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eFolio: A Secure Personal Data Manager Serving Physicians

**Proceedings of an
Invitational Conference**



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Executive Summary

Recent interest in learning portfolios has led to the planning and implementing of several working systems. However, these systems tend to support local needs rather than offer seamless application across the education and training continuum for all physicians. Several national organizations are exploring the feasibility of overlaying an open source electronic portfolio framework (eFolio) that could connect these isolated systems. The Association of American Medical Colleges (AAMC), Accreditation Council for Graduate Medical Education (ACGME), National Board of Medical Examiners (NBME) and Federation of State Medical Boards (FSMB) therefore co-convened a broad audience of educators, regulators, and other potential users, together with technical experts and vendors, at a two-day invitational conference in Baltimore, Maryland. The intent was to delineate a comprehensive vision for an eFolio framework, and to consider possible steps toward implementation of that framework.

Delineation of the vision involved re-examining the tenets of adult education and enumerating the services that ideally would be incorporated into a national eFolio approach, both in terms of the data requirements and stakeholder needs. To address concerns about data confidentiality, the notion of segregating private data from

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public data was explored. This led to conceptualization of a Private Learning Environment, in which individual physicians review a variety of data on “what” and “how” they are doing, undertake self-directed assessment, obtain mentoring if necessary and engage in appropriate educational activities to achieve self-improvement. In parallel, the Public View would, with appropriate authorization, accumulate accessible, credible and comprehensible data for such purposes as licensure, certification, credentialing and privileging. Central to this segregation of public and private is an immutable rule that nothing will enter the Public View without the authorization of the physician identified by the data.

In relation to implementation of such an eFolio, basic principles of design and operation were established for both the Private Learning Environment and the Public View. A variety of potential challenges were discussed, including the need for creation of standards, new assessment models, user and faculty development and training, appropriate business model and resources, technology appropriate to national scope, and last but not least, cultural change. Despite these potential difficulties, it was noted that collaborative discussions and pilots testing the feasibility of aspects of a national eFolio system are already getting underway.

Purpose

This document represents the dedication and hard work of many individuals. It reports the outcomes of an invitational conference held in October 2007 and summarizes an emerging vision for a national approach to build an electronic portfolio, or e-Folio, that supports and documents learning as a physician progresses through the continuum of medical education and practice (“the continuum”). The document is *not* a scholarly review of the portfolio literature or a detailed planning document.¹ It is rather a synthetic description of the invitational confer-

ence and describes areas of agreement and disagreement; the emerging vision; the next steps to be taken to realize this vision; and challenges to implementation. This document is written for a broad audience, for those who are in a position to influence the development of a national framework, and for all who could benefit from its development, including medical students, residents, health care professionals, practicing physicians, educators, regulators, vendors and information technologists.

¹ The interested reader is referred to several excellent papers by conference attendees:

Annotated Portfolio Bibliography at http://www.acgme.org/acWebsite/portfolio/cbpac_appendixa_bibliography.pdf

Driessen E, van Tartwijk J, van der Vleuten C, Wass V. The Role of Portfolios in Medical Education: Why Do They Meet with Mixed Success? A Systematic Review. *Medical Education*. 2007;41:1224–1233.

Lewin L, et al. Who You Are, What You Know, and What You Do: Competencies for Medical Learners. Personal communication, 2007.

Background

Portfolios are increasingly used as educational tools for documenting learner achievement of competence and of other educational expectations and outcomes. Simultaneously, electronic systems are increasingly replacing traditional paper systems. For example, residency application processes are almost entirely online now through the Electronic Residency Application Service (ERAS). Given the increasing need to document professional development across the continuum, there is growing interest among professional organizations, including the AAMC, ACGME, FSMB and NBME, in convening a community of interest around a national eFolio framework. The aim is to develop an electronic infrastructure that would gather experiences, outcomes and evidence of competencies appropriate to the education, practice level and daily activities of individual physicians; compile such data in relation to learning expectations and performance of other comparable learners; and present it to the individual to stimulate and guide self-assessment and self-improvement. This process of lifelong learning would continue through medical school and residency and out into practice. Such a system could also be used, with authorization of the individual physician, to provide selected data to designated third party viewers for a variety of purposes (e.g., licensing, certification, privileging and pay-for-performance). Such an eFolio system could also have the potential to provide salient data to both individuals and teams about their performance, as well as information about the microsystems and locales in which these individuals regularly interact.

It is clear that considerable innovation is underway in this area; examples include the collaborative of undergraduate medical education (UME) and efforts by the ACGME and others. In parallel, an expanding group of organizations has been meeting around the concept of a National Alliance for Physician Competence.² This national alliance, which was originally convened by the FSMB and also includes 40-50 other organizations, has held a series of five summit meetings. Its aim is to find common ground in relation to defining and maintaining physician proficiency. It is clear that physicians will need to have some sort of longitudinal record of professional expectations and growth from the beginning of their education to the conclusion of their professional career, in other words an eFolio. However, rapid growth in interest,

combined with an extraordinarily complex and fragmented system of medical education, practice and oversight, poses some risks. For example, if development is not coordinated, systems will likely be tailored to local context and implemented in isolation. Such systems may have common purpose but will be highly heterogeneous, with little or no portability across locales, time or the training/practice continuum. In effect, the medical education community will have created a fragmented system of tools and resources that cannot effectively be integrated and will likely add to the current siloed environment in which medical education takes place. It therefore seemed timely for interested organizations to come together to focus national attention on developing a transportable eFolio, and thereby to support physicians in serving the public's need for safe and transparent care.

