

Next Generation Molecular Technology: A Step- change in Foodborne Outbreaks



Confederation of Indian Industry



14th CII FOOD SAFETY QUALITY & REGULATORY SUMMIT

Smart Interventions for Strengthening the Food Safety Ecosystem

11 December 2019 | Hotel Le Meridien, New Delhi

December 11, 2019.

Balkumar Marthi



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What do we want from the food we eat?



...and is guaranteed to be SAFE

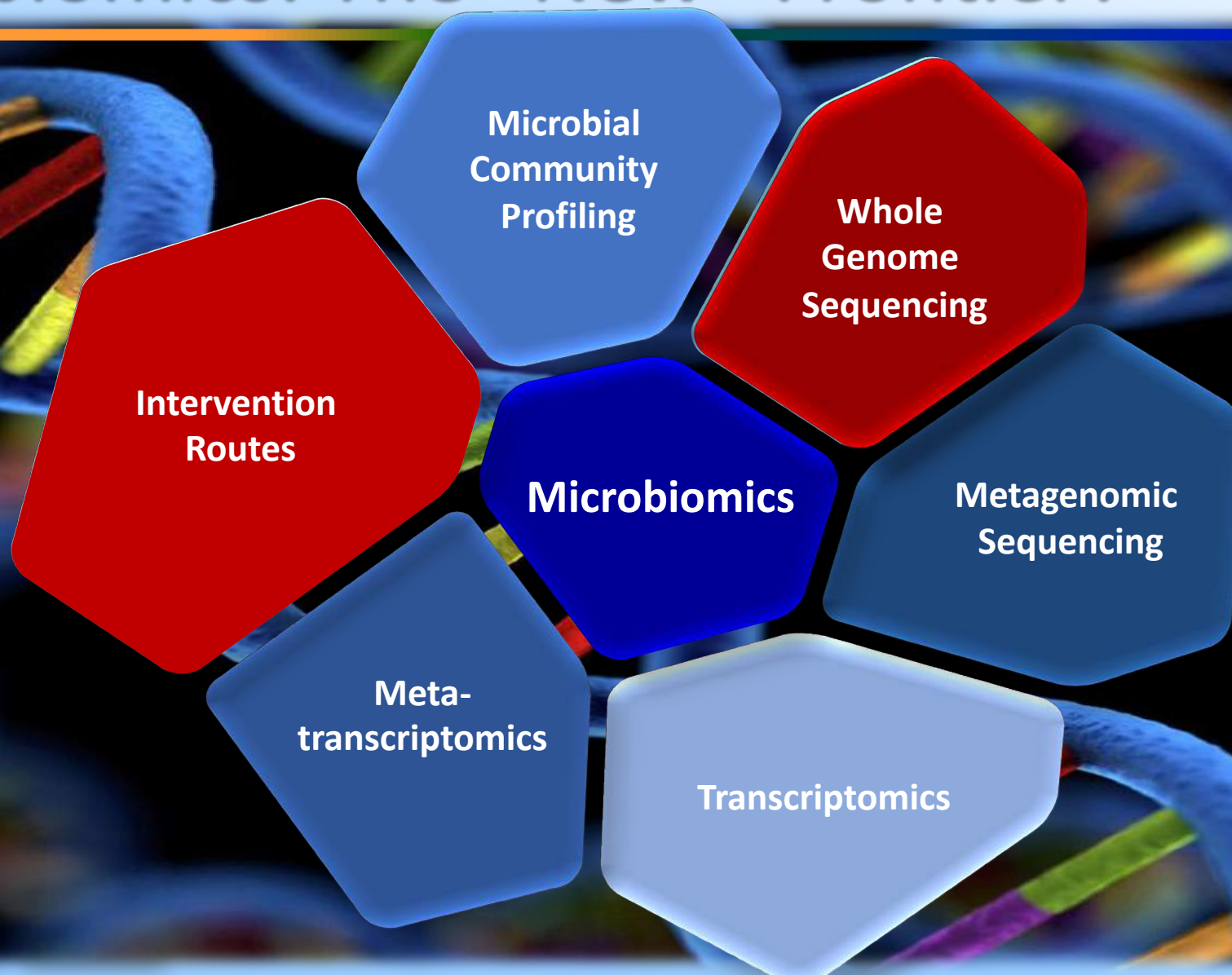


“SAFETY BY DESIGN”





Microbiomics: The “New” Frontier?



