GENOMIC RESEARCH AND INVOLVING PEOPLE

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About this document

This document was created by Jack Nunn on 11 October 2020, to accompany a presentation given for La Trobe University. This document is intended to provide additional information and resources relevant to the presentation 'Genomics Research and Involving People'. This document is licensed under Creative Commons Attribution-Non-Commercial 4.0 International (CC BY-NC 4.0). Contact Jack.Nunn@latrobe.edu.au.

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Introduction

- Summarise presentation and content
- Introduce self

What is genomics?

- All life is made from code. From DNA.
    - What if you were told a variation in your DNA might contribute to your risk of a disease? Or that you or your loved ones might pass on that risk to your children?
    - But what if you were told that the disease you are at risk from is so rare, that it has not been well-researched?
    - Or that there is a treatment but it's too expensive?
    - For some people, these questions are already very real.
- Genomics has the potential to improve prevention of disease and inform more targeted and effective interventions[1]
- Our understanding of genomics research works best when it is combined with rich data about medical history, lifestyle and other information. The more data there is, the more accurate predictions we can make.

Why now?

"No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be..." (Isaac Asimov) [2]

By 2025, it is estimated that nearly 2 billion people worldwide will have had their DNA sequenced, creating a global imperative for responsible and effective public involvement in research[3].

I started researching this area in 2012 and since then at least 14 countries have invested over US$4 billion to establish national genomic-medicine initiatives[4]. I started my PhD in 2016; here are three things which have happened since then:

- **October 2017:** Genomic medicine integrated into healthcare in countries across the world, improving diagnosis and treatment for millions of people, and the UK Biobank opens data associated with 500,000 genomes to all 'all bona fide health researchers'[5,6]
- **November 2018:** The human genome has been edited for the first time, a decision widely condemned as unethical[7,8]
- **April 2019:** A serial killer was found by law enforcement employees in the USA using 'GEDmatch'[9] (a database of people sharing their own DNA information), the website has since been bought by a private company[10]. The Electronic Frontier Foundation said 'We need to think long and hard as a society about whether law enforcement should be allowed to access genetic genealogy databases at all'[11]

Is genomics research different from other research?

In a recent global survey most people viewed DNA data as different from other medical data and most people were willing to donate DNA data when the recipient was specified as a 'medical doctor' and least willing when the recipient was a 'for-profit researcher'[12]

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Genomics and other biomedical research present specific social, ethical and legal challenges, such as the communication and commercialization of research results, the balancing of individual rights against the collective good, and data protection.

> 'To address these challenges, leading international institutions stress the importance of public involvement in biomedical research and innovation' [13(p2)].

In order for genomic research to be successful, it needs to be supported by the public (both for funding decisions and decision to participate)[14]

In a study in 2016, 80.30% of people who had shared their genomic data said they did so in order to contribute to the advancement of medical research [15(p1)].

By involving the public in shaping genomic research, we can create research which is more likely to benefit more people [16(p6)].

The way in which data is shared must therefore be developed with participants from the outset of any study which collects genomic data[17].

There is a critical need to involve people in genomics research during this phase, in particular to protect vulnerable people from exploitation.[3,18]

What's the problem?

- There is no clear methodology or evidence base for informing best-practice when involving people in genomics research[3].
- Genomics research is global and needs to work across populations and multiple human languages, so evidence of best practice for involvement needs to work across these same boundaries.

What is involvement in research?

The Australian National Health and Medical Research Council defines involvement as "research being carried out with" people, rather than "to, about or for them"[1]

Participatory research is an umbrella term which describes a number of related approaches, including forms of action research which embrace a participatory philosophy and include 'co-design' and 'co-production' of research, 'community-based participatory research', 'co-design' and forms of 'public involvement'[19]. It is a process whereby researchers, the public and other relevant stakeholders "work together, sharing power and responsibility from the start to the end of the project",[20] including knowledge generation and translation[20]. Here the term 'participatory research' will be used to refer to all variations of this method.

Why involve people in research?

