

You did What?

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I sent more police officers to Oakland than Berkeley-Ashbury.



I decided to investigate the effect of human/mouse MAPT on A β -mediated inhibition of LTP.

Wild-Type, but Not Mutant N296H, Human Tau Restores A β -Mediated Inhibition of LTP in *Tau*^{-/-} mice

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Microtubule associated protein tau (MAPT) is involved in the pathogenesis of Alzheimer's disease and many forms of frontotemporal dementia (FTD). We recently reported that A β -mediated inhibition of hippocampal long-term potentiation (LTP) in mice requires tau. Here, we asked whether expression of human MAPT can restore A β -mediated inhibition on a mouse *Tau*^{-/-} background and whether human tau with an FTD-causing mutation (N296H) can interfere with A β -mediated inhibition of LTP. We used transgenic mouse lines each expressing the full human MAPT locus using bacterial artificial chromosome technology. These lines expressed all six human tau protein isoforms on a *Tau*^{-/-} background. We found that the human wild-type MAPT H1 locus was able to restore A β ₄₂-mediated impairment of LTP. In contrast, A β ₄₂ did not reduce LTP in slices in two independently generated transgenic lines expressing tau protein with the mutation N296H associated with frontotemporal dementia (FTD). Basal phosphorylation of tau measured as the ratio of AT8/Tau5 immunoreactivity was significantly reduced in N296H mutant hippocampal slices. Our data show that human MAPT is able to restore A β ₄₂-mediated inhibition of LTP in *Tau*^{-/-} mice. These results provide further evidence that tau protein is central to A β -induced LTP impairment and provide a valuable tool for further analysis of the links between A β , human tau and impairment of synaptic function.

Keywords: Alzheimer's disease, amyloid beta, frontotemporal dementia, tau, MAPT, N296H

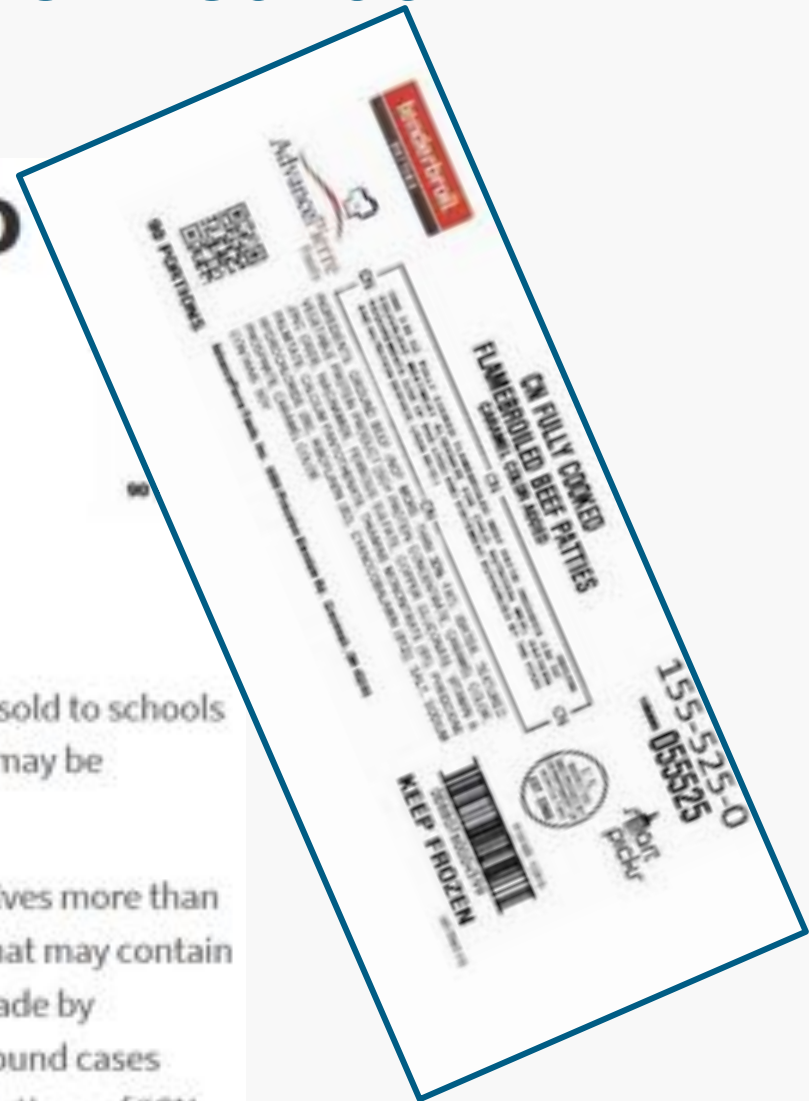
I issued a recall on burgers in school meals.

Recall: Burgers Sold to Schools for Contamination

By Aaron Gould Sheinin

April 3, 2019 -- More than 10 tons of frozen beef patties sold to schools nationwide were recalled Tuesday over concerns they may be contaminated.

The U.S. Department of Agriculture says the recall involves more than 20,000 pounds of frozen patties produced on Nov. 30 that may contain pieces of soft purple plastic. The recalled patties are made by AdvancePierre Foods of Enid, OK, and include: 14.06-pound cases containing three bags with 30 pieces for a total of 90 portions of "CN FULLY COOKED FLAMEBROILED BEEF PATTIES CARAMEL COLOR ADDED" with case code 155-525-0 and package code 8334.

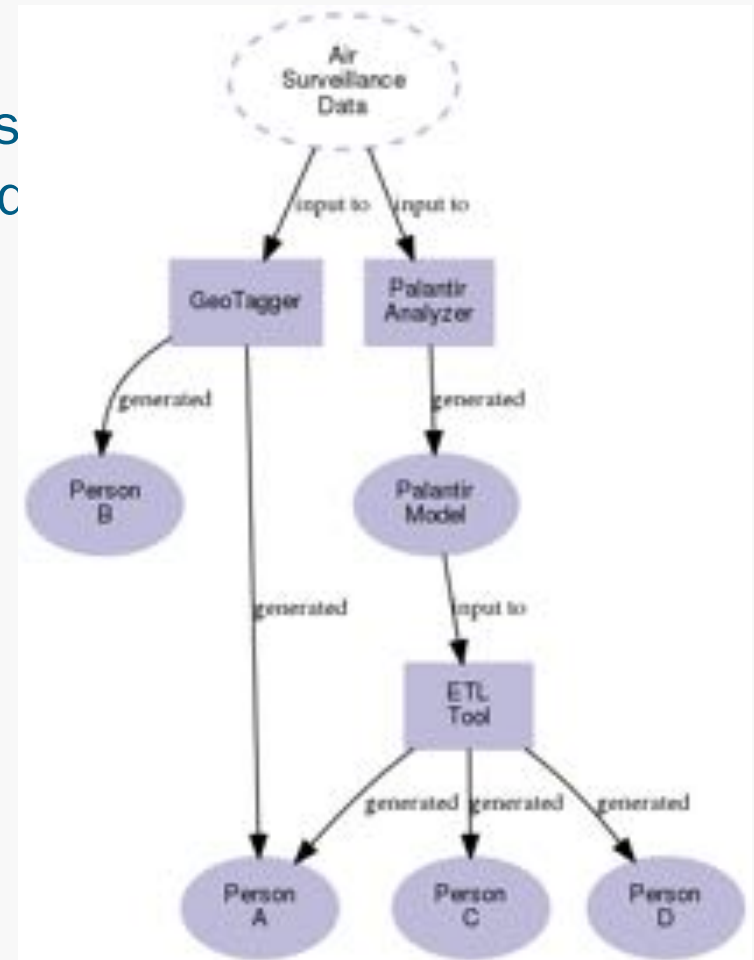


Why?

Concept: Provenance

Provenance is a record that describes the people, institutions, entities, and activities involved in producing, influencing, or delivering a piece of data or a thing in the world.

- “Family Tree” of relationships
 - Ovals = data, rectangles = process
 - Show how data is used and re-used
- Basic metadata
 - Timestamp
 - Owner
 - Name/Descr
- Can also include annotations
 - E.g. quality info
- Is not the actual data object



Why do we care about provenance?

PLUS Object Trust Widgets

Provenance Object: **Personal Communication** with 1 metadata items.

Settings

Believability: ☐

Taint (message): ☒

Source is discredited

Update Settings

Graph Filters

Graph Type: **Normal**

Display

Maximum Nodes:

☒ Include Non-Provenance Edges

☐ Display Confidence

☐ Display I/O Counts

☐ Include Source

☐ Include Metadata

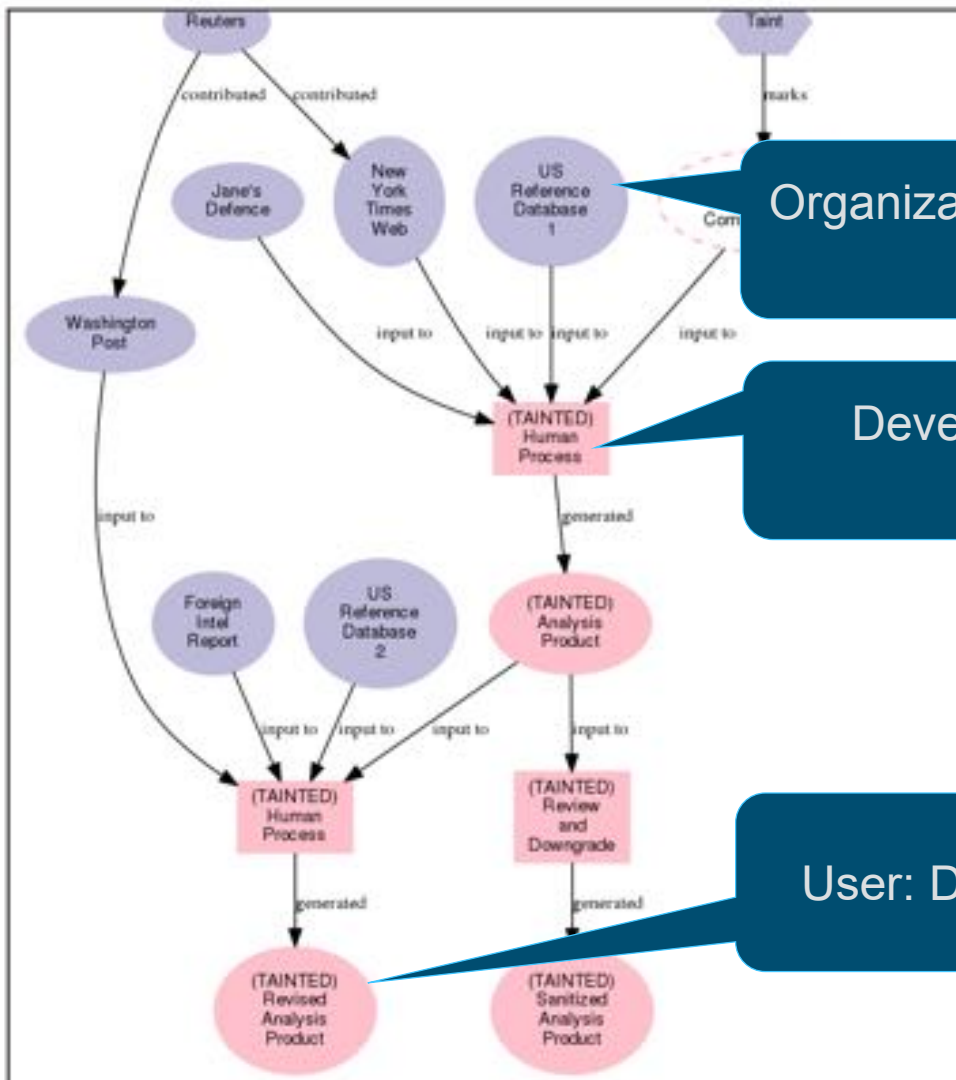
Clusters

Cluster By: **None**

☐ Collapse Clusters

Update Filters

Zoom: 100



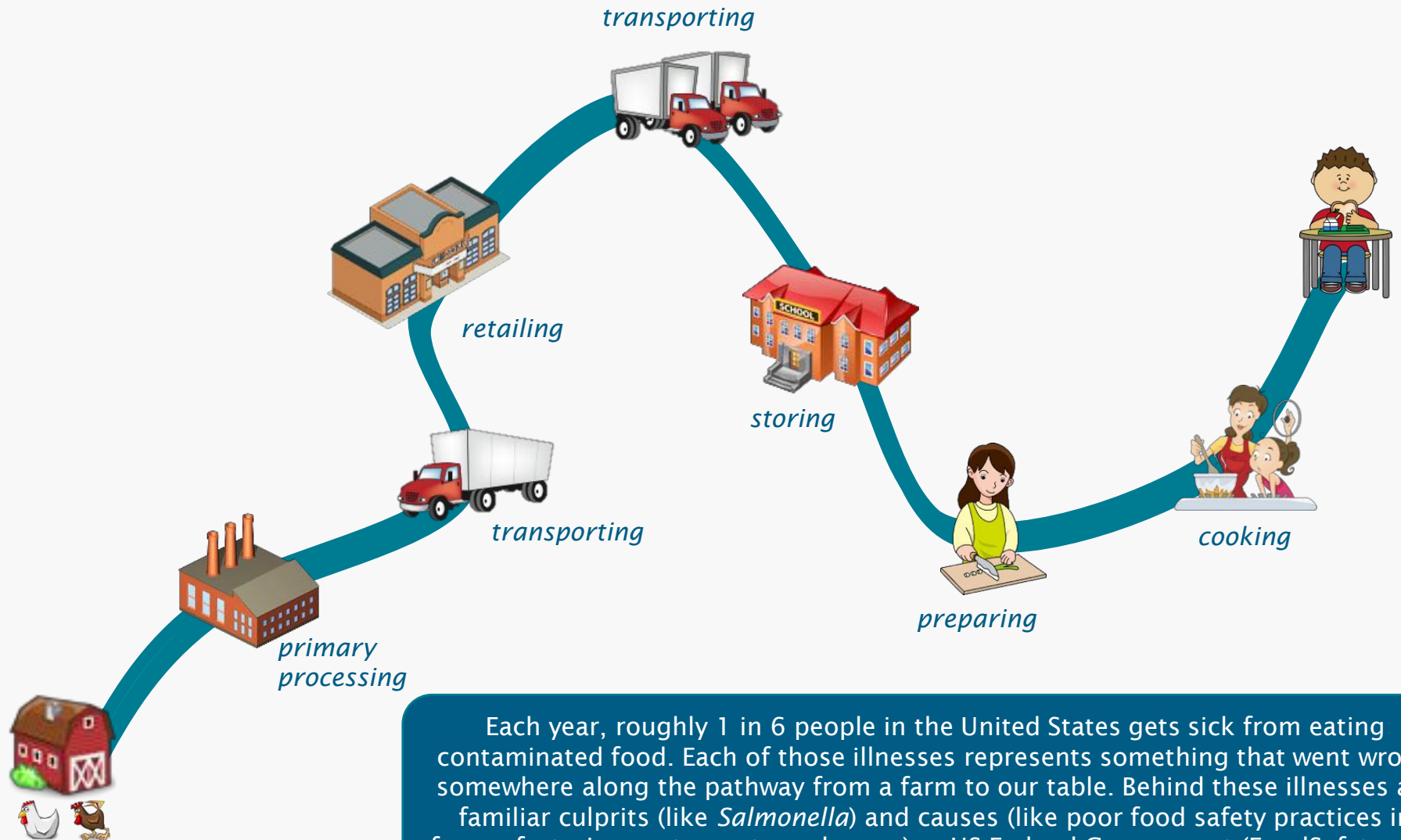
Organization: Who is using my data?

Developer: This data is tainted!

User: Do I "trust" this data?

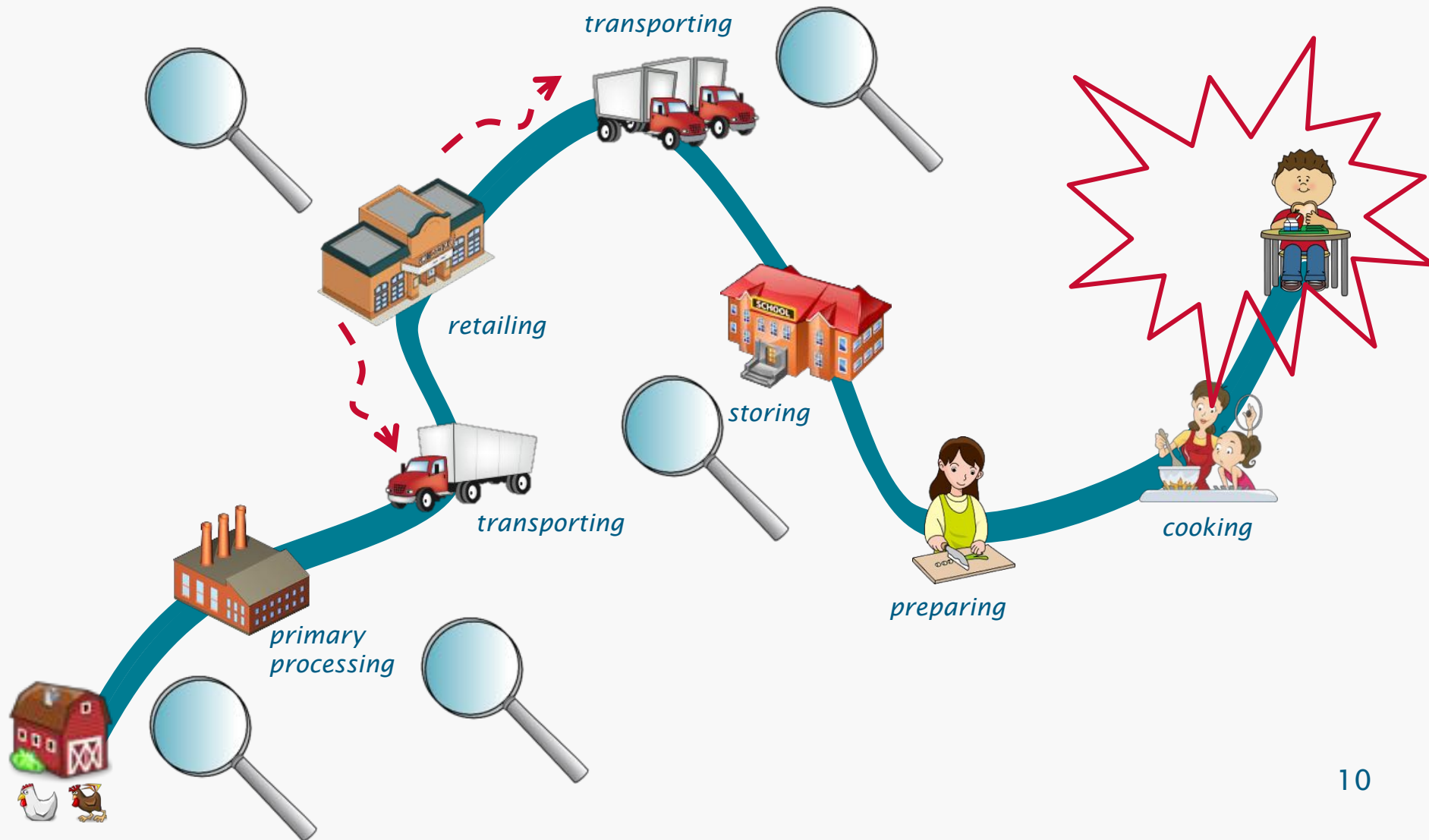
How does that work?