What is Whole Genome Sequencing (WGS)?



- ❖ The complete DNA make-up (i.e. “genome”) of an organism
- ❖ Helps better identify and understand variations/differences within and between species
- ❖ Allows greater precision in differentiating between organisms/species – that was hitherto not possible
- ❖ Helps in determining the relatedness of foodborne contaminants and pathogens
- ❖ It is rapid, and very accurate*





What are these Intervention Routes?

🚩 **Rapid Detection, Identification & Characterisation of Contaminants**

- 📺 Source Attribution and Tracking
- 📺 Improved Surveillance of Pathogens
- 📺 Rapid Responses and Better Containment

🚩 **Safer Design of Formulations**

🚩 **Nuanced, Next Generation, “Real-World” Risk Assessments**

- 📺 Detailed characterisation of individual contaminants and communities
- 📺 Deciphering Complex Community Behaviour through Big Data Integration & Manipulation

🚩 **More Effective Process Controls**





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S. Bareilly Outbreak from Tuna in the USA

EDITOR'S CHOICE

Tracing Origins of the *Salmonella* Bareilly Strain Causing a Food-borne Outbreak in the United States

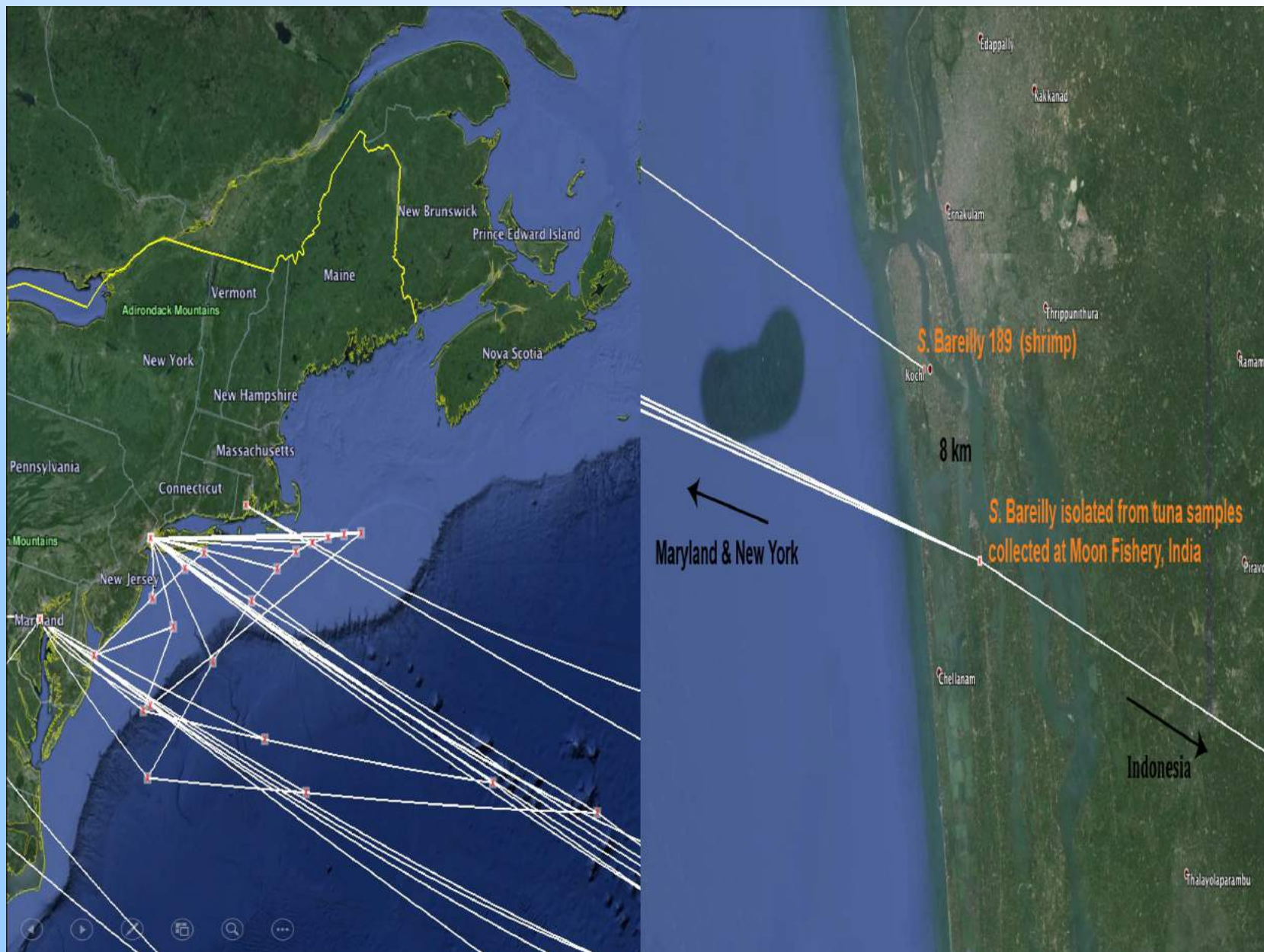
FREE

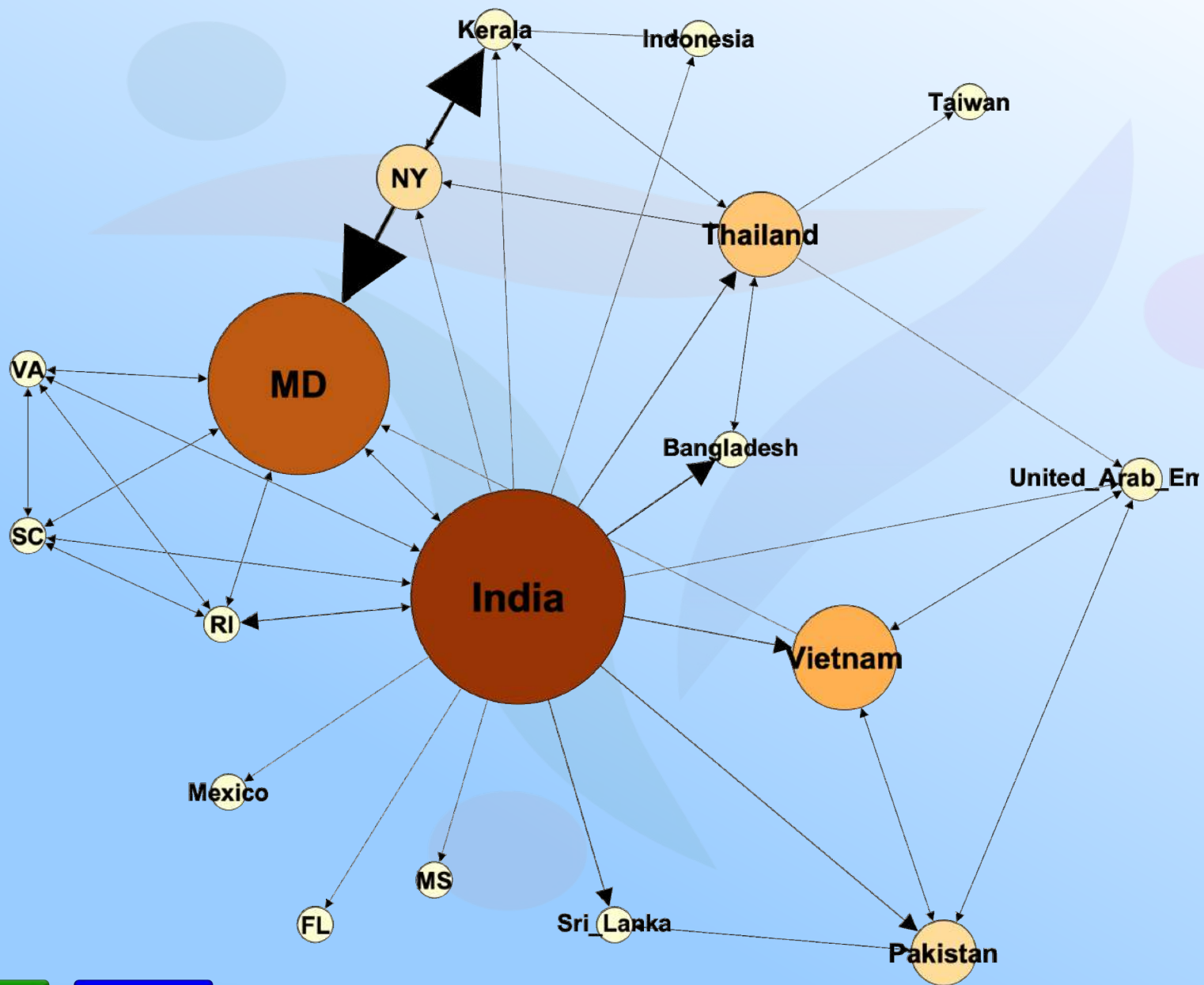
Maria Hoffmann ✉, Yan Luo, Steven R. Monday, Narjol Gonzalez-Escalona,
Andrea R. Ottesen, Tim Muruvanda, Charles Wang, George Kastanis, Christine Keys,
Daniel Janies ... Show more

