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January 19, 2011

Mr. Steven Posnack
Department of Health and Human Services,
Office of the National Coordinator for Health Information Technology (ONC)
Hubert H. Humphrey Building, Suite 729D
200 Independence Ave., SW,
Washington, DC 20201

Re: Request for Information Regarding the President's Council of Advisors on Science and Technology (PCAST) Report Entitled "Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward"

Dear Mr. Posnack,

On behalf of AMIA, I am pleased to submit these comments regarding the recently released PCAST report and its implications for the national health information technology (HIT) agenda and implementation of the HITECH Act. The questions you are considering are of great interest to AMIA, which is the leading professional association for the nation's top biomedical and health informaticians and serves as the center of action for the field. Our 4,000 constituents play important roles in health, healthcare, and science, and encourage the use of data, information and knowledge to improve both human health and the delivery of healthcare services. Our members are an interdisciplinary and diverse group of individuals and organizations that come from numerous countries, organizations, and backgrounds, working to support and leverage basic and applied informatics principles to help inform public policy issues, such as research and evaluation, patient safety, technology, change implementation, and quality of care.

Our comments are organized to respond to each of your overarching topics and related questions. Because of this formatting, some of our responses overlap as they are applicable to more than one topic.

General Comments

AMIA applauds the PCAST report for addressing important issues regarding interoperability and quality improvement. However, we note that the report highlights potential shortcomings and inadequacies in the current approaches and proposes a number of activities in addition to or instead of those currently underway. AMIA believes that the report would benefit from additional details and specificity to support the recommendations that are proposed. The report

does not mention the significant prior work that has been conducted in these areas. Additional consideration of data and lessons learned from the scientific and peer-reviewed literature would help to further support and substantiate the ideas presented. AMIA offers several references that begin to address this challenge cited in our comments and listed at the end of this submission. We are concerned that the "simplicity" of the proposed technical solution would not adequately handle health data well and is potentially not scalable as presented. As ONC is aware, it is impossible to enumerate what standards, mapping or criteria would be required for a vaguely defined and poorly referenced system.

AMIA notes that the PCAST report emphasizes data exchange between external healthcare systems. The presumption is that this exchange is needed to improve healthcare cost and quality. The report does not recognize that many of the benefits of the introduction of health information technology (IT) occur internally through workflow improvements, data accessibility and internal quality checks using locally implemented rules, many under the rubric of provider order entry. It is still unclear to what extent massive data exchange of raw clinical data among providers or provider organizations will improve cost or quality in healthcare.

The PCAST report criticizes current directions taken by ONC and CMS on health information interoperability and proposes what is presented as a new paradigm of health information exchange "at the level of the datum, rather than the message or document". The report states that these ideas are described in chapter 4. However, chapter 4 contains only general allusions, not a description of technical details for these ideas, and provides no references that provide sufficient description, prototype or other evidence that the proposed ideas are feasible and would lead to better results. Furthermore, there is no evidence that this “new paradigm” has worked anywhere else. We believe that the report process and its credibility would have benefitted from the participation of, and contributions from, additional subject matter experts in the theory, research, and practice of biomedical and health informatics as well as stakeholders with experience in the design, development, and application of health information technology and health information exchange.

Further, the PCAST report is silent about the role and contributions that can and should be made by other Federal agencies, and particularly by the National Library of Medicine (NLM). We believe that the lack of reference to the NLM and its significant efforts to develop and curate languages for health, healthcare, and medicine is a significant omission. It is disappointing that the report discusses the feasibility of creating languages for health, health care, and medicine without reviewing and citing the NLM's prior and ongoing work in this area, which lies at the heart of current efforts at terminology standardization in the U.S., and which has had significant and positive effects around the world. AMIA strongly believes that the NLM is uniquely positioned and qualified to lead efforts to develop a universal language of medicine.

The report is also silent about the need for a qualified health workforce with the requisite skills, training and education to help attain the desired goals; there is a major gap between the health professional workforce available and what is needed. Similarly the report is silent about training the workforce that is essential for them to be more accepting of new technologies.