Farm to Fork

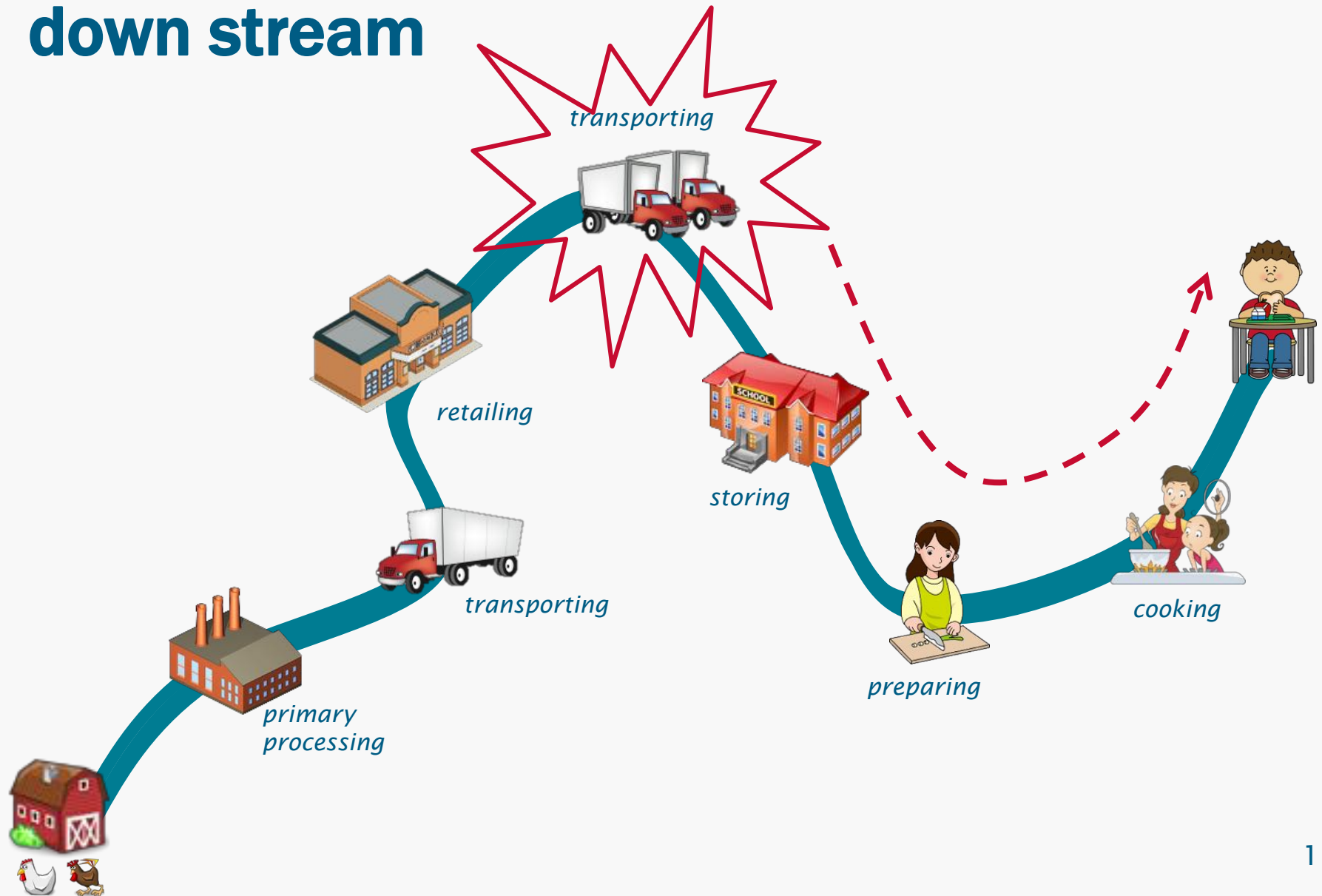


Each year, roughly 1 in 6 people in the United States gets sick from eating contaminated food. Each of those illnesses represents something that went wrong somewhere along the pathway from a farm to our table. Behind these illnesses are familiar culprits (like *Salmonella*) and causes (like poor food safety practices in farms, factories, restaurants, or homes). - US Federal Government (FoodSafety.gov)

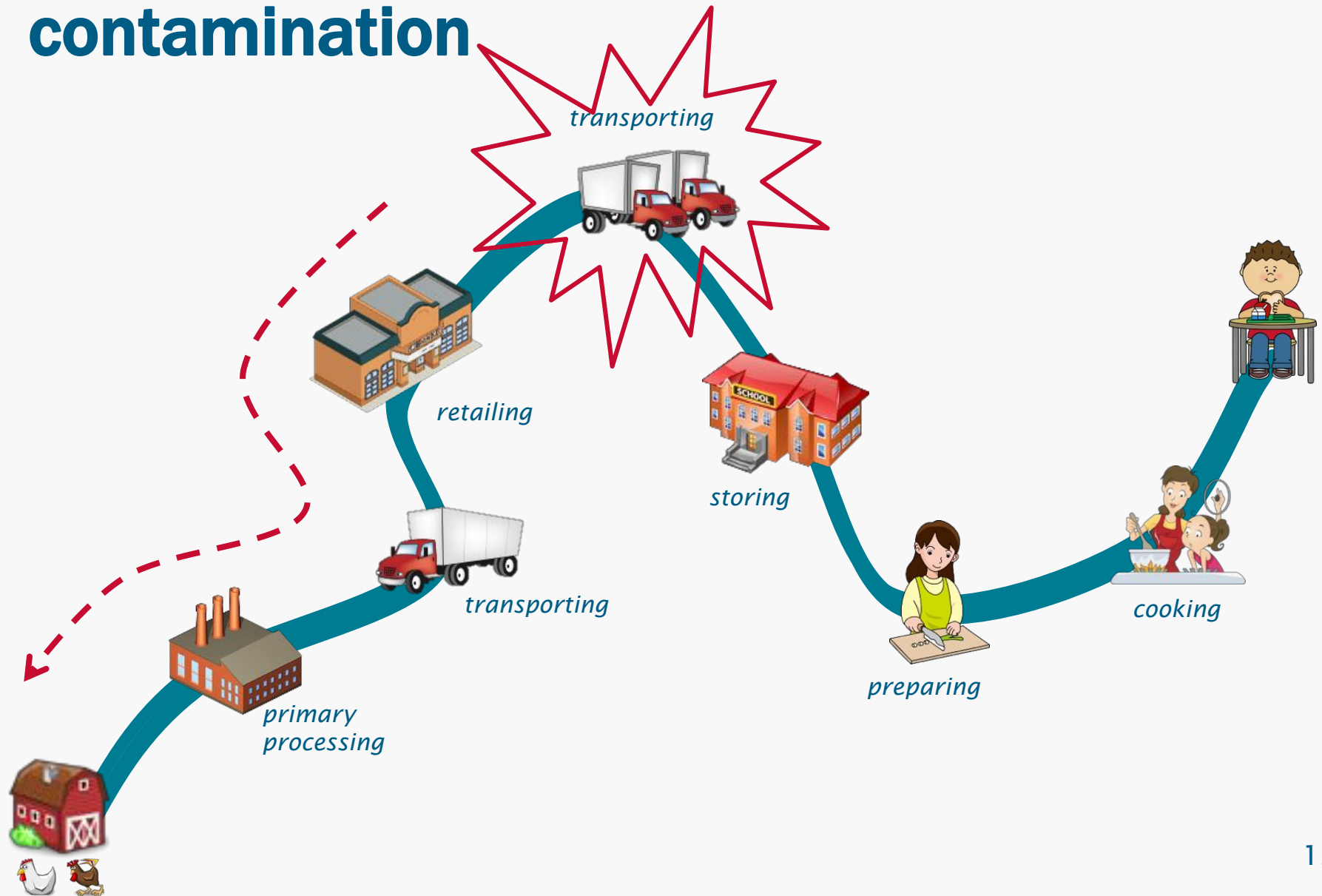
How is food safety done now?



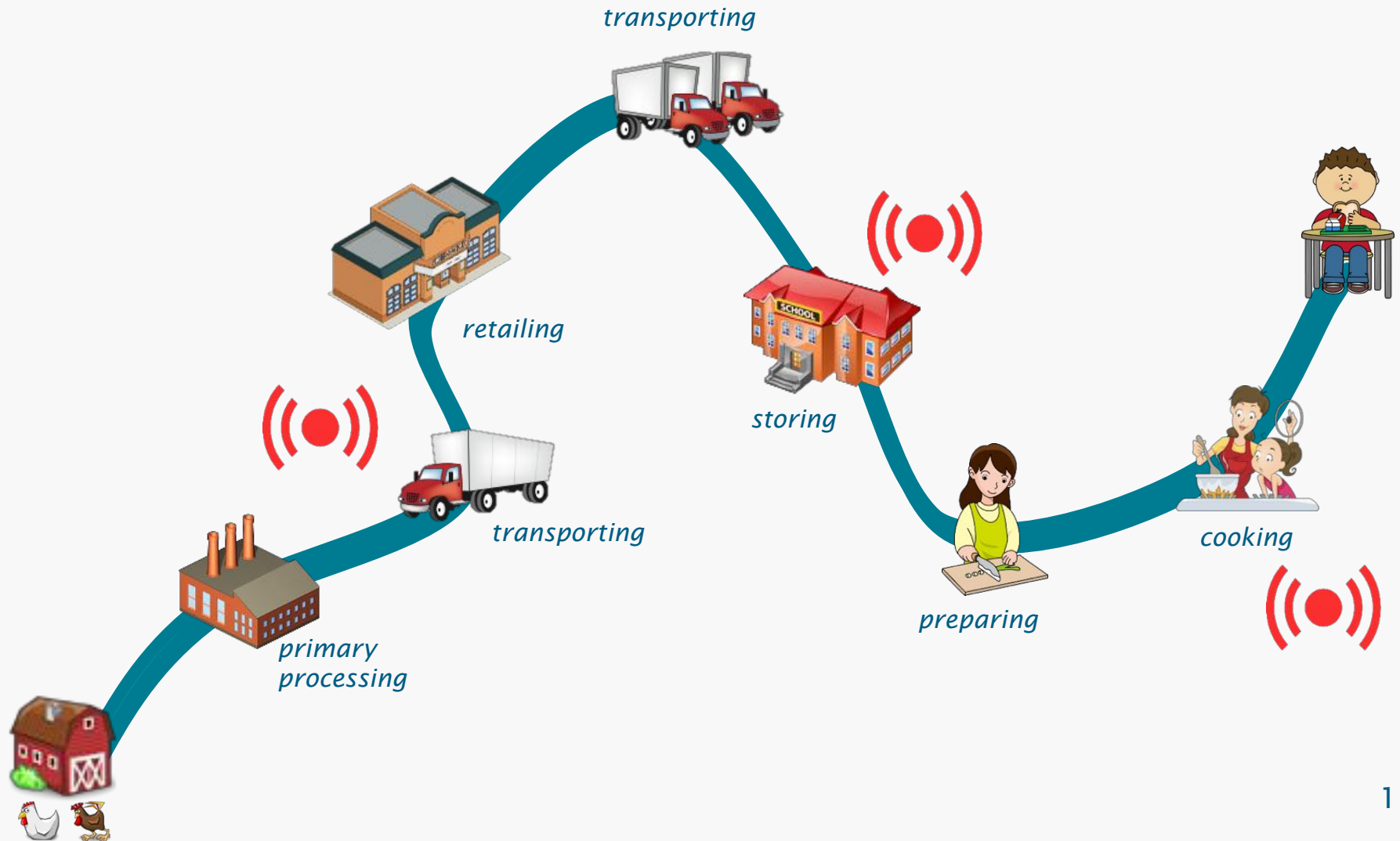
Problem 1: Find the risk of contamination down stream



