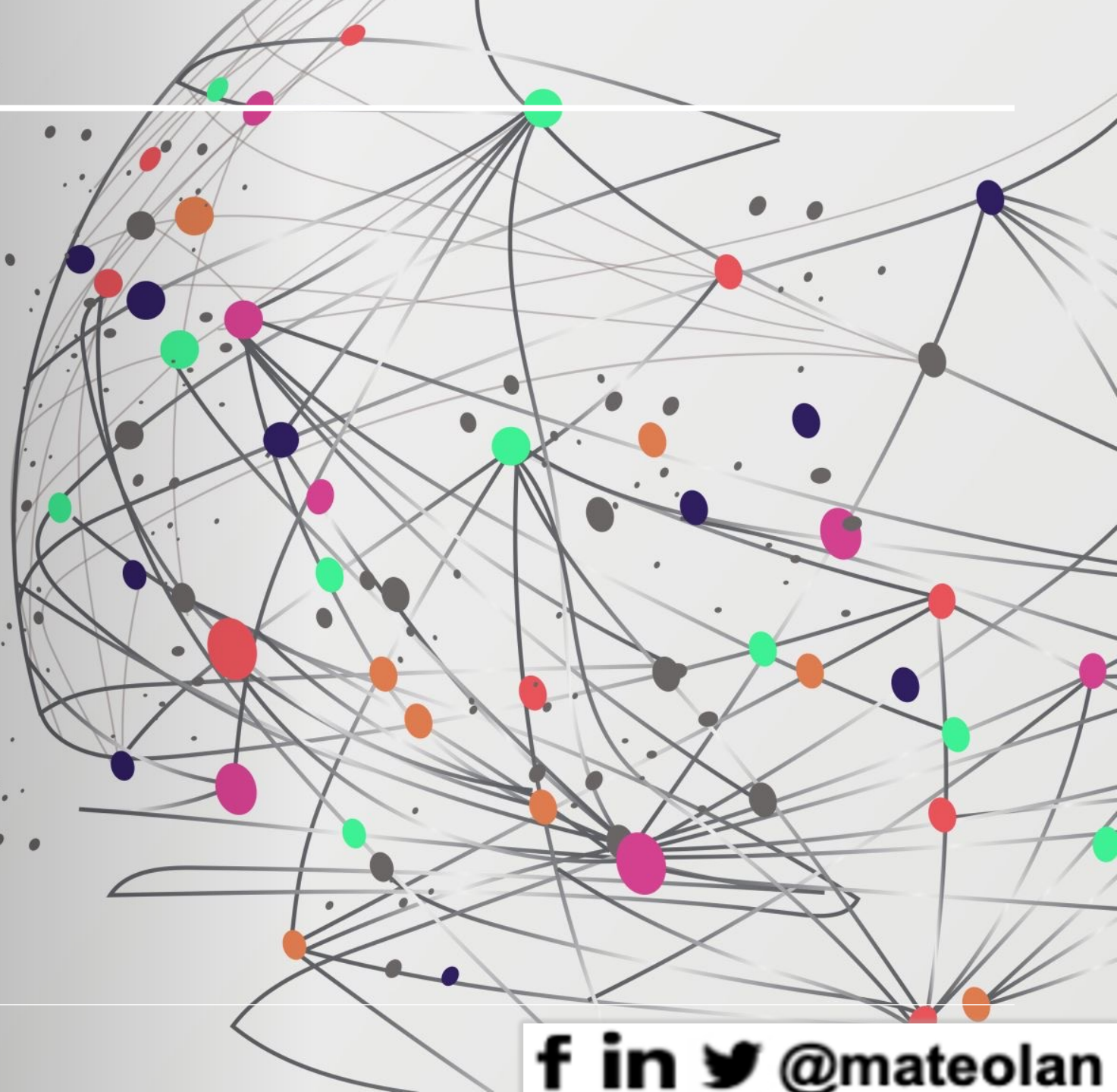


Conversational AI



Talk reality to me:
Grounding Chat in
Evolving Real World Facts

matthew@ic-foods.org



[f](#) [in](#) [🐦](#) [@mateolan](#)



www.lc-foods.org

IC-FOODS Mission

To democratize and digitize food systems in order to improve:

- Security, Sustainability & Resiliency,
- Access & Equity,
- Robustness & Healthfulness,
- Productivity & Efficiency



www.lc-foods.org

IC-FOODS Mission

To democratize and digitize food systems in order to improve:

- Security, Sustainability & Resiliency,
- Access & Equity,
- Robustness & Healthfulness,
- Productivity & Efficiency



