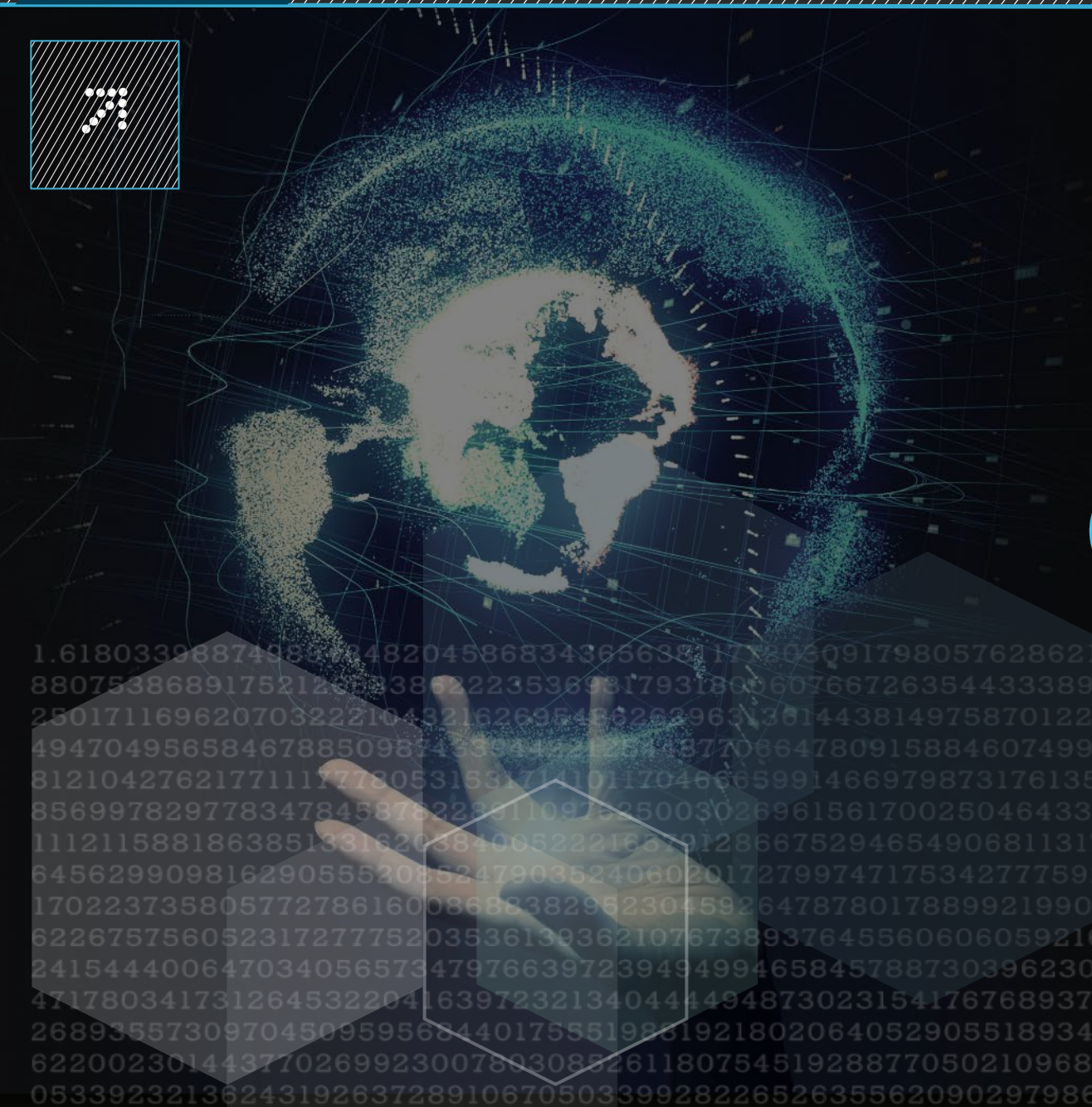


Office of the Director of National Intelligence

IARPA

BE THE FUTURE

Mercury Challenge

Q&A Session 2

MERCURY CHALLENGE

TODAY'S AGENDA

+ **Updated Challenge Timeline**
+ Judging and Scoring
+ Prizes
+ Prize Requirements

MERCURY PROGRAM CHANGE

We are changing the Mercury program timeline**, by combining scoring period 2 and 3**. We will now have a three-month scoring period (scoring period 2) and conclude the challenge on January 31st.