ONC has initiated a number of significant workforce-related grants, yet AMIA believes that even more effort is needed in this area. AMIA has consistently cautioned that there is a pressing need to increase and broaden the pool of workers who can help health and healthcare organizations and practitioners to maximize the effectiveness of their investments in technology. Strengthening the breadth and depth of the biomedical and health informatics workforce is a critical component of the transformation of the American healthcare system through the deployment and use of HIT, and AMIA commends ONC for its current efforts to enhance the HIT workforce through a variety of novel stimulus programs. We believe that additional types of training opportunities are needed, however, to help address the types of recommendations suggested in the PCAST report. In an innovative, competitive health IT market, we believe that the value of biomedical and heath informatics is readily apparent through the increased speed and wider impact that advancements and innovations will have as they incorporate, and are guided by, biomedical and heath informatics knowledge and expertise.

Regarding ONC's specific questions, AMIA offers the following comments for consideration:

What standards, implementation specifications, certification criteria, and certification processes for electronic health record (EHR) technology and other HIT would be required to implement the following specific recommendations from the PCAST report:

a. That ONC establish minimal standards for the metadata associated with tagged data elements

b. That ONC facilitate the rapid mapping of existing semantic taxonomies into tagged data elements

c. That certification of EHR technology and other HIT should focus on interoperability with reference implementations developed by ONC

AMIA supports the effective organization, analysis, management, and use of data in support of patient care, public health, teaching, research, administration and related policy. To this end, AMIA strongly supports the development of thoughtful standardization processes and establishment of appropriate certification criteria and processes HIT and electronic health records (EHR). As previously stated, AMIA is disappointed that the PCAST report is silent about important, relevant agencies, such as the National Library of Medicine (NLM). The National Cancer Institute (NCI) has also made important contributions. Thus, AMIA strongly

encourages ONC to engage and rely on the expertise of these agencies. Leveraging their prior work and lessons learned will help attain success in what is a very aggressive program.

AMIA supports the rapid mapping of existing semantic taxonomies into tagged data elements. We view certification focused on interoperability and the establishment of minimal standards for metadata associated with tagged data elements as vital elements in the development of successful, efficient and safe EHR technology.

a. That ONC establish minimal standards for the metadata associated with tagged data elements

AMIA suggests that additional clarification is needed regarding what the PCAST report means by "metadata associated with tagged elements." What tagged elements? For example, are these the XML header tags that define each element of a mark-up document or are they at a higher level? If they are the actual tags, then thousands exist, all different for the same element such as person name, and metadata have not and will not clarify the problem. Metadata help only if they allow the computer to adjudicate simple differences among elements. AMIA notes that the idea of metadata standards has been attempted on many levels with poor results. A previous attempt was in the NCI, caBIG project (i.e., the caDSR), which failed to deliver on the idea of semantic mapping without a standard. (AMIA provides some potential resources on this and other issues in the Appendix to this submission).

We believe that the PCAST report underestimates the complexity of modeling the domain of medicine in general. In particular the report does not address how the metadata tag approach would address relationships between concepts in the model. AMIA encourages expanded discussions within and across organizations in the public and private sector regarding metadata standards and the definition of "tagged data elements." AMIA believes that standards need to follow function and that a key question needs to be raised, "What business processes are the essential core operations to be supported by the establishment of minimal standards for the metadata associated with tagged data elements)?" A decision needs to be made regarding which health domains to start with such as demographics, laboratory, medications, allergies, vital signs, scheduling, and unstructured data such as progress notes and reports. AMIA recommends that ONC commission a review of those metadata elements that have already been identified in existing standards and data models for these data. ONC should choose an "initial set" of categories, and the review could further include related elements such as code sets and constraints that would refine characteristics contained in that tag

AMIA suggests that such a review could be conducted in conjunction with and leveraging the prior and ongoing work of other Federal agencies. The Social Security Administration (SSA)

through several prior and current projects, as well as the VA and DoD, through their Veterans Lifetime Electronic Record initiative, are Federal agencies that are the involved with health information exchange efforts, in part because they are involved in communicating beyond their geographic boundaries. Thus, as ONC considers its options, we encourage your office to work with these agencies to ensure that they are able to send and receive SSA, VA, and DoD data that meet or exceed the minimum metadata tagged standard ahead of the start of Stage 2 Meaningful Use.

To the extent possible such efforts could also build on the work already undertaken by international organizations such as the National Health Service in the United Kingdom, the European Union, the Canada Health Infoway, and the National E-Health Transition Authority in Australia. In an effort to engage a wide group of technology stakeholders ONC may also wish to explore existing efforts within the private sector such as the Continua Health Alliance, a non-profit industry coalition founded by Intel, Microsoft, Kaiser Permanente, Phillips, Motorola, and other global corporations that are working to develop a structure and process for collaboration on the development of interoperability standards (http://www.continuaalliance.org/index.html).

