



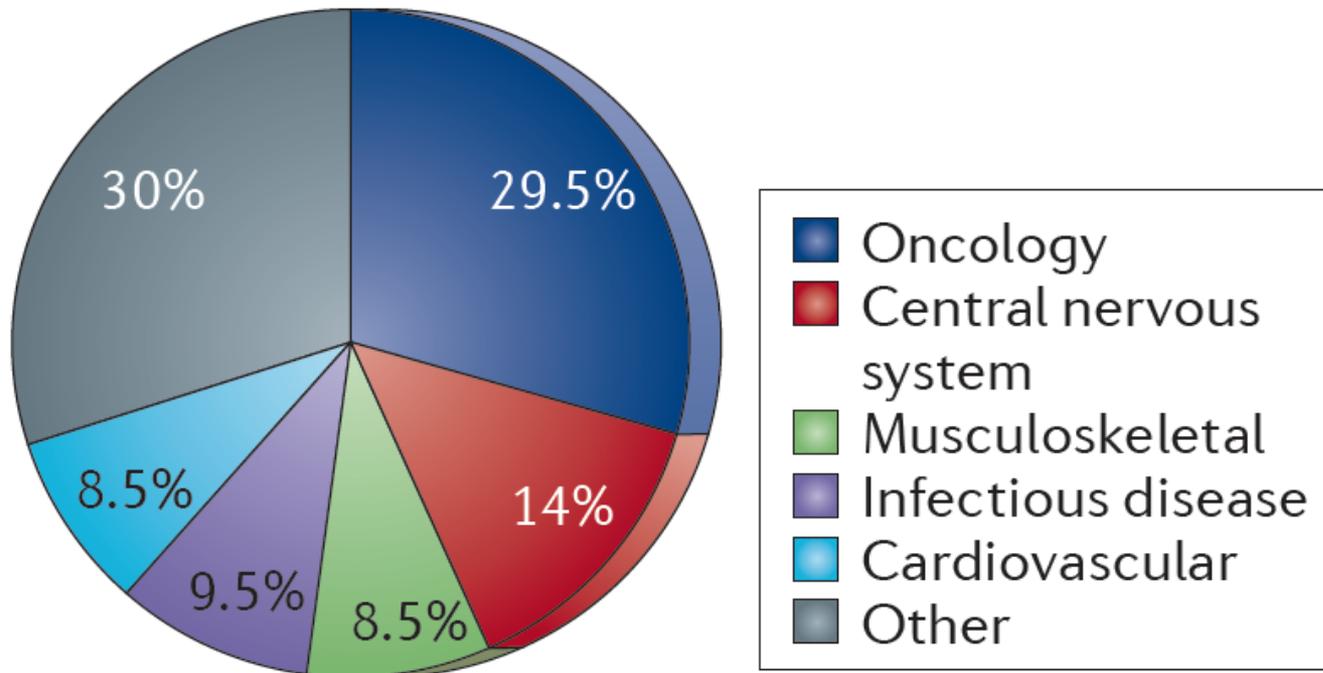
National Centre
for the Replacement
Refinement & Reduction
of Animals in Research