May 2007 Colloquium

As a first step, the AAMC and NBME invited a small group of individuals, primarily educators, with experience and expertise in portfolios to participate in a colloquium in May 2007. The goal of the colloquium was to develop a white paper (now available at www.aamc.org) for use at a larger meeting, an invitational conference in October 2007. Colloquium participants were asked to discuss what would be ideal, as well as what "is." They worked in small groups and as a whole, and discussed the following general issues:

- The overall goals and major functionalities and services
- The principles of design and operation
- The importance of establishing an electronic (real time) format
- The need for data exchange from one location/program to another (i.e., interoperability) and along the education/practice continuum (i.e., transportability)
- The benefits of thinking nationally, while acting locally

Participants created the following high level definition for the e-Folio:

"a learner-centered framework that provides a large selection of functional data compilations and tools that stimulate self-assessment, reflection, mentoring

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² The list of attendees and the proceedings of the first five summit meetings can be found at <http://www.innovationlabs.com/summit/>

and the ability to report selected portions to other individuals and organizations for a variety of purposes.”

Participants noted several salient areas that could benefit from inclusion in an eFolio. However, they also recognized that an eFolio approach is not a panacea for all that ails our current health care system and attendant challenges. At the same time, they emphasized the importance of creating a coherent national framework that could begin to provide physicians with “just-in-time” individualized data compilations, together with analytical tools and benchmarks derived in standardized fashion from others with comparable experience and practice. This could provide a powerful mechanism to support their education and professional development, and lead to improvement of safety and practice processes and outcomes. The primary mechanism used by an eFolio is that of flexible “just-in-time” data compilations that serve defined functionalities and services. This relatively broad conceptual sweep demands that specifications and standards be applied to component data and metadata to maximize data accuracy and the ability to use the same data elements in data compilations with very different functionalities. The output of an eFolio system should also be formatted and presented in a compelling fashion, not only to the individual physician, but also to any third parties that may be authorized as additional viewers. The eFolio framework should have the potential to tell the story of the individual’s professional development seamlessly across time, providing on one hand an explicit statement of expectations, as well as a clear record of achievement in relation to such expectations.

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October 2007 Invitational Conference

Achieving consensus on the value of an eFolio, both conceptually and pragmatically, will require interaction among numerous key stakeholders, including representatives of professional societies, regulatory bodies, medical school faculty, residents, students and professional associations. Recognizing this, the convening organizations invited representatives from academic societies, faculty from medical schools with portfolio projects in place, and potential users and consumers of the resulting data compilations to attend a three-day conference in Baltimore, Maryland, held October 1-3, 2007. (See page 17 for a list of participants.)

As background for the conference discussions, participants received the “white paper” developed during the colloquium. The conference began with a keynote speech by Dr. Deborah Powell offering foundational principles for use of portfolios. This was followed by informal discussions, primarily in small working groups. Each group, led by a pre-assigned facilitator, and the working groups reported their findings to the larger group in a plenary session.

On the conference’s second day, participants spent their time in two different working groups; each was assigned a specific topic and reported back to the larger group after each session. Participants spent the final morning of the conference in a large working group that included everyone. The session was focused on identifying the areas of consensus. Participants discussed interest in moving forward with the concept of a national eFolio framework, identifying unresolved issues, the steps necessary for implementation, and the barriers to implementation that must be overcome. All the discussions were transcribed and have been synthesized into this document under two main sections: the vision for a national eFolio system, and implementation steps and challenges.

Philosophic and Theoretic Rationales and Framing

Many different justifications were advanced for development of an eFolio. For example, an eFolio, as envisioned by the participants, is consistent with principles of adult theory, which proposes that adults are:

- *Autonomous and self-directed.* Adults do better with facilitators and mentors than they do with didactic instructors.
- *Shaped by life experiences.* Adults must connect learning to their base of experiences.
- *Goal-oriented.* Learning should be organized, with clear goals and expectations.
- *Relevancy-oriented.* Learning must be relevant to the work.
- *Practical.* Adults should see a reason for learning something.
- *Deserving of respect.* Adults usually have a wealth of experiences and expertise.

In addition, participants noted that the current educational framework is in many respects uncoupled from the realities of practice. This reflects such things as: a long-standing separation of local educational activities and external, high-stakes assessment primarily for regulatory purposes; greater emphasis on knowledge than on skills and behaviors; experiences and testing designed for mass education rather than tailored to the individual; and the common refrain that “I learn and then I do, but not both together.” Most learners do not have insight into the details of *what* they are doing (i.e., their practice profile and how it is changing), or equally importantly *how* they are doing (i.e., in their processes of care or outcomes). In the absence of hard data, accurate knowledge of the “what” is muddled by the fallibility of memory. In addition, examination of the “how” by self-directed assessment is notoriously unreliable if it is not subjected to an external reality-check from peers with similar practices.