www.ic-foods.org

Digitization

Language and Classification systems

Data Harvesting, Generation, and API aggregation

Machine Learning and Artificial Intelligence

Human-Computer Interface Development

Sensors, Actuators, and Automation

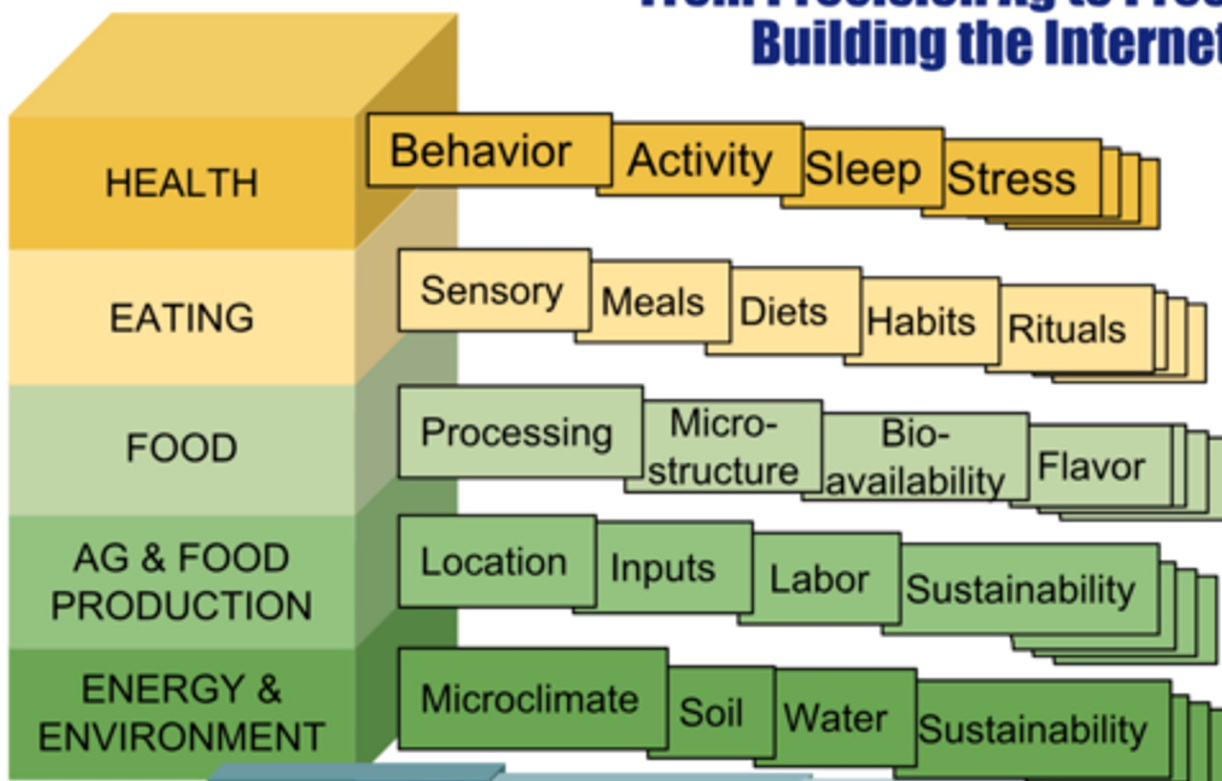
Traceability, Transparency, and Trust

Data-Driven Science, Policy, and Interventions



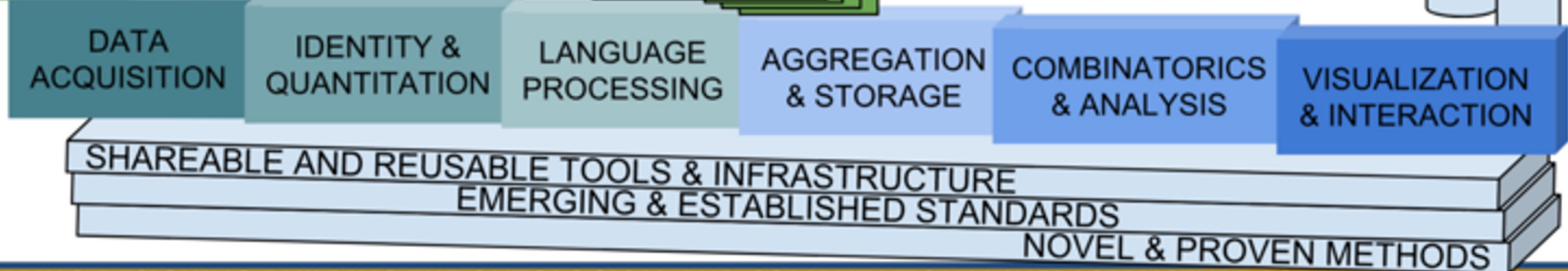
From Precision Ag to Precision Health: Building the Internet of Food

TRADE AND ECONOMICS
 CULTURE & PRACTICE
 GROUPS & VARIETIES
 AGING & TIME
 EXPOSURES
 INDIVIDUALS



***-omics**
Sensing
Assessing
Tracking
Mapping
Optimizing
Predicting

RESEARCH
 EDUCATION
 INNOVATION
 RECOMMENDATION
 PERSONALIZATION



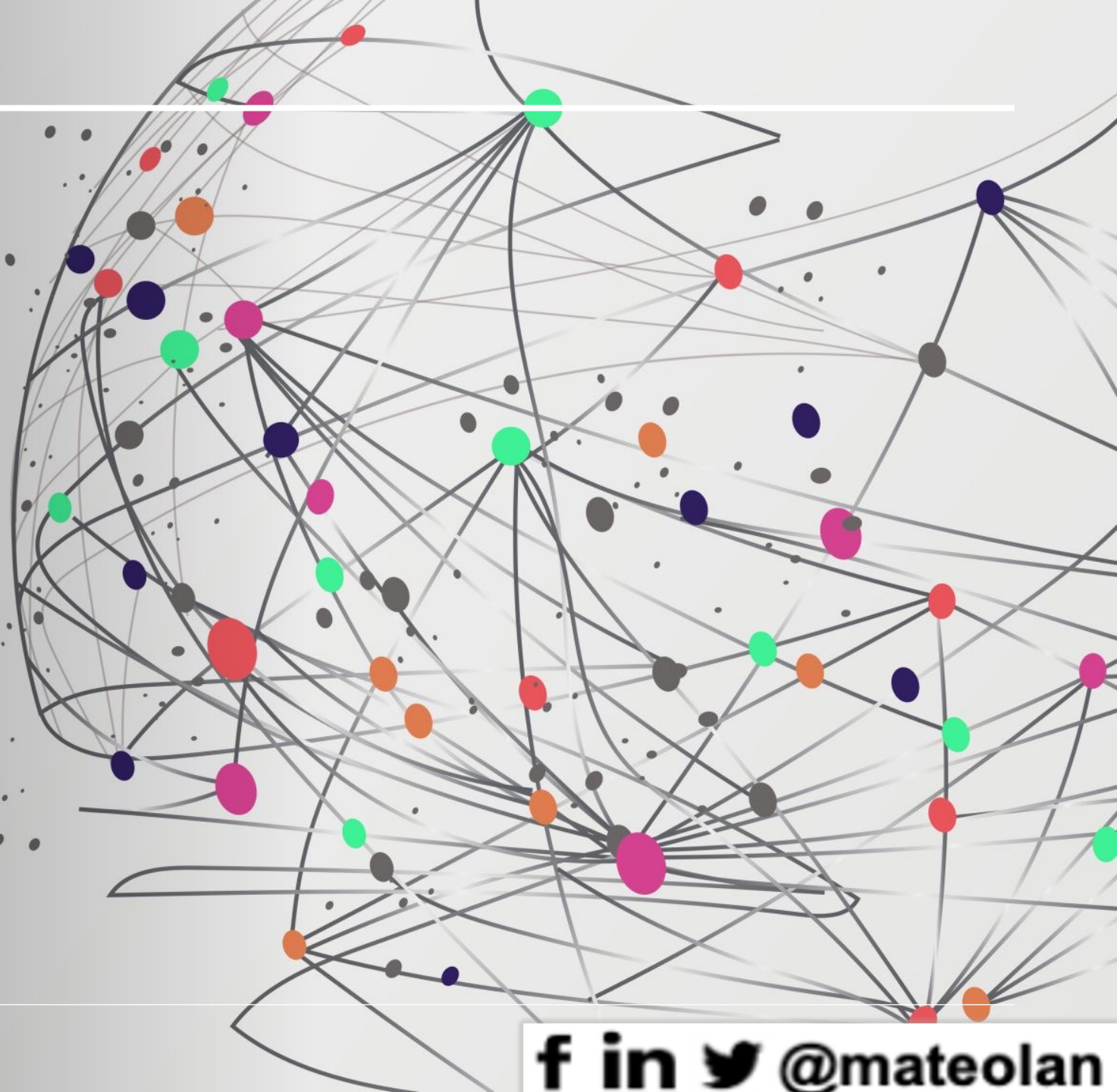
ASSEMBLING-DESIGNING-BUILDING THE ONTOLOGICAL AND COMPUTATIONAL INFRASTRUCTURE FOR

Conversational AI



Talk reality to me:
Grounding Chat in
Evolving Real World Facts

matthew@ic-foods.org



[f](#) [in](#) [🐦](#) [@mateolan](#)

Learning objectives

- Develop an understanding of LLM strengths and shortcomings
 - Association vs. Hallucination
 - Fact vs. Misrepresentation
 - Representative sampling vs. Bias
- Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure
- Develop an understanding of how LLMs can be used with Ontologies to create KG QA

Learning objectives

- Develop an understanding of LLM strengths and shortcomings
- Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure
 - Grounding in Domain Expertise
 - Ability to describe Computational Environment
 - Stakeholder Engagement
 - Reusability and Interoperability
- Develop an understanding of how LLMs can be used with Ontologies to create KG QA

Learning objectives

- Develop an understanding of LLM strengths and shortcomings
- Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure
- Develop an understanding of how LLMs can be used with Ontologies to create more robust Knowledge Graph Question and Answer Question and Answer (KGQA)
 - Creating Ontologies in tandem with LLMs
 - Ontologies for creating Computational Plans on specific Resources
 - Using Ontologies to discriminate Fact from Fiction

Develop an understanding of strengths and shortcomings

- Strengths:

- Extraordinary capacity in understanding and generating natural language
- Extraordinary capacity in understanding generic programs e.g. python
- Awareness of associations beyond the the reach of experts

- Weaknesses

- Hallucination
- Misrepresentation
- Representative sampling



write a song in the style of bob marley about culinary heritage, the importance of our grandparents recipes, and the wisdom of our elders



Verse 1:

From Jamaica to Ethiopia,
Our grandparents, they knew how to cook ya
With spices and herbs, they'd make a feast
Their dishes, they'd bring peace and release

Chorus:

Culinary heritage, it's a part of our culture
Our grandparents' recipes, they'll never lose their vulture
Their wisdom, it's a gift to us all
Their dishes, they'll always stand tall

Verse 2:

From curries to stews, they'd cook with care
Their recipes, they'd pass down with rare
Their dishes, they'd bring the family together
Their wisdom, it'd last forever

Develop an understanding shortcomings

- Strengths:
 - Extraordinary capacity in understanding and generating natural language
 - Extraordinary capacity in understanding generic programs e.g. python
 - Awareness of associations beyond the the reach of experts
- Weaknesses
 - Hallucination
 - Misrepresentation
 - Representative sampling



write python code that parses a complete map written in cxl



I am assuming that by 'cxl' you're referring to the CmapTools concept map file format. Python doesn't have an in-built parser for such a file, so you will need to use an XML parser to read it because the files are saved in XML format.

