

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

UNITED STATES FOOD AND DRUG ADMINISTRATION
CENTER FOR FOOD SAFETY AND APPLIED NUTRITION

Virtual Public Meeting
Data and Technology in the New Era
of Smarter Food Safety

DATE: April 24, 2024

TIME: 10:00 a.m.

1 A P P E A R A N C E S

2 Laurie Farmer

3 Director, OSCP

4 ORA, U.S. Food and Drug Administration

5 Lauren Finnegan

6 Advisor, Communications and Public Engagement

7 CFSAN, U.S. Food and Drug Administration

8 Adam Friedlander

9 Policy Analyst, CORE

10 CFSAN, U.S. Food and Drug Administration

11 Vinetta Howard-King

12 Director, OHAFO-East

13 ORA, U.S. Food and Drug Administration

14 Michael Kawczynski

15 Project Manager, OCD

16 CFSAN, U.S. Food and Drug Administration

17 Glenda Lewis

18 Director, Retail Food Protection Staff

19 CFSAN, U.S. Food and Drug Administration

20 Jim Jones

21 Deputy Commissioner for Human Foods

22 U.S. Food and Drug Administration

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

A P P E A R A N C E S

Mark Moorman, PhD
Director, Office of Food Safety
CFSAN, U.S. Food and Drug Administration

Ruth Timme, PhD
Research Microbiologist, ORS
CFSAN, U.S. Food and Drug Administration

Chris Waldrop
Senior Health Scientist, OAO
CFSAN, U.S. Food and Drug Administration

		PAGE
1	C O N T E N T S	
2		
3	Greeting & Housekeeping/Logistics	6
4	Lauren Finnegan	
5	Opening Remarks	7
6	Jim Jones	
7	Data and Technology in the New Era of Smarter	
8	Food Safety	
9	Core Element 1: Tech-Enabled Traceability	11
10	Adam Friedlander	
11	Core Element 2: Smarter Tools and Approaches	
12	For Prevention and Outbreak Response	20
13	Mark Moorman, PhD, Vinetta Howard-King	
14	Core Element 3: New Business Models and	
15	Retail Modernization	
16	Laurie Farmer	37
17	Core Element 4: Food Safety Culture	
18	Chris Waldrop	53
19	Panelist Introduction	61
20	Public Comment	66
21	Panelist Discussion	111
22	Moderator: Lauren Finnegan	

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

C O N T E N T S

PAGE

Adam Friedlander, Mark Moorman, PhD,
Ruth Timme, PhD, Vinetta Howard-King
Glenda Lewis, Laurie Farmer

Closing Remarks 131

1 P R O C E E D I N G S

2 GREETING & HOUSEKEEPING/LOGISTICS

3 MS. FINNEGAN: Good morning. The U.S. Food
4 and Drug Administration is pleased to welcome you to
5 today's virtual public meeting on "Data and Technology
6 in the New Era of Smarter Food Safety." I'm Lauren
7 Finnegan, a health communications specialist with the
8 FDA's Center for Food Safety and Applied Nutrition,
9 and I will be your moderator today, along with my
10 colleague Michael Kawczynski.

11 The New Era of Smarter Food Safety
12 Initiative was launched in 2019 to signal a new
13 approach to food safety, leveraging technology and
14 other tools and approaches to create a safer and more
15 digital traceable food system. Today, during the
16 morning session, you will hear presentations on FDA's
17 current thinking on the potential for new, innovative
18 or different data and technology activities to create
19 a safer food system, while the afternoon session will
20 be reserved for public comment.

21 Here are a few notes before we get started.
22 The meeting agenda, speakers' biographies and a

1 document entitled "How to Comment" are posted on the
2 FDA's public meeting webpage for this event. This
3 meeting is being transcribed and recorded and will be
4 posted on the same webpage when it becomes available.
5 The recording should post within a week, and the
6 transcript will be posted within a few weeks.

7 It is now my pleasure to begin our meeting
8 by introducing Jim Jones, FDA's deputy commissioner
9 for human food, to provide opening remarks.

10 OPENING REMARKS

11 MR. JONES: Good morning. I am so glad that
12 you are joining us for today's public meeting on the
13 New Era of Smarter Food Safety. As you are likely
14 aware, we are in a transition period waiting for
15 Commissioner Califf's proposal for unified Human Foods
16 Program to go through the external review required for
17 all federal reorganizations. But our work has not
18 slowed, and our approach going forward is already
19 taking shape.

20 Now and in the future, we are focused on
21 making food about wellness through ensuring food
22 safety, enhancing food chemical safety and improving

1 nutrition, and technology and innovation are critical
2 to meeting these goals, as are you, our stakeholders.
3 Your input and engagement are essential to helping us
4 to identify and leverage those innovations that can
5 make us more efficient and effective in achieving our
6 mission to protect public health through a safer, more
7 nutritious and sustainable food supply.

8 From the early days of the New Era of
9 Smarter Food Safety through our most recent work, your
10 expertise and collaboration have been integral to the
11 tremendous amount of important work that has been
12 accomplished in the past five years, as you'll hear
13 throughout the course of the morning. We are here
14 today because there's an opportunity for us to refocus
15 New Era on those technologies and innovations that can
16 turbocharge the advancement of food safety.

17 We are looking to you to help us chart a
18 path forward. Through our work together today, we
19 hope that you will share your thoughts on what you see
20 as the most important areas for us to leverage
21 technology and data under New Era. This feedback,
22 along with the comments received to the accompanying

1 docket, will be used as we identify the areas FDA will
2 prioritize for New Era.

3 I encourage you to think about food safety
4 from all aspects, from foodborne outbreak prevention
5 and response, from the farm to the facility to the
6 point of sale, from testing the laboratories and
7 fields, to our inspection and compliance actions.
8 There is little in the modernized world where data and
9 technology do not make a difference. With our limited
10 resources, the question is where can we make the
11 biggest differences for the most people.

12 We know that advancements in predictive
13 analytics, the use of intuitive and effective data
14 sharing systems and artificial intelligence, along
15 with increased participation in GenomeTrakr and
16 virtual reality-assisted training, we can help prevent
17 foodborne illness outbreaks. But we also know that in
18 a resource constrained environment, prioritization is
19 key, that if we are spread too thin, we may miss an
20 opportunity to create largescale, long-term, positive
21 public health changes.

22 We also know that there is a lot at stake.

1 For every foodborne illness outbreak we prevent or
2 contain, we reduce the devastating toll experienced by
3 those impacted and their families, and we also avoid
4 the tremendous waste caused by recalls that cast nets
5 that are overly wide because we lack critical
6 information to target only the implicated products.

7 So today, as you consider the possibilities
8 we have thought of and those that we have not, I
9 encourage you to think what you do best. Think
10 strategically and big, share with us your experience
11 and insights, and work with us to reshape our future
12 into one where we are more efficient and effective in
13 meeting our public health missions, and where
14 foodborne illness outbreaks are a thing of the past.
15 Thank you, and I look forward to working with you
16 together.

17 MS. FINNEGAN: Thank you so much for those
18 remarks, Deputy Commissioner Jones. I'd now like to
19 introduce our next speaker, Adam Friedlander, one of
20 the co-leads for Core Element 1: Tech-Enabled
21 Traceability. Adam, I'll turn it over to you now.
22 DATA AND TECHNOLOGY IN THE NEW ERA OF SMARTER FOOD

1 SAFETY

2 CORE ELEMENT 1: TECH-ENABLED TRACEABILITY

3 MR. FRIEDLANDER: Good morning, and thank
4 you all for joining today's public meeting on the New
5 Era of Smarter Food Safety. My name is Adam
6 Friedlander, and I'm a policy analyst in FDA's Office
7 of Coordinated Outbreak Response and Evaluation
8 Network in the Center for Food Safety and Applied
9 Nutrition. I'm also the co-lead for our tech-enabled
10 traceability initiative, Core Element 1 here at FDA,
11 and I'm very excited to give some remarks today about
12 the background of our tech-enabled traceability
13 initiative, some of our key accomplishments, and
14 really, I'm looking forward to hearing from you today
15 about how you envision the future of this initiative.

16 So we know that tech-enabled traceability
17 has grown in awareness over the last several years,
18 and for far too long, we've relied on very manual
19 processes to investigate foodborne illness outbreaks
20 here in the United States. And this tech-enabled
21 traceability initiative, we believe, puts front and
22 center a focus on using technology and data to improve

1 public health outcomes around the country and the
2 globe.

3 We know that better food traceability data
4 can result in fewer foodborne illnesses and deaths.
5 In a world where traceability records were
6 predominantly paper-based and very manual processes on
7 the industry side, the same was true at FDA, where
8 we're relying on a variety of records such as purchase
9 orders, invoices to try to triangulate the eventual
10 source of the outbreak.

11 These traceback investigations at FDA could
12 take days or weeks, and some of these outbreaks led to
13 significant market withdrawals from the product, and
14 we weren't even able to find the root cause of the
15 illness. We know that we need faster identification
16 for that source of contamination and the rapid removal
17 from the market, and we believe that by harmonizing
18 the definitions for traceability data, we can more
19 rapidly and accurately link products and shipments
20 together and ultimately stop that source of the
21 outbreak.

22 So early on, when we first started this New

1 Era Initiative, we knew that we had to write a
2 traceability rule under FSMA Section 204. And before
3 we wrote the proposed rule, we leveraged this
4 initiative, which is FSMA-based, people led, to try to
5 understand where the industry was in their
6 traceability journey. And we did many listening
7 sessions and we learned from some of the leading
8 experts in the food traceability space, and that did
9 inform the proposed rule.

10 But this New Era Initiative is not a
11 regulation. And the eventual final rule of the
12 traceability final rule was predominantly based on the
13 public comments that we received to strengthen even
14 the proposed rule. And we know that it's going to be
15 a very long journey ahead to truly make food
16 traceability at the speed of thought a reality. But
17 we have already seen so much innovation within the
18 food industry ever since we finalized the final rule
19 in 2022.

20 But this New Era Initiative is more than
21 about a final regulation. It's about going above and
22 beyond that foundational level of key data elements

1 and critical tracking events and truly leveraging that
2 data to not only think about how can we improve this
3 from a food safety perspective, but thinking about
4 some of the other benefits of food traceability as
5 well, such as better visibility within your supply
6 chain or having a better understanding of where the
7 greatest need for certain product may go in the supply
8 chain.

9 And we have also heard loud and clear from
10 the food industry that data interoperability is
11 incredibly important. So instead of relying on one
12 system to track the entire food supply chain, is there
13 a way for data systems to talk to each other so that
14 it doesn't require just one system? You can still
15 leverage many different IT systems, but you're still
16 ultimately seeing that same food traceability
17 language. And this is something that we're incredibly
18 excited to continue to see progress on and see the
19 innovation that's taking place every single day.

20 But we know that collaboration is going to
21 be a critical component of how we move forward in the
22 future. We need to bring multidisciplinary teams

1 together. We need to bring the food safety folks, the
2 IT folks, the legal folks, marketing and supply chain,
3 a variety of teams need to come together and tackle
4 this issue.

5 So we know that the industry can voluntarily
6 work together to improve upon some of the greatest
7 operational, organizational and technological pain
8 points that we're currently seeing. But we are very
9 confident that through collaboration, we can make
10 great progress in tech-enabled traceability.

11 You know, I just want to highlight some of
12 our key successes in our current activity that we have
13 here at FDA and our tech-enabled traceability
14 initiative. We have had over 70 listening sessions
15 and tech demos with the industry since 2020, and we
16 learned so much during each of these, and it's
17 incredibly impressive to see. We have also hosted the
18 tech-enabled traceability challenge, where we had over
19 90 submissions from all over the world provide a
20 snapshot into what they're doing to reduce the
21 barriers of entry into leveraging traceability
22 technology.

1 And then IFT also produced an independent
2 report highlighting some of the key outcomes and
3 themes from this challenge. There is also a tech talk
4 that was centered around food traceability, where some
5 leading experts from the food traceability space
6 provided a lay of the land of the current situation in
7 tech-enabled traceability, and from an internal
8 perspective, we have taken in the last few years and
9 developed a prototype for our product tracing system,
10 and now we're in the process of developing this
11 product tracing system internally. And we're excited
12 to continue sharing resources with you all about this
13 PTS.

14 Currently we're producing a tech-enabled
15 traceability video series where we're highlighting
16 certain service providers who participated in the
17 traceability challenge. And we've already released
18 one of the episodes, but we have a few more on the
19 way. So we're very excited to showcase those videos
20 and roundtable discussions with you all.

21 From an international outreach and
22 engagement perspective, we know that this is a global

1 food supply chain, and it's going to require global
2 harmonization and collaboration. So we're in the
3 future looking to continue doing outreach with
4 international governments and international industry
5 groups as well to try to speak the same food
6 traceability language.

7 And we're also developing different software
8 tools that are going to support those traceability
9 efforts. We've already highlighted some of those
10 technological components on our website, talking about
11 our product tracing system. But we look forward to
12 sharing more information about some of the tools that
13 we're leveraging, not so people can duplicate or
14 replicate what we're doing, but so that they can
15 consider the technologies that we're using in their
16 own digital transformation journeys.

17 And then lastly, we're participating in a
18 group called SHOP. And that's organized by the
19 Association of Food and Drug Officials. But it's
20 really looking at the role of consumer purchase
21 history data during outbreak investigations. And we
22 know that with the food traceability rules that the

1 records really end at the point of receiving at
2 retail. But we know that during the first leg of an
3 investigation, we rely on what did that sick patient
4 or customer eat that made them sick.

5 So how do we tie in the records from the
6 consumer all the way back to that point of receiving
7 at retail? It's a gap, and we know that there are
8 some industry groups already out there who are trying
9 to solve this, and that's an example of going above
10 and beyond the rule and leveraging traceability data.
11 And we're just very excited to see this level of
12 collaboration and ingenuity happen in our supply
13 chain.

14 So, today I'm most looking forward to
15 getting feedback from you all on what you believe the
16 next five years, ten years, 20 years look like for
17 tech-enabled traceability. On the screen you'll see
18 several questions. And we're going to put these
19 questions in the docket. And I hope also during the
20 oral comments today that we'll hear from you on some
21 of these ideas.

22 If you have any other ideas beyond just

1 these questions, we're very eager to learn and to
2 listen for you, but we're very interested to
3 understand how we can improve traceability, leveraging
4 technology, leveraging data to improve public health
5 outcomes. So we're very excited to hear from you all,
6 and just wanted to say thank you all for joining
7 today.

8 And I'll leave with this. We know that at
9 FDA we can only do so much to improve food
10 traceability across the industry. But we rely on
11 working with industry, government, academia partners,
12 and this is a global effort too. And together, we can
13 reduce that burden of foodborne diseases and truly
14 leverage the power of data to improve the public
15 health outcomes for our U.S. and global population.
16 So thank you all so much and I'm looking forward to
17 hearing from you.

18 MS. FINNEGAN: Thank you so much for your
19 presentation, Adam. Next, I would like to turn it
20 over to Mark Moorman and Vinetta Howard. They will be
21 presenting on "Smarter Tools and Approaches for
22 prevention and Outbreak Response."

1 CORE ELEMENT 2: SMARTER TOOLS AND APPROACHES FOR
2 PREVENTION AND OUTBREAK RESPONSE

3 DR. MOORMAN: Well, hello. My name is Mark
4 Moorman. I'm the director of the Office of Food
5 Safety at the Food and Drug Administration.

6 I'm thrilled today to talk about a topic
7 that our team cares deeply about, and it's the Core
8 Element 2: Smarter Tools and Approaches for Prevention
9 and Outbreak Response. I'll take you back to the Food
10 Safety Modernization Act to introduce this topic. You
11 know, that was an overhaul of our country's food
12 safety system, directing the FDA to develop a number
13 of regulations aimed at preventing foodborne illness.

14 But, you know, like many things in life,
15 life happens. Along the way comes technology that is
16 evolving so rapidly and the question that New Era
17 asked us to struggle with is how can we deploy this
18 technology in a way that assures and improves public
19 health. FSMA didn't envision that. New Era does.

20 The Core Element 2 seeks to do a couple
21 things: first, to advance the use of root cause
22 analysis, and I'm not going to talk about that today.

1 That's a topic I would love to talk more about because
2 our team has been doing a lot of work on it. Our
3 objective here is to introduce or to advance the use
4 of root cause analysis by all stakeholders, including
5 the FDA, to create a culture of learning. You know,
6 in life, you can't solve a problem you don't
7 understand, and that's what root cause analysis is
8 there to do to help you to understand what happened.

9 What I will be spending more time on today
10 is the second area, and that is where we seek to
11 strengthen the safety of our food supply by looking
12 for novel approaches, and these novel approaches are
13 based on data and data sharing. I'll also be wrapping
14 up by talking about a tremendous tool that we have
15 called the GenomeTrakr.

16 You know, if you're in this webinar today,
17 you've benefited from the use of better data. I'm
18 guessing right next to you right now is a cell phone.
19 And with that cell phone, well, you've probably used
20 it. You've used data to help you get to the right
21 destination and perhaps even on time. You've used
22 that cell phone with that data to be able to order

1 something online and have it received at the right
2 location and in fact probably got notified when it was
3 delivered.

4 Well, a good friend of mine, a great
5 colleague to those of us in food safety, Frank Yiannas,
6 has said better food safety begins and ends with
7 better data. And he is absolutely right. Our quest
8 in this Core Element 2 is to better connect to that
9 data and use it to make better decisions or better,
10 even better predictions.

11 As you'll see here, our scope isn't just the
12 FDA in the use of this data. What I hope you see is
13 that we're looking to create platforms or tools that
14 can be applied by all the stakeholders in the food
15 safety arena.

16 Today specifically, I'm going to be talking
17 about data, our use of that data, our use of that data
18 with these tools called artificial intelligence and
19 machine learning. I'll also be talking about data
20 sharing in what we call data trusts. And then
21 finally, as I mentioned, I'll be talking about this
22 game changing tool called GenomeTrakr.

1 So, my first job out of school, I worked out
2 in the Oakland area, and I would look out over these
3 massive docks where all these containers would be
4 launched. And I remember thinking, new in the food
5 safety world, how do the import folks know what to
6 Screen? How would you know what to sample to find out
7 what could be unsafe or violative? Imagine you're
8 that person.

9 Well, as it turns out, the FDA has been at
10 this for a while, and it has good systems. One that's
11 called PREDICT, which is a risk-based tool to be able
12 to know what to sample, which of those containers to
13 sample. Well, in the universe of data predictive
14 analytics, we're using these tools called artificial
15 intelligence and machine learning to help us to make
16 better predictions.

17 Now we started with the application of
18 machine learning with seafood. And you might say, why
19 seafood? Well, because about 90 percent of the U.S.
20 food seafood supply comes in from outside the United
21 States. A huge amount is imported. And the team has
22 worked through three phases. We're in the midst of

1 phase three right now. Phase one was a proof of
2 concept. Could we apply machine learning? The second
3 was to integrate this machine learning into our
4 existing PREDICT systems. And we're today at phase
5 three. We're using this tool, machine learning, to
6 better determine what we could sample to find
7 violative compounds. Well, what could those be? It
8 could be disease-causing organisms. It could be
9 seafood decomposition, the presence of unapproved
10 antibiotics or other hazards.

11 Now, we've also developed an AI-powered
12 emerging chemical hazard intelligence platform, which
13 is known as horizon scanning. Very excited about that
14 tool.

15 So where are we today? Well, as you know,
16 like me, you go through the grocery store, there's
17 more than just seafood that's imported and so we're
18 looking to apply machine learning to other imported
19 foods coming to the United States.

20 We're also looking to apply machine learning
21 to domestically produced foods. And then thirdly, and
22 very importantly, we're using this tool to try to

1 understand what are those drivers of contamination,
2 the drivers of those violative foods, what is causing
3 those foods to become a problem or risk to public
4 health.

5 So as I mentioned, we are using machine
6 learning to make better predictions at import and
7 looking to apply it to domestic foods. The request
8 that you've heard from Deputy Commissioner Jones is to
9 help us. Well, give us the gift of feedback. What
10 other food safety problems could be solved through the
11 use of artificial intelligence and machine learning?

12 We're also asking questions. Are you, is
13 your firm, is your area of food safety using machine
14 learning, predictive analytics? Thirdly, what
15 limitations exist? This is a great tool, but what
16 limits us from being able to apply this against our
17 food system? And then thirdly, what can FDA do to
18 provide or facilitate the application of machine
19 learning to the food safety system?

20 Please give us that gift of feedback for our
21 use of artificial intelligence and machine learning.
22 We're, as you can tell -- you can hear the excitement

1 in my voice. We're big on this. We think there's
2 tremendous applications, but it's bigger than FDA.
3 The applications are bigger than the FDA, and we want
4 to be champions of this technology.

5 So I've talked about artificial intelligence
6 and machine learning as part of this Core Element 2.2
7 on predictive analytics. I'll take you to a different
8 component of this, and it's on data sharing. And you
9 might ask why would anybody share with a regulatory
10 agency their data? Why would anybody do that? Well,
11 I'll ask you, and we have a lot of discussions in the
12 agency about this, to think about it differently.

13 You see, many of the categories that all of
14 us worry about have known existing hazards that have
15 been in that category for quite a long time. It's
16 there. We can either deal with it or not deal with
17 it. If we're going to deal with it, we need to
18 visualize it. We need to come together and to compile
19 the data that is out there to be able to better
20 visualize that data and for all of us to have to be
21 able to visualize it and make better decisions about
22 the data.

1 There are many categories that have existing
2 hazards, and we want to apply the seafood data sharing
3 platform that we've built to seafood, but as you'll
4 see, we want to apply it to other categories.

5 We have worked with our federal and state
6 regulatory partners to be able to compile that data,
7 and we've had a lot of success. With this seafood
8 data sharing platform, we've worked with a platform
9 built by Creme Global that is enabling us to see these
10 toxic elements, to see PFAS. There's enormous amounts
11 of PFAS data that we've pulled into this, aquaculture
12 residues, seafood decomposition, marine biotoxin data
13 globally. It is profoundly exciting and the ability
14 to visualize the data, the levels, the regions, is
15 very exciting.

16 So where are we going with this? Well,
17 we've built a heck of a tool, but like any tool in
18 your toolbox, it's only going to be as good as your
19 ability to use it and to apply it. And we're looking
20 to take this tool and expand it to other categories of
21 the grocery store. There's many.

22 So we would ask for feedback on what are

1 some of those application areas for this data sharing
2 platform. We want to work with partners that have
3 data. You know, on any given day, industry is doing a
4 lot more testing than the regulatory agencies are.
5 But, having come from industry, I can tell you that
6 there's not nearly the amount of sharing across the
7 category, across an industry and there's often very
8 little sharing with the regulatory agencies.

9 We're trying to change that. Yes, we are a
10 regulatory agency, but we're putting our prevention
11 hat on and we're trying to build a tool that enables
12 or that addresses of the concerns that many would have
13 of providing that information to a regulatory agency.
14 Could it be blinded? Yeah, we can work with that.
15 Aggregated data? Yes, we can work with that. We know
16 that there's trade secrets that have to be protected,
17 but we know in our core that the way through this,
18 with these hazards and for better protecting health is
19 by using these platforms, this platform to share data,
20 to bring partners in, to understand the data.

21 I will tell you that we're very excited to
22 work with a leader known as Western Growers. These

1 are produce manufacturers, produce growers out West
2 that have been working with the FDA to be able to
3 share their data. We're working through the concerns
4 that exist with sharing data, but I believe we are
5 going to get there.

6 We have a very strong desire to be able to
7 conduct predictive analytics with all of you on this
8 information. We also want to encourage industry to
9 use the data and the technology. There's a lot of
10 exciting stuff out there in the area of sensor
11 technology, data digitalization. This is a very
12 exciting space.

13 So the feedback that we would request is
14 what food safety challenges are out there in your part
15 of the world that could be addressed through data
16 sharing. What are they? We're happy to talk with you
17 about that. Me and my team would be happy to talk
18 with you. We're partnering with our Office of
19 Compliance to be able to build these data sharing
20 agreements. What data would you share in this public-
21 private trust?

22 And I'll finish up with this, the

1 GenomeTrakr 2.5. If you've never heard of this, I'll
2 explain it. And it's an area that many of us have a
3 lot of passion for in the agency. It is a tremendous
4 public health tool. So what is it? Just like you and
5 I have fingerprints, so do bacteria, so do parasites,
6 so do viruses. These fingerprints are encoded through
7 their nucleic acid sequences, just like you see there,
8 the G and C and the A and T of DNA. Those are their
9 fingerprints.

10 Whole genome sequencing does just that. It
11 determines the entire sequence of that genome, of that
12 organism. What do we do with that information? It
13 enables us to make associations. If there's clusters
14 of illness, we're able to see that, well, there's more
15 than just one person. In fact, as you dive into this,
16 these people all appear to have consumed the same
17 food. Oh, and by the way, we're able to find that
18 that same organism was in that growing arena or that
19 manufacturing facility.

20 It enables us to connect dots. And that's
21 the beauty of this GenomeTrakr tool. The FDA
22 established the GenomeTrakr. It's a laboratory

1 network. We've got it in 28 states, and we're looking
2 to get it in the remaining 50. It really is the case
3 of as a kid when you would just add water to a sponge.
4 This literally is adding water to the sponge. There
5 are resources that are needed to be able to conduct
6 the training and to bring forward the technology to
7 these remaining 25 states to be able to use, to be
8 able to determine these whole genome sequences and to
9 be able to submit them for bioinformatics analysis.

10 Just to illustrate how important this is,
11 the FDA, there's about 150 FDA regulatory actions per
12 year, per year that are informed by this GenomeTrakr.
13 It's a tremendous tool.

14 So what do we need? Yes, we are asking for
15 feedback, but it's very clear here. There's no
16 secret. We really do need funding to be able to
17 expand this from the existing 27 to all 50 states. We
18 would be able to build a continuous flow of
19 pathogenomic data, genomic data from humans and
20 animals gathered by the CDC and the USDA and FDA
21 partners. We'd be able to detect the signals, and
22 that's the beauty of this tool.

1 There is just so much work that's been done
2 in this data space, and we at FDA see tremendous
3 opportunities in this Core Element 2. We're very
4 excited to work with all of you and would welcome the
5 feedback on how else we can use these tools of
6 predictive analytics and data trusts and GenomeTrakr.
7 And with that, I thank you.

8 MS. HOWARD-KING: Good morning. I'm Vinetta
9 Howard-King, director of FDA's Office of Human and
10 Animal Food East in the Office of Regulatory Affairs.

11 I'm also the lead for several goals under
12 the Core Element 2 of the New Era of Smarter Food
13 Safety blueprint. Specifically, I lead goals under
14 2.3, domestic mutual reliance, 2.4, inspection,
15 training and compliance tools, and 2.6, recall
16 modernization.

17 As we build on the progress we've made in
18 implementing FSMA, the New Era of Smarter Food Safety
19 blueprint centered on three main principles: people-
20 focused and led, FSMA-based and technology-enabled.

21 Over the past three years, we've had many
22 successes and some challenges that we've had to

1 continue to work through, like funding and resources.
2 But some examples of successes under 2.3, domestic
3 mutual reliance goals, include establishing domestic
4 mutual reliance partnership agreements with state
5 regulatory agencies that allow FDA and states to
6 leverage inspectional coverage. This helps to reduce
7 redundancy and allows each organization to focus on
8 the highest priority work.

9 Harmonization of food testing methodologies
10 used by state and federal labs, including collection,
11 sample collection, analysis and reports. Last year,
12 over 8,000 micro and over 6,000 chemical food samples
13 were analyzed by state laboratories, resulting in 21
14 human food recalls, two consumer advisories, eight
15 firms or countries being added to import alert, and
16 one FDA outbreak notice. We've also enhanced IT
17 platforms to allow better data sharing with state
18 partners to include system to system reporting, firm
19 search and history, produce safety farm inventory and
20 inventory reconciliation.

21 During the COVID-19 pandemic, FDA worked
22 with our industry partners to develop, pilot and

1 implement remote inspectional tools. In the domestic
2 arena, these remote regulatory assessments are a
3 voluntary process that allow industry to share
4 pertinent information with FDA prior to us conducting
5 onsite visits. For example, for firms with a
6 demonstrated compliance history with FDA, we've used
7 remote regulatory assessments, or RRAs, to verify
8 corrective actions to previous inspectional
9 observations. This verification is done prior to an
10 onsite visit by FDA. It has led to focus and time
11 saving interactions between FDA and the firm doing the
12 future onsite inspection

13 In the foreign arena, FDA has been able to
14 utilize RRAs to both verify corrective actions and
15 assess compliance with FDA food safety laws and
16 regulations with firms that are located in countries
17 and regions where there are State Department security
18 concerns that prevent onsite inspections. We have
19 found RRAs to be an excellent educational tool, as
20 many foreign firms are not as well versed in our food
21 safety regulations, so they are very appreciative of
22 this outreach opportunity. Again, industry

1 participation in RRAs is a voluntary process.

2 FDA continues to work to modernize our
3 recall process, which includes better recall
4 communications and the use of technology. For
5 example, in April 2021, FDA rolled out its enforcement
6 report subscription service that allows consumers and
7 industry to sign up for email notifications of new and
8 updated recalls that are posted to the FDA's
9 enforcement report.

10 Since the initiation of the subscription
11 service, there have been updates to the service that
12 allows for subscribers to subscribe based on keywords
13 such as specific allergens. As of February 2024,
14 there are over 11,000 active subscribers to the
15 enforcement report subscription service,

16 And FDA continues to be very interested in
17 your feedback, as we are always looking for ways to
18 make our service more useful. So please feel free to
19 use the link in my presentation to send your feedback
20 to FDA.

21 Other recall modernization activities
22 include the public meeting held last September 2023.

1 As you know, FDA's recall process is enterprise-wide,
2 meaning our recall process covers the multitude of
3 commodities regulated by FDA; for example, human and
4 animal food, medical products, cosmetic and tobacco
5 products. As a result of the recall modernization
6 public meeting held last September, FDA received over
7 200 comments that were relevant to food recalls.
8 We're still reviewing the public comments and plan to
9 share the summary and outcomes in the near future.

10 Now let's talk about next steps. We plan to
11 continue our work on establishing and enhancing
12 domestic mutual reliance partnership agreements with
13 our state partners. They have proven to be invaluable
14 in our efforts to promote and enhance an integrated
15 food safety system. We're looking at ways to enhance
16 inspectional tools using artificial intelligence,
17 machine learning and GeoWeb mapping technology. We
18 want to explore different training modalities to
19 include virtual reality. We will increase our efforts
20 to effectively monitor and modernize the human food
21 supply chain oversight.

22 We want to work collaboratively with

1 external partners on food recall solutions to better
2 communicate recall information to the public. I look
3 forward to hearing your feedback and to working
4 together on common sense solutions. Thank you.

5 MS. FINNEGAN: Thank you for those
6 presentations, Vinetta and Mark. We will now take a
7 15-minute break, and when we return, we will hear from
8 the director of the Office of State Cooperative
9 Programs at the Office of Regulatory Affairs, Laurie
10 Farmer.

11 (Break)

12 MS. FINNEGAN: Welcome back everyone. Now
13 we have Laurie Farmer presenting on Core Element 3:
14 New Business Models and Retail Modernization.

15 CORE ELEMENT 3: NEW BUSINESS MODELS AND RETAIL
16 MODERNIZATION

17 MS. FARMER: Hello. I'm Laurie Farmer,
18 FDA's director of the Office of State Cooperative
19 Programs. I am the Core Element 3 co-lead with my
20 colleague Andreas Keller, and I'll be sharing the work
21 of the team with you today.

22 Core Element 3 is about ensuring the safety

1 of produced and delivered using new business models and
2 modernizing traditional retail food safety approaches.
3 When considering food safety and risk management, we
4 have a global food supply. Consumers are more
5 knowledgeable about safety and want immediate access
6 to ready-to-eat goods. Innovation and technology,
7 including data analytics, are tools to leverage.

8 The questions that we have been working to
9 answer and areas we want to hear feedback are how do
10 we support innovation yet still ensure food safety and
11 e-commerce? How can we use technology to monitor and
12 gather data on sales of food through e-commerce to
13 better understand the supply chain and identify
14 sources? How do we modernize the retail food
15 protection system in this country, and how can we work
16 with retail food safety stakeholders to encourage
17 innovation and technological development, digital
18 tools, data sharing and training methods to control
19 foodborne illness risk factors?

20 This conversation is a request for feedback
21 about where FDA should target our resources and
22 leverage stakeholders and data and technology. What

1 are we doing well, what do we need to expand on and
2 where are the gaps and how can we improve?

3 The FDA retail food program has been dealing
4 with the growth of food e-commerce, including evolving
5 delivery models. The challenges in new business
6 models include issues stemming from delivery practices
7 of meal kits and groceries, such as key drop
8 deliveries to unmanned retail establishments, also
9 known as micro markets, and even to robotics, where
10 machines do everything such as making pizza or
11 cupcakes in a vending machine. FDA's retail food
12 safety team has been engaged and working
13 collaboratively with all our retail stakeholders, as
14 well as USDA FSIS in addressing these emerging issues
15 surrounding meal kits and food delivery practices
16 through guidance development and policy changes to the
17 food code.

18 This includes working within the Conference
19 for Food Protection on its e-commerce committee
20 developing guidance for direct to consumer and third-
21 party delivery services and guidance for mail order
22 food companies. With FSIS, FDA developed a meal kit

1 video and infographics for consumers. Throughout this
2 process, we learned that the biggest challenges faced
3 by stakeholders are around regulatory scope.

4 Stakeholders want to understand the regulatory
5 framework and their role in it, as well as liability
6 issues and who has the ultimate responsibility for the
7 food delivered direct to consumers.

8 E-commerce of foods continues to grow and
9 evolve as domestic and foreign companies increasingly
10 use e-commerce sales platforms such as websites and
11 mobile applications to sell food products and arrange
12 delivery to consumers. We all felt the impact on the
13 industry during the coronavirus pandemic. Consumers
14 accelerated the utilization of e-commerce to make food
15 purchases amidst the coronavirus restrictions. Our
16 work has evolved and it is involved identifying and
17 learning more about the production and delivery of
18 human and animal food sold throughout e-commerce,
19 understanding the food safety vulnerabilities,
20 developing educational and outreach tools to combat
21 the vulnerabilities, working with the Conference for
22 Food Protection on its committee developing guidelines

1 for home delivery of food, and determining whether
2 they existing regulatory structure provides adequate
3 protection for consumers.

4 In reflecting on the foundational work
5 already accomplished, we realized we need to focus
6 efforts on emerging mechanisms and online platforms
7 for food delivery and how to protect foods from
8 contamination as e-commerce business models expand to
9 meet the needs of modern consumers.

10 With our refreshed focus on technology and
11 data, we're seeking feedback on how to use technology
12 to monitor and gather data on food safety risks
13 related to food sales through e-commerce and to better
14 understand the supply chain and explore ways to
15 improve our understanding of retail food e-commerce
16 trends with enhanced technology. Also, we're seeking
17 feedback regarding how to clearly define the
18 regulatory framework for e-commerce and gather data in
19 partnership with stakeholders to assess the extent to
20 which the existing domestic and international
21 frameworks operate to regulate food safety online.

22 We will also continue to work with the

1 Conference for Food Protection on identifying best
2 practices and existing guidance that pertains to e-
3 commerce shopping at retail. We will also work with
4 them on developing a comprehensive guidance document
5 for retail food establishments with best practices
6 specific to e-commerce food shopping to ensure general
7 food code recommendations are followed.