Another important generic benefit of an eFolio system may be that of engendering different approaches to education and assessment. For example, consistent with the precepts of adult learning, an eFolio could support a shift in perceived primary impetus for learning from the regulatory framework to the individual learner. It could also emphasize other educational frameworks, such as the contemporary emphasis on competency-based learning. With the ACGME/American Board of Medical Specialties (ABMS) competencies,³ it is possible to imagine that learning or practice expectations could be derived by spe-

cialty or subspecialty and by level of education or experience, under each of the six general competencies. These expectations could be displayed in the eFolio, and the physician could then request data compilations that speak to achievements in relation to each. This approach implies another important change in education, offering learning more tailored to the individual and yet also related to nationally specified learning outcomes or expectations. This is different from the traditional approach in which learning is driven primarily through a prescribed period of “seat time,” with a curriculum that is often remarkably local in scope and focus.

Another important consideration is the current move by the ABMS from “Recertification” to “Maintenance of Certification (MOC).” The eFolio could serve two purposes in preparing trainees for MOC. The first is the process of driving an individual’s learning and assessment. Both the eFolio and MOC will require learner initiative, active participation and documented self-assessment. The second is the MOC requirement for practice analysis with the intent of improvement. Engagement of trainees in eFolio documentation of ACGME competencies, such as practice-based learning and improvement, should prepare them well for MOC.

Widespread adoption of the Internet and wireless communications has set off an extraordinary explosion of social networking experiments, with massive voluntary sharing of data between individuals who may not even know each other. This has profound implications both for the likelihood that individuals will check their data with others, and for the discovery of new knowledge through a “wisdom of the crowds” effect. There was no consensus as to how the Internet and social networking might affect the conceptual design and development of an eFolio, but there was recognition that the younger physician with new and hitherto unavailable data in hand is technically equipped and culturally prepared to become involved in data-sharing with peer, mentoring groups that could usefully inform subsequent self-appraisal and self-development. This might lead naturally to socially driven professional self-regulation, new mechanisms for “safe” peer review and feedback, rapid dissemination of best practices and improved calibration of professional values.

Underlying Assumptions for the eFolio

Early portfolios were exclusively paper-based. This approach had two major shortcomings. The costs for handling and storage rapidly became prohibitive, and the

³ The ACGME competencies are available at: <http://www.acgme.org>

time involved in data acquisition, exchange and validation (e.g., “snail mail”) meant that very little data were truly current. Conference participants clearly favored a Web-based approach, provided that lingering difficulties over real time data-sharing and issues of confidentiality and security can be resolved. Several conference participants have already given this some thought. In relation to data-sharing, willing organizations were previously limited by incompatibilities in data architecture and operating systems. It was necessary to devise workarounds specific to each pair of data repositories. Data exchanges were difficult and thus limited in scope and frequency.

The advent of readily available tools for standardized data formatting, including Web services using XML and a service-oriented architecture (see *Technology appropriate to national scope* below), has the potential to change all this and to provide a means by which all data can in theory be sharable in real time across the Internet. Security and confidentiality with these systems are at least as good as they are with paper-based systems and potentially better in that data exchange occurs from machine to machine rather than from human to human. Accuracy is also correspondingly better.

Purpose and Services

The overall purpose of an eFolio is to provide data and support for individualized learning. It should speak to a culture of lifelong learning and improvement, and should support this through a combination of effective self-directed assessment and review to identify emerging problems and gaps in proficiency, bridge the discontinuities in education and practice and nurture a culture of continuous quality improvement and self-efficacy. A versatile toolkit should offer a variety of services and activities, including:

- Gathering, compiling and managing data
- Analyzing and formatting data
- Assessing data
- Reporting data
- Storing data
- Self-assessing and reflecting (supported by mentoring)
- Goal setting
- Recommending learning activities
- Tracking of learning activities
- Repurposing of data

Gathering, compiling and managing data

The sine qua non of any useful eFolio is the ability to gather data into compilations that have functional importance to the individual learner. The range of possible data (e.g., quantitative data, images, narratives, and videos) and of possible compilations thereof (e.g., curriculum

vitae, patient profiles, reports on processes of care and outcomes, self-assessments, e-learning) is enormous.

Analyzing and formatting data

In some cases, merely making appropriate data available to the individual may be sufficient. However, compilations will predictably be more useful if they include comparative data (or benchmarks) from other physicians who have similar practices. Compilations may also benefit from additional data analyses and formatting to generate a more visually compelling report for the learner.

