Acknowledgement of country

I begin today by acknowledging that I live on the unceded lands of the Boon Wurrung people, and pay my respects to their Elders past and present. I extend that respect to Aboriginal and Torres Strait Islander peoples here today.

Overview

- Complexity is growing
- Projects fail more often than we think
- Three common mistakes
  - Examples
  - Recommendations
  - Practical examples of recommendations
- Further information

Complexity is growing

Transcriptomics

What I started in 2010 in a small part of the Life Sciences, microarrays were mature.

In the last 13 years we have had four waves:
1. RNASeq - more complex and bigger datasets,
2. Single Cell RNASeq - even more complex and bigger datasets,
3. Multi-omics - RNASeq and other datasets brought together, and
4. Spatial-omics - Single Cell RNASeq and Imaging datasets brought together.

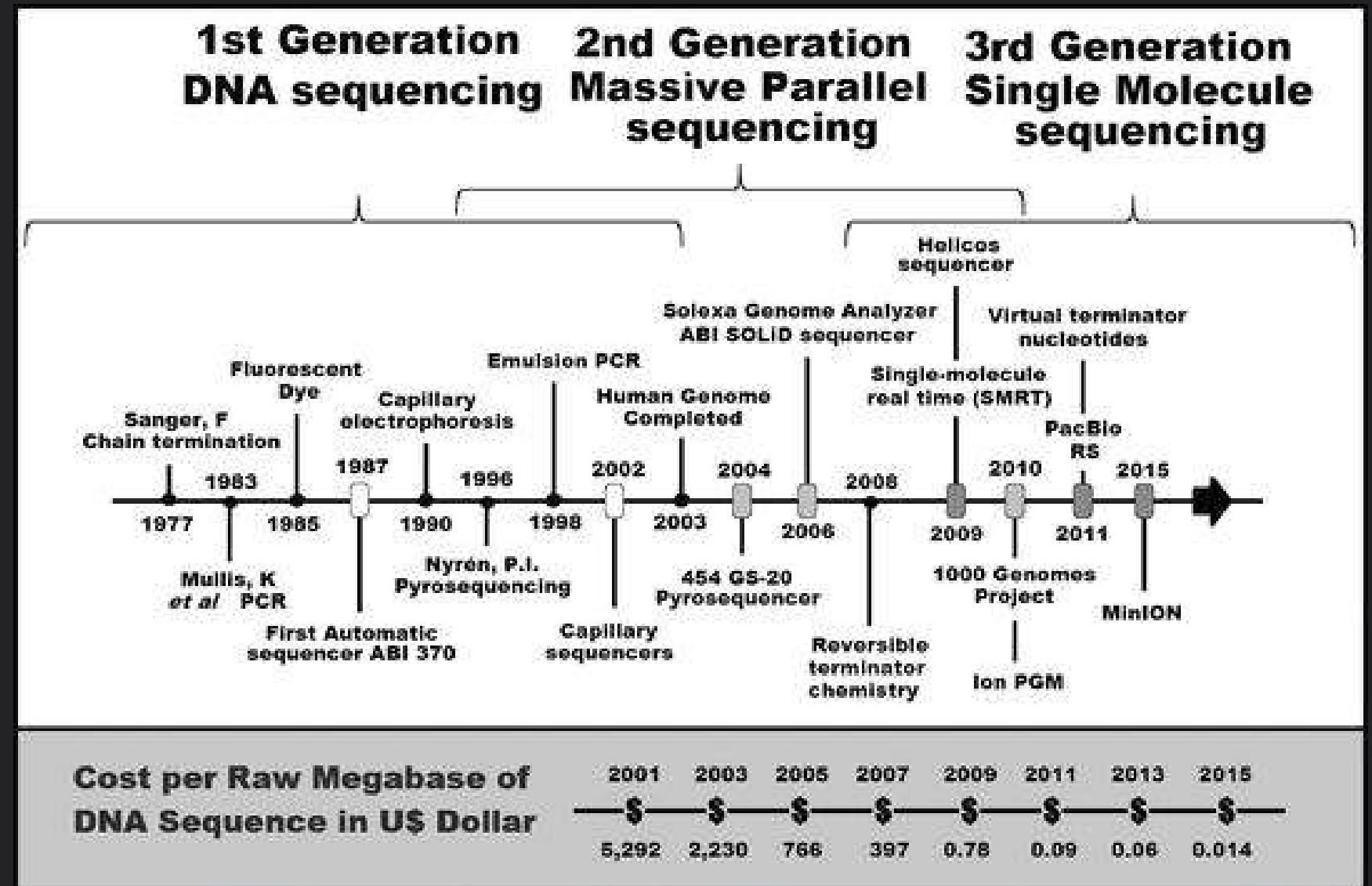And that is just one part of Life Sciences.

Figure 1. From Applications of RNA-Seq and Omics Strategies; Edited by Fabio A. Marchi, Priscila D.R. Cirillo and Elvis C. Mateo; https://www.intechopen.com/chapters/55706.

