

EXECUTIVE SUMMARY

Harnessing Knowledge to Ensure Food Safety

Opportunities to Improve
the Nation's Food Safety
Information Infrastructure



**Michael R. Taylor
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FOOD SAFETY RESEARCH CONSORTIUM
GAINESVILLE, FL

SCHOOL OF PUBLIC HEALTH AND HEALTH SERVICES
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FOREWORD

We live in the Information Age, which is marked by an explosion in the amount of information that exists, as well as rapid advances in the tools for its collection, management, analysis and communication. People working on food safety, like those in many fields, now face an abundance of information generated by diverse institutions and individuals for a wide range of purposes. This presents both opportunities and challenges.

The *great opportunity* lies in the fact that food safety in the United States can be improved if those working to reduce foodborne illness—in government, industry, academia and the consumer community—are informed by the best available science, data and analysis. The *difficult challenge* is to be sure the information generated is what these diverse practitioners really need *and* to provide timely access to the information in a useful form.

Meeting this information challenge is crucial, because ensuring food safety is, at its core, a matter of collecting and making good use of information to identify, understand and prevent food safety problems.

This report addresses today's food safety information challenge by recommending ways to improve the functioning of what we have termed the "food safety information infrastructure" (FSII), which encompasses the many public and private institutions, programs and processes through which information is collected, made accessible, and actively shared to ensure food safety.

The project from which this report emanates was funded by the Robert Wood Johnson Foundation, which has long worked to improve how information is generated and used to help meet public health objectives. With the Foundation's support, we were able to convene, in a series of four workshops, a wide range of food safety experts from federal, state and local governments, the food industry, academia and the consumer community to discuss information needs and ways to better meet them. In workshop presentations and discussions, other in-person meetings and interviews, teleconferences, email conversations and comments on our drafts, a large community of individuals helped us understand current food safety information practices and the constraints under which individuals and institutions operate in collecting and sharing information.

Participants in the project also offered many ideas for how to overcome these constraints and specific suggestions for improving the generation and flow of information across the food safety system. We

base many of our conclusions and recommendations in this report on their input. We emphasize, however, that, although we tried to include as many perspectives as possible in our project, we could not capture them all. In addition, while the recommendations spelled out in Section Five of the report draw heavily on the input we received throughout the project and are intended to address the expressed needs of the community, we, alone, are responsible and fairly accountable for their specific content.

One of the first things we learned from the food safety community is that the FSII in the United States is even more multi-faceted and complex than we thought at the outset of the project, and significantly improving it will be more difficult than we initially thought. While technical issues abound, we found that improving the FSII is primarily a matter of redefining roles and relationships among its many participants and creating incentives and mechanisms for agencies and individuals to collaborate more closely and to act on their common interest in improving the food safety system as a whole. Our recommendations focus largely on these matters.

Improving the FSII will certainly not be easy, but the time is right to tackle it. We hope our report will contribute to progress by increasing understanding of the central role of information in ensuring food safety and stimulating discussion of both constraints and opportunities for improvement in how we meet our food safety information needs.

We will continue to welcome any and all comments on this report and ideas for improving the nation's food safety information infrastructure.

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We also thank our colleagues in the Food Safety Research Consortium (FSRC) (<http://www.thefsrc.org>), under whose auspices we conducted the project. Members of the FSRC aided us throughout the project.

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EXECUTIVE SUMMARY

Introduction

Ensuring the safety of the food supply is centrally important to the public's health and underpins the success of the nation's trillion dollar food and agriculture industries. Food safety is also one of our most dynamic public health challenges due to changing technologies and consumer practices and the globalizing food supply.

Over the last two decades, food safety experts and practitioners have made great progress in understanding food safety as a “farm-to-table” challenge that requires science-based efforts all across the food system to prevent foodborne illness. And, today, policymakers are considering how to enhance the government's role in ensuring food safety and better harness the capacity and primary duty of the food industry to make food safe.

For all actors in the food safety system—public and private—the effectiveness of what they do depends on the quality of the information they have on potential hazards and how to minimize them. Thus, any effort to improve the food safety system must address how a wide range of institutions and individuals meet their information needs.

