storage and compute capability
 - Heterogeneous scientific environments with inconsistent configurations on various sites

Scientific Computing in the Cloud

Virtual Machines

- Level of abstraction between hardware & processing
- Enabling software developers to optimize configuration of a running machine into a virtual machine image that can be
 - Downloaded, installed and reconfigured
 - Shared
- Execution of software in the environment configured & tested by developers
- Reproducible results
- Easy migration between different versions of software and development during configuration
- Can be accessed on cloud or local infrastructure

Cloud Computing

- Offers scalability of data and readily available compute capacity
 - On-demand data transfer, storage, compute, and local compute
 - Enables integration of machine images into scientific workflows
 - There are built-in image templates on demand to process data
 - Provides rapid sharing of algorithms, raw data, and results
 - Pay-per-use model
 - A large TCO usage computer can be constructed, or hosted for as little as \$10 / hour with no commitments or minimums

Executing SCE in Cloud

- Configures images of SCE to support multiple cloud instance types
- Setting a machine with specific versions of SCE is as simple as a few line scripts or a click of a button
- Enables debugging on a single machine or execution across large capacity on a cloud based cluster

Results

Use of Cloud in Design of a SAR Mission

Configuration	Cost	Time
Traditional	\$20	4 hours
Cloud w/ 26 c1.xlarge	\$20	40 min
Cloud w/ 13 CC2	\$25	20 min
Cloud w/ 26 CC2	\$30	10 min

Interferogram Generation

The SCE workflow was applied to 24 ALOS PALSAR images acquired over the Los Angeles area spanning 7 years. We formed all possible interferograms (CI) using processing generating 478 of output pairs. CI are used as a distributed data sets and subsequent storage of results. This took actually took 1 week on local infrastructure.

- Deployed in AWS GovCloud over 81 machines of 8 cores and 1 GB of RAM
- 1 parallel interferogram on each machine
- Workflow orchestrated by Polyphony

\$256 - 4 hours

This demo was performed over a year ago using the AWS Gov Cloud. These cloud resources with their processing, solid state disks, and use of local based capacity would provide greater speed and cost savings.

Management of Cloud Resources

- Cloud resources are shared in 1 hour increments
- Environmentally friendly practices can be processed better by processing longer requests
- Costs can be optimized by filling up the 1 hour slots and using full based capacity
- Spot instances on AWS offer low based computing
 - Discounted rates that they are willing to pay the compute
 - Prices can be as low as 1/10th the standard price
 - Up to 90% savings can be generated for 24/7 (not for 24/7 AWS EC2 server then generated - \$1.80)
 - Power events include one optimization through use of Spot
- Cloud offers long term archival options for as low as 1 cent GB month

Polyphony

- Pipeline to assemble parallel workflow development
- Based on Amazon Simple Workflow
- Machine resources supporting
 - Highly optimized data transfer
 - Dynamic provisioning of machines based on load
 - Distributed file system to scale clusters
 - Already proven with nearly 10K users on AWS EC2 instances
- Deployed in Petascale, C, C++, Python, Java, & Hadoop
- Optimized as production for
 - MSL when usage is provided through Polyphony
 - CAREX (Center for Arctic Research Excellence)
 - Experiment: Level 0 Data Preprocessing
 - MSL Data archival project
 - Thompson small scale experiments across NASA
 - Supports AWS S3, EC2, EBS, DynamoDB, and Sagemaker

Future Work

- Virtual Machine Image Catalog to discover algorithms
- Science data testing to discover raw and processed data as well as machine parameters
- Reconfiguring cluster compute resources, GPUs, and high I/O networks for InSAR processing
- Enables archival storage of SAR results in cold storage
- Continuity of SCE and support of interconnectivity
- File-based visualization of interferograms to visualize data transfer required to produce results
- Development of CESCRE
- Extensive cost analysis for cloud computing and comparison with internal infrastructure
 - Cost of large scale processing (e.g. 300K ALOS scenes)
 - Long term storage, testing, and archival costs
 - Secondary results determine cloud computing to cost effective



CESCRE

Collection of Storage and Cloud-effective Compute Capabilities. Cloud computing enables us to utilize large-scale storage with elastic compute capacity. This allows large-scale storage of raw data and processing of the data into the local infrastructure. Compute capacity can be dynamically provisioned in the cloud, where the stored data are available on the local network.