The benefits of involving the public in research are wide-ranging. There is evidence from other fields that involving people in research improves research outcomes, ensures it is acceptable and meets people's diverse needs. Benefits include improving trust and public influence over research[17,21,22];

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1 https://consultations.nhmrc.gov.au/files/consultations/drafts/draftconsstatementconsultationversion140807.pdf

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ensuring that research is conducted in an ethical, accessible and transparent manner, and ensuring that research reflects the balance and diversity of priorities within populations[23,24].

Mapping what is known and unknown

A number of reviews have been completed, including a narrative review of systematic reviews about public involvement in research. The main learning from narrative review is that terminology is inconsistent and participatory research method had the most impacts according to a narrative review. Our scoping review of international genomics research projects concluded[25]:

> "The limited number of initiatives reporting public involvement and its impact in this study suggests **there would be significant value in developing a more systematic method of both reporting and evaluating how people are involved in human genomics research**"

Evidence-informed participatory research?

At the moment, there's no standardised way to describe how people have been involved, or to report the impacts of involving people[26]. There is also no standardised way to map and report different stakeholders' preferences for involvement (including the general public, professionals involved in research and industry).

Research aims

My PhD is exploring how can we bring the principles of democracy and human rights into genomics?

How do we do that practically, and what evidence is there for the best ways to involve people in certain tasks?

1. To understand when and how people have been involved in human genomics research to date
2. To apply a participatory action research method to human genomic research, using four case studies, in order to learn more about the practicalities of involving people in genomic research
3. To develop a standardised way of planning, reporting and evaluating involvement in order to improve future genomics research

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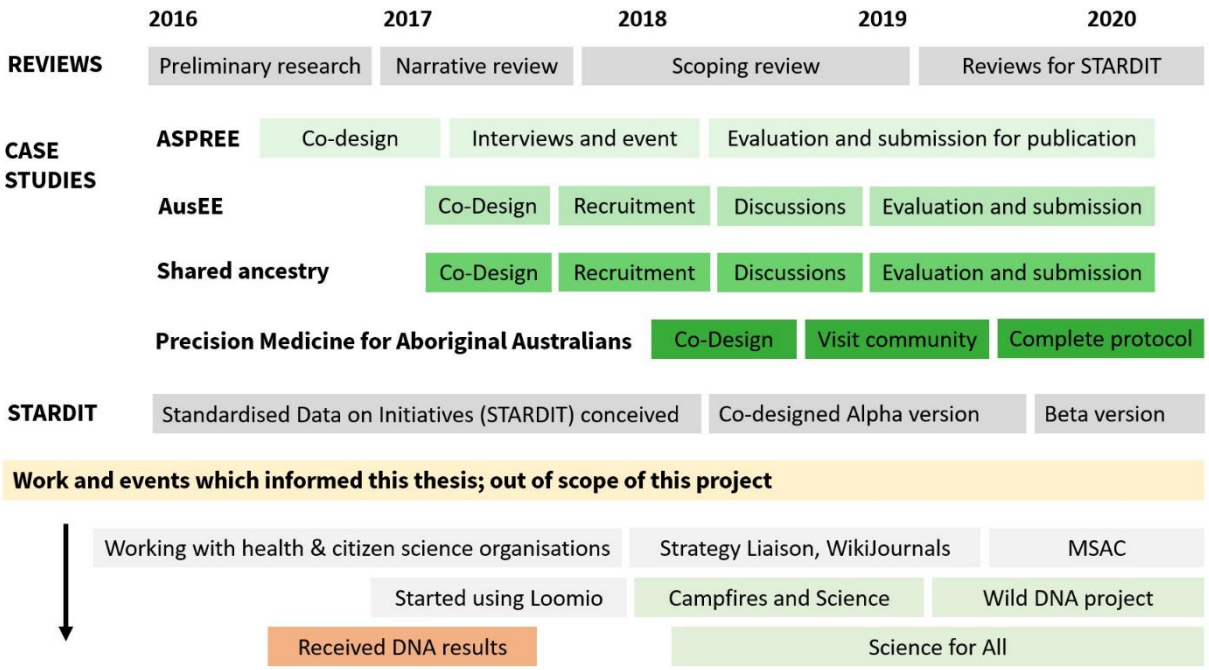
Summary of research timeline



What has been done?