Here is a simple script that reads a .cxl file and parses it using the xml.etree.ElementTree module.

This is a very basic example. Depending on the complexity of your cxl file, you may need to adjust this code.

python

Copy code

```
import xml.etree.ElementTree as ET

def parse_cxl(file):
    tree = ET.parse(file)
    root = tree.getroot()
    # CXL uses the ConceptMap namespace
    cmap_ns = {'cmap': 'http://cmap.ihmc.us/xml/cmap/'}
    # Extracting concepts and linking phrases
    concepts = []
    linking_phrases = []
    for concept in root.findall('.//cmap:concept-appearance', cmap_ns):
        concepts.append(concept.attrib)
    for linking_phrase in root.findall('.//cmap:linking-phrase-appearance', cmap_ns):
        linking_phrases.append(linking_phrase.attrib)
    # Extracting connections
    connections = []
```

Regenerate response

Develop an understanding of shortcomings

- Strengths:
 - Extraordinary capacity in understanding and generating natural language
 - Extraordinary capacity in understanding generic programs e.g. python
 - Awareness of associations beyond the the reach of single experts
- Weaknesses
 - Hallucination
 - Misrepresentation
 - Bias



enumerate the ways in which food ontologies can ameliorate food swamps



1. Improved data collection and sharing: Food ontologies can provide a standardized and structured way of representing and sharing information about food, enabling researchers and policymakers to more accurately identify and understand the characteristics of food swamps.
2. Targeted interventions: Using food ontologies, researchers and policymakers can more accurately target interventions to specific communities and neighborhoods, rather than relying on broad-brush approaches that may not be effective in addressing the specific needs of those communities.
3. Enhanced food traceability: Food ontologies can be used to track the movement of food through the supply chain, allowing policymakers and retailers to identify areas where there is a lack of healthy food options and take steps to address the issue.
4. Improved food labeling and packaging: Food ontologies can be used to provide consumers with detailed information about the ingredients, nutritional value, and origin of food products, enabling them to make more informed choices about the food they purchase.
5. Better decision-making: Using food ontologies, policymakers and food retailers can make more informed decisions about the types of food products they offer, and the locations where they offer them, in order

Develop an understanding of LLM strengths and shortcomings

- Weaknesses
 - Hallucination
 - Misrepresentation
 - Bias

If the CXL document you're parsing doesn't use the ``xlink`` namespace or you're not interested in extracting ``href`` attributes from ``resource-ref`` elements, you might not need to use the ``xlink`` namespace in your code.



I don't see resource-ref in the cxl specification, can you enlighten me?



I apologize for the confusion. You're right, and I'm sorry for the mistake in my previous messages. There is no ``resource-ref`` in the CXL specification. This was an error on my part.

Develop an understanding of LLM strengths and shortcomings

- Weaknesses
 - Hallucination
 - Misrepresentation
 - Bias



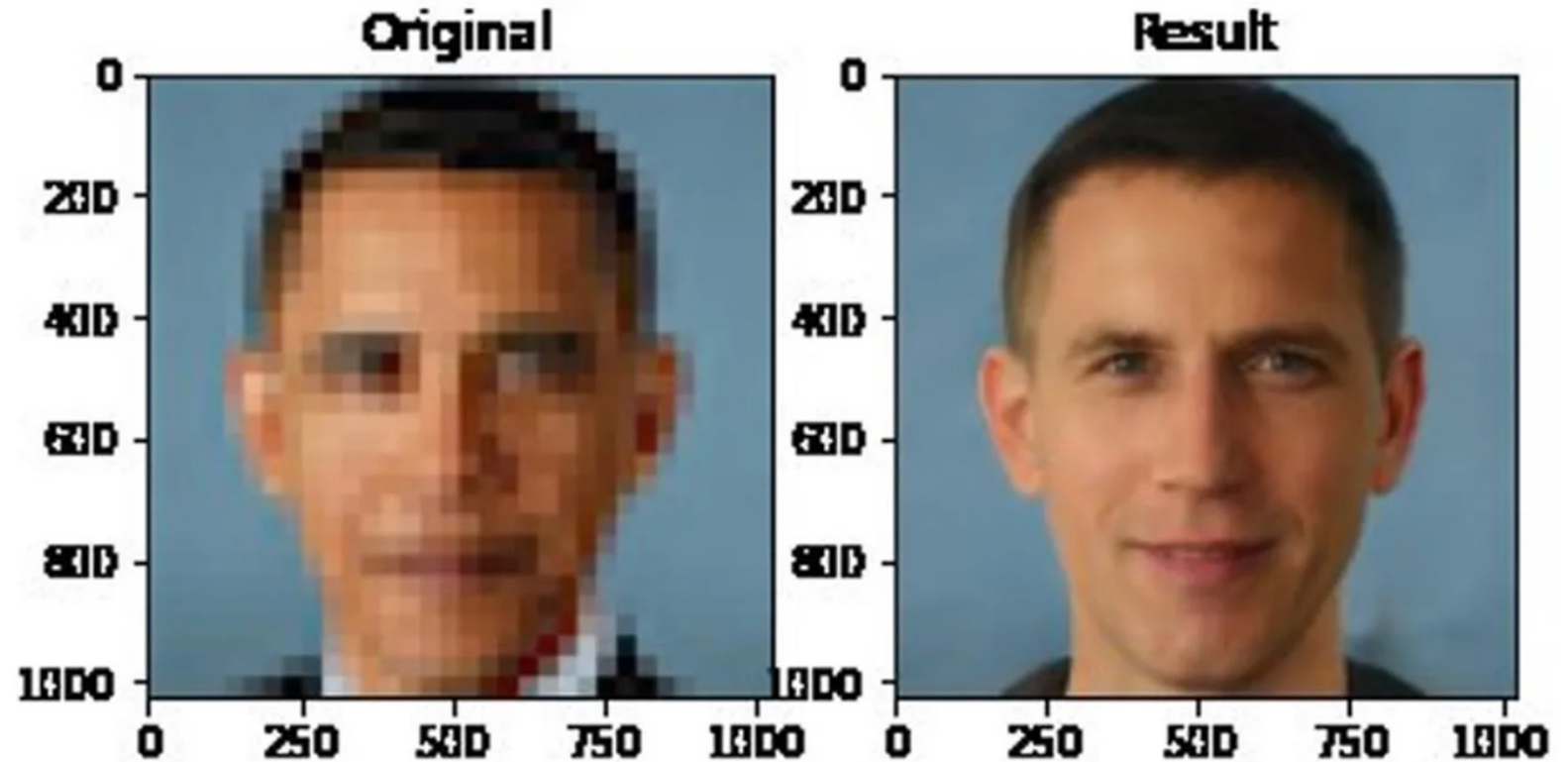
what does the international center for food ontology O[perability Data and Semantics do?



The International Center for Food Ontology (ICFO) is a research center that focuses on the use of data and technology to improve the food system. The center's main focus is on the development and application of ontologies and data standards for the food domain. Ontologies are formal representations of knowledge that can be used to organize, structure, and share data in a consistent and understandable way.

