

Executive Overview: Strategic Roadmap for Human-Relevant Non-Animal Methodologies (NAMs) - Immune & Infectious Diseases

1. Vision & Mandate

This roadmap outlines the institutional transition from traditional *in vivo* animal models to high-fidelity, human-relevant Non-Animal Methodologies (NAMs). Driven by the Section 2A statutory duty of the *Animals (Scientific Procedures) Act 1986*, this strategy prioritises the adoption of human-centric platforms to enhance the scientific validity, reproducibility, and ethical alignment of our research output.

2. Strategic Pillars

Our approach moves beyond isolated experiments, implementing a unified, cross-disciplinary framework across four core immune and infectious disease focus areas:

- **Immunology / Lymphoid Models (2.1):** Replacing systemic irradiation and engraftment models with lymph node-on-chip and lymphoid organoid systems.
- **Infectious Disease Models (2.2):** Utilising host-pathogen microphysiological systems (MPS) to provide accurate predictions of human viral/bacterial pathogenesis and tropism.
- **Cancer Immunology & Immunotherapy Models (2.3):** Implementing 3D immune-tumour assembloids to supersede misleading rodent xenograft and syngeneic models.
- **Vaccine Development Platform (2.4):** Adopting microfluidic biomimetic lymph nodes and engineered human mucosal barriers to replace high-severity animal challenge studies.

3. Institutional Impact & Roadmap Integration

By centralising these specialised technologies, the institution establishes a "fit-for-purpose" research infrastructure. This integration provides:

- **Regulatory Compliance:** Robust "Weight-of-Evidence" (WoE) packages that streamline Home Office and ASRU project licence approvals.
- **Scientific Superiority:** Data that mirrors human clinical outcomes, bypassing the inherent failures of rodent-to-human cross-species extrapolation.
- **Future-Proofing:** A sustainable research paradigm that positions the institution at the forefront of the global transition toward cruelty-free, precision medical science.

4. Commitment to Excellence

The successful execution of this roadmap is dependent on the prioritised investment in human expertise, including advanced training in lymphoid tissue engineering, microfluidic infection-on-chip management, and computational immunology modelling. This commitment ensures that we remain compliant with ASPA 1986 while simultaneously driving innovation in human-centric medical research.