Lessons Learned from Data Science Pre-Pilot Evaluation

NIST Perspective

DSE Series Workshop
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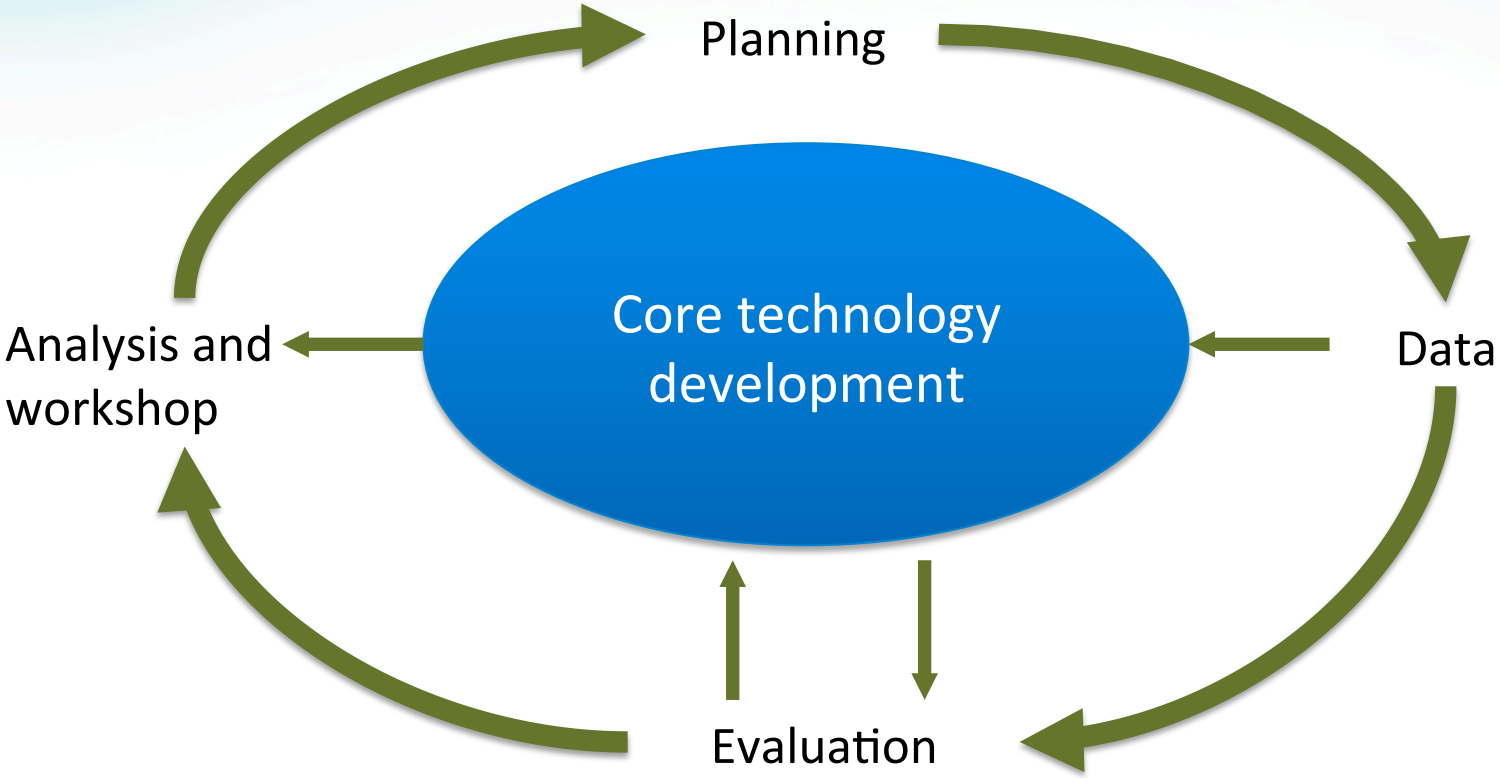
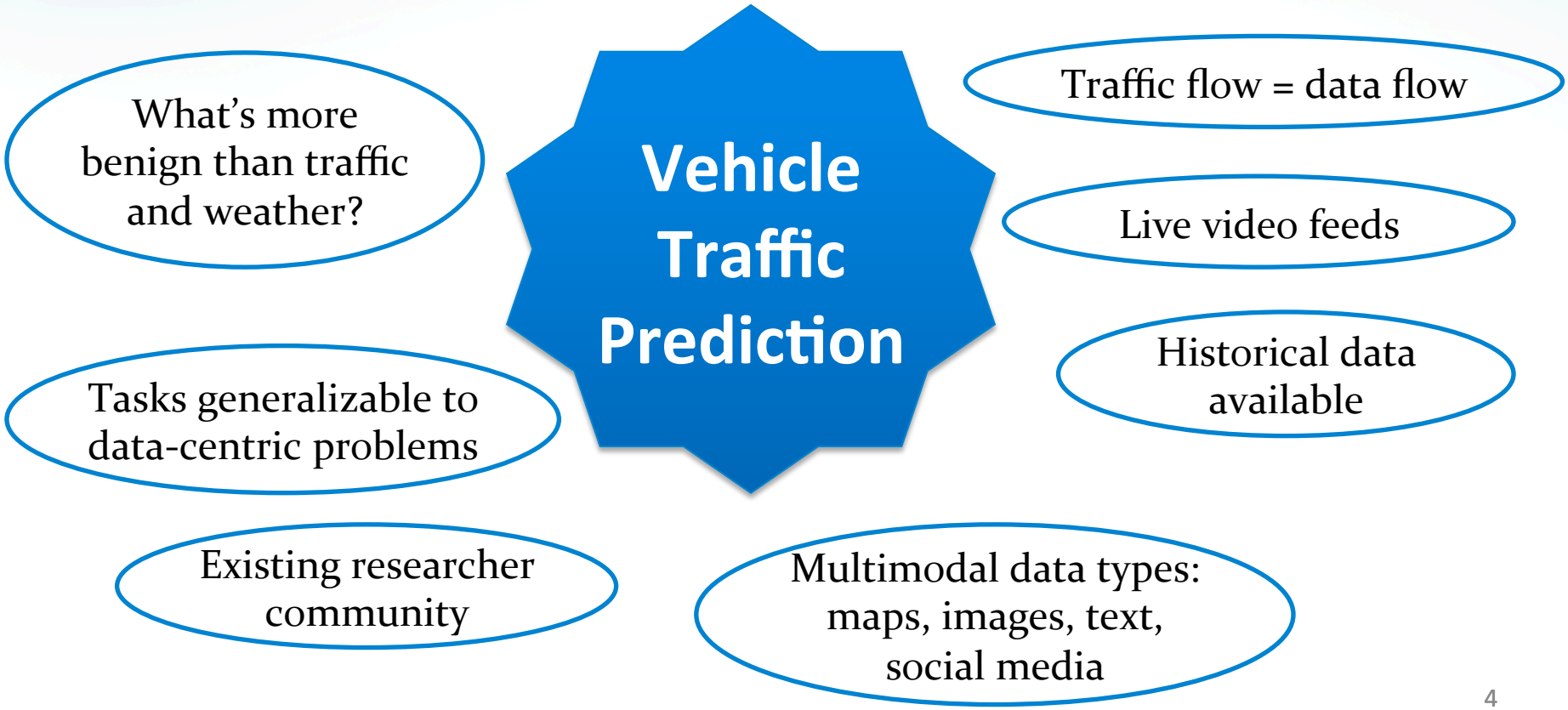
Lessons Learned Influence All Stages of the Evaluation Cycle



