

# **“Fake Media” Research at MIT Lincoln Laboratory**

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**IFIP 10.4 Dependable News Workshop**

**June 23-24, 2017**



\* This material is based upon work supported by the Assistant Secretary of Defense for Research and Engineering under Air Force Contract No. FA8721-05-C-0002 and/or FA8702-15-D-0001. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Assistant Secretary of Defense for Research and Engineering.





# Requirements and Current Limitations

***“The information war has begun.” – Danah Boyd, 2/15/17***

- **From a data scientist’s perspective, combating coordinated fake media campaigns require:**
  - Identifying what sources, platforms and users are spreaders / victims
  - Detecting unreliable content using cues from multiple modalities
  - Understanding the spread of unreliable content
  - Measuring impact and inferring intent
  - Proposing counter-measures
- **Traditional “Big-Data” stacks are not designed for this problem**

**Automatically detecting unreliable content, then assessing any coordinated campaign and influence is a difficult, multi-disciplinary challenge.**



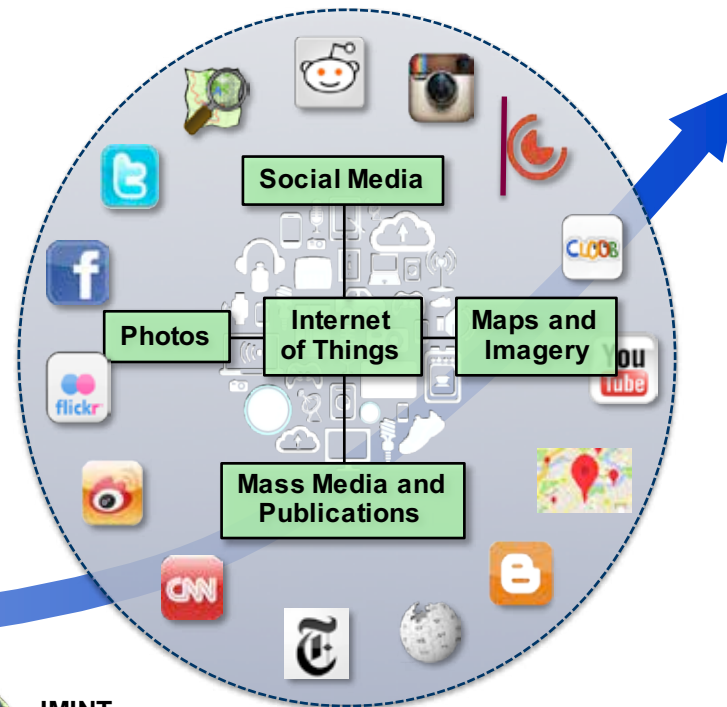
# Outline

- **Motivation**
- ➔ • **Lincoln Laboratory Capability Highlights**
- **A Multi-Disciplinary Approach**
- **Path Forward**



# The Open Source Challenge for Combatting Fake Media

- Open source data is growing exponentially
  - 2.8B internet users
  - 2B smartphone users
  - Commercial satellites and imagery coming online
- Data rich with information about people, organizations, relationships, events
- Data can be used to enrich information from USG sources