8 These recommendations would include; proper
9 handling during the shopping process to ensure
10 adequate time temperature control and prevent cross-
11 contamination, construction and equipment requirements
12 for areas where shopped products are held, procedures
13 to address the items that were shopped but not picked
14 up by the consumer, and any other concerns that may
15 arise during the guidance development.

16 As we move from new business model to
17 discussing retail food safety modernization, it's
18 important to recognize that retail food protection is
19 an integrated partnership program. FDA cannot
20 modernize retail food safety alone. We rely on strong
21 partnerships with stakeholders, including our state,
22 local, tribal and territorial colleagues, the

1 Conference for Food Protection, the industry, academia
2 and professional associations. Equally important is
3 having good communication and strategic alignment.
4 FDA has established deliberate, targeted partnerships
5 in retail food protection. There are specific
6 objectives and alignment with retail food regulatory
7 associations and targeted efforts with CDC and
8 industry to put research into action to provide tools
9 for regulators and industry.

10 As part of Healthy People 2030, we're
11 working towards reducing the burden of norovirus, the
12 leading cause of foodborne illness in retail. One
13 important avenue FDA is working toward addressing
14 norovirus is through the AFDO norovirus workgroup.
15 We're currently focused on employee health.

16 My team created a National Food Code
17 adoption strategy that is completed by a toolkit
18 designed by the association collaborative for use by
19 state, local, tribal and territorial regulatory
20 agencies to realize food code adoption in their
21 jurisdictions. Retail associations have built on this
22 effort, and I encourage you to think about how you can

1 build on the work I'm sharing today.

2 FDA requests that the CFP establish a
3 conference for food protection food safety management
4 systems committee to engage with stakeholders.

5 Industry really needs to lead this effort to take us
6 to the next level in building tools for small
7 operators who have limited resources. They are
8 beginning to build a toolkit, which will include
9 templates and examples on topics such as employee
10 health, and my hope is that these efforts will align
11 with the AFDO Healthy People norovirus group where
12 they are employee health-focused.

13 We have expanded our communication methods
14 and sharing of information, including six podcasts and
15 webinars ranging in topics from FDA food code adoption
16 to the behavioral science of retail food safety hosted
17 by groups such as Food Safety Magazine. All of
18 these things can be easily found on the FDA New Era
19 Smarter Food Safety website on the activity page.

20 In the area of expanding resources, the FDA
21 retail food flexible funding model has dispersed over
22 \$22 million in a three-year period to over 500

1 regulatory jurisdictions for development, capacity
2 building, mentorship and other special projects
3 supporting the retail program standards. We have also
4 awarded funding to regulatory associations to work
5 with federal partners to collaboratively advance
6 retail food initiatives to try to reduce foodborne
7 illness.

8 FDA and CDC developed five strategic action
9 plans, or roadmaps, that address key areas to improve
10 retail food safety. These objectives align with the
11 FDA retail food program's strategic plan and the
12 retail collaborative's objectives. Our goal is full
13 and complete adoption of the latest code nationally.

14 This is the biggest complaint we get from
15 industry. Different code requirements depending on
16 the version of the code the state has adopted. The
17 roadmaps includes: developing a strategy to support
18 national food code adoption. This requires an
19 environmental scan, defining states' current code and
20 anything unique in the state regulation, barriers for
21 adoption, tools and support to address the barriers
22 and then targeting states, including strategies to

1 move the needle.

2 Increasing the use of risk-based inspections
3 and intervention strategies. This start with
4 agreement on what risk-based inspections mean and what
5 it looks like, ensuring implementation and putting in
6 place interventions and measuring their effectiveness.

7 Increased use of FDA's voluntary national
8 retail food regulatory program standards. The
9 standards are a quality continuous improvement
10 framework for retail food safety regulatory programs.
11 These standards exist for manufactured program, feed
12 programs, eggs and they're being developed for
13 produce.

14 Improving foodborne outbreak investigation
15 methods. We're starting with environmental assessment
16 resources where we will centralize those, conduct a
17 gap analysis, do course assessments, make development
18 and the implementation of tools for the field.

19 We will increase the number of restaurants
20 and other retail food establishments with well-
21 developed food safety management systems that use
22 active managerial control. FDA will be supporting the

1 CFP committee.

2 These strategic action plans provide a
3 roadmap to align various projects, leveraging the
4 strengths of each agency and group, and avoiding
5 duplication of effort. Work in these areas includes
6 FDA's internal workgroup activities, the Retail
7 Regulatory Associations collaborative project, the CDC
8 and FDA MOU activities, DFP's initiatives and the New
9 Era for Smarter Food Safety work, and currently the
10 association collaborative is reviewing these roadmaps
11 and providing feedback.

12 The Retail Regulatory Association
13 collaborative brings together representatives from
14 seven member organizations with a role of improving
15 retail food safety in the United States. FDA and CDC
16 are members of this group. We leverage our combined
17 strengths and resources to create and share tools and
18 resources for food safety programs so they can use
19 these to improve their food safety in their
20 jurisdictions.

21 The collaborative's six objectives are
22 poised to influence or benefit regulatory food

1 programs and the food safety culture within regulatory
2 jurisdictions and at restaurants and other retail
3 establishments.

4 Pictured here are many leaders within the
5 collaborative. And this is a meeting where the FDA's
6 deputy commissioner for food, Jim Jones, met with
7 them. This was a 20-year vision of many to bring
8 retail food safety regulatory associations together to
9 target the reduction of foodborne illness risk factors
10 in the industry.

11 The group has made a commitment to work
12 together without funding. We have had the
13 opportunity most recently to fund the work of our
14 objective, and that has exponentially moved our
15 collective work forward.

16 In addition to the association
17 collaborative, we are also actively working with these
18 groups on the screen to advance retail food safety
19 initiatives. The Conference for Food Protection
20 committees, the CFP has multiple committees that are
21 progressing the work of New Era. This includes the
22 previously mentioned food safety management system and

1 the e-commerce committee, as well as committees on
2 food safety culture at retail. These groups include
3 stakeholders from industry, regulatory, academia, as
4 well as FDA and CDC.

5 I am very excited about a project the CFP is
6 leading. It's a research project focused on enhancing
7 food safety and quality through digital systems and
8 advanced technologies. Industry collects a lot of
9 information in this arena. Some examples include
10 health department, their inspectional data, third-
11 party audit data that could have significant value for
12 predictive modeling. This has real potential.

13 The CFP is conducting a literature review
14 examining the use of predictive modeling to enhance
15 food safety, including behaviors and practices in the
16 food industry. Focus groups will be convened to
17 explore participants' experiences with data
18 digitization and digital transformation. They will
19 also discuss and explore the utilization of various
20 technologies, artificial intelligence, augmented
21 reality and machine learning to evaluate food safety
22 and quality standards.

1 The AFDO Healthy People 2030 norovirus
2 Group. This workgroup focuses on putting research
3 into action in the prevention of norovirus
4 contamination of food and services in retail settings.
5 Activities will include identifying best practices,
6 vulnerabilities, mitigation and prevention strategies,
7 potential public health measures and identifying
8 barriers at retail food establishments that will
9 decrease the presence and spread of norovirus,
10 including tool to help prevent employees from coming
11 to work sick.

12 FDA and CDC signed an MOU to formalize the
13 partnership between the agencies for the purpose of
14 focusing on combined efforts on reducing foodborne
15 illness in retail and food service establishments.
16 The goal is to create practical, operational tools
17 that are demonstrated effective through research in
18 preventing foodborne illness.

19 In order to modernize retail food safety, it
20 would be beneficial to have a national benchmark. We
21 know some of the strengths that our national retail
22 food safety systems have, but do stakeholders believe

1 it would be helpful to have an independent body
2 conduct a review of the retail food safety system in
3 this country and how FDA supports it? Would you find
4 this data valuable, with the idea to ensure FDA is
5 targeting and prioritizing the support needed for our
6 primary customers who are state, local, tribes and
7 territory jurisdictions?

8 The FDA retail program standards provide a
9 framework on which retail food protection programs can
10 access how they stack up against nine standards. They
11 can identify gaps through this process and they can be
12 addressed and their accomplishments get national
13 recognition on our website. As you see on this map,
14 these pockets of coverage are fairly vast, with 969
15 jurisdictions currently enrolled as of December 2023.

16 While this seems like a large number, it's
17 still far from the 2,500-plus jurisdictions that
18 regulate retail food in this country. A national
19 study on retail food safety would help determine if
20 there are potential weaknesses and further ways we can
21 assist those jurisdictions that are not part of retail
22 program standards, as well as better helping FDA

1 target and prioritize work to improve retail food
2 safety.

3 Regarding retail food safety modernization,
4 as we look to the future, we would like to explore
5 with stakeholders how to leverage technological
6 advances in food safety and data we collect in retail
7 food space to advance the food safety and to prevent
8 foodborne illness. Further advance the importance of
9 facility and equipment design as preventive controls
10 for retail food safety management, and particularly
11 encouraging the development and use of commercial
12 smart kitchen equipment capable of automatically
13 monitoring temperature and temperature processes.

14 Exploring and encouraging the use of new
15 training technologies to better reach the vast network
16 of retail food protection stakeholders. Encouraging
17 and exploring the use of new digital tools and
18 incentives that prompt desired behavior, such as
19 handwashing and managing manual temperature
20 monitoring. Evaluating and analyzing new and existing
21 retail food safety data sources, and encourage the
22 sharing between stakeholders.

1 Retail food protection is a team sport and
2 all of us here today want to protect the food supply.
3 It is an all these areas that we look forward to
4 hearing your feedback from you today and in the
5 docket. Thank you.

6 MS. FINNEGAN: Thank you for that
7 informative presentation, Laurie. Our last presenter
8 before we move on to the public comment session is
9 Chris Waldrop, a co-lead for Core Element 4. Chris
10 will be presenting updates about food safety culture.

11 CORE ELEMENT 4: FOOD SAFETY CULTURE

12 MR. WALDROP: Hi. My name is Chris Waldrop.
13 I'm a senior health scientist in the Center for Food
14 Safety and Applied Nutrition, and I'm also one of the
15 co-leads for our work on food safety culture here at
16 FDA.

17 Today I'd like to talk briefly about the
18 work we've done regarding food safety culture here at
19 FDA. We included food safety culture as part of our
20 New Era of Smarter Food Safety because we recognize
21 that in order to make dramatic improvements in
22 reducing the burden of foodborne disease, we need to

1 do more to influence what employees think about food
2 safety and how they show a commitment to this goal in
3 their everyday work.

4 Food safety is the result of individual and
5 collective behaviors, and behaviors stem from
6 attitudes, perceptions, beliefs and values of both
7 individuals and organizations. We wanted to better
8 understand how those attitudes, perceptions and
9 behaviors can be harnessed to improve food safety and
10 we wanted to support efforts to make food safety a
11 social norm across the food industry.

12 There are three key areas we have focused on
13 in our work for food safety culture. First is to
14 promote food safety culture throughout the food
15 system. We know that more and more companies are
16 working to develop and enhance a culture of food
17 safety throughout their companies and in their
18 facilities, and we want to support those efforts.

19 We also want to help promote best practices
20 and examples of effective food safety cultures across
21 the food supply, and we want to encourage other
22 companies who may not yet have embarked on a food

1 safety culture journey to begin taking steps to do so.

2 Second, we wanted to promote food safety
3 cultures throughout FDA. We want to explore
4 internally our own culture of food safety within the
5 agency, and we want to lead by example and learn from
6 our own journey so we can better support food safety
7 culture across the food supply.

8 Third, we wanted to develop and promote a
9 smarter food safety consumer education campaign.
10 While we often think about food safety culture in the
11 context of companies and people producing our food, we
12 also know that consumers have a role to play in food
13 safety as well. We wanted to look at how we could
14 better communicate with consumers about food safety
15 and to do so using new digital tools, and we wanted to
16 see if there were lessons from the work the food
17 industry is doing on food safety culture that we could
18 apply to our engagement with consumers to help
19 influence their behavior when they're handling food in
20 their homes.

21 I want to mention three accomplishments that
22 we have done over the last few years. First, we

1 conducted a systematic literature review of the
2 scientific literature on food safety culture. This
3 helped ground us in the science of food safety culture
4 and the work that's already been done. We learned
5 that there's general consensus in the literature on
6 how to define food safety culture, and we also learned
7 that there is general agreement in the literature on
8 the determinants of a strong and effective food safety
9 culture. We posted our literature review on our
10 website so you can examine these findings more deeply
11 if you'd like.

12 We also learned there are a few gaps and
13 areas we might want to explore further. First, more
14 research is needed to assess the validity of
15 assessment tools across different organizational
16 settings, and we also learned that more research is
17 needed to quantitatively demonstrate the connection
18 between food safety culture and food safety outcomes,
19 and I'll talk a little bit more about that in just a
20 minute.

21 Second, we developed a training course for
22 our investigators and other FDA staff. This was an

1 introductory course really designed to expose FDA
2 staff to the concepts of food safety culture. The
3 course looked at a number of different issues,
4 including how you identify whether a firm has a good
5 food safety culture and how to know the
6 difference between a food safety program and a food
7 safety culture.

8 Now this wasn't designed as a course so our
9 investigators could begin inspecting a firm for a food
10 safety culture; rather, the course serves as a food
11 safety culture 101 so we could begin socializing the
12 idea within FDA. We trained over 1,200 FDA staff in
13 both our human and animal foods programs and the
14 course is now available to our federal, state, local,
15 tribal and territorial partners as well.

16 And third, we organized a webinar series
17 with the Alliance to Stop Foodborne Illness.
18 Hopefully many of you all were able to participate in
19 at least some of the webinars we held over the past
20 three years. This was really an opportunity for us to
21 be able to collaborate with our stakeholders in both
22 the food industry and the public interest community.

1 We wanted to elevate best practices, learn from some
2 of the leaders in food safety culture and hear
3 directly from our audience about the questions they
4 had and the issues they were grappling with and wanted
5 to hear more. In total, we had nearly 23,000 people
6 register across the ten webinars we've conducted.

7 We explored a range of issues such as how to
8 build a coalition of food safety culture champions
9 across your organization. We talked about the
10 importance of measuring food safety culture and
11 provided some ways that you might be able to do it.
12 We talked about storytelling and the importance that
13 can play in shaping and reinforcing messages and
14 inspiring employees, and we talked about how food
15 safety culture and food safety management systems work
16 together to improve food safety. And because people
17 learn in different ways, we've also been posting white
18 papers after each webinar that summarizes the content
19 and highlights the key points of what was talked about
20 in that webinar. These are all downloadable from
21 FDA's website.

22 Our final webinar will be broadcast live

1 from the Food Safety Summit on May 9th, which will be
2 both a virtual and a live event. We'll be looking at
3 everything we've learned about food safety culture
4 over the course of our webinar series as well as
5 getting some fresh perspectives and new ideas. So we
6 hope you'll be able to join us for that last final
7 webinar.

8 In closing, I wanted to mention one area
9 where we think new data could really help inform our
10 work on food safety culture, and that is the linkage
11 between food safety culture and food safety
12 performance and to what extent a strong, mature food
13 safety culture is predictive of food safety outcomes.

14 We're pretty confident that a mature food
15 safety culture leads to positive food safety outcomes.
16 But what data can we rely on to demonstrate that in a
17 quantitative way? Are there ways we can look at data
18 from the food industry that's maybe anonymized or
19 disaggregated and use machine learning and AI to
20 explore that correlation between food safety and
21 culture maturity? With enough data, what insights can
22 we learn about the development of food safety

1 measures? How can we better understand the drivers
2 for food safety and food safety culture performance?

3 So that's an area we'd like to explore
4 further, and we would really welcome your thoughts on
5 that as well as other ways that data and technology
6 can support our work on food safety culture. We'd
7 also of course love your input on how best FDA can
8 continue to support and foster industry efforts in
9 this space.

10 So thank you for your engagement over the
11 past years on food safety culture. We've learned a
12 lot. We hope others have as well, and we look forward
13 to continuing our food safety culture journey
14 together. Thank you very much.

15 MS. FINNEGAN: Thank you, Chris. We will
16 now take a break for lunch and when we return, we will
17 begin our public comment session.

18 (Break)

19 MR. KAWCZYNSKI: All right. Good afternoon.
20 We'll get started here shortly. So I welcome everyone
21 to our "Data and Technology in the New Era of Smarter
22 Food Safety" webinar. Again, we're just going to come

1 back from break, and we'll get started roughly in
2 about a minute or so.

3 All right. Good afternoon, and welcome back
4 from that break. I'm Mike Kawczynski, and this is the
5 "Data and Technology in the New Era of Smarter Food
6 Safety" webinar. At this time, I'd like to hand it
7 off to my co-host, Lauren Finnegan. Lauren, if you're
8 ready, take it away.

9 PANELIST INTRODUCTION

10 MS. FINNEGAN: Thank you, Michael. I hope
11 you all had a great break. Now we'll get into our
12 afternoon session, which will consist of comments from
13 members of the public, followed by responses by our
14 group of panelists. Before we hear from our public
15 commentators, I'd like to introduce our panel members.
16 From Core Element 1, we have Adam Friedlander. From
17 Core Element 2, we have Mark Moorman, Ruth Timme and
18 Vinetta Howard, and from Core Element 3, we have
19 Laurie Farmer and Glenda Lewis.

20 And now we'll hear from our public
21 commentators. Just a quick reminder before we get
22 started, that the views expressed today don't

1 necessarily represent the views of FDA. First up we
2 have Celina To.

3 MR. KAWCZYNSKI: Good afternoon, everybody.
4 First we'd like to please introduce each one of our
5 panel members. So let's go around with Core Element
6 1. Adam, would you please introduce yourself and tell
7 us what element you're managing?

8 MR. FRIEDLANDER: Hi. Thanks, Mike. And
9 thank you, Lauren, as well. My name is Adam
10 Friedlander. I'm a policy analyst in FDA's
11 coordinated outbreak response and evaluation network,
12 also known as CORE. I'm also the co-lead for New Era
13 of Smarter Food Safety Core Element 1, which is the
14 tech-enabled traceability initiative, and I co-lead
15 that core element we're Captain Kari Irvin, who is,
16 CORE's deputy director. And I'm very happy that you
17 all are here today. And I'm looking forward to your
18 comments. Thank you.

19 MR. KAWCZYNSKI: I'm going to hand it back
20 to Lauren, who can go around and introduce each one
21 and allow them to give their opening remarks.

22 Lauren, you want to take it away?

1 MS. FINNEGAN: Yeah. So, Mark, would you
2 like to introduce yourself?

3 DR. MOORMAN: I'd be happy to. My name is
4 Mark Moorman. I'm the director of the Office of Food
5 Safety. I've been with the Food and Drug
6 Administration for five years, prior to that in the
7 private sector. I have the privilege of leading the
8 Office of Food Safety, where our team spends a lot of
9 time thinking about when outbreaks happen, how do we
10 prevent them? What are those levers of prevention
11 that that we pull in that space of post response?
12 within that, we do a lot of work on policy, research
13 supporting our subject matter experts, support the
14 Office of Compliance. And very importantly for today,
15 I have the privilege of calling Core Element 2 with
16 Vinetta. So, thank you so much for taking the time to
17 be with us today. And look forward to hear from you.

18 MS. FINNEGAN: Thanks, Mark. Ruth, would
19 you like to begin?

20 DR. TIMME: Yeah, sure. I'm really happy to
21 be here today. My name is Ruth Timme. I'm a research
22 microbiologist at the FDA within the Office of

1 Regulatory Science and I've been with the FDA going on
2 13 years now. And for most of that time, I've been
3 really actively involved in FDA's initiative to use
4 genomics for foodborne pathogen surveillance. We call
5 this the GenomeTrakr program. And I'm the lead for
6 that program. And within New Era, that program, the
7 GenomeTrakr contributes to Critical Element Number 2,
8 along with Mark Moorman. Thanks.

9 MS. FINNEGAN: Thanks, Ruth. Vinetta?

10 MS. HOWARD-KING: Hi, everyone. My name is
11 Vinetta Howard-King. I am the director of the Office
12 of Human and Animal Food East in FDA's Office of
13 Regulatory Affairs, where I have executive oversight
14 over inspections and investigations, sample
15 collections and, for a while longer, compliance and
16 enforcement activities, foreign and domestic. I'm
17 also, as Mark mentioned, the co-lead for New Era of
18 Smarter Food Safety Core Element 2. Specifically, I
19 lead Elements 2.3, domestic mutual reliance, 2.4,
20 inspection, training and compliance tools and 2.6,
21 recall modernization.

22 MS. FINNEGAN: Thanks, Vinetta. Laurie?

1 MS. FARMER: Hi. So glad to be here. So
2 I'm Laurie Farmer. I'm the director of the Office of
3 State Cooperative Programs, and this team of subject
4 matter experts work in the field in the areas of
5 retail food protection, mollusk and shellfish,
6 sanitation and Grade A milk safety. And I'm just so
7 glad to be here. I co-chair the Core Element 3 with
8 Andreas Keller. And I work very closely with Glenda
9 Lewis, who is here today. So, looking forward to hearing
10 from you. Thank you.

11 MS. FINNEGAN: And Glenda?

12 MS. LEWIS: Good afternoon, everyone, or good
13 morning. So happy to be here today. I am the
14 director for the retail food protection staff in
15 CFSAN's Office of Food Safety, and I've been at FDA
16 since 1996 in the retail program and I currently have
17 responsibility for oversight of the retail policy
18 component at FDA, and I work with a fantastic group of
19 staff on a team developing national retail food policy
20 and interstate travel program policy.

21 I co-lead the New Era 3.1 core element on e-
22 commerce with Andreas Keller. So happy to hear from

1 everyone today. Thank you.

2 PUBLIC COMMENT

3 MS. FINNEGAN: Great. Thanks, Glenda, and
4 thank you all for being here today. Now we'll go
5 switch over to our public commentators, and we have
6 Celina To first.

7 MS. TO: Thank you. Good afternoon. Thank
8 you for this opportunity to provide feedback
9 specifically, to align with the continued New Era work
10 and WGS and ways to monitor and gather data. Oxford
11 Nanopore Technologies has created greater access for
12 labs to bring genomics and health due to capital
13 free, scalable and real-time devices with end-to-end
14 workflows like No-MISS, nanopore-only microbial
15 isolate sequencing.

16 These simpler workflows can accelerate the
17 implementation of GenomeTrakr across 50 states and
18 internationally, similar to ongoing efforts with CDC
19 PulseNet. Also, access to EPI2ME, a point and click
20 solution with optional use of smaller robotics like
21 TurBOT can potentially integrate Galaxy Tracker and
22 FDA BAM pipelines, similar to our integration of 602

1 for salmonella serotyping. The intent is to
2 streamline training of technicians, especially during
3 a staff turnover.

4 This type of technology can become useful
5 when responding to emerging pathogens like Cyclospora.
6 Similarly, if we were to face another Cronobacter
7 outbreak, we would be prepared with the ability of
8 this technology to further shorten root cause analysis
9 and response time. The real-time capability is
10 pivotal not just for the FDA, but for all stakeholders
11 in food safety.

12 I also hope the FDA will consider developing
13 and validating quasimetagenomics, metabarcoding or
14 targeted panel approach to update FDA BAM as a cost
15 and time saving strategy and screening and
16 confirmation. These tests can better align with
17 private sector and current operations and may allow
18 easier sharing of data anonymously by creating a safe
19 haven through similar setup like the Food Industry
20 Intelligence Network with Creme Global. Such a
21 collaborative environment would improve our ability to
22 predict an event day, build trust to encourage sharing

1 of WGS data, and exchange effective corrective actions
2 ahead of FDA sampling assignment and before an
3 outbreak occurs.

4 Thank you for considering these initiatives.
5 I look forward to seeing the FDA lead in these
6 innovative areas, setting a global standard for food
7 safety and public health preparedness.

8 MS. FINNEGAN: Thank you, Celina. Now up
9 next, we have John Bailey.

10 MR. BAILEY: Thank you, everyone. My name
11 is John Bailey. I'm the executive director of Top 10
12 Produce LLC located in Salinas, California. We have
13 growers in 25 states who utilize our low cost
14 traceability system currently. For the past 14
15 years, we've been assigning globally unique GS1 global
16 location numbers, commonly known as GLNs, to uniquely
17 identify each of our growers nationwide.

18 Our growers use their global location
19 numbers, which we have assigned to them, as the
20 traceability lot code source reference. It is our
21 position that this current ongoing practice is in
22 compliance with the Food Safety Modernization Act 204

1 final rule. There are currently just under 2 million
2 farms nationwide who are looking for clear and direct
3 answers related to FSMA, the Food Safety Modernization
4 Act.

5 So the most significant action the FDA could
6 undertake to enable our independent growers to enhance
7 traceability across the global supply chain would be
8 for the FDA to confirm that the use of these unique
9 GLNs as a traceability lot code source reference is in
10 compliance with the FSMA 204 final rule. Thank you.

11 MS. FINNEGAN: Thank you, John. We
12 appreciate those remarks. Next up we have Alexander
13 Kashef.

14 MR. KASHEF: First, I would like to really
15 thank FDA for this opportunity and also share my
16 excitement and passion from New Era. My name is
17 Alexander Kashef. I live in Los Angeles next to UCLA.
18 I'm the owner and the president of the Food Safety and
19 Geospatial Data Analysis Training Institute. It is
20 basically two institutes all together. Now, in terms
21 of my educational background, my degree is geology,
22 astrogeology, environmental science, microbial

1 ecology.

2 And I also want to share with you, the first
3 time I heard about HACCP was in the class of -- was
4 astrogeology. That changed my whole life. So this is
5 my beginnings in terms of getting involved in HACCP.
6 I'm also a GIS specialist. I generally believe that
7 if it is not mapped, it is not done. So, I'm
8 basically, involved in mapping and teaching mapping in
9 addition to being a (indiscernible) specialist.

10 I'm also lead instructor for 22 HACCP and
11 FSMA classes. I teach human food, PCQI for human
12 food, PCQI for animal food, for produce, imported food
13 and food defense. I also have established and written
14 for six different classes for the New Era. In
15 addition to six New Era HACCP class that I teach
16 already, and it's pretty much popular and also teach
17 FSMA classes, but also teach another 11 HACCP classes
18 that pretty much are regulated by FDA. Meat, poultry,
19 package, dietary supplement. So pretty much whatever
20 is regulated by FDA, my institute is teaching them.

21 So I would like to concentrate on the six
22 classes that I'm teaching and what basically I'm

1 learning from the business, the industry and the
2 academia in terms of New Era.

3 Since New Era came, I pretty much spend most
4 of my time developing class for New Era. I strongly
5 believe that the New Era is a whole new paradigm that
6 is going to change everything. But my focus is this,
7 basically using DNA fingerprinting, spectral
8 fingerprinting and geospatial data collaboratively
9 bringing them all to handheld devices.

10 So the issues that I cover in all these
11 classes are artificial intelligence. I would love to
12 share with you the six classes that I teach related to
13 food safety era. The number one is how to write a
14 HACCP plan to this class for traceability. So I
15 really go in detail talking about Section 204 and how
16 to write them with the addition or how to map
17 everything. If is not mapped, it is not done. I
18 strongly believe that we have to introduce geospatial
19 data, when 70 percent of the data has a geospatial
20 component. Bring them to all aspects of food safety.
21 So I introduce that to traceability class.

22 Now I also have developed four courses for

1 Core Number 2, and these are the following four
2 courses. I'll just talk about number two. Number
3 one, two-day class for the application of artificial
4 intelligence into food safety. So basically upon
5 completion of this class, pretty much everybody knows
6 what is AI and how it is used in food safety, all the
7 way from farm to table.

8 The second course related to the second core
9 is basically called food safety omics. it's the only
10 course on Earth that basically bring the whole issue
11 of omics, genomics, proteomics and transcriptomics,
12 other genomics, and teach them how to apply them in
13 food safety to this class for basically using all
14 kinds of omics in terms of in food safety.

15 And the third class is basically -- it
16 started eight, nine years ago. In Europe, there's an
17 consortium called Food Smartphone, and the address is
18 www.foodsmartphone.eu. They give PhD in how to use a
19 smartphone in food safety and with food quality. I
20 have been following what they have been doing. But I
21 have my own approach using NASA information and USGS
22 and other a spectral databases. It's very crucial to

1 really bring --

2 MR. KAWCZYNSKI: Please wrap it up.

3 MR. KASHEF: -- signature in food safety.

4 And the last one is basically food safety
5 modernization, food retail modernization. Do I have
6 any more time?

7 MS. FINNEGAN: No. That's it.

8 MR. KAWCZYNSKI: No.

9 MS. FINNEGAN: Thank you, Alexander. We
10 appreciate it.

11 MR. KASHEF: Thank you so much.

12 MS. FINNEGAN: Next up we have Jim White.

13 MR. WHITE: Hello, everyone. My name is,
14 Jim White. I'm president of ENSESO4Food. The FDA's
15 FSMA 204 regulation requires traceability for specific
16 foods. This means tracking them from farm to fork.
17 ENSESO4Food is here to help companies comply by
18 creating a system of traceability lot codes. These
19 codes are essential for the FDA to quickly investigate
20 outbreaks.

21 Primary source data collection from farms
22 and fishing enterprises will be the first big

1 challenge. Cost effectively capturing source
2 traceability lot codes has become one of our passions.
3 We're experts in traceability. We won the FDA's low
4 cost food traceability challenge and have experience
5 managing billions of transactions globally.

6 ENSESO4Food recognizes the importance of a diverse
7 traceability ecosystem and is committed to working
8 with other solution providers.

9 Our Trakkey system is one such solution
10 proven to support complex traceability needs. Trakkey
11 already manages billions of transactions in Europe and
12 around the world for both tobacco and pharmaceutical
13 serialization. Collaboration is key to success.

14 ENSESO4Food is a strong supporter of standards like
15 GS1 for standardization and interoperability. But
16 true success requires collaboration beyond just
17 standards. That's why we invite other technology
18 vendors to call us to discuss how our systems can work
19 together to seamlessly share data across the supply
20 chain.

21 ENSESO4Food's solutions are designed for
22 ease of use. We offer smartphone apps with

1 multilingual capability, ensuring a familiar and
2 comfortable experience for everyone involved. But
3 user friendliness goes beyond the interface. Our
4 solutions can enforce and automate workflows,
5 minimizing errors in manual data entry. They also
6 integrate with existing systems like accounting
7 systems, warehouse management systems, ERPs and MRPs.
8 This eliminates the need for duplicate data entry and
9 streamlines existing operations.

10 ENSESO4Food understands the challenges of a
11 small farm. We are piloting a solution to get source
12 traceability lot codes into the system easily and cost
13 effectively. This pilot includes offering our device
14 as a service, or DaaS model, as an option. DaaS can
15 simplify adoption for farmers and fishing operations
16 that are still transitioning to digital tools. It
17 provides a bundled solution with hardware, software
18 and support at an affordable monthly cost.

19 FSMA 204 is a starting point. ENSESO4Food's
20 solutions go beyond just compliance. For example, we
21 offer IoT sensors to monitor the cold chain.
22 Traceability solutions also provide valuable data for

1 recordkeeping related to GAP or planting strategies.
2 These tools can empower small businesses to improve
3 their operational efficiency and productivity today.
4 While predictive analytics, machine learning and AI
5 hold exciting opportunities, the foundation for a
6 robust food safety system rests on high quality source
7 traceability data.

8 Accurate data allows for faster outbreak
9 identification and targeted interventions minimizing
10 risks and protecting consumers. ENSES04Food is
11 committed to a safer, more efficient and transparent
12 food system. We believe that FSMA 204 is a catalyst
13 for positive change. We are here to help businesses
14 of all sizes thrive in this New Era of Food Safety.
15 Thank you for your time.

16 MS. FINNEGAN: Thank you, Jim. Next up, we
17 have Dr. Marcia Lee Herzberg.

18 DR. LEE: Hello. First of all, I'd like to
19 say thank you for allowing me to be here and speak,
20 looking at this data and technology in the New Era. I
21 find it to be very exciting. I am a former regulator
22 myself, having worked in the retail food segment,

1 manufactured food segment and also having worked in
2 the public sector and working as an adjunct professor
3 for Northeastern University for their master's program
4 in regulatory affairs for food.

5 What I'd like to speak about is the data
6 systems that have been spoken about previously. And
7 I'd like to speak about it in regards and in relation
8 to the retail food program. I did a study,
9 "Inspection, Laws, Risk Factors and Foodborne
10 Illness," and an important question that I posed was
11 how the current regulatory system could uphold its
12 responsibility to the public, enforcing the law and
13 food safety without adequate funding, with an
14 increasing number of food establishments, insufficient
15 numbers of food inspectors, budget constraints for
16 regulatory agencies and a pandemic of foodborne
17 illness, particularly relating to the food segment,
18 often managed by small county or small town boards of
19 health responsible for the majority of foodborne
20 illness and the only segment of the food system not in
21 the Code of Federal Regulation, the CFR, whose
22 regulations are voluntarily adopted from the FDA,

1 Model Food Code, which changes every four years.

2 They are supported by the FDA's retail food
3 program, which provides tremendous tools and
4 tremendous resources. But somehow there's a gap and I
5 know that's one of the things that Laurie mentioned,
6 that they're looking to try to find a way and assess
7 how to best address that task that they have.

8 My data demonstrated frequency of
9 inspections, had a high negative correlation
10 relationship with foodborne illnesses, frequency of
11 inspection increases or decreases, foodborne illness
12 will travel in the opposite direction. Every year
13 that the frequency of inspection rose in subject
14 cities, the per capita foodborne illness rate
15 decreased, and in the years where the frequency of
16 inspection was stagnant, the foodborne illness rates
17 were relatively unchanged.

18 Frequency of inspection and high risk
19 factors had a high positive correlation relationship.
20 The more frequent the inspections, the higher the
21 incidence of high-risk factors was noted. Risk
22 factors are used to reduce foodborne illness. They

1 are a preventive control.

2 By correcting these critical items, if
3 properly reported, an establishment can theoretically
4 prevent foodborne illness, and the high-risk factors
5 had a high negative correlation with foodborne illness
6 in the years that foodborne illness decreased,
7 demonstrating its functions as a preventative control,
8 the preventative control it is meant to be.

9 Risk factors were coded by assigned values
10 by state law and under a common numbering system. It
11 was designed to see if the food law changed the
12 assignment of the risk factors. The coded controlled
13 law and assigned law risk factors did demonstrate
14 a significant difference of means in each year of the
15 study, establishing that food law does influence risk
16 factor assignment, demonstrating the need for a
17 similar or the same standardized food code to be used
18 throughout the country.

19 One of the leading drivers to the success of
20 this study was the ability to access research material
21 through databases. It took a tremendous amount of
22 time and analysis. But from this study, I concluded

1 the retail food system would benefit from a study on a
2 viable national electronic inspection platform, an
3 information database system accessible across all
4 states by multiple agencies and all retail food
5 programs nationally.

6 The sharing of information in real time is
7 key to identifying factors that can mitigate risk of
8 foodborne illness effects, not only at the local
9 level, but nationally. And it's through data sharing
10 that we can create a dynamic food safety system that
11 can impact foodborne illness, necessary policy change,
12 and make the most of scarce resources in the public
13 health sector. If we can create --

14 MR. KAWCZYNSKI: That's time.

15 DR. LEE: Okay. Well --

16 MR. KAWCZYNSKI: Just go ahead and wrap --
17 you have a few minutes. Wrap it up, and then stay on,
18 please.

19 DR. LEE: Okay. So, I just wanted to state
20 that good policy is always driven by good data and
21 that this aligns with the harmonization of
22 traceability again through data. And we can use the

1 same type of system to do tracebacks and trace
2 forwards and to align with what we find in the retail
3 food system. Thank you.