Assessing data

It will also be important to provide a variety of different assessment tools. One potentially useful example would be in supporting self-directed assessment that is relatively low stakes and formative. This could involve multiple-choice question (MCQ) tests that are tailored to the specialty or subspecialty of the learner or to the scope of the individual’s actual practice as represented by experiences with patients over time (e.g., trends in the practice profile). Because practice-based tests will vary widely in their content, even for physicians in the same subspecialty, it will likely be impractical to provide standardized scores, but the learner could receive percentage correct scores that could be compared with those of other physicians who have similar practices. Additionally, because the practice profile of each physician – while different – is generally stable over the short term, it may be possible to show changes in scores over time, e.g., as educational interventions are undertaken. It would also be desirable to broaden the base of assessment beyond measures of competence in simulated settings (e.g., knowledge and reasoning) to include other domains (e.g., behaviors, skills, processes of care and outcomes) that speak to performance in real settings. Because the measurement approaches currently available for such assessment of work are much less well developed than are MCQ tests, it would be important to provide comparators or norms obtained from performance profiles of peers who have similar practices.

A second type of assessment would involve more summative, high-stakes tests such as those typically used for external, regulatory purposes. Thus, the eFolio system could track self-assessment activities and report them to the appropriate specialty board for purposes of MOC. The eFolio could also be linked to one or more of the performance improvement modules recently implemented by some specialty boards. Repeated assessment before and after continuing medical education (CME) might also be interesting in this regard. Participants discussed the desirability of providing instant feedback systems (e.g., dashboards) dynamically on the computer desktop of the physician. Such readouts could be requested by the

learner to show a particular element of performance, perhaps one in which improvement is desired, in order to monitor change in near real time.

Reporting data

The primary target for data compilations and derivative reports from the eFolio is the individual learner, but learners should also be able to authorize posting of portions of their data so that other designated individuals or organizations may view them. This could facilitate various credentialing functions (initial licensure and relicensure, initial certification and MOC, insurance credentialing, institutional privileging, and others). However, it is vital that such third party reporting occur only with express authorization of the relevant learner, both for security and confidentiality purposes and to maximize physician trust in the eFolio.

Storing data

Most participants agreed that an eFolio system should not be designed to redundantly store any data that is already stored elsewhere in a permanent data repository that meets adequate standards of custodianship. However, some requisite data are not currently or permanently stored anywhere; therefore, it may be necessary to create one or more new repositories for such “orphan” data. Any orphan repository could be hosted by entities outside the eFolio infrastructure, and several possible trusted sites exist already (e.g., medical schools during UME, the ACGME and residency programs during graduate medical education [GME], and the specialty and other professional societies for CME). It may be appropriate for the eFolio system to commission and support the creation and maintenance of new repositories and to encourage the use of relevant data specifications and standards as they emerge.

Self-assessing and reflecting

One of the professional values instilled in physicians is the habit of reviewing what happened, and how that action and its results might be improved. This is the focus of such hallowed traditions as morbidity and mortality conferences. However, many physicians may not have sufficient data, tools or time to stimulate or support formal self-assessment on a regular basis. The capability to enable and promote self-assessment is a vital service for an eFolio system. However, this needs to be done with care. Formal self-reflection is not always supported by physicians, despite the fact that many do already engage in thoughtful practice, albeit informally. Consequently, it may be useful to provide templates, anonymous exemplars and the opportunity to enter comments; these may assist the unaccustomed learner in gaining comfort with the process. It was also suggested that an eFolio could

offer a mentoring service, providing the learner with the opportunity to collect comments and suggestions on his or her data compilations and reflective pieces anonymously, from other physicians who have similar practices.

Goal setting

One important end-point for self-assessment and self-improvement is for the learner to make plans for appropriate additional learning. This might involve relevant e-learning opportunities, or formal CME or continuing professional development. Learning goals should logically be informed both by practice profiles and by the results of self-directed assessments.

Recommending learning activities

An eFolio could offer a “finder” function that matches the established “learning needs” of the physician with specific CME content. In parallel, a “recommender system” such as those increasingly being adopted by online services, could suggest appropriate interventions to interested learners (“physicians like you might want to read the following...” or “.....might like to consider taking this CME course based on your recent self-assessment results”).

Tracking of learning activities

An eFolio could also offer to track and keep a current record of educational activities, including CME, that are undertaken, the credits obtained and the results of any associated assessment.

In contrast to the primary emphasis on the individual learner discussed above, an eFolio could also help assess learning effectiveness at the program level. For this purpose, data compilations would be aggregated across individuals at the appropriate level of group or program. The availability of a comprehensive, longitudinal data set that could be displayed at the desired group level could also provide an important new tool for program evaluation and educational research.

Repurposing of data

Legitimate concerns about the time commitment necessary for the learner to build a record of professional formation in an eFolio system could be mitigated through opportunities for repurposing of data. Data entered electronically and correctly once should never need to be entered again. The system should also provide software tools to allow the learner to compile data and present them in a variety of formats to satisfy practitioner needs as well as external requirements.

