Advancing FAIR with CARE in Medical Imaging Research: A Federated Analysis Approach

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ABSTRACT / INTRODUCTION **(Up to 200 words)**

The FAIR data principles, established in 2016, have enhanced research data discoverability and usability. Within a few years, the CARE principles complemented FAIR to address ethical aspects of data sharing. Implementing these principles has been left to individual research groups, leading to a diverse operational implementation to uphold data sovereignty in New Zealand. Our goal is to increase the compatibility in outcomes.

Our proposal advocates a transformative approach to promote reproducibility, transparency, and collaboration using federated analysis. This approach allows individual research groups to retain raw data custody, while shared standardized protocols for acquiring and analysing data enable impactful research outcomes. Federated analysis facilitates collaborative deployment of tools, ensuring privacy and accuracy. Shared protocols reduce ambiguity while enhancing study comparability and generalisability.

A medical imaging research (MRI study) is used to showcase operational example of a federated analysis, as well as a future suggestion of a searchable metadata database made. The federated analysis model will allow better control of the raw data, and prepare the data to be interoperable and reusable with the right consultations and agreements. This can ultimately optimize the value extraction of data from multiple research without compromising the integrity of research values.

ABOUT THE AUTHOR(S)

- Name: Eryn Kwon
- Bio: Eryn Kwon completed a Bachelor of Engineering and Science (conjoint) from the University of Auckland, majoring in biomedical engineering, physics and chemistry. She started working on the forensic modelling project first as her Master's degree in Mechanical Engineering at the University of Auckland, which continued into her PhD. Eryn is currently working on a mild traumatic brain injury (mTBI) project, investigating early detection and modelling of the injury, which is a joint project between the Auckland Bioengineering Institute, Centre for Brain Research and Māta. Leveraging

from her PhD experience in modelling large and rapid deformation to the complex biological structure (brain), her recent work focused on obtaining data to build foundations to mTBI biomarker detection platform. When combined with the advanced MR imaging capability of Mātai, the data will result in accurate computational model of mTBI providing objective assessment and prognosis specific to each individual and impact scenario.