Problem 2: Identify the likely origin of contamination



Problem 3: Optimize sensor placement to sample contamination



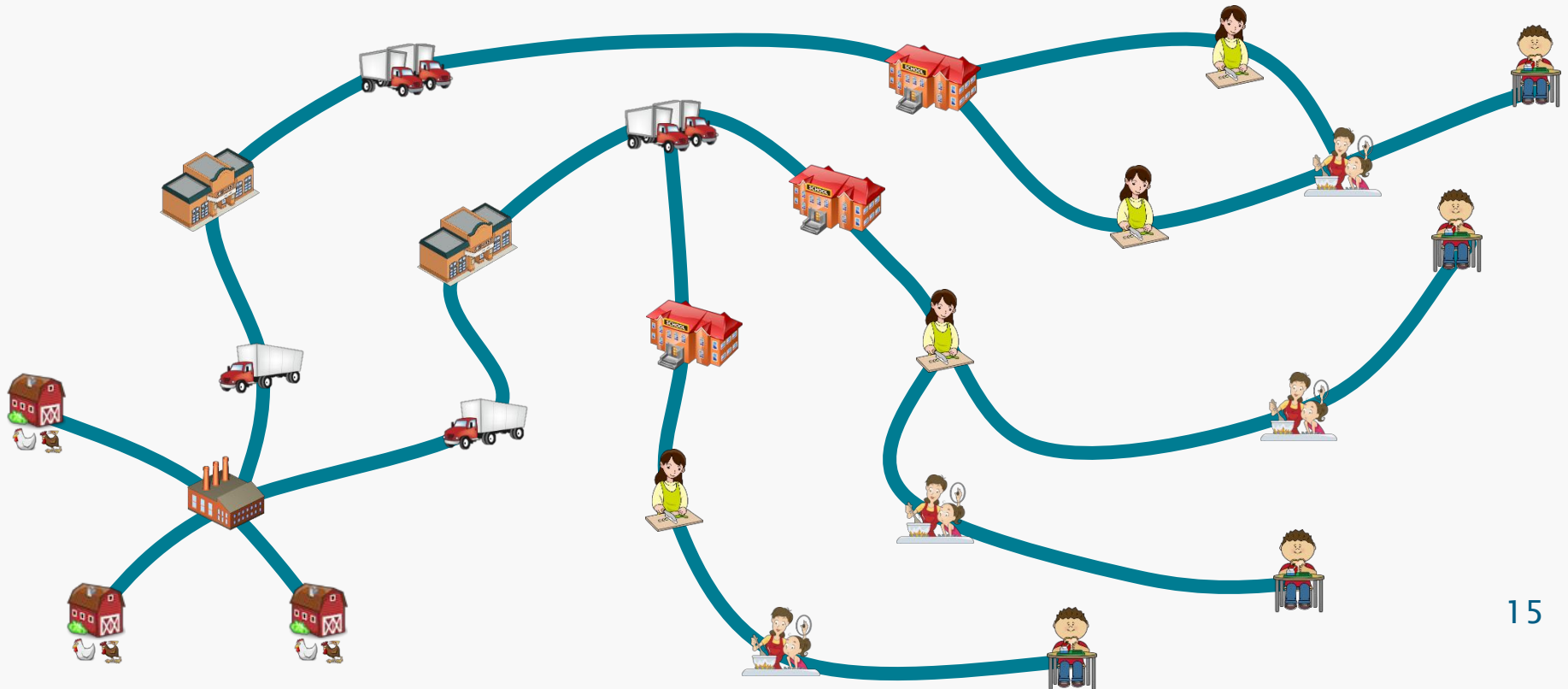
Required properties

A way to track and trace food, and assess risk up and down the food supply chain automatically

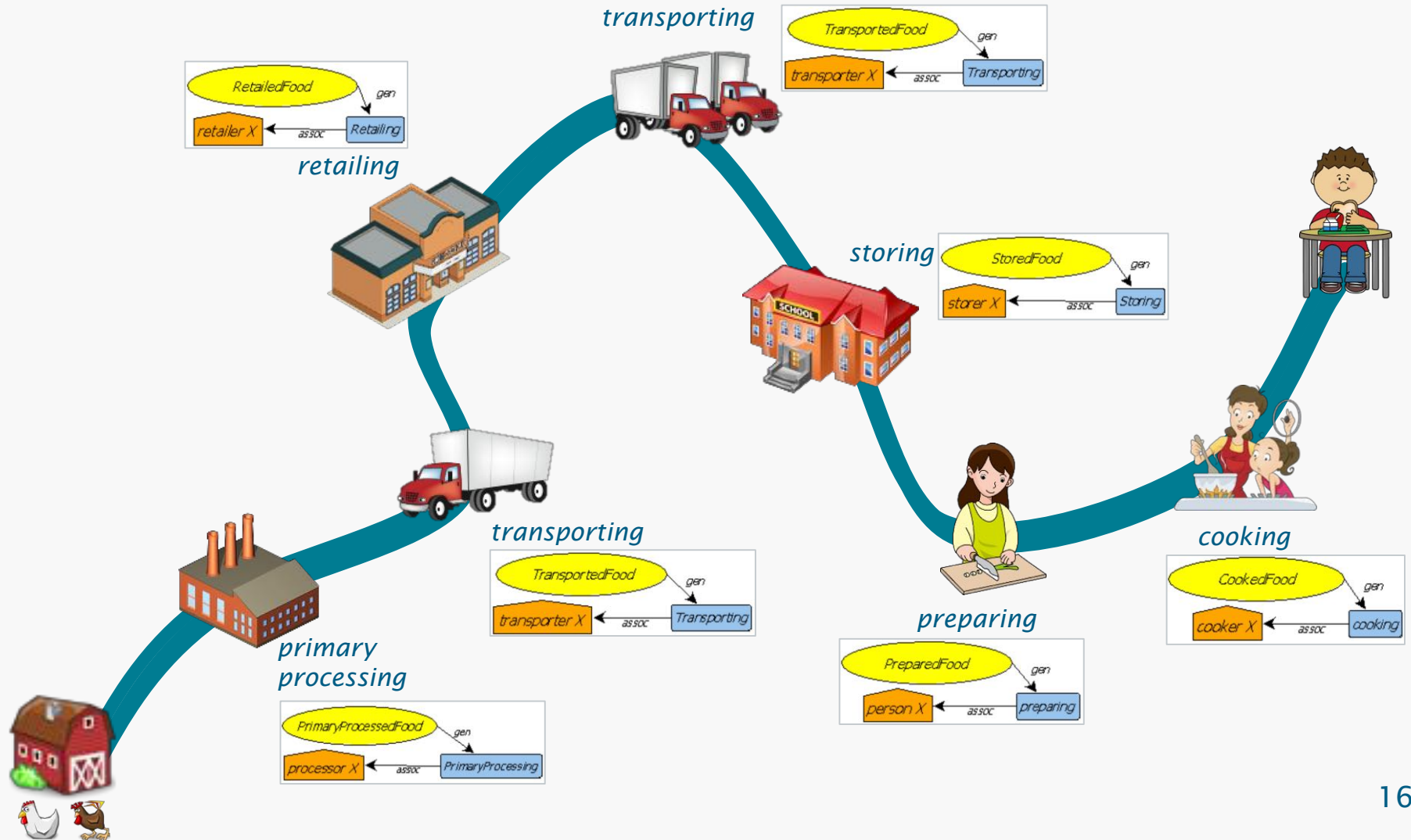


Required properties

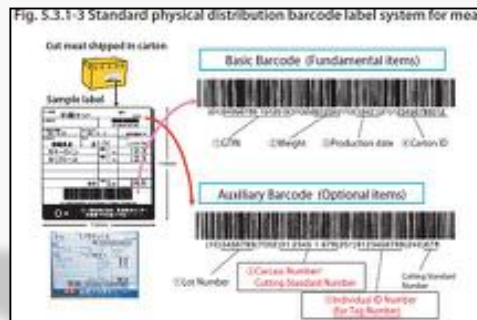
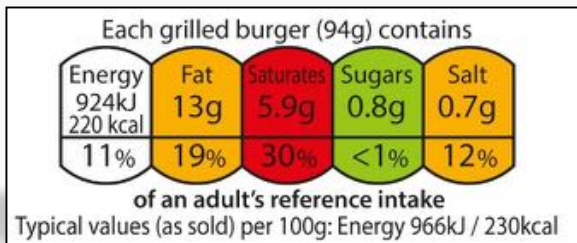
A way to track and trace food, and assess risk up and down the food supply chain automatically