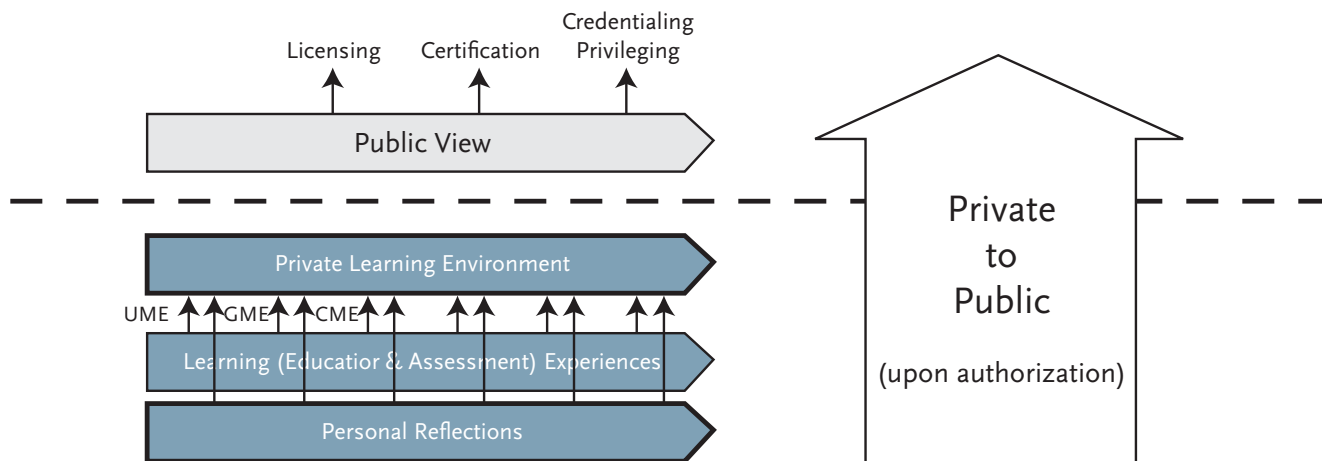
Segregation of Public from Private Data

Conference participants found it helpful to conceptualize an eFolio system in terms of two distinct and segregated data-viewing areas, private and public.

The private area would be exclusively for the individual learner and would be self directed. The information included in this Private Learning Environment would be accumulated through a combination of learning experiences (both educational and assessment) and reflections, as shown in Exhibit A.

Exhibit A

Conceptual View of Separation Between Public and Private Layers



The information could include results from most of the services discussed above, as shown in Exhibit B.

Exhibit B

Private Learning Environment – Examples of Services and Data

- Basic credentials
- CV/references
- Summary of progress through the continuum
- Learning expectations appropriate to experience
- Practice profile and changes over time
- Assessment
 - o Self-directed
 - In self-defined area of interest (tied to practice profile or specialty/ subspecialty construct)
 - o Externally applied (e.g., licensure, certification)
- Processes of care
- Outcomes of care
- Supporting evidence
- Reflection
 - o External validation
 - o Mentoring if appropriate
 - o Planning for self-improvement
 - o Tracking CME

Under normal circumstances, all data in this area would be private and available only to the physician identified. However, there was a strong consensus that any eFolio system should also offer the capability for selective posting of data and derivative reports to third parties, providing that learner authorization has been obtained. This feature would permit the learner to obtain external validation of self-assessment activities or to post data to the public viewing area to satisfy regulatory mandates.

The Public View of an eFolio would focus on data that are publicly accessible and/or externally relevant. In today's electronic world a surprising quantity of information can be obtained on most people, and physicians are no exception. As examples, licensure and certification status,

In both the Private Learning Environment and the Public View, any reporting of identified data would require specific authorization by the student or physician.

hospital and clinic affiliations, location of practice, state disciplinary actions and basic demographics are in the public record and often instantly accessible through the Internet. However, for many of the external reporting requirements, it is still necessary that such data be demonstrably accurate (i.e., source verified).

In both the Private Learning Environment and the Public View, any reporting of identified data would require specific authorization by the student or physician. However, if data are grouped or de-identified to make attribution to an individual impossible, such data might then be used for other purposes, including accreditation, program evaluation, and legitimate educational research.

Implementation

Principles of Design and Operation

As noted previously, the fundamental premise for the eFolio under consideration is to build a system of learning, assessment and self-improvement that is effective in promoting lifelong learning across the continuum. In addition, the eFolio should be built for physicians and their needs and not merely adapted with some modification from a non-medical domain as has occurred with many Electronic Health Record (EHR) systems. The eFolio system should be capable of productively engaging most physicians, regardless of origin, site of training, specialty and status of licensure and certification. This is important to build a collective level of trust in the eFolio and its services as a necessary prelude to deriving sufficiently accurate benchmarks (a task that will be challenging given the wide diversity of possible practice profiles). The eFolio should also broaden the basis of learning across the broad scope of necessary proficiency or, to coin a phrase, across one's "physicianship." It is not enough to focus on knowledge and its application. Feedback and assessment relevant to behaviors and skills must also be available. It is also critical that eFolio design maximizes the ability to assess performance in real settings, as well as competence in simulated settings. Similarly, the learner should be able to review performance within the context of a particular team or system, as well as an individual in isolation.