The Journal of Infectious Diseases, Volume 213, Issue 4, 15 February 2016, Pages 502–508,
<https://doi.org/10.1093/infdis/jiv297>

Published: 20 May 2015 **Article history** ▼









LISTERIA AND BLUE BELL ICE CREAM

Contaminated Production Facilities and Illnesses Linked to Blue Bell Creameries

Arizona

- ▶ 1 case linked to ice cream made in Oklahoma facility

Kansas

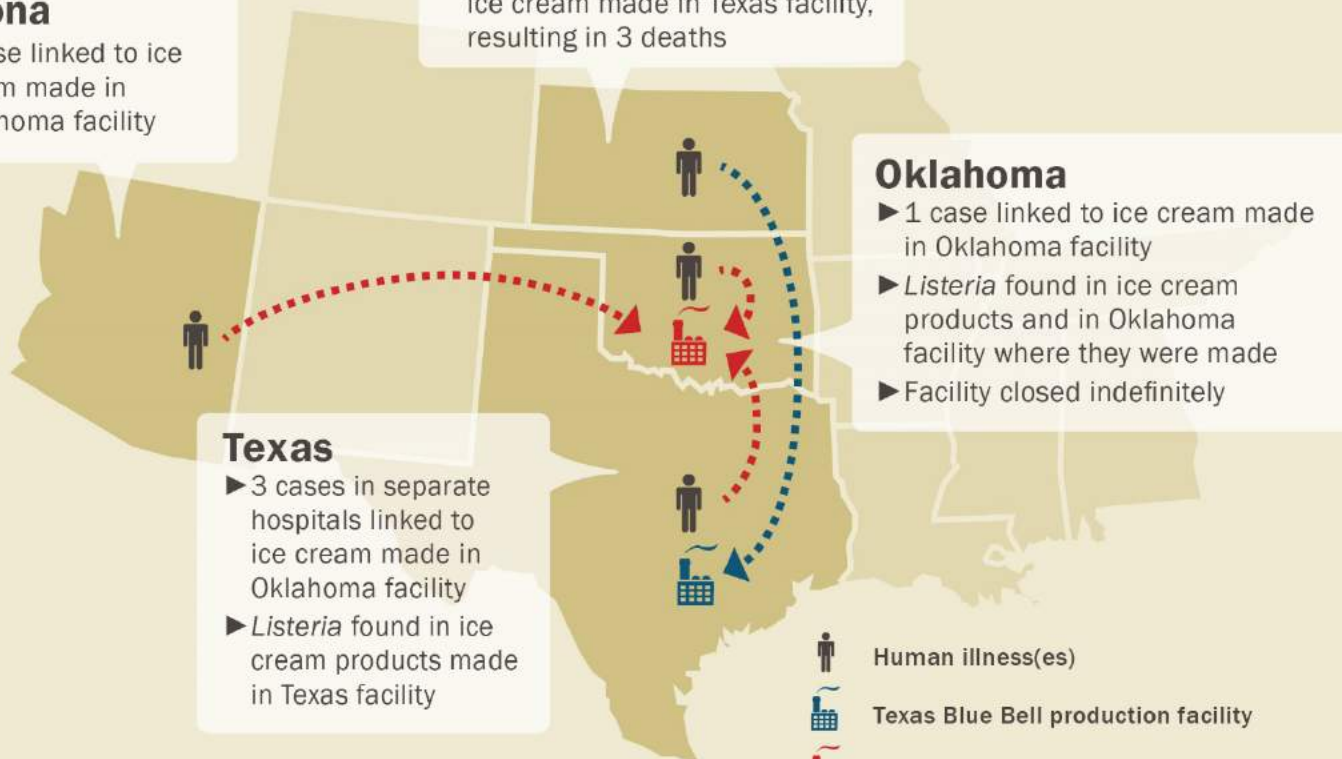
- ▶ 5 cases in one hospital linked to ice cream made in Texas facility, resulting in 3 deaths