+ The competition will now be divided into **two** Periods
+ Each Period will now be scored independently
+ Final scores for the Period will be calculated 20 days after the Period closes, and the winners will then be announced

MERCURY CHALLENGE

CHALLENGE UPDATES

+ Based on the feedback from Solvers and the results we have seen thus far, we have strategically altered the length of the challenge

+ We have reorganized the scoring categories to allow Solvers to focus their effort on several key areas

+ We have updated the incentive structure to bring the remaining Prize Pool into the second period to make this a more rewarding challenge experience for our Solvers

+ **Period 1:** August 7, 2018 – October 31, 2018
+ **Period 2:** November 1, 2018 – January 31, 2019

+ The leaderboard scores on **12/21/2018** will be used for the Milestone Incentives

AUGUST 1, 2018
Mercury Challenge launches

October 25, 2018
Q&A Session

OCTOBER 31, 2018
First scoring period ends

JANUARY 31, 2019
Second scoring period ends

FEBUARY 28, 2019
Winners announced

SCORING UPDATES

+ Scoring will be based on the following categories

Syria	Military Activity (MA)
Iraq	Military Activity (MA)
Egypt (Country daily counts only)	Civil Unrest (CU)
Jordan (Country weekly counts only)	Civil Unrest (CU)
Infectious Disease In Saudi Arabia	Disease (CU)

+ The following items **will no longer need to be submitted**, and will not count towards the final calculations

Saudi Arabia	Military Activity (MA)
Egypt	Military Activity (MA)
Lebanon	Military Activity (MA)
Qatar	Military Activity (MA)
Bahrain	Military Activity (MA)
Egypt - Tahrir Square	Civil Unrest (CU)
Jordan - Amman, Irbid, Madaba	Civil Unrest (CU)

+ Challenge Leaderboards will be updated to reflect the new categories that are being scored
+ Provisional Scoring will also happen on a bi-weekly basis

PRIZES

Participants with the best winning solutions will be eligible to win from a prize pool of $100,000, which will be distributed across a series of very difficult country/event combinations.

For example: "*Predict Non-violent Civil Unrest events in Egypt, but far away from Cairo, during the month of August 2018*."

Challenge participants can win prizes for having top scores across **thirteen separate categories**. The top scorers after each scoring period will earn the Top Prize for that given period. Regular and early participation will provide more opportunities for winning!

Begins Nov. 1

PERIOD 1 PRIZE PURSE	$21,000	
PERIOD 2 PRIZE PURSE	$79,000	
BEST UNDERGRAD	$5,000	
TOTAL WINNERS	30	

SCORING PERIOD 1 DISTRIBUTION

Please note that each competitor is limited to winning one (1) prize per scoring period. In the event that a competitor wins more than one category, they will receive the award with the highest prize amount.

COUNTRY	CLASS TYPE	# OF WINNERS	PRIZE AMOUNT
1st Place (All Countries)	Best Overall	1	$7,000
2nd Place (All Countries)	Best Overall	1	$5,000
3rd Place (All Countries)	Best Overall	1	$3,000
Egypt	Military Activity (MA)	1	$2,000
Saudi Arabia	Military Activity (MA)	1	$2,000
Lebanon	Military Activity (MA)	1	$2,000

Total Prize: $21,000

SCORING PERIOD 2 DISTRIBUTION

Please note that each competitor is limited to winning one (1) prize per scoring period. In the event that a competitor wins more than one category, they will receive the award with the highest prize amount.

COUNTRY	CLASS TYPE	# OF WINNERS	PRIZE AMOUNT
1st Place (All Countries)	Best Overall	1	$21,000
2nd Place (All Countries)	Best Overall	1	$15,000
3rd Place (All Countries)	Best Overall	1	$8,000
Best Undergrad Prize (All Countries)	Best Overall	1	$5,000
Syria	Military Activity (MA)	1	$5,000
Iraq	Military Activity (MA)	1	$5,000
Egypt	Civil Unrest (CU)	1	$5,000
Jordan	Civil Unrest (CU)	1	$5,000
Infectious Disease In Saudi Arabia	Disease (CU)	1	$5,000
Midway Split – Top 10 Overall	Milestone Prize	10 @ $500 each	$5,000

Total Prize: $79,000

RESOURCES

+ **Mercury Challenge Microsite -** Place for all challenge-related information and updates
  http://iarpa.gov/challenges/mercury.html

+ **Topcoder Registration Page -** Register for the challenge
  https://www.topcoder.com/mercury-challenge

+ **Topcoder Mercury Challenge Forum** - Connect with other challengers and ask questions
  http://apps.topcoder.com/forums/?module=ThreadList&forumID=630604&mc=0

+ **Mercury Challenge GitHub Repository -** Get technical updates and code here
  https://github.com/planetmercury/mercury-challenge

Appendix

JUDGING AND SCORING: MILITARY ACTIVITY (MA)

Conflict or Force Posture events initiated by the military or security forces of the Mercury countries. Excludes actions initiated by the US or its allies.