Outside my corner of Life Sciences

- We have cryo-EM which can generate TBs of data for a single run with tens of thousands of files [1]
- We have the search for integrating datasets in a "Data Commons"
- We want to aggregate datasets to be able to use AI/ML
- We have smaller organisations handling PBs of data

[1] Data Management in Integrated Research Institutes: Undertaking a Review of Research; Data Management at the Rosalind Franklin Institute. Felicity Currie, Mark Basham, Laura Shemilt, Nick Lynch. https://doi.org/10.48550/arXiv.2211.07284

From a librarian's point of view

- Researchers are now expecting Research Data Management solutions that handle these advanced scenarios.
- They are asking for practical help where solutions are not easy.
- Expectations have gone up because integrated solutions are now seen as standard in industries eg. Microsoft Office 365, Slack, all have their own integrations and applications [2].

[2] Microsoft Teams vs Slack: Which Collaboration App Is Better? Microsoft Teams vs Slack — Integrations. https://kinsta.com/blog/microsoft-teams-vs-slack/#microsoft-teams-vs-slack--integrations

Projects fail more often than we think

Failure rates are astounding

According to the Standish Group's Annual CHAOS 2020 report, 66% of technology projects ... end in partial or total failure... Large projects are successful less than 10% of the time [3].

[3] IT Project Failure Rates: Facts and Reasons. Frank Faeth. https://www.linkedin.com/pulse/project-failure-rates-facts-reasons-frank-faeth/

Recent example

The auditor is also contemplating an audit of the National Disability Insurance Agency's (NDIA) new Salesforce customer relationship management system, which more than doubled in price before it had even been launched [4].

[4] Audit office to review govt tech misfires. Justin Hendry. https://www.innovationaus.com/audit-office-to-review-govt-tech-misfires/

Why rely on simplistic methodologies?

- They probably didn't even work in an industry setting and may not translate any better in complex situations.
- Many of them rely on us "knowing" the complexity we are dealing with.
- Are we measuring key success factors like uptake and utilisation?
- Key things are:
  - How long will this project take?
  - What are the key bottlenecks?
 - Do we really know?
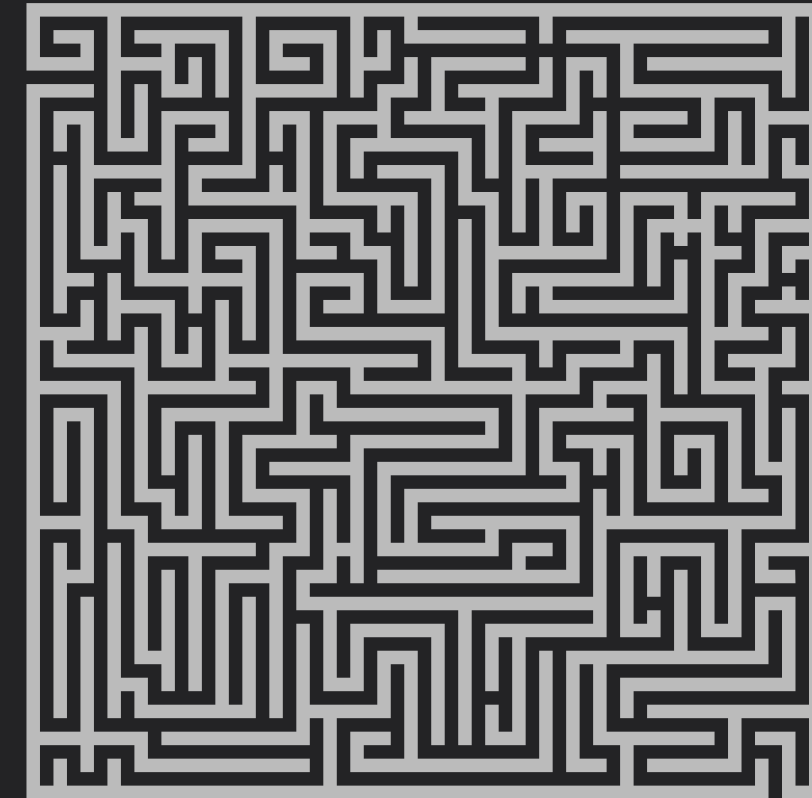
Three common mistakes

Summary of three common mistakes

1. Establishing a team unsuited for the project
2. Unable to connect with complex stakeholders
3. Failing to reveal complexity at an early stage