Open Sources

USG Sources

SIGINT

IMINT

HUMINT

MOVINT

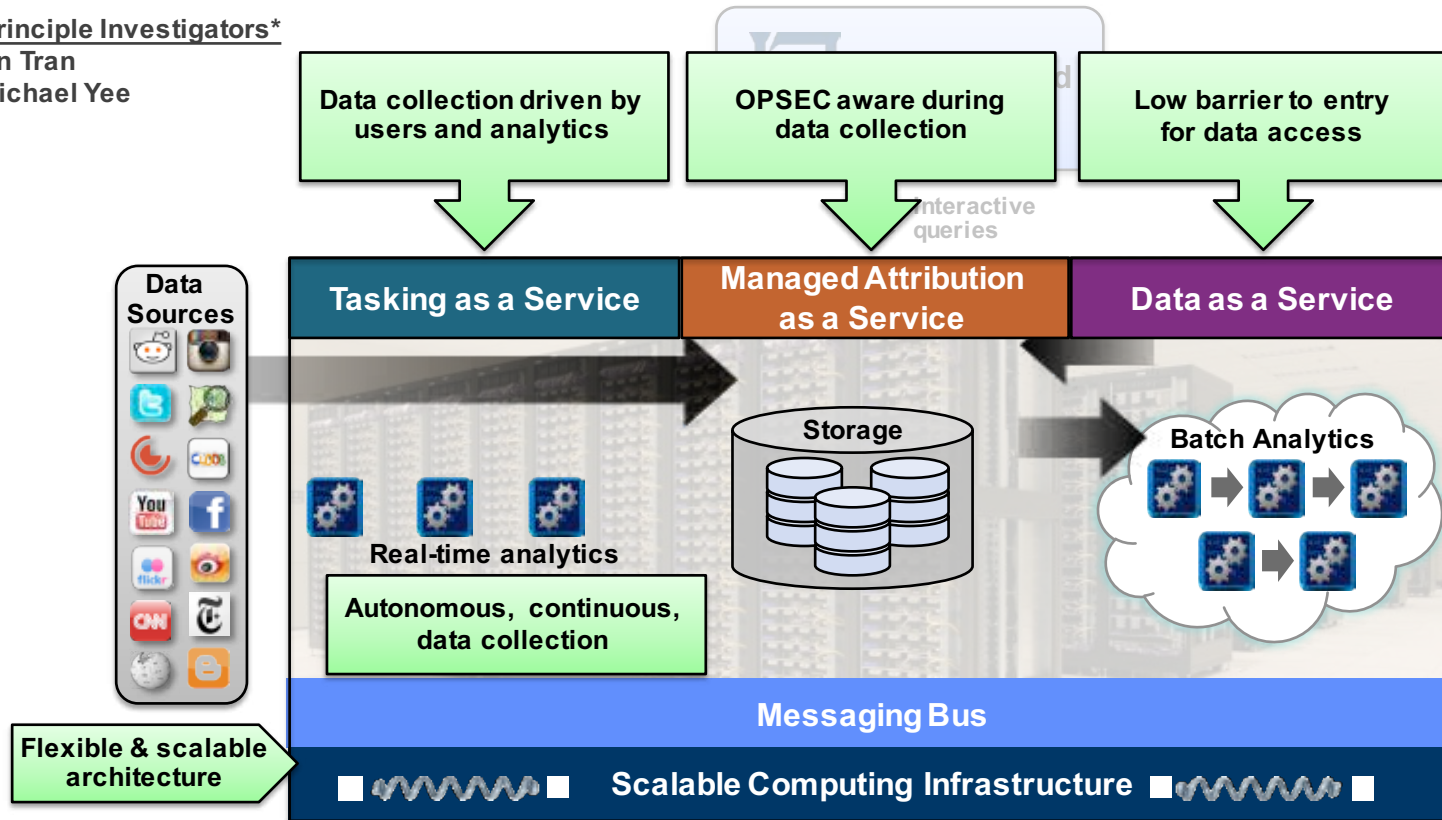




# Lincoln Laboratory Open Source Data Initiative (OSDI)

Principle Investigators\*

An Tran  
Michael Yee



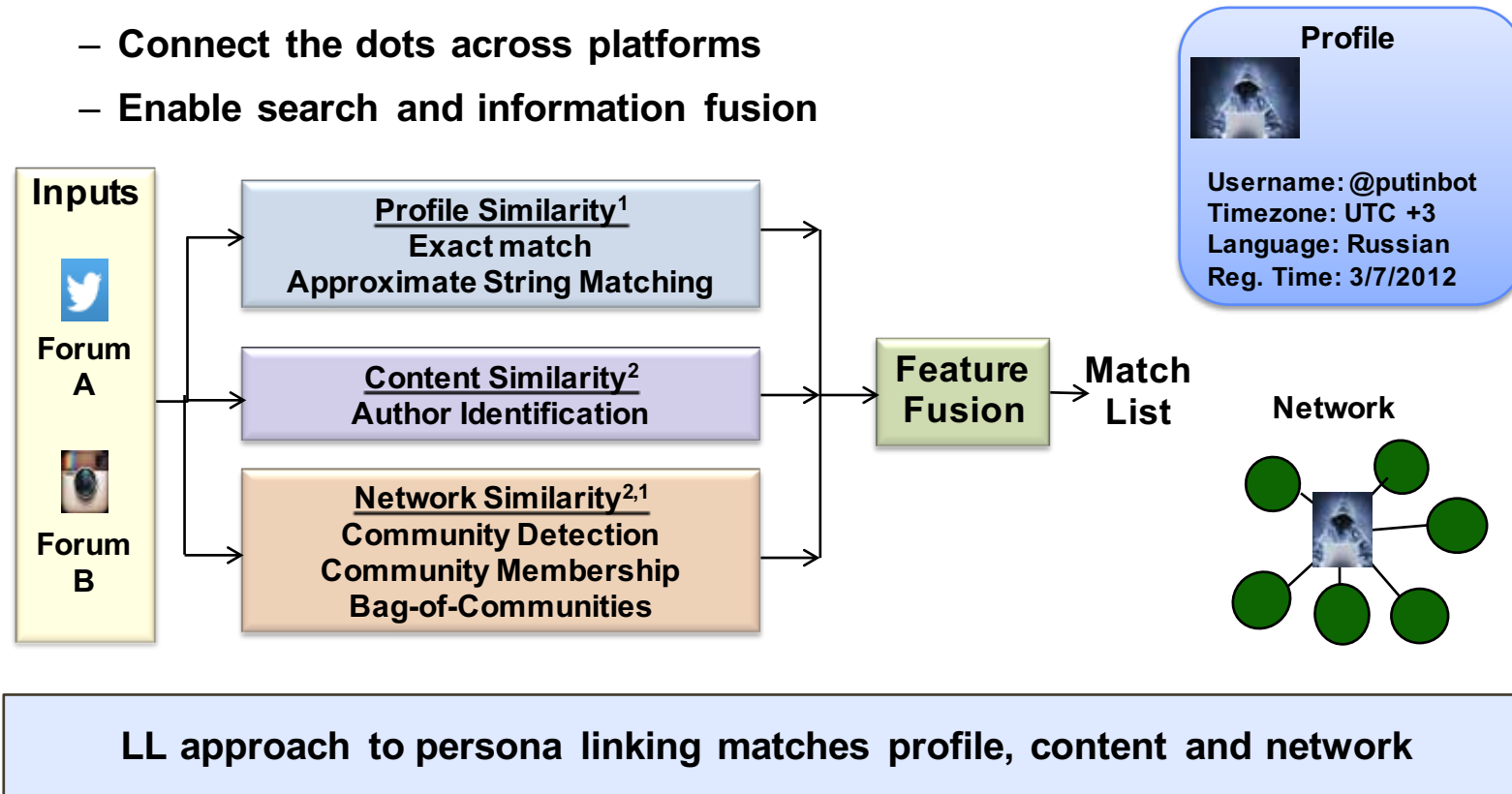
OSDI provides capability for smart data ingest (i.e. targeted collect, automated tasking).



# Persona Linking: Content and Context Analysis

Problem is to de-alias entities (i.e. people, organizations) across multiple datasets:

- Connect the dots across platforms
- Enable search and information fusion





# Persona Linking Results

## Twitter Data:

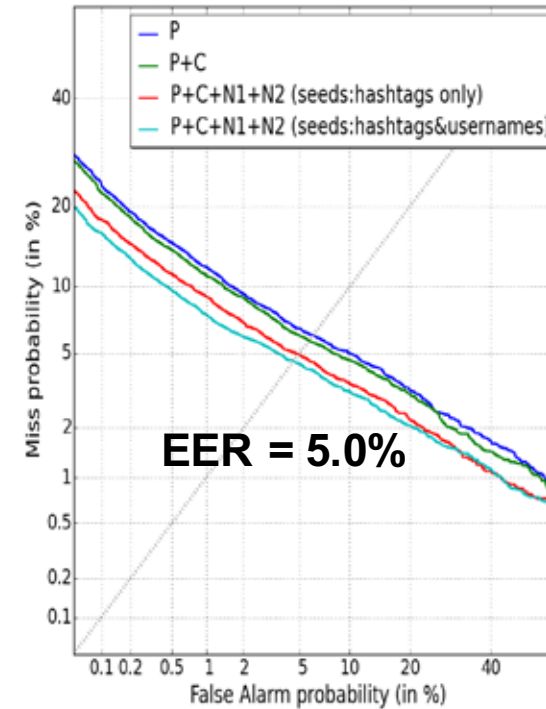
- Boston data set (2014)
- 580k distinct users  
280k distinct hashtags
- 142k users posted

## Instagram Data:

- Boston data set (2014)
- 1.13M distinct users,  
534k distinct hashtags
- 217k users posted

- Fusion of profile, content and network analytics yields highest performance

DET Curves  
P: Profile; C: Content; N1, N2: Network



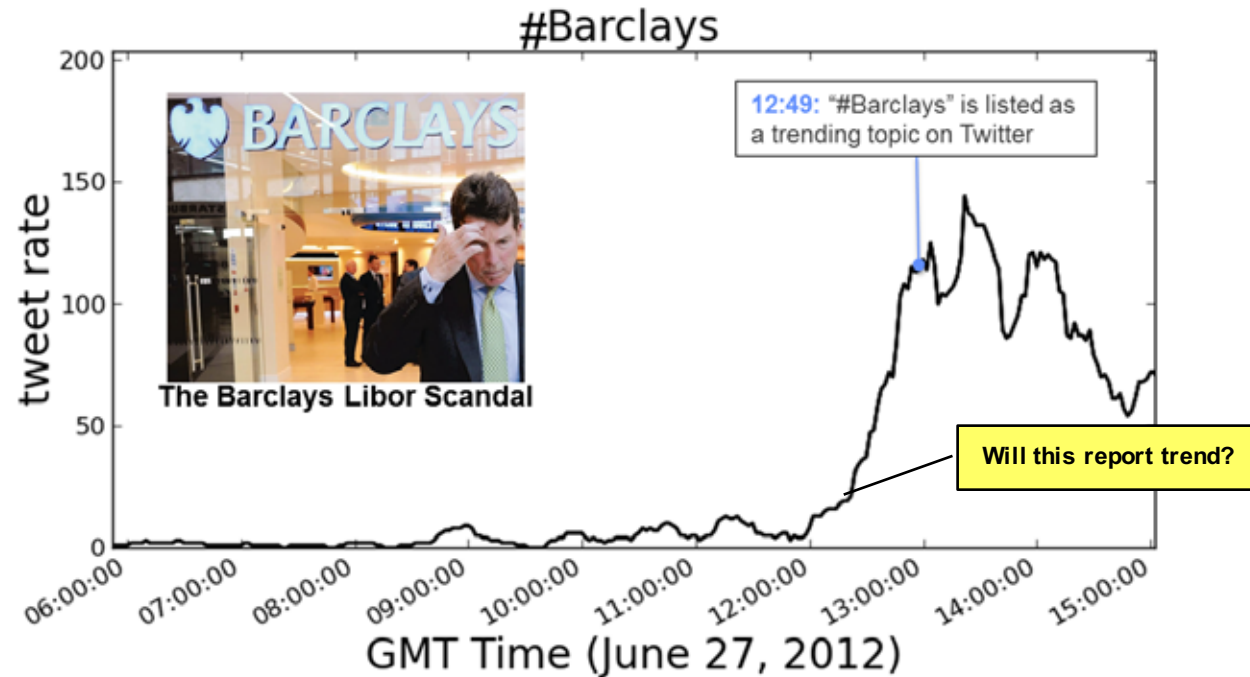
EER = 5.0%

What users talk about and with whom they talk with carries a lot of information.