4 MS. FINNEGAN: Thank you, Doctor. Next up,
5 we have Sharmeen Khan.

6 MS. KHAN: Good afternoon. My name is
7 Sharmeen Khan, and I am the chief strategy officer of
8 OpsSmart Global. We are also one of the winners of
9 the tech-enabled traceability challenge that was
10 referenced earlier. We at OpsSmart believe that the
11 FDA must stop looking at food safety through a topic-
12 based vision and start looking at it from a broader
13 spectrum.

14 It will require us to combine tech-enabled
15 traceability, predictive analytics and data sharing,
16 ambient IoTs. As said earlier, we must think
17 strategically and big. What I mean by that is that
18 the most significant and overarching focus should be
19 on interoperability. Until we move away from silo-
20 based data systems, we will never be fully able to
21 flex the muscle of data.

22 All companies, big or small, have some sort

1 of data in some sort of format. However, their
2 inability to share that data within their own
3 organizations and with their partners handicaps them,
4 the FDA and the public.

5 My first recommendation is that as the FDA
6 continues to harmonize the critical tracking events
7 and key data elements, the FDA also needs to
8 harmonize how data is shared. If you look at the
9 seafood industry as an example, organizations such as
10 Global Dialog of Seafood Traceability, MSC, AFC, et
11 cetera, got together and devised one method of
12 electronic data exchange. They created a system to
13 authorize technology providers to implement that
14 methodology of electronic data exchange. The FDA must
15 investigate finding a similar path in order to create
16 a unified path forward so there are standardized tools
17 for gathering and sharing data from industry to
18 government and the public.

19 My second recommendation is that the first
20 steps taken by the FDA in FSMA 204 have been a game
21 changer, but they are not enough. Telling people or
22 the industry that they need electronic sortable

1 spreadsheets, then saying that they don't have to have
2 a digital method of collecting their data, it's
3 sending the industry a very confusing message that
4 will hurt them in the long run. I believe the FDA
5 needs to speak more clearly as to what is
6 technologically expected of food growers and
7 processors. We need the FDA to possibly find a method
8 of subsidizing access to simple data collecting
9 methodologies, such as Microsoft Word or Excel, Google
10 Sheets or Docs, something. Let's make it easier for
11 the food industry to meet FDA's requirements by
12 becoming digitized.

13 Lastly, to answer Adam's questions, all of
14 which were fabulous, is what other areas can tech-
15 enabled traceability create value? My answer is
16 sustainability. If we can trace products, how they're
17 grown, where they're grown, how they're grown, we can
18 also capture the amount of waste, how product is
19 reutilized, how soil and water is reused, what type of
20 packaging we're using. By collecting how much we
21 reuse, how much we waste, we improve a company's
22 sustainability posture, but we also improve our

1 national carbon footprint.

2 In conclusion, it is important to remember
3 that we are a global food system and a product can
4 exchange multiple hands before it ends up on our
5 shelves. So adopting a data exchange-centric or
6 interoperability-centric approach to food safety
7 enhances visibility across the supply chain, which
8 translates to a safer food system. Thank you so much.

9 MS. FINNEGAN: Thank you, Sharmeen. So just
10 a general reminder to all of our public commentators,
11 please stay on the line so our panel, if they have any
12 questions for follow up, they can contact you again.
13 Next up, we have Tom Ragsdale.

14 MR. RAGSDALE: Hello everyone. I'm Tom
15 Ragsdale, I'm an app developer living here and in
16 Henderson, Nevada. Now, last year I worked for a
17 small company here in the Las Vegas area that sells
18 Vegas-themed candy to a number of stores, mostly in
19 casinos on the Strip. Their tracking paperwork was
20 entered into a ledger by hand, both incoming and
21 outgoing product.

22 And after I left the company, I happened to

1 cross the FDA requirements that go into effect, I
2 guess, next January. And at first I started working
3 on an app customized for the candy company, but then
4 realized there are probably a lot of other mom and pop
5 shops, as well as larger companies that would benefit
6 from a more generic app that would meet the FDA law
7 tracking and reporting requirements.

8 The app's nearing completion. It's fully
9 menu driven and has four sections. I call it Lot
10 Number Tracker. The first section, it allows the user
11 to enter products, multiple ingredient products,
12 manufacturers and suppliers of those products and
13 customers that they send the product to. And then
14 there's a section to be able to edit all that in case
15 they make mistakes.

16 There's a section to input tracking data for
17 both incoming and outgoing products. And then,
18 there's a section allowing the printing of reports.
19 In the event of a recall of a particular product or an
20 ingredient in a product, with one click reports can be
21 generated, all incoming product and any products that
22 have been distributed to customers containing the

1 ingredient with the suspect lot number, one report for
2 each customer that has received any of the product in
3 question.

4 At this time, the reports are in a PDF
5 format and not Excel format, but Excel can import from
6 PDF files. I've done it this way because text files
7 are more susceptible to accidental corruption. The
8 app will be available on Apple products, Android
9 products and Windows products and could in the future
10 be available on servers.

11 Again, my name is Tom Ragsdale. I can be
12 reached at tomragsdale@cox.net, and my mobile phone
13 number is 702-704-9497. That's 702-704-9497 or
14 tomragsdale@cox.net. Thank you for your time.

15 MS. FINNEGAN: Thank you, Tom. Next up, we
16 have Mara Burr.

17 MS. BURR: Thank you very much. I
18 appreciate the opportunity. My name is Mara Burr.
19 I'm the vice president for clinical affairs at
20 Consumer Brands Association, and I appreciate the FDA
21 providing this opportunity to speak on the data and
22 technology in the New Era of Smarter Food Safety.

1 The Consumer Brands Association champions
2 the industry whose products Americans depend on every
3 day, representing nearly 2,000 iconic brands, from
4 household and personal care products to food and
5 beverage products to consumer packaged goods
6 (indiscernible) industry plays a vital role in
7 powering the U.S. economy, contributing \$2 trillion to
8 the U.S. GDP and supporting more than 20 million
9 American jobs.

10 We appreciate the FDA's blueprint for the
11 future of a New Era of Smarter Food Safety, and the
12 opportunity to provide input on how data, innovation
13 and technology are utilized to produce better food
14 safety outcomes. Each of the core elements require a
15 strong, transparent and inclusive FDA that is
16 delivering on its mission as the lead food safety
17 regulatory agency in the United States.

18 Our members innovate on traceability,
19 safety, nutrition, sustainability and other
20 information to address consumer preferences. We
21 created the Facts up Front program in collaboration
22 with FDA, providing transparent information through

1 front of pack labeling so consumers can make informed
2 choices about the products they purchase. Although
3 this is not a technology, it is an innovation. And
4 with respect to technology and data specifically,
5 industry leaders from manufacturers and retailers came
6 together to create SmartLabel, a transparency tool
7 that has become the standard for sharing product
8 information beyond what is on the label.

9 SmartLabel currently has over 1,000 brands
10 and over 100,000 products, all participating
11 voluntarily. Consumers can gain access to ingredient
12 definitions, context run allergen statements,
13 nutrition resources, safe handling instructions and
14 more, all with just a simple QR code scan. More
15 recently, it was employed to facilitate recall
16 notifications to consumers at the tail end of 2023 and
17 into early 2024. Hundreds of thousands of consumers
18 benefited from SmartLabel.

19 The private sector will continue to innovate
20 to improve food safety and increase transparency, and
21 we would urge FDA to continue working with the
22 industry to encourage and incentivize innovation. FDA

1 should continue to incentivize the creation of
2 technological tools, including artificial intelligence
3 to address food safety issues, increase predictive
4 tools and allow for recall communication technology
5 that is implementable for companies and is accessible
6 to consumers.

7 We all have a role to play in fostering,
8 supporting and strengthening a food safety culture.
9 But at the center is a strong FDA playing a leading
10 role in enforcing its core mission of food safety.
11 State and local governments, private sector partners
12 and consumers are looking for leadership from the FDA
13 and for it to be a collaborative partner to develop
14 data and technological innovations to support the New
15 Era of Smarter Food Safety. Thank you very much.

16 MS. FINNEGAN: Thank you, Mara. Next up, we

17 --

18 MS. BARR: Thank you.

19 MS. FINNEGAN: -- Katy Jones.

20 MS. JONES: Yes, thank you so much. Thank
21 you for the opportunity to speak today. My name is
22 Katy Jones, and I am the CEO of Trustwell, a nutrition

1 analysis, food labeling, traceability and recall
2 software company. I speak before you today not just
3 as the CEO of a food technology company, but as a
4 mother whose child's life can be threatened by
5 something as simple as a snack.

6 My son's severe tree nut allergy not only
7 has reshaped our family's life, but has also
8 galvanized my dedication to ensuring the safety of
9 every item of food that reaches the consumer's hands.
10 At Trustwell, we recognize that technology and data
11 standards are not just tools for business efficiency
12 or regulatory compliance. They are vital lifelines
13 that can protect consumers and enhance the integrity
14 of our food supply chain.

15 As everyone here knows, each year millions
16 are affected by foodborne illnesses and one of the key
17 areas preventing these incidents is traceability.
18 With precise tracking, we can swiftly identify and
19 address the source of contamination or mislabeled
20 product, potentially saving lives. Technology plays a
21 key part in this process, ensuring that in the event
22 of a recall, we can quickly isolate the affected

1 products.

2 And as has been mentioned, it's also
3 critical that we think about traceability technology
4 beyond food safety as well. There are tremendous
5 opportunities to leverage this data in other areas of
6 the business for sustainability, real-time inventory
7 management, supplier scorecarding, just to name a few.
8 Data standards like GS1, the GTIN and the
9 (indiscernible) that have been mentioned are the
10 foundation that makes this possible.

11 Standardizing data across the industry
12 ensures that every stakeholder across the supply chain
13 speaks the same language, making the process of
14 tracing products not just possible, but seamless.
15 This uniformity also allows for the interoperability
16 of systems. We've had many software providers here
17 today. We all want to work together to have better
18 traceability in the supply chain from those small
19 farmers to large retailers.

20 The work we do at Trustwell, in partnership
21 with our customers, is driven by the belief that
22 technology can and should create a safer and more

1 transparent food industry. We are dedicated to
2 developing and implementing systems that ensure
3 traceability, compliance and quality across the supply
4 chain. And with that goal of turning this belief into
5 reality, our offerings across tech solutions,
6 training, training and services represent our mission
7 to change the food industry for the better.

8 Whether tracing and tracking with our
9 product, FoodLogiQ, or creating accurate and consumer-
10 focused nutrition labels with Genesis Foods, our
11 software gives companies the tools they need to adhere
12 to FDA regulations. We work with some of the best
13 food companies in the world who stand with us as
14 leaders and innovators, ready to go beyond compliance
15 to remain always ahead, tech-connected and focused on
16 safe food for all. In fact, we have tracked nearly
17 200 million critical tracking events, or CTEs, already
18 around the world to date.

19 In closing, I urge the FDA to continue its
20 commitment to advancing tech-enabled traceability
21 through the execution of FSMA 204 and emphasizing
22 recall technology as well in the food industry.

1 Together, we have the power to protect our nation's
2 health and well-being, ensuring that no one has to
3 face the unthinkable because of what's unknowingly in
4 their food. Thank you again for the time, your
5 attention and your commitment to the safety of our
6 food.

7 MS. FINNEGAN: Thank you, Katy. Next in the
8 lineup, we have Neil Wieselmann

9 MR. WIESELMAN: Hi. My name's Neil
10 Wieselmann. I am the director of infection prevention
11 for Intercon Chemical in St. Louis. And everybody's
12 been having really great points and traceability and
13 education and new technology are all really important.
14 But the one thing that most people aren't talking
15 about is hand hygiene. And the fact that alcohol-
16 based hand sanitizers do not have norovirus efficacy.

17 Most people I talked to are unaware of the
18 fact that they don't have norovirus efficacy with
19 their hand hygiene programs. And if everybody is
20 aware, norovirus is the leading cause of foodborne
21 outbreaks. So we have a hand hygiene program that
22 doesn't kill the leading cause of foodborne outbreaks.

1 And it's been this way for years.

2 My company manufactures alcohol-based hand
3 sanitizers, and we're going around trying to alert as
4 many people as possible about the lack of efficacy so
5 that they're aware of that at least. And until COVID,
6 it was a major concern. Of course, COVID put
7 everything into the backseat. So this actually made
8 things worse because during COVID, first of all,
9 norovirus is a non-enveloped virus where COVID, which
10 was caused by SARS-CoV-2 is an envelope virus.

11 And actually alcohol hand sanitizers do have
12 envelope viral efficacy like SARS. But they do not
13 kill non-envelope viral organisms like norovirus. So
14 during COVID, the CDC correctly was pushing alcohol
15 hand sanitizer use and their recommendation increased
16 the usage of alcohol hand sanitizers exponentially.
17 And it's caused the dependance on alcohol hand
18 sanitizers. And now that we're somewhat out of COVID
19 and we're somewhat normal, everybody's dependent on
20 alcohol hand sanitizers because for one, they're
21 convenient and, two, the CDC pushed them like
22 constantly, which was great for our business and they

1 actually worked for that.

2 But now the only thing that the CDC is
3 saying right now, if you go and look at their
4 norovirus prevention page, it says hand sanitizer does
5 not work well against norovirus. It's not a
6 substitute for washing your hands with warm -- with
7 soap and water, which is great except for the fact
8 that it doesn't really come out and say hand sanitizer
9 does not kill norovirus, period.

10 I mean, except for the fact that I hate to
11 use someone's name, but he was quoted in an article,
12 Dr. Aron Hall, the former chief of viral
13 gastroenterology for the CDC, actually was quoted in
14 an article in Forbes last year saying alcohol gels
15 won't kill the virus. Even if you were to use so much
16 hand sanitizer on your hands that you felt like you
17 were wearing hand sanitizer mittens, the live virus
18 could still remain on your hands.

19 And that's the thing is, the CDC is not
20 doing their job in making sure that everybody is aware
21 of the problem, and the only thing they're telling
22 people to do is wash your hands, which is great. And

1 hand washing is a very important aspect of hand
2 hygiene. But hand washing doesn't kill norovirus.

3 You can remove it if you use the proper
4 technique, but that's according to the USDA that's
5 done less than 50 percent of the time. So if you've
6 got a sick employee who has norovirus, or if you have
7 contaminated food that comes in with the norovirus or
8 if you have a customer coming into your food service
9 place with norovirus and they start touching things,
10 anyone that were to touch anything they touched is
11 going to start spreading around norovirus and their
12 hand hygiene isn't going to kill it.

13 So we have a major problem here with hand
14 hygiene not killing norovirus is being the leading
15 cause of foodborne outbreaks. And on top of that,
16 alcohol-based hand sanitizers also can dissolve the
17 lipid layer of your skin, which causes dermal damage,
18 which causes the lipid barrier of your skin to no
19 longer function properly, which allows --

20 MR. KAWCZYNSKI: Time --

21 MR. WIESELMAN: -- organisms into -- okay,
22 I'll finish up -- which allows organisms to --

1 actually like norovirus actually to contaminate you
2 easier. So something needs to be done. The UK and
3 Europe use hypochlorous acid for hand hygiene and for
4 surface hygiene. And so we need to follow what the UK
5 and Europe do and switch everything to hypochlorous
6 acid. But we need to make sure you use one that is
7 safe for your hands, because some of them are not.
8 There's a lot more to this, but apparently my time's
9 up. So I'd be more than happy to continue on if
10 anybody would like me to point out a few more things.
11 So thank you.

12 MS. FINNEGAN: Thank you, Neil. Next up, we
13 have Julie McGill.

14 MS. MCGILL: Thank you, and good afternoon.
15 My name is Julie McGill, and I'm the vice president of
16 supply chain strategy and insights at Trustwell. At
17 Trustwell, we provide food companies with a connected
18 platform managing food formulation, nutrition
19 labeling, supplier compliance, traceability and recall
20 management. And I thank you for the opportunity to
21 provide comments today.

22 So I'd like to address a few questions for

1 consideration that were included in today's event
2 material. First, what are the greatest challenges to
3 creating a more digital, traceable global food supply?
4 And how can the FDA and stakeholders work together to
5 approach this in a manner that creates shared value
6 for all participants?

7 So first I'd like to point out, change is
8 hard, right? It just is. However, many companies
9 don't realize that they do collect most of the
10 information they need today for food safety and
11 traceability recordkeeping. It may be in multiple
12 systems that aren't connected. It might be on paper,
13 but that data is available and we look to the FDA to
14 continue organizing virtual meetings like this one,
15 but also to provide other educational opportunities to
16 engage all stakeholders.

17 Next, we need solutions for all. Industry
18 partners are often surprised that solution providers
19 do offer food safety solutions for companies of all
20 sizes. To enable the industry, we must meet companies
21 where they are but continue to educate on new tools
22 and technologies. Today, many companies are using

1 tools such as RFID, IoT, API or might have a robust
2 (indiscernible) but others are using barcodes to scan,
3 maybe mobile apps or spreadsheet upload to share
4 information.

5 What we want to recognize is that when we
6 level the playing field, all companies can benefit,
7 and value can be found in many areas, such as
8 inventory management and freshness. And we've seen
9 this in action with companies' timesheets and lot data
10 information to their slotting systems. This allows
11 them to move from FEFO, first expired, first out for
12 their produce items, which provided better shelf life
13 to the distributor and fresher products for their
14 customers and consumers. But it also help reduce
15 waste for both parties.

16 And with the advent of new technologies such
17 as ambient IoT, we can seamlessly capture information
18 beyond traceability data such as temperature and
19 humidity, which can adversely affect produce items and
20 other products as they move across supply chain.
21 Helping companies to achieve accurate and precise lot
22 level traceability is a reality today, and with new

1 technologies, we will continue to see improvements in
2 read rate, data accuracy and enable connectivity with
3 more systems than ever before.

4 Looking ahead, we need to pilot these
5 solutions and much of the pilot work today has been
6 focused on data capture, and we need the FDA's help to
7 conduct more pilots that are focused on data exchange.
8 GS1 US, IoT, GDSG, they also have helped traceability
9 pilots to demonstrate how using standards can help
10 achieve interoperability across diverse tracing
11 systems that leverages blockchain and cloud
12 technologies. More pilots such as these are needed
13 with various stakeholders solutions and product
14 scenarios. And with the FDA's direction and
15 partnership, we can get these pilots underway.

16 So I'll wrap up with technology, which is,
17 as we know, outpacing industry, and the time is now to
18 engage and demonstrate how we can enable digital food
19 safety and traceability, adding value for all industry
20 stakeholders. Thank you.

21 MS. FINNEGAN: Thank you, Julie. Stepping
22 up to the spotlight next is Erik Lieberman.

1 MR. LIEBERMAN: Hello. Can you hear me?

2 MS. FINNEGAN: Yes, we can hear you. Go
3 ahead.

4 MR. LIEBERMAN: Okay, great. Okay, great.
5 I'm Erik Lieberman, president of U.S. Food Imports.
6 I'd like to thank FDA today for the opportunity to
7 speak and hosting this meeting and just generally
8 thanking the agency for really fostering public
9 participation in all of these FSMA rulemaking. So
10 I've been involved with them since the beginning, you
11 know, over ten years ago.

12 So we are a company that provides food
13 regulatory compliance software and services. We have
14 a platform that's called FSMA Cloud, which is utilized
15 by supermarket chains, wholesalers, manufacturers and
16 trading companies for compliance with FSMA
17 regulations. We built a module for compliance with
18 Section 204 with the aim of automating compliance to
19 the greatest extent possible and minimizing burdens on
20 food industry firms.

21 I'm going to address today some of the
22 questions that the agency had posed to the public as

1 topics for consideration, starting with the tech-
2 enabled traceability, Number 2, how can FDA promote
3 collaboration and information sharing between tech
4 providers and food supply chain entities to support
5 low or no cost traceability?

6 I'd just caution the agency there's no such
7 thing as a no cost traceability solution. And many of
8 these costs get passed down the supply chain,
9 ultimately to consumers. Given the high cost of food,
10 minimizing compliance costs should be a top
11 consideration for FDA as it continues to work to
12 implement Section 204.

13 What are the greatest challenges in creating
14 a more digital and traceable food supply chain, and
15 where can FDA help? I would say FDA support of a
16 global standard and recognition of it is critical and
17 I envision this much the way that FDA did with certain
18 GFSI schemes, in the context of the produce safety
19 rule and the preventive controls for human food rule.
20 FDA recognized certain GFSI schemes as being aligned
21 with those, and that -- those regulations, and that
22 gives industry confidence that they can rely on those

1 schemes for purposes of supporting compliance with FDA
2 requirements.

3 And we want to invest as a -- you know, as a
4 provider of compliance solutions, we want to invest
5 and develop standards that support FDA's mission of
6 strengthening food safety throughout the supply chain.
7 We want to create a system that helps FDA do its job.
8 So I think, you know, making sure that the
9 expectations of the agency on what records need to be
10 kept and how they should be provided to the agency or
11 perhaps, you know, the agency's preferences and
12 getting that data, that should be absolutely made
13 clear so we can start working on that now as opposed
14 to reacting after, you know, this regulation starts
15 getting enforced.

16 Beyond food safety, where can tech-enabled
17 traceability create value? Absolutely in prevention
18 of food fraud. We've just seen the U.S. Department of
19 Agriculture put into place the strengthening organic
20 enforcement regulation, went into effect last month
21 and it requires traceability. So industry efforts on
22 traceability would support compliance with this rule

1 and efforts to combat food fraud. There was recently
2 a report that FDA released, I believe, about, sampling
3 imported honey and now 10 percent of imported honey
4 was found to be adulterated for economic purposes.
5 So, you know, traceability can go a long way in
6 combating those food fraud issues.

7 Now, obstacles on sharing data with the
8 agency, of course, ensuring confidentiality,
9 protecting data from FOIA requests. And what kind of
10 incentives can FDA give for sharing data? Fewer
11 inspections is a consideration for businesses that
12 share data voluntarily. Also, reduced penalties is
13 something the agency should consider if a firm is
14 found in violation. And also, a safe harbor for
15 sharing data in certain circumstances.

16 How should FDA share data with industry and
17 technology providers? I can tell you from a software
18 developers perspective, API is very helpful. And that
19 would be our preference. In terms of e-commerce,
20 obviously that's a that's a growing area. It's an
21 area that regulations are working to catch up with and
22 obviously FDA is contemplating that by posing these

1 questions to the public. One of the challenges with
2 e-commerce is that we have lots of -- from the import
3 side is we have a lot of small value shipments that
4 fall under the de minimis standards for importation.
5 It's section -- they're coming in under a Type 86
6 entry, Section 321. FDA doesn't get all the data that
7 they would for a shipment with larger value.

8 But, you know, these consolidated shipments
9 are very important for entrepreneurs that are using
10 the third-party fulfillment services. So, you know,
11 it would be requiring food to be sent in larger
12 quantities would certainly pose challenges for a
13 number of importers. But, you know, FDA could look at
14 requiring importers to keep more data that FDA could
15 audit at a later time. That would be, you know,
16 something that they could consider.

17 Ambiguity in e-commerce. What are the
18 responsibilities of third-party fulfillment providers?
19 That's something that the courts --

20 MR. KAWCZYNSKI: Time.

21 MR. LIEBERMAN: Okay. Can I -- should I
22 finish this one thing?

1 MR. KAWCZYNSKI: Yeah. Finish your thought.

2 MR. LIEBERMAN: So yeah, the courts, that's
3 one thing the courts are grappling with now. They
4 don't own, import or sell the product, but they are
5 providing a way for entrepreneurs to get the product
6 into, you know, the U.S. marketplace. And they're
7 very important for small businesses. So I would just
8 urge the agency to allow these platforms to continue
9 to innovate because it's very important for small
10 businesses in selling food products in the United
11 States. Thank you.

12 MS. FINNEGAN: Thank you, Eric. And
13 finally, our last public commentator of the day is
14 Steven Mandernach.

15 MR. MANDERNACH: Thank you to Deputy
16 Commissioner Jones and the FDA for holding this public
17 meeting. The Association of Food and Drug Official,
18 or AFDO, is a regulatory organization that connects
19 food and medical product safety stakeholders and
20 impacts the regulatory environment by shaping sound
21 science-based rules, laws and regulations, and sharing
22 best practices that protect public health. Founded in

1 1896, AFDO is an international professional
2 organization consisting of state, federal and local
3 regulatory officials as members. AFDO and its members
4 were among the early advocates working with Dr. Harvey
5 Wiley for the adoption of the nation's first food
6 safety laws, including the Pure Food and Drug Act in
7 1906.

8 Today we'll focus on four topics: data,
9 recall food safety, traceability and recalls, and
10 public-private partnerships. First, we at AFDO have
11 been very engaged in data work, which currently we
12 support over 25 state agencies and their regulatory
13 data systems. We have also been bringing together
14 larger data sets, including a retail inspections
15 database of about 900,000 inspections from nine
16 states.

17 We then use this data to look at improving
18 inspection outcomes and improving inspections overall.
19 We have partnered with another group of states to
20 bring together a similar (indiscernible) in the
21 manufactured food space. Lastly, we are currently
22 building the system for agriculture, food, health, e-

1 inspections and registration, or SAFHER, a regulatory
2 data system for states and local governments with
3 financial support from FDA and states. We are
4 beginning to understand the data available and use it
5 to improve regulatory programs. We have far more we
6 can accomplish using this data.

7 In retail food safety, the second area, much
8 of the work that is in retail food safety has been
9 funded and supported partially through the FDA Retail
10 Food Safety Regulatory Association Collaborative.

11 This first of its kind program partners FDA, CDC,
12 AFDO, ASTHO, CFP, NACCHO and NEHA to set programmatic
13 goals and develop action plan today, leveraging the
14 each group's strength and focusing all on the same
15 objectives: reducing foodborne illness, implementing
16 risk based inspections, assisting and promoting food
17 code adoption and implementing program standards.

18 This small amount of FDA funding is essential in
19 accelerating this work in retail food safety, the area
20 with the greatest opportunity to reduce foodborne
21 illness and bend the illness curve.

22 We also believe a comprehensive review of

1 the retail food safety program is needed. We believe
2 this review is fundamental for the retail food safety
3 (indiscernible) to be timely and to keep up with the
4 innovation of industry. This review must engage all
5 stakeholders and help ensure that we have an FDA
6 retail food safety program that meets the needs and
7 the current needs of industry, state and local
8 regulators and the American consumers.

9 With traceability and recalls, we strongly
10 support a traceability rule, but also recognize some
11 challenges of the rule and its implementation.
12 Currently, there is a lack of clear enforcement
13 strategy and implementation strategy with restaurants
14 and grocery stores, nearly all of which fall under
15 federal food safety regulation for the first time with
16 traceability. We urge the FDA to work more
17 proactively with these areas that will be new to
18 federal regulation and the state and local agencies
19 that typically regulate them.

20 We also urge FDA to be open and flexible
21 with the rule to these unique industry segment
22 challenges. No one is favorably impacted if the rule

1 goes into effect in portions cannot be successfully
2 implemented. Further, we hope FDA can move toward
3 using and coalescing around current industry best
4 practices such as the GS1 standard, which is widely
5 adopted and used with all products and barcodes.

6 We see enormous opportunity for FDA to
7 modernize and embrace technology and improve
8 communication with recalls. In September 2023, FDA
9 had a public meeting on recalls, and it was clear
10 there was a desire to modernize food recalls through
11 both technology and improved communication to
12 consumers based on good risk communication practices.
13 We hope the FDA human food program continues to
14 prioritize this effort. We continue to observe
15 ineffective recalls resulting in unnecessary illnesses
16 and exposures, including in the most -- in the recent
17 applesauce recall.

18 Lastly, we continue to work on public-
19 private partnerships in bringing together all areas of
20 the human food program. We see a game-changing
21 opportunity to work with industry to jointly use
22 shared data to improve regulatory outcomes and more

1 efficiently use regulatory resources.

2 Some very practical methods could be sharing
3 regulatory inspections, third-party audit information,
4 and industry and regulatory samples for use by both
5 industry and regulatory agencies. We also see ways to
6 improve access to regulatory information to consumers.
7 The technology exists. The challenge today relates to
8 trust and willingness to embrace change.

9 Together, we do believe FDA, state and local
10 governments and industry can use data to improve
11 regulatory and food safety outcomes. We would urge
12 FDA and state and local regulatory agencies to promote
13 and allow this safe space and to move forward to a New
14 Era of Food Safety that is focusing on preventing
15 foodborne illness and improving outcomes, and less on
16 building a case for compliance and enforcement. Thank
17 you for the opportunity to comment today on behalf of
18 the boots on the ground state and local regulatory
19 programs.

20 PANEL DISCUSSION

21 MS. FINNEGAN: Thank you, Steve. And before
22 we bring the panel back to respond to those, I just

1 wanted to thank all of our speakers today for offering
2 your thoughts and ideas. So now we will have our
3 panel respond to those comments. Adam, we'll start
4 off with you first.

5 MR. FRIEDLANDER: Hi. Well, I'm Adam
6 Friedlander. I'm the co-lead for Core Element 1,
7 tech-enabled traceability. And I also just want to
8 echo Lauren's comments and thank everyone for
9 providing their expertise, their feedback. And I
10 really enjoyed listening to everyone's comments today.
11 And I certainly encourage people to respond in writing
12 to the docket questions as well.

13 There were many common themes that I heard
14 around tech-enabled traceability. And I just want to
15 just go a little bit into some of the common themes
16 that I wrote down today. There is an incredible
17 amount of effort being put into complying with the
18 traceability rule. And although I cannot comment on
19 FDA's compliance efforts about the rule, we heard
20 themes about going above and beyond the rule's
21 requirements to improve traceability, and how there
22 were other themes that can improve food traceability

1 that extends beyond food safety, such as improving
2 sustainability efforts, reducing food waste,
3 preventing food fraud, and just to name a few. And I
4 really appreciated those insights.

5 There were also conversations about how FDA
6 can continue to support the harmonization of data
7 that's used for traceability and the importance of
8 interoperability, and I certainly agree that FDA can
9 continue to support those industry-led efforts and to
10 help everyone speak that same food traceability
11 language.

12 We also heard about some of the challenges
13 that are currently present in today's food
14 traceability system. And one comment mentioned that
15 there is data that is currently available to advance
16 food traceability today, but it may be in separate IT
17 systems. And I found that fascinating.

18 So although I can't comment on the rule, I
19 just want to point people towards the FSMA technical
20 assistance network on FDA's website if they have any
21 specific questions about the food traceability rule
22 and our compliance efforts. I certainly encourage

1 people to ask those questions, so you can get an
2 official response. And I encourage people to be as
3 specific as you can in those questions so that way you
4 can get the best response that that you can get.

5 So with that, I just again wanted to thank
6 everyone for providing the comments today. And I'll
7 turn it to my colleagues over at Core Element 2.
8 Thank you.

9 MS. FINNEGAN: Thank you, Adam. Mark, would
10 you like to begin?

11 DR. MOORMAN: I am more than happy to. Yes.
12 I heard some interesting things that were brought up
13 that I'll comment on first. One of the speakers
14 mentioned WGS expansion and the -- I think you get a
15 flavor from the FDA, we're very interested in the
16 expansion of that technology. You know, we all have a
17 lot to learn about these strains and attribution and
18 very importantly, ecology of these strains. So a lot
19 of shared ground between what the first person on the
20 group spoke to and the FDA.

21 One of the other things that was said I
22 captured was, how the FDA can encourage, incentivize,

1 incentivize data sharing. And, you know, certainly we
2 can do sessions like we're doing today to encourage
3 it. But the word incentivize is a very interesting
4 word. And I think it's an important one. And I'll
5 talk this out, as we've spent a lot of time thinking
6 about this topic.

7 You know, if you if you read the Reagan-
8 Udall report on the FDA, they acknowledged there's a
9 lot of work being done in the agency and we've all
10 determined that one of the things we have to do a
11 better job of is identifying and discerning \$5
12 problems from five cent problems. My words, not the
13 FDA's. And it's true, if everything's a priority,
14 nothing's a priority. And one of the incentives to
15 think about in this space, I'll reflect on this, is
16 that if we can work with those that have data to
17 better understand hazards and to characterize those
18 hazards, the more that we can be informed as to what
19 we think are the \$5 problems and what are not.

20 A good example of this is what is being done
21 with our toxic elements group and close to zero.
22 We've clearly signaled a desire to have groups provide

1 us with data so that we can better understand what
2 levels can be achieved. So that's the second thing
3 that that jumped out at me.

4 And then the third I think is a really
5 important question that we should all struggle with,
6 which is what are the greatest challenges to
7 digitization? And I'll reflect on that, that, you
8 know, when our group started thinking a lot about
9 data, data trusts and building those, of course we
10 spent a lot of time thinking about the first part of
11 that, data. But I've come around to realizing that a
12 very important point that we don't talk enough about
13 is trust.

14 There's a there's a great quote I heard a
15 long time ago that progress in life happens at the
16 speed of trust. And there is a reticence to share
17 data. And I think we've got to find a way to build
18 trust and to talk about how we can do that better,
19 both across the stakeholders and even with the FDA.
20 So I would submit trust is an important one that we
21 have to spend time thinking about and what can be done
22 to build that trust.

1 And then number two, I think we need good
2 stories to tell, you know, where have we had some wins
3 in data sharing? I just think that that's a really
4 important one, if we can. You know, one of the things
5 I like a lot about the traceability challenges is it
6 showed some good examples of where traceability could
7 be done. And it doesn't have to cost \$30 million in
8 capital. There are some simple tools that are out
9 there. And I think of those as good stories to tell.
10 And I think in the data sharing, data trust,
11 predictive analytics space, we all need to do a better
12 job of telling stories and what works. So my
13 thoughts. Over to Ruth or Vinetta. Thank you.

14 MS. FINNEGAN: Thanks, Mark. Ruth, you're
15 up next.

16
17 DR. TIMME: Yeah. Thanks for all the
18 comments. I really enjoyed listening to all the
19 different perspectives as well (indiscernible) food
20 safety. I wanted to first mention the commenter who
21 talked about pathogen and genomic surveillance, Celina
22 To, and just respond specifically to her inquiry on
23 the validation of new technologies such as Oxford

1 Nanopore.

2 And I just -- I want to assure both Celina
3 and the general public that GenomeTrakr is committed
4 to really thorough testing of all new technologies and
5 chemistries, including OIT and we really prioritize
6 the accuracy and reliability in our methods. We've
7 been fairly stable over the past decade. But as new
8 technologies come up, we evaluate them intensively.
9 We work alongside our other U.S. agency partners to
10 ensure that new data types that are generated for
11 public health response are validated and can be
12 seamlessly integrated. They're all interoperable,
13 right, with our huge, large historical databases of
14 genomic data for testing. So, thank you for bringing
15 up that important topic (indiscernible).

16 There were a couple other questions that
17 were that were submitted asking -- surrounding
18 GenomeTrakr, and I thought I'd chat about the one
19 about how important it is to make data public, since
20 Mark talked about it so eloquently. One of the
21 biggest strengths of our GenomeTrakr program, and its
22 database, is that we make all the whole genome

1 sequence data public immediately after the data are
2 collected. And this really benefits all the
3 stakeholders collaborating to create a safer food
4 system in the U.S., including industry, and this kind
5 of transparency allows industry to independently
6 monitor this public database, these pathogen genomes
7 coming in every day for signals. And they can respond
8 to those signals without any direct communication with
9 the FDA.

