ATP Initiatives in Healthcare Informatics

Background on the ATP 1999 Competition

The Advanced Technology Program announces the opening of its 1999 competition. This year ATP will not hold focused competitions but instead is conducting one competition, which is open to proposals from any area of technology. The subjects of the ATP research projects are proposed by industry and not limited to a pre-defined scope associated with focused programs.

The single competition is open to all technology areas and is structured to capture the advantage and momentum of focused program planning. The ATP competition encourages, but is not limited to, proposals from the many technical teams that have identified synergy between industry needs and ATP funding opportunities, accelerating the pursuit of critical elements of research which were identified in focused program plans. However, a goal of this hybrid competition is to allow industry to more rapidly respond to common barriers and opportunities without the delay of justifying a focused program. Instead of focused program competitions and boards, all fiscal year 1999 proposals received will be distributed to a technology-specific Source Evaluation Board (SEB). SEB technology areas include advanced materials, biotechnology, electronics, information technology and manufacturing. So, for example, many of the funded IIH projects and many of the proposals submitted to the IIH focused program would now fall under the purview of the Information Technology Source Evaluation Board.

Within the healthcare area, participants are welcome to submit proposals applicable to the previous IIH competition addressing elements of any of the three tiers of the pyramid (see figure 1 in the full white paper on Information Infrastructure for Healthcare at www.atp.nist.gov/atp/focusprg.htm#Ongoing). Alternatively, companies may want to propose innovative solutions to those technical challenges arising from the emerging healthcare challenges of the 21st century. Still other companies might propose technological approaches that do not fit either of these categories. All proposals submitted to ATP will be evaluated solely for their scientific and technological merit and their potential for broad-based economic benefits, with both parts weighted equally. There will be no need to determine whether a proposal falls within the scope of specific technical programs.

This year ATP invites companies to submit pre-proposals for project ideas. Pre-proposals are optional and do not impact the outcome of future ATP competitions. Pre-proposals are intended to provide intermediate feedback as to whether 1) your project idea is on track regarding information essential to developing a successful full proposal; and 2) your project idea is appropriate for cost-shared funding from ATP. Pre-proposals can be received at anytime throughout the year and will be reviewed as they are received. ATP will strive to provide written feedback generally within approximately two weeks after receipt. Please see the November 1998 ATP Proposal Preparation Kit, Appendix E for instructions.

Identifying the Vision

Within this past year ATP has invited the healthcare industry to submit ideas on their Vision of Healthcare in the 21st Century. Responses were received from individuals, corporations and consortia in the form of full white papers, brief position papers, emails, phone calls and visits. Significant input came from participation in informal discussion sessions held at the Towards an Electronic Patient Record (TERP) conference in San Antonio, May, 1998, the American Medical Informatics Association (AMIA) Spring Congress in Philadelphia, May, 1998 and at the ATP Information Infrastructure for Healthcare (IIH) Workshop in Gaithersburg, July ,1998. ATP has attempted to coalesce the responses into a robust vision of healthcare in the 21st century. The paper provided here is an amalgamation of words and ideas taken from a multitude of industry representatives, however we would like to especially thank the following contributors for their extensive contributions of white papers and position papers.

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[The HOST white paper available at their Website is a compilation of input from over 58 individuals and 40 organizations including research institutions, healthcare providers, universities and non-profit organizations.]

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Healthcare Challenges of the 21st Century

Emerging healthcare challenges are upon us as we enter the 21st century. Americans are looking for quality, cost-effectiveness, and personal satisfaction from their healthcare providers. The healthcare industry, responding to this highly competitive market, is reorganizing, consolidating, and integrating to form a new healthcare delivery structure that will enable the delivery of high quality, cost-effective care to everyone.

However, healthcare entities find it difficult to accurately determine costs associated with treatments. They have little or no basis for understanding costs associated with their services or tradeoffs associated with in-house versus contracted professional services due to lack of consistency across practices. As a result, many healthcare entities take on significant risk when either bidding or letting a capitated contract. Ongoing consolidation and affiliation of healthcare organizations increases uncertainty in cost projections and hence the complexity associated with efficient management.

Added to the costing complexities are greater demands for healthcare resource planning and disease management. In the United States over 14% of GDP is related to expenses associated with the treatment of chronic illness and acute care. Currently there are over 100 million Americans with chronic illness, including heart disease, arthritis, diabetes, depression, asthma, and Alzheimer's depression. Chronic illness, which correlates to aging, accounts for at least 70% of hospital admissions and half of all emergency room visits. The U.S. population is aging rapidly. Today, every eight seconds a baby boomer turns fifty, totaling 11,000 fiftieth birthdays every day. Projections are that by the year 2020 17% of the American population will be over the age of 65, significantly increasing the incidence of chronic illness and associated healthcare costs.