Oklahoma

- ▶ 1 case linked to ice cream made in Oklahoma facility
- ▶ *Listeria* found in ice cream products and in Oklahoma facility where they were made
- ▶ Facility closed indefinitely

Texas

- ▶ 3 cases in separate hospitals linked to ice cream made in Oklahoma facility
- ▶ *Listeria* found in ice cream products made in Texas facility

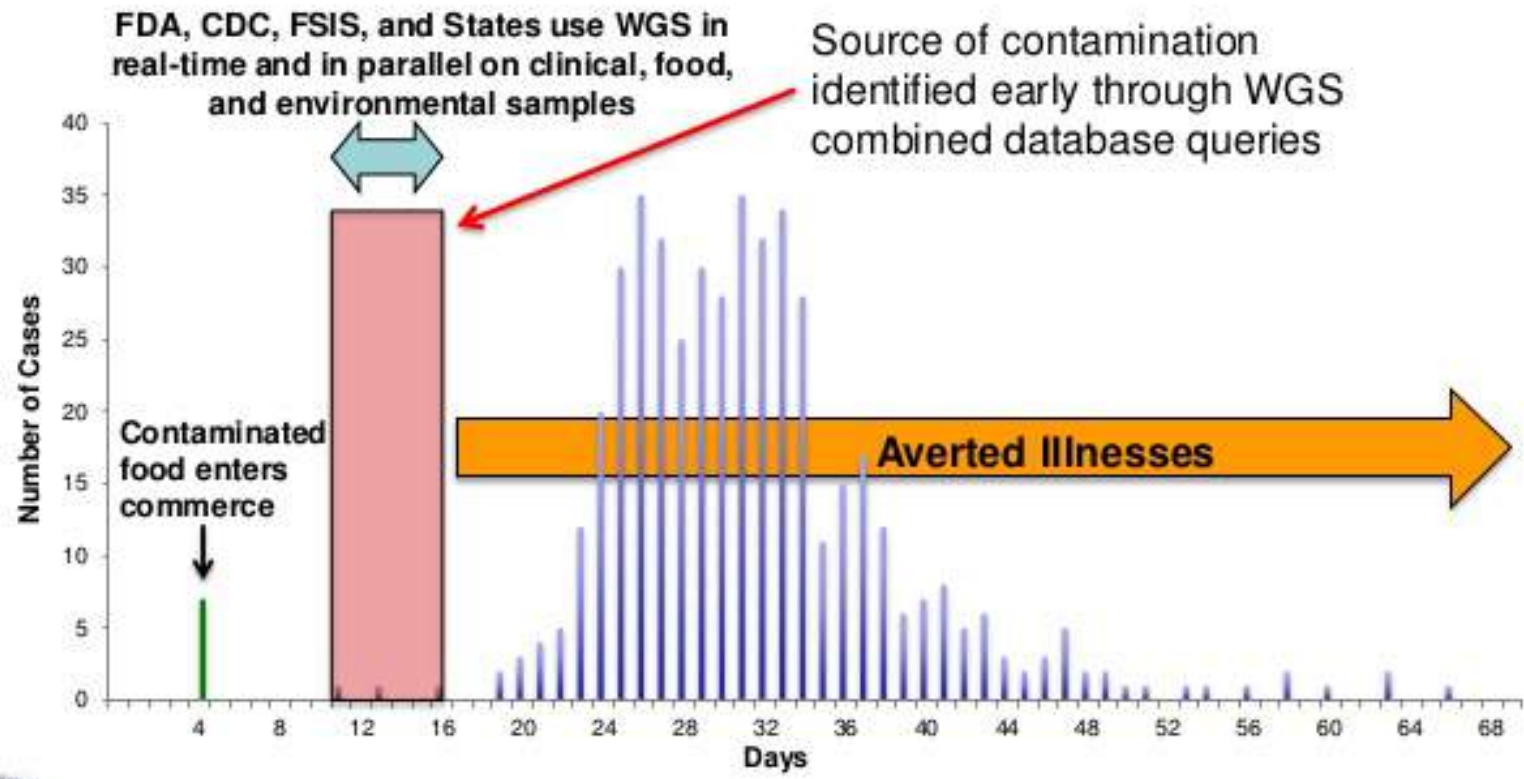


-  Human illness(es)
-  Texas Blue Bell production facility
-  Oklahoma Blue Bell production facility
-  Illness(es) linked to Texas facility
-  Illness(es) linked to Oklahoma facility