Education has long relied on the learner eventually clearing an assessment hurdle that is summative and viewed as high stakes, and either "gate-keeping" or frankly punitive. The eFolio should offer a learning approach that includes more formative, non-punitive self-improvement in addition to the summative assessment. It might at first blush seem likely that the Private Learning Environment would focus on non-punitive self-improvement, while the Public View would rely on traditional high-stakes assessment. However, a better approach might be to include the means of support for both high-stakes and lower-stakes assessment in both areas, and let the learners pick what they need.

Conference participants agreed that the eFolio should both support and stimulate reflective practice and ongoing self-improvement, with the goal of improving health care and patient safety. The importance of self-assess-

ment (reflection) as a professional value has been mentioned previously. While most physicians engage in some reflection regularly, many might benefit from receiving a periodic stimulus in the form of appropriate data compilation(s), or templates and exemplars, or possibly even mentoring input from appropriate personnel. It is clearly desirable to remind learners of the professional expectations they take on and to which they aspire as a physician. These include generic values and behaviors expected of most physicians in most settings. The National Alliance has recently formulated a document, *Good Medical Practice – USA*, which codifies and lays out these expectations.⁴ Beyond the broad input already obtained from the organizations that "constitute" the National Alliance, this document gains added weight because it is based on a similar document (*Good Medical Practice*) that was commissioned by the General Medical Council in the United Kingdom and adopted in 2005.

The eFolio should offer a learning approach that includes more formative, non-punitive self-improvement in addition to the summative assessment.

To these generic expectations can be added those relevant for each specialty and subspecialty, and these can also be arrayed in relation to the competencies frameworks. An example might be as follows: "Under the heading of communication skills, a third year resident in pediatrics is expected to be able to take a complete history from the patient, engaging both the child and the parent." Other expectations may derive from specialty societies or specialty boards as part of MOC or could be self-imposed. The learner can then use the eFolio to review his or her achievements in balance with such expectations. Explicit learning expectations add context and saliency to measurement activities. They are also entirely consistent with making learning more active and helping the individual to become an important agent of responsibility for self-improvement (in addition to the external regulatory bodies that traditionally drive this process.)

The eFolio must be broadly viewed as providing a safe harbor for the individual learner's data, especially within the Private Learning Environment. Adoption of state-of-the-art security and confidentiality protocols, together with regular upgrading, are the bare essentials. These features by themselves may not build sufficient trust to encourage use by skeptical learners, such as those for whom reliance on an electronic platform may be a difficult sell. It therefore makes sense to include other design

⁴ http://www.gmc-uk.org/guidance/good_medical_practice/index.asp
<https://gmpusa.org/>

features that increase trust regarding security and confidentiality issues. Perhaps the most important point has already been mentioned several times: Compiling data and posting reports to someone other than the learner must require the learner's authorization. This rule would not preclude release of data from the public area if the release is pre-authorized through a utility that builds a permissions profile customized to each learner (e.g., "if this organization asks for data relative to privileging, release it" or "if this organization asks for any data, check with me first" or even "should not ever release any data to this organization"). Nonetheless, everything that happens with identified data must be authorized by the learner at some point before it can occur. Trust in this sense may be compared to use of automatic teller machines (ATMs), online shopping, or online banking. Users do not necessarily like using these services but value their convenience and generally accept that the levels of security and confidentiality are at least as good as they are with the paper-based analog.

Interoperability and Transportability

The need for the eFolio to be interoperable across settings and transportable across the professional lifetime of a physician was a key starting premise for the October 2007 invitational conference, and participants upheld this premise. However, details regarding this remain unclear. Interoperability and transportability seem relatively straightforward in relation to the public area. Much relevant data are already publicly accessible, reside in organizations that can provide data 24/7, and have broadly comparable and reliable custodianship policies. As the learner proceeds through various educational experiences and out into practice, the eFolio would simply add relevant data through linking to additional repositories and matching any new organizational IDs as appropriate. However, several issues will need attention.

First, sharing data across repositories of such diversity will absolutely require consensus-based data specifications and standards, some of which are already in development.⁵ Second, it will be necessary to have clear policies (e.g., to deal with the case of data elements available from more than one repository, in order to decide which version should be used). Third, robust mechanisms will be needed for primary source verification of data. Fourth, data used in the Public View generally should be available in perpetuity. It will also be important to ensure that conceptual development of the public area is closely coordinated with emerging processes to monitor proficiency more uniformly at a national level (such as the National Alliance process).

Interoperability and transportability for the Private Learning Environment are less straightforward. The first issue is security. Repositories for private data are specific to different phases in the continuum and therefore much more heterogeneous. As noted previously, most private data relating to UME will be stored within medical schools, while those for residents are at the level of the residency program or at the ACGME. The situation for practicing physicians is much less predictable. Since the private layer is for the benefit of the individual learner, it must be perceived as offering unassailable security and confidentiality. The siloed nature of data custodianship actually provides an advantage in regard to added security for confidential data, particularly since the design envisions that data, compilations and derivative reports are always expunged from the infrastructure after posting to the learner (and to any authorized third party viewers).

