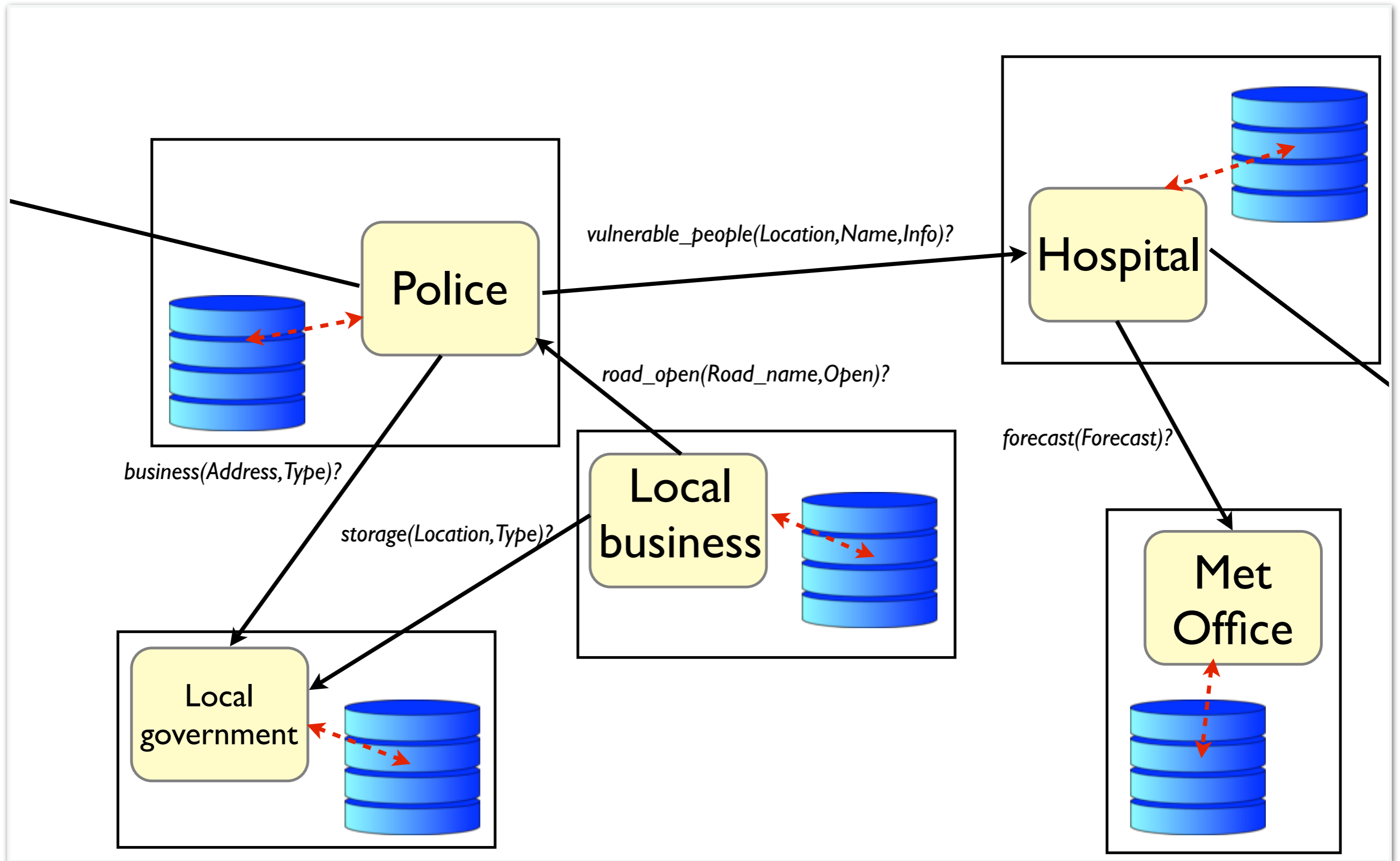


An Integrated Platform for Data Sharing during Emergency Responses

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3rd Scottish Linked Data Interest Group Workshop

Real-time interpretation of large data



Emergency Response Situations

Characterised by:

- Lots of disparate organisations (may be unknown/untrusted)
- Large amounts of data
- Need for a quick response
- Need to minimise overheads on humans (bottle-necks)

Automated support for data sharing is needed!

How can we use others' data?

We need to know:

- How can we communicate with other organisations?
- How to interpret the data - how does it relate to our data?
- How much do we trust the organisation providing it?
- What is the provenance of the data?

What is the state-of-the-art?

In practice: very little automation is used for data exchange during responses.

In theory:

- Systems-of-systems for dynamic coalition formation.
- Data matching to interpret mismatched data - a hard problem.
- Work on trust in organisations.
- Work on expressing and interpreting providence requirements.
- How can we combine these?