Develop an understanding of LLM strengths and shortcomings

- Weaknesses
 - Hallucination
 - Misrepresentation
 - Bias





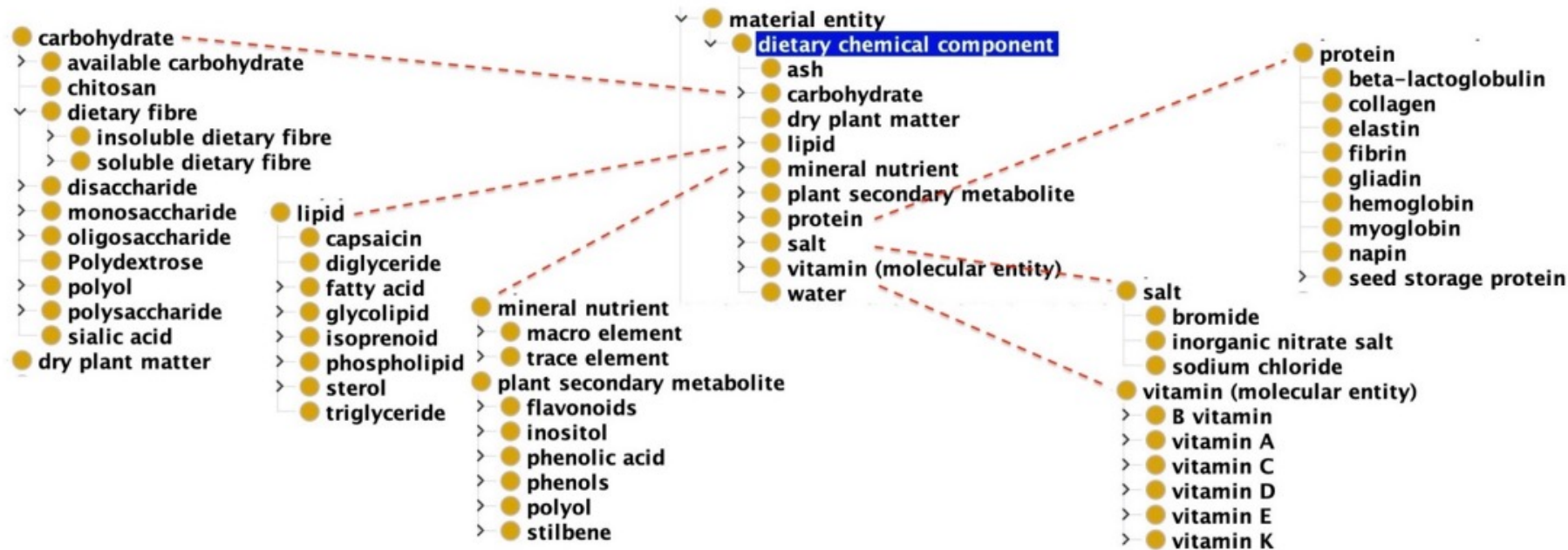
Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure

- Grounding in Domain Expertise
- Ability to describe Computational Environment
- Stakeholder Engagement
- Reusability and Interoperability



Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure

- Grounding in Domain Expertise



Title: **OBO Foundry Food Ontology Interconnectivity**

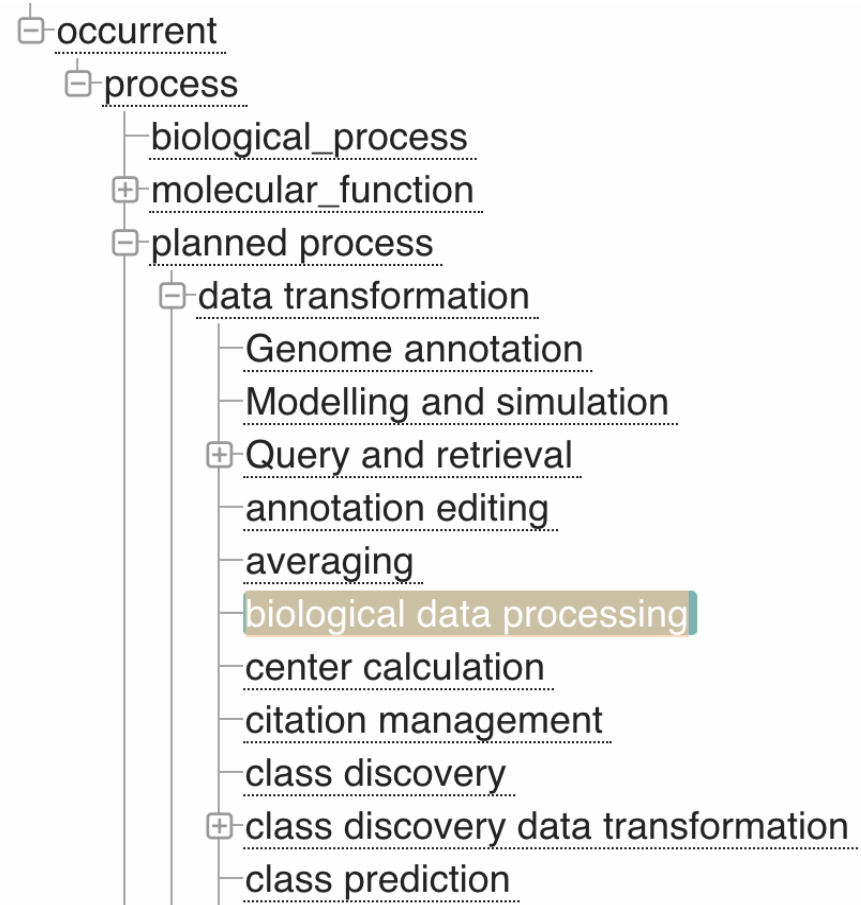
Authors:

Damion Dooley, Liliana Andrés-Hernández², Georgeta Bordea, Leigh Carmody¹, Duccio Cavalieri, Lauren Chan, Pol Castellano-Escuder, Carl Lachat, Fleur Mouglin¹, Francesco Vitali¹, Chen Yang, Magalie Weber, Hande McGinty², Matthew Lange

Fig. 2: The top level CDNO 'dietary chemical component' class and its subclasses, most of which are imported from ChEBI.