I published a global review of over 100 international genomics research projects and discovered only one third of them currently involve people[27]. Applying learning from this I have co-designed research with four different groups to explore and evaluate practical ways of involving people[28]. After starting this PhD I decided to do my own DNA test and I unexpectedly learned my actual biological grandfather was a prolific sperm donor who fathered up to 1000 people[29].

- So I worked with 20 biological relatives from this group to co-design online discussions about future genomic research[28,29]
- I've worked with remote Aboriginal communities to co-design genomics research and published papers with the National Centre for Indigenous Genomics[18,30]
- Working with participants of one of the largest clinical trials in Australia, I co-designed a multi-generational study[31]
- I worked with a group of people affected by rare disease [32]
- I've led the conception and co-design of Standardised Data on Initiatives. [26]

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Visual summary of entire project

Adapted from 'Involving People in Genomic Research'[28]

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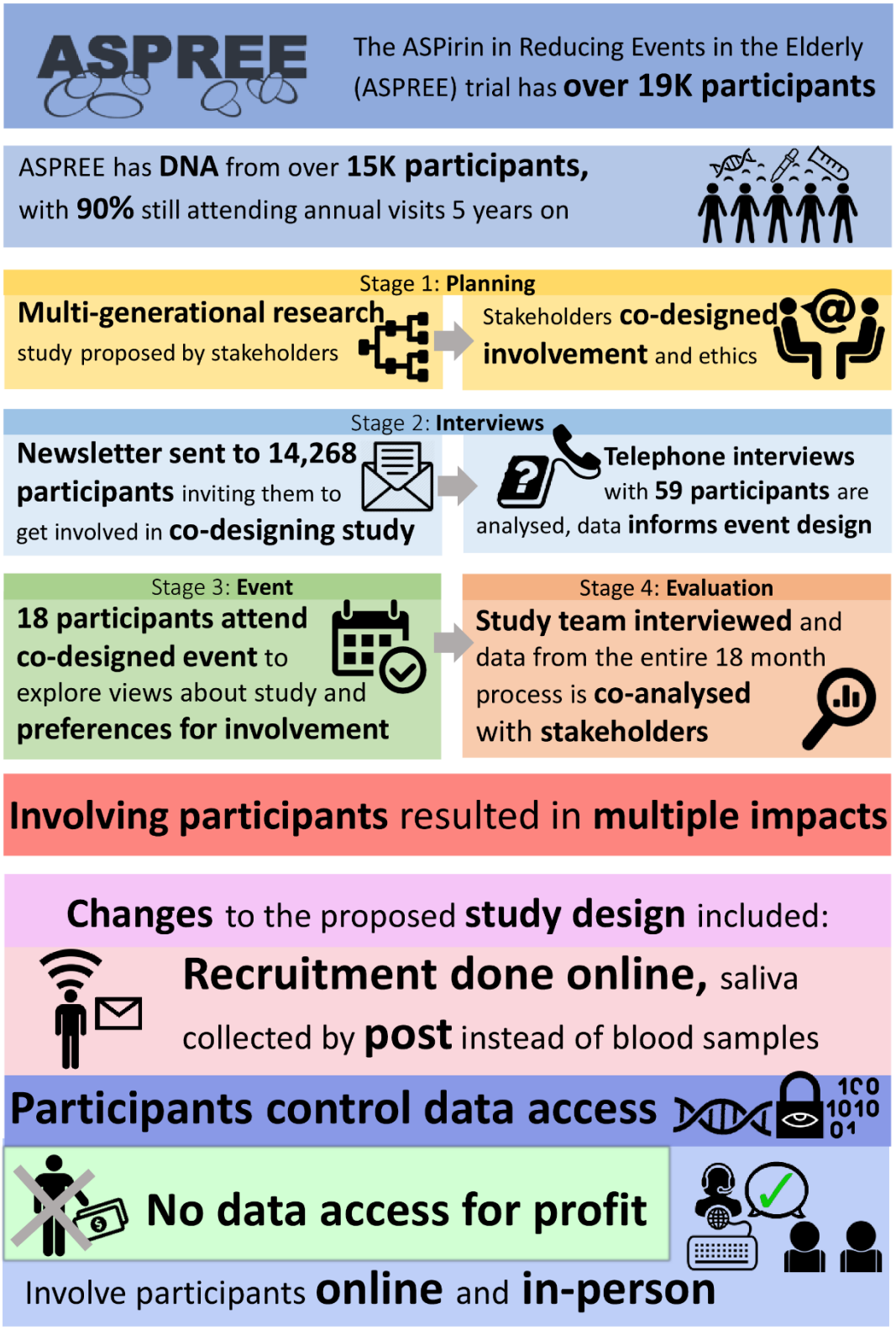
ASPREE case study – visual summary



