Setting a National R&D Agenda for Population Health Informatics: An Invited Expert Symposium

Hosted By:

Venue: The Legg Mason Conference Center, Baltimore Inner Harbor

Thursday, March 27, 2014

Made Possible Through the Generous Support of:

The National Library of Medicine
DST Health Solutions (A CPHIT Industry Partner)
The Johns Hopkins Bloomberg School of Public Health
PricewaterhouseCoopers LLP
Accountable Care Solutions from Aetna
A. Conference Aims and Objectives:

By convening leaders from health care, government, industry and academia, the aim of this participatory, interactive symposium is to help set national research and development priorities for the newly emerging field of Population Health Informatics.

To accomplish this aim, the key objectives of the symposium are to:

1) Develop a consensus definition of Population Health Informatics;

2) Identify the key priorities of the field in terms of opportunities for using HIT/informatics tools to improve the health of populations;

3) Identify key challenges and technical hurdles facing the field;

4) Suggest a national agenda/roadmap for research and technical development in this field for the next 5-10 years;

5) Identify recommendations for how R&D stakeholders (including researchers, policymakers, HIT users and vendors, and funders) could facilitate this agenda; and

6) Disseminate the above findings to those with involvement and interest in the Population Health Informatics / IT field.
# B. Program Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:45-8:30am</td>
<td>Continental Breakfast and Registration</td>
</tr>
<tr>
<td>8:30-9:00am</td>
<td>Welcome &amp; Opening Remarks</td>
</tr>
<tr>
<td></td>
<td>Jonathan Weiner (Professor, JHU and Director, CPHIT)</td>
</tr>
<tr>
<td>9:00-9:45am</td>
<td>Keynote 1 – Farzad Mostashari</td>
</tr>
<tr>
<td></td>
<td>(Brookings Institution, Former ONC Director)</td>
</tr>
<tr>
<td>9:45-10:30am</td>
<td>Keynote 2 - Joshua Sharfstein</td>
</tr>
<tr>
<td></td>
<td>(Maryland Health Secretary)</td>
</tr>
<tr>
<td>10:30-10:45am</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:45am-12:15pm</td>
<td>Breakout A – See Sessions 1-3 Below</td>
</tr>
<tr>
<td>12:15-1:00pm</td>
<td>Lunch (Provided)</td>
</tr>
<tr>
<td>1:00-1:45pm</td>
<td>Keynote 3 - John Glaser (CEO Siemens Healthcare)</td>
</tr>
<tr>
<td>1:45-3:15pm</td>
<td>Breakout B - See Sessions 4-6 Below</td>
</tr>
<tr>
<td>3:15-3:30 pm</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>3:30-4:30pm</td>
<td>Synthesis of Today's Deliberations Breakout</td>
</tr>
<tr>
<td></td>
<td>Moderators, Facilitated by David Chin (JHU/CPHIT)</td>
</tr>
<tr>
<td>4:30-5:30pm</td>
<td>Reception / Informal Networking / Continued Discussion</td>
</tr>
</tbody>
</table>
C. Working Definitions  (Open to Discussion and Revision)

To help support the breakout sessions and keynote speakers, we offer the following “working definitions.” These are open to discussion and modification during the symposium.

**Population Health:**
“Population health comprises organized activities for assessing and improving the health and well-being of a defined population.”

**Comment:** Population health is practiced by both private and public organizations. The target “population” can be a specific geographic community or region, or it may represent some other “denominator,” such as enrollees of a health plan, persons residing in a provider’s catchment area, or an aggregation of individuals with special needs. The difference between population health and public health is subtle and there is not always a full consensus on these definitions. That said, public health services are typically provided by government agencies and include the “core” public health functions of health assessment, assurance and policy setting. In the US, most actions of public health agencies represent population health, but a considerable proportion, if not the majority, of population health services are provided by private organizations.

**Population Health Informatics (PHIT):**
“Population health informatics is the systematic application of information technologies and electronic information to the improvement of the health and well-being of a defined community or other target population.”

**Note:** For this symposium, we use the term "Population Health Informatics" and “Population Health IT” interchangeably. We will use the acronym “PHIT” to cover both concepts. We avoid the acronym “PHI” since this term would be confused with “personal health information”).

