Informatics as both a Subspecialty (and an intrinsic component of) Pathology

Faculty, Fellowships, Informatics & the Future of Pathology

John Gilbertson MD
Associate Chief of Pathology
Massachusetts General Hospital
Director, Partners Pathology
Informatics Fellowship Program
There is a long term collaboration agreement between MGH and Sunquest to help develop aspects of the Sunquest AP LIS platform.

I will not be talking about Sunquest (or any specific vendor) today.

Conflict of Interest Disclosure

John Gilbertson, MD

Sunquest - Executive Advisory Board Member
A vision and a plan...

Five years ago, when I first interviewed for my position at MGH, the new chairman, David Louis, proposed a vision of pathology’s future.
A vision and a plan...
A vision and a plan…

Informatics & Molecular as the growth areas

That would infuse the clinical services with new ideas and techniques

That would transform the way we practice Medicine and understand disease
Informatics as a transformational agent
… and a caveat

He knew how molecular would transform pathology
Molecular was...

...being embraced by a large number of pathologists

...in all subspecialties

... becoming central to the way pathologist think of disease

Molecular concepts were increasingly defining Pathology’s vision of itself
Molecular was...

...being embraced by a large number of pathologists

...in all subspecialties

...becoming central to the way pathologist think of disease

Molecular concepts were increasingly defining Pathology’s vision of itself
Informatics was not…

He did not know how informatics would hold up its end of the bargain.
Pathology generates accurate, “actionable” clinical information

70% of the data in the EMR…

Pathology is a technical, increasingly automated set of processes

Can informatics be central to diagnosis and the understanding of disease?
The stakes were high
The Mission

Could we find a way to make informatics..

...embraced by a large number of pathologists

...in all subspecialties

...central to the way pathologist think of disease

...could define Pathology’s vision of itself
You can:

But informatics will change in fundamental ways
Levers

The Faculty

The Fellowship
The structure of pathology informatics divisions

Bruce Friedman
Informatics as a separate section within a department of pathology.
Am J Clin Pathol. 1990 Oct;94(4 Sup 1):S2-6

John Gilbertson
The informatics rich pathology department model
PI-2010

Mike Becich
The biomedical informatics department model
PI-2010

Informatics Faculty Member
The diaspora of the informatics faculty

There is no informatics division at MGH

Informatics faculty embedded into other divisions as diagnostic teaching faculty

Letting go…
The maximum transformational effect

The maximum surface area

Does not constrain thought / scope

Does not constrain growth

Anchors informatics in the department

Makes everyone your ally
The maximum transformational effect

Create an accessible, continuous informatics presence that grows on itself

- Informatics faculty “signing out” at every major part of the department
- A “natural” career path for residents
- A large and diverse fellowship program
- Simplifies collaborations with non-informatics faculty members
- Enhances recruitment of residency candidates

One generates a lot of interest
The maximum transformational effect

There is a lot of interest by faculty, fellows and residents

One generates a lot of interest
What happened?

Diagnostic faculty began to cluster around specific “informatics” interests.

We call these “informatics domains”.

Clustering around “informatics” concepts:
The structure of informatics in the department

The domains are distinct from traditional informatics roles

But closer to the traditional role of the pathologist

Computational models of disease, anatomy, diagnostic processes, etc.
The don’t feel that their main goal is to manage a systems, their main goal is to diagnoses and understand disease

An *opportunity* to change the infrastructure
Partners Enterprise Clinical IT Architecture

Enterprise EMR / CIS

Enterprise PACS

The Pathology Layer

- Hospitals & Clinics
  - Laboratories

Departments

- MGH Pathology
  - Hospitals & Clinics
    - Laboratories

- NSMC Pathology
  - Hospitals & Clinics
    - Laboratories

- NWH Pathology
  - Hospitals & Clinics
    - Laboratories

- DFMC Pathology
  - Hospitals & Clinics
    - Laboratories

- FH Pathology
  - Hospitals & Clinics
    - Laboratories

- BHW Pathology
  - Hospitals & Clinics
    - Laboratories
Structure of the Layer
Academic Domains and Operational Systems