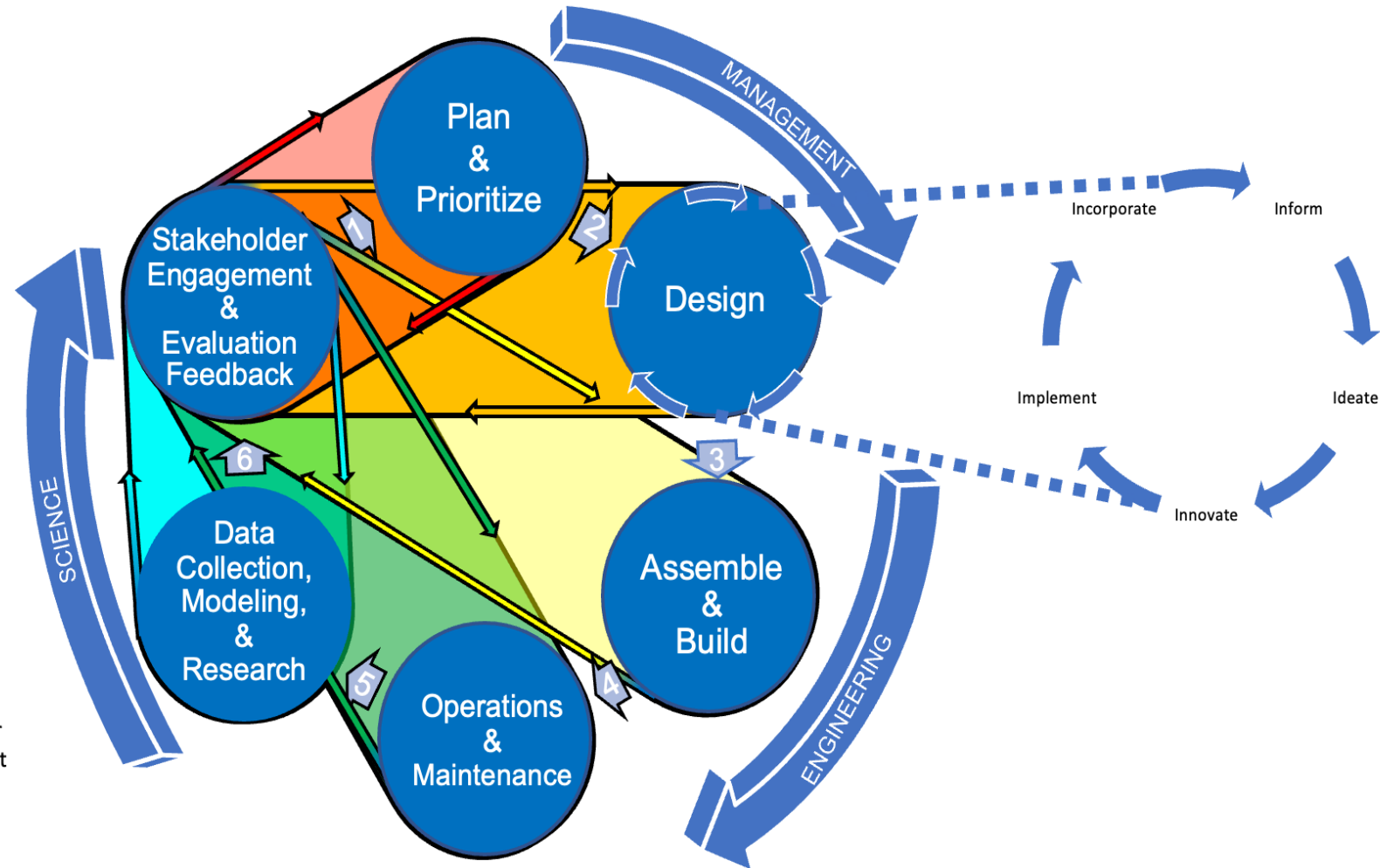
Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure

- Grounding in Domain Expertise
- Ability to describe Computational Environment
- Stakeholder Engagement
- Reusability and Interoperability



Develop an understanding why ontologies are important in Conversational/Chat AI infrastructure

- Grounding in Domain Expertise
- Ability to describe Computational Processes
- Stakeholder Engagement
- Reusability and Interoperability





Develop an understanding of Conversational/Chat AI infrastructure

- Grounding in Domain Expertise
- Ability to describe Computation
- Stakeholder Engagement
- Reusability and Interoperability



Open Foundry Commons ontology Learn a

Quick Summary

The following summarizes each principle. See individual pages for details.

P1) **Open** - The ontology MUST be openly available to be used by all without any constraint other than (a) its origin must be acknowledged and (b) it is not to be altered and subsequently redistributed in altered form under the original name or with the same identifiers.

P2) **Common Format** - The ontology is made available in a common formal language in an accepted concrete syntax.

P3) **URI/Identifier Space** - Each ontology MUST have a unique IRI in the form of an OBO Foundry permanent URL (PURL).

P4) **Versioning** - The ontology provider has documented procedures for versioning the ontology, and different versions of ontology are marked, stored, and officially released.

P5) **Scope** - The scope of an ontology is the extent of the domain or subject matter it intends to cover. The ontology must have a clearly specified scope and content that adheres to that scope.

P6) **Textual Definitions** - The ontology has textual definitions for the majority of its classes and for top level terms in particular.

P7) **Relations** - Relations should be reused from the Relations Ontology (RO).

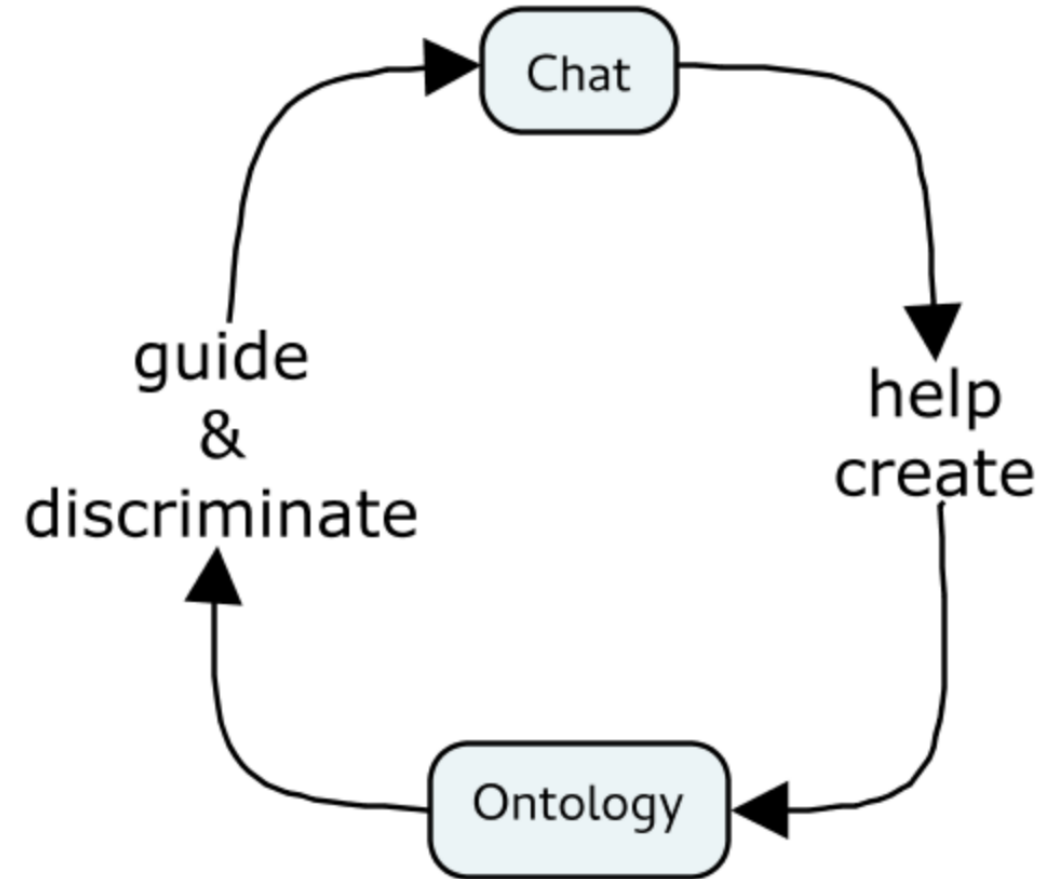
Using LLMs with Ontologies to create KG QA

- Creating Ontologies in tandem with LLMs
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction



Using LLMs with Ontologies to create KG QA

- Creating Ontologies in tandem with LLMs
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction



Using LLMs with Ontologies

- Creating Ontologies in tandem with LLMs
 - Suggest perspectives/hypotheses
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction



define sustainable from the perspective of an ecologist



From the perspective of an ecologist, sustainability refers to the capacity of ecosystems to endure and maintain a balance, while providing necessary resources and services for present and future generations. It is about interactions between different organisms and their environments, and how these relationships allow life to sustain over long periods of time.

This definition emphasizes three core aspects:

1. **Biodiversity:** Sustainable ecosystems have high levels of biodiversity, allowing for a wide range of species to interact and contribute to the ecosystem's functionality. Each species has a role, and their interaction enhances the system's overall resilience and adaptability.
2. **Resilience and Adaptability:** This refers to the ability of ecosystems to withstand disturbances and changes, such as climate change, natural disasters, or human activities, and to adapt accordingly. Systems that are more diverse are usually more resilient and adaptable.
3. **Resource Use and Regeneration:** In a sustainable ecosystem, the consumption of resources doesn't exceed their rate of regeneration. This balance ensures that species can continue to survive and thrive in the long run without depleting necessary resources.