In this context, the Robert Wood Johnson Foundation funded a project under the auspices of the university-based Food Safety Research Consortium to examine and make recommendations for improving the nation's “food safety information infrastructure” (FSII), defined to encompass all public and private institutions, programs and processes through which information are collected, made accessible and actively shared to ensure food safety. Through the project, a diverse collection of food safety experts and stakeholders came together for a series of workshops to discuss information needs and ways to better meet them.

This report and its recommendations are based largely on those workshop discussions, though the authors alone are responsible for the content of the report. Our hope is this report will provide the basis for further dialogue and actions to improve the use of information to ensure food safety.

Vision for the Food Safety Information Infrastructure

The food safety system and, in turn, the FSII, are comprised of many thousands of institutions and individuals at all levels of government, throughout the food industry and academia, in the public health and consumer communities, and, increasingly, in the international community, all of which are involved in collecting and using food safety information. They connect to and depend on each other in many ways, but operate, for the most part, independently.

The FSII is, therefore, best understood as a highly dispersed and decentralized network, rather than an integrated and managed system. The decentralized nature of the FSII has strengths that should be preserved, but it also complicates coordination in the collection of specific research or test data and other types of information, as well as the sharing of information, required for the success of a science-based, farm-to-table food safety system.

Thus, to better meet the information needs of all participants in the food safety system, *we envision an FSII that, through the better coordinated and connected efforts of many public and private parties, generates useful and timely information and makes it readily accessible to those who need it.* It is a system characterized by information not only being generated and used well within organizations but also flowing among organizations to enhance the overall effectiveness of the food safety system.

Based on our workshop discussions, we believe an FSII functioning in these ways would improve the contribution that participants all across the food system can make to ensuring food safety.

Today's Food Safety Information Infrastructure

The complexity and decentralization of today's FSII mean that initiatives to improve it face serious challenges. Nevertheless, a number of recent efforts suggest that progress is not only possible but already underway.

Challenges

Achieving the vision of an improved FSII is made difficult by the following realities of the food safety system and the FSII:

- **Many Information Types**, ranging from data on human disease rates and food contamination to information on the availability and cost of preventive measures and food safety practices in industry and among consumers.
- **Many Information Sources and Scientific Disciplines**, including government research and regulatory agencies, food companies and academic researchers and disciplines including veterinary medicine, epidemiology, food science, microbiology, risk analysis and economics.
- **Many Organizations and Actors**, including:
 - Multiple agencies of the U.S. Food and Drug Administration (FDA), U.S. Centers for Disease Control and Prevention (CDC), U.S. Department of Agriculture (USDA) and U.S. Environmental Protection Agency (EPA);

- Departments of health, agriculture and the environment and public health laboratories across the 50 states;
- Nearly 3,000 local health departments and retail inspection agencies;
- Millions of agricultural producers, hundreds of thousands of food processors, retailers and restaurants, and dozens of associations representing various segments of the food and agriculture industries;
- A wide range of government and university-based food safety researchers;
- Consumer representatives and organized victims of foodborne illness; and
- Overseas actors, including food producers, foreign regulators and international organizations.
- **Complexity of Information Needs**, for addressing both immediate problems, such as outbreak response and forward-looking analytical needs, such as microbial risk analysis.

Recent Progress

Today's understanding of food safety as a farm-to-table "system" challenge requiring science-based, preventive solutions has resulted in greatly expanded and, in some cases, more sophisticated information collection efforts by government and industry. These include:

- Improved foodborne illness surveillance and outbreak identification and reporting by CDC and state and local agencies, including increased use of electronic reporting systems, standardization of laboratory methods and ongoing efforts to improve coordination of outbreak response;
- More extensive food safety research, collection of contamination data and marshaling of other information for risk analysis by regulatory agencies;
- Rapid expansion of microbial testing and scientific validation of control measures by the food industry; and
- Increasing use of modern information technology and the Internet to compile information and make it accessible.

Constraints on Success

Despite recent progress, our analysis of the current FSII and discussions at the project workshops revealed important constraints on achieving the vision of better coordinated generation and wider dissemination and sharing of food safety information. Fundamentally, the FSII is constrained by the fact it is comprised of thousands of institutions collecting data for their own purposes, in accordance with long-established practices, and without adequate incentive to change those practices and incur the inevitable added costs.