10 And so this strength of really standard
11 data, really current data being publicly -- being made
12 publicly available to stakeholders is really what I
13 think New Era is all about, and I think New Era can
14 even -- it's so important for GenomeTrakr in that our
15 missions really align perfectly (indiscernible) New
16 Era really has the capacity to potentially integrate
17 GenomeTrakr's genomic information with other digital
18 food system databases.

19 You've heard a lot of these today, including
20 the supply chain, tech-enable traceability. So as we
21 go into the future, you know, GenomeTrakr is well
22 integrated with these other efforts at the FDA for

1 digital data and improving (indiscernible) technology.
2 So with that, I will close my remarks and thank
3 everyone again for all the comments. I really enjoyed
4 it. Thank you.

5 MS. FINNEGAN: Thank you so much for those
6 thoughts, Ruth. Next, we'll move on to Vinetta.

7 MS. HOWARD-KING: Hi. Yeah. So, you know,
8 first I want to thank all of the FDA and industry
9 stakeholders who took the opportunity to join us today
10 for this extremely important public meeting. A
11 special thanks to those who provided comments today on
12 how FDA can work with our stakeholders to leverage
13 data and technology.

14 I heard a few comments that sort of
15 resonated with me. The need to maybe look at some
16 handheld tools and other data innovation and
17 technology platforms to provide real-time recall
18 notifications to consumers. I would also be
19 interested in handheld tools for inspectional
20 purposes. So thank you for that. We definitely will
21 be looking into that more.

22 Like, Mark said, the need to incentivize has

1 really, you know, struck me, to incentivize data
2 sharing. Like, fewer inspections, I find this could
3 be a better way to manage everyone's very limited
4 resources, from the regulator side and industry side.
5 So it's really a topic that we need to look at
6 carefully.

7 And in order to really embrace data sharing,
8 I agree with Mark. I agree with Steve Mandernach.
9 There is a need for a trusted and safe place for all
10 involved. So that that's an area that we that we need
11 to work on, all of us, we need to work on. We can't
12 do this alone. No one can do this in a bottle.

13 I also wanted to take this opportunity to
14 address a few questions on data sharing that was
15 submitted prior to the public meeting. There was a
16 question regarding data connectivity with FDA's
17 reportable food registry. I want to mention that FDA
18 has been working on various projects to allow and
19 enhance connectivity with the RFR; for example,
20 activities to make RFR filings more user friendly. We
21 believe that enhanced data connectivity with FDA
22 databases would be in line with how we're looking at

1 leveraging existing data to advance food safety
2 outcomes. So that's one area.

3 There was also a question on how FDA is
4 going to work with -- I'm sorry, how FDA is going to
5 work with state level regulators to improve access to
6 and acceptance of new technology. So, I want to first
7 acknowledge the very important partnership that FDA
8 has with our state and public health regulators, our
9 state regulators and our public health partners. This
10 this can't be understated. We can't do this without
11 them.

12 And so our ability to work with our partners
13 is extremely important. So, one example of this
14 partnership is the work FDA is doing with the
15 Association of Food and Drug Officials, or AFDO, under
16 a cooperative agreement with AFDO is working --
17 there's work being done to update, as Steve mentioned,
18 the regulatory program management system for states
19 called SAFHER (System for Agriculture, Food, Health, E-
Inspections, and Registration).

20 This effort actually would allow for a
21 system-to-system integrated data sharing with our FDA
22 applications. So, I mean, these are just a few

1 examples of how FDA is actually working with our
2 stakeholders to leverage data and technology.

3 So again, thank you. I heard a lot of great
4 ideas. And we are actually taking this all in, and we
5 are also going to utilize this information with
6 information and comment that we got from the recall
7 public -- recall modernization public meeting. And so
8 you'll be hearing from us soon. Thank you.

9 MS. FINNEGAN: Thank you, Vinetta. And now
10 to start off for Core Element 3, Glenda Lewis.

11 MS. LEWIS: Hi everyone. I just really
12 enjoyed hearing so much of the comments that have come
13 in and been made. I'm like Vinetta. We're taking it
14 in. I heard about just, you know, that we want other
15 engagement opportunities and the virtual meetings and
16 great. And, and we actually had a question that came
17 in with registration around how are we going to
18 interact with industry stakeholders and continue to
19 modernize and prepare for food delivery. And I'm here
20 speaking on behalf of three, Core Element 3, industry
21 (indiscernible) space related to that e-commerce. And
22 in that area, we do plan further engagement together.

1 We've been working with regulatory partners,
2 industry partners, consumers and we just want to
3 continue that outreach. We really want to continue
4 the (indiscernible) protection on their guidance
5 document. And we just know the regulatory landscape
6 is of interest to that group, and it can be daunting.
7 And so lots of stakeholders have questions. What is
8 it like in my lane? What's your lane look like? How
9 do we drive this this car together?

10 So, as we further explore challenges and
11 barriers faced by regulatory partners, we want to
12 bring folks together. We want to bring them to the
13 table. We want to have a dialog, hear concerns, gain
14 ideas and really work together to address barriers as
15 we proceed. As we continue to do this, we know
16 (indiscernible) and education, and that's really going
17 to be the focus. We have to work together, as many of
18 my colleagues have already said, so that we can avoid
19 foodborne illnesses happening.

20 So we do anticipate and envision stakeholder
21 meetings, webinars for these dialogs and engaging in
22 different sessions with that. We have already

1 addressed some issues with consumers by providing
2 educational materials. We have fact sheets. We have
3 a video out and infographics around that and our focus
4 is going to be on that regulatory framework and
5 (indiscernible) and what data speaks (indiscernible)
6 as we close out, about what data pieces may be, could
7 be involved in that was the question.

8 But I also heard many comments around we
9 need to meet companies where they are, and that's what
10 we want to do in the 3.1 New Era space and to have
11 that level playing field. So, as we look at the
12 regulatory scope of e-commerce, we'll keep that in
13 mind. And I like the idea of raising the challenge to
14 the company so that we can move forward into the
15 future.

16 And I really found interesting the comment
17 by Marcia, Dr. Lee Herzberg. I'd like to hear more of
18 your study that you're doing. So we may reach back to
19 you on to learn more about your study.

20 And lastly, I guess I wanted to compliment
21 AFDO and its work with state partners and the work
22 that that we have been doing and the interest there

1 that they're capturing in terms of the data and
2 looking at the reporting, you said over 25 state
3 agencies (indiscernible).

4 I think all of that can help us strengthen
5 what the technological system will look like going
6 into the future in this New Era of Food Safety, the
7 idea of having someone else, having uniformity in the
8 system is what we need (indiscernible) and I think
9 that's key. And that will be key across all of the
10 core elements. So, I really appreciate the comments
11 today and looking forward to hearing more. And I'll
12 turn it over to Laurie. She's going to talk a little
13 bit more about the broader scope of retail food and
14 retail food (indiscernible). Laurie?

15 MS. FARMER: Great. Thanks, Glenda. I
16 appreciate that. So, I'm Laurie Farmer. Glad to see
17 all of you today. Thank you for taking the time to be
18 here. I know this is a long webinar and just so happy
19 that you're here. Happy for the engagement and want
20 to thank you for the comments.

21 You know, I heard an overall desire for
22 collaboration and a desire for a transparent food

1 system. And I especially appreciate Katy Jones
2 putting a face on food safety issues to really bring
3 it. You know, I wrote in the chat, oh, I got a chill.
4 This kind of storytelling, a way to communicate the
5 need for an organization's food safety culture is
6 critical for all of us. I just really appreciated
7 that.

8 And I really want to also thank the speaker
9 recognizing the leading cause of foodborne illness in
10 the retail industry is norovirus, and how we need to
11 take approaches to reduce foodborne illness in the
12 industry. I am co-leading with the CDC the AFDO
13 Healthy People Norovirus workgroup, and we are working
14 with regulators and industry to develop an employee
15 health toolkit to get employees not to come to work
16 sick.

17 I mean, this includes an employee health
18 assessment tool that is being piloted that can be used
19 by both regulators and industry. And we also look at
20 the use of sanitation and disinfectants on surfaces to
21 reduce the norovirus load, and we're doing that with
22 the lead of NoroCORE, Lee-Ann Jaykus, who is on this

1 team. So all of us who are familiar with foodborne
2 illness risk factors, we also know the great benefits
3 of handwashing, and other things that I've heard that
4 relate to the retail food safety sector for the Core
5 Element 3, which is, you know, one is retail is a team
6 sport.

7 This is something that we're going to have
8 to do together, we're going to do together and we
9 continue to do together with states, locals, tribes,
10 territories, industries and academia. Glenda talked
11 about the conference for food protection and that is
12 one place where we all come together. The recognition
13 for the heavy lift that state and local regulators
14 have in conducting retail food inspections and the
15 need to focus on risk factors and the relationships
16 with food laws and standardization.

17 And the point about policy is driven by good
18 data, so I really appreciated that from Dr. Marcia Lee
19 Herzberg. So thank you for that. And there is
20 already happening, and Vinetta pointed to this, the
21 electronic gathering of regulatory inspection
22 findings. This information can be used for

1 improvement of inspections and public health outcomes.
2 So, one of the questions that we received --- you were
3 able to, in your registration submit questions and
4 you'll also be able to ask questions in the docket
5 and provide additional information. So, I encourage
6 you to do that.

7 But one of the questions that came in was,
8 how can we address the diversity of data systems and
9 low data literacy across local food inspection
10 agencies? And wanted to make sure that you heard the
11 talking point that I actually also heard Steve
12 Mandernach talk about from AFDO, and he talked about a
13 pilot that FDA is funding around regulatory data
14 sharing, and it is the SAFHER system, S-A-F-H-E-R (System
for Agriculture, Food, Health, E-Inspections, and
Registration), and
15 this is an example of how data can be shared across
16 systems. And it's starting with a relatively small
17 number of jurisdictions. But it also includes not
18 only manufactured foods, but retail food safety. The
19 goal is to have all regulatory jurisdictions on a
20 interoperable platform where inspectional data is
21 transparent to regulators and holistic
22 interoperability of data systems was something that a

1 speaker touched on today from a broad perspective, and
2 that's a need.

3 The vision here is all regulatory
4 jurisdictions have access to the data. There is
5 reciprocal data from states and FDA. We are going to
6 be able to trend analysis. What could be done to
7 inform interventions such as training? You heard Mark
8 talking about trend analysis and how that's so
9 important with our learning for the future. FDA wants
10 to encourage progress on data sharing and improving
11 data literacy and technology use, while still meeting
12 jurisdictions wherever they currently are so nobody
13 gets left behind.

14 Other things that I've heard also are I
15 heard the ask for the agency to keep an item that was
16 in the original New Era blueprint, which is
17 prioritizing the comprehensive review of the national
18 retail food safety system in this country and how FDA
19 supports it. I heard the importance of, and the need
20 for the agency to continue to prioritize and support
21 the FDA retail food regulatory association, that it's
22 really a force. It's a force of four regulatory

1 associations, FDA and CDC working together towards
2 targeted objectives in the retail sector.

3 And again in the retail and restaurant food
4 sector, FDA does not have regulatory authority but
5 provides support to states and local jurisdictions. I
6 heard the concern for implementing the traceability
7 rule as it relates to any enforcement strategy and the
8 implementation with restaurants and grocery stores,
9 and I heard that Adam recognizes that as well.

10 So, I want to thank you for the time today,
11 for you coming, and I really am looking forward to
12 more engagement. This is the beginning of a lot of
13 conversation that is already been talked about today.
14 So I will, at this point, pass it back to Lauren.

15 CLOSING REMARKS

16 MS. FINNEGAN: Thank you, Laurie, for those
17 remarks. Now I'd like to open the floor to all of the
18 panelists for closing remarks. Adam, we'll start with
19 you.

20 MR. FRIEDLANDER: Thank you, Lauren. And I
21 just wanted to reiterate my huge thanks to everyone
22 today for joining this conversation. As Laurie

1 mentioned, this is just one of many conversations that
2 we're looking forward to having in the future. I want
3 to thank the commenters today. I want to thank you in
4 advance for submitting your questions or your written
5 comments into the docket.

6 And while this panel is up here, you know,
7 we're just a small subset of many people behind the
8 scenes who are working on this New Era Initiative, and
9 it is incredibly important for us to always look
10 toward the future. How can we make progress in our
11 food safety system? How can we better protect
12 consumers? How do we leverage data and technology at
13 the intersection of all of our core elements with
14 traceability, whole genome sequencing, recall
15 modernization, e-commerce modernization, and retail
16 modernization as well, as well as safety culture. We
17 all intersect with one another, and we all have a role
18 to play along with you, the public, the industry,
19 consumer groups, other regulatory agencies, academia,
20 solution providers. We're all part of the same team.
21 And I'm just excited to continue these efforts with
22 each of you. And I strongly encourage people to

1 submit their thoughts, ideas into the docket and
2 always feel free to reach out to because we want to
3 help. So thank you.

4 MS. FINNEGAN: All right. Now let's move on
5 to Mark.

6 DR. MOORMAN: Yeah. I will join my fellow
7 panelists in saying a big thanks for the questions,
8 the comments that we received today. There were some
9 that came in that I thought I would briefly touch on
10 in the limited time that I have.

11 One of them spoke to can artificial
12 intelligence help us in navigating the potential
13 problem based on past history and product risk
14 Assessment. I think it's a really important question,
15 the way that it was phrased in navigating, because,
16 well, indeed, we do have to navigate these challenges.
17 You know, the way that I think about problems in food
18 safety is sometimes it's based upon something the firm
19 or individual did. And sometimes these hazards in the
20 food supply are just there. Mother Nature put them
21 there or it's an artifact of human behavior from a
22 long, long time ago.

1 Artificial intelligence and machine learning
2 gives us an opportunity to step back and to look at
3 all of the data that might be out there that can help
4 us color the drivers of those hazards and, you know,
5 things like the production region, the size of the
6 firms, the history of the firms, seasonality, climatic
7 drivers, all of those factors can help us, to give an
8 example, an understanding, as I said in the opening
9 comments, what containers do we sample when they come
10 to the United States. Artificial intelligence and
11 applying that to machine learning gives us the ability
12 to tap into all of that information and better
13 understand what can be the best signals, the best,
14 drivers so that we know what to do.

15 There was another question that I thought
16 was really important and it is will FDA consider
17 research in data collection and sharing platform
18 technologies funded by public-private collaborations
19 to inform future policies. And the answer that is a
20 big fat yes, flat out. We are very interested in
21 understanding what information is out there. If I can
22 just reflect on this, you know, one of the things that

1 I have learned in life is you can't solve a problem
2 you don't understand. And, you know, we're in a
3 discipline, particularly in the food microbiology
4 that's about 300 years old. There's so much that we
5 don't understand about these microorganisms. So, we
6 look at genomics now and we've gone from detection to
7 sequencing. We look at massive data sources. These
8 are two things that fundamentally change the way we go
9 about doing food safety.

10 We're interested in canvassing to get what
11 information is out there. Now one of the things that
12 I think has to be called out is why would a firm or
13 why would anybody share information with the Food and
14 Drug Administration. And I want to just tell you that
15 I think it's a really important one to speak to and it
16 does involve trust.

17 The FDA wears many different hats. We do
18 have -- you know, Congress has given us the regulatory
19 hat that we have to wear, the compliance hat, if you
20 will, that we have to wear. But as I talked about
21 earlier, there are many of us that spend all of our
22 time thinking about prevention, and when we talk about

1 data sharing, I have my prevention hat on. I have my
2 hat on to say how do we work together to build data
3 sets so that we can all make better decisions. I
4 don't have that compliance hat on. I understand many
5 people will question then how does how does that
6 happen, and I will tell you that we've got some people
7 that have given a lot of thought. I'll call out Dr.
8 Stacy Wig and Dr. Nate Anderson from our team that has
9 spent a lot of time thinking about how information can
10 be provided to us and be protected so that it doesn't
11 impact the firms.

12 We're getting really good at this. You're
13 all going to hear about longitudinal studies that are
14 coming out from the Yuma, Arizona region, later next
15 month. Those studies were conducted because we got
16 really good at understanding how do we collect data
17 and not put firms at risk. And so I want to say that,
18 yes, the FDA would very much like to have a seat at
19 the table. But when we look at this New Era effort,
20 it isn't all about FDA. We want to encourage firms to
21 share amongst one of us with each other. That's very
22 important.

1 And then the final point that I'll make is a
2 question came in, gosh, I would like to work with
3 other companies and share data, but how do we do that?
4 And I want to point out that I think the data sharing
5 is actually topic two. Topic one is the question.
6 You know, I often get asked can we share coliform
7 data. Can we share fecal coliform play count data
8 with the FDA? And I think sure. But that's the easy
9 part. The question is what's the question. What's
10 the problem that we're trying to solve? And if you
11 really focus on that, it brings out creativity and
12 thinking of if we aggregated data, how could we answer
13 some problems. From a food manufacturing standpoint,
14 I always wonder how our plant environmental results
15 compared to other companies. That's a really good
16 question. I always wondered with pathogen detection
17 that we would find is it seasonal. I was wondering
18 about toxic elements and is it regional. Companies
19 have the opportunity, stakeholders have the
20 opportunity to compile that data and to answer those
21 really important questions. So how could you go about
22 sharing that information? I'll tell you these four

1 areas. Number one, we have firms, groups that work
2 directly with us. Number two, we have others that
3 work directly with platforms like Creme Global that
4 we've contracted with. We have -- they don't provide
5 data to us. They provide it to Creme Global and they
6 work to make sure that it's presented in a way that
7 protects all parties. I think the trade associations
8 are very central to answering category problems, and
9 they can serve to compile data. Number four, we have
10 law firms that work with us directly to provide that
11 information.

12 And then, one of the questions asked, well,
13 how do I do this? Well, if you want to learn more,
14 there's a simple email. And I'm sure it's out there
15 on our websites. It's
16 foodsafetydatasharingplatform@fda.gov. And we are
17 more than happy. We watch that. And we're very happy
18 to talk more with anybody about what information can
19 be shared. So with that, I thank you.

20 MS. FINNEGAN: Thanks, Mark. Appreciate it.
21 Ruth, would you like to go next?

22 DR. TIMME: Yeah. Sure. I just have a

1 couple closing comments. Again, thank you all for
2 your comments. It's been a good discussion. I
3 thought I'd just dovetail on something that Mark
4 mentioned. And, you know, that is the recognition
5 that, you know, there's Mother Nature out there.
6 Foodborne pathogens kind of grow and exist and are
7 quite happy in kind of the food facility and
8 environmental spaces all across the country and across
9 the world. And one of our goals in GenomeTrakr is to
10 try to sample that space to get an idea about what are
11 these pathogens doing out there and how are they
12 intersecting with our food supply, And so this just
13 goes to address one of the questions that came in, in
14 the registration, about why, why we're monitoring, you
15 know, why we're sequencing pathogens for food in
16 environmental spaces.

17 You know, you don't usually think about this
18 for other pathogens like COVID or avian flu. Those
19 are -- you know, those pathogens transmit from animal
20 to animal or human to human. But foodborne pathogens
21 are quite different. You know, those contamination
22 events come in from an environmental source and then

1 spread out from there.

2 And so, yeah, so with that, I think I'll
3 just hit on that common theme that has come up about
4 data sharing. The GenomeTrakr program, you know, in
5 conjunction with New Era, is a really good example of
6 us sharing data as soon as it's generated. And I
7 think this really helps the entire collaborative
8 stakeholders that are trying to make food supply safer
9 in the U.S. And so with that, I will thank you and
10 turn it to the next person.

11 MS. FINNEGAN: Thanks, Ruth. Vinetta, go
12 ahead.

13 MS. HOWARD-KING: Hi. So in closing, I
14 again just want to thank all of the stakeholders and,
15 of course, my FDA colleagues for joining us today.
16 Another reminder that the docket is open. So please
17 don't hesitate to send in your comments and your
18 ideas. I want to say that we're always looking for
19 sensible and meaningful ways to leverage with our
20 stakeholders. We're never closed to that. And we
21 should never be closed to that. That's just a
22 necessity in order for us all to continue to develop

1 and grow.

2 One area that I heard was the
3 interoperability of IT systems to leverage data. I
4 can tell you now that FDA, we're actually working on
5 trying to do that our very self internally. And
6 that's not easy because anything dealing with IT, you
7 need funding and you need resources. And so we know
8 that that's limited for everyone. So how do we do
9 this with the resources that we have? But that that
10 is something that we're working on internally as well.

11 We hear the need to harmonize data that's
12 shared so that we have a unified data sharing tool.
13 That goes without saying. We're working with our
14 state and local public health regulators on that that
15 effort. And we want to be making sure -- we want to
16 make sure that we're working with industry partners as
17 well. We know that no one, no one entity, be it
18 federal, state, local, territorial, tribal, industry
19 or academia, none of us can do this alone. You know,
20 none of us can ensure food safety by ourselves. We
21 just can't.

22 And so, you know, it's going to take a

1 collaborative, integrated partnership and a
2 relationship, a trusted relationship. And that's
3 going to come with a culture change as well, not only
4 internally with FDA, but with some of our stakeholders
5 and some of our partners. There is a culture change
6 that needs to happen across the board in order for us
7 to all be on the same playing field.

8 So, we're at the table. We're going to stay
9 at the table. We know you're at the table. And so,
10 you know, let's start talking. Let's look at what
11 each one can bring to the table and let's help
12 consumers. And so, you know, I just want you to
13 please continue to share your ideas, please. And
14 thank you again for talking with us today.

15 MS. FINNEGAN: Thanks, Vinetta. Glenda,
16 you're up next.

17 MS. LEWIS: I just -- all I can say is, wow,
18 this has been really great. I am so honored to sit
19 here with my FDA colleagues, with colleagues on the
20 phone, with the attendees to the meeting today and
21 just have this conversation and hear the ideas that
22 folks are bringing to the table and just taking notes

1 on, you know, so much is going on and so many ideas
2 that you've given to us to reach back and to engage
3 with you even further.

4 I think about it I guess in two ways, coming
5 from retail, everything ends up at retail. So all the
6 food, all the food safety information and controls and
7 things that are in place, that my colleagues have
8 mentioned, I'm happy to hear that, and Laurie and I
9 are committed to, at the retail level, you know,
10 making sure with our state and local partners, our
11 industry partners, that when it gets to the consumer
12 that it's safe and whether that's by e-commerce or
13 other ways. Probably some of us on this call today
14 are going to order lunch or order dinner to be
15 delivered this evening. And so we know that --
16 talking about that e-commerce section of it, that it's
17 so entrenched in our environment now and in the way we
18 live. And so leveraging that data and technology for
19 a strong infrastructure, we want to continue
20 conversations around that and to any data usage.

21 So again, for the docket as well, there were
22 several questions, three questions that were in there,

1 24, 25 and 26 where we talk about utilizing
2 technologies in ways that can help strengthen the
3 program. So I encourage you to review that. And when
4 you look at those questions, I did just want to say a
5 little bit sort of frame up of why we asked some of
6 those questions. Right? The first question was, and
7 these are ways to use technology to monitor and gather
8 data.

9 And we asked, how can FDA, industry and our
10 state, local, tribal and regulatory partners use
11 technology to monitor and gather data on sales of food
12 through e-commerce. So, we're interested there on
13 whether and how data on e-commerce products and sales
14 can inform the regulatory landscape. Remember when we'
15 looking at what lanes do we survey? How can we drive
16 food safety and what types of technologies and data
17 sources can help us to inform future implementations
18 and perhaps any enforcement efforts?

19 And then, we had a second question. We asked
20 what data and research can be collected in partnership
21 with stakeholders to help assess the existing
22 regulatory framework in place domestically and

1 internationally for the (indiscernible). Some things
2 that we are looking for there, you know, what policies
3 or rules are in place currently? What impact does it
4 have -- has it had or could it have or maybe that it
5 did not have, alternatives that could be modeled at a
6 national level, you know? Is that an approach we
7 should take? Why or why not? So that's something to
8 think about and just look at Question 25.

9 And I think Question 26, it asks -- we asked
10 are there current ambiguities related to sales of food
11 through e-commerce that could pose a risk to the
12 consumer. So, we know it's happening everywhere. It's
13 on the Internet. But the advent of cottage food
14 (indiscernible) in states, there are social media, we
15 have Facebook Marketplace and other similar platforms
16 that may not necessarily have regulatory oversight.
17 So it's very convenient for the general public, but
18 does it pose a risk or can it pose a risk to consumers
19 that we may not be aware of. So we're mindful of that
20 food safety (indiscernible).

21 And we're thinking about too what actions
22 could FDA and partners take. So this one's kind of a

1 tough one. It could be perceived as an infringement
2 on rights to do business or to earn money, that type
3 of thing. But we're approaching it more in a
4 different context of being able to sell or serve safe
5 food. And we want to ensure that there's a level
6 playing field. I heard that in the comments. Make
7 sure we all have a level playing field that's there
8 for anyone who steps into that platform
9 (indiscernible).

10 And we do define the e-commerce space as a
11 retail space. And just encourage folks to take a look
12 at those. Thank you again for joining us today, and
13 we look forward to continued conversations around data
14 and technology in e-commerce. So with that, I'll turn
15 it back to Lauren, over to Laurie.

16 MS. FINNEGAN: Thanks, Glenda, and I'll turn
17 it over to Laurie.

18 MS. FARMER: All right. Well, again, I want
19 to thank you. I want to thank my fellow panelists and
20 all those that put this event together. It is a lot
21 to put one of these things together. So thank you.
22 And we're here representing a much larger workforce of

1 collaborators. And as we consider the future of the
2 FDA human foods program, please know that we want to
3 take food safety to the next level, and we want to do
4 that with stakeholders. Please think about the ideas
5 posed today. What areas would you like to see FDA
6 prioritize and invest in? Please be specific in your
7 feedback to the docket. Your input is essential for
8 us to have an effective human foods program.

9 At the point of food safety as a system,
10 we're talking about connections in the system. Within
11 retail food protection, we're making transformational
12 changes that will impact our strategic goal of
13 reducing foodborne illness in the industry. FDA has a
14 variety of ways we currently support data and
15 technology with regulatory jurisdictions. Retail
16 regulatory food programs, our program standards, this
17 is where we lift regulatory programs up to performing,
18 top performing organizations. And one example of how
19 we support that is our food shield risk factor study
20 database. As an enrolled jurisdiction, you can
21 request access to the same data collection and
22 analysis program that the FDA uses for our national

1 study. The risk factor study database provides cloud
2 storage for your data as well as customizable data
3 collection forms. The database is built and quality
4 assured -- has built-in quality assurance checks,
5 and it's really a saving time mechanism for you. And
6 it'll decrease errors. And the system provides
7 several reporting options, including some that do the
8 heavy lift for your analysis. So FDA is sharing the
9 same tool we utilized for our national risk factor
10 study.

11 FDA has made a large investment in retail
12 regulatory jurisdictions working towards conformance
13 with our program standards. Between 2022 and 2024
14 this year, we've been able to fund \$22.8 million to an
15 average of 237 jurisdictions each year, for a total of
16 1,487 retail program standards projects to date. Some
17 of these funds were used to support data and
18 technology initiatives.

19 As has already been said, we can't do this
20 New Era transformational work alone. This is a
21 journey with stakeholders. We've identified areas to
22 work in partnership that will have significant impact

1 in the retail sector. They are food code adoption,
2 leveling the playing field across the country, risk-
3 based inspections and intervention strategies, having
4 a uniform assessment of risk and providing
5 interventions and measuring effects (indiscernible)
6 retail regulatory program standards, increased work
7 towards conformance of a quality improvement framework
8 for a regulatory program, outbreak investigations
9 improving the use of existing resources and
10 identifying areas for improvement, food safety
11 management systems.

12 Our goal is to increase active managerial
13 control in the retail restaurant setting. We need
14 your help in validating these existing partnerships
15 and identifying new ones, identifying groups that we
16 need to work closely with. Tell us what you want us
17 to prioritize in this space.

18 Some questions in the docket targeted to
19 retail food protection are the following. What can
20 FDA do to have the biggest impact to meet our retail
21 food program strategic goal and take it to the next
22 level? What can FDA do, working in partnership with

1 regulatory, industry and academic partners to impact
2 the reduction of foodborne illness in retail food
3 safety environment?

4 Are there specific collaborations between
5 FDA and industry that will help to ensure the safety
6 of retail food? What benefits will be gained by
7 conducting an audit of the traditional retail food
8 safety systems' effectiveness and how FDA supports
9 that system?

10 And food safety culture is also a very
11 important aspect of food safety, so please feel free
12 to post additional feedback beyond the questions posed
13 in the docket. Other areas to consider are what food
14 safety challenges you're facing that could be
15 addressed by data sharing. Are there public-private
16 partnerships that could help move the needle on the
17 reduction of foodborne illness in the industry? We
18 look forward to seeing your comments and future
19 stakeholder engagement. Thank you all and I will pass
20 it back to Lauren.

21 MS. FINNEGAN: Thank you, Laurie, and thank
22 you for all the panelists today for all your thoughts

1 and expertise.

2 Now, before we adjourn today's meeting, I'd
3 like to encourage you all to submit comments to the
4 docket by June 24, 2024. The link to the docket can
5 be found if you scroll down to the "More Info" section
6 underneath the stream, and you can also enter the
7 number up on the screen on regulations.gov.

8 A recording of the public meeting will be
9 posted on the FDA's public meetings webpage shortly.
10 The meeting transcript will also be posted within a
11 few weeks, as well as a summary of themes shared
12 through the listening session.

13 Thank you for your time today, especially to
14 everybody watching at home, all of our public
15 commentators and, again, our panelists and everybody
16 who made this possible. We hope you have a great rest
17 of your day. Thank you.

18 (Whereupon, the proceeding was
19 concluded.)

20

21

22

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

CERTIFICATE OF TRANSCRIBER

I, SONYA LEDANSKI HYDE, do hereby certify that this transcript was prepared from the digital audio recording of the foregoing proceeding, that said transcript is a true and accurate record of the proceedings to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.