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AusEE case study - visual summary

Working in partnership with the charity AusEE, **this study was co-designed** with people affected by rare Eosinophilic Gastrointestinal Disorders

We explored using **online discussions** as a way of **involving people** in shaping future **genomic research into rare diseases**

Stage 1: **Co-design**

Study **co-designed** with **representatives** from charity → Online discussion refined according to feedback

Stage 2: **Recruitment**

Invitation to participate shared on charity's **social media group** → **26 give consent** and complete survey, **online discussion** details sent

Stage 3: **Discussions**

14 day online discussion with **15 participants,** 2 facilitators → Stage 4: **Evaluation**

Post-discussion survey sent and data **analysis completed** October 2019

Involving participants in the process resulted in **multiple impacts**

The **online discussion** was reported as a **positive and helpful experience** by participants.

Involving people changed views about the **value of involvement** and **improved understanding** of involvement in research.

Online discussions were also **perceived as a more inclusive** and **flexible** way of involving people, for example those with caring responsibilities.

People's views about who should be involved in research 'widened' to include more people.

Everyone involved ← → Only professionals involved

Standardised reporting of involvement in research

STARDIT

Planning, reporting and analysis of **involvement** was **standardised**

- **Who was involved in which tasks?**
- **Who is funding it and why?**
- **What is the outcome or impact?**
- **How will data be shared?**

STARDIT is being develop by the **Wikimedia Foundation's** open-access journals. The **ongoing co-design process** is hosted at ScienceForAll.World/STARDIT