The resulting reality of the FSII presents a number of specific constraints that should be addressed.

Lack of Mechanisms for Planning and Coordinating Information Collection

- Government food safety research is, at best, loosely coordinated and not sufficiently accountable to government regulators, policy makers and industry food safety managers.

- The management of food safety epidemiology is highly decentralized, mostly reactive to outbreaks, and not planned in close collaboration with government policy makers and industry food safety managers who can devise prevention strategies.
- Food contamination data are collected by many government agencies, food companies and researchers without coordination or concern for how the data might be aggregated or compared.

Institutional Obstacles to Information Sharing

- Government agencies generally lack a mandate and resources to collaborate on collecting or sharing information.
- Government agencies at all levels operate under legal constraints on information gathering and sharing, including privacy laws, protections against disclosing confidential business information and such federal measures as the Paperwork Reduction Act (PRA) and the Information Quality Act (IQA).
- Government agencies and others that collect information typically have a sense of ownership that can hinder information sharing.
- The food industry has competitive, liability and other business reasons to be reticent about sharing information.
- Academic publishing traditions result in large amounts of publicly funded research data not being accessible readily, or at all, to others who might find it useful.

Technical Constraints on Information Sharing

- The lack of standardized approaches to data collection—such as sampling protocols, sample collection methods and laboratory test methods—make it difficult and often impossible to compare or aggregate data from diverse sources.
- The incompatibility of diverse information systems and data formats complicates and sometimes prevents the meaningful compilation and sharing of otherwise similar data.

Recommendations

Our workshop discussions identified many specific issues and problems that stakeholders believe must be addressed to get the most value from existing food safety information and improve future information collection. We found, however, that most of the problems in the FSII are systemic in nature, meaning they are grounded in how the vast network of players in our decentralized food safety system see their roles, what their incentives are to act in particular ways and the obstacles that exist to acting differently. We believe that lasting solutions must respect and address these institutional realities and include mechanisms that facilitate diverse institutions working together in new ways.

Our recommendations thus include establishing a national FSII policy and program. This would provide both “top-down” leadership to catalyze change in the government’s approach to food safety information and “bottom-up” mechanisms for devising and implementing change. We also recommend actions and initiatives that respond directly to specific concerns and opportunities for improvement that we heard in the workshops. Some of these recommendations are broad cross-cutting initiatives that directly impact many institutions in the system, while others are more sharply

focused. We emphasize that the costs of implementing any of these recommendations may be significant and that how these costs are covered over the long term is an important consideration.

Our recommendations call for a major philosophical and practical shift in the current food safety system. Any such major change to a longstanding government program is inherently difficult to achieve and sustain. Launching the recommended transformation of the FSII will thus require high-level commitment, leadership and action from the Congress and the White House to provide the needed direction and resources. The sustainability of change will depend ultimately, however, on the program's success in meeting the information needs of food safety practitioners and stakeholders, including those in government, industry, academia and the consumer community.

Finally, our recommendations address the FSII from a broad public health perspective and with particular attention to how the many actors in the U.S. food safety system can better collaborate to reduce the well-documented burden of foodborne illness in the United States. We focus largely, therefore, on institutional roles, relationships and policies affecting the collection and sharing of food safety information. We ground the report as much as possible in the substance and science of food safety, but it is beyond our scope to address, for example, the need to improve the internal data management systems of government agencies or such important technical issues as how to improve the scientific quality of the data various parties generate.

We address the international dimension of food safety to the extent our recommendations for improving information collection, access and sharing relate as much to information about imported foods as about foods produced domestically. This project has not, however, examined the important question of how U.S.-based institutions might better interact with foreign companies and governments and international organizations. That question richly deserves its own study.

FSII National Policy and Program

Leadership from the federal government is critical to achieving our vision for the FSII's role in ensuring food safety, but no federal agency is charged with providing it. We thus recommend that the federal government, via legislation or executive order, make it the duty of all federal food safety agencies, whether involved in regulation, surveillance, or research, to:

- Foster coordinated approaches to collecting food safety information among federal, state and local agencies;
- Consider the larger needs of the food safety system in planning information collection; and
- Maximize access to and active sharing of food safety information among government agencies and with the private sector.

