Reinventing Research:
Agile in the Academic Laboratory

An Agile2018 Experience Report
Kendra West, CSM, MSEM
1. Set the Scene
2. My Story
3. Agile challenges in the academic setting
4. An agile manifesto for the academic lab
Section I: Set the scene
The Broad Institute of MIT and Harvard

International, non-profit genome research institution

Est. 2004

4,000 Employees, Members, and Affiliates

8,715 scientific publications to date.
Values

- Propelling the understanding and treatment of disease.
- Reaching globally
- Empowering scientists
- Building Partnerships
- Sharing data and knowledge
- Promoting Inclusion
- Collaborating deeply
Research Specialties

Disease Areas

- Epigenomics
- Medical and Population Genetics
- Cell Circuitry
- Metabolism
- Chemical Biology and Therapeutics
- Genome Regulation

Technology Areas

- Imaging
- Proteomics
- Genetic Perturbation
- Technology Labs
- Metabolomics
- Genomics
- Data Science

Scientific Areas

- Psychiatric Disease
- Diabetes
- Obesity
- Cancer
- Cardiovascular Disease
- Immunological Disease
- Rare Disease
- Infectious Disease and Microbiome
A general intro to the academic lab...

- Academic Research Institutions
- Knowledge Driven
- Non-profit & Grant-Based
A brief intro to the academic lab...

The Principal Investigator (PI)

Students & Post-Doctoral Researchers

Staff Scientists, Research Technicians, and Professional Support Staff
The scrum cycle

Product Backlog → Sprint Backlog → Sprint Backlog → Sprint Backlog → Results!

Develop, Test, daily feedback!

24 hr Sprint Cycle

Feedback!
The “scientific scrum cycle”
Section II: My Story
Now...

Scrum Master
Data Sciences Platform
MS Engineering Management
And then...

Research Associate
Sabeti Laboratory
MS “I don’t quite know yet but I know I like people and science”
A powerful mission.
Cool. So how does all this relate to Agile?
How can I help?
Broad Institute’s Data Sciences Platform
Agile Academia @Broad

**Agile Academia Group Members over time**

92 Members
20+ Departments!

**Dear Kendra,**

Tonight as the result of both anonymous and popular judging, your poster was selected as one of 10 winners from this year’s Retreat poster session. As indicated
Section III: Agile challenges in the Academic setting
Challenge 1: How to start

Challenge 2: Team Structure

Challenge 3: Work Structure

Challenge 4: Project Tracking
Challenge 1:
“How do we start?”
“I know! We’ll present a basic Introduction to the Agile Principles and Frameworks, and then highlight how these tools can be used in the lab!”
Building your Agile Toolkit

An Overview of Agile values and techniques such as Scrum, Kanban, and Scrumbank

Scrum Framework
Supports Iterative Development

- Create product increment every sprint
- More cross-functional collaboration
- Deliver top value items first
- Earlier feedback

The Agile Manifesto

*Delivering Value > Comprehensive Documentation

Customer Collaboration > Contract Negotiation

Responding to Change > Following a Plan
“That sounds like a lot of meetings, we don’t have time for that!”

“But my project is different from everyone else’s.”

“Do you play Rugby?”

“Do you have any examples from other labs?”

“We don’t have customers.”

“Is this the thing with the sticky notes?”
Challenge 1: “How do we start?”

Why do we start?
“Stealth Scrum”

Standup → Team Check-in

Product Backlog → Prioritized Task List

Customers/Users → Advisors/Scientific Community
Identify opportunities for improvement through Agile Retrospectives.
Challenge 2: Team Structure
Agile Software Development Team

Common Goal!
Research Focus

New Idea

Yikes!

Question

Project
Establish Communities of Practice for communication, mentorship, and support.
Challenge 3: Work Structure
The typical scrum cycle

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The typical lab cycle: Preparing samples for DNA sequencing

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DNA Sequencing
### Preparing DNA samples for genomic sequencing

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<td>Sample Preparation</td>
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**Tuesday**
- QC Analysis
- **MEETING!**

**Wednesday**
- QC Analysis
- **MEETING!**

**Thursday**
- Process A
- Process B

**Friday**
- QC Analysis
- **MEETING!**
- SEQUENCING PREP
Do the right thing.
Challenge 4: Project Tracking
How do software teams visualize work?
Visualize work.
Inspect and adapt.
What works for Broad Institute laboratories?

- Reflect & Inspect
- Discover your “teams”
- Simplify terms & emphasize the why
- Embrace the research cadence
Section IV: An agile manifesto for the Academic Lab
The Agile Manifesto for Software Development

**Individuals and interactions** over processes and tools

**Working software** over comprehensive documentation

**Customer collaboration** over contract negotiation

**Responding to change** over following a plan
1. Individuals and interactions over processes and tools
2. **working software** over **comprehensive documentation**

**seeking improvements** over **sustaining practices**
3. customer collaboration over contract negotiation

collaboration over competition
Responding to change over following a plan

Responding to change over following a plan
An Agile Manifesto for the Academic Lab

Individuals and interactions over processes and tools
Seeking improvements over sustaining practices
Collaboration over competition
Responding to change over following a plan
Agile ideas can evolve the way that academic laboratories operate.
Acknowledgements

Diolinda Vaz
Prof. Partha Ghosh
Candase Hokanson
Yenarae Lee
Jenny (Yihan Liu)
Bruce Kozuma
Dr. Pardis Sabeti
Sarah Winnicki
The Sabeti Lab
Agile Academia
Data Sciences Platform

@sabeti_lab
Questions?

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Image sources

- Avatars by Hexatar
- DNA Clip art: https://dumielauxepices.net/dna-structure-clipart/dna-structure-clipart-clipart-transparent-background
- "Open Door" gif: https://giphy.com/gifs/tiffany-eXq8li7JgnyOu
- Team Evolution Clip art:
  - https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwi6Pq58DcAhUIUt8KHc-zBA8Qjhx6BAgBEAM&url=http%3A%2F%2Fgetdrawings.com%2Fscientist-silhouette&psig=AOvVaw3r2p0M4yKYtYYB3pnuZnKn&ust=1532833477214143
- Science Photos courtesy of the Broad Institute of MIT and Harvard
- Messy Lab photo: http://achim.org/the-messy-lab/
- Sabeti Lab Photos: https://www.instagram.com/sabeti_lab/?hl=en
- Laboratory beakers: https://www.my-tutor.com/courses/chemistry/