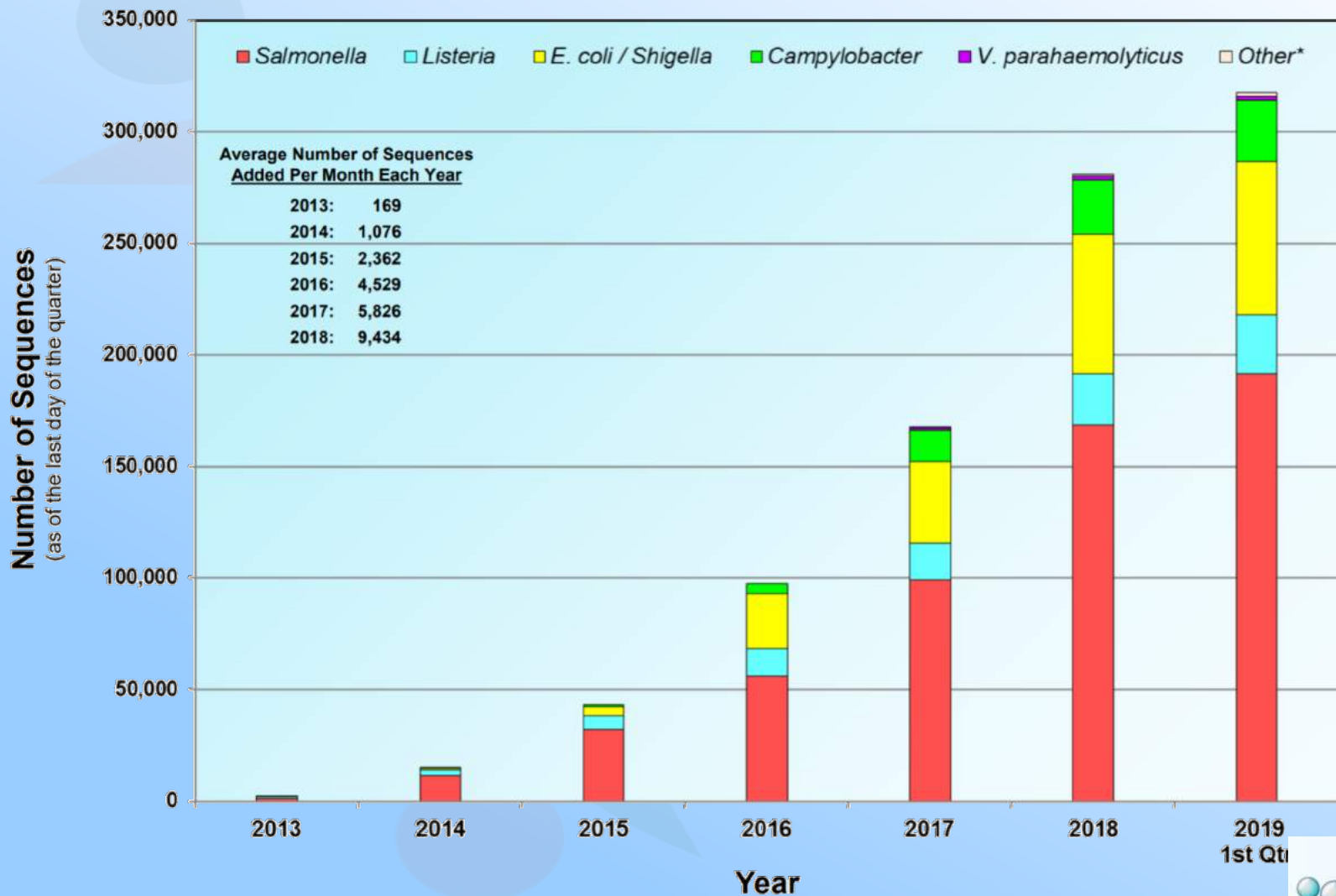


Representative* Timeline for Foodborne Illness Investigation Using Whole Genome Sequencing