We recommend the federal government create two mechanisms for implementing this new FSII policy: the FSII Council and the FSII Stakeholder Forum. We also recommend a series of priority actions be addressed as part of the national program, listed in Box ES.1.

FSII Council

The FSII Council would be an intergovernmental body housed in the U.S. Department of Health and Human Services (HHS) and composed of the senior food safety official from the key federal agencies, centers and offices and at least an equal number of representatives of state and local food

safety agencies. The Council should have a line item in the HHS budget with an initial authorization in the range of \$25 million to fund its own base activities and catalyze initiatives to improve the FSII.

The primary responsibility of the Council would be to convene, coordinate and otherwise provide needed support to agencies in fulfilling their new responsibilities under the national FSII policy. Specific duties would include:

1. Seeking regular input on information needs from all participants in the food safety system;
2. Prioritizing, planning and coordinating implementation of actions to improve the collection and flow of food safety information;
3. Identifying any legislative or policy changes required to carry out needed actions;
4. Estimating costs and benefits associated with needed actions; and
5. Reporting annually to Congress and public regarding food safety information needs, progress in improving the FSII and key obstacles.

Box ES.1—Priority Actions of the FSII National Program

Participants in our project workshops made a number of suggestions for improving government practices related to information access. We recommend that Congress (or the president) direct the FSII Council, in consultation with the Stakeholder Forum, to consider and prioritize the following possible actions:

1. Prompt reporting and deeper access to CDC's outbreak and surveillance data, including online public access to national outbreak data collected via eFORS;
2. Treating FoodNet data as a public resource and making it promptly available and user-friendly to all interested parties in the public and private sectors, limited only by appropriate protection of patient privacy;
3. Expanding participation in eLEXNET by government laboratories, and possibly non-government laboratories as well, and, eventually, creating a means to make the information available online to the public;
4. Creating mechanisms to aggregate, analyze and share among jurisdictions the inspection, enforcement and recall information generated by federal, state and local agencies, including harmonized inspection reporting criteria and searchable online databases; state and local agencies, including harmonized inspection reporting criteria and searchable online databases;
5. Clarifying and strengthening protocols for rapid information sharing in outbreak situations among public agencies, with the food industry and the public, to ensure timely access to information needed to contain outbreaks and prevent future ones;
6. Greatly expanding the commissioning of state and local officials by FDA and other agencies to help foster information access and sharing during illness outbreaks, compliance investigations and other settings;
7. Amending or interpreting the IQA so as not to affect the release of information to other public agencies;
8. Making fully public information concerning research activities performed or funded by federal agencies, in particular USDA's Agriculture Research Information System (ARIS);
9. Standardizing and harmonizing sampling methods and laboratory procedures to enable data and results to be compared; and
10. Generally improving public Web access to publicly generated datasets.

FSII Stakeholder Forum

While the federal government has both the duty and capacity to catalyze and support improvement in the FSII, meaningful progress on most issues will not be possible without the participation of practitioners and experts from all elements of the food safety system. To facilitate this participation, an FSII Stakeholder Forum should be established under the auspices of the FSII Council.

The Forum would play a consultative role, facilitate the exchange of information and promote implementation of various programs and policies. In its consultative role, the Forum would be a principal means by which the Council would gather input on information needs and suggestions for improving the FSII. The Forum would facilitate the exchange of information by providing a setting in which members of the food safety community could identify common problems and share best practices, including advances in information technology that can facilitate data sharing.

The Forum could also serve as a mechanism for implementation of specific initiatives. For example, the Forum could facilitate dialogue and collaboration across institutional lines in efforts to standardize data collection methods.

Specific Initiatives

With or without the establishment of a new national policy and program to improve the FSII, the following are specific actions that could be taken to better meet the information needs of the food safety system. All are spelled out more fully in Section Five of the report.