**Comment:** Again there is not full consensus, but in the US, the terms “health informatics” and “health information technology” (HIT) are often used interchangeably. We recognize that some consider “health information technology” to denote the information systems, electronic devices or tools, and “informatics” the application of said technology into practice. In both cases the intent of using the electronic tools is to impact health, deliver health care or to create related knowledge through research. For the purposes of this symposium, we will use the terms “HIT” and “health informatics” interchangeably. We also
recognize that there are other closely related terms commonly used to represent this domain, e.g., e-Health, or digital healthcare.

For this symposium we will consider the population health implications of all inter-related HIT to be in scope. This would include electronic health records (EHRs), non-EHR clinical registries and management tools, clinical data warehouses, public health/vital record systems, health management & claims information systems, personal health records (PHRs), mobile health (m-health) applications, telemedicine devices, and “big data” database/repositories and analytic systems.

D. Breakout Sessions: Background and Initial “Strawman” Outline of Issues for Discussion by Each Group

Material for each of the six breakout sessions is presented below. For each session the title, domain and scope are presented. To get the discussion going, the two moderators of each session have prepared additional material on a “strawman” basis. The talking points provided vary somewhat for each session and may include additional working definitions, background information and in most cases a starting point list of key challenges and opportunities and suggested research and development priority areas. All of this is meant as “preliminary draft” and is meant to be discussed, revised, added to, adopted or rejected as each breakout group wishes to during their session.

The flow of each breakout session will be as follows. As you can see there is plenty of time to allow for collaborative discussion and we hope that all participants will reach consensus on some of the top priorities. If time allows we encourage each session to talk about what the next steps would be to begin addressing some of these priorities.

<table>
<thead>
<tr>
<th>Item</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open the session + quick review of the one pager and slides</td>
<td>-</td>
</tr>
<tr>
<td>- Introductions (Name and Organization)</td>
<td>5</td>
</tr>
<tr>
<td>- Session format + Review one-pager</td>
<td>8</td>
</tr>
<tr>
<td>Open discussion</td>
<td>-</td>
</tr>
<tr>
<td>- Discuss PHIT working definition and/or session topic</td>
<td>10</td>
</tr>
<tr>
<td>- Discuss and prioritize ‘challenges and opportunities’</td>
<td>25</td>
</tr>
<tr>
<td>- Discuss and prioritize ‘key R&amp;D’ topics</td>
<td>25</td>
</tr>
<tr>
<td>Review and summarize the findings + Close the session</td>
<td>-</td>
</tr>
<tr>
<td>- Additional comments, potential next steps</td>
<td>15</td>
</tr>
<tr>
<td>- Closing the session</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>90 minutes</td>
</tr>
</tbody>
</table>
**Breakout Period - A (Sessions 1-3)**

**Breakout Session #1  (Moderators: John Loonsk, Brian Dixon)**

**Title:** Approaches for creating a robust, interoperable information infrastructure to support public and population health functions using EHRs

**Domain:** Public Health/Medical Care Collaboration for Population Health

**Room:** Atlantic/Mediterranean

**Overview of Session Scope:** National investment in the adoption of EHR and meaningful use has the potential to engage clinical providers and public health agencies in collaborative population health efforts through a shared information infrastructure. Interoperable HIT networks across communities -- sometimes referred to as Health Information Exchanges (HIEs) or Organizations (HIOs), or “private” HIEs -- are a key ingredient to achieving coordinated patient-centered care and population outcomes. To effectively build and sustain a national interoperable infrastructure for population health functions, collaborative clinical-public health efforts need to address several ongoing challenges. First, these efforts should address “governance” issues that include a lack of generally adopted standards for defining, structuring and exchanging data; inconsistencies in clinical EHR use; confidentiality, privacy, and regulatory compliance; and system interoperability. Second, national collaborative efforts should address issues in methodology including data quality; population health functions and indicators; generalizability; system design; and duplication of provider efforts. Third, efforts need to address organizational issues including business models, workforce, education, and workflow integration to sustain progress and support work functions.

**STRAWMAN MATERIAL FOR SESSION 1**

**Background:** The Affordable Care Act, new payment methodologies, and national investment in the adoption of EHRs and Meaningful Use has the potential to engage clinical providers and public health agencies in collaborative population health efforts through a shared, or at least well connected information infrastructure. Health IT infrastructure for clinical care, health departments and interoperable HIT networks across communities, electronic services between organizations and shared access to data stores are key ingredients to achieving coordinated patient-centered care and population outcomes.

**Working definition:** Population health comprises organized activities for assessing and improving the health and well-being of a defined population. Public health departments and clinical care population health management come at these needs from different organizations, cultures and levels of data access. A coherent, robust, interoperable
infrastructure for supporting population health will require a coordinated strategy to align information system, organizational, and human resources towards seamless exchange of data on health care services and outcomes.