- $QS = \frac{1}{4} * (Location\ Score + Date\ Score + Actor\ Score + Event\ Subtype\ Score)$
- $F1 = \frac{2 * Precision * Recall}{Precision + Recall}$
- $Mercury\ Score = \frac{QS + F1}{2}$

Warning Fields

- Warning_ID: A unique identifier
- Event_Date: YYYY-MM-DD
- Country
- Latitude
- Longitude
- Actor: Use a value from provided Actor Dictionary
- Event Subtype: Conflict or Force Posture
- State (optional, not scored)
- City (optional, not scored)
- Event_Type: Military Activity

JUDGING AND SCORING: CIVIL UNREST EVENTS (CU)

Counts of events:

Egypt

- Daily
- ~~Tahrir Weekly (events within 75 km of Tahrir Square, Cairo)~~

Jordan

- Weekly
- ~~Amman Province Monthly~~
- ~~Irbid Province Monthly~~
- ~~Madaba Province Monthly~~

- $QS = \frac{|Predicted - Actual|}{\max(Predicted, Actual, 4)}$

Warning Fields:

- Warning_ID: A unique identifier
- Event_Date: YYYY-MM-DD
- Country: Egypt or Jordan
- State (required only for Jordanian Province Monthly events)
- City (required only for Tahrir Weekly events, use “Tahrir Square”)
- Case_Count: Predicted Number of Events
- Event_Type: Civil Unrest

JUDGING AND SCORING: DISEASE (MERS)

Weekly count of Middle Eastern Respiratory Syndrome (MERS) cases in Saudi Arabia

- $QS = \frac{|Predicted - Actual|}{\max(Predicted, Actual, 4)}$

Warning Fields

- Warning_ID: A unique identifier
- Event_Date: YYYY-MM-DD
- Country: Saudi Arabia
- Case_Count
- Event_Type: Disease
- Disease: MERS

GOLD STANDARD REPORTS (GSR)

- Gold Standard Report (GSR) provides the ground truth against which participants are scored.
- Published bi-weekly, reporting lag typically 10 – 24 days.
  - *cu_count_gsr*: CU count events, one file per location.
  - *cu_gsr*: Individual CU occurrences from which counts are derived. Not used directly in scoring. One file per calendar month.
  - *disease_gsr*: MERS weekly count events. One file.
  - *ma_gsr*: Individual MA occurrences, one file per calendar month.
- **Github**: https://github.com/planetmercury/mercury-challenge-team

Example MA GSR event (scored fields in yellow):