Overview: Aspects to Consider

- Use case
- Coverage of trials
- Baseline systems
- Metric interpretation
- Context of a metric
- Benefits of artificiality
- Barriers to entry
- Community involvement

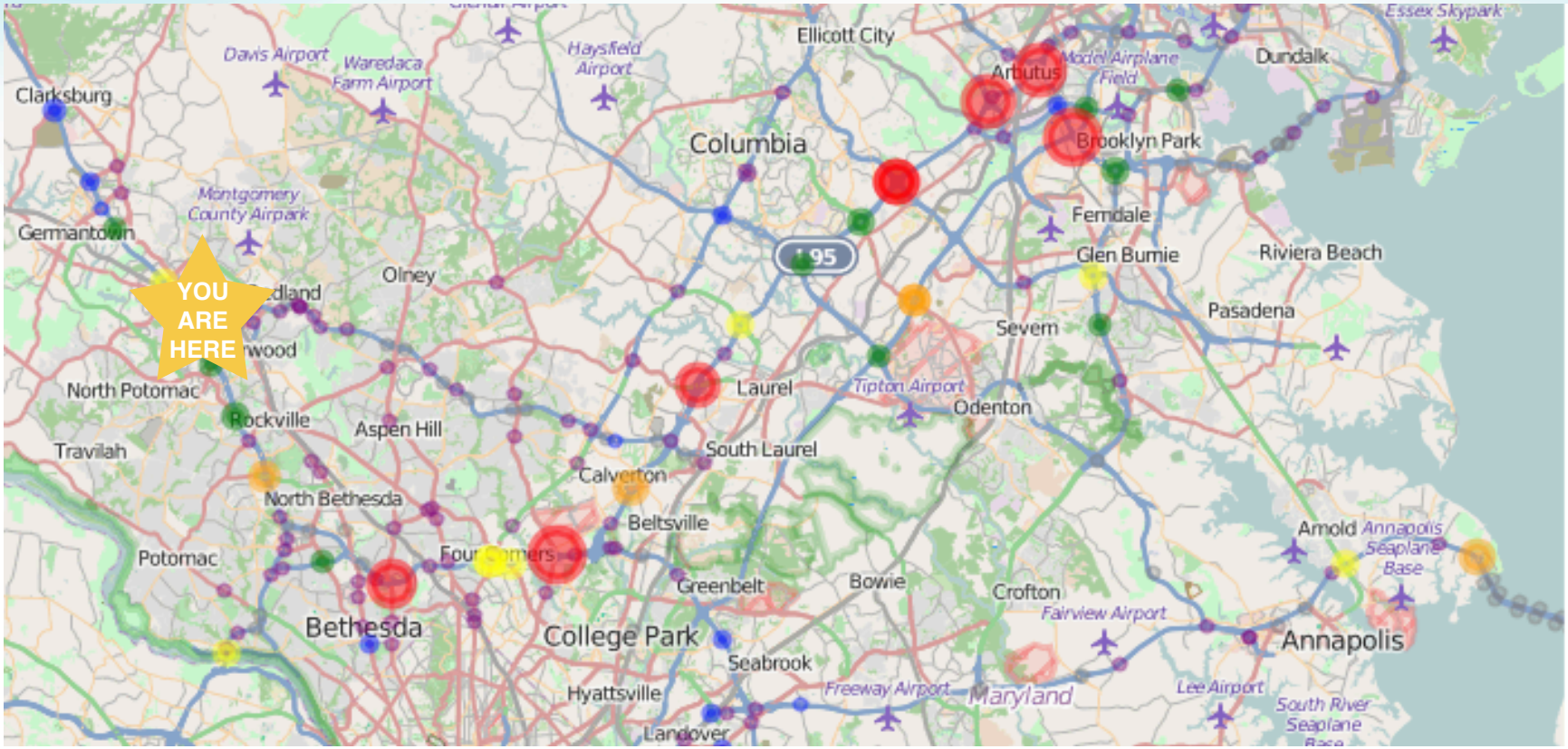
Choose a use case with desirable properties



Select trials that allow for an analysis of variance

- Design the experiment so the **"In what conditions do systems have a worse score"** becomes easy to analyze.
- Utilize **experimental design**, analysis of variance, factor analysis, to choose the trials so that statistical analysis can be performed
- **Domain expertise** helps in selecting factors