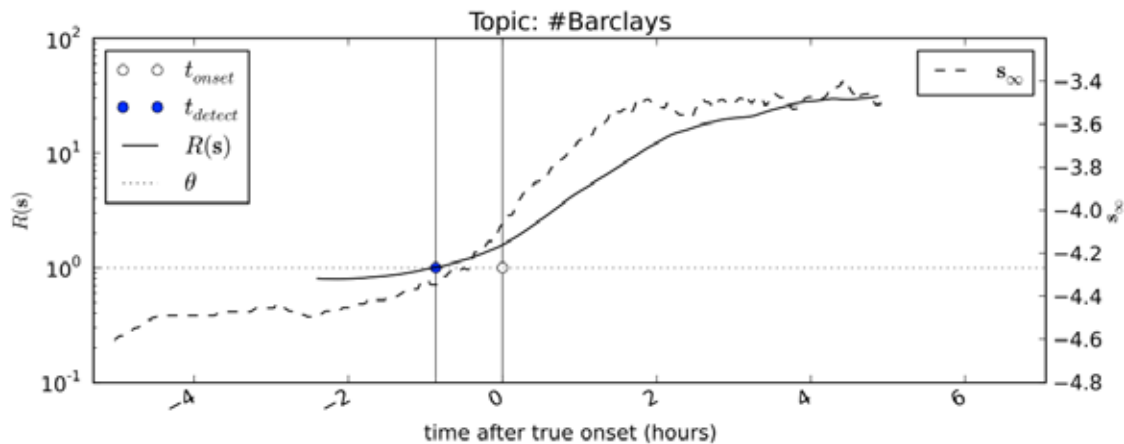
# Assessing Influence: Trend Detection



**How articles/memes spread on social media help quantify impact.  
Detecting & predicting trends provides a means of assessing influence.**

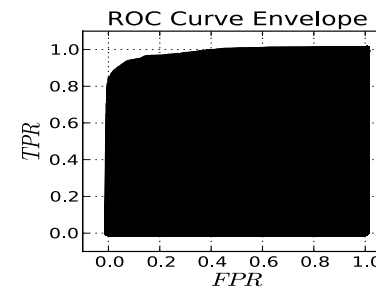
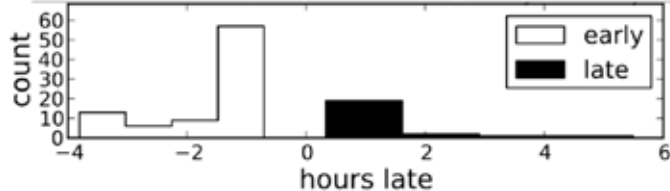


# Assessing Influence: Trend Detection



Reports on the power of trend analyses

$FPR=0.04$ ,  $TPR=0.95$ ,  $P(early)=0.79$ ,  $\langle early \rangle = 1.43hrs$   
(best parameter setting)