Using LLMs with Ontologies

- Creating Ontologies in tandem with LLMs
 - Suggest perspectives/hypotheses
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction



What is a health systems planner's definition of sustainability



A health systems planner's definition of sustainability might revolve around the concept of developing and maintaining health services and systems that can consistently deliver high-quality care over time, without negatively impacting the economic, social, and environmental contexts in which they operate.

Here are some key dimensions that a health systems planner might consider in the context of sustainability:

1. **Healthcare Quality and Effectiveness:** Sustainable health systems consistently deliver high-quality care that is safe, effective, patient-centered, timely, efficient, and equitable. They are adaptable to changing health needs and medical advancements.
2. **Workforce Sustainability:** This involves creating working conditions and career pathways that attract and retain healthcare workers, including ongoing training and support to ensure the health workforce can meet current and future health needs.
3. **Financial Sustainability:** Health systems need to be financially sustainable, which means they can maintain operations and services without exhausting resources. This often involves efficient resource allocation, cost-saving measures, and innovative financing models.
4. **Environmental Sustainability:** Health systems also contribute to environmental sustainability by minimizing their environmental footprint, including reducing waste, conserving energy, and using sustainable products and materials.
5. **Equity and Accessibility:** Sustainable health systems ensure healthcare services are

Using LLMs with Ontologies to create KG QA

- Creating Ontologies in tandem with LLMs
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction

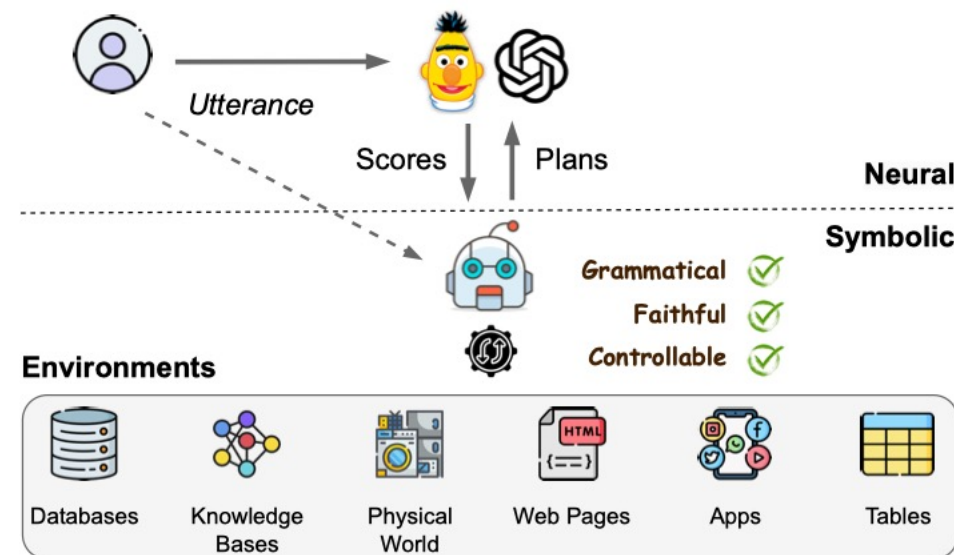


Figure 1: A schematic illustration of the proposed framework, Pangu, where a symbolic agent interacts with the target environment to propose candidate plans, and a neural LM evaluates the plausibility of each plan. The agent searches the environment to incrementally construct the plans, and the LM guides the search process.

Don't Generate, Discriminate:

A Proposal for Grounding Language Models to Real-World Environments



Yu Gu

The Ohio State University
gu.826@osu.edu

Xiang Deng

The Ohio State University
deng.595@osu.edu

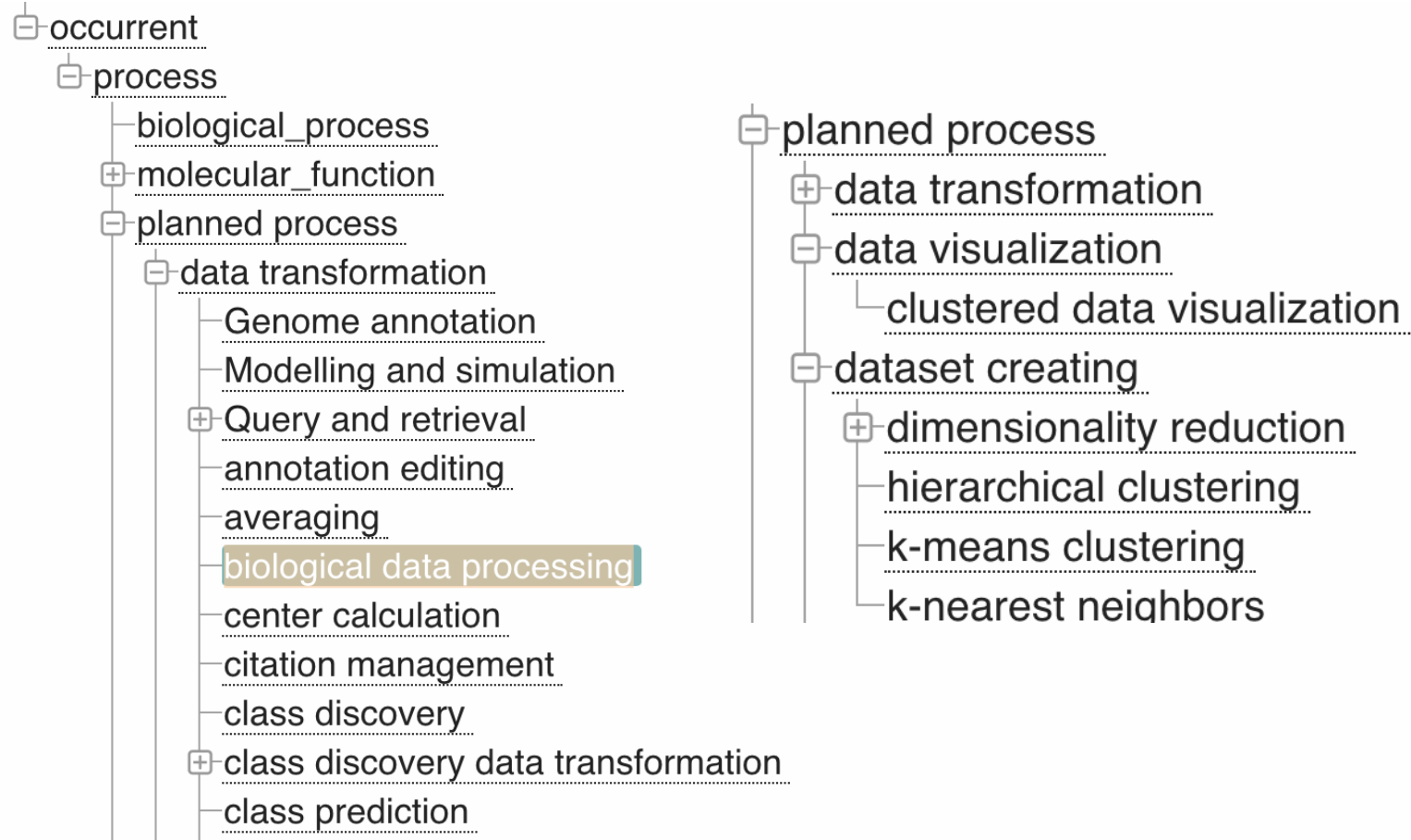
Yu Su

The Ohio State University
su.809@osu.edu



Using LLMs with Ontologies to create KG QA

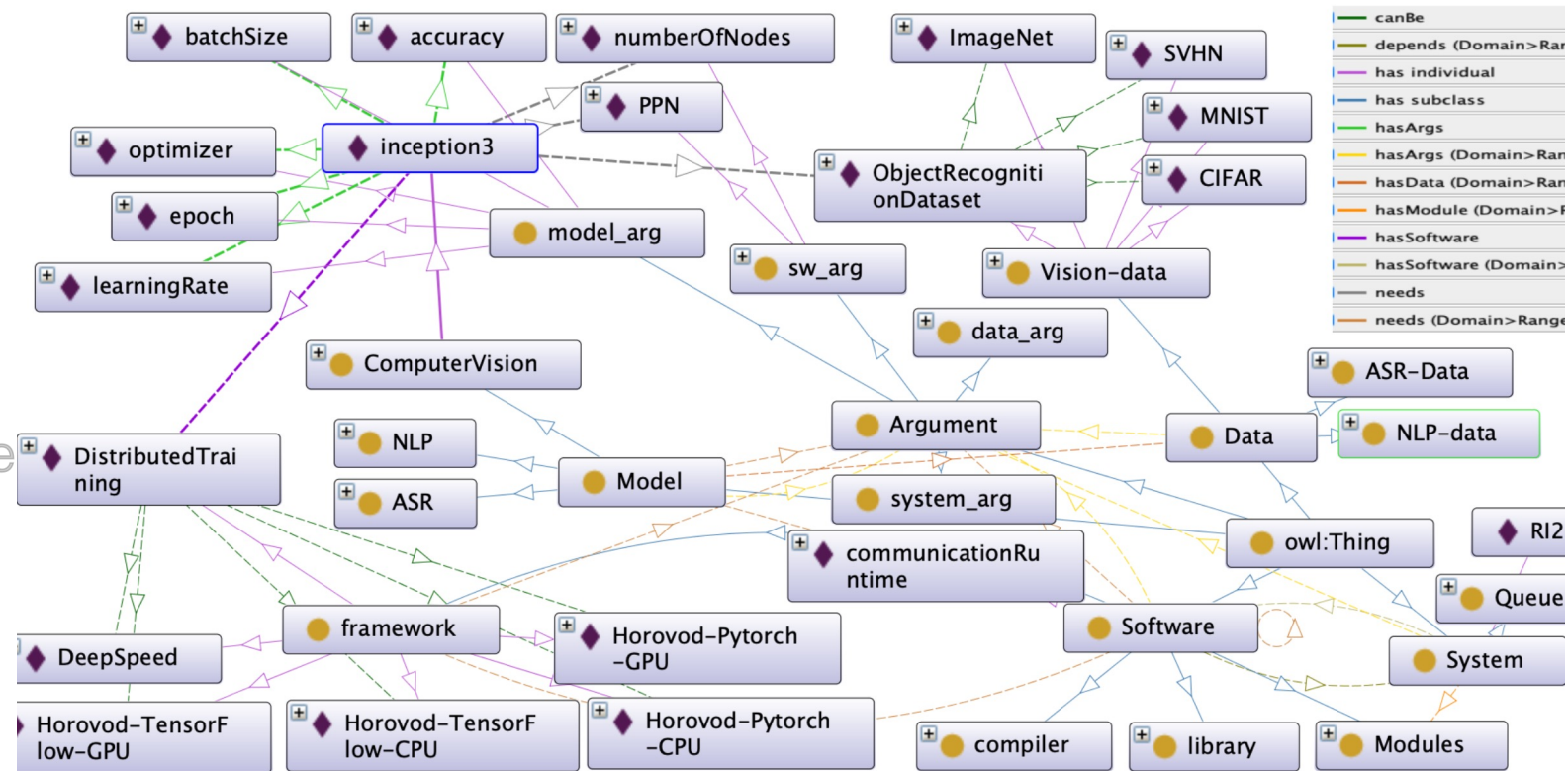
- Creating Ontologies in tandem with LLMs
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction





Using LLMs with Ontologies to create KG QA

- Creating Ontologies in tandem with LLMs
- Ontologies for creating Computational Plans on specific Resources
- Using Ontologies to discriminate Fact from Fiction



Using LLMs with Ontologies to create KG QA

- Using Ontologies to discriminate Fact from Fiction

Input utterance:

What is the latest released computer emulator developed in *Java*?

Environment:

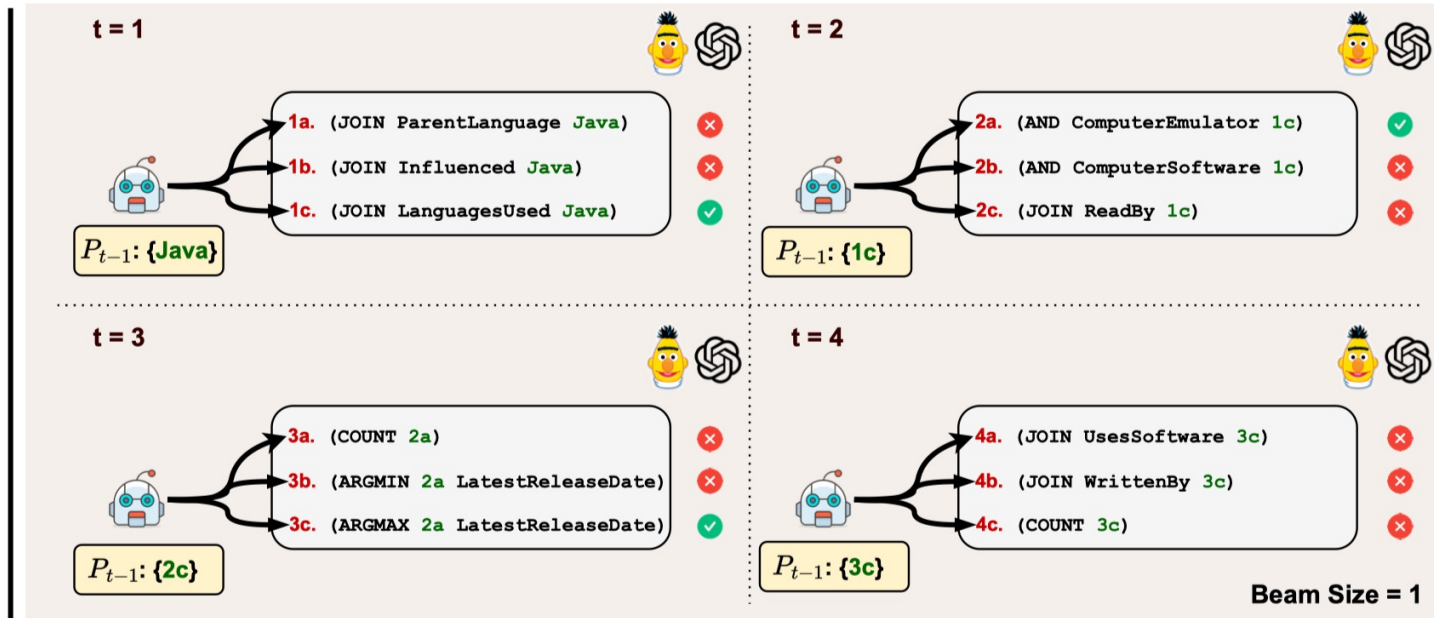


Knowledge Base

Target plan:

```
(ARGMAX (AND ComputerEmulator
          (JOIN LanguagesUsed Java))
 LatestReleaseDate)
```

(a)



(b) **Utterance:** What is the latest released computer emulator developed in java?