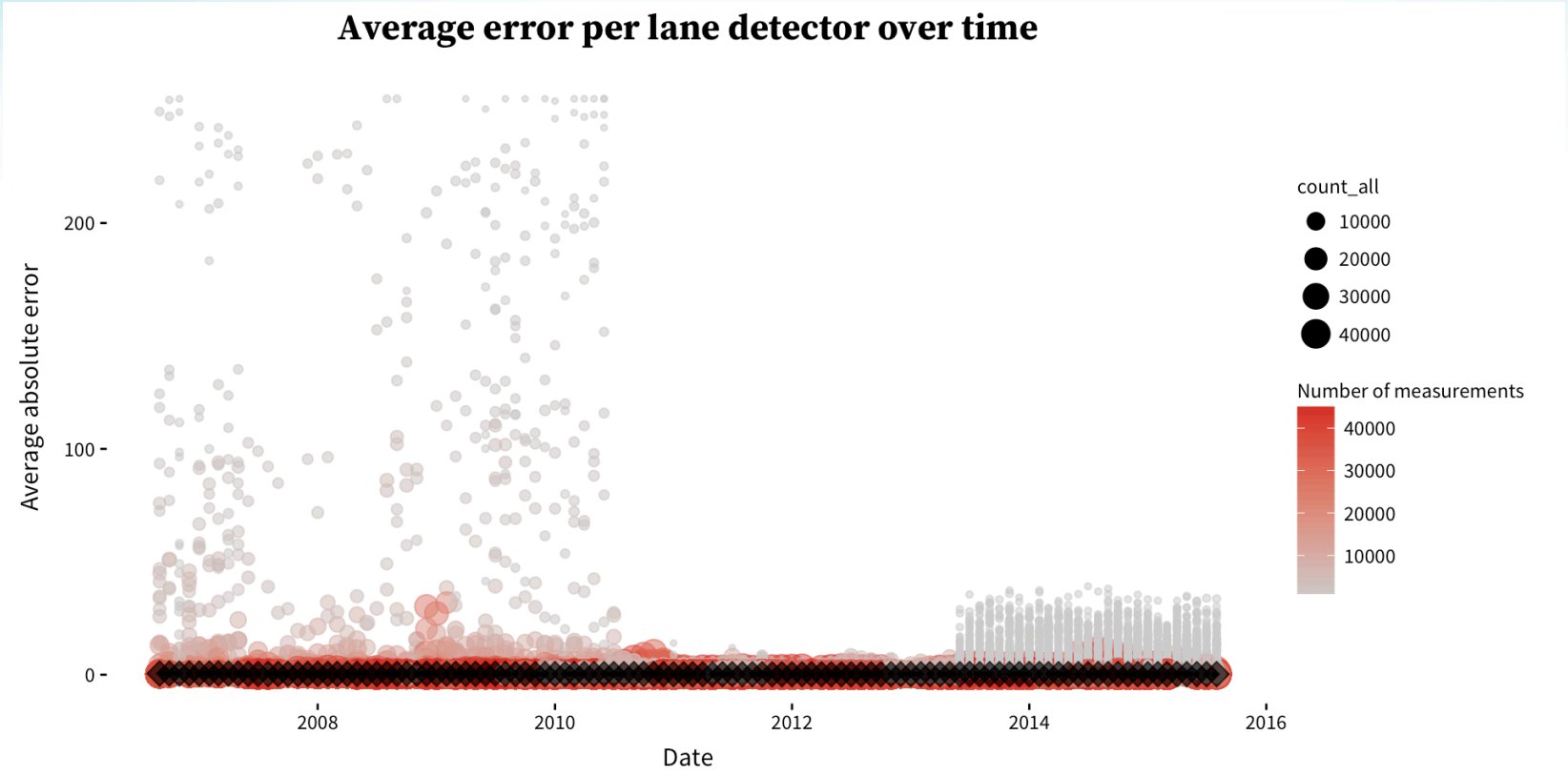
Select trials that allow for an analysis of variance



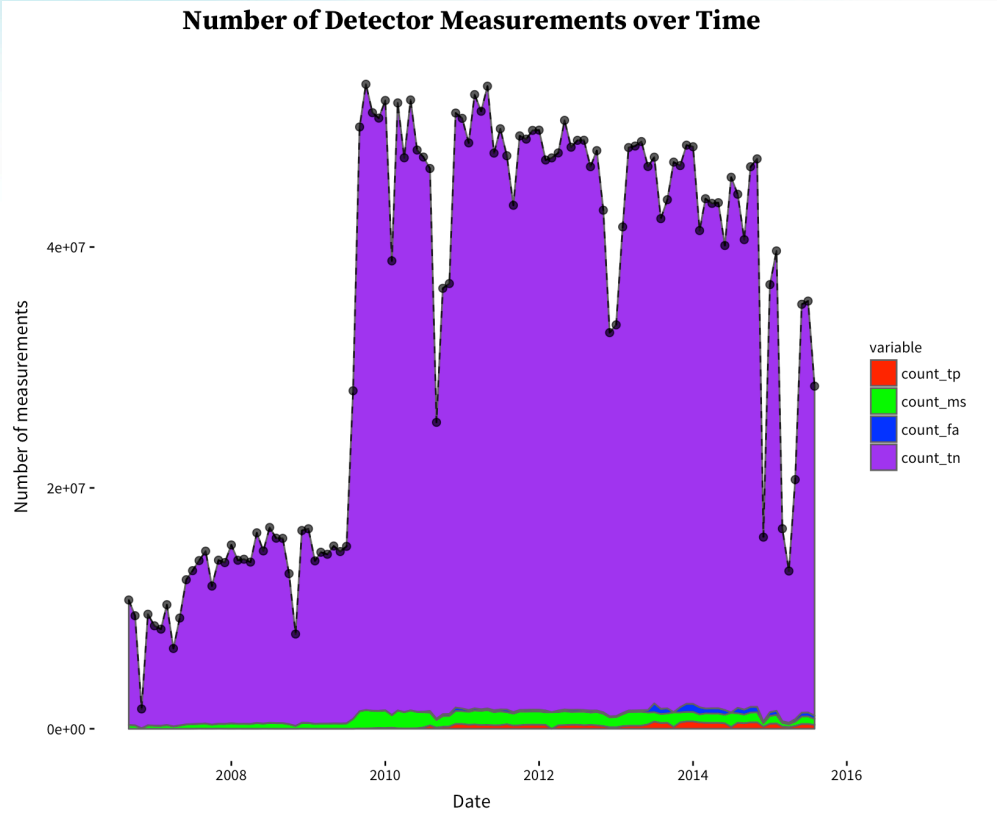
Develop baseline systems to improve task design