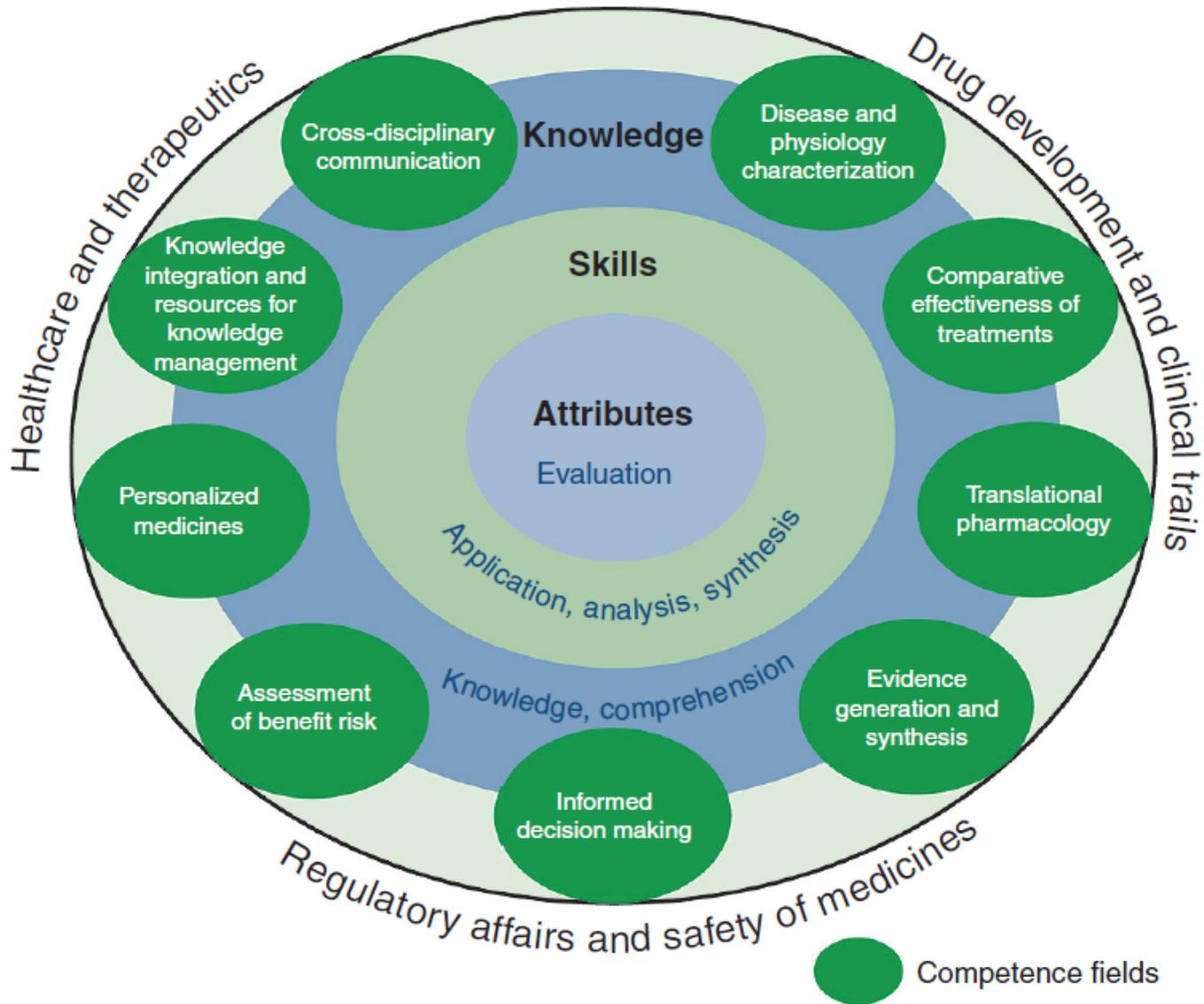
Challenge 16: Virtual Infectious Disease Research