SONYA LEDANSKI HYDE

&	2,500 51:17	144:1 145:8	8
& 4:3 6:2	2.2 26:6	26 144:1 145:9	8,000 33:12
1	2.3 32:14 33:2 64:19	27 31:17	86 105:5
1 4:9 10:20 11:2,10 61:16 62:6,13 112:6	2.4 32:14 64:19	28 31:1	9
1,000 88:9	2.5. 30:1	3	90 15:19 23:19
1,200 57:12	2.6 32:15 64:20	3 4:14 37:13,15 37:19,22 61:18 65:7 123:10,20 128:5	900,000 107:15
1,487 148:16	20 4:12 18:16 48:7 87:8	3.1 65:21 125:10	969 51:14
10 68:11 104:3	200 36:7 92:17	30 117:7	9th 59:1
100,000 88:10	2019 6:12	300 135:4	a
101 57:11	2020 15:15	321 105:6	a.m. 1:15
10:00 1:15	2021 35:5	37 4:16	ability 27:13 27:19 67:7,21 79:20 122:12 134:11 152:7
11 4:9 70:17	2022 13:19 148:13	4	able 12:14 21:22 23:11 25:16 26:19,21 27:6 29:2,6,19 30:14,17 31:5 31:7,8,9,16,18 31:21 34:13 57:18,21 58:11 59:6 81:20 85:14 129:3,4 130:6 146:4 148:14
11,000 35:14	2023 35:22 51:15 88:16 110:8	4 4:17 53:9,11	above 13:21 18:9 112:20
111 4:21	2024 1:14 35:13 88:17 148:13 151:4	5	absolutely 22:7 103:12,17
12151 152:14	2030 43:10 50:1	5 115:11,19	academia 19:11 43:1 49:3 71:2 128:10 132:19 141:19
13 64:2	204 13:2 68:22 69:10 71:15 73:15 75:19 76:12 82:20 92:21 101:18 102:12	50 31:2,17 66:17 96:5	
131 5:6		500 44:22	
14 68:14		53 4:18	
15 37:7		6	
150 31:11		6 4:3	
1896 107:1		6,000 33:12	
19 33:21		602 66:22	
1906 107:7		61 4:19	
1996 65:16		66 4:20	
2		7	
2 4:11 20:1,8 20:20 22:8 32:3,12 61:17 63:15 64:7,18 69:1 72:1 87:7 94:10 102:2 114:7	21 33:13	7 4:5	
2,000 87:3	22 44:22 70:10	70 15:14 71:19	
	22.8 148:14	702-704-9497 86:13,13	
	23,000 58:5		
	237 148:15		
	24 1:14 144:1 151:4		
	25 31:7 68:13 107:12 126:2		

academic 150:1	achieve 99:21 100:10	11:5 19:19 61:16 62:6,9	adopted 45:16 77:22 110:5
accelerate 66:16	achieved 116:2	112:3,5 114:9	adopting 84:5
accelerated 40:14	achieving 8:5	131:9,18	adoption 43:17 43:20 44:15
accelerating 108:19	acid 30:7 97:3 97:6	adam's 83:13	45:13,18,21 75:15 107:5
acceptance 122:6	acknowledge 122:7	add 31:3	108:17 149:1
access 38:5 51:10 66:11,19	acknowledged 115:8	added 33:15	adulterated 104:4
79:20 83:8	act 20:10 68:22 69:4 107:6	adding 31:4 100:19	advance 20:21 21:3 45:5
88:11 111:6	action 43:8 45:8 47:2 50:3	addition 48:16 70:9,15 71:16	48:18 52:7,8 113:15 122:1
122:5 130:4	69:5 99:9	additional 129:5 150:12	132:4
147:21	108:13 152:8 152:12	address 42:13 45:9,21 72:17	advanced 49:8
accessible 80:3 89:5	actions 9:7 31:11 34:8,14	78:7 87:20 89:3 90:19	advancement 8:16
accidental 86:7	68:1 145:21	97:22 101:21 121:14 124:14	advancements 9:12
accompanying 8:22	active 35:14 46:22 149:12	129:8 139:13	advances 52:6
accomplish 108:6	actively 48:17 64:3	addressed 29:15 51:12	advancing 92:20
accomplished 8:12 41:5	activities 6:18 35:21 47:6,8	125:1 150:15	advent 99:16 145:13
accomplishm... 11:13 51:12	50:5 64:16	addresses 28:12	adversely 99:19
55:21	121:20	addressing 39:14 43:13	advisor 2:6
accounting 75:6	activity 15:12 44:19	adequate 41:2 42:10 77:13	advisories 33:14
accuracy 100:2 118:6	actually 94:7 94:11 95:1,13	adhere 92:11	advocates 107:4
accurate 76:8 92:9 99:21	97:1,1 122:20	adjourn 151:2	afc 82:10
152:5	123:1,4,16	adjunct 77:2	afdo 43:14 44:11 50:1
accurately 12:19	129:11 137:5 141:4	administration 1:1 2:4,7,10,13	106:18 107:1,3 107:10 108:12 122:15,16
	adam 2:8 4:10 5:3 10:19,21	2:16,19,22 3:4 3:7,10 6:4 20:5 63:6 135:14	

125:21 127:12 129:12 affairs 32:10 37:9 64:13 77:4 86:19 affect 99:19 affected 90:16 90:22 affordable 75:18 afternoon 6:19 60:19 61:3,12 62:3 65:12 66:7 81:6 97:14 agencies 28:4,8 33:5 43:20 50:13 77:16 80:4 107:12 109:18 111:5 111:12 126:3 129:10 132:19 agency 26:10 26:12 28:10,13 30:3 47:4 55:5 87:17 101:8,22 102:6 103:9,10 104:8,13 106:8 115:9 118:9 130:15,20 agency's 103:11 agenda 6:22 aggregated 28:15 137:12 ago 72:16 101:11 116:15 133:22	agree 113:8 121:8,8 agreement 46:4 56:7 122:16 agreements 29:20 33:4 36:12 agriculture 103:19 107:22 ahead 13:15 68:2 80:16 92:15 100:4 101:3 140:12 ai 24:11 59:19 72:6 76:4 aim 101:18 aimed 20:13 alcohol 93:15 94:2,11,14,16 94:17,20 95:14 96:16 alert 33:15 94:3 alexander 69:12,17 73:9 align 44:10 45:10 47:3 66:9 67:16 81:2 119:15 aligned 102:20 alignment 43:3 43:6 aligns 80:21 allergen 88:12 allergens 35:13 allergy 90:6 reliance 33:3,4 36:12 57:17	64:19 allow 33:5,17 34:3 62:21 67:17 89:4 106:8 111:13 121:18 122:20 allowing 76:19 85:18 allows 33:7 35:6,12 76:8 85:10 91:15 96:19,22 99:10 119:5 alongside 118:9 alternatives 145:5 ambient 81:16 99:17 ambiguities 145:10 ambiguity 105:17 american 87:9 109:8 americans 87:2 amidst 40:15 amount 8:11 23:21 28:6 79:21 83:18 108:18 112:17 amounts 27:10 analysis 20:22 21:4,7 31:9 33:11 46:17 67:8 69:19 79:22 90:1 130:6,8 147:22	148:8 analyst 2:9 11:6 62:10 analytics 9:13 23:14 25:14 26:7 29:7 32:6 38:7 76:4 81:15 117:11 analyzed 33:13 analyzing 52:20 anderson 136:8 andrea 37:20 andreas 65:8 65:22 android 86:8 angeles 69:17 animal 32:10 36:4 40:18 57:13 64:12 70:12 139:19 139:20 animals 31:20 ann 127:22 anonymized 59:18 anonymously 67:18 answer 38:9 83:13,15 129:4 134:19 137:12 137:20 answering 138:8 answers 69:3 antibiotics 24:10
---	--	--	---

<p>anticipate 124:20</p> <p>anybody 26:9 26:10 97:10 135:13 138:18</p> <p>api 99:1 104:18</p> <p>app 84:15 85:3 85:6 86:8</p> <p>app's 85:8</p> <p>apparently 97:8</p> <p>appear 30:16</p> <p>apple 86:8</p> <p>applesauce 110:17</p> <p>application 23:17 25:18 28:1 72:3</p> <p>applications 26:2,3 40:11 122:22</p> <p>applied 1:2 6:8 11:8 22:14 53:14</p> <p>apply 24:2,18 24:20 25:7,16 27:2,4,19 55:18 72:12</p> <p>applying 134:11</p> <p>appreciate 69:12 73:10 86:18,20 87:10 126:10,16 127:1 138:20</p> <p>appreciated 113:4 127:6 128:18</p>	<p>appreciative 34:21</p> <p>approach 6:13 7:18 67:14 72:21 84:6 98:5 145:6</p> <p>approaches 4:11 6:14 19:21 20:1,8 21:12,12 38:2 127:11</p> <p>approaching 146:3</p> <p>apps 74:22 99:3</p> <p>april 1:14 35:5</p> <p>aquaculture 27:11</p> <p>area 21:10 23:2 25:13 29:10 30:2 44:20 59:8 60:3 84:17 104:20 104:21 108:7 108:19 121:10 122:2 123:22 141:2</p> <p>areas 8:20 9:1 28:1 38:9 42:12 45:9 47:5 53:3 54:12 56:13 65:4 68:6 83:14 90:17 91:5 99:7 109:17 110:19 138:1 147:5 148:21 149:10</p>	<p>150:13</p> <p>arena 22:15 30:18 34:2,13 49:9</p> <p>arizona 136:14</p> <p>aron 95:12</p> <p>arrange 40:11</p> <p>article 95:11,14</p> <p>artifact 133:21</p> <p>artificial 9:14 22:18 23:14 25:11,21 26:5 36:16 49:20 71:11 72:3 89:2 133:11 134:1,10</p> <p>asked 20:17 137:6 138:12 144:5,9,19 145:9</p> <p>asking 25:12 31:14 118:17</p> <p>asks 145:9</p> <p>aspect 96:1 150:11</p> <p>aspects 9:4 71:20</p> <p>assess 34:15 41:19 56:14 78:6 144:21</p> <p>assessment 46:15 56:15 127:18 133:14 149:4</p> <p>assessments 34:2,7 46:17</p> <p>assigned 68:19 79:9,13</p>	<p>assigning 68:15</p> <p>assignment 68:2 79:12,16</p> <p>assist 51:21</p> <p>assistance 113:20</p> <p>assisted 9:16</p> <p>assisting 108:16</p> <p>association 17:19 43:18 47:10,12 48:16 86:20 87:1 106:17 108:10 122:15 130:21</p> <p>associations 30:13 43:2,7 43:21 45:4 47:7 48:8 131:1 138:7</p> <p>assurance 148:4</p> <p>assuranced 148:4</p> <p>assures 20:18</p> <p>astho 108:12</p> <p>astrogeology 69:22 70:4</p> <p>attendees 142:20</p> <p>attention 93:5</p> <p>attitudes 54:6 54:8</p> <p>attorney 152:10</p> <p>attribution 114:17</p>
--	--	---	--

audience 58:3 audio 152:4 audit 49:11 105:15 111:3 150:7 augmented 49:20 authority 131:4 authorize 82:13 automate 75:4 automatically 52:12 automating 101:18 available 7:4 57:14 86:8,10 98:13 108:4 113:15 119:12 avenue 43:13 average 148:15 avian 139:18 avoid 10:3 124:18 avoiding 47:4 awarded 45:4 aware 7:14 93:20 94:5 95:20 145:19 awareness 11:17	134:2 143:2 146:15 150:20 background 11:12 69:21 backseat 94:7 bacteria 30:5 bailey 68:9,10 68:11 bam 66:22 67:14 barcodes 99:2 110:5 barr 89:18 barrier 96:18 barriers 15:21 45:20,21 50:8 124:11,14 based 12:6 13:4,12 21:13 23:11 32:20 35:12 46:2,4 81:12,20 93:16 94:2 96:16 106:21 108:16 110:12 133:13 133:18 149:3 basically 69:20 70:8,22 71:7 72:4,9,10,13 72:15 73:4 beauty 30:21 31:22	beginnings 70:5 begins 22:6 behalf 111:17 123:20 behavior 52:18 55:19 133:21 behavioral 44:16 behaviors 49:15 54:5,5,9 belief 81:10 91:21 92:4 beliefs 54:6 believe 11:21 12:17 18:15 29:4 50:22 70:6 71:5,18 76:12 83:4 104:2 108:22 109:1 111:9 121:21 benchmark 50:20 bend 108:21 beneficial 50:20 benefit 47:22 80:1 85:5 99:6 benefited 21:17 88:18 benefits 14:4 119:2 128:2 150:6 best 10:9 42:1 42:5 50:5 54:19 58:1 60:7 78:7	92:12 106:22 110:3 114:4 134:13,13 152:6 better 12:3 14:5,6 21:17 22:6,7,8,9,9,10 23:16 24:6 25:6 26:19,21 28:18 33:17 35:3 37:1 38:13 41:13 51:22 52:15 54:7 55:6,14 60:1 67:16 87:13 91:17 92:7 99:12 115:11,17 116:1,18 117:11 121:3 132:11 134:12 136:3 beverage 87:5 beyond 13:22 18:10,22 74:16 75:3,20 88:8 91:4 92:14 99:18 103:16 112:20 113:1 150:12 big 10:10 26:1 73:22 81:17,22 133:7 134:20 bigger 26:2,3 biggest 9:11 40:2 45:14 118:21 149:20
b	becoming 83:12 beginning 44:8 101:10 108:4 131:12		
back 18:6 20:9 37:12 61:1,3 62:19 111:22 125:18 131:14			

<p>billions 74:5,11 biographies 6:22 bioinformatics 31:9 biotoxin 27:12 bit 56:19 112:15 126:13 144:5 blinded 28:14 blockchain 100:11 blueprint 32:13,19 87:10 130:16 board 142:6 boards 77:18 body 51:1 boots 111:18 bottle 121:12 brands 86:20 87:1,3 88:9 break 37:7,11 60:16,18 61:1 61:4,11 briefly 53:17 133:9 bring 14:22 15:1 28:20 31:6 48:7 66:12 71:20 72:10 73:1 107:20 111:22 124:12,12 127:2 142:11 bringing 71:9 107:13 110:19 118:14 142:22</p>	<p>brings 47:13 137:11 broad 130:1 broadcast 58:22 broader 81:12 126:13 brought 114:12 budget 77:15 build 28:11 29:19 31:18 32:17 44:1,8 58:8 67:22 116:17,22 136:2 building 44:6 45:2 107:22 111:16 116:9 built 27:3,9,17 43:21 101:17 148:3,4 bundled 75:17 burden 19:13 43:11 53:22 burdens 101:19 burr 86:16,17 86:18 business 4:14 37:14,15 38:1 39:5 41:8 42:16 71:1 90:11 91:6 94:22 146:2 businesses 76:2 76:13 104:11 106:7,10</p>	<p>c c 2:1 3:1 4:1 5:1 6:1 30:8 califf's 7:15 california 68:12 call 22:20 64:4 74:18 85:9 136:7 143:13 called 17:18 21:15 22:18,22 23:11,14 72:9 72:17 101:14 122:19 135:12 calling 63:15 campaign 55:9 candy 84:18 85:3 canvasing 135:10 capability 67:9 75:1 capable 52:12 capacity 45:1 119:16 capita 78:14 capital 66:12 117:8 captain 62:15 capture 83:18 99:17 100:6 captured 114:22 capturing 74:1 126:1 car 124:9</p>	<p>carbon 84:1 care 87:4 carefully 121:6 cares 20:7 case 31:2 85:14 111:16 casinos 84:19 cast 10:4 catalyst 76:12 catch 104:21 categories 26:13 27:1,4 27:20 category 26:15 28:7 138:8 cause 12:14 20:21 21:4,7 43:12 67:8 93:20,22 96:15 127:9 caused 10:4 94:10,17 causes 96:17 96:18 causing 24:8 25:2 caution 102:6 cdc 31:20 43:7 45:8 47:7,15 49:4 50:12 66:18 94:14,21 95:2,13,19 108:11 127:12 131:1 celina 62:2 66:6 68:8 117:20 118:2</p>
--	--	--	---

<p>cell 21:18,19,22 cent 115:12 center 1:2 6:8 11:8,22 53:13 89:9 centered 16:4 32:19 central 138:8 centralize 46:16 centric 84:5,6 ceo 89:22 90:3 certain 14:7 16:16 102:17 102:20 104:15 certainly 105:12 112:11 113:8,22 115:1 certificate 152:1 certify 152:2 cetera 82:11 cfp 44:2 47:1 48:20 49:5,13 108:12 cfp 77:21 cfsan 2:7,10,16 2:19 3:4,7,10 cfsan's 65:15 chain 14:6,8,12 15:2 17:1 18:13 36:21 38:13 41:14 69:7 74:20 75:21 84:7 90:14 91:12,18 92:4 97:16 99:20 102:4,8</p>	<p>102:14 103:6 119:20 chains 101:15 chair 65:7 challenge 15:18 16:3,17 74:1,4 81:9 111:7 125:13 challenges 29:14 32:22 39:5 40:2 75:10 98:2 102:13 105:1 105:12 109:11 109:22 113:12 116:6 117:5 124:10 133:16 150:14 champions 26:4 58:8 87:1 change 28:9 71:6 76:13 80:11 92:7 98:7 111:8 135:8 142:3,5 changed 70:4 79:11 changer 82:21 changes 9:21 39:16 78:1 147:12 changing 22:22 110:20 characterize 115:17 chart 8:17 chat 118:18 127:3</p>	<p>checks 148:4 chemical 7:22 24:12 33:12 93:11 chemistries 118:5 chief 81:7 95:12 child's 90:4 chill 127:3 choices 88:2 chris 3:8 4:18 53:9,9,12 60:15 circumstances 104:15 cities 78:14 class 70:3,15 71:4,14,21 72:3,5,13,15 classes 70:11 70:14,17,17,22 71:11,12 clear 14:9 31:15 69:2 103:13 109:12 110:9 clearly 41:17 83:5 115:22 click 66:19 85:20 climatic 134:6 clinical 86:19 close 115:21 120:2 125:6 closed 140:20 140:21</p>	<p>closely 65:8 149:16 closing 5:6 59:8 92:19 131:15,18 139:1 140:13 cloud 100:11 101:14 148:1 clusters 30:13 coalescing 110:3 coalition 58:8 code 39:17 42:7 43:16,20 44:15 45:13,15 45:16,18,19 68:20 69:9 77:21 78:1 79:17 88:14 108:17 149:1 coded 79:9,12 codes 73:18,19 74:2 75:12 cold 75:21 coliform 137:6 137:7 collaborate 57:21 collaborating 119:3 collaboration 8:10 14:20 15:9 17:2 18:12 74:13,16 87:21 102:3 126:22 collaborations 134:18 150:4</p>
--	---	--	---

<p>collaborative 43:18 47:7,10 47:13 48:5,17 67:21 89:13 108:10 140:7 142:1</p> <p>collaborative's 45:12 47:21</p> <p>collaboratively 36:22 39:13 45:5 71:8</p> <p>collaborators 147:1</p> <p>colleague 6:10 22:5 37:20</p> <p>colleagues 42:22 114:7 124:18 140:15 142:19,19 143:7</p> <p>collect 52:6 98:9 136:16</p> <p>collected 119:2 144:20</p> <p>collecting 83:2 83:8,20</p> <p>collection 33:10,11 73:21 134:17 147:21 148:3</p> <p>collections 64:15</p> <p>collective 48:15 54:5</p> <p>collects 49:8</p> <p>color 134:4</p> <p>combat 40:20 104:1</p>	<p>combating 104:6</p> <p>combine 81:14</p> <p>combined 47:16 50:14</p> <p>come 15:3 26:18 28:5 60:22 95:8 116:11 118:8 123:12 127:15 128:12 134:9 139:22 140:3 142:3</p> <p>comes 20:15 23:20 96:7</p> <p>comfortable 75:2</p> <p>coming 24:19 50:10 96:8 105:5 119:7 131:11 136:14 143:4</p> <p>comment 4:20 6:20 7:1 53:8 60:17 66:2 111:17 112:18 113:14,18 114:13 123:6 125:16</p> <p>commentator 106:13</p> <p>commentators 61:15,21 66:5 84:10 151:15</p> <p>commenter 117:19</p> <p>commenters 132:3</p>	<p>comments 8:22 13:13 18:20 36:7,8 61:12 62:18 97:21 112:3,8,10 114:6 117:17 120:3,11,14 123:12 125:8 126:10,20 132:5 133:8 134:9 139:1,2 140:17 146:6 150:18 151:3</p> <p>commerce 38:11,12 39:4 39:19 40:8,10 40:14,18 41:8 41:13,15,18 42:3,6 49:1 65:22 104:19 105:2,17 123:21 125:12 132:15 143:12 143:16 144:12 144:13 145:11 146:10,14</p> <p>commercial 52:11</p> <p>commissioner 2:21 7:8,15 10:18 25:8 48:6 106:16</p> <p>commitment 48:11 54:2 92:20 93:5</p> <p>committed 74:7 76:11 118:3 143:9</p>	<p>committee 39:19 40:22 44:4 47:1 49:1</p> <p>committees 48:20,20 49:1</p> <p>commodities 36:3</p> <p>common 37:4 79:10 112:13 112:15 140:3</p> <p>commonly 68:16</p> <p>communicate 37:2 55:14 127:4</p> <p>communicati... 43:3 44:13 89:4 110:8,11 110:12 119:8</p> <p>communicati... 2:6 6:7 35:4</p> <p>community 57:22</p> <p>companies 39:22 40:9 54:15,17,22 55:11 73:17 81:22 85:5 89:5 92:11,13 97:17 98:8,19 98:20,22 99:6 99:9,21 101:16 125:9 137:3,15 137:18</p> <p>company 84:17 84:22 85:3 90:2,3 94:2 101:12 125:14</p>
--	--	---	---

company's 83:21	compounds 24:7	confirmation 67:16	consolidated 105:8
compared 137:15	comprehensive 42:4 108:22	conformance 148:12 149:7	consortium 72:17
compile 26:18 27:6 137:20 138:9	130:17	confusing 83:3	constantly 94:22
complaint 45:14	concentrate 70:21	congress 135:18	constrained 9:18
complete 45:13	concept 24:2	conjunction 140:5	constraints 77:15
completed 43:17	concepts 57:2	connect 22:8 30:20	construction 42:11
completion 72:5 85:8	concern 94:6 131:6	connected 92:15 97:17 98:12	consumed 30:16
complex 74:10	concerns 28:12 29:3 34:18 42:14 124:13	connection 56:17	consumer 17:20 18:6 33:14 39:20 42:14 55:9 86:20 87:1,5 87:20 92:9 132:19 143:11 145:12
compliance 9:7 29:19 32:15 34:6,15 63:14 64:15,20 68:22 69:10 75:20 90:12 92:3,14 97:19 101:13 101:16,17,18 102:10 103:1,4 103:22 111:16 112:19 113:22 135:19 136:4	concluded 79:22 151:19	connections 147:10	consumer's 90:9
compliment 125:20	conclusion 84:2	connectivity 100:2 121:16 121:19,21	consumers 35:6 38:4 40:1 40:7,12,13 41:3,9 55:12 55:14,18 76:10 88:1,11,16,17 89:6,12 90:13 99:14 102:9 109:8 110:12 111:6 120:18 124:2 125:1 132:12 142:12 145:18
comply 73:17	conduct 29:7 31:5 46:16 51:2 100:7	connects 106:18	
complying 112:17	conducted 56:1 58:6 136:15	consensus 56:5	
component 14:21 26:8 65:18 71:20	conducting 34:4 49:13 128:14 150:7	consider 10:7 17:15 67:12 104:13 105:16 134:16 147:1 150:13	
components 17:10	conference 39:18 40:21 42:1 43:1 44:3 48:19 128:11	consideration 98:1 102:1,11 104:11	
	confidence 102:22	considering 38:3 68:4	
	confident 15:9 59:14	consist 61:12	
	confidentiality 104:8	consisting 107:2	
	confirm 69:8		

<p>contact 84:12</p> <p>contain 10:2</p> <p>containers 23:3 23:12 134:9</p> <p>containing 85:22</p> <p>contaminate 97:1</p> <p>contaminated 96:7</p> <p>contamination 12:16 25:1 41:8 42:11 50:4 90:19 139:21</p> <p>contemplating 104:22</p> <p>content 58:18</p> <p>context 55:11 88:12 102:18 146:4</p> <p>continue 14:18 16:12 17:3 33:1 36:11 41:22 60:8 88:19,21 89:1 92:19 97:9 98:14,21 100:1 106:8 110:14 110:18 113:6,9 123:18 124:3,3 124:15 128:9 130:20 132:21 140:22 142:13 143:19</p> <p>continued 66:9 146:13</p>	<p>continues 35:2 35:16 40:8 82:6 102:11 110:13</p> <p>continuing 60:13</p> <p>continuous 31:18 46:9</p> <p>contracted 138:4</p> <p>contributes 64:7</p> <p>contributing 87:7</p> <p>control 38:18 42:10 46:22 79:1,7,8 149:13</p> <p>controlled 79:12</p> <p>controls 52:9 102:19 143:6</p> <p>convened 49:16</p> <p>convenient 94:21 145:17</p> <p>conversation 38:20 131:13 131:22 142:21</p> <p>conversations 113:5 132:1 143:20 146:13</p> <p>cooperative 37:8,18 65:3 122:16</p> <p>coordinated 11:7 62:11</p>	<p>core 2:9 4:9,11 4:14,17 10:20 11:2,10 20:1,7 20:20 22:8 26:6 28:17 32:3,12 37:13 37:15,19,22 53:9,11 61:16 61:17,18 62:5 62:12,13,15 63:15 64:18 65:7,21 72:1,8 87:14 89:10 112:6 114:7 123:10,20 126:10 128:4 132:13</p> <p>core's 62:16</p> <p>coronavirus 40:13,15</p> <p>correcting 79:2</p> <p>corrective 34:8 34:14 68:1</p> <p>correctly 94:14</p> <p>correlation 59:20 78:9,19 79:5</p> <p>corruption 86:7</p> <p>cosmetic 36:4</p> <p>cost 67:14 68:13 74:1,4 75:12,18 102:5 102:7,9 117:7</p> <p>costs 102:8,10</p> <p>cottage 145:13</p> <p>counsel 152:7 152:10</p>	<p>count 137:7</p> <p>countries 33:15 34:16</p> <p>country 12:1 38:15 51:3,18 79:18 130:18 139:8 149:2</p> <p>country's 20:11</p> <p>county 77:18</p> <p>couple 20:20 118:16 139:1</p> <p>course 8:13 46:17 56:21 57:1,3,8,10,14 59:4 60:7 72:8 72:10 94:6 104:8 116:9 140:15</p> <p>courses 71:22 72:2</p> <p>courts 105:19 106:2,3</p> <p>cov 94:10</p> <p>cover 71:10</p> <p>coverage 33:6 51:14</p> <p>covers 36:2</p> <p>covid 33:21 94:5,6,8,9,14 94:18 139:18</p> <p>cox.net 86:12</p> <p>cox.net. 86:14</p> <p>create 6:14,18 9:20 21:5 22:13 47:17 50:16 80:10,13 82:15 83:15</p>
---	---	---	---

88:6 91:22 103:7,17 119:3 created 43:16 66:11 82:12 87:21 creates 98:5 creating 67:18 73:18 92:9 98:3 102:13 creation 89:1 creativity 137:11 creme 27:9 67:20 138:3,5 critical 8:1 10:5 14:1,21 64:7 79:2 82:6 91:3 92:17 102:16 127:6 cronobacter 67:6 cross 42:10 85:1 crucial 72:22 ctes 92:17 culture 4:17 21:5 48:1 49:2 53:10,11,15,18 53:19 54:13,14 54:16 55:1,4,7 55:10,17 56:2 56:3,6,9,18 57:2,5,7,10,11 58:2,8,10,15 59:3,10,11,13 59:15,21 60:2 60:6,11,13 89:8 127:5	132:16 142:3,5 150:10 cultures 54:20 55:3 cupcakes 39:11 current 6:17 15:12 16:6 45:19 67:17 68:21 77:11 109:7 110:3 119:11 145:10 currently 15:8 16:14 43:15 47:9 51:15 65:16 68:14 69:1 88:9 107:11,21 109:12 113:13 113:15 130:12 145:3 147:14 curve 108:21 customer 18:4 86:2 96:8 customers 51:6 85:13,22 91:21 99:14 customizable 148:2 customized 85:3 cyclospora 67:5	data 1:9 4:7 6:5 6:18 8:21 9:8 9:13 10:22 11:22 12:3,18 13:22 14:2,10 14:13 17:21 18:10 19:4,14 21:13,13,17,20 21:22 22:7,9 22:12,17,17,17 22:19,20 23:13 26:8,10,19,20 26:22 27:2,6,8 27:11,12,14 28:1,3,15,19 28:20 29:3,4,9 29:11,15,19,20 31:19,19 32:2 32:6 33:17 38:7,12,18,22 41:11,12,18 49:10,11,17 51:4 52:6,21 59:9,16,17,21 60:5,21 61:5 66:10,12 67:18 68:1 69:19 71:8,19,19 73:21 74:19 75:5,8,22 76:7 76:8,20 77:5 78:8 80:9,20 80:22 81:15,20 81:21 82:1,2,7 82:8,12,14,17 83:2,8 84:5 85:16 86:21 87:12 88:4	89:14 90:10 91:5,8,11 98:13 99:9,18 100:2,6,7 103:12 104:7,9 104:10,12,15 104:16 105:6 105:14 107:8 107:11,13,14 107:17 108:2,4 108:6 110:22 111:10 113:6 113:15 115:1 115:16 116:1,9 116:9,11,17 117:3,10,10 118:10,14,19 119:1,1,11,11 120:1,13,16 121:1,7,14,16 121:21 122:1 122:21 123:2 125:5,6 126:1 128:18 129:8,9 129:13,15,20 129:22 130:4,5 130:10,11 132:12 134:3 134:17 135:7 136:1,2,16 137:3,4,7,7,12 137:20 138:5,9 140:4,6 141:3 141:11,12 143:18,20 144:8,11,13,16 144:20 146:13 147:14,21
	d		
	d 6:1 daas 75:14,14 damage 96:17		

148:2,2,17 150:15 database 80:3 107:15 118:22 119:6 147:20 148:1,3 databases 72:22 79:21 118:13 119:18 121:22 date 1:14 92:18 148:16 daunting 124:6 day 14:19 28:3 67:22 72:3 87:3 106:13 119:7 151:17 days 8:8 12:12 de 105:4 deal 26:16,16 26:17 dealing 39:3 141:6 deaths 12:4 decade 118:7 december 51:15 decisions 22:9 26:21 136:3 decomposition 24:9 27:12 decrease 50:9 148:6 decreased 78:15 79:6 decreases 78:11	dedicated 92:1 dedication 90:8 deeply 20:7 56:10 defense 70:13 define 41:17 56:6 146:10 defining 45:19 definitely 120:20 definitions 12:18 88:12 degree 69:21 deliberate 43:4 delivered 22:3 38:1 40:7 143:15 deliveries 39:8 delivering 87:16 delivery 39:5,6 39:15,21 40:12 40:17 41:1,7 123:19 demonstrate 56:17 59:16 79:13 100:9,18 demonstrated 34:6 50:17 78:8 demonstrating 79:7,16 demos 15:15 department 34:17 49:10 103:18 depend 87:2	dependance 94:17 dependent 94:19 depending 45:15 deploy 20:17 deputy 2:21 7:8 10:18 25:8 48:6 62:16 106:15 dermal 96:17 design 52:9 designed 43:18 57:1,8 74:21 79:11 desire 29:6 110:10 115:22 126:21,22 desired 52:18 destination 21:21 detail 71:15 detect 31:21 detection 135:6 137:16 determinants 56:8 determine 24:6 31:8 51:19 determined 115:10 determines 30:11 determining 41:1 devastating 10:2	develop 20:12 33:22 54:16 55:8 89:13 103:5 108:13 127:14 140:22 developed 16:9 24:11 39:22 45:8 46:12,21 56:21 71:22 developer 84:15 developers 104:18 developing 16:10 17:7 39:20 40:20,22 42:4 45:17 65:19 67:12 71:4 92:2 development 38:17 39:16 42:15 45:1 46:17 52:11 59:22 device 75:13 devices 66:13 71:9 devised 82:11 dfp's 47:8 dialog 82:10 124:13 dialogs 124:21 dietary 70:19 difference 9:9 57:6 79:14 differences 9:11
---	---	--	---

<p>different 6:18 14:15 17:7 26:7 36:18 45:15 56:15 57:3 58:17 70:14 117:18 124:22 135:17 139:21 146:4</p> <p>differently 26:12</p> <p>digital 6:15 17:16 38:17 49:7,18 52:17 55:15 75:16 83:2 98:3 100:18 102:14 119:17 120:1 152:3</p> <p>digitalization 29:11</p> <p>digitization 49:18 116:7</p> <p>digitized 83:12</p> <p>dinner 143:14</p> <p>direct 39:20 40:7 69:2 119:8</p> <p>directing 20:12</p> <p>direction 78:12 100:14</p> <p>directly 58:3 138:2,3,10</p> <p>director 2:3,12 2:18 3:3 20:4 32:9 37:8,18 62:16 63:4 64:11 65:2,14 68:11 93:10</p>	<p>disaggregated 59:19</p> <p>discerning 115:11</p> <p>discipline 135:3</p> <p>discuss 49:19 74:18</p> <p>discussing 42:17</p> <p>discussion 4:21 111:20 139:2</p> <p>discussions 16:20 26:11</p> <p>disease 24:8 53:22</p> <p>diseases 19:13</p> <p>disinfectants 127:20</p> <p>dispersed 44:21</p> <p>dissolve 96:16</p> <p>distributed 85:22</p> <p>distributor 99:13</p> <p>dive 30:15</p> <p>diverse 74:6 100:10</p> <p>diversity 129:8</p> <p>dna 30:8 71:7</p> <p>docket 9:1 18:19 53:5 112:12 129:4 132:5 133:1 140:16 143:21 147:7 149:18 150:13 151:4,4</p>	<p>docks 23:3</p> <p>docs 83:10</p> <p>doctor 81:4</p> <p>document 7:1 42:4 124:5</p> <p>doing 15:20 17:3,14 21:2 28:3 34:11 39:1 55:17 72:20 95:20 115:2 122:14 125:18,22 127:21 135:9 139:11</p> <p>domestic 25:7 32:14 33:2,3 34:1 36:12 40:9 41:20 64:16,19</p> <p>domestically 24:21 144:22</p> <p>dots 30:20</p> <p>dovetail 139:3</p> <p>downloadable 58:20</p> <p>dr 20:3 63:3,20 76:17,18 80:15 80:19 95:12 107:4 114:11 117:16 125:17 128:18 133:6 136:7,8 138:22</p> <p>dramatic 53:21</p> <p>drive 124:9 144:15</p> <p>driven 80:20 85:9 91:21 128:17</p>	<p>drivers 25:1,2 60:1 79:19 134:4,7,14</p> <p>drop 39:7</p> <p>drug 1:1 2:4,7 2:10,13,16,19 2:22 3:4,7,10 6:4 17:19 20:5 63:5 106:17 107:6 122:15 135:14</p> <p>duplicate 17:13 75:8</p> <p>duplication 47:5</p> <p>dynamic 80:10</p> <p style="text-align: center;">e</p> <p>e 2:1,1 3:1,1 4:1 5:1 6:1,1 38:11,12 39:4 39:19 40:8,10 40:14,18 41:8 41:13,15,18 42:2,6 49:1 65:21 104:19 105:2,17 107:22 123:21 125:12 129:14 132:15 143:12 143:16 144:12 144:13 145:11 146:10,14</p> <p>eager 19:1</p> <p>earlier 81:10 81:16 135:21</p> <p>early 8:8 12:22 88:17 107:4</p>
--	--	---	--

earn 146:2	effectiveness	37:13,15,19,22	empower 76:2
earth 72:10	46:6 150:8	53:9,11 61:16	enable 69:6
ease 74:22	effects 80:8	61:17,18 62:5	98:20 100:2,18
easier 67:18	149:5	62:7,13,15	119:20
83:10 97:2	efficacy 93:16	63:15 64:7,18	enabled 4:9
easily 44:18	93:18 94:4,12	65:7,21 112:6	10:20 11:2,9
75:12	efficiency 76:3	114:7 123:10	11:12,16,20
east 2:12 32:10	90:11	123:20 128:5	15:10,13,18
64:12	efficient 8:5	elements 13:22	16:7,14 18:17
easy 137:8	10:12 76:11	27:10 64:19	32:20 62:14
141:6	efficiently	82:7 87:14	81:9,14 83:15
eat 18:4 38:6	111:1	115:21 126:10	92:20 102:2
echo 112:8	effort 19:12	132:13 137:18	103:16 112:7
ecology 70:1	43:22 44:5	elevate 58:1	112:14
114:18	47:5 110:14	eliminates 75:8	enables 28:11
economic	112:17 122:20	eloquently	30:13,20
104:4	136:19 141:15	118:20	enabling 27:9
economy 87:7	efforts 17:9	email 35:7	encoded 30:6
ecosystem 74:7	36:14,19 41:6	138:14	encourage 9:3
edit 85:14	43:7 44:10	embarked	10:9 29:8
educate 98:21	50:14 54:10,18	54:22	38:16 43:22
education 55:9	60:8 66:18	embrace 110:7	52:21 54:21
93:13 124:16	103:21 104:1	111:8 121:7	67:22 88:22
educational	112:19 113:2,9	emerging	112:11 113:22
34:19 40:20	113:22 119:22	24:12 39:14	114:2,22 115:2
69:21 98:15	132:21 144:18	41:6 67:5	129:5 130:10
125:2	eggs 46:12	emphasizing	132:22 136:20
effect 85:1	eight 33:14	92:21	144:3 146:11
103:20 110:1	72:16	employed	151:3
effective 8:5	either 26:16	88:15 152:8,11	encouraging
9:13 10:12	electronic 80:2	employee	52:11,14,16
50:17 54:20	82:12,14,22	43:15 44:9,12	ends 22:6 84:4
56:8 68:1	128:21	96:6 127:14,17	143:5
147:8	element 4:9,11	152:10	enforce 75:4
effectively	4:14,17 10:20	employees	enforced
36:20 74:1	11:2,10 20:1,8	50:10 54:1	103:15
75:13	20:20 22:8	58:14 127:15	enforcement
	26:6 32:3,12		35:5,9,15

64:16 103:20 109:12 111:16 131:7 144:18 enforcing 77:12 89:10 engage 44:4 98:16 100:18 109:4 143:2 engaged 39:12 107:11 engagement 2:6 8:3 16:22 55:18 60:10 123:15,22 126:19 131:12 150:19 engaging 124:21 enhance 36:14 36:15 49:14 54:16 69:6 90:13 121:19 enhanced 33:16 41:16 121:21 enhances 84:7 enhancing 7:22 36:11 49:6 enjoyed 112:10 117:17 120:3 123:12 enormous 27:10 110:6 enrolled 51:15 147:20 enseso4food 73:14,17 74:6 74:14 75:10	76:10 enseso4food's 74:21 75:19 ensure 38:10 42:6,9 51:4 92:2 109:5 118:2,10 141:20 146:5 150:5 ensures 91:12 ensuring 7:21 37:22 46:5 75:1 90:8,21 93:2 104:8 enter 85:11 151:6 entered 84:20 enterprise 36:1 enterprises 73:22 entire 14:12 30:11 140:7 entities 102:4 entitled 7:1 entity 141:17 entrenched 143:17 entrepreneurs 105:9 106:5 entry 15:21 75:5,8 105:6 envelope 94:10 94:12,13 enveloped 94:9 environment 9:18 67:21 106:20 143:17 150:3	environmental 45:19 46:15 69:22 137:14 139:8,16,22 envision 11:15 20:19 102:17 124:20 epi2me 66:19 episodes 16:18 equally 43:2 equipment 42:11 52:9,12 era 1:9 4:7 6:6 6:11 7:13 8:8 8:15,21 9:2 10:22 11:5 13:1,10,20 20:16,19 32:12 32:18 44:18 47:9 48:21 53:20 60:21 61:5 62:12 64:6,17 65:21 66:9 69:16 70:14,15 71:2 71:3,4,5,13 76:14,20 86:22 87:11 89:15 111:14 119:13 119:13,16 125:10 126:6 130:16 132:8 136:19 140:5 148:20 eric 106:12 erik 100:22 101:5	erps 75:7 errors 75:5 148:6 especially 67:2 127:1 151:13 essential 8:3 73:19 108:18 147:7 establish 44:2 established 30:22 43:4 70:13 establishing 33:3 36:11 79:15 establishment 48:3 79:3 establishments 39:8 42:5 46:20 50:8,15 77:14 et 82:10 europe 72:16 74:11 97:3,5 evaluate 49:21 118:8 evaluating 52:20 evaluation 11:7 62:11 evening 143:15 event 7:2 59:2 67:22 85:19 90:21 98:1 146:20 events 14:1 82:6 92:17 139:22
---	---	--	---

