Research and Innovation Roadmap
2020 Annual Projects
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Overview

This document has been developed by the Australia New Zealand Policing Advisory Agency National Institute of Forensic Science (ANZPAA NIFS), with input from the Australia New Zealand forensic science community through the Research and Innovation Advisory Committee (RIAC) and the Specialist Advisory Group (SAG) network. This document is also informed by the outcomes of the ANZPAA NIFS Forensic Fundamentals project, that is, where priority research areas are identified as part of the gap analyses of forensic science disciplines performed for this project, they are considered for inclusion in the relevant section. This document articulates the priority areas for research and innovation in forensic science for 2020 approved by the Australia New Zealand Forensic Executive Committee (ANZFE).

The specific research priorities are posed as questions, to allow researchers to explore opportunities to investigate and address the issues involved. These questions are intended to provide a short-term focused priority list of the forensic responses detailed in the ANZPAA NIFS Research and Innovation Roadmap, which also provides context in the law enforcement environment, aligning each forensic response to broader strategic policing priorities and crime rate data. The questions contained in this document cannot be addressed by one agency or one research project alone; rather, initiatives aligned to these questions should be collaborative and leverage resources from different sectors of the community.

ANZPAA NIFS have committed to providing assistance where possible and the process for seeking this assistance is detailed in the ANZPAA NIFS Research and Innovation Strategy. In order to reduce duplication of effort, it is suggested that those looking to undertake an initiative aligned to one or more of the questions contained in this document contact ANZPAA NIFS. This will help to identify potential opportunities for collaboration and ensure that resources are shared across the different areas prioritised for further investigation.


Any questions related to the content of any of these documents should be directed to secretariat.nifs@anzpaa.org.au.
How could artificial intelligence enabled handheld devices expand the scope of in-field testing in forensic science? E.g. roadside and other field based drug testing.

How does the legalisation of medicinal cannabis impact roadside, criminal and workplace drug testing? E.g. determining level of impairment / differentiation of medicinal versus illicit cannabis use.

What additional information could be captured from latent fingerprints from crime scenes? E.g. new recovery techniques and analysis to provide additional information / inform reconstruction of events.

What body fluid identification tools exist or could be developed to support activity level assessments?
What casework relevant data is required / already exists to support probabilistic models for the evaluation of transfer, persistence, prevalence and recovery of trace evidence, in order to inform source and / or activity level evaluative opinions?

Are fingerprint feature frequencies in Australia and New Zealand consistent with those reported in international databases and can they be used to operationalise a probabilistic reporting framework for fingerprint comparisons?

What is the level of inter- and intra- examiner reliability of opinions expressed using evaluative reporting within feature comparison disciplines?

What key features are used to form opinions in pattern comparison disciplines, how are these features weighed, and how consistent is their use between different examiners?
Under what conditions are the various forensic audio enhancement techniques demonstrably effective at improving the intelligibility of speech?

What empirical evidence is required to demonstrate the validity of the different elements of facial comparison? E.g. facial recognition software, evidential comparison and identity confirmation.

How does the transition from manual to digital workflows in forensic science disciplines impact validation, as well as training and reporting requirements? E.g. move to use of Adobe Photoshop® for shoemark comparisons.

How do experts interpret / account for distortion during the analysis and comparison of friction ridge skin?

What is the accuracy and reliability of expert recreation of events? E.g. reconstruction of a shooting scene / reconstruction of a post-blast scene.
How can the evidence base for expert opinions in the medical science disciplines be supported through ground truth data in the absence of controlled experiments? E.g. secondary confirmation of case circumstances such as CCTV, animal models, review of case reports / trends.

What new / improved technologies can be leveraged to increase the ability to detect and analyse trace evidence?

What is the best way to measure the effectiveness or impact of forensic science and what is required to develop these metrics to inform decision making?

How can the results of forensic analyses be reported to investigators more quickly, and what information is critical for efficient and effective use of the results?
How could existing forensic science disciplines utilise their current processes or information generated from their examinations for forensic intelligence applications?

What forensic disciplines are suitable for the development of cross-jurisdictional databases to inform forensic intelligence applications, and how could these databases be developed?

Could knowledge of drug manufacture, drug production trends and illicit drug markets predict the development of new psychoactive substances and / or metabolites?

How can forensic science data / expertise be used to further support crime prevention / disruption activities?
What forensic data are suitable for an artificial intelligence analysis workflow, what efficiencies can be gained and what level of accuracy and reliability can be expected?

How can citizen data holdings such as mobile phone recordings, smart devices and dashcam footage be utilised in the reconstruction of events for criminal investigations?

How could data modelling / analytics be applied to forensic casework data to improve efficiency and / or increase service delivery?
How should performance testing be designed to validate methods, demonstrate competency, and inform training regimes?

What are the benefits and limitations of supplementing oral testimony with visual, interactive and potentially immersive evidence presentation?

What is the best mechanism to develop and maintain expertise in, and disseminate / report evaluative opinions in forensic science?

What is the best pathway to develop future forensic science practitioners, given rapidly changing technologies, operating models and task division?
Given the existing research in relation to lay person understanding of the results of forensic analyses, what is the optimal method of communication for forensic expert opinions across disciplines?

What methodologies are available to capture and recreate crime scenes for re-assessment, presentation of evidence or education and training purposes?

What tools and methodologies could be developed to trace exploitation/abuse material without the need for human review?

What impact will the increasing use of digital processes in forensic laboratories have on expert performance, training requirements and the presentation of evidence?