To effectively build and sustain a national interoperable infrastructure for population health functions, collaborative clinical-public health efforts need to address several ongoing challenges. First, these efforts need to consider organizational roles, “business” drivers and shared needs. They should also address “governance” issues that include data access; a lack of generally adopted standards for defining, structuring and exchanging data; inconsistencies in clinical EHR use; confidentiality, privacy, and regulatory compliance; and system interoperability. Also, national collaborative efforts should address issues in methodology including data quality; population health functions and indicators; generalizability; system design; and duplication of provider efforts. Third, efforts need to address organizational issues including workforce, education, and workflow integration to sustain progress and support work functions.

**Preliminary List of Key Challenges and Opportunities**

1. Fragmented information systems and population registries in various units of population health organizations (e.g., clinical care, health departments, federal agencies, medical societies)
2. Fragmented, state-based approaches to the electronic submission of data from clinical providers to public health authorities for a wide variety of populations
3. Continued reliance on mass media approaches (e.g., email, newsletters) for disseminating knowledge from population health organizations to clinicians vs. timely and effective electronic services and decision support
4. Limitations for capturing and linking health information containing identifying characteristics across public health authorities
5. Existing workforce lacks education and formal training in informatics systems, tools, “big data” analytics, and methods for data management and exchange

**Preliminary List of Research and Development Priorities**

1. Better access to data and tools to support surveillance of clinical and community populations
2. Common, shared services and knowledge bases for health prevention guidelines like immunizations, cancer screening, etc. and community health trends that can enable population decision support
3. Methods for securely and privately linking records to enable cross-organizational data sharing in the public sector
4. Better approaches for integrating and analyzing large, population-based data sets to inform clinical and public health practice as well as health policy
Breakout Session #2 (Moderators: Aneel Advani, Michael Furukawa)

Title: Strategies for collaborating across health plan/provider EHR/HIT platforms in support of population health

Domain: Payor/Provider/IT Industry Collaboration
Room: Baltic

Overview of Session Scope: Payors are uniquely positioned to sustain the development of collaborative IT capabilities in support of population health. With their continual flow of patient data and comprehensive analytics platforms, highly interoperable payor systems could give providers timely, actionable insight into patient medical histories and health outcomes. Health plan-provider collaboration toward integrated IT platforms can significantly improve population-level efforts in care coordination and health promotion/disease management, inform care choices, and provide treatment and decision support. Examples of integrated payor-provider platform capabilities in support of population health include: augmented analytical capability to understand health status indicators for preventive health efforts, and creation and refining of disease registries to help providers identify and manage their patient mix.

STRAWMAN MATERIAL FOR SESSION 2

Background: Before defining common approaches to collaborative health IT capabilities and data sources among payors and providers, it is important to circumscribe their areas of programmatic and economic overlap in population health. We will address two areas of converging programmatic roles. We will first discuss areas of overlap between payor and providers on care models. We will move to discuss shared risk for population health outcomes among payors and providers and what this implies for interoperability and information flows. We can then address the issue of common data sources and health IT infrastructure. We will next move on to defining an agenda and outcomes for population health IT in this domain and conclude by outlining recommendations for policy-makers, regulators, and funders.

A. Care Models and Payor-Provider Collaboration: We begin by characterizing the chronic disease management and care management models shared between payor and provider. Achieving outcomes for population health requires coordination and collaboration on primary and secondary prevention, chronic disease management, and care management. What are the chronic disease management models with a population health focus? How prevalent are IT solutions that address and implement these new care models in the post-ACA world? What are the areas in which payors and providers need to collaborate and share information when managing populations of patients with single chronic diseases as well as complex co-
morbidities? What are the gaps in measurement systems for population-based outcomes that need to be filled?

B. Sharing Risk for Population Health: Population-based outcomes improvement approaches also require aligning incentives for payors and providers. Models for sharing risk include population-based payor-provider contracts. We will explore the implications for measurements and data involved in instrumenting share risk models and alternative quality contract and the requirements for financial and clinical data flows. What are the current gaps? We will then explore registry-based approaches and all-payor databases for sharing information on population outcomes and predictive analytics to allow risk-sharing on costs and outcomes across the payor-provider continuum. The United-Mayo database is one such example. What is the current state of these databases and how they are being used in the field? What are the differing needs of payors and providers and what are the measurement systems that complement the use of these population-wide databases?