<p>eventual 12:9 13:11 everybody 62:3 72:5 93:19 95:20 151:14 151:15 everybody's 93:11 94:19 everyday 54:3 everyone's 112:10 121:3 everything's 115:13 evolve 40:9 evolved 40:16 evolving 20:16 39:4 examine 56:10 examining 49:14 example 18:9 34:5 35:5 36:3 55:5 75:20 82:9 115:20 121:19 122:13 129:15 134:8 140:5 147:18 examples 33:2 44:9 49:9 54:20 117:6 123:1 excel 83:9 86:5 86:5 excellent 34:19 except 95:7,10 exchange 68:1 82:12,14 84:4 84:5 100:7</p>	<p>excited 11:11 14:18 16:11,19 18:11 19:5 24:13 28:21 32:4 49:5 132:21 excitement 25:22 69:16 exciting 27:13 27:15 29:10,12 76:5,21 execution 92:21 executive 64:13 68:11 exist 25:15 29:4 46:11 139:6 existing 24:4 26:14 27:1 31:17 41:2,20 42:2 52:20 75:6,9 122:1 144:21 149:9 149:14 exists 111:7 expand 27:20 31:17 39:1 41:8 expanded 44:13 expanding 44:20 expansion 114:14,16 expectations 103:9</p>	<p>expected 83:6 experience 10:10 74:4 75:2 experienced 10:2 experiences 49:17 expertise 8:10 112:9 151:1 experts 13:8 16:5 63:13 65:4 74:3 expired 99:11 explain 30:2 explore 36:18 41:14 49:17,19 52:4 55:3 56:13 59:20 60:3 124:10 explored 58:7 exploring 52:14,17 exponentially 48:14 94:16 expose 57:1 exposures 110:16 expressed 61:22 extends 113:1 extent 41:19 59:12 101:19 external 7:16 37:1 extremely 120:10 122:13</p>	<p>f f 129:14 fabulous 83:14 face 67:6 93:3 127:2 facebook 145:15 faced 40:2 124:11 facilitate 25:18 88:15 facilities 54:18 facility 9:5 30:19 52:9 139:7 facing 150:14 fact 22:2 30:15 92:16 93:15,18 95:7,10 125:2 factor 79:16 147:19 148:1,9 factors 38:19 48:9 77:9 78:19,21,22 79:4,9,12,13 80:7 128:2,15 134:7 facts 87:21 fairly 51:14 118:7 fall 105:4 109:14 familiar 75:1 128:1 families 10:3 family's 90:7</p>
---	---	---	---

fantastic 65:18	45:8,11 46:22	130:5,9,18,21	38:9,20 41:11
far 11:18 51:17	47:8,15 49:4	131:1,4 134:16	41:17 47:11
108:5	50:12 51:3,4,8	135:17 136:18	53:4 66:8
farm 9:5 33:19	51:22 53:16,19	136:20 137:8	112:9 147:7
73:16 75:11	55:3 56:22	140:15 141:4	150:12
farmer 2:2	57:1,12,12	142:4,19 144:9	feel 35:18
4:16 5:5 37:10	60:7 62:1	145:22 147:2,5	133:2 150:11
37:13,17,17	63:22 64:1	147:13,22	fefo 99:11
61:19 65:1,2	65:15,18 66:22	148:8,11	fellow 133:6
126:15,16	67:10,12,14	149:20,22	146:19
146:18	68:2,5 69:5,8	150:5,8	felt 40:12 95:16
farmers 75:15	69:15 70:18,20	fda's 6:8,16 7:2	fewer 12:4
91:19	73:19 74:3	7:8 11:6 32:9	104:10 121:2
farms 69:2	77:22 81:11	35:8 36:1	field 46:18 65:4
73:21	82:4,5,7,14,20	37:18 39:11	99:6 125:11
fascinating	83:4,7 85:1,6	46:7 47:6 48:5	142:7 146:6,7
113:17	86:20 87:15,22	58:21 62:10	149:2
faster 12:15	88:21,22 89:9	64:3,12 73:14	fields 9:7
76:8	89:12 92:12,19	78:2 83:11	files 86:6,6
fat 134:20	98:4,13 101:6	87:10 100:6,14	filings 121:20
favorably	102:2,11,15,15	103:5 112:19	final 13:11,12
109:22	102:17,20	113:20 115:13	13:18,21 58:22
fda 9:1 11:10	103:1,7 104:2	121:16 151:9	59:6 69:1,10
12:7,11 15:13	104:10,16,22	fda.gov. 138:16	137:1
19:9 20:12	105:6,13,14	february 35:13	finalized 13:18
21:5 22:12	106:16 108:3,9	fecal 137:7	finally 22:21
23:9 25:17	108:11,18	federal 7:17	106:13
26:2,3 29:2	109:5,16,20	27:5 33:10	financial 108:3
30:21 31:11,11	110:2,6,8,13	45:5 57:14	financially
31:20 32:2	111:9,12 113:5	77:21 107:2	152:11
33:5,16,21	113:8 114:15	109:15,18	find 12:14 23:6
34:4,6,10,11	114:20,22	141:18	24:6 30:17
34:13,15 35:2	115:8 116:19	feed 46:11	51:3 76:21
35:5,16,20	119:9,22 120:8	feedback 8:21	78:6 81:2 83:7
36:3,6 38:21	120:12 121:17	18:15 25:9,20	116:17 121:2
39:3,22 42:19	121:21 122:3,4	27:22 29:13	137:17
43:4,13 44:2	122:7,14,21	31:15 32:5	finding 82:15
44:15,18,20	123:1 129:13	35:17,19 37:3	

findings 56:10 128:22	138:1,10	44:12 49:6	36:4,7,15,20
fingerprinting 71:7,8	first 12:22 18:2 20:21 23:1	54:12 92:10,15 100:6,7	37:1 38:2,3,4 38:10,12,14,16
fingerprints 30:5,6,9	54:13 55:22	focuses 50:2	39:3,4,11,15
finish 29:22 96:22 105:22 106:1	56:13 62:1,4 66:6 69:14 70:2 73:22	focusing 50:14 108:14 111:14	39:17,19,22 40:7,11,14,18
finnegan 2:5 4:4,22 6:3,7 10:17 19:18 37:5,12 53:6 60:15 61:7,10 63:1,18 64:9 64:22 65:11 66:3 68:8 69:11 73:7,9 73:12 76:16 81:4 84:9 86:15 89:16,19 93:7 97:12 100:21 101:2 106:12 111:21 114:9 117:14 120:5 123:9 131:16 133:4 138:20 140:11 142:15 146:16 150:21	76:18 82:5,19 85:2,10 94:8 98:2,7 99:11 99:11 107:5,10 108:11 109:15 112:4 114:13 114:19 116:10 117:19 120:8 122:6 144:6	foia 104:9	40:19,22 41:1 41:7,12,13,15 41:21 42:1,5,6 42:7,17,18,20 43:1,5,6,16,20 44:3,3,15,16 44:17,19,21 45:6,10,11,18 46:8,10,20,21 47:9,15,18,19 47:22 48:1,6,8 48:18,19,22 49:2,7,15,16 49:21 50:4,8 50:15,19,22 51:2,9,18,19 52:1,3,6,7,7,10 52:16,21 53:1 53:2,10,11,13 53:15,18,19,20 54:1,4,9,10,11 54:13,14,14,16 54:20,21,22 55:2,4,6,7,9,10 55:11,12,14,16 55:17,19 56:2 56:3,6,8,18,18 57:2,5,6,6,9,10 57:22 58:2,8 58:10,14,15,16 59:1,3,10,11 59:11,12,13,14
firms 33:15 34:5,16,20 101:20 134:6,6 136:11,17,20	flat 134:20 flavor 114:15 flex 81:21 flexible 44:21 109:20 floor 131:17 flow 31:18 flu 139:18 focus 11:22 33:7 34:10 41:5,10 49:16 71:6 81:18 107:8 124:17 125:3 128:15 137:11 focused 7:20 32:20 43:15	folks 15:1,2,2 23:5 124:12 142:22 146:11 follow 84:12 97:4 followed 42:7 61:13 following 72:1 72:20 149:19 food 1:1,2,10 2:4,7,10,13,16 2:18,19,22 3:3 3:4,7,10 4:8,17 6:3,6,8,11,13 6:15,19 7:9,13 7:21,21,22 8:7 8:9,16 9:3 10:22 11:5,8 12:3 13:8,15 13:18 14:3,4 14:10,12,16 15:1 16:4,5 17:1,5,19,22 19:9 20:4,5,9 20:11 21:11 22:5,6,14 23:4 23:20 25:10,13 25:17,19 29:14 30:17 32:10,12 32:18 33:9,12 33:14 34:15,20	

59:15,18,20,22 60:2,2,6,11,13 60:22 61:5 62:13 63:4,5,8 64:12,18 65:5 65:14,15,19 67:11,19 68:6 68:22 69:3,18 70:11,12,12,12 70:13 71:13,20 72:4,6,9,13,14 72:17,19,19 73:3,4,5 74:4 76:6,12,14,22 77:1,4,8,13,14 77:15,17,20 78:1,2 79:11 79:15,17 80:1 80:4,10 81:3 81:11 83:6,11 84:3,6,8 86:22 87:4,11,13,16 88:20 89:3,8 89:10,15 90:1 90:3,9,14 91:4 92:1,7,13,16 92:22 93:4,6 96:7,8 97:17 97:18 98:3,10 98:19 100:18 101:5,12,20 102:4,9,14,19 103:6,16,18 104:1,6 105:11 106:10,17,19 107:5,6,9,21 107:22 108:7,8 108:10,16,19	109:1,2,6,15 110:10,13,20 111:11,14 112:22 113:1,2 113:3,10,13,16 113:21 117:18 119:3,18 121:17 122:1 122:15 123:19 126:6,13,14,22 127:2,5 128:4 128:11,14,16 129:9,18 130:18,21 131:3 132:11 133:17,20 135:3,9,13 137:13 139:7 139:12,15 140:8 141:20 143:6,6 144:11 144:16 145:10 145:13,20 146:5 147:3,9 147:11,16,19 149:1,10,19,21 150:2,6,7,10 150:11,13 foodborne 9:4 9:17 10:1,14 11:19 12:4 19:13 20:13 38:19 43:12 45:6 46:14 48:9 50:14,18 52:8 53:22 57:17 64:4 77:9,16,19	78:10,11,14,16 78:22 79:4,5,6 80:8,11 90:16 93:20,22 96:15 108:15,20 111:15 124:19 127:9,11 128:1 139:6,20 147:13 150:2 150:17 foodlogiq 92:9 foods 2:21 7:15 24:19,21 25:2 25:3,7 40:8 41:7 57:13 73:16 92:10 129:18 147:2,8 foodsafetyda... 138:16 foodsmartph... 72:18 footprint 84:1 forbes 95:14 force 130:22,22 foregoing 152:4 foreign 34:13 34:20 40:9 64:16 fork 73:16 formalize 50:12 format 82:1 86:5,5 former 76:21 95:12 forms 148:3	formulation 97:18 forward 7:18 8:18 10:15 11:14 14:21 17:11 18:14 19:16 31:6 37:3 48:15 53:3 60:12 62:17 63:17 65:9 68:5 82:16 111:13 125:14 126:11 131:11 132:2 146:13 150:18 forwards 81:2 foster 60:8 fostering 89:7 101:8 found 34:19 44:18 99:7 104:4,14 113:17 125:16 151:5 foundation 76:5 91:10 foundational 13:22 41:4 founded 106:22 four 71:22 72:1 78:1 85:9 107:8 130:22 137:22 138:9 frame 144:5 framework 40:5 41:18 46:10 51:9
--	--	---	---

125:4 144:22 149:7 frameworks 41:21 frank 22:5 fraud 103:18 104:1,6 113:3 free 35:18 66:13 133:2 150:11 frequency 78:8 78:10,13,15,18 frequent 78:20 fresh 59:5 fresher 99:13 freshness 99:8 friedlander 2:8 4:10 5:3 10:19 11:3,6 61:16 62:8,10 112:5 112:6 131:20 friend 22:4 friendliness 75:3 friendly 121:20 front 11:21 87:21 88:1 fsis 39:14,22 fsma 13:2,4 20:19 32:18,20 69:3,10 70:11 70:17 73:15 75:19 76:12 82:20 92:21 101:9,14,16 113:19 fulfillment 105:10,18	full 45:12 fully 81:20 85:8 function 96:19 functions 79:7 fund 48:13 148:14 fundamental 109:2 fundamentally 135:8 funded 108:9 134:18 funding 31:16 33:1 44:21 45:4 48:12 77:13 108:18 129:13 141:7 funds 148:17 further 51:20 52:8 56:13 60:4 67:8 110:2 123:22 124:10 143:3 152:9 future 7:20 10:11 11:15 14:22 17:3 34:12 36:9 52:4 86:9 87:11 119:21 125:15 126:6 130:9 132:2,10 134:19 144:17 147:1 150:18	g g 6:1 30:8 g10 91:8 gaap 76:1 gain 88:11 124:13 gained 150:6 galaxy 66:21 galvanized 90:8 game 22:22 82:20 110:20 gap 18:7 39:2 46:17 78:4 gaps 51:11 56:12 gastroenterol... 95:13 gather 38:12 41:12,18 66:10 144:7,11 gathered 31:20 gathering 82:17 128:21 gdp 87:8 gdsg 100:8 gels 95:14 general 42:6 56:5,7 84:10 118:3 145:17 generally 70:6 101:7 generated 85:21 118:10 140:6 generic 85:6	genesis 92:10 genome 30:10 30:11 31:8 118:22 132:14 genomes 119:6 genometrakr 9:15 21:15 22:22 30:1,21 30:22 31:12 32:6 64:5,7 66:17 118:3,18 118:21 119:14 119:21 139:9 140:4 genometrakr's 119:17 genomic 31:19 117:20 118:14 119:17 genomics 64:4 66:12 72:11,12 135:6 geology 69:21 geospatial 69:19 71:8,18 71:19 geoweb 36:17 getting 18:15 59:5 70:5 103:12,15 136:12 gfsi 102:18,20 gift 25:9,20 gis 70:6 give 11:11 25:9 25:20 62:21 72:18 104:10 134:7
--	---	---	--

<p>given 28:3 102:9 135:18 136:7 143:2 gives 92:11 102:22 134:2 134:11 glad 7:11 65:1 65:7 126:16 glenda 2:17 5:5 61:19 65:8,11 123:10 126:15 128:10 142:15 146:16 glns 68:16 69:9 global 16:22 17:1 19:12,15 27:9 38:4 67:20 68:6,15 68:18 69:7 81:8 82:10 84:3 98:3 102:16 138:3,5 globally 27:13 68:15 74:5 globe 12:2 go 7:16 14:7 24:16 62:5,20 66:4 71:15 75:20 80:16 85:1 92:14 95:3 101:2 104:5 112:15 119:21 135:8 137:21 138:21 140:11 goal 45:12 50:16 54:2 92:4 129:19</p>	<p>147:12 149:12 149:21 goals 8:2 32:11 32:13 33:3 108:13 139:9 goes 75:3 110:1 139:13 141:13 going 7:18 13:14,21 14:20 17:1,8 18:9,18 20:22 22:16 26:17 27:16,18 29:5 60:22 62:19 64:1 71:6 94:3 96:11,12 101:21 112:20 122:4,4 123:5 123:17 124:16 125:4 126:5,12 128:7,8 130:5 136:13 141:22 142:3,8 143:1 143:14 good 6:3 7:11 11:3 22:4 23:10 27:18 32:8 43:3 57:4 60:19 61:3 62:3 65:12,12 66:7 80:20,20 81:6 97:14 110:12 115:20 117:1,6,9 128:17 136:12 136:16 137:15 139:2 140:5</p>	<p>goods 38:6 87:5 google 83:9 gosh 137:2 government 19:11 82:18 governments 17:4 89:11 108:2 111:10 grade 65:6 grappling 58:4 106:3 great 15:10 22:4 25:15 61:11 66:3 93:12 94:22 95:7,22 101:4 101:4 116:14 123:3,16 126:15 128:2 142:18 151:16 greater 66:11 greatest 14:7 15:6 98:2 101:19 102:13 108:20 116:6 greeting 4:3 6:2 groceries 39:7 grocery 24:16 27:21 109:14 131:8 ground 56:3 111:18 114:19 group 17:18 44:11 47:4,16 48:11 50:2 61:14 65:18</p>	<p>107:19 114:20 115:21 116:8 124:6 group's 108:14 groups 17:5 18:8 44:17 48:18 49:2,16 115:22 132:19 138:1 149:15 grow 40:8 139:6 141:1 growers 28:22 29:1 68:13,17 68:18 69:6 83:6 growing 30:18 104:20 grown 11:17 83:17,17,17 growth 39:4 gs1 68:15 74:15 91:8 100:8 110:4 guess 85:2 125:20 143:4 guessing 21:18 guidance 39:16 39:20,21 42:2 42:4,15 124:4 guidelines 40:22</p>
			h
			<p>h 129:14 haccp 70:3,5 70:10,15,17 71:14</p>

hall 95:12	hard 98:8	118:11 122:8,9	hello 20:3
hand 61:6	hardware	127:15,17	37:17 73:13
62:19 84:20	75:17	129:1 141:14	76:18 84:14
93:15,16,19,21	harmonization	healthy 43:10	101:1
94:2,11,15,16	17:2 33:9	44:11 50:1	help 8:17 9:16
94:17,20 95:4	80:21 113:6	127:13	21:8,20 23:15
95:8,16,17	harmonize	hear 6:16 8:12	25:9 50:10
96:1,1,2,12,13	82:6 141:11	18:20 19:5	51:19 54:19
96:16 97:3	harmonized	25:22 37:7	55:18 59:9
handheld 71:9	82:8	38:9 58:2,5	73:17 76:13
120:16,19	harmonizing	61:14,20 63:17	99:14 100:6,9
handicaps 82:3	12:17	65:9,22 101:1	102:15 109:5
handling 42:9	harnessed 54:9	101:2 124:13	113:10 126:4
55:19 88:13	harvey 107:4	125:17 136:13	133:3,12 134:3
hands 84:4	hat 28:11	141:11 142:21	134:7 142:11
90:9 95:6,16	135:19,19	143:8	144:2,17,21
95:18,22 97:7	136:1,4	heard 14:9	149:14 150:5
handwashing	hate 95:10	25:8 30:1 70:3	150:16
52:19 128:3	hats 135:17	112:13,19	helped 56:3
happen 18:12	haven 67:19	113:12 114:12	100:8
63:9 136:6	hazard 24:12	116:14 119:19	helpful 51:1
142:6	hazards 24:10	120:14 123:3	104:18
happened 21:8	26:14 27:2	123:14 125:8	helping 8:3
84:22	28:18 115:17	126:21 128:3	51:22 99:21
happening	115:18 133:19	129:10,11	helps 33:6
124:19 128:20	134:4	130:7,14,15,19	103:7 140:7
145:12	head 136:2	131:6,9 141:2	henderson
happens 20:15	health 3:9 6:7	146:6	84:16
116:15	8:6 9:21 10:13	hearing 11:14	hereto 152:11
happy 29:16,17	12:1 19:4,15	19:17 37:3	herzberg 76:17
62:16 63:3,20	20:19 25:4	53:4 123:8,12	125:17 128:19
65:13,22 97:9	28:18 30:4	126:11	hesitate 140:17
114:11 126:18	43:15 44:10,12	heavy 128:13	hi 53:12 62:8
126:19 138:17	49:10 50:7	148:8	64:10 65:1
138:17 139:7	53:13 66:12	heck 27:17	93:9 112:5
143:8	68:7 77:19	held 35:22 36:6	120:7 123:11
harbor 104:14	80:13 93:2	42:12 57:19	140:13
	106:22 107:22		

<p>high 76:6 78:9 78:18,19,21 79:4,5 102:9 higher 78:20 highest 33:8 highlight 15:11 highlighted 17:9 highlighting 16:2,15 highlights 58:19 historical 118:13 history 17:21 33:19 34:6 133:13 134:6 hit 140:3 hold 76:5 holding 106:16 holistic 129:21 home 41:1 151:14 homes 55:20 honey 104:3,3 honored 142:18 hope 8:19 18:19 22:12 44:10 59:6 60:12 61:10 67:12 110:2,13 151:16 hopefully 57:18 horizon 24:13 host 61:7</p>	<p>hosted 15:17 44:16 hosting 101:7 household 87:4 housekeeping 4:3 6:2 howard 2:11 4:13 5:4 19:20 32:8,9 61:18 64:10,11 120:7 140:13 huge 23:21 118:13 131:21 human 2:21 7:9,15 32:9 33:14 36:3,20 40:18 57:13 64:12 70:11,11 102:19 110:13 110:20 133:21 139:20,20 147:2,8 humans 31:19 humidity 99:19 hundreds 88:17 hurt 83:4 hyde 152:2,15 hygiene 93:15 93:19,21 96:2 96:12,14 97:3 97:4 hypochlorous 97:3,5</p>	<p>idea 51:4 57:12 125:13 126:7 139:10 ideas 18:21,22 59:5 112:2 123:4 124:14 133:1 140:18 142:13,21 143:1 147:4 identification 12:15 76:9 identified 148:21 identify 8:4 9:1 38:13 51:11 57:4 68:17 90:18 identifying 40:16 42:1 50:5,7 80:7 115:11 149:10 149:15,15 ift 16:1 illness 9:17 10:1,14 11:19 12:15 20:13 30:14 38:19 43:12 45:7 48:9 50:15,18 52:8 57:17 77:10,17,20 78:11,14,16,22 79:4,5,6 80:8 80:11 108:15 108:21,21 111:15 127:9 127:11 128:2 147:13 150:2</p>	<p>150:17 illnesses 12:4 78:10 90:16 110:15 124:19 illustrate 31:10 imagine 23:7 immediate 38:5 immediately 119:1 impact 40:12 80:11 136:11 145:3 147:12 148:22 149:20 150:1 impacted 10:3 109:22 impacts 106:20 implement 34:1 82:13 102:12 implementable 89:5 implementati... 46:5,18 66:17 109:11,13 131:8 implementati... 144:17 implemented 110:2 implementing 32:18 92:2 108:15,17 131:6 implicated 10:6 import 23:5 25:6 33:15</p>
	i		
	iconic 87:3		

86:5 105:2 106:4 importance 52:8 58:10,12 74:6 113:7 130:19 important 8:11 8:20 14:11 31:10 42:18 43:2,13 77:10 84:2 93:13 96:1 105:9 106:7,9 115:4 116:5,12,20 117:4 118:15 118:19 119:14 120:10 122:7 122:13 130:9 132:9 133:14 134:16 135:15 136:22 137:21 150:11 importantly 24:22 63:14 114:18 importation 105:4 imported 23:21 24:17,18 70:12 104:3,3 importers 105:13,14 imports 101:5 impressive 15:17 improve 11:22 14:2 15:6 19:3 19:4,9,14 39:2	41:15 45:9 47:19 52:1 54:9 58:16 67:21 76:2 83:21,22 88:20 108:5 110:7,22 111:6,10 112:21,22 122:5 improved 110:11 improvement 46:9 129:1 149:7,10 improvements 53:21 100:1 improves 20:18 improving 7:22 46:14 47:14 107:17,18 111:15 113:1 120:1 130:10 149:9 inability 82:2 incentives 52:18 104:10 115:14 incentivize 88:22 89:1 114:22 115:1,3 120:22 121:1 incidence 78:21 incidents 90:17 include 33:3,18 35:22 36:19 39:6 42:8 44:8 49:2,9 50:5	included 53:19 98:1 includes 35:3 39:18 45:17 47:5 48:21 75:13 127:17 129:17 including 21:4 33:10 38:7 39:4 42:21 44:14 45:22 49:15 50:10 57:4 89:2 107:6,14 110:16 118:5 119:4,19 148:7 inclusive 87:15 incoming 84:20 85:17,21 increase 36:19 46:19 88:20 89:3 149:12 increased 9:15 46:7 94:15 149:6 increases 78:11 increasing 46:2 77:14 increasingly 40:9 incredible 112:16 incredibly 14:11,17 15:17 132:9 independent 16:1 51:1 69:6	independently 119:5 indiscernible 70:9 87:6 91:9 99:2 107:20 109:3 117:18 118:15 119:15 120:1 123:21 124:4,16 125:5 125:5 126:3,8 126:14 145:1 145:14,20 146:9 149:5 individual 54:4 133:19 individuals 54:7 industries 128:10 industry 12:7 13:5,18 14:10 15:5,15 17:4 18:8 19:10,11 28:3,5,7 29:8 33:22 34:3,22 35:7 40:13 43:1,8,9 44:5 45:15 48:10 49:3,8,16 54:11 55:17 57:22 59:18 60:8 67:19 71:1 82:9,17 82:22 83:3,11 87:2,6 88:5,22 91:11 92:1,7 92:22 98:17,20 100:17,19
--	---	---	--

101:20 102:22 103:21 104:16 109:4,7,21 110:3,21 111:4 111:5,10 113:9 119:4,5 120:8 121:4 123:18 123:20 124:2 127:10,12,14 127:19 132:18 141:16,18 143:11 144:9 147:13 150:1,5 150:17 ineffective 110:15 infection 93:10 influence 47:22 54:1 55:19 79:15 info 151:5 infographics 40:1 125:3 inform 13:9 59:9 130:7 134:19 144:14 144:17 information 10:6 17:12 28:13 29:8 30:12 34:4 37:2 44:14 49:9 72:21 80:3,6 87:20 87:22 88:8 98:10 99:4,10 99:17 102:3 111:3,6 119:17	123:5,6 128:22 129:5 134:12 134:21 135:11 135:13 136:9 137:22 138:11 138:18 143:6 informative 53:7 informed 31:12 88:1 115:18 infrastructure 143:19 infringement 146:1 ingenuity 18:12 ingredient 85:11,20 86:1 88:11 initiation 35:10 initiative 6:12 11:10,13,15,21 13:1,4,10,20 15:14 62:14 64:3 132:8 initiatives 45:6 47:8 48:19 68:4 148:18 innovate 87:18 88:19 106:9 innovation 8:1 13:17 14:19 38:6,10,17 87:12 88:3,22 109:4 120:16 innovations 8:4 8:15 89:14	innovative 6:17 68:6 innovators 92:14 input 8:3 60:7 85:16 87:12 147:7 inquiry 117:21 insights 10:11 59:21 97:16 113:4 inspecting 57:9 inspection 9:7 32:14 34:12 64:20 77:9 78:11,13,16,18 80:2 107:18 128:21 129:9 inspectional 33:6 34:1,8 36:16 49:10 120:19 129:20 inspections 34:18 46:2,4 64:14 78:9,20 104:11 107:14 107:15,18 108:1,16 111:3 121:2 128:14 129:1 149:3 inspectors 77:15 inspiring 58:14 institute 69:19 70:20 institutes 69:20 instructions 88:13	instructor 70:10 insufficient 77:14 integral 8:10 integrate 24:3 66:21 75:6 119:16 integrated 36:14 42:19 118:12 119:22 122:21 142:1 integration 66:22 integrity 90:13 intelligence 9:14 22:18 23:15 24:12 25:11,21 26:5 36:16 49:20 67:20 71:11 72:4 89:2 133:12 134:1 134:10 intensively 118:8 intent 67:1 interact 123:18 interactions 34:11 intercon 93:11 interest 57:22 124:6 125:22 interested 19:2 35:16 114:15 120:19 134:20 135:10 144:12 152:12
---	--	--	--

interesting 114:12 115:3 125:16	21:3 61:15 62:4,6,20 63:2 71:18,21	iots 81:16	jones 2:20 4:6 7:8,11 10:18 25:8 48:6 89:19,20,22 106:16 127:1
interface 75:3	introducing 7:8	irvin 62:15	journey 13:6 13:15 55:1,6 60:13 148:21
internal 16:7 47:6	introduction 4:19 61:9	isolate 66:15 90:22	journeys 17:16
internally 16:11 55:4 141:5,10 142:4	introductory 57:1	issue 15:4 72:10	julie 97:13,15 100:21
international 16:21 17:4,4 41:20 107:1	intuitive 9:13	issues 39:6,14 40:6 57:3 58:4 58:7 71:10 89:3 104:6 125:1 127:2	jumped 116:3
internationally 66:18 145:1	invaluable 36:13	it'll 148:6	june 151:4
internet 145:13	inventory 33:19,20 91:6 99:8	item 90:9 130:15	jurisdiction 147:20
interoperabili... 14:10 74:15 81:19 84:6 91:15 100:10 113:8 129:22 141:3	invest 103:3,4 147:6	items 42:13 79:2 99:12,19	jurisdictions 43:21 45:1 47:20 48:2 51:7,15,17,21 129:17,19 130:4,12 131:5 147:15 148:12 148:15
interoperable 118:12 129:20	investigate 11:19 73:19 82:15	i'm 123:13	k
intersect 132:17	investigation 18:3 46:14	january 85:2	kari 62:15
intersecting 139:12	investigations 12:11 17:21 64:14 149:8	jaykus 127:22	kashef 69:13 69:14,17 73:3 73:11
intersection 132:13	investigators 56:22 57:9	jim 2:20 4:6 7:8 48:6 73:12 73:14 76:16	katy 89:19,22 93:7 127:1
interstate 65:20	investment 148:11	job 23:1 95:20 103:7 115:11 117:12	kawczynski 2:14 6:10 60:19 61:4 62:3,19 73:2,8 80:14,16 96:20 105:20 106:1
intervention 46:3 149:3	invite 74:17	jobs 87:9	
interventions 46:6 76:9 130:7 149:5	invoices 12:9	john 68:9,11 69:11	
introduce 10:19 20:10	involve 135:16	join 59:6 120:9 133:6	
	involved 40:16 64:3 70:5,8 75:2 101:10 121:10 125:7	joining 7:12 11:4 19:6 131:22 140:15 146:12	
	iot 75:21 99:1 99:17 100:8	jointly 110:21	

keep 105:14 109:3 125:12 130:15 keller 37:20 65:8,22 kept 103:10 key 9:19 11:13 13:22 15:12 16:2 39:7 45:9 54:12 58:19 74:13 80:7 82:7 90:16,21 126:9,9 keywords 35:12 khan 81:5,6,7 kid 31:3 kike 121:2 kill 93:22 94:13 95:9,15 96:2 96:12 killing 96:14 kind 104:9 108:11 119:4 127:4 139:6,7 145:22 kinds 72:14 king 2:11 4:13 5:4 32:8,9 64:10,11 120:7 140:13 kit 39:22 kitchen 52:12 kits 39:7,15 knew 13:1 know 9:12,17 9:22 11:16 12:3,15 13:14	14:20 15:5,11 16:22 17:22 18:2,7 19:8 20:11,14 21:5 21:16 23:5,6 23:12 24:15 28:3,15,17 36:1 50:21 54:15 55:12 57:5 78:5 100:17 101:11 103:3,8,11,14 104:5 105:8,10 105:13,15 106:6 114:16 115:1,7 116:8 117:2,4 119:21 120:7 121:1 123:14 124:5 124:15 126:18 126:21 127:3 128:2,5 132:6 133:17 134:4 134:14,22 135:2,18 137:6 139:4,5,15,17 139:19,21 140:4 141:7,17 141:19,22 142:9,10,12 143:1,9,15 145:2,6,12 147:2 knowledge 152:6 knowledgeable 38:5	known 24:13 26:14 28:22 39:9 62:12 68:16 knows 72:5 90:15 I label 88:8 labeling 88:1 90:1 97:19 labels 92:10 laboratories 9:6 33:13 laboratory 30:22 labs 33:10 66:12 lack 10:5 94:4 109:12 land 16:6 landscape 124:5 144:14 lane 124:8,8 lanes 144:15 language 14:17 17:6 91:13 113:11 large 51:16 91:19 118:13 148:11 larger 85:5 105:7,11 107:14 146:22 largescale 9:20 las 84:17 lastly 17:17 83:13 107:21	110:18 125:20 latest 45:13 launched 6:12 23:4 lauren 2:5 4:4 4:22 6:6 61:7,7 62:9,20,22 131:14,20 146:15 150:20 lauren's 112:8 laurie 2:2 4:16 5:5 37:9,13,17 53:7 61:19 64:22 65:2 78:5 126:12,14 126:16 131:16 131:22 143:8 146:15,17 150:21 law 77:12 79:10,11,13,13 79:15 85:6 138:10 laws 34:15 77:9 106:21 107:6 128:16 lay 16:6 layer 96:17 lead 11:9 32:11 32:13 37:19 44:5 53:9 55:5 62:12,14 64:5 64:17,19 65:21 68:5 70:10 87:16 112:6 127:22 leader 28:22
---	---	--	--