- What **about the problem** results in this system having a worse score?
- What computational infrastructure is needed to **complete** these tasks (barrier to entry)
- What computational infrastructure is needed to **benchmark** these tasks (analysis)

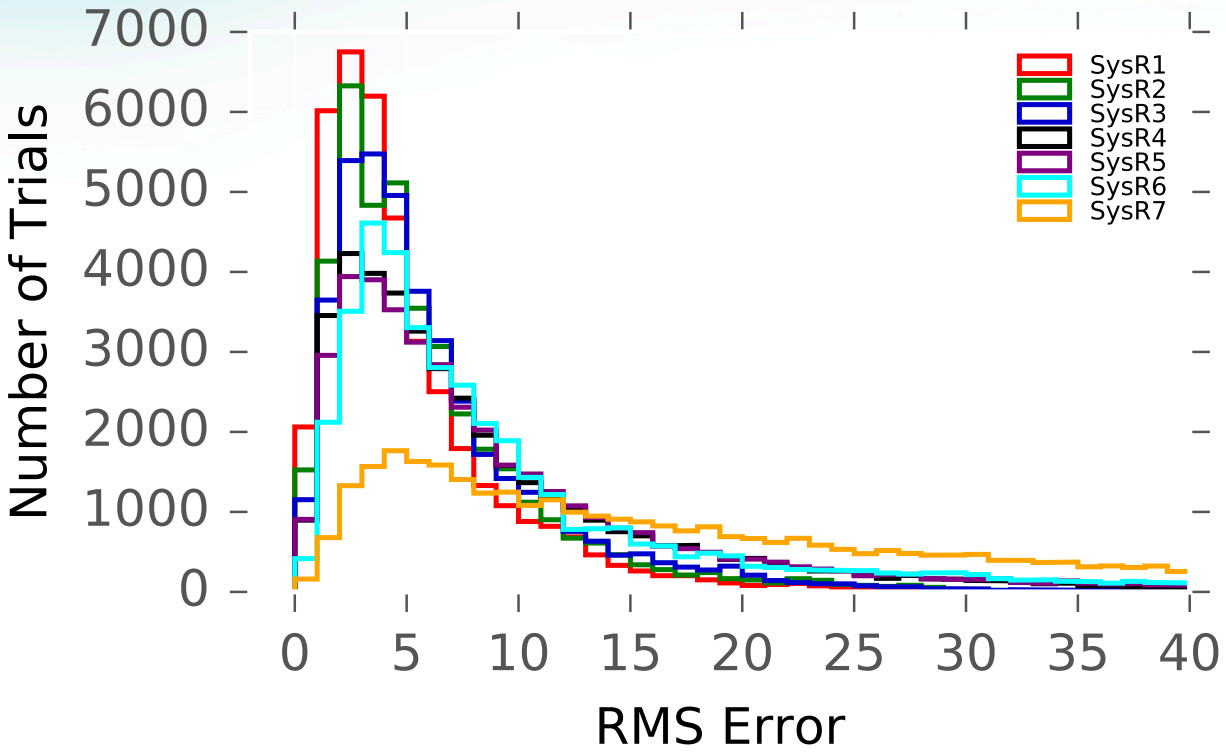
Baseline systems aid in analysis and in evaluation design