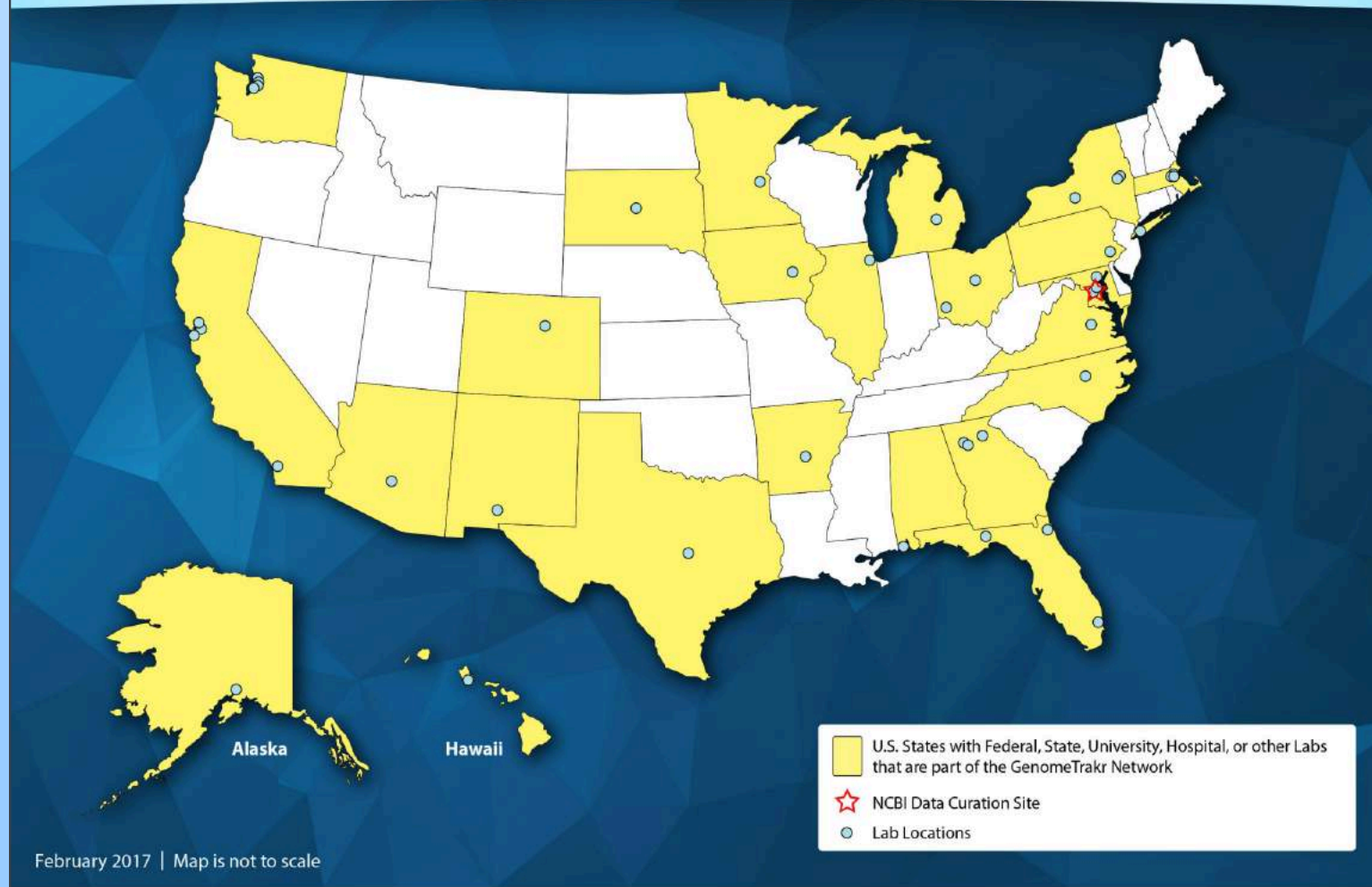


*Data is for illustrational purposes and does not represent an actual outbreak





U.S. GenomeTrakr Labs



Labs Outside the U.S. Contributing to GenomeTrakr



Challenges/Questions...



- ❖ Complexity of Communities, Ecosystems...?
- ❖ Enormous Volumes of Data and Complexity of Databases...?
- ❖ Standardisation of Technologies, Databases,...?
- ❖ Sharing of Information/Data/Knowledge...?
- ❖ Regulatory Considerations...?
- ❖ Costs...?
- ❖ Trade Barriers...?