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Phase II Attrition rates

Failure by therapeutic area



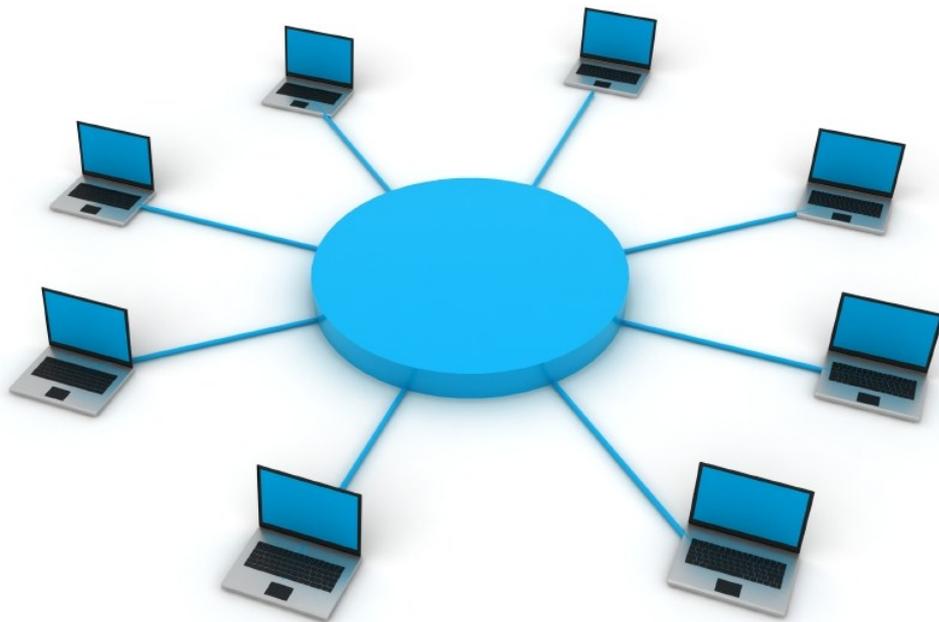


Infectious Disease Research and the 3Rs

- Animal use in a typical rodent efficacy study for new antibiotics or vaccines can involve approximately 100 animals per candidate
- The animals are infected with the pathogen after vaccination or treated with the drug of interest
- Untreated controls are always used. The resulting disease in control animals and those in whom the vaccine or drug are ineffective, can cause severe suffering
- The use of *in silico* approaches to study disease biology and predict efficacy would reduce the number of animals used
- Reducing the number of animals used AND reducing attrition

The Virtual Infectious Disease Research Challenge

To develop a virtual platform that models infection and the host response to pathogen assault for basic research and enhances new target development in infectious diseases.



Challenge Details : Phase 1

Key deliverables

- Identify chosen host and pathogen on an evidence basis with justification and scientific merit along with projected 3Rs impact
- Propose infrastructure for the platform outlining the integration of animal based evidence and literature with a mathematical and computational approach
- Demonstrate the level of predictivity of the system, including the limitations
- Develop a simple prototype of how the information will be assimilated and presented to the user
- Provide a strategy for validation of the model in Phase 2 including key criteria that will define success
- Provide evidence of collaborative expertise, including wet scientists, to progress into Phase 2
- Consideration of a suitable business model to disseminate the platform including potential market

Challenge Details : Phase 2

The successful Phase 2 candidate will have delivered a proof-of-concept model for their chosen pathogen and host during Phase 1. Certain deliverables will be influenced by the Phase 1 outcome, but the common requirements will be:

- The delivery of a virtual platform, including predictive tools, quantitative techniques and mathematical models that will describe and predict the spread of infection and the host response for a single, or combination of, pathogens

And/or

- A model to determine how vaccines or adjuvants influence the host response

Challenge Details : Phase 2

The model should be able to:

- Predict/ biology of the pathogen in the host
- Detail the internal microbial processes of the pathogen
- Track the dissemination of the pathogen within the host
- Describe the interaction of the pathogen with the host immune system
- Identify new and improved diagnostic and therapeutic targets. There should also be the capability to detect and test novel responses associated with resistance.

Challenge Details : Phase 2

The project management team should provide evidence of:

- Consultation with industry and academic experts in this area to access the data sets needed to deliver the brief
- The needs and market of the end user

The consortia should deliver:

- A system that will be taken up across all areas in the bioscience sector
- Strategy for commercialisation and uptake

Points to consider:

- What we don't want are models for measuring the spread of pathogens through populations
- Relevance to human health
- 3Rs impact
- Choice of pathogen, host, model of resistance
- Focus of your application:
 - can it all be done?
 - single host / multiple pathogens?
- Skills sets: network for expertise outside your area-mathematics, biology



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Thank you

Pioneering Better Science