ONC should also seek to leverage the work of the International Standards Organization (Technical Committee 215) that seeks to advance standardization in the field of health information to promote interoperability and enable compatibility and consistency for health information and data (see http://www.iso.org/iso/iso_technical_committee?commid=54960).

b. That ONC facilitate the rapid mapping of existing semantic taxonomies into tagged data elements

AMIA views rapid mapping of existing semantic taxonomies into tagged data elements as valuable to the development of EHR technology and health IT. However, it is not clear whether such an undertaking can be accomplished without significant additional and dedicated resources. AMIA suggests studying the lessons learned from existing semantic taxonomies, particularly the HL7 V3 RIM, before devising a new or different strategy for mapping. Further, ONC should consider exploring the potential roles for those organizations that have previously developed existing semantic taxonomies to map them to the new minimal standards.

AMIA believes that it is essential to develop a draft reference implementation for iterative testing before releasing beyond the initial semantic taxonomies. The initial draft reference implementation should be tested with mappings done from a few "early adopter" EHRs -- both governmental (VistA, RPMS, AHLTA) as well as commercial enterprise and ambulatory EHRs.

c. *That certification of EHR technology and other HIT should focus on interoperability with reference implementations developed by ONC*

AMIA commends the ONC for the fast-paced creation of Authorized Testing and Certification Bodies (ATCBs) in 2010. However, the work of the ATCBs in conjunction with the establishment of Meaningful Use (MU) criteria by the Centers for Medicaid and Medicare Services (CMS), as related to the implementation of EHR technology and HIT, highlights the pressing need to address interoperability criteria and certification early in the process. Without criteria and certification for interoperability, further EHR adoption efforts will possibly stall or freeze the industry with uncertainty. AMIA believes that interoperability is critical to safe and effective transmission of patient-centered data and that further, without criteria and certification, long-term meaningful use (e.g., a learning health system) cannot be realized.

Under the current certification process, providers or hospital systems may invest in a complement of certified products, assuming that the products will successfully address meaningful use and result in a well-rounded EHR system, only to learn after implementation that the certified products are not interoperable. AMIA supports and encourages heightened discussions with a targeted focus on interoperability criteria and certification; we support accelerating the timeline to develop and implement interoperability criteria as part of EHR certification. AMIA believes that the lack of attention to interoperability criteria within the current certification process is a key deficiency and will likely pose significant challenges and impediments to long term health information exchange.

What processes and approaches would facilitate the rapid development and use of these standards, implementation specifications, certification criteria and certification processes?

AMIA supports a coordinated and multidisciplinary strategy to assure the successful adoption of interoperable EHRs and true health information exchange. AMIA also supports continued dialogue and communication with all stakeholders to help assure that EHR product development and refinement are responsive to regulations and requirements. AMIA believes that improved efforts to communicate with and inform the wide diversity of stakeholders about the proposed processes are critical. Efforts are needed to translate the technical aspects of the proposed universal exchange language while focusing the dialogue on the benefits of better care of patients. Financial incentives for information exchange will need to be more closely aligned with the clinicians' desire to improve the quality of their care of patients and to improve their own administrative efficiency.

AMIA supports maintaining the iterative, incremental process currently underway. We believe that consideration or acceptance of any PCAST report recommendations should not abruptly

replace the current approaches in development. Some may argue that the incremental approach gives rise to providers and provider organizations postponing adoption pending further guidances from the government. Nevertheless, we do not view this as justification to overhaul rapidly the current processes. Instead, this concern demonstrates the need to provide assurances to providers that meeting current criteria will in fact facilitate the rapid improvement of the healthcare system.

As an example, after almost a decade of testing syndromic surveillance systems, much of the benefit is still derived retrospectively. Direct clinical data feeds to public health agencies are useful in tracking known outbreaks to allow fine-tuning and curtailing response when the outbreak is over. However, it does not appear that the cost of clinical data feeds for just this purpose has been justified. A key example of this type of system is the Centers for Disease Control (CDC) Nosocomial Reporting System that, for at least 3 decades, has used sentinel hospitals to monitor the sources and causes of hospital-acquired infections. Today the reporting is electronic and more complete but still controlled.

