

DM-SST S19 Planned Projects

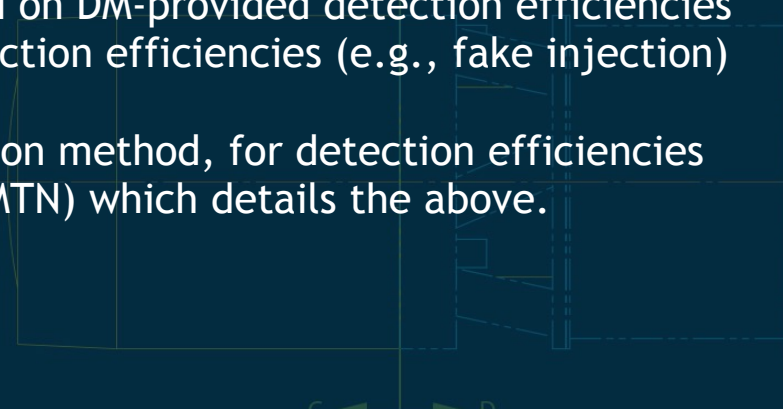
Detection Efficiencies for Difference Images

In this context, a “Detection Efficiency” is:

- the probability that the transient/variable component is detected in difference imaging
- a function of the variable flux, local surface brightness, image quality, DCR correction, etc.

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- Summarize existing requirements in LSST documentation regarding detection efficiencies
- Identify scientific opportunities and risks that depend on DM-provided detection efficiencies
- Explore technical pathways to the generation of detection efficiencies (e.g., fake injection)
- **GOAL:** Recommend the DM deliverable, and its creation method, for detection efficiencies
- **EXPECTED OUTCOME:** A project-facing document (DMTN) which details the above.



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Detection Efficiencies for Difference Images

Existing Requirements:

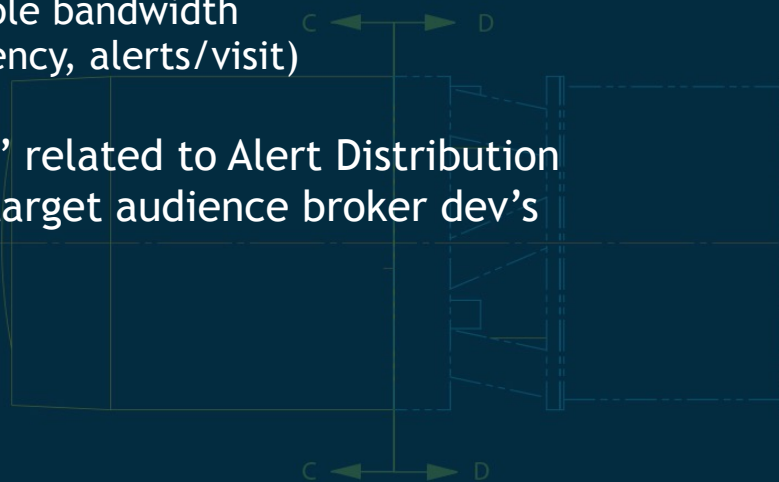
- **spuriousness** parameter in the DPDD for each **DIASource**
 - “computed using information from the source and image characterization” and be “prior free ... and not use any information about ... whether it has been previously observed or not ... to avoid introducing a bias against unusual sources or sources discovered in unusual environments.”
- OSS-REQ-0351 — **spuriousness** parameter be assessed by, e.g., “insertion and recovery of artificial sources”
- OSS-REQ-0352 — the completeness and purity of **DIASources** be estimated as a function of **spuriousness**
- DMS-REQ-0009 — “The DMS shall provide the ability to inject artificial or simulated data into data products to assess the functional and temporal performance of the production processing software.”
- OSS-REQ-0164 — The Data Release **Object** “catalog completeness and reliability shall be determined by the data management system for a variety of astrophysical objects ... and will be reported as a function of magnitude. Further, provisions will be made to determine completeness and reliability ... through injection of synthetic objects into the DM pipelines during the Data Release processing” (i.e., not part of Prompt Proc.)
- LDM-151: “In this document we do not address estimation of the selection function for alert generation through the injection of simulated sources. Such a process could be undertaken in batch mode as part of DRP.”

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Alerts “Key Numbers”

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- **MOTIVATION:** bandwidth for Alerts delivery to multiple Brokers will be limited
- include the basis information, assumptions, and derivation method for all
- be clear about which are estimates, calculations, boundaries, or limits
- example quantities might include:
 - number per visit of Alerts, new sources, types of sources, false detections
 - Alert packet sizing, full Alert Stream volume, available bandwidth
 - mini-broker deliverables (number of users, filter latency, alerts/visit)
- **GOAL:** define and estimate a set of “Key Numbers” related to Alert Distribution
- **EXPECTED OUTCOME:** a public-facing document, target audience broker dev’s



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Options for Alert Production in Year 1

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Previously known as 'Alert Production Bootstrapping'

- consider how time-domain science could be maximized in year 1
- evaluate options for building templates
 - build monthly templates?
 - only release Alerts in areas covered by commissioning templates?
- assess potential responses to unexpectedly high Alert volume
 - i.e., if we find in year 1 this is often in excess of 10000/visit
- **GOAL:** a recommendation of a scientific strategy for DM's Alert production in year 1
- **EXPECTED OUTCOME:** a project-facing document (DMTN) detailing the above