WIKIMEDIA MOVEMENT AFFILIATES

SCIENCE FOR ALL

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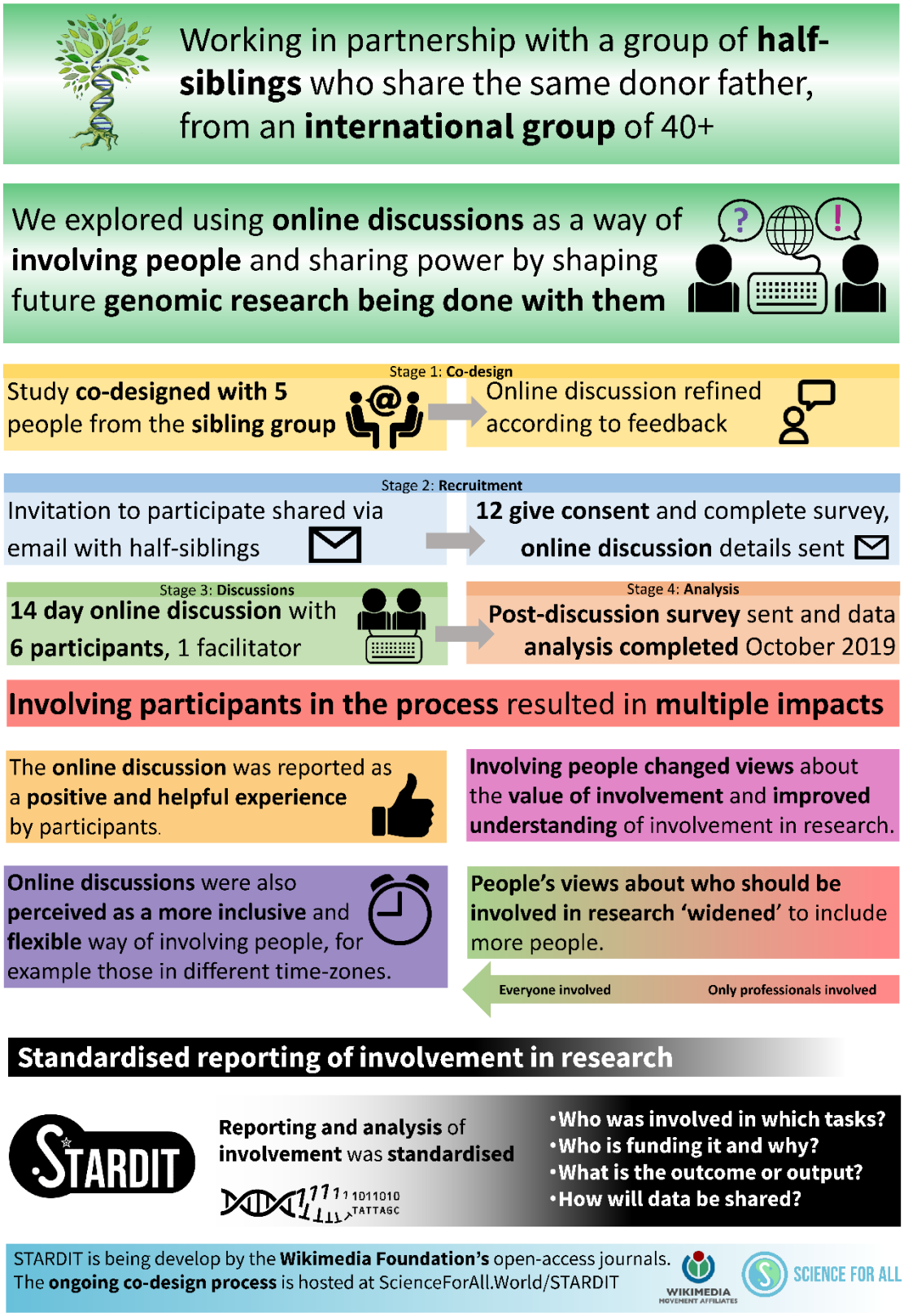
Shared Ancestry case study – visual summary



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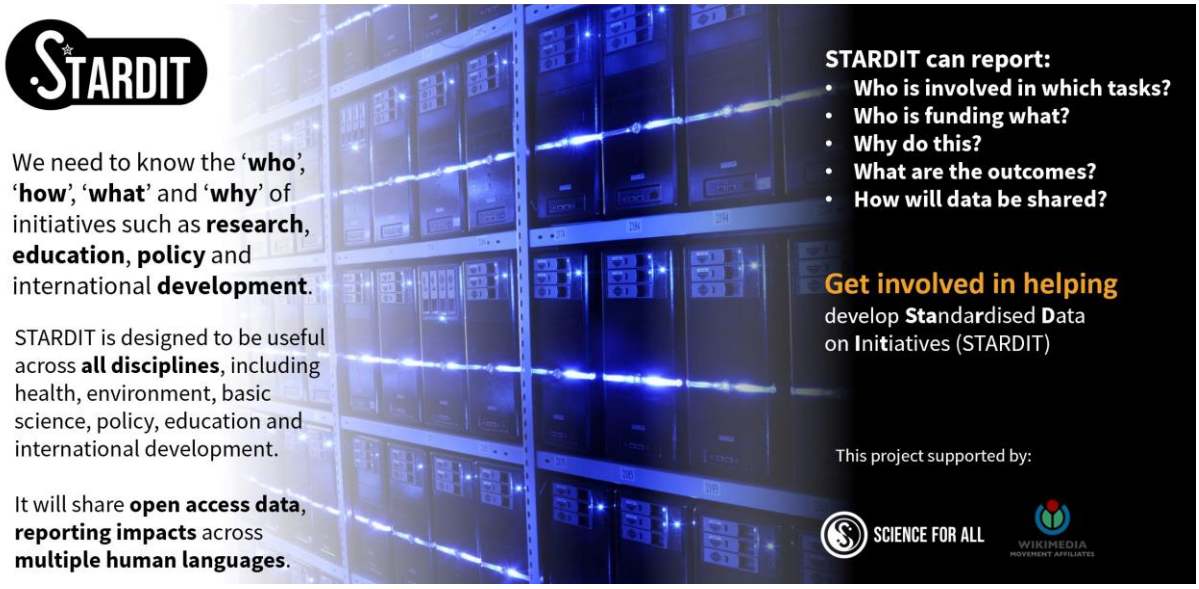
What is Standardised Data on Initiatives (STARDIT)?