In contrast to the "official record" nature of the Public View, the design of the eFolio should make it feasible within the Private Learning Environment to expunge potentially sensitive data that are no longer required (e.g., at graduation from medical school and upon completion of residency). This option would clearly appeal to medical schools and residencies if they continued to have access to relevant data in the Public View and could use these for educational purposes (e.g., program evaluation and accreditation). It would also be easier if the relevant repositories were less heterogeneous. (It is noteworthy that the ACGME is developing a learning eFolio that will impose some basic level of standardization on all residency programs.) Most schools have transitioned from paper to digital records, but the data solutions vary widely. A second, related issue is that of how much data are coded, and how much data are in the form of free text (e.g., narrative reflection, mentoring).

Additional Challenges for Implementation

Conference participants identified and discussed the following issues regarding the implementation of the eFolio.

Assessment

The eFolio not only allows, but emphasizes, the use of formative as well as summative assessment. The heterogeneity of learning experiences and the sites in which they occur make it highly unlikely that current approaches to standardized testing will be feasible, at least without substantive change. Some assessment will therefore occur within the context of comparison across time using the learner effectively as his or her own control. However, it is essential to provide benchmarks, especially for meas-

⁵ <http://www.medbiquitous.org>

ures of performance within a real setting. This is not theoretically difficult for measures that can be the same for most learners (e.g., multi-source feedback in relation to behaviors observed). However, for most performance measures, practicing physicians will need benchmarks derived from physicians with substantially comparable practice profiles. For residents, benchmarks will require additional scrutiny to determine if significant variance exists across educational settings.

Another thorny question is how best to aggregate heterogeneous measures for the individual learner. Is it possible to come up with either a composite score or an overall designation or profile of proficiency? How do we decide on and assign appropriate weighting for the different measures that would be aggregated in such a composite score? Feasibility testing of the eFolio will drive some of the necessary developmental work. With respect to program evaluation and accreditation, the situation is somewhat different because the variance between programs is the main topic of interest rather than a problem.

User and faculty development and training

Conference participants noted that the introduction of an eFolio will amount to a massive change in the culture of medical education and learning. Beyond natural antipathy to change, it is prudent to recognize that many of the services will be initially foreign to almost all participants across the continuum, including individual learners, educators, assessors, mentors, regulators and employers. In the long run, it may be that the most useful training is simply to use the system. However, given the many challenges in successfully implementing the eFolio, it would be sensible first to ensure some minimal level of training for all concerned. This would likely be provided by the same organizations developing and implementing the eFolio, although for those primarily in the business of assessment this would be out of line with their existing cultural orientation. The most efficient principle would appear to follow the concept of “train the trainer.”

Technology appropriate to national scope

The development of Web services has sparked the very real possibility of widespread data sharing. Loose coupling would enable massive scalability of the Web services architecture across hundreds of databases, in effect the creation of a huge virtual repository. The Trusted Agent is one model for a secure infrastructure model for real time data sharing, with the requested data compilations being completed in near real time, posted to the learner and any other authorized viewers, and immediately expunged from intermediate electronic conduits. This cycle of compiling, viewing and expunging is metaphorically the electronic equivalent of mandalas, exquisite sand sculptures created by Buddhist monks that signify important mes-

sages, which are then ritually expunged after construction. Since data mandalas can be compiled and re-compiled ad libitum in a service-oriented architecture, their expungement adds security and confidentiality.

The data mandala approach also removes any requirement to assemble a physical super-repository, with the attendant problems of massive new storage needs. It also avoids an increased likelihood of legal discovery of a data “super-set.” Moreover, because the super-repository would contain derivative rather than primary data, the data mandala approach also eliminates problems in refreshing data and keeping any new super-repository accurate and up-to-date. On the other hand, it may be necessary to create new primary repositories when needed data are not reliably available from existing repositories. One interesting example could be a repository for tracking CME completed, which could then contribute requisite data to be included in eFolio compilations. It will be important to emphasize the adoption of standards as soon as initial feasibility of the eFolio is determined.

Community of interest

The conference brought together a wide range of participants from across the continuum. Although it must be admitted that these individuals might not normally interact, the level of shared engagement was gratifyingly high. This hints at the possibility that this group, or a similar one, could act as the nidus from which a community of interest could form and self-organize around a national eFolio initiative. There may also be several shared activities that could further foster cohesion within the group. First, pilots testing the feasibility of the eFolio or related concepts have been completed or are underway between two of the sponsoring organizations. The FSMB and NBME have recently completed a proof-of-concept pilot of the Trusted Agent infrastructure for purposes of initial application for licensure in three states that agreed to use a common licensure application form (CLAF). This involved setting up a service-oriented architecture across the two organizations that permitted automatic compilation of the CLAF with data that were already primary source verified. The advantage for the applying physician was that very little data entry was required. Compilation, review and submission were accomplished in near real time (5-10 minutes), as opposed to the weeks sometimes necessary to complete a paper-based application (together with notarized forms) and undertake source verification.