The role of the platform

The proposed integrated platform would allow organisations to:

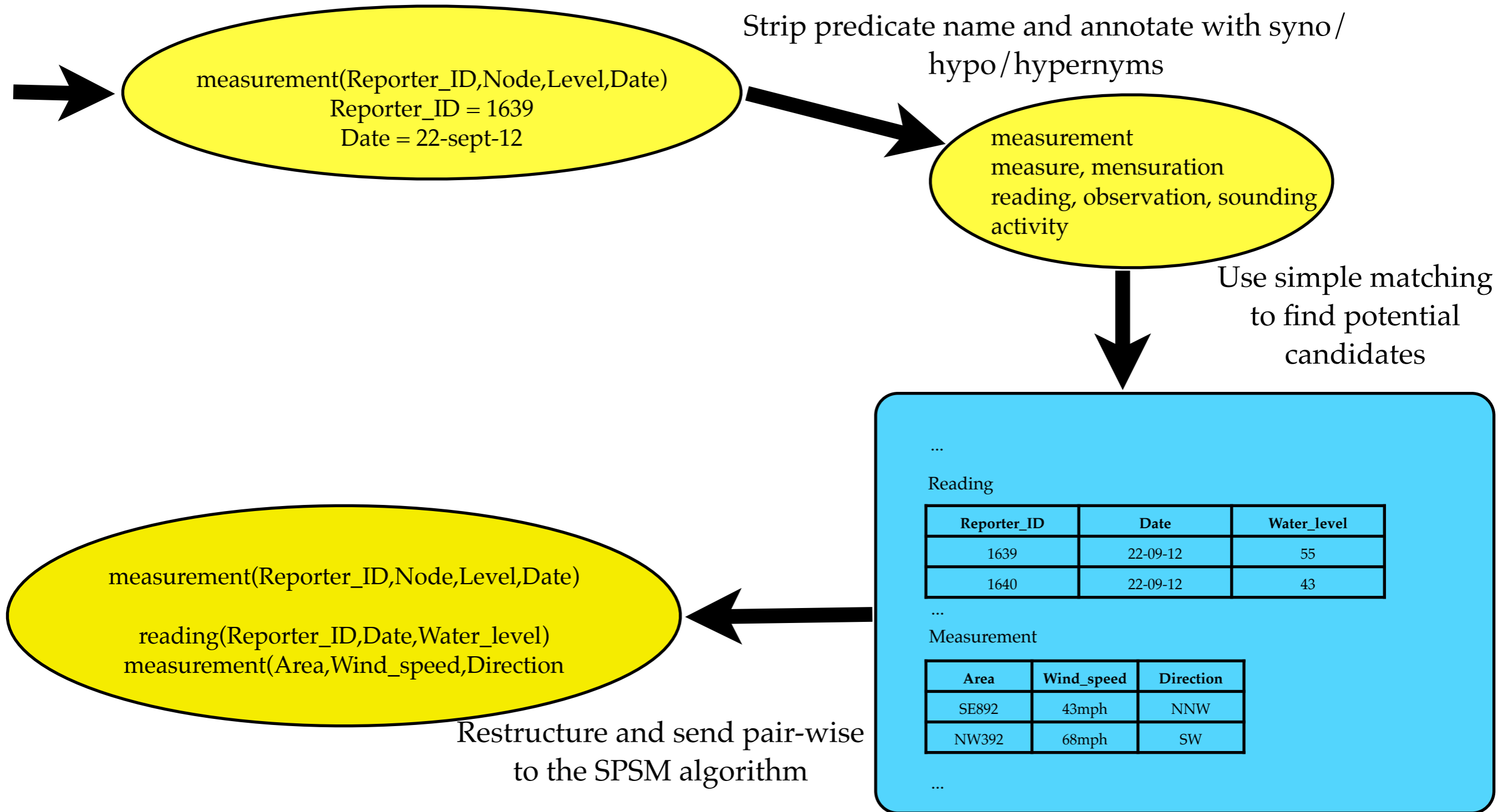
- Quickly form coalitions which provide channels of communication.
- Send queries to other organisations even if they don't know how their data is organised.
- Receive approximate responses back with full information about how these relate to the original query.
- Have these responses ranked according to:
 - quality of match
 - adherence to provenance policy
 - trust held in sending organisation