Research

Another example, similar to our discussion about Incremental Process, is reflected in AMIA's concern that the PCAST report offers strong statements regarding health information technology (HIT) and research but does not provide empirical data to support the purported savings to be achieved from an expanded exchange system. The report does not address a fundamentally unanswered but vital question—do current privacy rules inhibit research or is it local interpretations that deter research? A review of a decade of National Committee on Vital and Health Statistics (NCVHS) hearings on this topic (http://www.ncvhs.hhs.gov/pvcmemb.htm) provides a synthesis of the topic. In public health, where HIPAA is clear on the need for free exchange between private and public health, CDC spent a decade educating healthcare systems on the need for a permissive data exchange.

AMIA believes that that the issues now inhibiting research largely occur in the context of the adjudication of differences between HIPAA and NIH rules and in currently suboptimal use of the IRB system. For example, the National Center for Health Statistics (NCHS) has shown how to develop closed systems to allow research use of sensitive data under the present system. It is unclear that the public is willing to allow the unencumbered access to data mining that the PCAST report suggests. AMIA is concerned that the report does not directly address the greater value of a controlled statistical study in achieving research success and we challenge the report's assumptions, such as suggesting that the determination of a denominator as simple. The denominator issue alone is complicated. As noted in the report, clinicians record what is required and pay little attention to what is not. Those little discrepancies accumulate in denominator data and cause error. While costing money, controlled statistical studies give peer-

reviewed results of known error that is easily converted to clinical action. AMIA's report on research and evidenced based care offers additional insight into this topic as do our reports on use of data (citation for these are included in the appendix).

AMIA recognizes that rapid development is a complex task. With this in mind, AMIA suggests that the ONC has an opportunity to reassess its currently funded activities and internal efforts/projects. AMIA believes that an effective approach to development must involve a large scale coordinated effort across a team of universities, at least as large as CaBIG or the informatics components of the Clinical and Translational Science Awards (CTSAs). Resources should be of sufficient scale and appropriate to the task at hand and should support and facilitate a truly nationwide academic effort.

Given currently implemented information technology (IT) architectures and enterprises, what challenges will the industry face with respect to transitioning to the approach discussed in the PCAST report?

a. Given currently implemented provider workflows, what are some challenges to populating the metadata that may be necessary to implement the approach discussed in the PCAST report?

b. Alternatively, what are proposed solutions, or best practices from other industries, that could be leveraged to expedite these transitions?

AMIA believes that the healthcare industry has tremendous impediments when implementing health IT changes regardless of the approach used. When looking toward other industries for relevant examples, AMIA suggests that the fragmented nature of the healthcare industry prevents the identification of highly relevant or replicable examples.

What technological developments and policy actions would be required to assure the privacy and security of health data in a national infrastructure for HIT that embodies the PCAST vision and recommendations?

This question asks for actions that would be needed under the hypothesis that PCAST recommendations have been implemented. AMIA suggests that regardless of the specific infrastructure that is implemented there are a number of key considerations to help assure privacy and security of health data in a national infrastructure for health IT:

Policy

- Extension of HHS/government authority to regulate health data wherever they are located or transmitted, beyond the entities currently covered under HIPAA and HITECH.
- Adjudication of potential conflicts between federal and state privacy requirements, including possible federal preemption to create a uniform national floor.
- Consideration of opt-in or opt -out approaches and the state variation in supplemental privacy law.
- Implementation of services within the Data Element Access Services (DEAS) to enable and restrict access to the data elements consistent with privacy rules and policies

Technology

- Improve the accuracy of patient identification (e.g., unique patient identifier)
- Address the possibility of inappropriate data re-identification in order to gain patients' confidence and, thus, providers' willingness to invest in HIT.
- Provide reliable authentication of institutions and individuals, including patients and providers' credentials.
- Certification and/or accreditation of networks and larger institutions of health IT systems that internally control access, to control access consistent with the privacy rules and policies metadata tags.
- An extensive infrastructure for access to secure keys for decryption
- Development of EHRs that operate on the basis of distributed information models
- Development of technologies for validation of markup and of marked up content (e.g., type, range checking.).