Baseline systems aid in analysis and in evaluation design



Evaluate known systems to add meaning to scores



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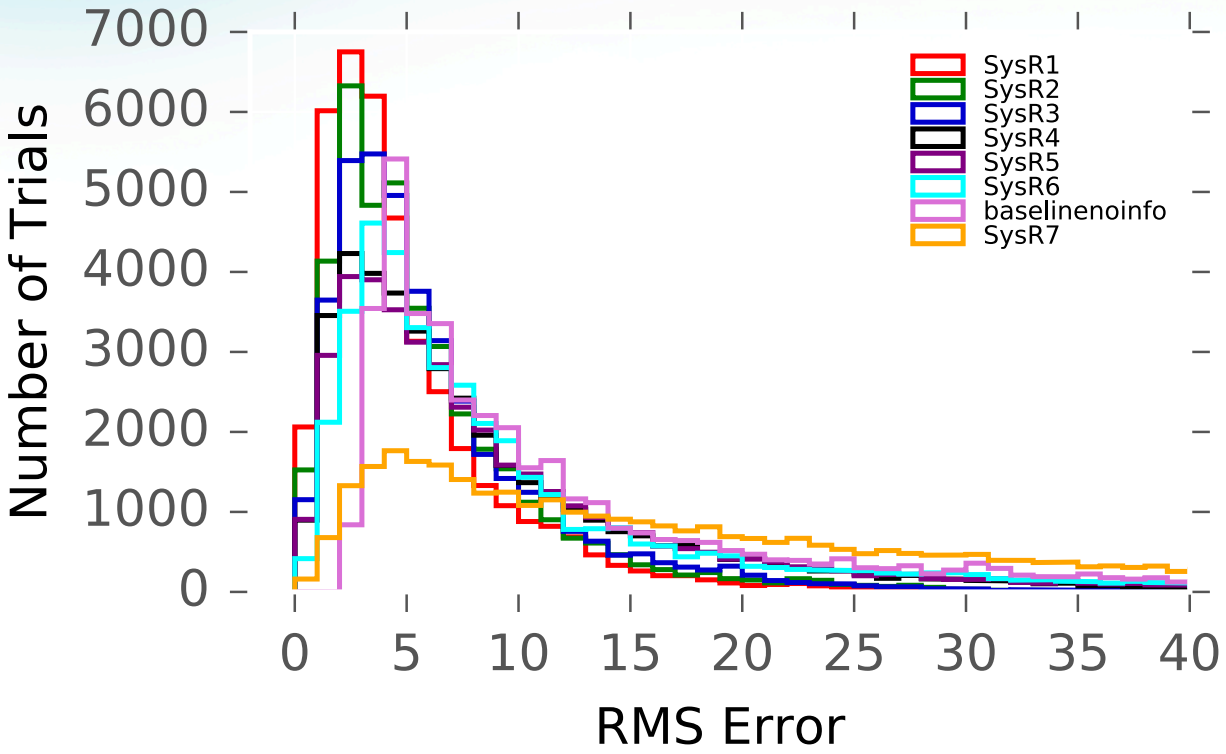
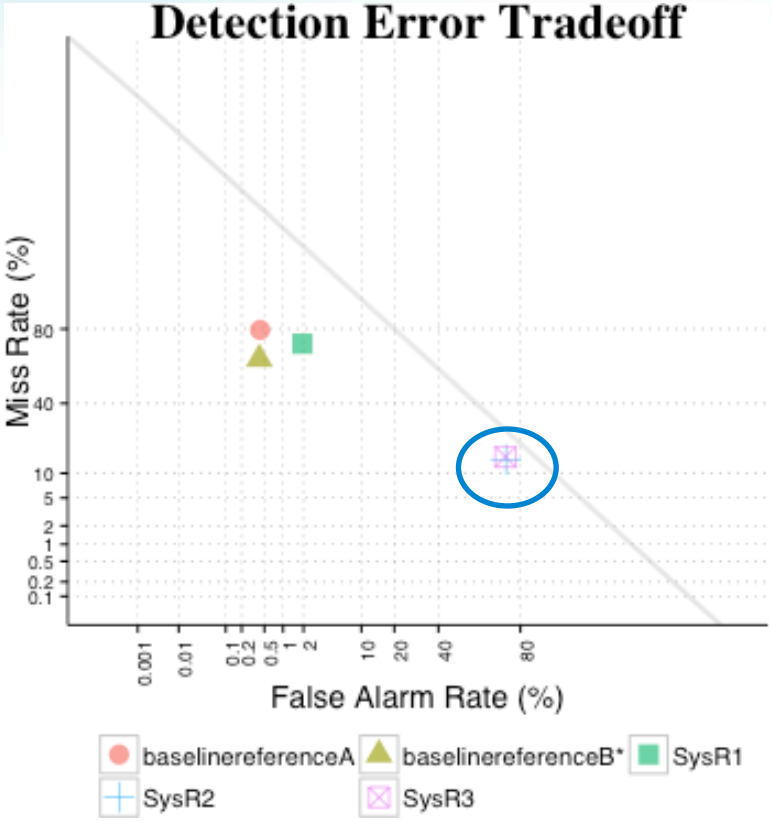
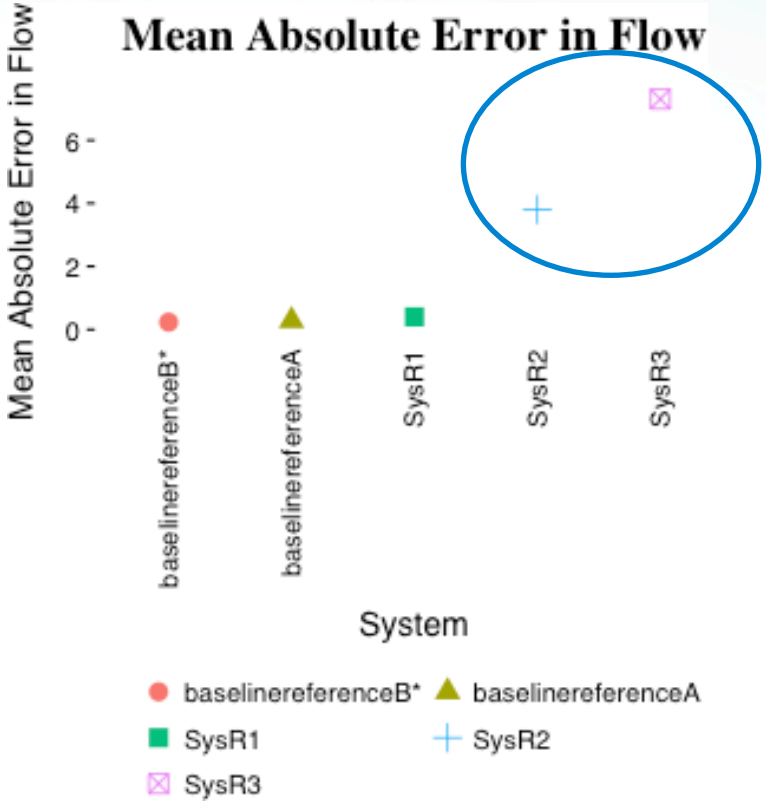