C. Data Sources, HIT Infrastructure, and Analytics: Continuing the programmatic and requirements-based discussion, we will then delve more deeply into the health IT and data infrastructure issues. What are the new or existing data sources that can or should support the payor-provider collaboration? Are the standards for all-payor databases sufficient right now? Will the PCORI-type clinical effectiveness infrastructure be sufficient? Are there particular tools for analytics that are especially relevant? What are the implications and relationships between the data needs, risk sharing, care model design, and the electronic health record infrastructure in single hospitals and in provider networks? Will market power between payors and providers depend on the ability to marshal and control data sources? If so, what are the incentives to align approaches to common development and shared data infrastructure and capital outlays for health IT and analytics capabilities?

D. Agenda for Population Health IT: We will move to defining and outlining an agenda for Population Health IT in this domain of payor-provider collaboration. We will define the outcome or goals sought based on the data sources and HIT infrastructure discussion, and then summarize the gaps between the outcomes and the status quo. Using the gap discussion, we will outline the elements of an agenda for the field of Population Health IT/Health Informatics in the next 2, 5, and 10 years. We will then define the agenda for research and development as well as for the studies or evaluations needed in association with moving this agenda for the field forward.

E. Policy and Funding Recommendations: We will then conclude with a discussion about recommendations for payors, providers, and vendors regarding Population Health IT. What are the mutual and individual responsibilities of each of these communities in implementing the agenda defined? What are recommended actions for policy-makers and regulators in regards to the agenda? What should CMS, ONC,
the Health IT Policy Committee, HHS do to further the agenda? What should associations advocate for legislatively? What are the recommendations for private and public funders for Population Health IT R&D to further the agenda? What levels of private and public investments are needed to get to the 2, 5, and 10-year outcomes defined in the agenda? What is the role of international collaboration and shared public-private partnerships in securing this funding stream?

Breakout Session #3: (Moderators: Aldo Tinoco, Kitty Chan)

Title: Developing and validating quality indicators and other metrics for population health

Domain: Metrics and Methods for Population Health
Room: Java

Overview of Session Scope: With the widespread implementation of electronic health records and the renewed policy focus on delivering high quality, high value population-focused care, the development of electronically derived quality/performance indicators is becoming paramount. Such pressures are increasing the need for improved point-of-care process measures, end-result outcome measures, consumer-focused measures and community-level population measures. Over the last several years, there have been increased efforts to develop and validate electronic quality measures based largely on structured digital data sources. Yet, there is evidence that many measures are more richly documented in unstructured data elements (e.g., clinicians’ notes). Given that most patients get care from multiple providers and given the growing importance of many non-medical data sources (e.g., m-health or digital home monitoring), it is essential that data sources become interoperable and metrics become standardized if we are to fully understand performance at the care "system" of community levels. Moreover, for the foreseeable future, developing measures for resource-poor providers, patients and communities may be particularly difficult. With these parallel challenges in mind, the goal of this breakout session will be to identify research and development priorities to support the creation and dissemination of reliable and valid electronic measures of performance at the system/population level.

STRAWMAN MATERIAL FOR SESSION 3

Preliminary List of Key Challenges and Future Opportunities

1) Methods for prioritizing population health metrics and opportunities for future development
2) Establishment of the data infrastructure necessary for management of data for population health quality indicators and metrics
   a. What are the features of this data infrastructure?
b. Who are the stakeholders?
c. What are the barriers (e.g., technical, legal, ethical, organizational etc.) to building such a system?

3) Methods for improving data quality, accessibility, and comparability for population-level indicators and metrics
4) Understanding the role of new data and data sources in population health metrics: patient generated data (e.g., data from biometric devices), patient reported outcomes, and unstructured data
5) Methods for testing the psychometric properties of population level metrics: validity and reliability

**Preliminary List of Priority R & D Topics**

1) What framework is necessary to support implementation of current and development of new population health metrics (prioritization criteria, processes, partners)?
2) How do we identify and prioritize the capture of critical data elements for quality and other population health metrics (e.g., symptoms, patient outcomes)?
3) What are the most important missed opportunities in quality and population health metrics? How can concerns with actionability be integrated in identifying the most critical metrics to develop?
4) What are the new tools, standards and EHR technology features needed to enable capture and extraction of critical data elements for these new population health metrics?
5) Are there new concerns with respect to attribution for population health metrics? With a population or community perspective, who or what is the accountable entity for different types of metrics?
Breakout Period B — (Sessions 4-6)