Technology capabilities concerning data field or element permissions aside, the PCAST report envisions a level of individual control over data that significantly exceeds the current situation; for example, "As a privacy choice, a patient might choose to hide even the existence of certain data from the DEAS, for example the fact that he/she had received treatment at a particular facility." Aside from the clinical and legal liability implications of granting such granular control to individuals, the assumption of patient "consent" controlling the use and disclosure of health data proposes a fundamental change in the current HIPAA framework, which permits use/disclosure without consent for purposes of "treatment, payment and healthcare operations." While HIPAA is certainly not sacrosanct, such a change would have significant impact of healthcare organizations that have spent 10 years and untold dollars and person hours coming into compliance with the Privacy and Security rules of HIPAA. As we have suggested in our comments throughout, AMIA is concerned that the proposal of such a fundamental change in the regulatory structure that governs large swaths of the health information universe today seems to

have been simply assumed, without sufficient regard for previous work on these issues or the implications of such a change.

AMIA wishes to emphasize that discussions in the PCAST report related to technology envisioned for health exchange, including “middleware”, “cloud computing”, and the general notion of XML based messages, should not be seen as new methods. Instead, AMIA supports the view that future privacy issues far exceed the historical perspective of privacy. We assert that privacy and security requirements must be discussed on the basis of new technologies and considering the unforeseen and unintended consequences of HIT and HIE for potential levels of misuse, error and fraud in a new era of implementation and adoption, along with the potential for stifling research and technology innovations. AMIA’s recent report on unintended consequences of health IT and policy offers several recommendations in this regard and is included as a citation in the Appendix at the end of this document.

How might a system of Data Element Access Services (DEAS), as described in the report, be established, and what role should the Federal government assume in the oversight and/or governance of such a system?

AMIA believes the Federal government should help facilitate the introduction of a DEAS system by funding demonstration projects. However, AMIA strongly believes that it is essential that the Federal government conduct a careful threat analysis of DEAS from a cyber security perspective. Before committing the nation's health system to this schema, the vulnerability of such a system to Denial of Service and cyber attack strategies would need to be assessed. If such a system would result in unacceptable risks, due to lack of resilience to cyber attack, the project should be delayed until these issues can be addressed.

DEAS proposes an increase in the scaling of the old concept of a "record locator service", which is at the core of many HIEs, to an unprecedented level. After addressing the issue of resilience, the Federal government should assess the feasibility of the approach. Is it practical? Is it scalable? Based on estimates of the maximum population that a DEAS center could cover, with adequate performance, and some finite investment in hardware, the Federal government should estimate the number of DEAS sites needed and the feasibility of their assemblage into organizational units.

How might ONC best integrate the changes envisioned by the PCAST report into its work in preparation for Stage 2 of Meaningful Use?

AMIA emphasizes that preparations for Stage 2 of Meaningful Use must incorporate changes where approaches, processes, expectations and the way to monitor and measure have been

clearly defined. Effort should be focused on implementing an approach in which providers and patients have confidence. AMIA cautions against implementing what is easy or expedient without evidence to the stakeholders of measurable value.

We are optimistic about the achievement of data exchange as envisioned using the current methods. ONC is encouraged to establish the minimal set as rapidly as possible, covering all data that have been required in Stage 1, including quality reporting data, along with a reference implementation that can be readily accessed and used as a self-testing resource, so that vendors can begin preparing their products to exchange metadata-tagged data. ONC could fund shared middleware solutions, such as CONNECT, that could implement the communications protocols and provide services that can perform bidirectional transformations between structured data sets and properly constructed, metadata- tagged formats. Ensuring interoperable exchange of encoded information is a key step that should not be minimized in priority.

AMIA does not support wide-scale replacement of current efforts with those suggested by the PCAST report. Replacing current efforts would likely result in significant delays in adoption of electronic health records and the implementation of health information exchange. We believe that changing course at this time world essentially negate the value and benefits of the Federal efforts and investment to date on HIT and HIE. AMIA believes Stage 2 will require significantly more time and resources than presently envisioned and that reviewing, blending and utilizing the functional elements of Stage 1 into an interoperability roadmap and next-phase technology approaches will save time and improve on adoption, safety and efficiency.

What are the implications of the PCAST report on HIT programs and activities, specifically, health information exchange and Federal agency activities, and how could ONC address those implications?

AMIA believes that current organizational entities and infrastructures are not adequate to accomplish the goals of health information exchange as envisioned. AMIA proposes that, in addition to the current model of federal interagency-coordination and the oversight provided through the HIT Policy Committee, additional types of public-private sector partnerships, such as one modeled after Infoway or the Continua Health Alliance, could be considered

Are there lessons learned regarding metadata tagging in other industries that ONC should be aware of?