Applying Provenance to the Food Chain



Applying ontologies to food and the food supply chain

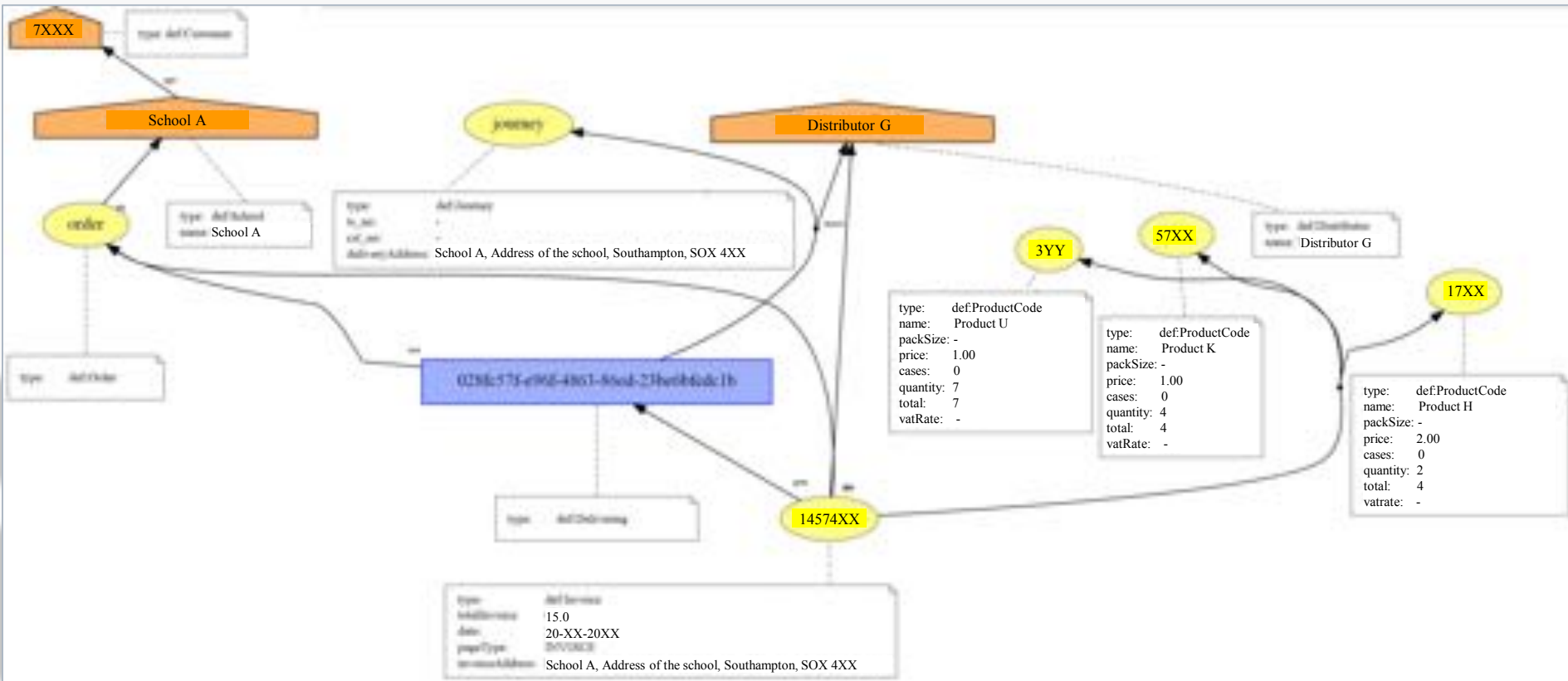


SAFE HANDLING INSTRUCTIONS

This product was prepared from inspected and passed meat and/or poultry. Some food products may contain bacteria (that could cause illness if the product is mishandled or cooked improperly. For your protection, follow these safe handling instructions.

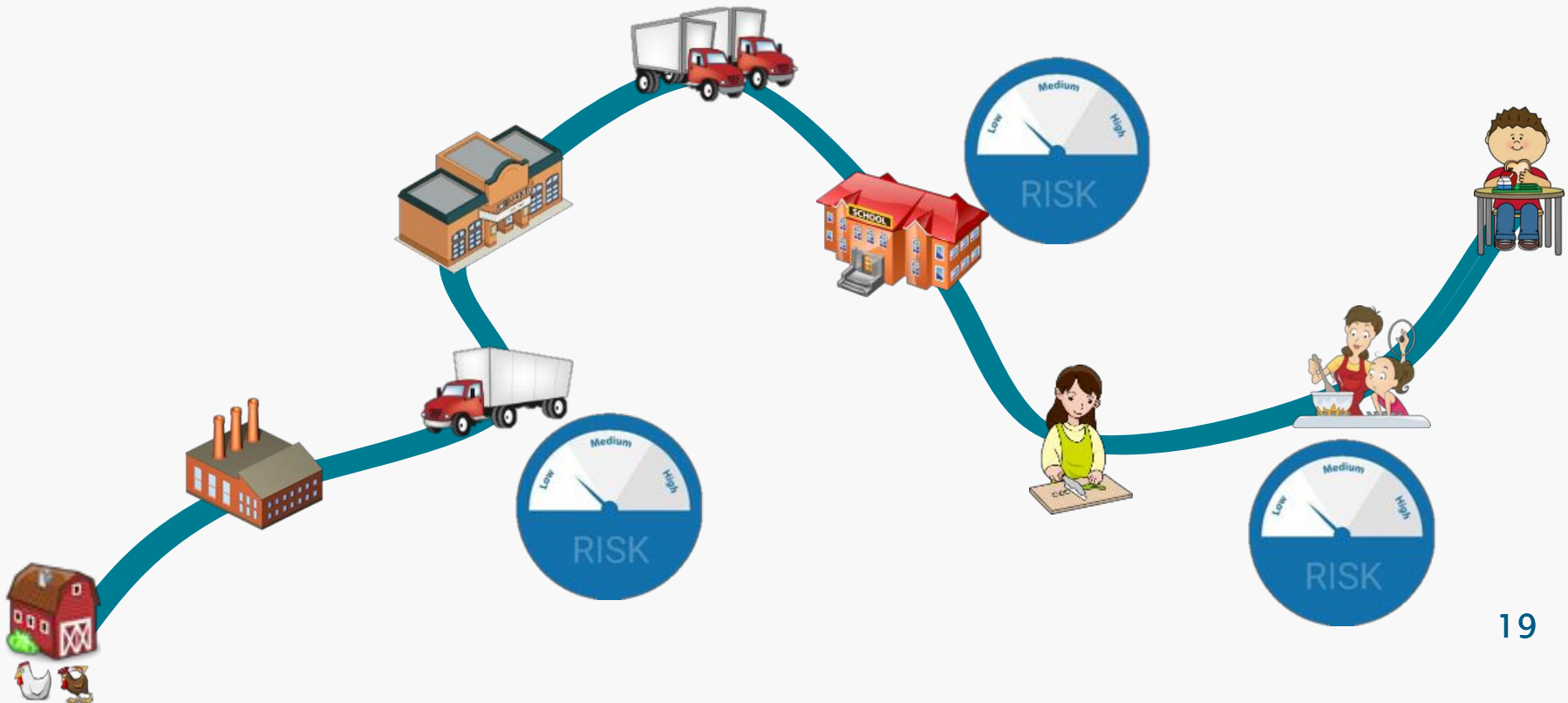
- Keep refrigerated or frozen. Thaw in refrigerator or microwave.
- Keep raw meat or poultry separate from other foods. Wash cutting surfaces (including cutting boards), utensils, and hands after touching raw meat or poultry.
- Cook thoroughly.
- Keep hot foods hot. Refrigerate leftovers immediately or discard.

Track and trace – Southampton Schools Example!



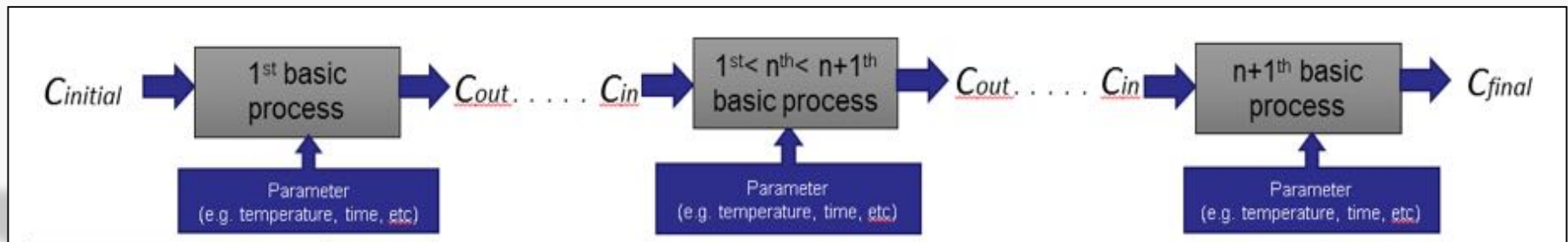
Required properties

A way to track and trace food, and assess risk up and down the food supply chain automatically



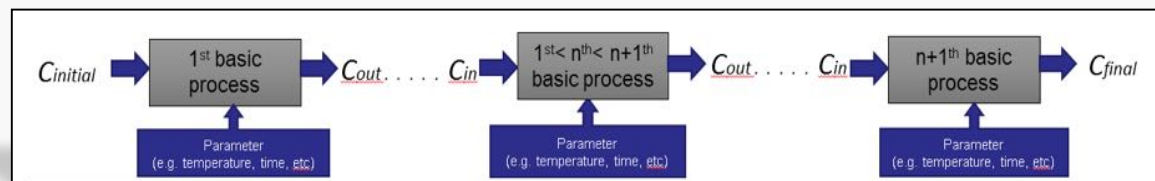
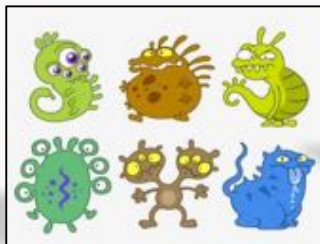
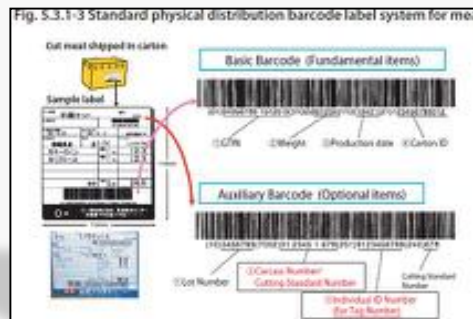
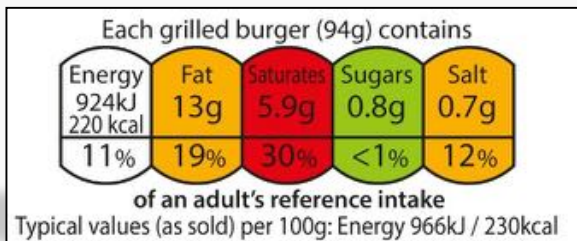
Concept: Risk Model

Modular Process Risk Model (MPRM) is a risk model that uses risk distribution in order to understand the likelihood of the presence of bacteria as food travels through any process in food supply chain.⁴