Macro health challenges of the 21st century must be addressed early on to provide opportunities for bettering individual and community health. The use of population data for disease surveillance can lead to better prevention and control of diseases and improved coordination of prevention efforts and medical care. An accurate definition of community health and disease status will facilitate health policy and resource allocation for health service delivery worldwide.

Coordination to the extent necessary to undertake the issues presented above requires the availability of "the right data to the right people at the right time in the right format for the right cost", made possible through open, interoperable and secure systems. Clinical repositories must support the efficient sharing of data, information and knowledge across the continuum of care, including clinical, administrative, and knowledge services. Such access to sensitive data raise privacy and security issues, prevalent among all information technology domains, but especially sensitive in healthcare. The risk of unauthorized access or disclosure of patient data and the lack of integrity of the information must be mitigated.

The Vision

Industry has formulated a vision of the future of our nation's healthcare delivery system to meet these challenges and has forecast broad and sweeping changes. The dynamic environment of healthcare delivery within the United States is driving change in the way healthcare will be delivered, when and where it will be delivered, and who will be providing care. Healthcare will no longer solely be the administration of physician expertise within the

confines of a doctor's office, clinic or hospital, initiated by the onset of symptoms. Care will be delivered to the patient at the most cost-effective location, and frequently delivered by medical practitioners other than physicians. Medical expertise will be acquired remotely. Diagnoses and treatments will be based on evidence of effectiveness determined by the collection of outcomes data and based on population and demographics information.

New models of care are being designed to address the challenges presented, and to improve the quality of healthcare, quality of life, and the productivity of the U.S. population, and to do this in a more cost-effective manner.

Seamless Continuum of Care

Information technology will provide the means for information sharing, knowledge representation and management required to establish a seamless continuum of care to all segments of the population. This means that the healthcare of local or regional populations can be addressed with a progressive spectrum of appropriate delivery entities such as home healthcare, ambulatory clinics, trauma centers, hospitals, or any other resource that is geographically distributed and available to that community. With increasing numbers of aging individuals potentially suffering from a variety of chronic illnesses, delivery of care must move in the direction of quality and cost-effectiveness. With the ability to remotely access sophisticated medical expertise and specialties when necessary, primary practice encounters will be administered by the lowest possible level of professional appropriate for the care being rendered. Each service will be designed, and each practitioner will be selected to minimize costs while maximizing the quality of care and patient satisfaction.

Information technology can provide an environment for the aging and chronically ill that will promote individual independence, reducing stresses on the caregiver community and demand on healthcare resources. Development and implementation of technologies such as sensor and actuator software technologies, communications architectures, data collection and assessment capabilities, and analysis and response systems will facilitate healthcare professionals in providing cost-effective home care. Bringing care to the patient will provide both the social and economic benefits that come from allowing people to remain in their homes and avoid institutional living.

Evidence-Based Healthcare

Evidence-Based Healthcare will play a significant role in the future of our healthcare system. Issues such as rising costs, unexplained variations in treatments and outcomes, inappropriate care, and uncertain outcomes are driving the healthcare community to acquire knowledge that will guide them in the appropriate delivery of care. The evidence-based approach, rooted in a wealth of geographically dispersed data, uses knowledge about the treatments and technologies that provide the best patient outcomes under different circumstances. The methodology of evidence-based healthcare is to provide the best and most current scientific evidence ultimately to the point of care. The generation and provision of such evidence will culminate in the development and support of practice guidelines and will facilitate the standardization of care.

Data on patient treatment and outcomes are needed for clinical functions, quality assurance, utilization review, business planning, and administrative and public health purposes. Predicting costs associated with services becomes a much less risky endeavor for a

healthcare entity when utilizing both internal and external outcomes data and standardized practice guidelines. With a proven, viable set of metrics against which to measure its performance, a healthcare organization can identify areas of high and low operational performance, implement risk mitigation strategies, and provide customers with informative, accurate knowledge. "When a healthcare organization measures and reports its performance it can more objectively allocate resources, target needed health services, identify improvement opportunities, and provide valuable information to purchasers and consumers."[1] So too can local, national and global health policy organizations, through communication of population outcomes generated knowledge, improve the cost-effective performance of national and international health systems supporting the health needs of populations.