AMIA notes that metadata are more easily addressed in industries outside of health care, in which the industry representatives unite in vertical groups to achieve consensus around data elements. For the health care industry, AMIA encourages the ONC to consider lessons from the

rise and demise of the caDSR based semantic interoperability initiative. CaBIG architects started out with an attitude of doing better than existing health interoperability standards. They considered technology-neutral approaches and emphasized metadata mapping. But little or no evidence existed to support the viability of this approach and, consequently, the caDSR effort now seeks to use a reference-model based approach. The CaBIG process has been discussed in peer reviewed publications. We have included a list of potential references for ONC's use as part of this submission

In addition, AMIA recommends that the ONC review the HL7 V3 RIM, considering its efficiency or lack thereof, and consider how the proposed markup language could avoid the issues with efficiency and mismatch between the RIM and task information models that make HL7 V3 so difficult to use. To date, this has resulted in HL7 v2.X remaining the U.S. standard.

Are there lessons learned from initiatives to establish information-sharing languages (''universal languages'') in other sectors?

AMIA recognizes that a "universal language" is the standard practice within vertical segments of the business world. Without these standards, both for content and format, global business would likely come to a halt. The issue in healthcare is not one of example but the lack of an identified business need to have universally understood electronic information. AMIA strongly believes that members of the biomedical and heath informatics community have much to offer as the PCAST recommendations are considered and as a universal exchange language for health information becomes pervasive. Biomedical and health informaticians are experts in the use of information that is derived from basic biomedical research (biomedical informatics); they also apply their skills to the clinical care of patients (clinical informatics) and help to protect the public through a wide range of population-oriented activities (public health informatics). Informaticians' knowledge base and sensitivities span a wide range of disciplines including biomedical and health sciences, organizational behavior, and cognitive science, as well as computer and communications technology. A key goal of biomedical informaticians is to integrate multidisciplinary knowledge in the design, construction, and implementation of systems that can assure safe, timely, efficient, equitable, patient-centered, and effective care for individuals and populations. This includes knowledge and skills relating to monitoring and evaluating HIT, with a commitment to pursue open exchange of information about systems coupled with interventions to correct or mitigate problems as they are identified.

Summary

The PCAST report highlights an important area – the need for HHS (through ONC and CMS) to complement its current trajectory for meaningful use guidelines with much more active interventions and by focusing meaningful use guidelines for 2013 and 2015 on stimulating more

comprehensive abilities to exchange healthcare information. AMIA agrees that such robust, comprehensive healthcare data exchange can spur changes that would dramatically improve the likelihood for the Administration to achieve its goals to improve the quality of patient-centered health care and to contain the nation's rising healthcare costs. However, as there is no clear blueprint this has been challenging to achieve in other parts of the world, in contrast to getting providers to adopt electronic health records.

Furthermore, we caution that the PCAST report is too narrowly focused on ***healthcare*** information; when in fact current efforts must continue to be applicable more broadly to ***health*** information. Rather than focusing only on disease and management data, ongoing efforts regarding interoperability and quality of care delivery need to include considerations of issues such as population and public health, prevention, and chronic conditions. The role of the consumer is also critical to the future success of these efforts.

The more important goal, and one that we think is even more essential to reach, is triggering the emergence of person-centered, learning health systems throughout this nation, supported by a robust, innovative, competitive health IT marketplace. As AMIA is the professional home for experts and researchers in the area of health data representation and medical terminologies, AMIA would be happy to assist HHS by convening a work group of its members to identify the most feasible and highest priority areas for rapid development.

AMIA thanks the Office of the National Coordinator for its attention to what represents an important public policy issue. We serve as a source of informed, unbiased opinions on issues relating to the national health information infrastructure, the uses and protection of clinical and personal health information, and a variety of public health considerations, and we accordingly appreciate the opportunity to contribute to your deliberations. Finally, AMIA again wishes to thank you for inviting public comments. Please feel free to contact us at any time for further discussion of the issues we have raised.

Sincerely,

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Appendix: Selected Resources

Bianchi S, Burla A, Conti C, Farkash A, Kent C, Maman Y, Shabo A. Biomedical data integration - capturing similarities while preserving disparities. Conf Proc IEEE Eng Med Biol Soc. 2009;2009:4654-7.

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