Enterprise Clinical and Research Systems

“Pathology Layer” - Clinical Systems and Academic Domains

- Clinical Integration
- Imaging Orientation & Sampling
- Data Visualization & Reporting
- Clinical Decision Support
- Statistics & Computational Methods
- Bioinformatics
- Disease Modeling
- Knowledge Management
- Population Modeling

HL7 Order Interfaces
HL7 Results Interfaces

Common, Enterprise LIS

Classic Pathology IT
Order, Specimen, Protocol, Data Integration across the enterprise and though the LIS stack
High quality, machine consumable data
Structure of the Layer
Academic Domains and Operational Systems

Enterprise Clinical and Research Systems

“Pathology Layer” - Clinical Systems and Academic Domains

Clinical Integration
Imaging Orientation & Sampling
Data Visualization & Reporting*
Clinical Decision Support
Statistics & Computational Methods
Bioinformatics
Disease Modeling
Knowledge Management
Population Modeling

HL7 Order Interfaces
HL7 Results Interfaces

“Lab-ome”

AP LIS
CP LIS
Blood Bank LIS
Molecular LIS
“PACS”
“AP/CP”
“MULHOS”
“SMART”
Tissue Archives

Business Intelligence Systems | Process Models

Computational Pathology
Correlative research
Predictive Models
Data Exploration and Visualization

Instantiation of the ‘clusters’
The department felt it had do computational pathology – in pathology – because it is central to what pathology is
Remember the original mission?

...be embraced by a large number of pathologists

...in all subspecialties

... become part of Pathology’s vision of itself

... become central to the way pathology thinks of disease
Levers

The Faculty

The Fellowship
The Fellowship

The fellowship has been the laboratory of informatics in the department

Many of the ideas and information in this talk comes from our informatics fellows and faculty

Clinical fellowship training in pathology informatics: a program description

Journal of Pathology Informatics 2012;3:11
Partners Fellows

Victor Brodsky*
Jiyeon Kim*
David McClintock*
Roy Lee*
Maristela Onozato*
Bruce Levy*
Jason Baron
William Lane
Veronica Klepeis
Luigi Rao
Jing Huang
Andy Quinn
Diana Mandelker^^
Mihae Platt^^

Partners Pathology Informatics Fellowship Program 2009-2012
The conundrum of the fellowship

Informatics is a wide field of applied science, engineering and process management, with its own sub-specialties, with applicability across all of pathology.

The field is poorly defined.

This doesn’t sound like a sub-specialty.
Structure of the Fellowship

The Partners Informatics Fellowship Program

**Sub-specialization**
- Operational Rotations
- Research
- Specific Clinical Interests

**Breadth of the Field**
- National Meetings (2)
- Management & Technical Retreats (6)
- Common Core Course (92)

- Configured to the fellow's interests
- Common for all fellows

The program continues to evolve
Attendees of a pathology informatics fellowship retreat at MGH

Visiting Fellows
James Hipp (Michigan)
Mehrvash Haghighi (Henry Ford)
Seung Park (Pittsburgh)

Visiting Faculty
UI Balis (Michigan), Michael Becich (Pitt), Victor Brodsky (Cornell), Alexis Carter (Emory), Wally Henricks (Cleveland Clinic), John Sinard (Yale), Mark Tuthill (Henry Ford)
Structure of the Fellowship

The Partners Informatics Fellowship Program

Sub-specialization

Operational Rotations
Research
Specific Clinical Interests

Configured to the fellow’s interests

Breadth of the Field

National Meetings (2)
Management & Technical Retreats (6)
Common Core Course (92)

Common for all fellows

The program continues to evolve
The Fellowship Core Course

Goal is to cover most of the field

McClintock et al, A Core Curriculum for Clinical Fellowship Training in Pathology Informatics. J Pathology Informatics; 3:31
The Fellowship Core Course

McClintock et al, A Core Curriculum for Clinical Fellowship Training in Pathology Informatics.
J Pathology Informatics; 3:31
Who becomes an informatics fellow and why?