**MIT latent source model detects Twitter trends 1.43 hours early on average.**

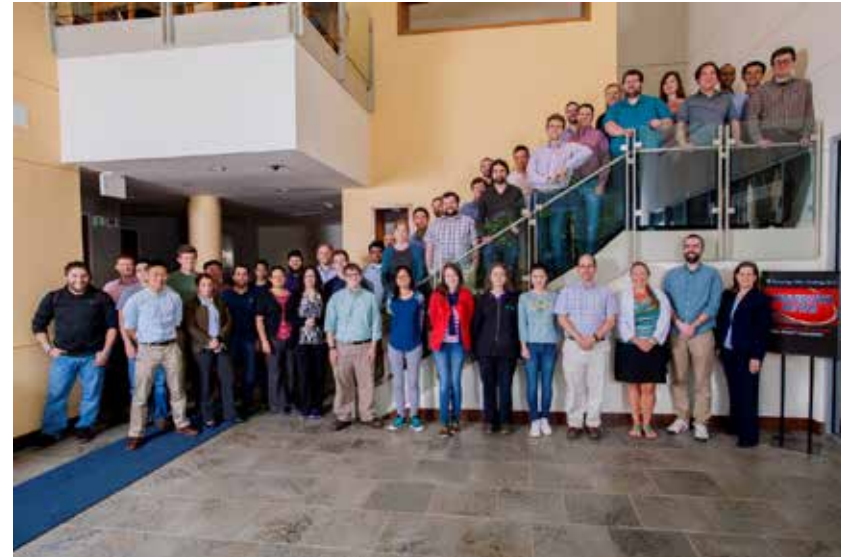


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## A Multi-Disciplinary Approach



- **Laboratory-wide Fake Media Hackathon event June 8-9 open to all staff**
- **50 LL staff from multiple divisions competed on 9 teams**
  - Varied technical backgrounds and machine learning expertise
- **Seedling effort to initiate & scope LL efforts in Fake Media domain**



# MIT-LL Fake Media Hackathon Overview

- **Task**
  - Predict whether news articles are from a reliable source given content & style cues by building novel multi-modal stylo-metric classifiers
- **Data**
  - (Pre-Hackathon) BuzzFeed News Fact-Check labeled dataset
  - (Hackathon) LL Challenge Data: Targeted collect of articles from reliable and unreliable news sites (truth-marked by OpenSources.co)
  - (Hackathon) Stretch Data: All tweets sharing articles in Challenge Data
- **Modalities and Provided Features**
  - Text, HTML/Cyber Metadata, Social Media Engagement, Image

Multi-disciplinary teams developed highly-promising detectors, began collaborative relationships and kick-started LL's "Fake Media" capabilities all in 1.5 days



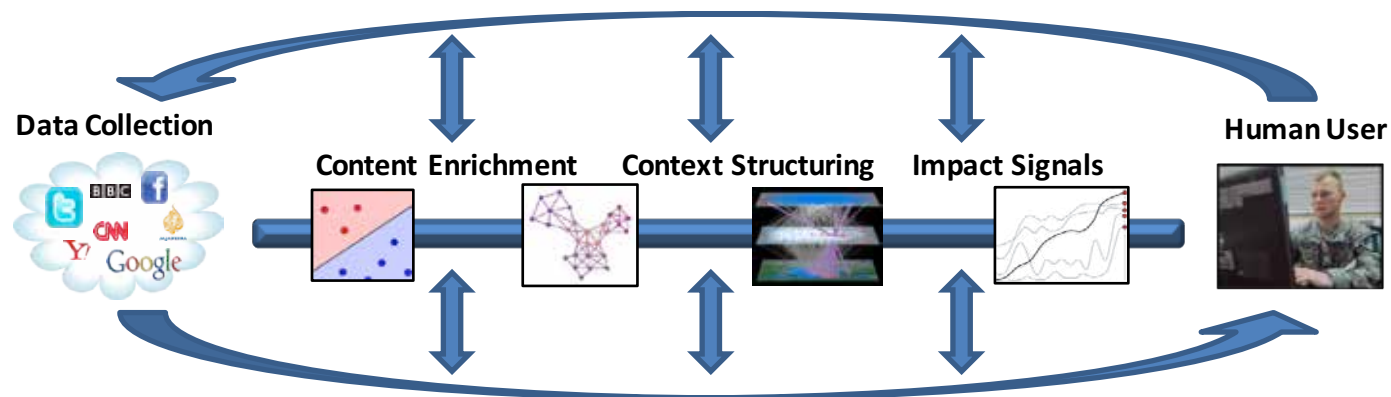


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## Path Forward



- **Create Data Science Platforms which are targeted and adaptive**
- **Collaboratively Develop Technologies with Technologists & Practitioners**
  - Discussions with Deb Roy at MIT Media Lab
  - Discussions with Robby Mook, Political Strategist

**MIT Lincoln Laboratory is leveraging existing capabilities and ongoing research technologies across multiple disciplines for the automatic detection and spread of unreliable media**