Breakout Session #4 (Moderators: Hadi Kharrazi, David Chin)

Title: The next generation of HIT-based tools and applications to manage the care for patient populations within integrated/ACO delivery systems

Domain: ACO-Provider Systems for Population Health
Room: Atlantic/Mediterranean

Overview of Session Scope: The ACA has accelerated the move toward population health and value-based purchasing through the formation of Accountable Care Organizations (ACOs). To reach their financially-linked performance targets, ACOs must achieve evidence-based end-results measured at the "attributed" population level. Most agree that EHR/HIT systems are the "virtual glue" of the successful ACO: an ACO cannot achieve its performance and care management goals without robust EHRs. Many, if not most, ACOs do not yet have the HIT infrastructure or cross-provider interoperability to integrate and analyze population-level data in a timely manner.

The next generation of HIT-based ACO tools should not only serve as the basis for calculating the required ACO quality/performance metrics, but they should also offer solutions to manage and improve the health of an ACO's entire patient population. These tools will likely include multi-faceted care coordination and transition management systems, advanced population-level predictive analytics for case identification and high cost case management, patient-centric chronic care / disease management applications, and innovative applications of consumer and community derived digital data sources. This session will help identify the key challenges and R&D priorities associated in these and other areas identified by the participants. The session will be relevant not only to the current generation of ACOs, but also other current related (e.g., PCMH) and next generation initiatives that that will apply HIT to help independent providers focus on the entire "denominator" of consumers who rely on them.

STRAWMAN MATERIAL FOR SESSION 4

Preliminary List of Key Challenges
1) Shortage of established standards and interoperability frameworks to collate various sources of data that cover an entire ACO population
2) Lack of governance structures to align ACO management with data governance initiatives to facilitate sharing population-level data across provider boundaries
3) Misalignment of ‘Meaningful Use’ measures and population-level value-based-purchasing measures required by CMS and NCQA for ACOs
4) Ambiguous definition of population management in an ACO setting leading to insufficiency of PHIT solutions in delivering desired outcomes
5) Absence of successful PHIT implementation cases in ACOs that are newly established and have had no prior PHIT infrastructure

**Preliminary List of Top R&D Priority Areas**
1) Investigate pragmatic approaches to integrate data across various ACO systems including non-homogenous data sources (e.g., connecting individual patient devices with the ACO)
2) Develop and evaluate generalizable data governance frameworks for ACOs
3) Define a unifying framework for all population metrics needed by an ACO (mandated or optional) and identify data sources to capture them with minimal effort
4) Study the triple aim ROI (improved care, improved population health, and reduced cost) of PHIT investment and deployment in ACOs
5) Fund ACO Beacon communities to demonstrate the PHIT limits and opportunities

---

**Breakout Session #5 (Moderators: Peter Greene, Mark Dredze)**

**Title: Use and advancement of computer science and informatics tools and methodologies for population based interventions**

**Domain: Informatics and Computer Science Methods for Population Health**

**Room: Baltic**

**Overview of Session Scope:** As the amount and types of health data grow, new computer / information science methods and techniques are needed to help identify and monitor the health of populations. Natural language processing (NLP) and machine learning are among the many robust tools that could help, as could a number of “big data” storage and analytic modeling techniques being used in other industries. Population health research and intervention methods would benefit from commonly shared ontologies and data models that capture the complexity of the health states of individuals within a population. Some potential impediments to the adoption of these new techniques include lack of access to data, the development of shared infrastructures, and the usability and availability of advanced tools. Effective future research for population-based interventions requires collaboration among the pharmaceutical and biotechnology industries, healthcare institutions, the HIT industry, clinicians, public health and social service agencies, as well as the computer science and health informatics scientific communities.
STRAWMAN MATERIAL FOR SESSION 5

Preliminary List of Key Challenges

1) Data Access and Privacy: HIPAA, the rules governing health data privacy requirements, were written before the founding of Google, years before anyone conceived of the potential for large scale analyses. Privacy rules for substance abuse data are even more restrictive. At a time when data science has pushed for open data, data sharing and common data sets, current data policies have kept PHIT a generation behind technology in other fields.

2) Health + IT Collaboration: Any successful collaboration between technologists and domain experts requires a common language and ongoing conversations. Yet the technology and healthcare communities remain divided. Consider the illustrative case of the natural language processing academic community: while it has deep connections with linguistics and social scientists, the clinical NLP discipline is largely disconnected from the main research community. Meanwhile, health experts are often unaware of the capabilities of the NLP community. Research topics that have been solved in some application areas remain viewed as open topics in health.