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>3/9 from MIT</td>
</tr>
<tr>
<td>Number from Partners Residency Programs</td>
<td>4/9 from Partners</td>
</tr>
<tr>
<td>Number of advanced (not MD) degrees</td>
<td>8/9</td>
</tr>
<tr>
<td>Number of informatics rotations / projects in residency</td>
<td>8/9</td>
</tr>
<tr>
<td>Number with other pathology fellowships</td>
<td>8/9</td>
</tr>
</tbody>
</table>

**Partners Pathology Informatics Fellows through 2011-12 & Alumni (n=9)**

*Levy et al*, Different Tracks for Pathology Informatics Fellowship Training: Experiences of and input from trainees in a large, multisite fellowship program.

*J Pathology Informatics; 3:30*
Who becomes an informatics fellow and why

- **Director of Pathology Informatics (30%)**
  - One or two years of informatics-focused fellowship
  - Clinical Informatics?

- **Sub-specialist Pathologist with informatics skills (60%)**
  - One year of diagnostic pathology and one year of informatics
  - Integrated Program?

10% of our fellows plan to be full time informatics researchers.
An integrated “1 + 1” program
A combined diagnostic fellowship & an informatics fellowship linked over two years.

Year 1
- Diagnostic Pathology Fellowship
- Informatics-centric Electives
- Attend the Core Course

Diagnostic Clinical Concentration
- Attend the Core Course

Informatics Fellowship
- Year 2

This is relatively easy to do now…
...an intrinsic component of pathology

CP + Micro + Molecular + Informatics

$3 + 2 + 1 + 2 = 8 \text{ years?}$

* 8/9 have advanced degrees

Sub-specialist Pathologist with informatics skills (60%)

Will not do a two year “informatics only” fellowship

Levy et al, Different Tracks for Pathology Informatics Fellowship Training: Experiences of and input from trainees in a large, multisite fellowship program. J Pathology Informatics, Accepted
The pathologist of the future
Number of Pathology Informatics Fellows

Hyper-certification

This is a problem across all of pathology
A future divide?

Director of Pathology Informatics (30%)

Clinical Informatics?

Sub-specialist Pathologist with informatics skills (60%)

Informatics integrated with a diagnostic sub-specialty?

Informatics as both a Subspecialty (and an intrinsic component of) Pathology
Remember the original mission?

...be embraced by a large number of pathologists

...in all subspecialties

... become part of Pathology’s vision of itself

... become central to the way pathology thinks of disease
Summary

IF

Informatics can be embraced by many pathologists across many disciplines

Informatics can become central to pathology’s vision of itself

THEN

Informatics will change in fundamental ways

It becomes less aligned with information systems and directors

It will be less of a subspecialty and more of an intrinsic component of pathology
Mickey Mouse

Informatics has not yet transformed pathology

One can get a lot of interest if one structures the department properly

This interest is clustering into “Computational Pathology” (Pathology centric informatics)

Informatics is a wide field of applied science with its own sub-specialties

Very high quality residents will enter informatics fellowships

We have to deal with the problem of hyper-certification
The Fellowship Program Overall

Clinical fellowship training in pathology informatics: a program description
Journal of Pathology Informatics 2012;3:11

The Core Course and Curriculum

A Core Curriculum for Clinical Fellowship Training in Pathology Informatics
Journal of Pathology Informatics, 2012; 3:31
Tracks in the Fellowship Program

**Different Tracks for Pathology Informatics Fellowship Training: Experiences of and Input from Trainees in a Large Multisite Fellowship Program**
Bruce P. Levy, David S. McClintock, Roy E. Lee, William J. Lane, Veronica E. Klepeis, Jason M. Baron, Maristela L. Onozato, JiYeon Kim, Victor Brodsky, Bruce Beckwith, Frank Kuo and John R. Gilbertson
*Journal of Pathology Informatics; 3:30*

Pathology Informatics Fellowship Management Retreats

**Pathology Informatics Fellowship Retreats: The Use of Interactive Scenarios and Case Studies as Pathology Informatics Teaching Tools**
*Journal of Pathology Informatics, Accepted*
The Vision of Pathology

"Next-generation" pathology and laboratory medicine
Louis DN, Virgin HW 4th, Asa SL
Arch Pathol Lab Med. 2011 Dec;135(12):1531-2.