<p>leaders 48:4 58:2 88:5 92:14</p> <p>leadership 89:12</p> <p>leading 13:7 16:5 43:12 49:6 63:7 79:19 89:9 93:20,22 96:14 127:9,12</p> <p>leads 10:20 53:15 59:15</p> <p>learn 19:1 55:5 58:1,17 59:22 114:17 125:19 138:13</p> <p>learned 13:7 15:16 40:2 56:4,6,12,16 59:3 60:11 135:1</p> <p>learning 21:5 22:19 23:15,18 24:2,3,5,18,20 25:6,11,14,19 25:21 26:6 36:17 40:17 49:21 59:19 71:1 76:4 130:9 134:1,11</p> <p>leave 19:8</p> <p>led 12:12 13:4 32:20 34:10 113:9</p> <p>ledanski 152:2 152:15</p>	<p>ledger 84:20</p> <p>lee 76:17,18 80:15,19 125:17 127:22 128:18</p> <p>left 84:22 130:13</p> <p>leg 18:2</p> <p>legal 15:2</p> <p>lessons 55:16</p> <p>level 13:22 18:11 44:6 80:9 99:6,22 122:5 125:11 143:9 145:6 146:5,7 147:3 149:22</p> <p>leveling 149:2</p> <p>levels 27:14 116:2</p> <p>leverage 8:4,20 14:15 19:14 33:6 38:7,22 47:16 52:5 91:5 120:12 123:2 132:12 140:19 141:3</p> <p>leveraged 13:3</p> <p>leverages 100:11</p> <p>leveraging 6:13 14:1 15:21 17:13 18:10 19:3,4 47:3 108:13 122:1 143:18</p> <p>levers 63:10</p>	<p>lewis 2:17 5:5 61:19 65:9,12 123:10,11 142:17</p> <p>liability 40:5</p> <p>lieberman 100:22 101:1,4 101:5 105:21 106:2</p> <p>life 20:14,15 21:6 70:4 90:4 90:7 99:12 116:15 135:1</p> <p>lifelines 90:12</p> <p>lift 128:13 147:17 148:8</p> <p>likely 7:13</p> <p>limitations 25:15</p> <p>limited 9:9 44:7 121:3 133:10 141:8</p> <p>limits 25:16</p> <p>linda 66:3</p> <p>line 84:11 121:22</p> <p>lineup 93:8</p> <p>link 12:19 35:19 151:4</p> <p>linkage 59:10</p> <p>lipid 96:17,18</p> <p>listen 19:2</p> <p>listening 13:6 15:14 112:10 117:17 151:12</p> <p>literacy 129:9 130:11</p>	<p>literally 31:4</p> <p>literature 49:13 56:1,2,5 56:7,9</p> <p>little 9:8 28:8 56:19 112:15 126:12 144:5</p> <p>live 58:22 59:2 69:17 95:17 143:18</p> <p>lives 90:20</p> <p>living 84:15</p> <p>llc 68:12</p> <p>load 127:21</p> <p>local 42:22 43:19 51:6 57:14 80:8 89:11 107:2 108:2 109:7,18 111:9,12,18 128:13 129:9 131:5 141:14 141:18 143:10 144:10</p> <p>locals 128:9</p> <p>located 34:16 68:12</p> <p>location 22:2 68:16,18</p> <p>logistics 4:3 6:2</p> <p>long 9:20 11:18 13:15 26:15 83:4 104:5 116:15 126:18 133:22,22</p> <p>longer 64:15 96:19</p>
---	---	--	---

longitudinal 136:13 look 10:15 17:11 18:16 23:2 37:2 52:4 53:3 55:13 59:17 60:12 63:17 68:5 82:8 95:3 98:13 105:13 107:17 120:15 121:5 124:8 125:11 126:5 127:19 132:9 134:2 135:6,7 136:19 142:10 144:4 145:8 146:11,13 150:18 looked 57:3 looking 8:17 11:14 17:3,20 18:14 19:16 21:11 22:13 24:18,20 25:7 27:19 31:1 35:17 36:15 59:2 62:17 65:9 69:2 76:20 78:6 81:11,12 89:12 100:4 120:21 121:22 126:2 126:11 131:11 132:2 140:18 144:15 145:2 looks 46:5	los 69:17 lot 9:22 21:2 26:11 27:7 28:4 29:9 30:3 49:8 60:12 63:8,12 68:20 69:9 73:18 74:2 75:12 85:4,9 86:1 97:8 99:9,21 105:3 114:17 114:18 115:5,9 116:8,10 117:5 119:19 123:3 131:12 136:7,9 146:20 lots 105:2 124:7 loud 14:9 louis 93:11 love 21:1 60:7 71:11 low 68:13 74:3 102:5 129:9 lunch 60:16 143:14 <hr/> m <hr/> machine 22:19 23:15,18 24:2 24:3,5,18,20 25:5,11,13,18 25:21 26:6 36:17 39:11 49:21 59:19 76:4 134:1,11 machines 39:10	made 18:4 32:17 48:11 94:7 103:12 119:11 123:13 148:11 151:16 magazine 44:17 mail 39:21 main 32:19 major 94:6 96:13 majority 77:19 make 8:5 9:9 9:10 13:15 15:9 22:9 23:15 25:6 26:21 30:13 35:18 40:14 46:17 53:21 54:10 80:12 83:10 85:15 88:1 97:6 118:19,22 121:20 129:10 132:10 136:3 137:1 138:6 140:8 141:16 146:6 makes 91:10 making 7:21 39:10 91:13 95:20 103:8 141:15 143:10 147:11 manage 121:3 managed 77:18 management 38:3 44:3	46:21 48:22 52:10 58:15 75:7 91:7 97:20 99:8 122:18 149:11 manager 2:15 managerial 46:22 149:12 manages 74:11 managing 52:19 62:7 74:5 97:18 mandernach 106:14,15 121:8 129:12 manner 98:5 manual 11:18 12:6 52:19 75:5 manufactured 46:11 77:1 107:21 129:18 manufacturers 29:1 85:12 88:5 101:15 manufactures 94:2 manufacturing 30:19 137:13 map 51:13 71:16 mapped 70:7 71:17 mapping 36:17 70:8,8 mara 86:16,18 89:16
--	---	---	---

<p>marcia 76:17 125:17 128:18 marine 27:12 mark 3:2 4:13 5:3 19:20 20:3 37:6 61:17 63:1,4,18 64:8 64:17 114:9 117:14 118:20 120:22 121:8 130:7 133:5 138:20 139:3 market 12:13 12:17 marketing 15:2 marketplace 106:6 145:15 markets 39:9 mass 23:3 massive 135:7 master's 77:3 material 79:20 98:2 materials 125:2 matter 63:13 65:4 mature 59:12 59:14 maturity 59:21 mcgill 97:13,14 97:15 meal 39:7,15 39:22 mean 46:4 81:17 95:10 122:22 127:17</p>	<p>meaning 36:2 meaningful 140:19 means 73:16 79:14 meant 79:8 measures 50:7 60:1 measuring 46:6 58:10 149:5 meat 70:18 mechanism 148:5 mechanisms 41:6 media 145:14 medical 36:4 106:19 meet 41:9 83:11 85:6 98:20 125:9 149:20 meeting 1:8 6:5 6:22 7:2,3,7,12 8:2 10:13 11:4 35:22 36:6 48:5 101:7 106:17 110:9 120:10 121:15 123:7 130:11 142:20 151:2,8 151:10 meetings 98:14 123:15 124:21 151:9 meets 109:6</p>	<p>member 47:14 members 47:16 61:13,15 62:5 87:18 107:3,3 mention 55:21 59:8 117:19 121:17 mentioned 22:21 25:5 48:22 64:17 78:5 91:2,9 113:14 114:14 122:17 132:1 139:4 143:8 mentorship 45:2 menu 85:9 message 83:3 messages 58:13 met 48:6 metabarcoding 67:13 method 82:11 83:2,7 methodologies 33:9 83:9 methodology 82:14 methods 38:18 44:13 46:15 111:2 118:6 michael 2:14 6:10 61:10 micro 33:12 39:9 microbial 66:14 69:22</p>	<p>microbiologist 3:6 63:22 microbiology 135:3 microorganis... 135:5 microsoft 83:9 midst 23:22 mike 61:4 62:8 milk 65:6 million 44:22 69:1 87:8 92:17 117:7 148:14 millions 90:15 mind 125:13 mindful 145:19 mine 22:4 minimis 105:4 minimizing 75:5 76:9 101:19 102:10 minute 37:7 56:20 61:2 minutes 80:17 misabeled 90:19 mission 8:6 87:16 89:10 92:6 103:5 missions 10:13 119:15 mistakes 85:15 mitigate 80:7 mitigation 50:6 mittens 95:17 mobile 40:11 86:12 99:3</p>
--	---	---	---

modalities 36:18 model 42:16 44:21 75:14 78:1 modeled 145:5 modeling 49:12 49:14 models 4:14 37:14,15 38:1 39:5,6 41:8 moderator 4:22 6:9 modern 41:9 modernization 4:15 20:10 32:16 35:21 36:5 37:14,16 42:17 52:3 64:21 68:22 69:3 73:5,5 123:7 132:15 132:15,16 modernize 35:2 36:20 38:14 42:20 50:19 110:7,10 123:19 modernized 9:8 modernizing 38:2 module 101:17 mollusk 65:5 mom 85:4 money 146:2 monitor 36:20 38:11 41:12	66:10 75:21 119:6 144:7,11 monitoring 52:13,20 139:14 month 103:20 136:15 monthly 75:18 moorman 3:2 4:13 5:3 19:20 20:3,4 61:17 63:3,4 64:8 114:11 133:6 morning 6:3,16 7:11 8:13 11:3 32:8 65:13 mother 90:4 133:20 139:5 mou 47:8 50:12 move 14:21 42:16 46:1 53:8 81:19 99:11,20 110:2 111:13 120:6 125:14 133:4 150:16 moved 48:14 mrps 75:7 msc 82:10 multidiscipli... 14:22 multilingual 75:1 multiple 48:20 80:4 84:4 85:11 98:11 multitude 36:2	muscle 81:21 mutual 32:14 33:3,4 36:12 64:19 <hr/> n <hr/> n 2:1 3:1 4:1,1 5:1,1 6:1 naccho 108:12 name 11:5 20:3 53:12 62:9 63:3,21 64:10 68:10 69:16 73:13 81:6 86:11,18 89:21 91:7 95:11 97:15 113:3 name's 93:9 nanopore 66:11,14 118:1 nasa 72:21 nate 136:8 nation's 93:1 107:5 national 43:16 45:18 46:7 50:20,21 51:12 51:18 65:19 80:2 84:1 130:17 145:6 147:22 148:9 nationally 45:13 80:5,9 nationwide 68:17 69:2 nature 133:20 139:5	navigate 133:16 navigating 133:12,15 near 36:9 nearing 85:8 nearly 28:6 58:5 87:3 92:16 109:14 necessarily 62:1 145:16 necessary 80:11 necessity 140:22 need 12:15 14:7,22 15:1,3 26:17,18 31:14 31:16 39:1 41:5 53:22 75:8 79:16 82:22 83:7 92:11 97:4,6 98:10,17 100:4 100:6 103:9 117:1,11 120:15,22 121:5,9,10,11 125:9 126:8 127:5,10 128:15 130:2 130:19 141:7,7 141:11 149:13 149:16 needed 31:5 51:5 56:14,17 100:12 109:1
--	--	--	--

<p>needle 46:1 150:16</p> <p>needs 41:9 44:5 74:10 82:7 83:5 97:2 109:6,7 142:6</p> <p>negative 78:9 79:5</p> <p>neha 108:12</p> <p>neil 93:8,9 97:12</p> <p>neither 152:7</p> <p>nets 10:4</p> <p>network 11:8 31:1 52:15 62:11 67:20 113:20</p> <p>nevada 84:16</p> <p>never 30:1 81:20 140:20 140:21</p> <p>new 1:9 4:7,14 6:6,11,12,17 7:13 8:8,15,21 9:2 10:22 11:4 12:22 13:10,20 20:16,19 23:4 32:12,18 35:7 37:14,15 38:1 39:5 42:16 44:18 47:8 48:21 52:14,17 52:20 53:20 55:15 59:5,9 60:21 61:5 62:12 64:6,17 65:21 66:9 69:16 70:14,15</p>	<p>71:2,3,4,5,5 76:14,20 86:22 87:11 89:14 93:13 98:21 99:16,22 109:17 111:13 117:22 118:4,7 118:10 119:13 119:13,15 122:6 125:10 126:6 130:16 132:8 136:19 140:5 148:20 149:15</p> <p>nine 51:10 72:16 107:15</p> <p>non 94:9,13</p> <p>norm 54:11</p> <p>normal 94:19</p> <p>norocore 127:22</p> <p>norovirus 43:11,14,14 44:11 50:1,3,9 93:16,18,20 94:9,13 95:4,5 95:9 96:2,6,7,9 96:11,14 97:1 127:10,13,21</p> <p>northeastern 77:3</p> <p>noted 78:21</p> <p>notes 6:21 142:22</p> <p>nothing's 115:14</p> <p>notice 33:16</p>	<p>notifications 35:7 88:16 120:18</p> <p>notified 22:2</p> <p>novel 21:12,12</p> <p>nucleic 30:7</p> <p>number 20:12 46:19 51:16 57:3 64:7 71:13 72:1,2,2 77:14 84:18 85:10 86:1,13 102:2 105:13 117:1 129:17 138:1,2,9 151:7</p> <p>numbering 79:10</p> <p>numbers 68:16 68:19 77:15</p> <p>nut 90:6</p> <p>nutrition 1:2 6:8 8:1 11:9 53:14 87:19 88:13 89:22 92:10 97:18</p> <p>nutritious 8:7</p> <p style="text-align: center;">o</p> <p>o 4:1 5:1 6:1</p> <p>oakland 23:2</p> <p>oao 3:9</p> <p>objective 21:3 48:14</p> <p>objectives 43:6 45:10,12 47:21 108:15 131:2</p>	<p>observations 34:9</p> <p>observe 110:14</p> <p>obstacles 104:7</p> <p>obviously 104:20,22</p> <p>occurs 68:3</p> <p>ocd 2:15</p> <p>offer 74:22 75:21 98:19</p> <p>offering 75:13 112:1</p> <p>offerings 92:5</p> <p>office 3:3 11:6 20:4 29:18 32:9,10 37:8,9 37:18 63:4,8 63:14,22 64:11 64:12 65:2,15</p> <p>officer 81:7</p> <p>official 106:17 114:2</p> <p>officials 17:19 107:3 122:15</p> <p>oh 30:17 127:3</p> <p>ohafo 2:12</p> <p>oit 118:5</p> <p>okay 80:15,19 96:21 101:4,4 105:21</p> <p>old 135:4</p> <p>omics 72:9,11 72:14</p> <p>one's 145:22</p> <p>ones 149:15</p> <p>ongoing 66:18 68:21</p>
---	--	--	---

<p>online 22:1 41:6,21</p> <p>onsite 34:5,10 34:12,18</p> <p>open 109:20 131:17 140:16</p> <p>opening 4:5 7:9 7:10 62:21 134:8</p> <p>operate 41:21</p> <p>operational 15:7 50:16 76:3</p> <p>operations 67:17 75:9,15</p> <p>operators 44:7</p> <p>opportunities 32:3 76:5 91:5 98:15 123:15</p> <p>opportunity 8:14 9:20 34:22 48:13 57:20 66:8 69:15 86:18,21 87:12 89:21 97:20 101:6 108:20 110:6 110:21 111:17 120:9 121:13 134:2 137:19 137:20</p> <p>opposed 103:13</p> <p>opposite 78:12</p> <p>opssmart 81:8 81:10</p> <p>option 75:14</p>	<p>optional 66:20</p> <p>options 148:7</p> <p>ora 2:4,13</p> <p>oral 18:20</p> <p>order 21:22 39:21 50:19 53:21 82:15 121:7 140:22 142:6 143:14 143:14</p> <p>orders 12:9</p> <p>organic 103:19</p> <p>organism 30:12,18</p> <p>organisms 24:8 94:13 96:21,22</p> <p>organization 33:7 58:9 106:18 107:2</p> <p>organization's 127:5</p> <p>organizational 15:7 56:15</p> <p>organizations 47:14 54:7 82:3,9 147:18</p> <p>organized 17:18 57:16</p> <p>organizing 98:14</p> <p>original 130:16</p> <p>ors 3:6</p> <p>oscp 2:3</p> <p>outbreak 4:12 9:4 10:1 11:7 12:10,21 17:21 19:22 20:2,9 33:16 46:14</p>	<p>62:11 67:7 68:3 76:8 149:8</p> <p>outbreaks 9:17 10:14 11:19 12:12 63:9 73:20 93:21,22 96:15</p> <p>outcome 152:12</p> <p>outcomes 12:1 16:2 19:5,15 36:9 56:18 59:13,15 87:14 107:18 110:22 111:11,15 122:2 129:1</p> <p>outgoing 84:21 85:17</p> <p>outpacing 100:17</p> <p>outreach 16:21 17:3 34:22 40:20 124:3</p> <p>outside 23:20</p> <p>overall 107:18 126:21</p> <p>overarching 81:18</p> <p>overhaul 20:11</p> <p>overly 10:5</p> <p>oversight 36:21 64:13 65:17 145:16</p> <p>own 17:16 55:4 55:6 72:21 82:2 106:4</p>	<p>owner 69:18</p> <p>oxford 66:10 117:22</p> <p style="text-align: center;">p</p> <p>p 2:1,1 3:1,1 6:1</p> <p>pack 88:1</p> <p>package 70:19</p> <p>packaged 87:5</p> <p>packaging 83:20</p> <p>page 4:2 5:2 44:19 95:4</p> <p>pain 15:7</p> <p>pandemic 33:21 40:13 77:16</p> <p>panel 61:15 62:5 67:14 84:11 111:20 111:22 112:3 132:6</p> <p>panelist 4:19 4:21 61:9</p> <p>panelists 61:14 131:18 133:7 146:19 150:22 151:15</p> <p>paper 12:6 98:12</p> <p>papers 58:18</p> <p>paperwork 84:19</p> <p>paradigm 71:5</p> <p>parasites 30:5</p> <p>part 26:6 29:14 43:10 51:21</p>
---	--	---	--

53:19 90:21 116:10 132:20 137:9 partially 108:9 participants 49:17 98:6 participate 57:18 participated 16:16 participating 17:17 88:10 participation 9:15 35:1 101:9 particular 85:19 particularly 52:10 77:17 135:3 parties 99:15 138:7 152:8,11 partner 89:13 partnered 107:19 partnering 29:18 partners 19:11 27:6 28:2,20 31:21 33:18,22 36:13 37:1 45:5 57:15 82:3 89:11 98:18 108:11 118:9 122:9,12 124:1,2,11 125:21 141:16 142:5 143:10	143:11 144:10 145:22 150:1 partnership 33:4 36:12 41:19 42:19 50:13 91:20 100:15 122:7 122:14 142:1 144:20 148:22 149:22 partnerships 42:21 43:4 107:10 110:19 149:14 150:16 party 39:21 49:11 105:10 105:18 111:3 pass 131:14 150:19 passed 102:8 passion 30:3 69:16 passions 74:2 past 8:12 10:14 32:21 57:19 60:11 68:14 118:7 133:13 path 8:18 82:15,16 pathogen 64:4 117:20 119:6 137:16 pathogenomic 31:19 pathogens 67:5 139:6,11,15,18 139:19,20	patient 18:3 pc2i 70:11,12 pdf 86:4,6 penalties 104:12 people 9:11 13:4 17:13 30:16 32:19 43:10 44:11 50:1 55:11 58:5,16 82:21 93:14,17 94:4 95:22 112:11 113:19 114:1,2 127:13 132:7 132:22 136:5,6 perceived 146:1 percent 23:19 71:19 96:5 104:3 perceptions 54:6,8 perfectly 119:15 performance 59:12 60:2 performing 147:17,18 period 7:14 44:22 95:9 person 23:8 30:15 114:19 140:10 personal 87:4 perspective 14:3 16:8,22 104:18 130:1	perspectives 59:5 117:18 pertains 42:2 pertinent 34:4 pfas 27:10,11 pharmaceutical 74:12 phase 24:1,1,4 phases 23:22 phd 3:2,5 4:13 5:3,4 72:18 phone 21:18,19 21:22 86:12 142:20 phrased 133:15 picked 42:13 pictured 48:4 pieces 125:6 pilot 33:22 75:13 100:4,5 129:13 piloted 127:18 piloting 75:11 pilots 100:7,9 100:12,15 pipelines 66:22 pivotal 67:10 pizza 39:10 place 14:19 46:6 96:9 103:19 121:9 128:12 143:7 144:22 145:3 plan 36:8,10 45:11 71:14 108:13 123:22 plans 45:9 47:2
---	--	--	---

<p>plant 137:14</p> <p>planting 76:1</p> <p>platform 24:12 27:3,8,8 28:2 28:19 80:2 97:18 101:14 129:20 134:17 146:8</p> <p>platforms 22:13 28:19 33:17 40:10 41:6 106:8 120:17 138:3 145:15</p> <p>play 55:12 58:13 89:7 132:18 137:7</p> <p>playing 89:9 99:6 125:11 142:7 146:6,7 149:2</p> <p>plays 87:6 90:20</p> <p>please 25:20 35:18 62:4,6 73:2 80:18 84:11 140:16 142:13,13 147:2,4,6 150:11</p> <p>pleased 6:4</p> <p>pleasure 7:7</p> <p>plus 51:17</p> <p>pockets 51:14</p> <p>podcasts 44:14</p> <p>point 9:6 18:1 18:6 66:19 75:19 97:10</p>	<p>98:7 113:19 116:12 128:17 129:11 131:14 137:1,4 147:9</p> <p>pointed 128:20</p> <p>points 15:8 58:19 93:12</p> <p>poised 47:22</p> <p>policies 134:19 145:2</p> <p>policy 2:9 11:6 39:16 62:10 63:12 65:17,19 65:20 80:11,20 128:17</p> <p>pop 85:4</p> <p>popular 70:16</p> <p>population 19:15</p> <p>portions 110:1</p> <p>pose 105:12 145:11,18,18</p> <p>posed 77:10 101:22 147:5 150:12</p> <p>posing 104:22</p> <p>position 68:21</p> <p>positive 9:20 59:15 76:13 78:19</p> <p>possibilities 10:7</p> <p>possible 91:10 91:14 94:4 101:19 151:16</p> <p>possibly 83:7</p> <p>post 7:5 63:11 150:12</p>	<p>posted 7:1,4,6 35:8 56:9 151:9,10</p> <p>posting 58:17</p> <p>posture 83:22</p> <p>potential 6:17 49:12 50:7 51:20 133:12</p> <p>potentially 66:21 90:20 119:16</p> <p>poultry 70:18</p> <p>power 19:14 93:1</p> <p>powered 24:11</p> <p>powering 87:7</p> <p>practical 50:16 111:2</p> <p>practice 68:21</p> <p>practices 39:6 39:15 42:2,5 49:15 50:5 54:19 58:1 106:22 110:4 110:12</p> <p>precise 90:18 99:21</p> <p>predict 23:11 24:4 67:22</p> <p>predictions 22:10 23:16 25:6</p> <p>predictive 9:12 23:13 25:14 26:7 29:7 32:6 49:12,14 59:13 76:4 81:15 89:3 117:11</p>	<p>predominantly 12:6 13:12</p> <p>preference 104:19</p> <p>preferences 87:20 103:11</p> <p>prepare 123:19</p> <p>prepared 67:7 152:3</p> <p>preparedness 68:7</p> <p>presence 24:9 50:9</p> <p>present 113:13</p> <p>presentation 19:19 35:19 53:7</p> <p>presentations 6:16 37:6</p> <p>presented 138:6</p> <p>presenter 53:7</p> <p>presenting 19:21 37:13 53:10</p> <p>president 69:18 73:14 86:19 97:15 101:5</p> <p>pretty 59:14 70:16,18,19 71:3 72:5</p> <p>prevent 9:16 10:1 34:18 42:10 50:10 52:7 63:10 79:4</p>
---	---	--	---

preventative 79:7,8	88:19 89:11 107:10 110:19	46:13 68:12 70:12 87:13	45:3 46:8,11 51:8,22 57:6
preventing 20:13 50:18 90:17 111:14 113:3	134:18 150:15 privilege 63:7 63:15	99:12,19 102:18	64:5,6,6 65:16 65:20 77:3,8 78:3 87:21 93:21 108:11
prevention 4:12 9:4 19:22 20:2,8 28:10 50:3,6 63:10 93:10 95:4 103:17 135:22 136:1	proactively 109:17 probably 21:19 22:2 85:4 143:13	produced 16:1 24:21	108:17 109:1,6 110:13,20 118:21 122:18 140:4 144:3 147:2,8,16,22 148:13,16 149:6,8,21
preventive 52:9 79:1 102:19	problem 21:6 25:3 95:21 96:13 133:13 135:1 137:10	producing 16:14 55:11	program's 45:11
previous 34:8	problems 25:10 115:12 115:12,19	product 12:13 14:7 16:9,11 17:11 40:11 83:18 84:3,21 85:13,19,20,21 86:2 88:7 90:20 92:9 100:13 106:4,5 106:19 133:13	programmatic 108:12
previously 48:22 77:6	133:17 137:13 138:8	production 40:17 134:5	programs 37:9 37:19 46:10,12 47:18 48:1 51:9 57:13 65:3 80:5 93:19 108:5 111:19 147:16 147:17
primary 51:6 73:21	procedures 42:12	productivity 76:3	progress 14:18 15:10 32:17 116:15 130:10 132:10
principles 32:19	proceed 124:15	products 10:6 12:19 36:4,5 42:12 83:16 85:11,11,12,17 85:21 86:8,9,9 87:2,4,5 88:2 88:10 91:1,14 99:13,20 106:10 110:5 144:13	progressing 48:21
printing 85:18	proceeding 151:18 152:4	professional 43:2 107:1	project 2:15 47:7 49:5,6
prior 34:4,9 63:6 121:15	proceedings 152:6	professor 77:2	projects 45:2 47:3 121:18 148:16
prioritization 9:18	process 16:10 34:3 35:1,3 36:1,2 40:2 42:9 51:11 90:21 91:13	profoundly 27:13	promote 36:14 54:14,19 55:2
prioritize 9:2 52:1 110:14 118:5 130:20 147:6 149:17	processes 11:19 12:6 52:13	program 7:16 39:3 42:19	
prioritizing 51:5 130:17	processors 83:7		
priority 33:8 115:13,14	produce 29:1,1 33:19 38:1		
private 29:21 63:7 67:17			

55:8 102:2 111:12 promoting 108:16 prompt 52:18 proof 24:1 proper 42:8 96:3 properly 79:3 96:19 proposal 7:15 proposed 13:3 13:9,14 protect 8:6 41:7 53:2 90:13 93:1 106:22 132:11 protected 28:16 136:10 protecting 28:18 76:10 104:9 protection 2:18 38:15 39:19 40:22 41:3 42:1,18 43:1,5 44:3 48:19 51:9 52:16 53:1 65:5,14 124:4 128:11 147:11 149:19 protects 138:7 proteomics 72:11 prototype 16:9 proven 36:13 74:10	provide 7:9 15:19 25:18 43:8 47:2 51:8 66:8 75:22 87:12 97:17,21 98:15 115:22 120:17 129:5 138:4,5,10 provided 16:6 58:11 99:12 103:10 120:11 136:10 provider 103:4 providers 16:16 74:8 82:13 91:16 98:18 102:4 104:17 105:18 132:20 provides 41:2 75:17 78:3 101:12 131:5 148:1,6 providing 28:13 47:11 86:21 87:22 106:5 112:9 114:6 125:1 149:4 pts 16:13 public 1:8 2:6 4:20 6:5,20 7:2 7:12 8:6 9:21 10:13 11:4 12:1 13:13 19:4,14 20:18 25:3 29:20 30:4 35:22	36:6,8 37:2 50:7 53:8 57:22 60:17 61:13,14,20 66:2,5 68:7 77:2,12 80:12 82:4,18 84:10 101:8,22 105:1 106:13,16,22 107:10 110:9 110:18 118:3 118:11,19 119:1,6 120:10 121:15 122:8,9 123:7,7 129:1 132:18 134:18 141:14 145:17 150:15 151:8,9 151:14 publicly 119:11 119:12 pull 63:11 pulled 27:11 pulsenet 66:19 purchase 12:8 17:20 88:2 purchases 40:15 pure 107:6 purpose 50:13 purposes 103:1 104:4 120:20 pushed 94:21 pushing 94:14 put 18:18 43:8 94:6 103:19 112:17 133:20 136:17 146:20	146:21 puts 11:21 putting 28:10 46:5 50:2 127:2 q qr 88:14 quality 46:9 49:7,22 72:19 76:6 92:3 148:3,4 149:7 quantitative 59:17 quantitatively 56:17 quantities 105:12 quasimetage... 67:13 quest 22:7 question 9:10 20:16 77:10 86:3 116:5 121:16 122:3 123:16 125:7 133:14 134:15 136:5 137:2,5 137:9,9,16 144:6,19 145:8 145:9 questions 18:18,19 19:1 25:12 38:8 58:3 83:13 84:12 97:22 101:22 105:1 112:12 113:21
---	---	--	---

114:1,3 118:16 121:14 124:7 129:2,3,4,7 132:4 133:7 137:21 138:12 139:13 143:22 143:22 144:4,6 149:18 150:12 quick 61:21 quickly 73:19 90:22 quite 26:15 139:7,21 quote 116:14 quoted 95:11 95:13	reaches 90:9 reacting 103:14 read 100:2 115:7 ready 38:6 61:8 92:14 reagan 115:7 real 49:12 66:13 67:9 80:6 91:6 120:17 reality 9:16 13:16 36:19 49:21 92:5 99:22 realize 43:20 98:9 realized 41:5 85:4 realizing 116:11 really 11:14 17:20 18:1 31:2,16 44:5 57:1,20 59:9 60:4 63:20 64:3 69:14 71:15 73:1 93:12,13 95:8 101:8 112:10 113:4 116:4 117:3,17 118:4 118:5 119:2,10 119:11,12,15 119:16 120:3 121:1,5,7 123:11 124:3	124:14,16 125:16 126:10 127:2,6,8 128:18 130:22 131:11 133:14 134:16 135:15 136:12,16 137:11,15,21 140:5,7 142:18 148:5 recall 32:15 35:3,3,21 36:1 36:2,5 37:1,2 64:21 85:19 88:15 89:4 90:1,22 92:22 97:19 107:9 110:17 120:17 123:6,7 132:14 recalls 10:4 33:14 35:8 36:7 107:9 109:9 110:8,9 110:10,15 received 8:22 13:13 22:1 36:6 86:2 129:2 133:8 receiving 18:1 18:6 recent 8:9 110:16 recently 48:13 88:15 104:1 reciprocal 130:5 recognition 51:13 102:16	128:12 139:4 recognize 42:18 53:20 90:10 99:5 109:10 recognized 102:20 recognizes 74:6 131:9 recognizing 127:9 recommenda... 82:5,19 94:15 recommenda... 42:7,8 reconciliation 33:20 record 152:5 recorded 7:3 recording 7:5 151:8 152:4 recordkeeping 76:1 98:11 records 12:5,8 18:1,5 103:9 reduce 10:2 15:20 19:13 33:6 45:6 78:22 99:14 108:20 127:11 127:21 reduced 104:12 reducing 43:11 50:14 53:22 108:15 113:2 147:13 reduction 48:9 150:2,17
r			
r 2:1 3:1 6:1 129:14 ragdale 84:13 84:14,15 86:11 raising 125:13 range 58:7 ranging 44:15 rapid 12:16 rapidly 12:19 20:16 rare 56:12 rate 78:14 100:2 rates 78:16 rather 57:10 reach 52:15 125:18 133:2 143:2 reached 86:12			

redundancy 33:7	77:22 92:12 101:17 102:21	135:18 144:10 144:14,22	relying 12:8 14:11
reference 68:20 69:9	104:21 106:21 regulations.g...	145:16 147:15 147:16,17	remain 92:15 95:18
referenced 81:10	151:7 regulator	148:12 149:6,8 150:1	remaining 31:2 31:7
reflect 115:15 116:7 134:22	76:21 121:4 regulators 43:9	reinforcing 58:13	remarks 4:5 5:6 7:9,10
reflecting 41:4	109:8 122:5,8	reiterate 131:21	10:18 11:11 62:21 69:12
refocus 8:14	122:9 127:14	relate 128:4	120:2 131:15 131:17,18
refreshed 41:10	127:19 128:13 129:21 141:14	related 41:13 69:3 71:12	remember 23:4 84:2 144:14
regarding 41:17 52:3	regulatory 26:9 27:6 28:4	72:8 76:1 123:21 145:10	reminder 61:21 84:10 140:16
53:18 121:16	28:8,10,13 31:11 32:10	152:7	remote 34:1,2,7
regards 77:7	33:5 34:2,7 37:9 40:3,4	relates 111:7 131:7	removal 12:16
region 134:5 136:14	41:2,18 43:6 43:19 45:1,4	relating 77:17	remove 96:3
regional 137:18	46:8,10 47:7 47:12,22 48:1	relation 77:7	reorganizatio... 7:17
regions 27:14 34:17	48:8 49:3 64:1 64:13 77:4,11	relationship 78:10,19 142:2	replicate 17:14
register 58:6	77:16 87:17 90:12 101:13	142:2	report 16:2 35:6,9,15 86:1
registration 108:1 123:17	106:18,20 107:3,12 108:1	relationships 128:15	104:2 115:8
129:3 139:14	108:5,10 110:22 111:1,3	relative 152:10	reportable 121:17
registry 121:17	111:4,5,6,11 111:12,18	relatively 78:17 129:16	reported 79:3
regulate 41:21 51:18 109:19	122:18 124:1,5 124:11 125:4	released 16:17 104:2	reporting 33:18 85:7
regulated 36:3 70:18,20	125:12 128:21 129:13,19	relevant 36:7	126:2 148:7
regulation 13:11,21 45:20	130:3,21,22 131:4 132:19	reliability 118:6	reports 33:11 85:18,20 86:4
73:15 77:21		reliance 32:14	represent 62:1 92:6
103:14,20		relied 11:18	representatives 47:13
109:15,18		rely 18:3 19:10 42:20 59:16	
regulations 20:13 34:16,21		102:22	

representing 87:3 146:22	111:1 121:4 141:7,9 149:9	37:15 38:2,14 38:16 39:3,8	return 37:7 60:16
request 25:7 29:13 38:20 147:21	respect 88:4 respond 111:22 112:3,11 117:21 119:7	39:11,13 41:15 42:3,5,17,18 42:20 43:5,6 43:12,21 44:16 44:21 45:3,6 45:10,11,12 46:8,10,20 47:6,12,15 48:2,8,18 49:2 50:4,8,15,19 50:21 51:2,8,9 51:18,19,21 52:1,3,6,10,16 52:21 53:1 65:5,14,16,17 65:19 73:5 76:22 77:8 78:2 80:1,4 81:2 107:14 108:7,8,9,19 109:1,2,6 126:13,14 127:10 128:4,5 128:14 129:18 130:18,21 131:2,3 132:15 143:5,5,9 146:11 147:11 147:15 148:11 148:16 149:1,6 149:13,19,20 150:2,6,7	reuse 83:21 reused 83:19 reutilized 83:19 review 7:16 49:13 51:2 56:1,9 108:22 109:2,4 130:17 144:3 reviewing 36:8 47:10 rfid 99:1 rfr 121:19,20 right 21:18,18 21:20 22:1,7 24:1 60:19 61:3 95:3 98:8 118:13 133:4 144:6 146:18 rights 146:2 risk 23:11 25:3 38:3,19 46:2,4 48:9 77:9 78:18,21,21 79:4,9,12,13 79:15 80:7 108:16 110:12 128:2,15 133:13 136:17 145:11,18,18 147:19 148:1,9 149:2,4 risks 41:12 76:10 roadmap 45:17 47:3,10
requests 44:2 104:9 require 14:14 17:1 81:14 87:14 required 7:16 requirements 42:11 45:15 83:11 85:1,7 103:2 112:21 requires 45:18 73:15 74:16 103:21 requiring 105:11,14 research 3:6 43:8 49:6 50:2 50:17 56:14,16 63:12,21 79:20 134:17 144:20 reserved 6:20 reshape 10:11 reshaped 90:7 residues 27:12 resonated 120:15 resource 9:18 resources 9:10 16:12 31:5 33:1 38:21 44:7,20 46:16 47:17,18 78:4 80:12 88:13	responding 67:5 response 4:12 9:5 11:7 19:22 20:2,9 62:11 63:11 67:9 114:2,4 118:11 responses 61:13 responsibilities 105:18 responsibility 40:6 65:17 77:12 responsible 77:19 rest 151:16 restaurant 131:3 149:13 restaurants 46:19 48:2 109:13 131:8 restrictions 40:15 rests 76:6 result 12:4 36:5 54:4 resulting 33:13 110:15 results 137:14 retail 2:18 4:15 18:2,7 37:14	retailers 88:5 91:19 reticence 116:16	

roadmaps 45:9	140:11	53:10,11,14,15	127:2,5 128:4
robotics 39:9	s	53:18,19,20	129:18 130:18
66:20	s 2:1 3:1 4:1	54:2,4,9,10,13	132:11,16
robust 76:6	5:1 6:1 129:14	54:14,17,20	133:18 135:9
99:1	safe 67:18	55:1,2,4,6,9,10	141:20 143:6
role 17:20 40:5	88:13 92:16	55:13,14,17	144:16 145:20
47:14 55:12	97:7 104:14	56:2,3,6,8,18	147:3,9 149:10
87:6 89:7,10	111:13 121:9	56:18 57:2,5,6	150:3,5,8,10
132:17	143:12 146:4	57:7,10,11	150:11,14
rolled 35:5	safer 6:14,19	58:2,8,10,15	safher 108:1
root 12:14	8:6 76:11 84:8	58:15,16 59:1	122:19 129:14
20:21 21:4,7	91:22 119:3	59:3,10,11,11	sale 9:6
67:8	140:8	59:13,13,15,15	sales 38:12
rose 78:13	safety 1:2,10	59:20,22 60:2	40:10 41:13
roughly 61:1	3:3 4:8,17 6:6	60:2,6,11,13	144:11,13
roundtable	6:8,11,13 7:13	60:22 61:6	145:10
16:20	7:22,22 8:9,16	62:13 63:5,8	salinas 68:12
rras 34:7,14,19	9:3 11:1,5,8	64:18 65:6,15	salmonella
35:1	14:3 15:1 20:5	67:11 68:7,22	67:1
rule 13:2,3,9,11	20:10,12 21:11	69:3,18 71:13	sample 23:6,12
13:12,14,18	22:5,6,15 23:5	71:20 72:4,6,9	23:13 24:6
18:10 69:1,10	25:10,13,19	72:13,14,19	33:11 64:14
102:19,19	29:14 32:13,18	73:3,4 76:6,14	134:9 139:10
103:22 109:10	33:19 34:15,21	77:13 80:10	samples 33:12
109:11,21,22	36:15 37:22	81:11 84:6	111:4
112:18,19	38:2,3,5,10,16	86:22 87:11,14	sampling 68:2
113:18,21	39:12 40:19	87:16,19 88:20	104:2
131:7	41:12,21 42:17	89:3,8,10,15	sanitation 65:6
rule's 112:20	42:20 44:3,16	90:8 91:4 93:5	127:20
rulemaking	44:17,19 45:10	98:10,19	sanitizer 94:15
101:9	46:10,21 47:9	100:19 102:18	95:4,8,16,17
rules 17:22	47:15,18,19	103:6,16	sanitizers
106:21 145:3	48:1,8,18,22	106:19 107:6,9	93:16 94:3,11
run 83:4 88:12	49:2,7,15,21	108:7,8,10,19	94:16,18,20
ruth 3:5 5:4	50:19,22 51:2	109:1,2,6,15	96:16
61:17 63:18,21	51:19 52:2,3,6	111:11,14	sars 94:10,12
64:9 117:13,14	52:7,10,21	113:1 117:19	saving 34:11
120:6 138:21		122:1 126:6	67:15 90:20