1. Establishing a team unsuited for the project

- Focusing on "experience"
- Focusing only on technical skills
- Ignoring diversity in all its forms
- Ignoring collaboration skills
- Not bringing in diversity and key skills to the interview panel
- Thinking that using a "magic" process can overcome missing skills in a team
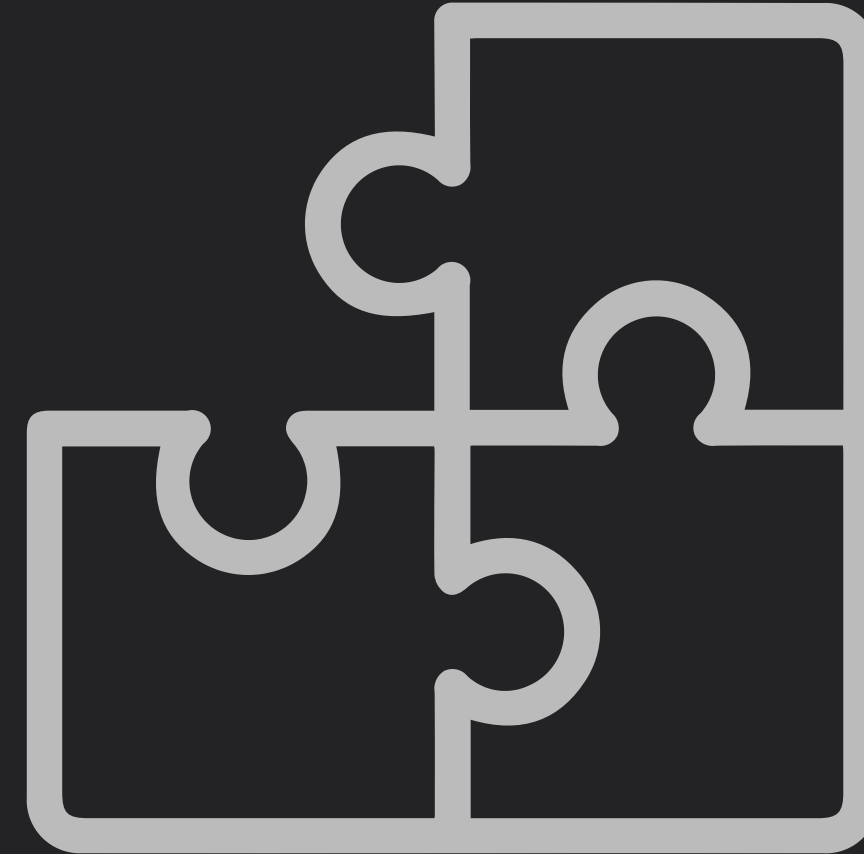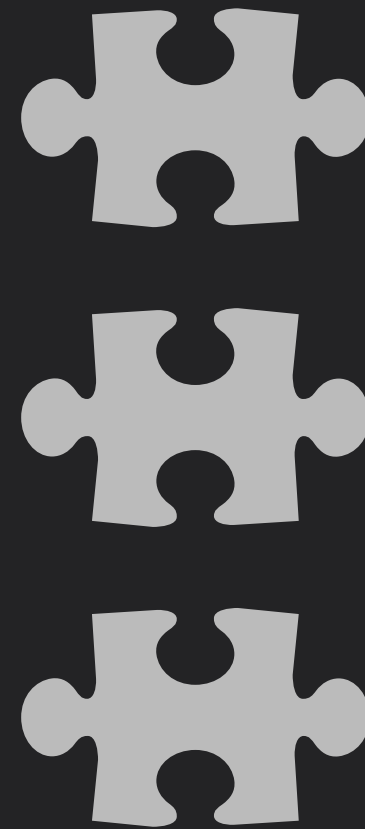
Example of misaligned team composition

- Initial mistake was hiring to solve for the project management process when the real challenge was the complexity of the problem and the stakeholder management.
- This hire then ended up hiring people with little to no "lived experience" of the domain.
- This led to multiple breakdowns, destroyed the reputation with key stakeholders, and delayed the project for months.
- One stakeholder commented: "It's like we might have to wait for this to finish so we can start over."

Recommendations to improve team composition

- Put increased weighting on Continuous Improvement Skills and reduce weighting on technical experience
- Have at least one translator (or "glue person") within the team
- Take into account "Achievement relative to Opportunity" when hiring
- Depending on size, having a mix of "lived experience" and naivete in a team is helpful to test assumptions
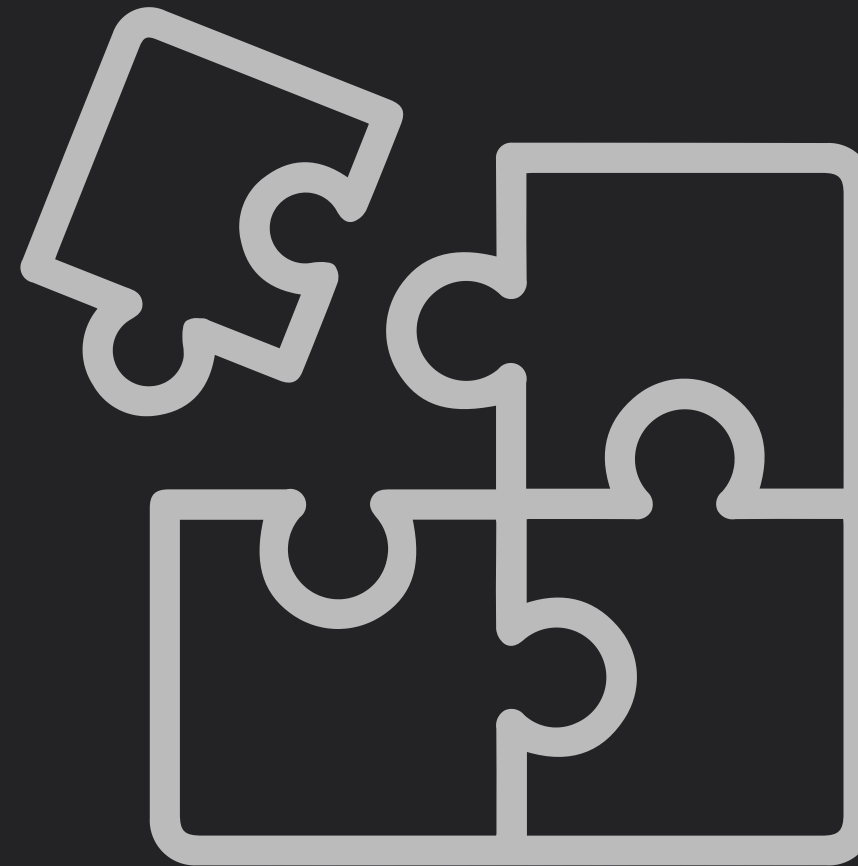
Key Continuous Improvement Skills

