Animal Research Database Management System

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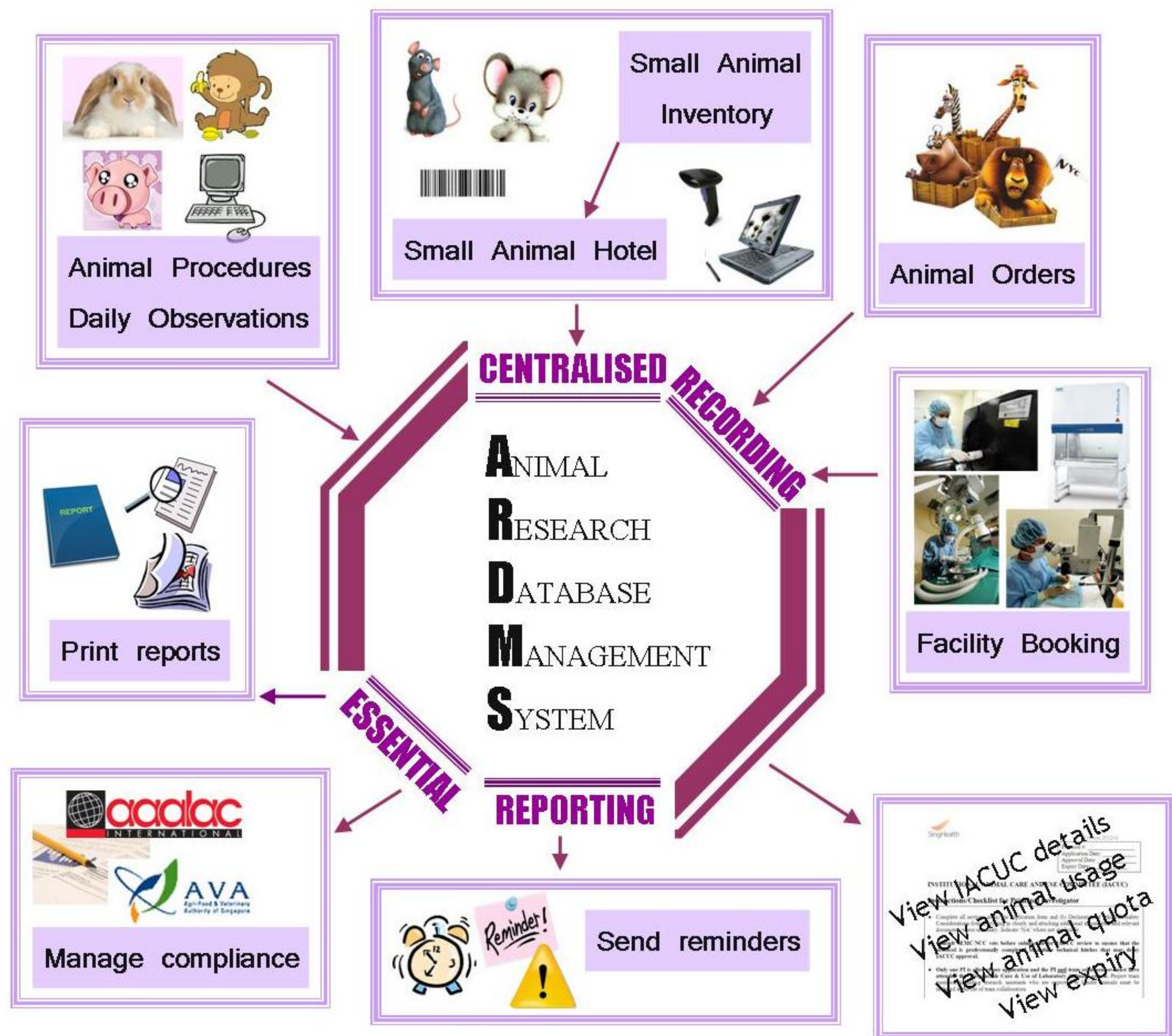Bernice Cheo Yi Fen, SingHealth Corporate Office

1 Introduction

SingHealth Experimental Medicine Centre (SEMC) operates a comprehensive animal-based research facility licensed by the Agri-Food and Veterinary Authority (AVA) of Singapore. It is currently the largest centre in Singapore, capable of supporting research utilising both small and large animals. The centre offers a one-stop service solution for investigators in animal research, starting from protocol development, animal supply, provision of facilities, veterinary care to technical services.