<p>148:5 saying 83:1 95:3,14 133:7 141:13 says 95:4 scalable 66:13 scan 45:19 88:14 99:2 scanning 24:13 scarce 80:12 scenarios 100:14 scenes 132:8 schemes 102:18,20 103:1 school 23:1 science 44:16 56:3 64:1 69:22 106:21 scientific 56:2 scientist 3:9 53:13 scope 22:11 40:3 125:12 126:13 scorecarding 91:7 screen 18:17 23:6 48:18 151:7 screening 67:15 scroll 151:5 seafood 23:18 23:19,20 24:9 24:17 27:2,3,7 27:12 82:9,10</p>	<p>seamless 91:14 seamlessly 74:19 99:17 118:12 search 33:19 seasonal 137:17 seasonality 134:6 seat 136:18 second 21:10 24:2 55:2 56:21 72:8,8 82:19 108:7 116:2 144:19 secret 31:16 secrets 28:16 section 13:2 71:15 85:10,14 85:16,18 101:18 102:12 105:5,6 143:16 151:5 sections 85:9 sector 63:7 67:17 77:2 80:13 88:19 89:11 128:4 131:2,4 149:1 security 34:17 see 8:19 14:18 14:18 15:17 18:11,17 22:11 22:12 26:13 27:4,9,10 30:7 30:14 32:2 51:13 55:16 79:11 100:1</p>	<p>110:6,20 111:5 126:16 147:5 seeing 14:16 15:8 68:5 150:18 seek 21:10 seeking 41:11 41:16 seeks 20:20 seems 51:16 seen 13:17 99:8 103:18 segment 76:22 77:1,17,20 109:21 self 141:5 sell 40:11 106:4 146:4 selling 106:10 sells 84:17 send 35:19 85:13 140:17 sending 83:3 senior 3:9 53:13 sense 37:4 sensible 140:19 sensor 29:10 sensors 75:21 sent 105:11 separate 113:16 september 35:22 36:6 110:8 sequence 30:11 119:1</p>	<p>sequences 30:7 31:8 sequencing 30:10 66:15 132:14 135:7 139:15 serialization 74:13 series 16:15 57:16 59:4 serotyping 67:1 serve 138:9 146:4 servers 86:10 serves 57:10 service 16:16 35:6,11,11,15 35:18 50:15 75:14 96:8 services 39:21 50:4 92:6 101:13 105:10 session 6:16,19 53:8 60:17 61:12 151:12 sessions 13:7 15:14 115:2 124:22 set 108:12 sets 107:14 136:3 setting 68:6 149:13 settings 50:4 56:16 setup 67:19</p>
--	---	---	---

<p>seven 47:14 several 11:17 18:18 32:11 143:22 148:7 severe 90:6 shape 7:19 shaping 58:13 106:20 share 8:19 10:10 26:9 28:19 29:3,20 34:3 36:9 47:17 69:15 70:2 71:12 74:19 82:2 99:3 104:12,16 116:16 135:13 136:21 137:3,6 137:7 142:13 shared 82:8 98:5 110:22 114:19 129:15 138:19 141:12 151:11 sharing 9:14 16:12 17:12 21:13 22:20 26:8 27:2,8 28:1,6,8 29:4 29:16,19 33:17 37:20 38:18 44:1,14 52:22 67:18,22 80:6 80:9 81:15 82:17 88:7 102:3 104:7,10 104:15 106:21 111:2 115:1</p>	<p>117:3,10 121:2 121:7,14 122:21 129:14 130:10 134:17 136:1 137:4,22 140:4,6 141:12 148:8 150:15 sharmeen 81:5 81:7 84:9 sheets 83:10 125:2 shelf 99:12 shellfish 65:5 shelves 84:5 shield 147:19 shipment 105:7 shipments 12:19 105:3,8 shop 17:18 shopped 42:12 42:13 shopping 42:3 42:6,9 shops 85:5 shorten 67:8 shortly 60:20 151:9 show 54:2 showcase 16:19 showed 117:6 sick 18:3,4 50:11 96:6 127:16 side 12:7 105:3 121:4,4 sign 35:7 signal 6:12</p>	<p>signaled 115:22 signals 31:21 119:7,8 134:13 signature 73:3 152:14 signed 50:12 significant 12:13 49:11 69:5 79:14 81:18 148:22 silos 81:19 similar 66:18 66:22 67:19 79:17 82:15 107:20 145:15 similarly 67:6 simple 83:8 88:14 90:5 117:8 138:14 simpler 66:16 simplify 75:15 single 14:19 sit 142:18 situation 16:6 six 44:14 47:21 70:14,15,21 71:12 size 134:5 sizes 76:14 98:20 skills 152:6 skin 96:17,18 slotting 99:10 slowed 7:18 small 44:6 75:11 76:2 77:18,18 81:22</p>	<p>84:17 91:18 105:3 106:7,9 108:18 129:16 132:7 smaller 66:20 smart 52:12 smarter 1:10 4:7,11 6:6,11 7:13 8:9 10:22 11:5 19:21 20:1,8 32:12 32:18 44:19 47:9 53:20 55:9 60:21 61:5 62:13 64:18 86:22 87:11 89:15 smartlabel 88:6,9,18 smartphone 72:17,19 74:22 snack 90:5 snapshot 15:20 soap 95:7 social 54:11 145:14 socializing 57:11 software 17:7 75:17 90:2 91:16 92:11 101:13 104:17 soil 83:19 sold 40:18 solution 66:20 74:8,9 75:11 75:17 98:18 102:7 132:20</p>
---	--	--	---

<p>solutions 37:1 37:4 74:21 75:4,20,22 92:5 98:17,19 100:5,13 103:4 solve 18:9 21:6 135:1 137:10 solved 25:10 someone's 95:11 somewhat 94:18,19 son's 90:6 sonya 152:2,15 soon 123:8 140:6 sorry 122:4 sort 81:22 82:1 120:14 144:5 sortable 82:22 sound 106:20 source 12:10 12:16,20 68:20 69:9 73:21 74:1 75:11 76:6 90:19 139:22 sources 38:14 52:21 135:7 144:17 space 13:8 16:5 29:12 32:2 52:7 60:9 63:11 107:21 111:13 115:15 117:11 123:21 125:10 139:10 146:10,11</p>	<p>149:17 spaces 139:8 139:16 speak 17:5 76:19 77:5,7 83:5 86:21 89:21 90:2 101:7 113:10 135:15 speaker 10:19 127:8 130:1 speakers 6:22 112:1 114:13 speaking 123:20 speaks 91:13 125:5 special 45:2 120:11 specialist 6:7 70:6,9 specific 35:13 42:6 43:5 73:15 113:21 114:3 147:6 150:4 specifically 22:16 32:13 64:18 66:9 88:4 117:21 spectral 71:7 72:22 spectrum 81:13 speed 13:16 116:16 spend 71:3 116:21 135:21</p>	<p>spending 21:9 spends 63:8 spent 115:5 116:10 136:9 spoke 114:20 133:11 spoken 77:6 sponge 31:3,4 sport 53:1 128:6 spotlight 100:22 spread 9:19 50:9 140:1 spreading 96:11 spreadsheet 99:3 spreadsheets 83:1 st 93:11 stable 118:7 stack 51:10 stacy 136:8 staff 2:18 56:22 57:2,12 65:14 65:19 67:3 stagnant 78:16 stake 9:22 stakeholder 91:12 124:20 150:19 stakeholders 8:2 21:4 22:14 38:16,22 39:13 40:3,4 41:19 42:21 44:4 49:3 50:22</p>	<p>52:5,16,22 57:21 67:10 98:4,16 100:13 100:20 106:19 109:5 116:19 119:3,12 120:9 120:12 123:2 123:18 124:7 137:19 140:8 140:14,20 142:4 144:21 147:4 148:21 stand 92:13 standard 68:6 88:7 102:16 110:4 119:10 standardization 74:15 128:16 standardized 79:17 82:16 standardizing 91:11 standards 45:3 46:8,9,11 49:22 51:8,10 51:22 74:14,17 90:11 91:8 100:9 103:5 105:4 108:17 147:16 148:13 148:16 149:6 standpoint 137:13 start 46:3 81:12 96:9,11 103:13 112:3 123:10 131:18 142:10</p>
--	--	--	--

<p>started 6:21 12:22 23:17 60:20 61:1,22 72:16 85:2 116:8 starting 46:15 75:19 102:1 129:16 starts 103:14 state 27:5 33:4 33:10,13,17 34:17 36:13 37:8,18 42:21 43:19 45:16,20 51:6 57:14 65:3 79:10 80:19 89:11 107:2,12 109:7 109:18 111:9 111:12,18 122:5,8,9 125:21 126:2 128:13 141:14 141:18 143:10 144:10 statements 88:12 states 1:1 11:20 23:21 24:19 31:1,7,17 33:5 45:19,22 47:15 66:17 68:13 80:4 87:17 106:11 107:16 107:19 108:2,3 122:18 128:9 130:5 131:5 134:10 145:14</p>	<p>stay 80:17 84:11 142:8 stem 54:5 stemming 39:6 step 134:2 stepping 100:21 steps 36:10 55:1 82:20 146:8 steve 111:21 121:8 122:17 129:11 steven 106:14 stop 12:20 57:17 81:11 storage 148:2 store 24:16 27:21 stores 84:18 109:14 131:8 stories 117:2,9 117:12 storytelling 58:12 127:4 strains 114:17 114:18 strategic 43:3 45:8,11 47:2 147:12 149:21 strategically 10:10 81:17 strategies 45:22 46:3 50:6 76:1 149:3 strategy 43:17 45:17 67:15</p>	<p>81:7 97:16 109:13,13 131:7 stream 151:6 streamline 67:2 streamlines 75:9 strength 108:14 119:10 strengthen 13:13 21:11 126:4 144:2 strengthening 89:8 103:6,19 strengths 47:4 47:17 50:21 118:21 strip 84:19 strong 29:6 42:20 56:8 59:12 74:14 87:15 89:9 143:19 strongly 71:4 71:18 109:9 132:22 struck 121:1 structure 41:2 struggle 20:17 116:5 studies 136:13 136:15 study 51:19 77:8 79:15,20 79:22 80:1 125:18,19 147:19 148:1,1</p>	<p>148:10 stuff 29:10 subject 63:13 65:3 78:13 submissions 15:19 submit 31:9 116:20 129:3 133:1 151:3 submitted 118:17 121:15 submitting 132:4 subscribe 35:12 subscribers 35:12,14 subscription 35:6,10,15 subset 132:7 subsidizing 83:8 substitute 95:6 success 27:7 74:13,16 79:19 successes 15:12 32:22 33:2 successfully 110:1 summarizes 58:18 summary 36:9 151:11 summit 59:1 supermarket 101:15 supplement 70:19</p>
--	---	---	--

<p>supplier 91:7 97:19</p> <p>suppliers 85:12</p> <p>supply 8:7 14:5 14:7,12 15:2 17:1 18:12 21:11 23:20 36:21 38:4,13 41:14 53:2 54:21 55:7 69:7 74:19 84:7 90:14 91:12,18 92:3 97:16 98:3 99:20 102:4,8 102:14 103:6 119:20 133:20 139:12 140:8</p> <p>support 17:8 38:10 45:17,21 51:5 54:10,18 55:6 60:6,8 63:13 74:10 75:18 89:14 102:4,15 103:5 103:22 107:12 108:3 109:10 113:6,9 130:20 131:5 147:14 147:19 148:17</p> <p>supported 78:2 108:9</p> <p>supporter 74:14</p> <p>supporting 45:3 46:22 63:13 87:8 89:8 103:1</p>	<p>supports 51:3 130:19 150:8</p> <p>sure 63:20 95:20 97:6 103:8 129:10 137:8 138:6,14 138:22 141:15 141:16 143:10 146:7</p> <p>surface 97:4</p> <p>surfaces 127:20</p> <p>surprised 98:18</p> <p>surrounding 39:15 118:17</p> <p>surveillance 64:4 117:20</p> <p>survey 144:15</p> <p>susceptible 86:7</p> <p>suspect 86:1</p> <p>sustainability 83:16,22 87:19 91:6 113:2</p> <p>sustainable 8:7</p> <p>swiftly 90:18</p> <p>switch 66:5 97:5</p> <p>system 6:15,19 14:12,14 16:9 16:11 17:11 20:12 25:17,19 33:18 36:15 38:15 48:22 51:2 54:15 68:14 73:18 74:9 75:12</p>	<p>76:6,12 77:11 77:20 79:10 80:1,3,10 81:1 81:3 82:12 84:3,8 103:7 107:22 108:2 113:14 119:4 119:18 122:18 122:21,21 126:5,8 127:1 129:14 130:18 132:11 147:9 147:10 148:6 150:9</p> <p>systematic 56:1</p> <p>systems 9:14 14:13,15 23:10 24:4 33:18 44:4 46:21 49:7 50:22 58:15 74:18 75:6,7,7 77:6 81:20 91:16 92:2 98:12 99:10 100:3,11 107:13 113:17 129:8,16,22 141:3 149:11 150:8</p> <p style="text-align: center;">t</p> <p>t 4:1,1 5:1,1 30:8</p> <p>table 72:7 124:13 136:19 142:8,9,9,11 142:22</p>	<p>tackle 15:3</p> <p>tail 88:16</p> <p>take 12:12 20:9 26:7 27:20 37:6 44:5 60:16 61:8 62:22 121:13 127:11 141:22 145:7,22 146:11 147:3 149:21</p> <p>taken 16:8 82:20 152:9</p> <p>talk 14:13 16:3 20:6,22 21:1 29:16,17 36:10 53:17 56:19 72:2 115:5 116:12,18 126:12 129:12 135:22 138:18 144:1</p> <p>talked 26:5 58:9,12,14,19 93:17 117:20 118:20 128:10 129:12 131:13 135:20</p> <p>talking 17:10 21:14 22:16,19 22:21 71:15 93:14 129:11 130:8 142:10 142:14 143:16 147:10</p> <p>tap 134:12</p> <p>target 10:6 38:21 48:9</p>
---	---	---	--

52:1 targeted 43:4,7 67:14 76:9 131:2 149:18 targeting 45:22 51:5 task 78:7 teach 70:11,15 70:16,17 71:12 72:12 teaching 70:8 70:20,22 team 20:7 21:2 23:21 29:17 37:21 39:12 43:16 53:1 63:8 65:3,19 128:1,5 132:20 136:8 teams 14:22 15:3 tech 4:9 10:20 11:2,9,12,16 11:20 15:10,13 15:15,18 16:3 16:7,14 18:17 62:14 81:9,14 83:14 92:5,15 92:20 102:1,3 103:16 112:7 112:14 119:20 technical 113:19 technicians 67:2 technique 96:4 technological 15:7 17:10	38:17 52:5 89:2,14 126:5 technological... 83:6 technologies 8:15 17:15 49:8,20 52:15 66:11 98:22 99:16 100:1,12 117:22 118:4,8 134:18 144:2 144:16 technology 1:9 4:7 6:5,13,18 8:1,21 9:9 10:22 11:22 15:22 19:4 20:15,18 26:4 29:9,11 31:6 32:20 35:4 36:17 38:6,11 38:22 41:10,11 41:16 60:5,21 61:5 67:4,8 74:17 76:20 82:13 86:22 87:13 88:3,4 89:4 90:3,10 90:20 91:3,22 92:22 93:13 100:16 104:17 110:7,11 111:7 114:16 120:1 120:13,17 122:6 123:2 130:11 132:12 143:18 144:7 144:11 146:14	147:15 148:18 tell 25:22 28:5 28:21 62:6 104:17 117:2,9 135:14 136:6 137:22 141:4 149:16 telling 82:21 95:21 117:12 temperature 42:10 52:13,13 52:19 99:18 templates 44:9 ten 18:16 58:6 101:11 term 9:20 terms 69:20 70:5 71:2 72:14 104:19 126:1 territorial 42:22 43:19 57:15 141:18 territories 128:10 territory 51:7 testing 9:6 28:4 33:9 118:4,14 tests 67:16 text 86:6 thank 10:15,17 11:3 19:6,16 19:18 32:7 37:4,5 53:5,6 60:10,14,15 61:10 62:9,18 63:16 65:10 66:1,4,7,7 68:4	68:8,10 69:10 69:11,15 73:9 73:11 76:15,16 76:19 81:3,4 84:8,9 86:14 86:15,17 89:15 89:16,18,20,20 93:4,7 97:11 97:12,14,20 100:20,21 101:6 106:11 106:12,15 111:16,21 112:1,8 114:5 114:8,9 117:13 118:14 120:2,4 120:5,8,20 123:3,8,9 126:17,20 127:8 128:19 131:10,16,20 132:3,3 133:3 138:19 139:1 140:9,14 142:14 146:12 146:19,19,21 150:19,21,21 151:13,17 thanking 101:8 thanks 62:8 63:18 64:8,9 64:22 66:3 117:14,16 120:11 126:15 131:21 133:7 138:20 140:11 142:15 146:16
--	---	--	---

theme 140:3	140:2,7 143:4	tie 18:5	63:14,17,21
themed 84:18	145:8,9 147:4	time 1:15 21:9	65:9,13 66:1,4
themes 16:3	thinking 6:17	21:21 26:15	76:3 89:21
112:13,15,20	14:3 23:4 63:9	34:10 42:10	90:2 91:17
112:22 151:11	115:5 116:8,10	61:6 63:9,16	97:21 98:10,22
theoretically	116:21 135:22	64:2 66:13	99:22 100:5
79:3	136:9 137:12	67:9,9,15 70:3	101:6,21 107:8
thin 9:19	145:21	71:4 73:6	108:13 111:7
thing 10:14	third 39:20	76:15 79:22	111:17 112:1
93:14 95:2,19	49:10 55:8	80:6,14 86:4	112:10,16
95:21 102:7	57:16 72:15	86:14 91:6	113:16 114:6
105:22 106:3	105:10,18	93:4 96:5,20	115:2 119:19
116:2 146:3	111:3 116:4	100:17 105:15	120:9,11
things 20:14,21	thirdly 24:21	105:20 109:15	126:11,17
44:18 78:5	25:14,17	115:5 116:10	130:1 131:10
94:8 96:9	thorough 118:4	116:15,21	131:13,22
97:10 114:12	thought 10:8	120:17 126:17	132:3 133:8
114:21 115:10	13:16 106:1	131:10 133:10	140:15 142:14
117:4 128:3	118:18 133:9	133:22 135:22	142:20 143:13
130:14 134:5	134:15 136:7	136:9 148:5	146:12 147:5
134:22 135:8	139:3	151:13	150:22 151:13
135:11 143:7	thoughts 8:19	time's 97:8	today's 6:5
145:1 146:21	60:4 112:2	timely 109:3	7:12 11:4 98:1
think 9:3 10:9	117:13 120:6	timesheets 99:9	113:13 151:2
10:9 14:2 26:1	133:1 150:22	timme 3:5 5:4	together 8:18
26:12 43:22	thousands	61:17 63:20,21	10:16 12:20
54:1 55:10	88:17	117:16 138:22	15:1,3,6 19:12
59:9 81:16	threatened	tobacco 36:4	26:18 37:4
91:3 103:8	90:4	74:12	47:13 48:8,12
114:14 115:4	three 23:22	today 6:9,15	58:16 60:14
115:15,19	24:1,5 32:19	8:14,18 10:7	69:20 74:19
116:4,17 117:1	32:21 44:22	11:11,14 18:14	82:11 88:6
117:3,9,10	54:12 55:21	18:20 19:7	91:17 93:1
119:13,13	57:20 123:20	20:6,22 21:9	98:4 107:13,20
126:4,8 133:14	143:22	21:16 22:16	110:19 111:9
133:17 135:12	thrilled 20:6	24:4,15 37:21	123:22 124:9
135:15 137:4,8	thrive 76:14	44:1 53:2,4,17	124:12,14,17
138:7 139:17		61:22 62:17	128:8,8,9,12

131:1 136:2 146:20,21 toll 10:2 tom 84:13,14 86:11,15 tomragsdale 86:12,14 took 79:21 120:9 tool 21:14 22:22 23:11 24:5,14,22 25:15 27:17,17 27:20 28:11 30:4,21 31:13 31:22 34:19 50:10 88:6 127:18 141:12 148:9 toolbox 27:18 toolkit 43:17 44:8 127:15 tools 4:11 6:14 17:8,12 19:21 20:1,8 22:13 22:18 23:14 32:5,15 34:1 36:16 38:7,18 40:20 43:8 44:6 45:21 46:18 47:17 50:16 52:17 55:15 56:15 64:20 75:16 76:2 78:3 82:16 89:2,4 90:11 92:11 98:21 99:1	117:8 120:16 120:19 top 68:11 96:15 102:10 147:18 topic 20:6,10 21:1 81:11 115:6 118:15 121:5 137:5,5 topics 44:9,15 102:1 107:8 total 58:5 148:15 touch 96:10 133:9 touched 96:10 130:1 touching 96:9 tough 146:1 toward 43:13 110:2 132:10 towards 43:11 113:19 131:1 148:12 149:7 town 77:18 toxic 27:10 115:21 137:18 trace 81:1 83:16 traceability 4:9 10:21 11:2,10 11:12,16,21 12:3,5,18 13:2 13:6,8,12,16 14:4,16 15:10 15:13,18,21 16:4,5,7,15,17 17:6,8,22 18:10,17 19:3	19:10 62:14 68:14,20 69:7 69:9 71:14,21 73:15,18 74:2 74:3,4,7,10 75:12,22 76:7 80:22 81:9,15 82:10 83:15 87:18 90:1,17 91:3,18 92:3 92:20 93:12 97:19 98:11 99:18,22 100:8 100:19 102:2,5 102:7 103:17 103:21,22 104:5 107:9 109:9,10,16 112:7,14,18,21 112:22 113:7 113:10,14,16 113:21 117:5,6 119:20 131:6 132:14 traceable 6:15 98:3 102:14 traceback 12:11 tracebacks 81:1 tracing 16:9,11 17:11 91:14 92:8 100:10 track 14:12 tracked 92:16 tracker 66:21 85:10	tracking 14:1 73:16 82:6 84:19 85:7,16 90:18 92:8,17 trade 28:16 138:7 trading 38:18 101:16 traditional 38:2 150:7 trained 57:12 training 9:16 31:6 32:15 36:18 52:15 56:21 64:20 67:2 69:19 92:6,6 130:7 trakkey 74:9 74:10 transactions 74:5,11 transcribed 7:3 transcriber 152:1 transcript 7:6 151:10 152:3,5 transcriptomi... 72:11 transformation 17:16 49:18 transformatio... 147:11 148:20 transition 7:14 transitioning 75:16 translates 84:8 transmit 139:19
--	---	---	---

<p>transparency 88:6,20 119:5</p> <p>transparent 76:11 87:15,22 92:1 126:22 129:21</p> <p>travel 65:20 78:12</p> <p>tree 90:6</p> <p>tremendous 8:11 10:4 21:14 26:2 30:3 31:13 32:2 78:3,4 79:21 91:4</p> <p>trend 130:6,8</p> <p>trends 41:16</p> <p>triangulate 12:9</p> <p>tribal 42:22 43:19 57:15 141:18 144:10</p> <p>tribes 51:6 128:9</p> <p>trillion 87:7</p> <p>true 12:7 74:16 115:13 152:5</p> <p>truly 13:15 14:1 19:13</p> <p>trust 29:21 67:22 111:8 116:13,16,18 116:20,22 117:10 135:16</p> <p>trusted 121:9 142:2</p> <p>trusts 22:20 32:6 116:9</p>	<p>trustwell 89:22 90:10 91:20 97:16,17</p> <p>try 12:9 13:4 17:5 24:22 45:6 78:6 139:10</p> <p>trying 18:8 28:9,11 94:3 137:10 140:8 141:5</p> <p>turbocharge 8:16</p> <p>turbot 66:21</p> <p>turn 10:21 19:19 114:7 126:12 140:10 146:14,16</p> <p>turning 92:4</p> <p>turnover 67:3</p> <p>turns 23:9</p> <p>two 33:14 69:20 72:2,3 94:21 117:1 135:8 137:5 138:2 143:4</p> <p>type 67:4 81:1 83:19 105:5 146:2</p> <p>types 118:10 144:16</p> <p>typically 109:19</p> <hr/> <p>u</p> <hr/> <p>u.s. 2:4,7,10,13 2:16,19,22 3:4 3:7,10 6:3</p>	<p>19:15 23:19 87:7,8 101:5 103:18 106:6 118:9 119:4 140:9</p> <p>ucla 69:17</p> <p>udall 115:8</p> <p>uk 97:2,4</p> <p>ultimate 40:6</p> <p>ultimately 12:20 14:16 102:9</p> <p>unapproved 24:9</p> <p>unaware 93:17</p> <p>unchanged 78:17</p> <p>under 8:21 13:2 32:11,13 33:2 69:1 79:10 105:4,5 109:14 122:15</p> <p>underneath 151:6</p> <p>understand 13:5 19:3 21:7 21:8 25:1 28:20 38:13 40:4 41:14 54:8 60:1 108:4 115:17 116:1 134:13 135:2,5 136:4</p> <p>understanding 14:6 40:19 41:15 134:8,21 136:16</p>	<p>understands 75:10</p> <p>understated 122:10</p> <p>undertake 69:6</p> <p>underway 100:15</p> <p>unified 7:15 82:16 141:12</p> <p>uniform 149:4</p> <p>uniformity 91:15 126:7</p> <p>unique 45:20 68:15 69:8 109:21</p> <p>uniquely 68:16</p> <p>united 1:1 11:20 23:20 24:19 47:15 87:17 106:10 134:10</p> <p>universe 23:13</p> <p>university 77:3</p> <p>unknowingly 93:3</p> <p>unmanned 39:8</p> <p>unnecessary 110:15</p> <p>unsafe 23:7</p> <p>unthinkable 93:3</p> <p>update 67:14 122:17</p> <p>updated 35:8</p> <p>updates 35:11 53:10</p>
---	---	--	--

uphold 77:11	useful 35:18	103:17 105:3,7	violative 23:7
upload 99:3	67:4	values 54:6	24:7 25:2
urge 88:21	user 75:3 85:10	79:9	viral 94:12,13
92:19 106:8	121:20	variety 12:8	95:12
109:16,20	uses 147:22	15:3 147:14	virtual 1:8 6:5
111:11	usgs 72:21	various 47:3	9:16 36:19
usage 94:16	using 11:22	49:19 100:13	59:2 98:14
143:20	17:15 23:14	121:18	123:15
usda 31:20	24:5,22 25:5	vast 51:14	virus 94:9,10
39:14 96:4	25:13 28:19	52:15	95:15,17
use 9:13 20:21	36:16 38:1	vegas 84:17,18	viruses 30:6
21:3,17 22:9	55:15 71:7	vending 39:11	visibility 14:5
22:12,17,17	72:13,21 83:20	vendors 74:18	84:7
25:11,21 27:19	98:22 99:2	verification	vision 48:7
29:9 31:7 32:5	100:9 105:9	34:9	81:12 130:3
35:4,19 38:11	108:6 110:3	verify 34:7,14	visit 34:10
40:10 41:11	usually 139:17	versed 34:20	visits 34:5
43:18 46:2,7	utilization	version 45:16	visualize 26:18
46:21 47:18	40:14 49:19	viable 80:2	26:20,21 27:14
49:14 52:11,14	utilize 34:14	vice 86:19	vital 87:6 90:12
52:17 59:19	68:13 123:5	97:15	voice 26:1
64:3 66:20	utilized 87:13	video 16:15	voluntarily
68:18 69:8	101:14 148:9	40:1 125:3	15:5 77:22
72:18 74:22	utilizing 144:1	videos 16:19	88:11 104:12
80:22 94:15	v	views 61:22	voluntary 34:3
95:11,15 96:3	validated	62:1	35:1 46:7
97:3,6 107:17	118:11	vinetta 2:11	vulnerabilities
108:4 110:21	validating	4:13 5:4 19:20	40:19,21 50:6
111:1,4,10	67:13 149:14	32:8 37:6	w
127:20 130:11	validation	61:18 63:16	waiting 7:14
144:7,10 149:9	117:22	64:9,11,22	waldrop 3:8
used 9:1 21:19	validity 56:14	117:13 120:6	4:18 53:9,12
21:20,21 33:10	valuable 51:4	123:9,13	53:12
34:6 72:6	75:22	128:20 140:11	want 15:11
78:22 79:17	value 49:11	142:15	26:3 27:2,4
110:5 113:7	83:15 98:5	violation	28:2 29:8
127:18 128:22	99:7 100:19	104:14	36:18,22 38:5
148:17			

38:9 40:4 53:2 54:18,19,21 55:3,5,21 56:13 62:22 70:2 91:17 99:5 103:3,4,7 112:7,14 113:19 118:2 120:8 121:17 122:6 123:14 124:2,3,11,12 124:13 125:10 126:19 127:8 131:10 132:2,3 133:2 135:14 136:17,20 137:4 138:13 140:14,18 141:15,15 142:12 143:19 144:4 146:5,18 146:19 147:2,3 149:16 wanted 19:6 54:7,10 55:2,8 55:13,15 58:1 58:4 59:8 80:19 112:1 114:5 117:19 121:13 125:20 129:10 131:21 wants 130:9 warehouse 75:7 warm 95:6 wash 95:22 washing 95:6 96:1,2	waste 10:4 83:18,21 99:15 113:2 watch 138:17 watching 151:14 water 31:3,4 83:19 95:7 way 14:13 16:19 18:6 20:15,18 28:17 30:17 59:17 72:7 78:6 86:6 94:1 102:17 104:5 106:5 114:3 116:17 121:3 127:4 133:15,17 135:8 138:6 143:17 ways 35:17 36:15 41:14 51:20 58:11,17 59:17 60:5 66:10 111:5 140:19 143:4 143:13 144:2,7 147:14 we've 11:18 16:17 17:9 24:11 27:3,7,8 27:11,17 31:1 32:17,21,22 33:16 34:6 53:18 58:6,17 59:3 60:11 68:15 91:16 99:8 103:18	115:5,9,22 116:17 118:6 124:1 135:6 136:6 138:4 148:14,21 weaknesses 51:20 wear 135:19,20 wearing 95:17 wears 135:17 webinar 21:16 57:16 58:18,20 58:22 59:4,7 60:22 61:6 126:18 webinars 44:15 57:19 58:6 124:21 webpage 7:2,4 151:9 website 17:10 44:19 51:13 56:10 58:21 113:20 websites 40:10 138:15 week 7:5 weeks 7:6 12:12 151:11 welcome 6:4 32:4 37:12 60:4,20 61:3 wellness 7:21 went 103:20 west 29:1 western 28:22 wgs 66:10, 68:1 114:14	white 58:17 73:12,13,14 wholesalers 101:15 wide 10:5 36:1 widely 110:4 wieselman 93:8 93:9,10 96:21 wig 136:8 wiley 107:5 willingness 111:8 windows 86:9 winnners 81:8 wins 117:2 withdrawals 12:13 won 74:3 wonder 137:14 wondered 137:16 wondering 137:17 word 83:9 115:3,4 words 115:12 work 7:17 8:9 8:11,18 10:11 15:6 21:2 28:2 28:14,15,22 32:1,4 33:1,8 35:2 36:11,22 37:20 38:15 40:16 41:4,22 42:3 44:1 45:4 47:5,9 48:11 48:13,15,21 50:11 52:1
--	---	---	--

53:15,18 54:3 54:13 55:16 56:4 58:15 59:10 60:6 63:12 65:4,8 65:18 66:9 74:18 91:17,20 92:12 95:5 98:4 100:5 102:11 107:11 108:8,19 109:16 110:18 110:21 115:9 115:16 118:9 120:12 121:11 121:11 122:4,5 122:12,14,17 124:14,17 125:21,21 127:15 136:2 137:2 138:1,3 138:6,10 148:20,22 149:6,16 worked 23:1,22 27:5,8 33:21 76:22 77:1 84:16 95:1 workflows 66:14,16 75:4 workforce 146:22 workgroup 43:14 47:6 50:2 127:13 working 10:15 19:11 29:2,3 37:3 38:8	39:12,18 40:21 43:11,13 48:17 54:16 74:7 77:2 85:2 88:21 103:13 104:21 107:4 121:18 122:16 123:1 124:1 127:13 131:1 132:8 141:4,10 141:13,16 148:12 149:22 works 117:12 world 9:8 12:5 15:19 23:5 29:15 74:12 92:13,18 139:9 worry 26:14 worse 94:8 wow 142:17 wrap 73:2 80:16,17 100:16 wrapping 21:13 write 13:1 71:13,16 writing 112:11 written 70:13 132:4 wrote 13:3 112:16 127:3	106:2 117:16 120:7 133:6 138:22 140:2 year 31:12,12 33:11 44:22 48:7 78:12 79:14 84:16 90:15 95:14 148:14,15 years 8:12 11:17 16:8 18:16,16,16 32:21 55:22 57:20 60:11 63:6 64:2 68:15 72:16 78:1,15 79:6 94:1 101:11 135:4 yuma 136:14
		z
		zero 115:21
	y	
	yiannas 22:5 yeah 28:14 63:1,20 106:1	