Learnability
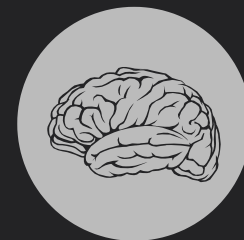
Critical Thinking

Collaborative by Default

Tolerance for Ambiguity

Adaptability

Tolerance for Complexity

Figure 2. List of Key continuous Improvement skills from Future-Proofing your Workforce while Navigating Organizational Change; Rowland Mosbergen; https://doi.org/10.6084/m9.figshare.16725757

Translators

A "translator" (or glue-person) sits at the center of complex projects and creates authentic, concrete communication between stakeholders.

They translate, collaborate, and challenge assumptions. They are generalists with good knowledge, experience, and skills across multiple areas who like to connect people and collaborate.

Health Researchers
Data Stewards
Data Curators
Researchers
Trainers

Software Developers
Service Providers
IT sysadmins
IT Security
Helpdesk

Legal Staff
Grants Staff
Financial Staff
Governance Staff
Ethics and Integrity

Funders
Sponsors
Project Staff
Project Managers
Change Managers

Figure 3. Diagram showing how a translator (in the middle) can translate across all the different stakeholders.

Achievement Relative to Opportunity

You can update your definition of merit to take into account opportunities as well.

Compare two leaders in a similar industry: one generated $100 million with a team of 4 and another generated $120 million with a team of 20. All other things being equal, who would you hire?

This is similar to the Achievement Relative to Opportunity that is part of many universities [5].

$$\frac{skills\ \&\ experience}{opportunities}$$

Figure 4. Diagram showing skills and experience should be divided by the opportunities received by the person.

[5] Improving Diversity and Inclusion in Senior Leadership: A workshop to help recruit diverse senior leaders. Rowland Mosbergen
https://doi.org/10.6084/m9.figshare.14315846

Practical example to improve team composition

- Recruitment campaign for an international Not-For-Profit based in the UK.
- They wanted to recruit a single person to fulfil two roles, a programme coordinator and a community researcher - essentially a generalist.
- Extended best-practice by creating a recruitment process that centred the applicants' perspectives and focused on continuous improvement skills.
- This led to over 120 applicants from Europe, Africa, South America, North America, and Asia with final hire (from South America) was a huge success.

2. Unable to connect with complex stakeholders

- Always talking in the project team's language and not the language of the stakeholders
- Always talking in abstract and not concrete terms eg. using a Generic Data Lifecycle instead of a plate-based single cell RNASeq lifecycle
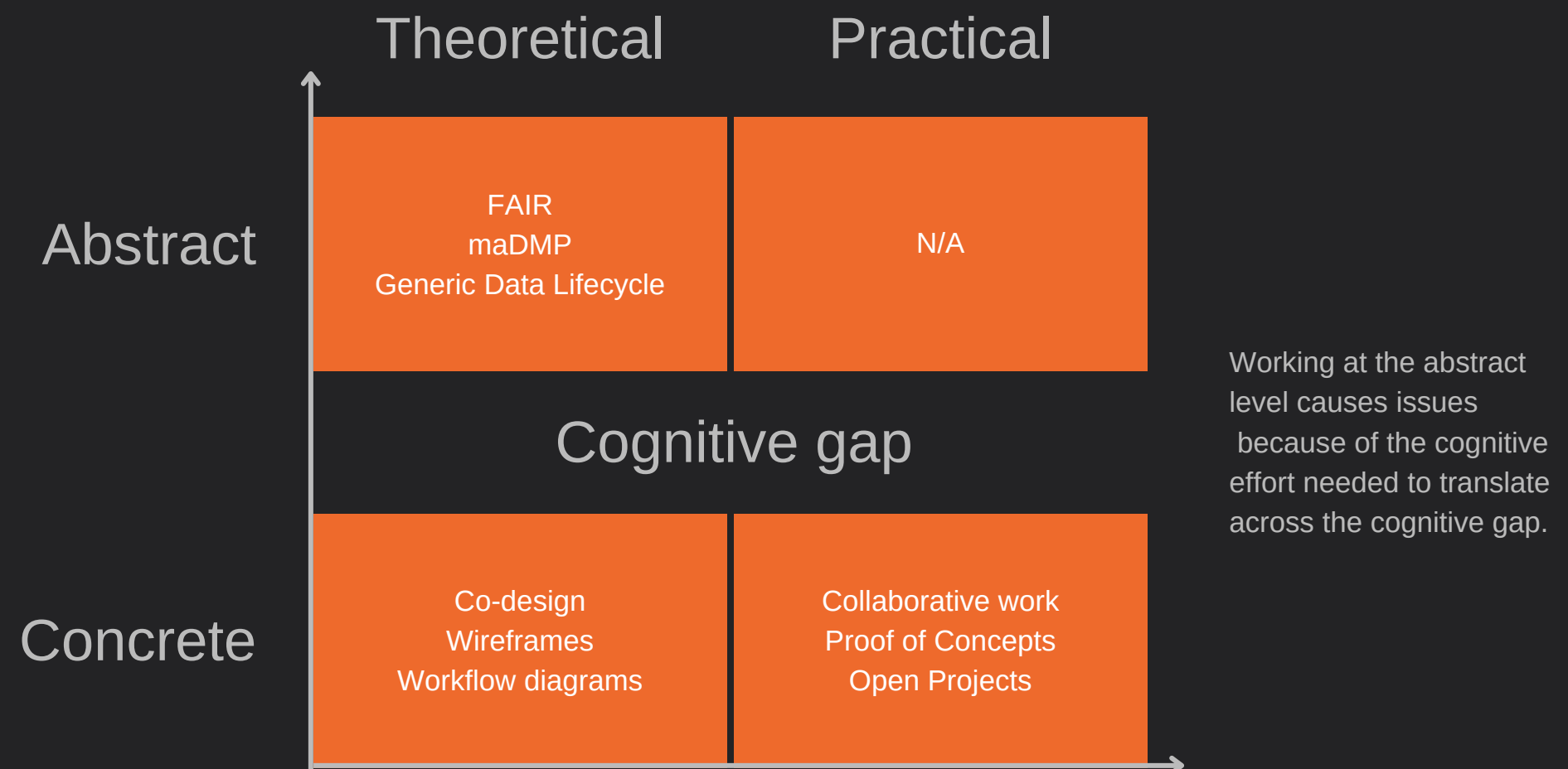- Easy to miscommunicate

