

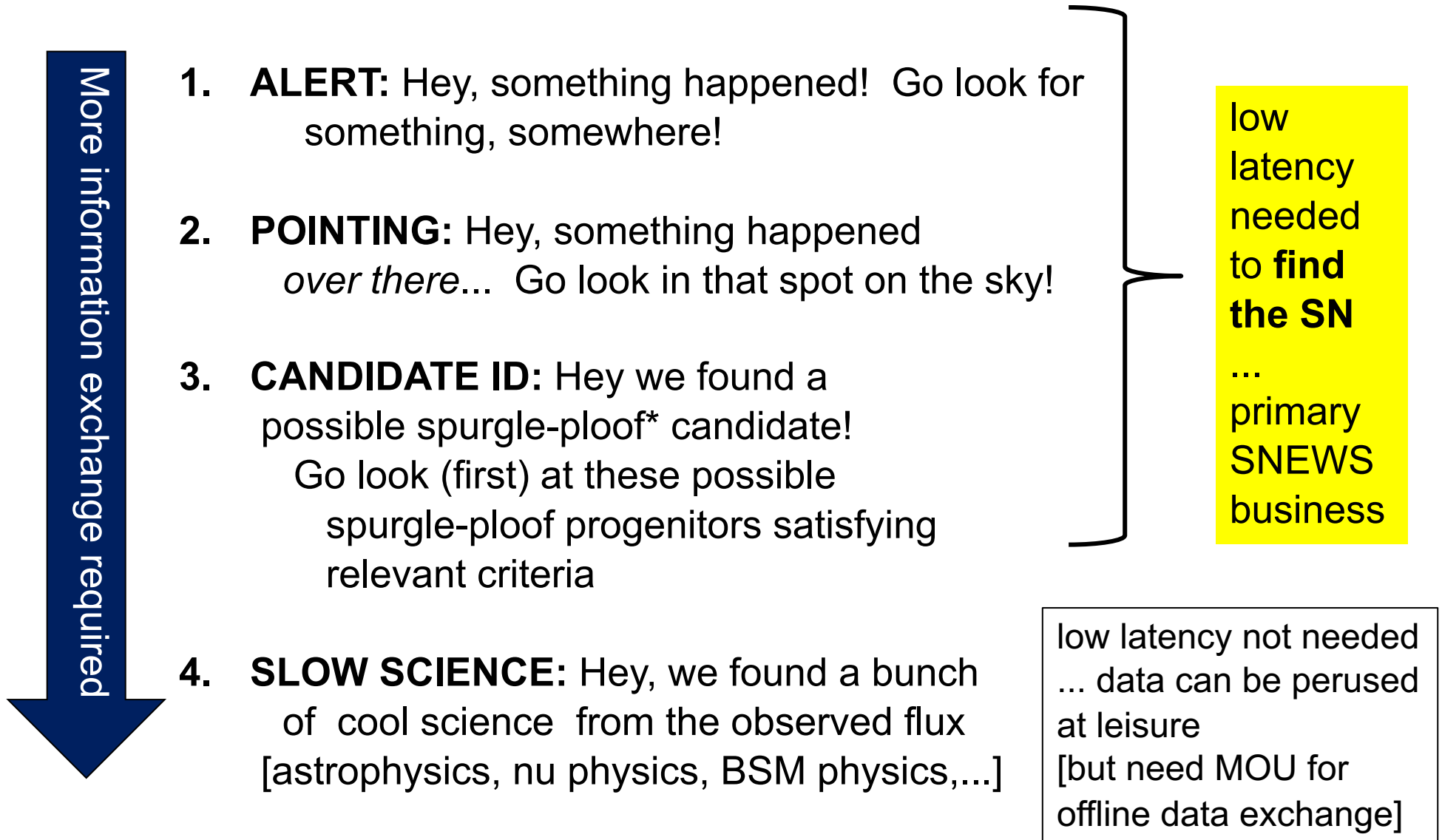
# What Can We Do With More Data?



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SNEWS 2.0 Meeting, May 12, 2021

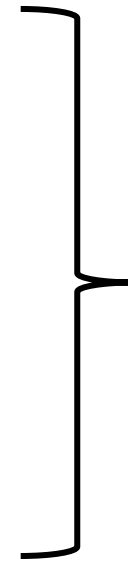
# Levels of Information Exchange



\*spurgle-ploof= e.g. core-collapse [characteristics, distance], black hole formation, thermonuclear supernova, ...

SNEWS 1.0: exchanges only  
(minimum/nominal)

- experiment
- UTC time
- level (possible, good, test)
- optional: pointing, counts



really  
only level 1.1  
[alert+]

**For SNEWS 2.0:** what additional information  
will it be worthwhile  
to exchange?

What buys us faster SN identification?

Moving to level 2+...

## Neutrino Pointing Methods

- ❑ **Anisotropic neutrino interactions**  
combined with detector technology that can exploit it,  
using the burst neutrino signal
- ❑ **Triangulation**  
using inter-detector timing
- ❑ **Oscillation pattern pointing**  
in high-energy resolution detectors
- ❑ **High-energy ( $\sim$ GeV) neutrino follow-on pointing**  
in directional detectors, using later neutrinos
- ❑ **All of the above!**

## ❑ **Anisotropic neutrino interactions**

combined with detector technology that can exploit it,  
using the burst neutrino signal

Generally up to each experimental collaboration  
... doesn't require exchange, although  
in principle combination can help  
[SK will dominate in near-term]

## ❑ **Triangulation**

using inter-detector timing

This **does** require prompt data exchange, and  
is where we need to optimize for speed vs robustness

## Possibilities:

- "first event"
- "first event + bias correction"
- cutoff for BH case
- some other summarized information  
e.g. based on highest rate interval
- full light curve [various methods]

Need also to evaluate corrections for different sensitivities, backgrounds, ...

## Approach to evaluate:

- Try these methods over the space of snwpy models
- Evaluate: pointing quality [easy to quantify]  
robustness [over models,  
bg assumptions,  
xscn & efficiency uncertainties]

What is the minimum information to achieve reasonable quality?

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Moving to level 3, candidate ID: see Danny's talk!

same generic approach...

theorist and astronomer input needed!

What kind of ID would help to narrow the  
range of candidates? What information needed?  
[modeling, followup working groups]

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## Final random notes:

- will want to fold this into the firedrill activities
- also worthy of attention:
  - presupernova* pointing...
  - can imagine using combined pointing information that gradually accumulates for an impending supernova;
  - will require a specific kind of [noisy] data exchange