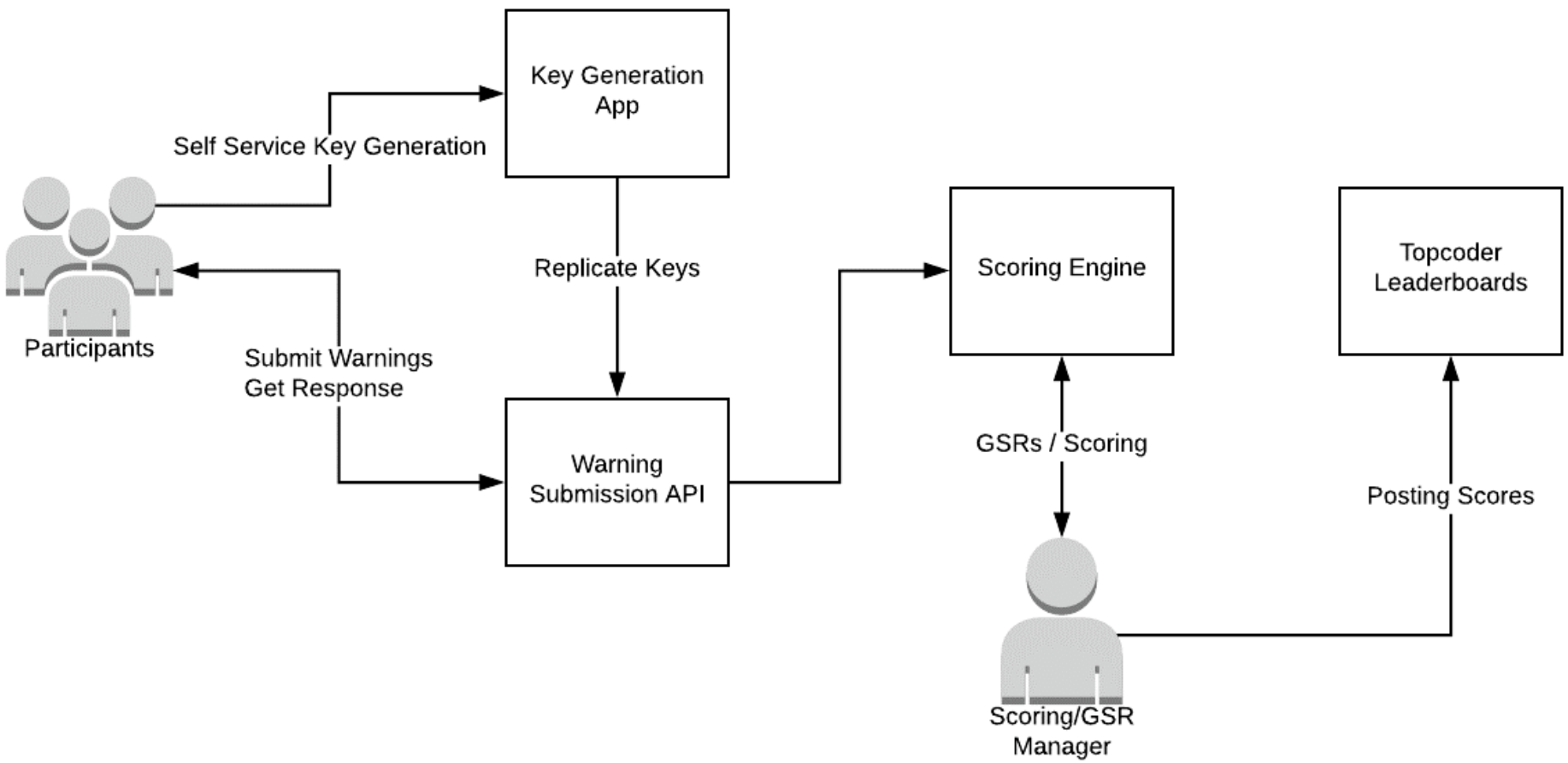

```
{"Actor":"Iraqi Military",
"Approximate_Location":"False",
"City":"Wādī al Faḍwah",
"Country":"Iraq",
"Earliest_Reported_Date":"2018-09-01",
"Event_Date":"2018-09-01",
"Event_ID":"MN287902",
"Event_Subtype":"Conflict",
"Event_Type":"Military Activity",
"First_Reported_Link":"http:\\www.basnews.com\index.php\ar\news\iraq\462683"
"GSS_Link":"http:\\www.basnews.com\index.php\ar\news\iraq\462683",
"Latitude":33.6074,
"Longitude":41.277,
"News_Source":"Bas News",
"Other_Links":null,
"Revision_Date":"2018-09-06",
"State":"Anbar",
"Revision_DTG":1536192000000}
```

BASERATE MODELS

+ **Mercury_Baserate** is a pseudo-Participant that submits warnings that are only based on the GSR and that use no exogeneous signals.
  - MA: Sample from the previous 12 months of events, extrapolated into the future.
  - CU: ARIMA model trained on the pre-challenge history.
  - Disease: Historical average for the Epidemiological Week, scaled by the ratio of recent trend to historical trend.

+ Baserate warnings are produced bi-weekly, shortly after the GSR release.

SUBMISSION OVERVIEW



API SUBMISSIONS

+ Warnings can be submitted to the /warning/intake endpoint listed in the documentation here: https://solutions.topcoder.com/mercury-challenge/submission

+ Generated tokens are not immediately added for access. It may take a few hours before your token is validated

+ We've added another endpoint for listing out your submitted warnings. This will allow you to validate all of the warnings you have sent to the system so far
  - The endpoint for warning list is: /warning/history
  - Detailed instructions for warning history can be found on the Github repository wiki: https://github.com/planetmercury/mercury-challenge/wiki

SCORING ENGINE AND LEADERBOARDS

+ Detailed scoring information can be found on the Github repository: https://github.com/planetmercury/mercury-challenge

+ The scoring process is a manual effort that involves adding the GSRs, running and aggregating the scores, then posting them to various leaderboards

+ Topcoder has an overall leaderboard which contains all of the aggregated scores here: https://community.topcoder.com/longcontest/?module=ViewStandings&rd=17231

+ Topcoder also has a detailed leaderboard showing the breakdown of scoring across event classes and countries here: https://mercury-leaders.herokuapp.com/

Mercury Challenge Detailed Leaderboard Current Participation Leaders 8-1-9-4 8-1-8-21

Participant	Total Submissions
valilenk	256
n01z3	117
catskills	97
abadkingdog	92
mrChehov	70
rekcahd	51
pjmuthu	50
nfitch3	34
peterhaglich	20
omarbari	8
Ovidiu.Dobre	7