	Theoretical	Practical
Abstract	FAIR maDMP Generic Data Lifecycle	N/A
	Cognitive gap	
Concrete	Co-design Wireframes Workflow diagrams	Collaborative work Proof of Concepts Open Projects

Working at the abstract level causes issues because of the cognitive effort needed to translate across the cognitive gap.

Figure 5. Diagram shows the cognitive gap when discussing abstract concepts in Research Data Management.

Example of inability to connect

- This was a research infrastructure initiative for a large multi-disciplinary research community
- Non-research executives were appointed and said "We don't need the research infrastructure as this compute (research) is the same as the standard compute (enterprise)
- When they shut it down, it was then that they realised that the term compute doesn't mean the same between enterprise and research
- There were a large number of angry stakeholders that had to be dealt with

Recommendations to connect

- Find easy ways to get people up to speed on the domain language
- Aim to talk in concrete terms so that it is clear that all stakeholders can understand the implications for their workflows
- Ensure everyone is on the same page by writing the same document multiple times for specific stakeholders
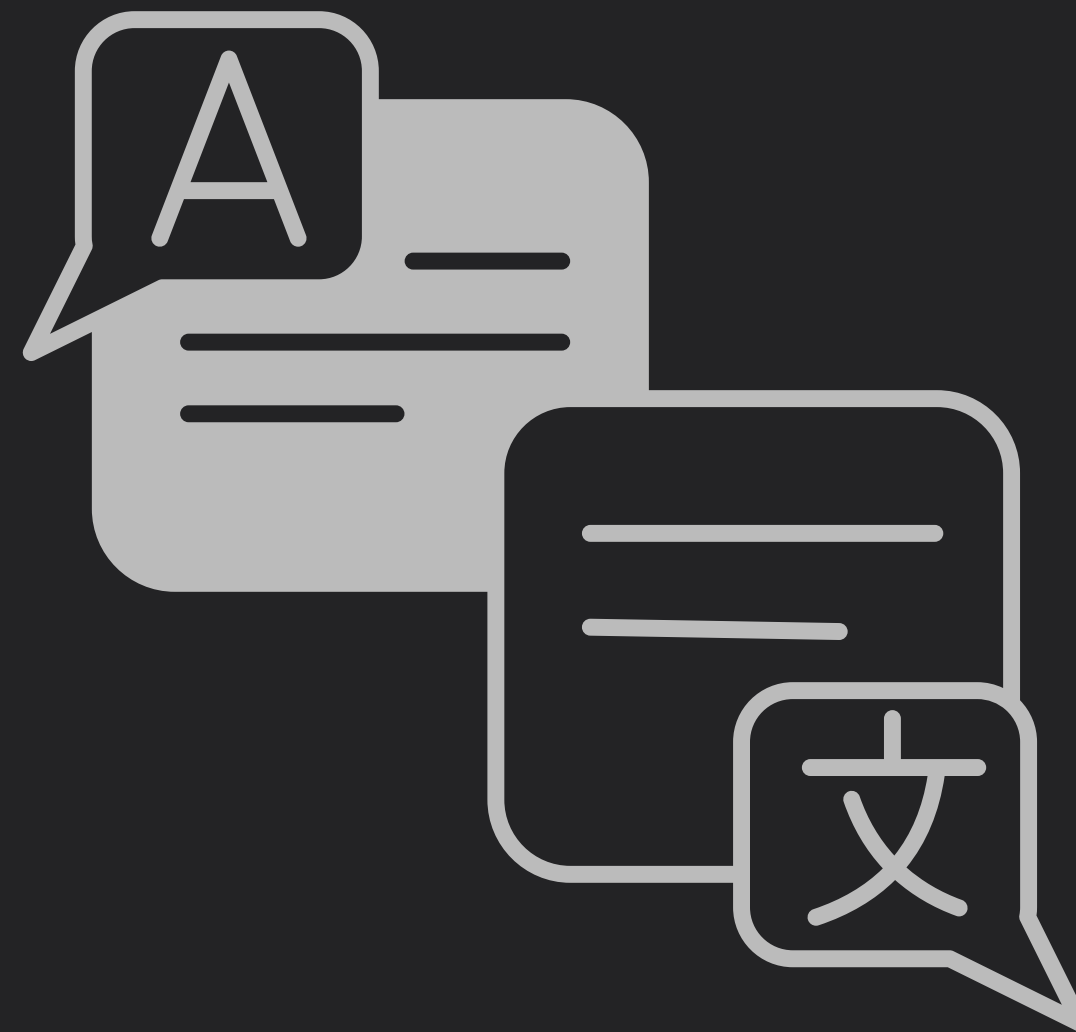
Example of connecting with stakeholders