Candidate Plan: (AND ComputerEmulator (JOIN LanguagesUsed Java))

Score:



[CLS]

Utterance

[SEP]

Candidate Plan

[SEP]



Score: $P(\text{Candidate Plan} | \text{Utterance})$

Don't Generate, Discriminate: A Proposal for Grounding Language Models to Real-World Environments

Yu Gu
gu.826@osu.edu

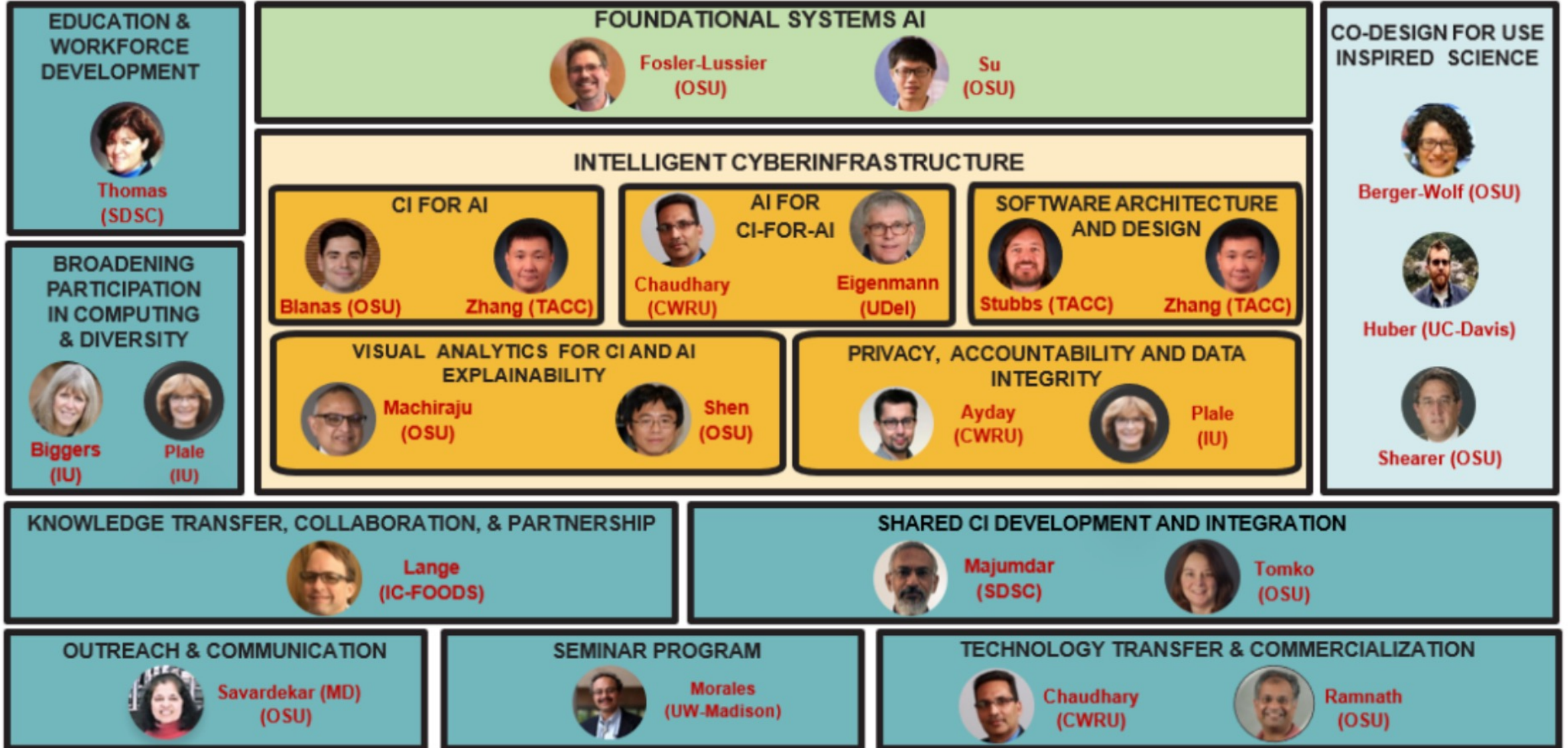
Xiang Deng
deng.595@osu.edu

Yu Su
su.809@osu.edu

@mateolan



Appreciation

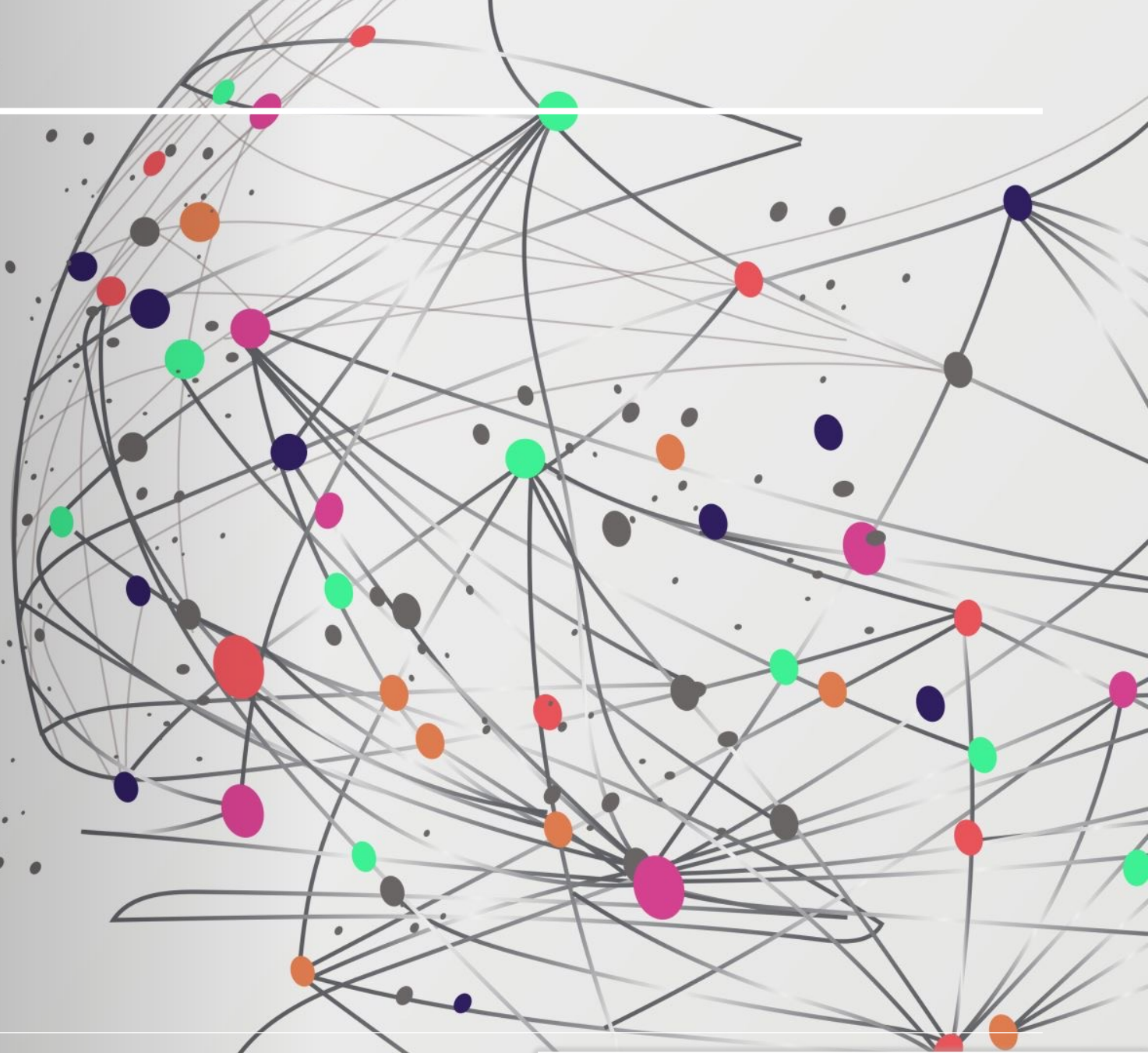


Thank you.

matthew@ic-foods.org



Talk reality to me:
Grounding Chat in
Evolving Real World Facts



f in  **@mateolan**