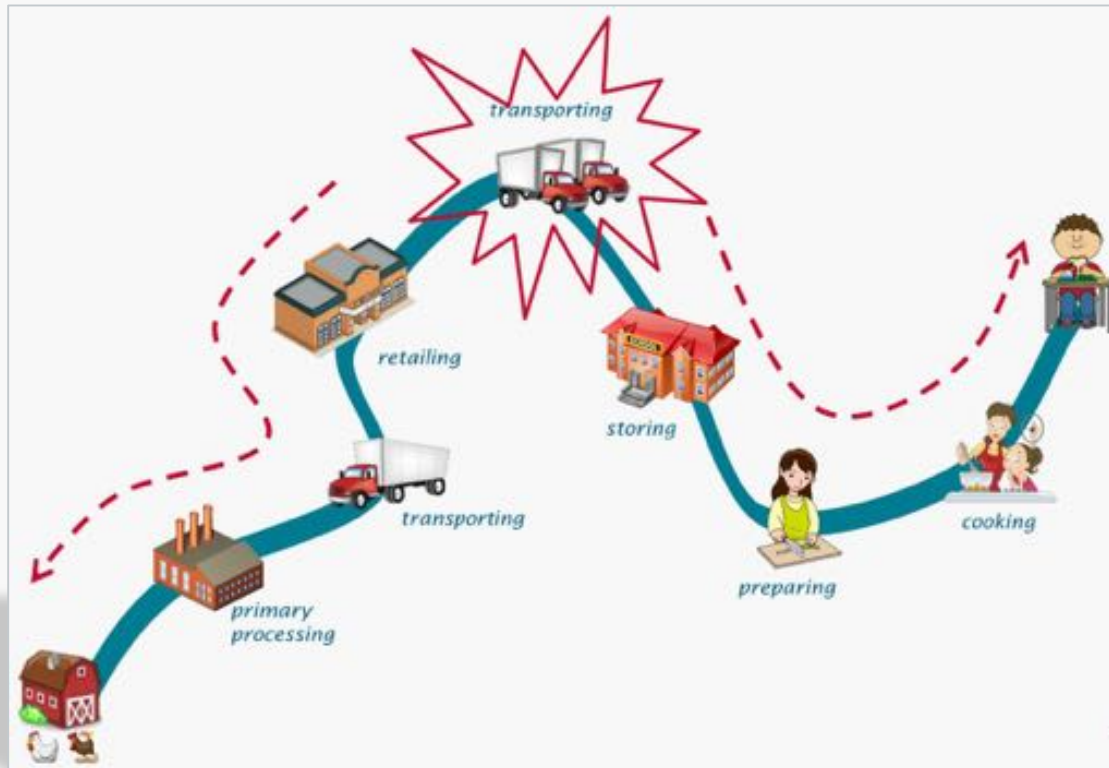
C = level of bacteria

Applying risk in the food chain ontology

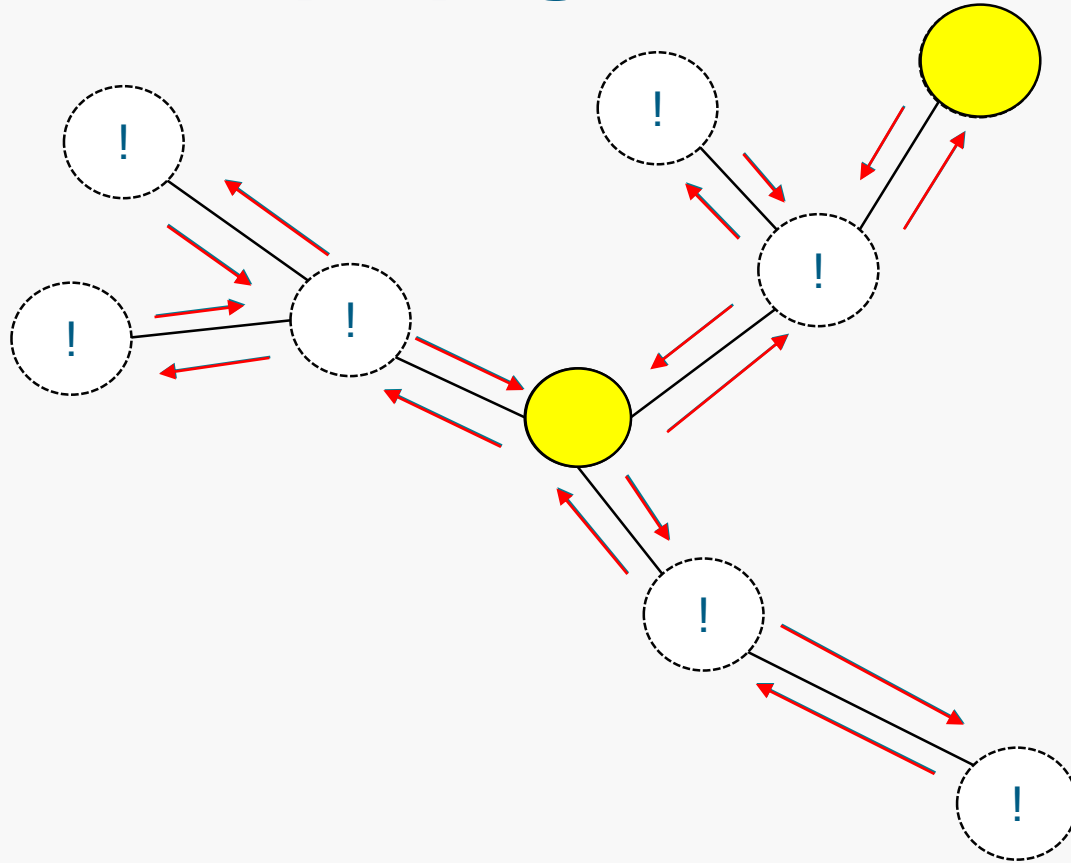


Required properties

A way to track and trace food, and assess risk up and down the food supply chain automatically

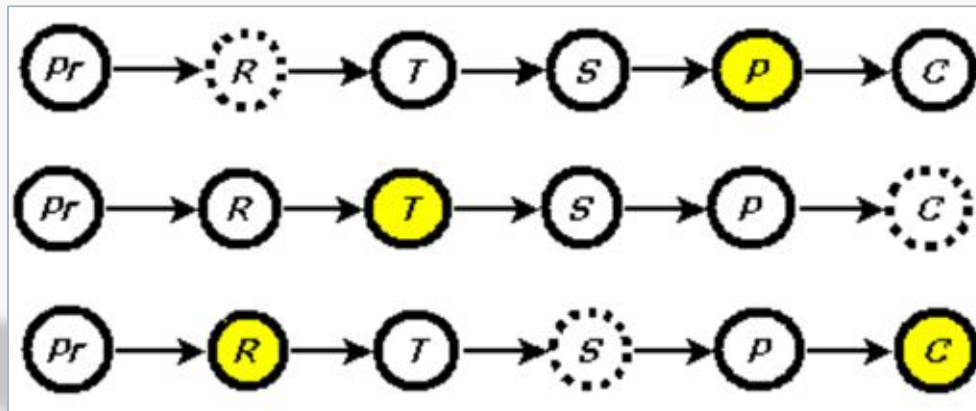


Concept: Belief propagation



Belief Propagation (BP) is an inference technique that relies on an iterative updated belief/message over the graph representation.

Belief propagation example



Prob (Obs | Inf)



Level [X or Y or Z]

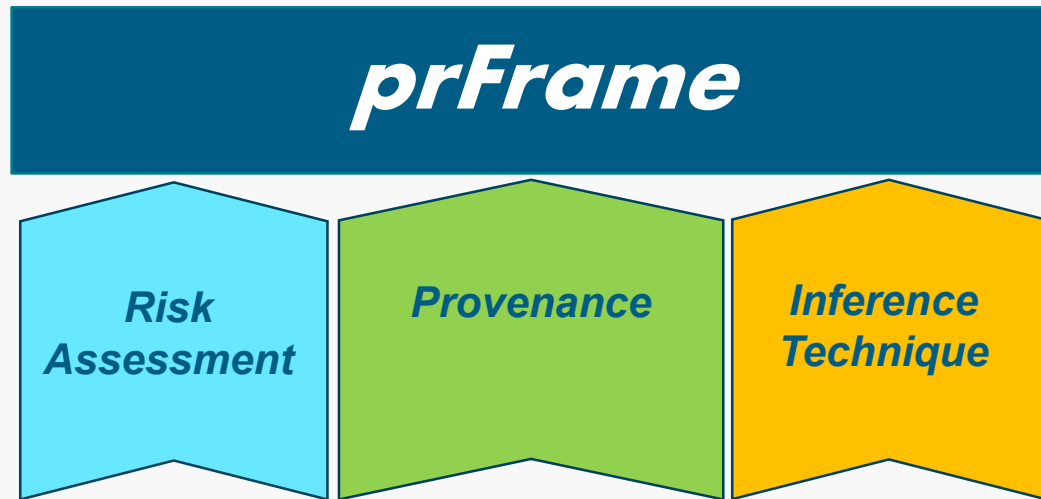
Level [X] = $0\% \leq K\% \leq 100\%$

Level [Y] = $0\% \leq K\% \leq 100\%$

Level [Z] = $0\% \leq K\% \leq 100\%$

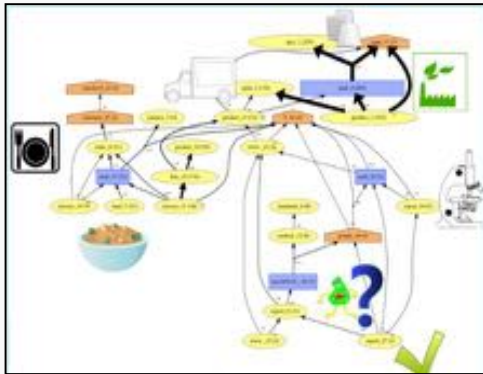
Required properties

A way to track and trace food, and assess risk up and down the food supply chain automatically