3) Tools for the Rest of Us: A successful research system does not make a successful and usable software tool. While a problem is sometimes considered “solved” by the research community, it isn’t solved in practice until someone can transition the technology to a useable product. For example, the technology behind “Siri” and similar smartphone companions was developed years ago, but it took a dedicated team to bring the technology to the average consumer. Many NLP tools are currently available for general use in the form of downloadable software, vendor systems or web APIs. Yet in health, systems that solve common problems are often customized solutions, with few off-the-shelf high quality products.

4) Talent Shortage: Even mature software can require technology experts for deployment. As a result, many disciplines, such as computational finance, have people trained in the latest IT systems embedded in financial groups where they gain great domain expertise. In contrast, there is not a large pool of people who have training in core computer science topics with health expertise. The resulting gap in communities leads to confusion about which technologies are best suited to each domain.

5) Big Data Hype: It is clear that “Big Data” is the technology of the day. Whatever big data means, everyone wants a piece of it and everyone is selling big data expertise. The massive hype leads to genuine confusion. What is big data? What can and can’t it do? How can we reproduce big data studies? What established scientific and peer review techniques are suited for reviewing and understanding the big data literature? While big data analysis is certainly a valuable new tool, the hype has led to a confused and crowded landscape.
**Preliminary List of Possible Research and Development Priorities**

1) **Develop guidelines for large scale data sharing and analysis:** Many of the most important population health problems will require access to large and integrated sets of data. If we think that current guidelines and best practices for data sharing data and restricting data access are outdated, what should replace them? How can we enable groundbreaking public health research while ensuring patient privacy? What will it take to create common datasets? Are there any emerging technology strategies that might enable better privacy protections for shared data?

2) **Set research challenges:** Many fields focus their efforts by recognizing major research goals over a 10 year timeframe. Sometimes these are transformed into xPrize style competitions, or grand challenges. What are the technical research challenges for the next 10 years? How can we achieve them?

3) **Establish a platform to enabling software innovation:** Given the right environment, innovative companies will develop tools based on the latest research to meet the needs of domain experts. A number of experts have suggested that healthcare needs better and open platforms for advancing both transactional and analytic system development. What would be the best way to encourage the development of those platforms? How could we encourage startup companies to focus on public health informatics problems?

---

**Breakout Session #6 (Moderators: Bill Yasnoff, Harold Lehmann)**

**Title:** Strategies for linking non-clinical health data with provider-centric EHR systems and traditional public health records to support community-wide population health

**Domain:** Integration of Social/Environmental Data with Public Health/Clinical Data in Pursuit of Population Health

**Room:** Java

**Overview of Session Scope:** Health information is being collected from a variety of sources and is being made available in new and innovative ways to patients, providers, and researchers alike. Mobile applications and health devices are flooding the market for consumers to track their weight, food intake, exercise, etc. Such data sources (and others) could add to the depth of data already readily accessible within health care and public health organizations. Other data sources such as consumer reports, consumer location data, social media data, social/human service agency data and environmental scans could also be linked with data from EHRs and traditional public health IT systems.

These data could be used to help create more effective programs and interventions for entire communities or populations by giving researchers, providers and policymakers more insight into behavior, environmental factors, and service accessibility. Creating
HIT/informatics systems that can provide population relevant, yet person-specific data will be challenging. This will require joint standards and cooperation between consumers, providers, HIT vendors, the scientific community and public health professionals.

**STRAWMAN MATERIAL FOR SESSION 6**

**Preliminary List of Potential Challenges** *(need to prioritize during the session)*

1) What are the different sources of data beyond EHRs and public health records?
2) What standards are developers missing to represent and communicate data in the different systems?
3) How can person-specific data from a variety of disparate systems be reliably linked into comprehensive records for individuals, both technically and politically?
4) How can such data be made available for population health interventions?
5) How can/should privacy be protected in the use of these systems?
6) How can such systems be funded/sustained?

**Preliminary List of Potential R&D Priority Areas**

1) How can the value of various types of information be measured?
2) How can “non-personal” data (e.g., environmental, social determinants) be reliably linked to person-specific data?
3) How can the provenance of information be standardized and displayed to facilitate user understanding of its source and reliability?
4) How should the use of this information (clinical combined with non-clinical) be governed/regulated?