Data interpretation

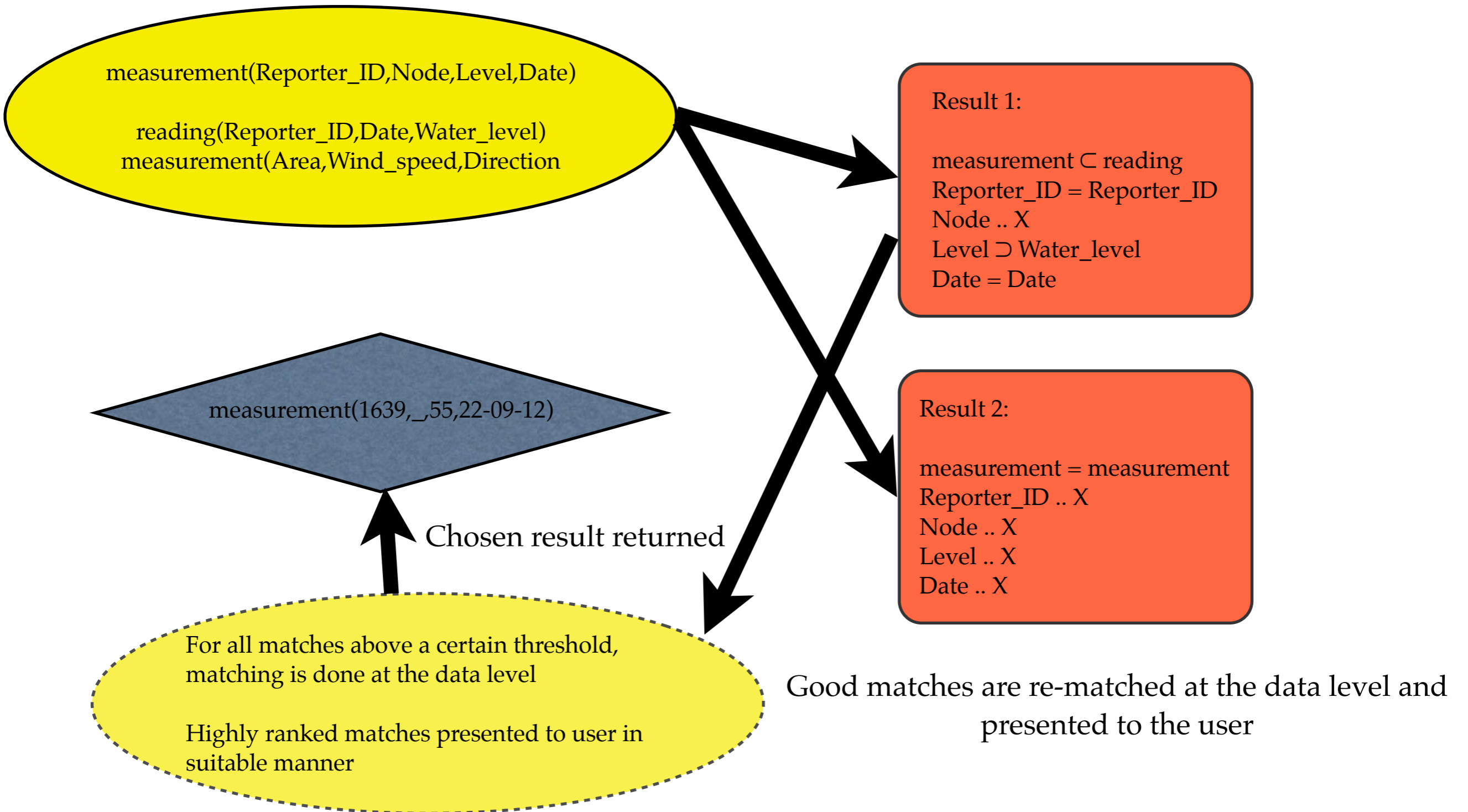
When an organisation receives a query that fails, the CHAI system is called. This:

- Uses naïve table-name matching to narrow down the organisation's data to a small subset.
- Performs structured-data matching on this small subset.
- Matches at both the schema and the data level.
- Ranks matches according to quality and returns those that pass a given threshold.

Matching lifecycle: SPSM algorithm called



Matching lifecycle: results returned



Integrating the results

The CHAIn system ranks matches according to the quality of match.

But the results returned need to be returned according to their overall quality:

- How good the match is;
- How well the provenance of the data complies with requirements;
- How much the organisation providing the data is trusted.

These can be quantified but are orthogonal.

We have successfully integrated trust and matching, but this is essentially experimental.

Interaction with responders

We have a good idea what the technical questions are.

But what about the social questions?

The tool must be usable in the field, we need to:

- understand the priorities and concerns of users around data;
- persuade them to trust our system;
- make sure it integrates with their procedures.

This requires significant and long-term interaction with responders.

Evaluation

How do we know this is actually useful?

- Matching is hard to evaluate
- How can we be sure that we are integrating provenance and trust in the most effective way?
- How can we be sure we are providing the right details at the right level for the users to make informed choices?
- How can we be sure that responders are confident using the system?

To my mind, this can only be determined through extensive simulation of emergency events, in collaboration with responders.

Conclusions

Developing a complete solution to providing automated support for data sharing during emergencies requires a 'big picture' approach.

This integrated platform is still further work

- but many aspects of it have already been developed and some orthogonal aspects have successfully been integrated.

Current fellowship proposal, with collaborators:

- Scottish Resilience, Dstl, the Chief Fire Officers' Association.
- John Fitzgerald and Jeremy Bryans (Newcastle) - systems-of-systems and provenance.
- Fausto Giunchiglia (Trento) - matching
- Carles Sierra (CSIC Barcelona) - trust
- Chris Johnson (Glasgow) - simulation

Demo

Demo of CHAIn given by Diana Bental

CHAIn is currently a proof-of-concept system!