Genomics Metadata Multiplexing project showed that with patient stakeholders and curious students you can build trust when you talk in the language of your stakeholders.

In this project the trust and momentum built so that the stakeholders were keen to continue contributing as they could see the benefit to them.

Figure 6. Diagram showing part of the process on the day of sorting for a Single Cell RNASeq protocol.
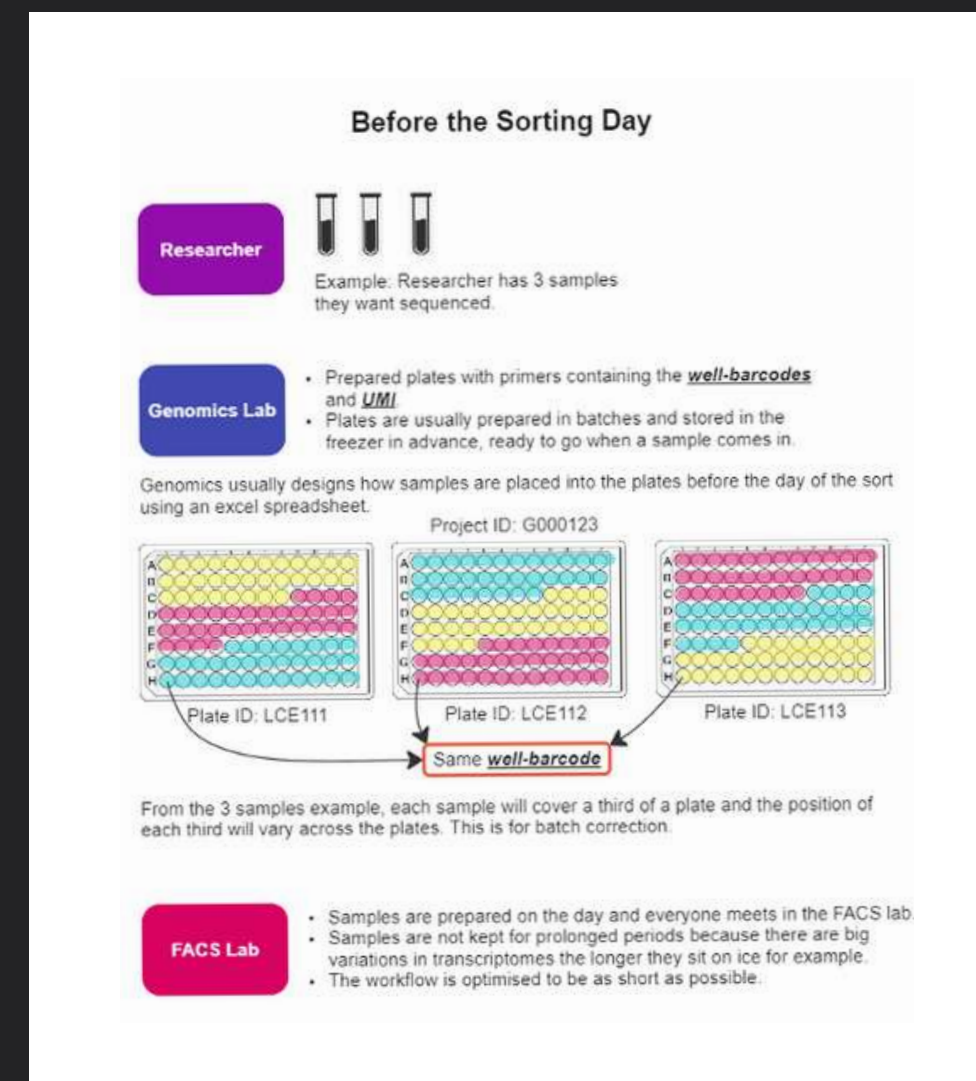
3. Failing to reveal complexity at an early stage