1. Create a Food Safety Epidemiology User Group

In collaboration with state and local health officials, CDC should sponsor and lead the creation of a Food Safety Epidemiology User Group to ensure that publicly funded food safety epidemiology is as demand-driven as possible and of the greatest value feasible to those working to improve food safety. The User Group would include participants from throughout the food safety community, including those in government regulatory agencies, industry, academia and consumer advocacy. The User Group would work to prioritize the data and analytical needs of the food safety community and ensure data from publicly funded epidemiology are made accessible in the most timely and useful manner possible.

2. Create a “Network of Networks” to Improve the Interconnectivity of the Food Safety Web

To increase awareness of food safety information sources and overcome the “stove pipe” effect of isolated food safety databases, the food safety community should collaborate to create a “network of networks” for food safety information. Such a network would be based on a gateway Web site that would include a browseable and searchable directory of food safety databases and other information sources across the food safety system. The goal would be to support the diversity of the current FSII but improve the ability of those within the food safety community to find the information they seek.

3. Create a Database for Tracking Research and Data Collection

The federal government, acting through the proposed FSII Council and Stakeholder Forum or other suitable mechanism, should develop and maintain an online and searchable database of past and on-going food safety research and data collection and analysis activities, focused on subjects of current interest to food safety practitioners. The database should enable interested parties to find out what data are being collected across the system and what research is being performed on a particular topic of interest, whether the activity is conducted by the federal government, university researchers, or others. The database should include research and data collection and analysis activities related to particular pathogens, foods or commodities, and interventions—information practitioners could use to understand hazards and how to prevent them. The idea is not to duplicate published scientific literature, but to supplement it with up-to-date information.

4. Conduct Targeted Analyses to Identify Knowledge and Information Gaps

The federal government, through the FSII Council and Stakeholders Forum or other mechanism, should take the lead in conducting or sponsoring targeted analyses and systematic reviews of existing information to identify trends in research activities, unnecessary overlap in research and significant data gaps.

5. Initiate Dialogue to Prioritize Information Needs

Building on the research database and analyses outlined above, the federal government should drive an ongoing community and dialogue-based process to identify and prioritize the information needs of the food safety system. One approach to achieving such a dialogue would be to hold an annual research and data conference, bringing together representatives of major funding organizations together with representatives of regulatory and public health agencies, private industry, consumers and scientists from the research community. This gathering should not be a simple research update, but rather a focused and well-facilitated discussion of research and data collection required to solve current food safety problems, leading to as much agreement as possible on what needs to be done.

6. Increase Access to Information and Publications Resulting from Publicly Funded Food Safety Research

Data, analysis and other information from publicly funded food safety research, including academic research, have potential public health value. They should not be considered the proprietary resource of the researcher, but rather should be publicly available on a timely and complete basis, subject to some reasonable protection of the researcher's right to "first publication."

Achieving this will require efforts by researchers, their funders and the publishers of their work. We recommend the following:

1. The academic and government research community should use online data repositories to supplement peer-reviewed journal articles as the vehicle for publishing data from food safety research.
2. Government research grants should mandate that all peer-reviewed journal articles made possible by publicly funded research—whether generated by public officials, academic

researchers or those in the private sector—be made freely and publicly available online within a year of original publication, along with the data utilized within these publications.

3. Government and other research funders should take steps to ensure that complete data, not just articles, resulting from their investments are made available to others once the research projects are completed.
4. Journal publishers should work to ensure broader and less costly access to articles and also consider alternatives to current practices that would make research data available earlier and more broadly.

7. Increase Access to Industry-Generated Food Safety Information

The food industry should work with government and academic researchers to identify specific problems whose solutions might be advanced by access to industry-generated food safety data and other information and to find workable solutions to make such information available in an appropriate form.

Conclusion

There are no panaceas for improving the FSII. Our project workshops and other outreach to the food safety community revealed, however, both strong interest in the FSII's problems and many good ideas to help solve them. We hope the recommendations outlined here do justice to both the problem and possible solutions and help foster change that puts more and improved information in the hands of people who can use it to better ensure the safety of the American food supply.

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The Food Safety Research Consortium is a multidisciplinary collaboration between eight research institutions to improve the U.S. food safety system. The Consortium is developing new analytical approaches to make food safety decision making more science- and risk-based, including tools for allocating resources, setting priorities, and devising interventions.

www.thefsrc.org

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