Design metrics to treat all approaches fairly





Introduce artificiality when advantageous

- Real data and real problems have many desirable properties
- **Cleaning Task Error Priors:** Unrealistic yet increase external validity and reduce system bias
- **Pre-Processed Video:** can separate alignment from domain research, reducing the barrier of entry
- **Synthesized Flow Errors:** synthetic data allows for holding some factors constant and changing others

Reduce barriers to entry for participants

- Help others **bring processing to the data**
- **Dry runs** iron-out submission and evaluation logistics
- **Leverage technology** developed for other programs within NIST

Involve the community in evaluation design

- The evaluation provides a **framework to discuss data science problems**.
- **Evaluation Design:** get community input to make the evaluation inclusive, interesting, and fair
- **Example: participants' infrastructures:** 150 GB may or may not be a "toy problem"

Involve the community in evaluation design

- **Community-Designed Tracks**
  - Led by **track coordinators** within the community
  - Data and problems of community interest
  - Different domains make evaluation inclusive

Conclusion: Lessons Learned

- Choose a use case with desirable properties
- Select trials that allow for an analysis of variance
- Develop baseline systems to improve task design
- Evaluate known systems to add meaning to scores
- Design metrics to treat all approaches fairly
- Introduce artificiality when advantageous
- Reduce barriers to entry for participants
- Involve the community in evaluation design

Lessons Learned by the Pre-Pilot Participants

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