STARDIT creates a standard way to share information about which tasks were done, how they were funded, who completed the tasks, which people or organisations were involved and any impacts made. It offers a way to share ongoing updates throughout the lifetime of an initiative, from planning to evaluation. STARDIT could be used across sectors including health, environment, policy education and international development.

Data is structured to allow for translation into multiple languages, and increase reach across countries and communities. STARDIT reports will be available open access in the public domain, with options for peer-review and verification of authorship. The data is presented in a way that is accessible to anyone, in multiple languages.



Learnings

- I have learned people want to be involved, they want to make ethical decisions about their own data, but people need support to get involved.
- I have learned we need to involve people in helping design how they'll be involved, but researchers need to use evidence-informed methods to do this.
- Currently there is limited evidence about how best to involve people. So I created a standardised way to report involvement and I'm now leading an international team of over 40 people, creating a tool which will be used to report research initiatives around the world and help us answer the question 'what is the best way of involving everyone in shaping future research'[26]

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Main outcomes

- Improved understanding of contemporary involvement in genomic research with a well-read scoping review which has been cited by others
- Public understanding of genomics and DNA is often connected with crime (forensics) and ancestry. People working in public health genomics need to co-create communications to ensure they are understandable, and that the purpose of any research is understood.
- STARDIT tool has helped:
    - plan and evaluate different projects, showing impacts from the process
    - Map different stakeholders' preferences for involvement (including researchers, participants and the wider public)
    - Demonstrate that involving people in genomics research has positive impacts

Research translation

- A well-read scoping review (5k plus reads) which has been cited by others[27]
- Learning from the scoping review and the methodological techniques developed informed subsequent scoping reviews in the field[33] and the development of STARDIT[26]
- Learning from projects informed work of partner organisations including **ASPREE**, **AusEE** and the **Poche Centre for Indigenous Health**
- Informed public debate, by participating in discussion on UK's Genetic Society's podcast (2019)[29] and the film 'The World's Biggest Family'(2020)[34].
- STARDIT has been used by other research initiatives beyond this PhD thesis; it has been recommended for reporting involvement in biobanks[33], and is continuing to be co-developed by an international team of over 40 people[33]

Recommendations

- Scoping review highlighted the importance of being able to show who was involved in labelling phenotypes for genomic variations where a subjective experience is important[3]. STARDIT can be used to show this[35].
- Genomic medicine often requires both knowledge of a subjective experience of living with a phenotype, combined with medical and DNA data. For example, there are objective measures of dementia so how can we describe subjective ones to improve annotation of genomes?
- STARDIT can be used to report who was involved in the research, including in tasks such as phenotype description
- More research is required to appraise methods of co-designing and co-managing biobanks and other genomic databases, where governance might span decades
- More research is required to explore evidence-informed ways of involving people in the health technology assessment process
- Continuing the co-design process in order to create workable, culturally-safe and effective methods for reporting how people from vulnerable communities are involved in research

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Conclusion

I have shown how there is a global imperative to improve involvement in genomics research, but there remains a lack of data to support evidence informed policy.

I have led the design of different research projects in order to explore different methodologies of involving people in genomics research. Learning from these case studies can be applied to a number of different settings, including vulnerable populations.

The most difficult work now remains ahead, which is translating this learning into practice and continuing to ensure that data sharing around involvement in research is standardised.

Once this is achieved, humanity will begin to develop evidence-informed ways of sharing power which can be applied and evaluated by anyone, anywhere.

Acknowledgements

I would like to acknowledge and pay respect to the traditional owners of the land on which this research was done. I acknowledge that sovereignty was never ceded. I acknowledge and respect all Elders past, present and future. The Wurundjeri people of the Kulin nation are the traditional custodians of the land on which I speak today.

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- Co-Supervisor: **Dr Paul Lacaze**
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