Reconfigurable Machine Images for Streamlined Processing. CESCRE allows virtualization, which enables end-users to create pre-configured machine images with all the software and dependencies required by their environment. Pre-configured machine images with popular algorithms streamline the process of provisioning a machine and running the analysis.

Parallelization of Algorithms and Cloud Orchestration. CESCRE integrates capabilities with Polyphony, to enable scientists to chain their results faster by consistently employing large number of machines. This enables scientists to cost-effectively accelerate and produce outputs.

Collaboration. Collection of data enables sharing of raw data as well as higher-level data products. The pre-configured machine images enable software developers and research scientists to share their implementations and algorithms with the community. This significantly reduces the overhead associated with installing and maintaining their algorithms. The proliferation of algorithms in a shared environment will accelerate algorithm processing and lead to collaborative processing of large datasets. It will further facilitate efficient sharing of computational resources across the NASA community.

End-to-End Validation of Proposed Capabilities with InSAR. SCE is used to prototype data analysis and archiving applications for the development of CESCRE. CESCRE will be validated against an end-to-end system that takes raw data through higher-level data products and back down into archiving algorithms.

Publication

Combs, Eric, Greg Foster, Paul A. Rosen, and Khairiga Mamed, "InSAR Scientific Computing Environment," Earth Science Technology, Forum 2013

Delbec, Howard, Scott Rowley, Pyrosk Shastha, Cody Workman, Scott Stovall, "Interferometric Synthetic Aperture Radar (InSAR) Data Processing and Archiving Strategy," IC2013, 2013

Stevens, B. Radhak, A. Sridharan, S. et al., "Enabling Earth Science through Cloud Computing," IEEE AIAA Aerospace 2011

Acknowledgement

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Select Neighborhood

ALL

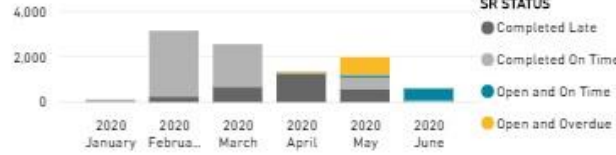
CleanStat Goals & Measures

As part of Mayor Young's Clean It Up! Campaign, we're committed to completing overdue service requests. Learn about other key initiatives [here](#).



Keep Streets & Alleys Clean

Includes cleaning up illegal dumping in alleys, mechanical street sweeping, and servicing public trash cans.

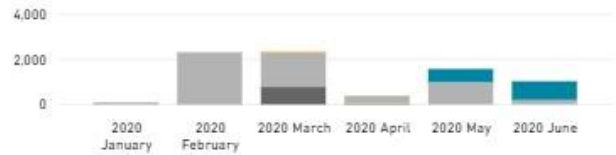


Current Backlog
861



Maintain Vacant & Abandoned Properties

Includes routine cleaning and mowing of vacant lots, illegal dumping clean-ups, and boarding vacant buildings.



Current Backlog
90



Hold Violators Accountable

Includes inspections and investigations of reported trash and dumping issues, with the possibility of citations and other enforcement action.

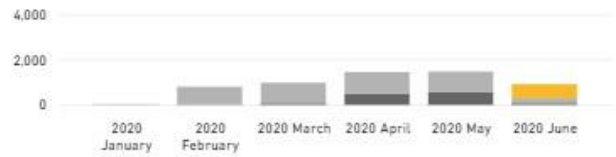


Current Backlog
509



Efficiently Remove Waste & Recycling

The Bureau of Solid Waste removes trash and recycling from more than 500,000 households in Baltimore. This measure tracks how efficiently make-up collections are completed.



Current Backlog
613



Game Plan

**Engagement Winner:
Will be announced at the
next meeting!**

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Brian.Mark@watech.wa.gov