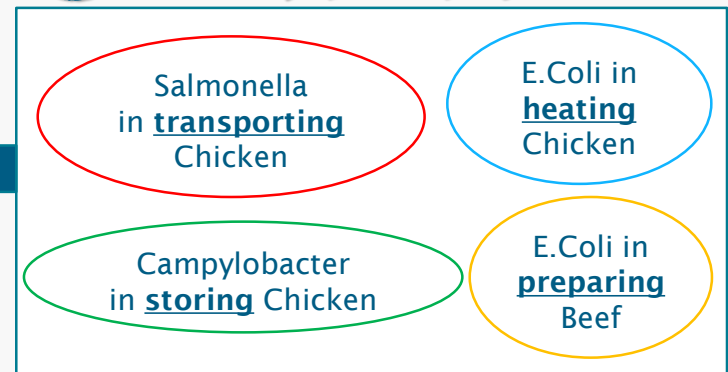


System Design

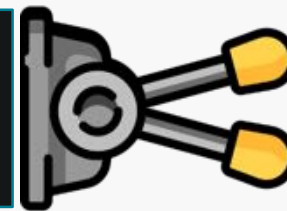
Food Provenance



Set of Risk Models

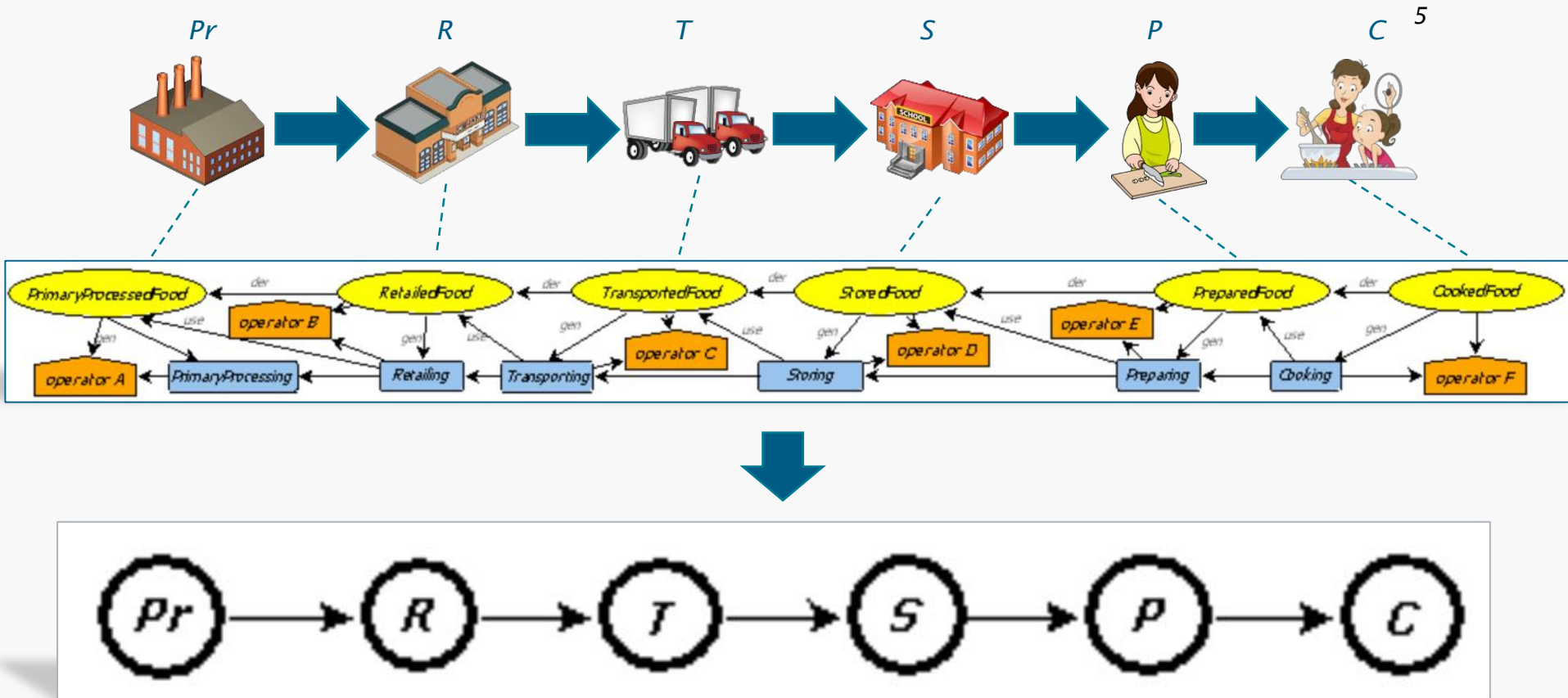


Belief Propagation



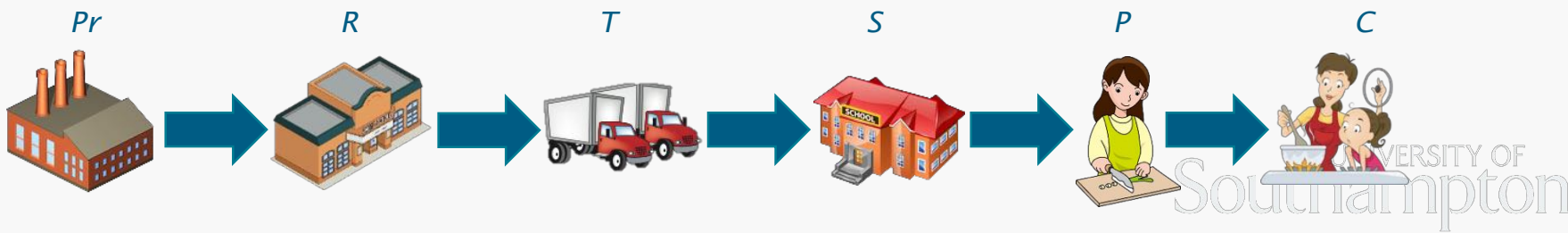
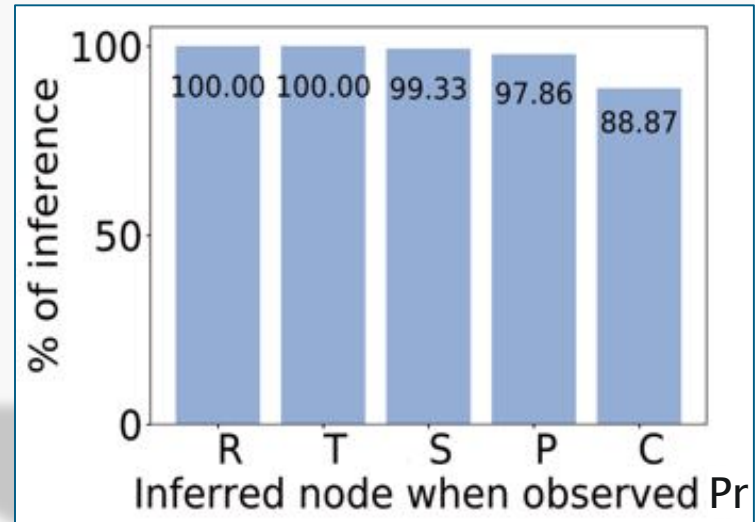
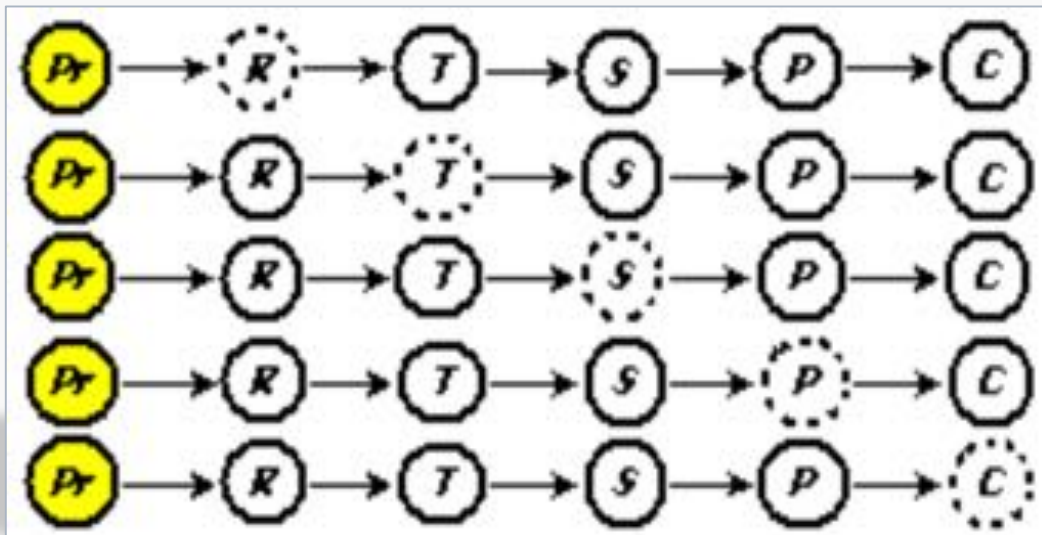
Risk assessment up and down stream the food supply chain

Evaluation



Sample Result

prFrame predicts the correct risk for unobserved food processes.

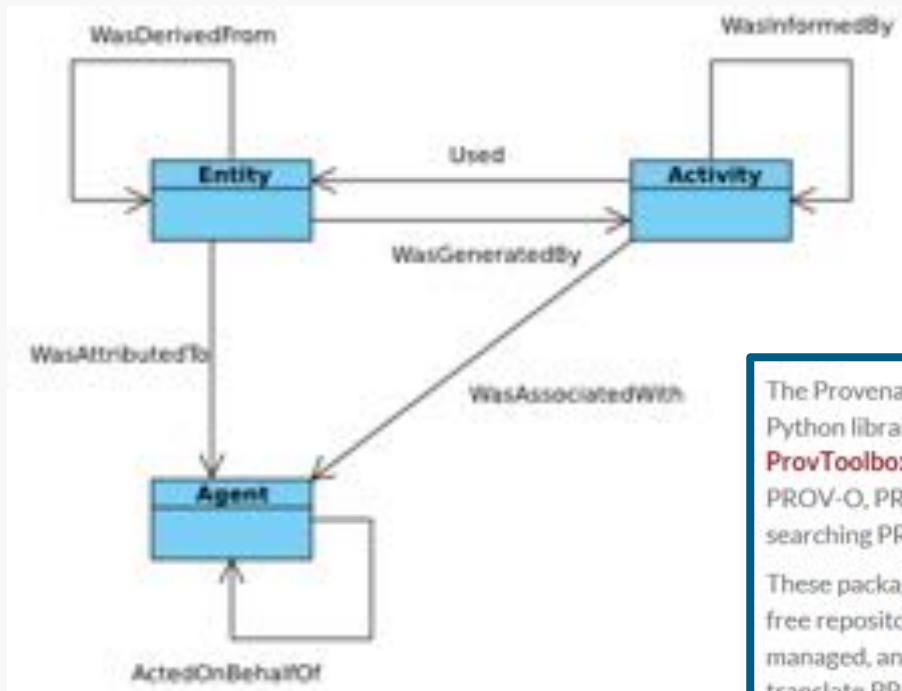


How can I do this?