In relation to the eFolio, several pilots have been performed in medical schools, and the ACGME presented the initial results of an alpha test of its developing system (ACGME Learning Portfolio, or ALP). While the focus is on developing a new repository that emphasizes learning in relation to program evaluation and accreditation, the

chances are good that ALP will provide data to include in salient compilations at the individual learner level. There is also interest in an eFolio approach by specialty boards and specialty societies acting in concert. Beyond such pilots, conference participants were interested in using an eFolio framework (if one existed) for compilations of de-identified data across time to enable relevant research and development. These activities could facilitate many new projects and also the de facto generation of a database of relevant research and practice. The possibility of linking educational and assessment activities directly to patient care outcomes raises tremendous opportunities for quality improvement.

Business Model and Resources

Conference participants identified numerous questions under this heading. For example, who will bear the costs of development and operation, and is there evidence that benefits will outweigh costs? Who will own the system, and how will effective governance be achieved? How will functionality be achieved seamlessly across the entire continuum? At this juncture, there are few clear answers, but the very scope of the transportable eFolio system under consideration strongly suggests the appropriateness of a national initiative approached collectively by several organizations in the House of Medicine. It is however important that any national initiative work diligently to link to local repositories. This is in everyone's best interests in that it maximizes the scope of the "virtual" national database thereby defined, while at the same time supporting local repositories in their current form. It is also prudent to keep the system "open" so that a variety of vendors can offer technology solutions that "plug and play" well in the eFolio system. Such a collaboration, or joint venture, between organizations within organized medicine – which are typically not-for-profit – and for-profit external vendors will likely cause some cultural dissonance. Nevertheless, it is hard to imagine building a system as potentially complex as a national eFolio system, and within a reasonable timespan, without some creative interactions with entities traditionally outside the House of Medicine.

It seems possible that developmental funding might be available from one or more foundations. It is also conceivable that one or more insurance payors or one or more pharmaceutical companies might be interested in funding development of the eFolio. Given that the major impetus for these industries is profit maximization, it is unclear if this type of support would be acceptable, considering recent moves by the profession to distance itself from the perceptions and realities of industry gifting. It seems that the eFolio would be better positioned if it were

developed by physicians, for physicians. In this regard, the work of the National Alliance, which currently includes many key organizations in organized medicine, and the Trusted Agent infrastructure may converge most naturally with the emerging eFolio system.

Managing Culture Change and Increasing Buy-in

Conventional wisdom would point to many reasons that a national eFolio framework just won't work. However, there are several perceived barriers that might be minimized or even removed with judicious planning. For example, although we do not know for certain that a project as ambitious as a developing national eFolio system will accomplish its purpose, we can point to success stories and lessons learned in other educational areas (e.g., high school). In addition, many of the "Millennials" currently entering medical schools have already had experience with the portfolio concept. Because they live in a world of online data sharing and social networking, they are more likely to speak positively about the eFolio concept and might perhaps even seek to know why such an infrastructure is not already in place. Similarly, as groups move forward toward an eFolio system, they can anticipate and speak to several predictable anxieties around possible legal and political issues. Emphasizing the private/public separation and the learner-centeredness of the system – and that no posting of data beyond the individual learner is possible without authorization – may help ease anxiety.

It would be salutary for busy physicians to see the utility of posting reports for external regulatory purposes; this could be a major factor in reducing hassle and saving time. Equally, the ability to compile data and display them in relation to competencies may be helpful to both learners and educators as MOC moves forward. The potential for push-back around formal reflection is considerable. It would be prudent to accept that full engagement with narrative reflection may be an easier sell for younger learners who already engage with social networking sites, and may take more time to realize with other physicians.

There are several physician groups likely to feel particularly anxious about the eFolio concept. Examples include international medical graduates (IMGs) and physicians lacking active specialty board certification (either never certified or time-expired). For IMGs, assembling a Private Learning Environment based on their medical school records may pose problems. However, even if requisite UME data cannot be obtained in every case, all such physicians would be able to participate starting with GME, since all now undertake residencies in the United States. The availability of an official eFolio Public View

How will functionality be achieved seamlessly across the entire continuum?

could actually be beneficial for such physicians. Utility of the eFolio will be greatly enhanced by benchmarks and for many physicians by derivative dashboards showing progress in real time. These services should be provided as soon as possible, although this is easier said than done. Accurate benchmarks will require engaging numbers of physicians sufficient to obtain adequate denomi-

nators for each of the measures and the many different practice profiles that are possible. It will also be difficult to achieve levels of measurement reliability that the medical community is accustomed to seeing for MCQ tests. On the other hand, if “good enough” benchmarks can be provided, the eFolio could support a substantially broader scope of education and assessment.

Summary

This conference resulted in active engagement of a highly diverse group in a complex but important topic. Hope was expressed that involvement of other key organizations in the House of Medicine might cohere an emerging community of interest to oversee the introduction of a truly learner-centered national eFolio framework and provide a collective guiding hand to continued professional growth and achievement across the continuum.

This could also be perceived as a renewed commitment on the part of the medical professions to build and engage in effective professional self-regulation. The participants' work in the colloquium and the invitational conference contributed to developing a vision for a physician eFolio and the steps necessary to realize that vision. It is important to seize the opportunity to disseminate and build on this collective vision.

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