- Complexity is like an iceberg with most of it "under the waterline"
- You can never really know until you start to explore
- How can you possible decide on how long it will take if you don't know what it is you are up against?
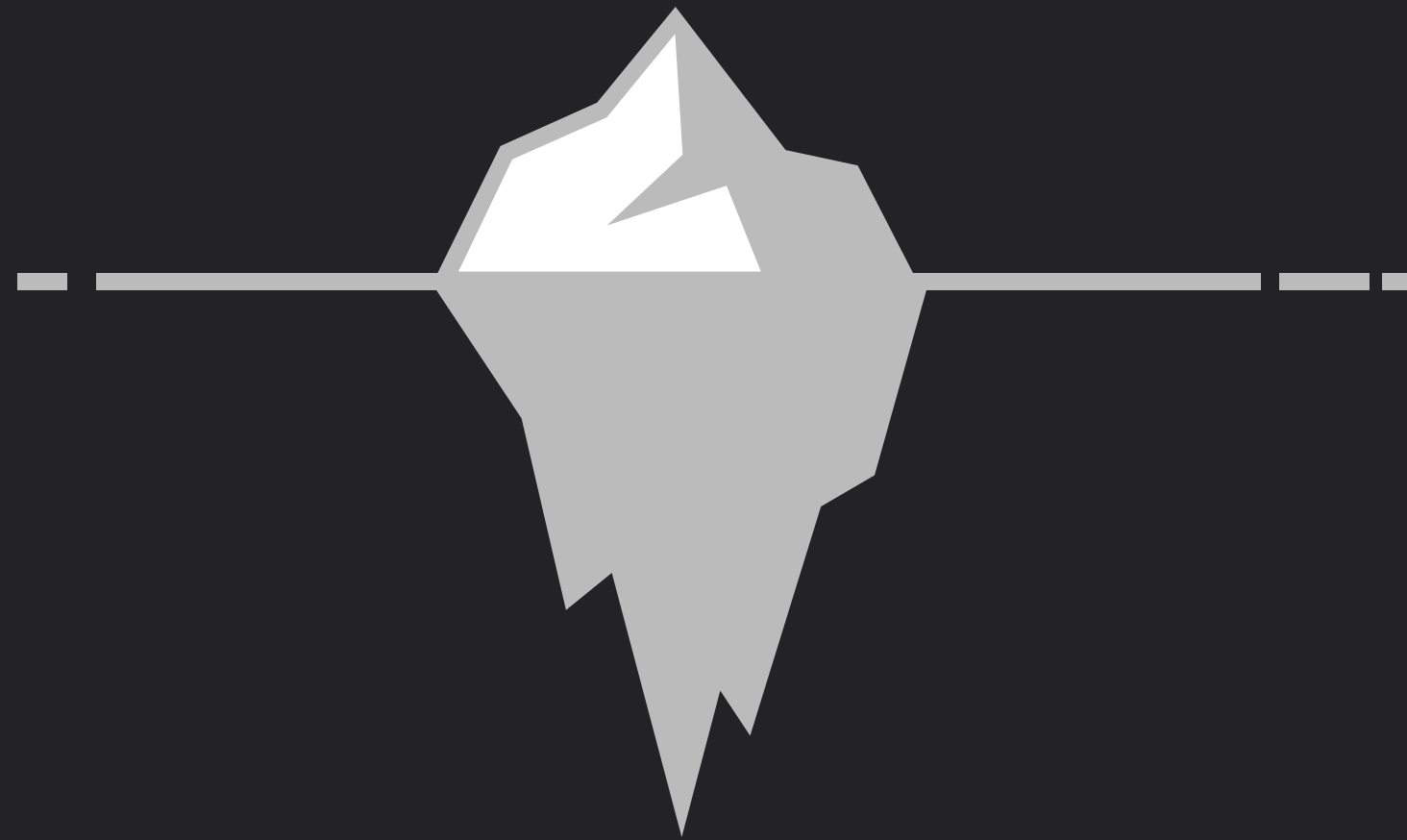
Example of revealing complexity late

- Large project working with researchers and complex datasets
- Tried to fit "Best practice" tools
- Found out about complexities late in the project
- Delivered under pressure
- Ended up delivering but the damage to reputation was high
- Never used as it never fit the needs of the researchers

Recommendations to reveal complexity

- Start as early as you can with light resourcing
- Ethical student internships are great for this.
- Solve at the right level - is this organisational or is this an international problem?
- Aim to go from start to finish quickly with a proof of concept that tries to touch on each area

Example of revealing complexity early

New Data Commons project:

- Write publicly available, high-level tutorials and diagrams
- Identify publicly available raw and processed datasets
- Also identify the software tools and data workflows.
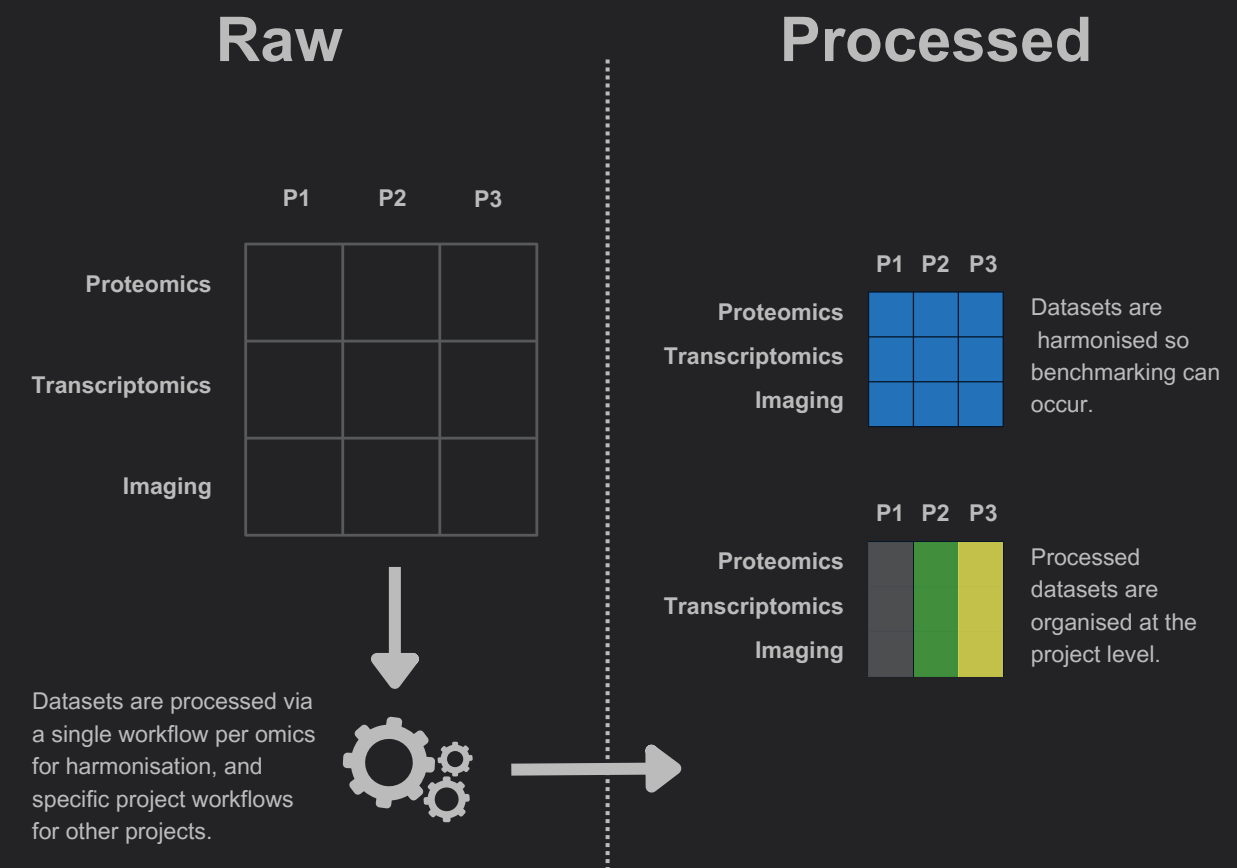- Work with and hopefully identify talented student interns

Raw

Processed

P1   P2   P3

Proteomics

Transcriptomics

Imaging

P1 P2 P3

Proteomics
Transcriptomics
Imaging

Datasets are harmonised so benchmarking can occur.

P1 P2 P3

Proteomics
Transcriptomics
Imaging

Processed datasets are organised at the project level.

Datasets are processed via a single workflow per omics for harmonisation, and specific project workflows for other projects.

Figure 7. Partial diagram of a potential spatial omics Data Commons.

Further information

Further reading

These presentations explain in more detail some of the concepts I mentioned today.

[5] Improving Diversity and Inclusion in Senior Leadership: A workshop to help recruit diverse senior leaders. Rowland Mosbergen https://doi.org/10.6084/m9.figshare.14315846

[6] Future-Proofing your Workforce while Navigating Organizational Change. Rowland Mosbergen. https://doi.org/10.6084/m9.figshare.16725757

[7] Strategic Planning using a Change Management Lifecycle Framework. Rowland Mosbergen. https://doi.org/10.6084/m9.figshare.12199856

Strategic Planning using a Change Management Framework

Mosbergen, Rowland (2020): Strategic Planning using a Change Management Lifecycle Framework.

https://doi.org/10.6084/m9.figshare.1219 9856

Future-Proofing your Workforce while Navigating Organizational Change

Rowland Mosbergen
https://doi.org/10.6084/m9.figshare.16725757

Improving Diversity and Inclusion in Senior Leadership

https://doi.org/10.6084/m9.figshare.14315846

These are combined into this leadership program

This is a Research Software Engineer Leadership Course that I am developing that is scheduled to be launched later this year or early next year.

In the future there will be an opportunity to make this for a broader audience related to complex digital projects.

RSE Leadership Course

PRACTICAL DIVERSITY AND INCLUSION

This is a new leadership course that is likely the first in the world to provide an intersectional Diversity, Equity, and Inclusion (DEI) framework that underpins a leadership course for people who lead Research Software Engineers (RSEs).

Using a Diversity and Inclusion framework to unearth talent

Using Continuous Improvement skills to identify talent

Setup and maintain pipelines to attract talent

Managing high-performance teams

How to deal with difficult people and building relationships

PRACTICAL DIVERSITY AND INCLUSION