What is involved in tracking Provenance?

- Collection
 - Automated collection preferred
 - API's exist to record the data, but the work comes in adapting tools to call those APIs
 - Capture of appropriate information often challenging
 - Manual capture difficult
- Representation
 - At what granularity (e.g., video, video frame, chip)?
 - Dependent upon usage requirements and exchange requirements
- Storage
 - Separate store from data, or with data? Dependent upon usage requirements
- Querying
 - Based on usage needs

Representation: W3C PROV



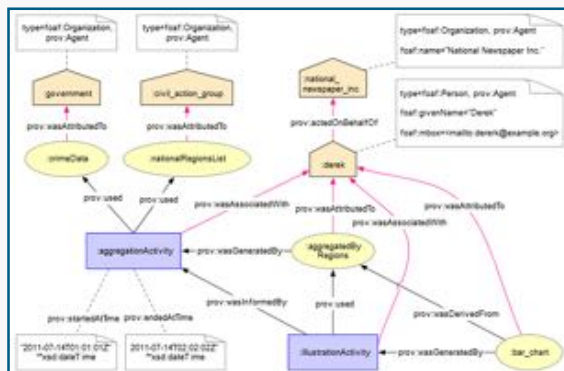
The Provenance Tool Suite includes a number of software packages. These include: **ProvPy**, a Python library supporting import and export of PROV-DM data as PROV-JSON and PROV-XML; **ProvToolbox**, a Java library to create Java representations of PROV-DM and convert them to PROV-O, PROV-XML, PROV-N, and PROV-JSON; and, **ProvJS**, a JavaScript utility for indexing and searching PROV-JSON objects within JavaScript objects.

These packages are used to provide Provenance Tool Suite services. These include: **ProvStore**, a free repository for PROV provenance documents that allows these to be stored, browsed and managed, and which currently hosts over 59,000 documents; **ProvTranslator**, a service to translate PROV documents from one PROV representation to another; and, **ProvValidator**, a service that validates PROV documents. Each of the services can be used via a browser-based interface or a REST API.

W3C PROV is an interoperability standard for provenance information

Representation: Embedded Tags vs. Free Entities

- Alternative 1:
Provenance free entity
representation
(showing nodes and
edges)



From W3C Provenance
(<http://www.w3.org/community/openannotation/wiki/Provenance>)

- Alternative 2:
Provenance metadata
in embedded
annotations (“tags”)

```
{  
  "@type": "oa:Annotation",  
  "oa:annotatedBy": "Paolo",  
  "oa:annotatedAt": "date of annotation"  
  "pav:createdWith": "Domeo tool",  
  "pav:importedBy": "Text mining connector Y",  
  "pav:importedOn": "2014-01-28T12:00:00Z",  
  "pav:authoredBy": "Text mining  
service/algorithm X" ;  
}
```

From W3C PROV-O: The PROV Ontology
(<http://www.w3.org/TR/2013/REC-prov-o-20130430/>)

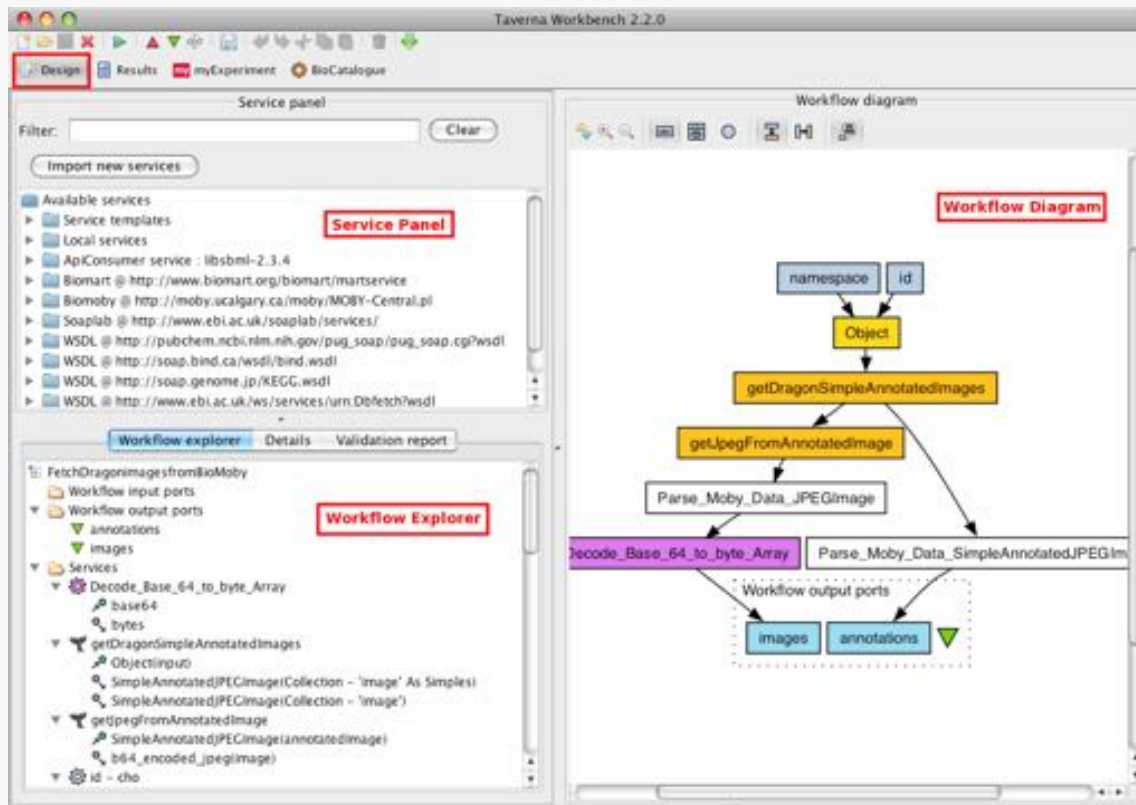
Recommendation:

Store via Alternative 1. If needed, write-on-demand Alternative 2.

Collection

- The hardest part of the provenance problem
 - Determine the highest value capture points in this space
 - Put in the capture points!
-
- Difficulty? Cost – both initial development and O&M costs

Capture

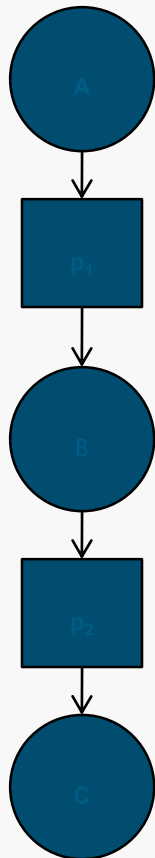


- When a single system is used, provenance is
 - Complete
 - Obtained by one capture point
 - Options of granularity
 - High quality
 - E.g. can see payload in addition to envelope

Architectural Options for Capture

- “Smart Applications”
 - Strategy: Each application calls lineage API to log whatever it thinks is important.
 - But, unrealistic for legacy applications
- “Interceptors”
 - Strategy: Listen in to whatever is happening, and log silently as it happens
 - Requires a small number of points of lineage capture: ESBs are ideal, since they act as central “routers”
- “Wrappers”
 - Strategy: Write a transparent wrapper service. Make sure all orchestrations call the wrapper service with enough information for the wrapper to invoke the real thing.
- “Scrapers”
 - Strategy: Write a log scraper to translate information typically stored in audit logs into provenance. Sometimes difficult creating relationship links.

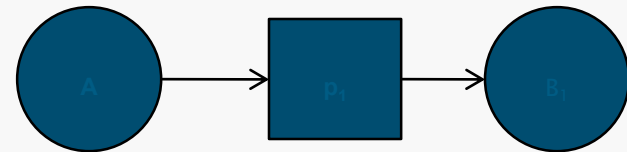
Identity Problem



Actual
Workflow

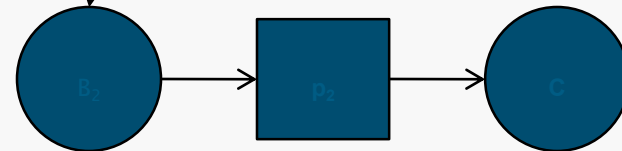
ESB
Lineage
Capture (Step-wise)

Step 1:



How do we know
these two
B's are the same
thing?

Step 2:



Need Identity Function
We suggest cryptoHash

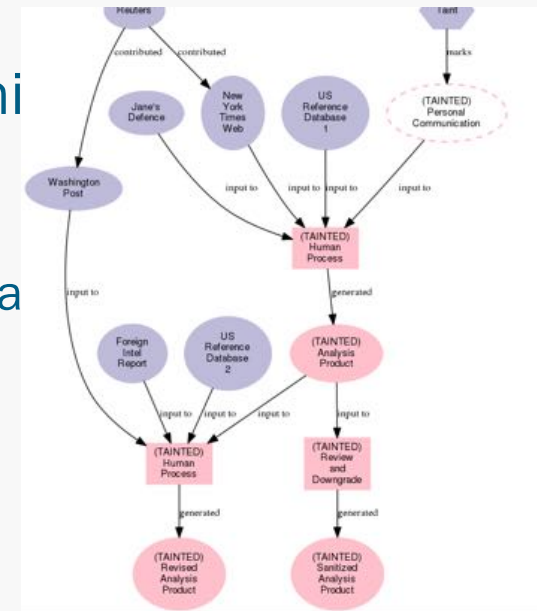
How to do it

- Pick Use Case(s) of interest
 - Needed to know exactly what to capture, where to capture
- Understand system-of-systems
 - Determine the actual flow of information to support answering queries for use case
 - Determine capture points
- Instrument
 - Capture, Storage, Usage
- Test/Pilot

*It's all peaches and
cream, right?*

Provenance is a new Data Stream

- Taint
 - A source or process used to create this is Bad!
- Data Flows and Ownership
 - Where is the data actually coming from?
 - Who touched it along the way?
- Return on Investment (or alert to change training)
 - Does everyone use just two data sources?
 - Stop paying for the others!
 - Re-train analysts so they are aware of other data
- Suitability
 - Does this data meet *my* needs?





Questions?

What was she talking about?

Acknowledgements

1. The Hampshire County Council Catering Services (HC3S) for a description of their processes and illustrative data about food supply chain in Hampshire County, United Kingdom.
2. Indonesia Endowment Fund For Education (LPDP) for supporting authors research at University of Southampton, United Kingdom.