Wellness and Prevention

"Consumer education needs to be an important part of the health care mission" according to Dr. Greenes. *Wellness and prevention* offer a strategy for coping with the costs associated with chronic illness, as well as with injury-related and other types of healthcare encounters. An emerging trend in this country is to shift more resources to preventive care and health promotion efforts. Traditionally, healthcare has focused resources on treatment, overlooking the benefits of prevention. By preventing incidents requiring hospitalization and the onset of disabilities that require long-term expensive treatment, significant reductions in the economic burden of healthcare can occur.

The public will be expected to share in the responsibility of maintaining their health. From personalized health risk profiles, *health risk assessments* will be developed. From this information, individual intervention programs can be developed to prevent onset of disease. Through personal health information systems, *health education* information and decision-support will be directly accessible to the public over the Internet, through newsletters, and through Telemedicine. A strong patient-centered lifetime wellness strategy combined with a robust patient education program could have a major impact on lifestyle-related chronic illness.

Disease Management is another important aspect of the Wellness and Prevention paradigm. Disease management is a prospective disease-specific approach to delivering health care, that spans all encounter sites including inpatient treatment, emergency services, outpatient care and home care. It is a new model of care that requires proactive intervention in illnesses at all disease stages, with the emphasis on preventing acute episodes and complications in order to avoid expensive and unpleasant hospitalizations. Common features of disease management are physicians guidelines, monitoring (drug and other treatment interventions), patient education, and behavior modification interventions.

Privacy and Security

The healthcare industry has established a need to make systems and data more accessible external to the organization where the system and data reside. This need arises out of new business relationships among various healthcare players established to respond to the new paradigm shifts in healthcare delivery, and from the need to deliver information directly to

[1] "Medical Management – Performance Measurement" the tenth article in the Medical Management " Signature Series" by Managed Care Resources, Inc. – articles on topics in managed care written by experts in the field. The author of this article is Roberta L. Carefoote, a Vice President of Managed care Resources, is an RN with 20 years of managed care QM leadership.

the patient to encourage and make possible patient involvement in his/her own healthcare decisions.

Open exchange of healthcare data and information mandates due diligence be practiced to mitigate the risk of unauthorized access or disclosure of information, or a lack of integrity of information. Systems must distinguish between clinical and personal information and each of these types of data must be handled differently. Clinical data is the proprietary property of the physician who collects and assimilates it, and who can then share this data as he/she determines. Personal data belongs to the individual patient who can specify access. Technically, solutions must come about that both allow for linking of clinical data to personal data, and preventing that same linking. Systems must be able to provide security against unauthorized access, maintain the integrity of the data, and confirm the originators and requesters of the data. Existing systems will not scale to meet these types of demands.

The Challenge

Information technology will enable the healthcare industry to implement these paradigm shifts in the delivery of healthcare that will allow for a more cost-effective and efficient, quality healthcare system. *Process reengineering and automation of current manual transactions and processes* are necessary technological accomplishments that will enable the implementation of a Seamless Continuum of Care, Evidence-Based Healthcare and Wellness and Prevention. One of the key problems to be solved is providing a means for practitioners to enter data they develop during patient encounters without imposing on the encounter process or the practitioner's natural, individual workflow. Such *Unobtrusive Data Capture* will allow for the development of resources such as the longitudinal patient record, knowledge services and clinical repositories that are necessary to address the healthcare challenges of the 21st Century. Be mindful however that providing information alone will not serve to improve quality of healthcare delivery. *Intelligent, Context-Based Presentation of Information* must be provided. Information must be intelligently presented to the practitioner in a fashion synergistic to his/her manner of practicing medicine.

Enabling technologies will allow for a seamless, evidence-based continuum of care to be delivered to the patient when and where it is desired, and that will allow the healthcare community to work collaboratively on integrated disease-treatment regimens. Healthcare delivery in the 21st century will have moved from fee-for-service to managed care, and from managed care to virtual health management. Each shift brings with it increased complexities in *knowledge acquisition, knowledge management methodologies, life cycle management issues and knowledge distribution issues*. Through enhanced user interfaces the real needs of the healthcare providers will be met, improving the results in all areas of healthcare ranging from acute to chronic care, from prediction to prevention, from inpatient to home care.

ATP encourages industry to address these and other healthcare challenges and invites those companies with innovative technical solution approaches to submit proposals to the ATP 1999 Open Competition.