Running this Centre is about 50 dedicated staff who are involved in the above activities from the start to end of projects. In doing so, the processes are handled by different group of staff in interrelated steps. In addition, many records and data are generated, from project protocols to animal-related records. The Animal Research Database Management System (ARDMS) is an in-house application system that was developed to manage the different workflows and centralise all recording of data.
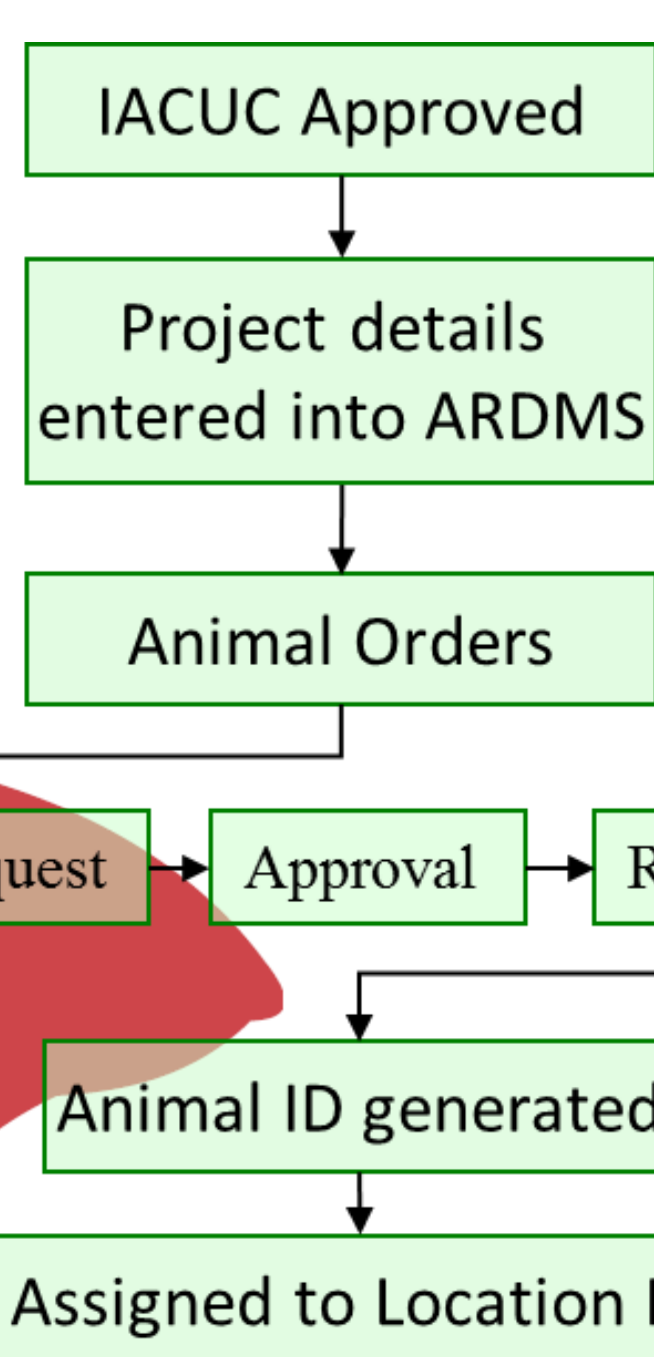
2 Objectives / Aims

- To create a central repository for all data and records
- To improve workflow and minimise manual recording on hardcopy
- To ensure compliance with NACLAR[1] guidelines
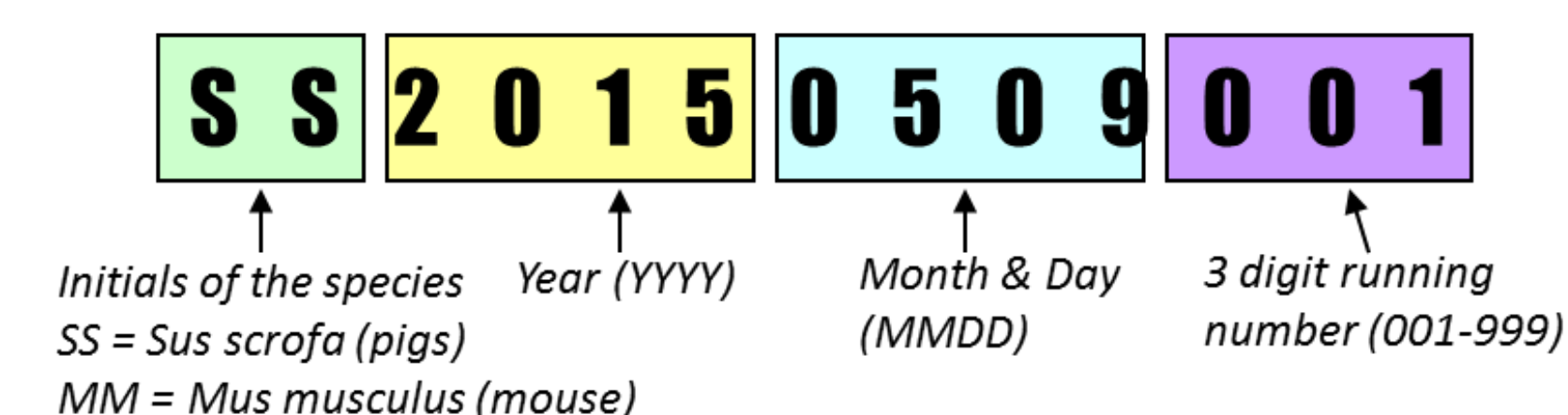- To ensure the highest standard of animal care is met

CENTRALISED RECORDING

ANIMAL **R**ESEARCH **D**ATABASE **M**ANAGEMENT **S**YSTEM

ESSENTIAL REPORTING

Animal Procedures Daily Observations · Small Animal Inventory · Small Animal Hotel · Animal Orders · Facility Booking · Print reports · Manage compliance · Send reminders · View IACUC details · View animal usage · View animal quota · View expiry

3 Methodology

Workflow 1: Registration of project and enrolment of animals

IACUC Approved → Project details entered into ARDMS → Animal Orders → Request → Approval → Receipt → Animal ID generated → Assigned to Location ID

Approved IACUC[2] project keyed into system.
Features:
- Project details
- Animal quota and usage
- Animal orders and facility bookings

Enrolled animals given unique Animal ID

S S 2 0 1 5 0 5 0 9 0 0 1

Initials of the species
SS = Sus scrofa (pigs)
MM = Mus musculus (mouse)
Year (YYYY)
Month & Day (MMDD)
3 digit running number (001-999)

Location ID
"Location/Room/Row or Rack/Cage"
- Animals allocated to particular Location ID
- Easily retrievable
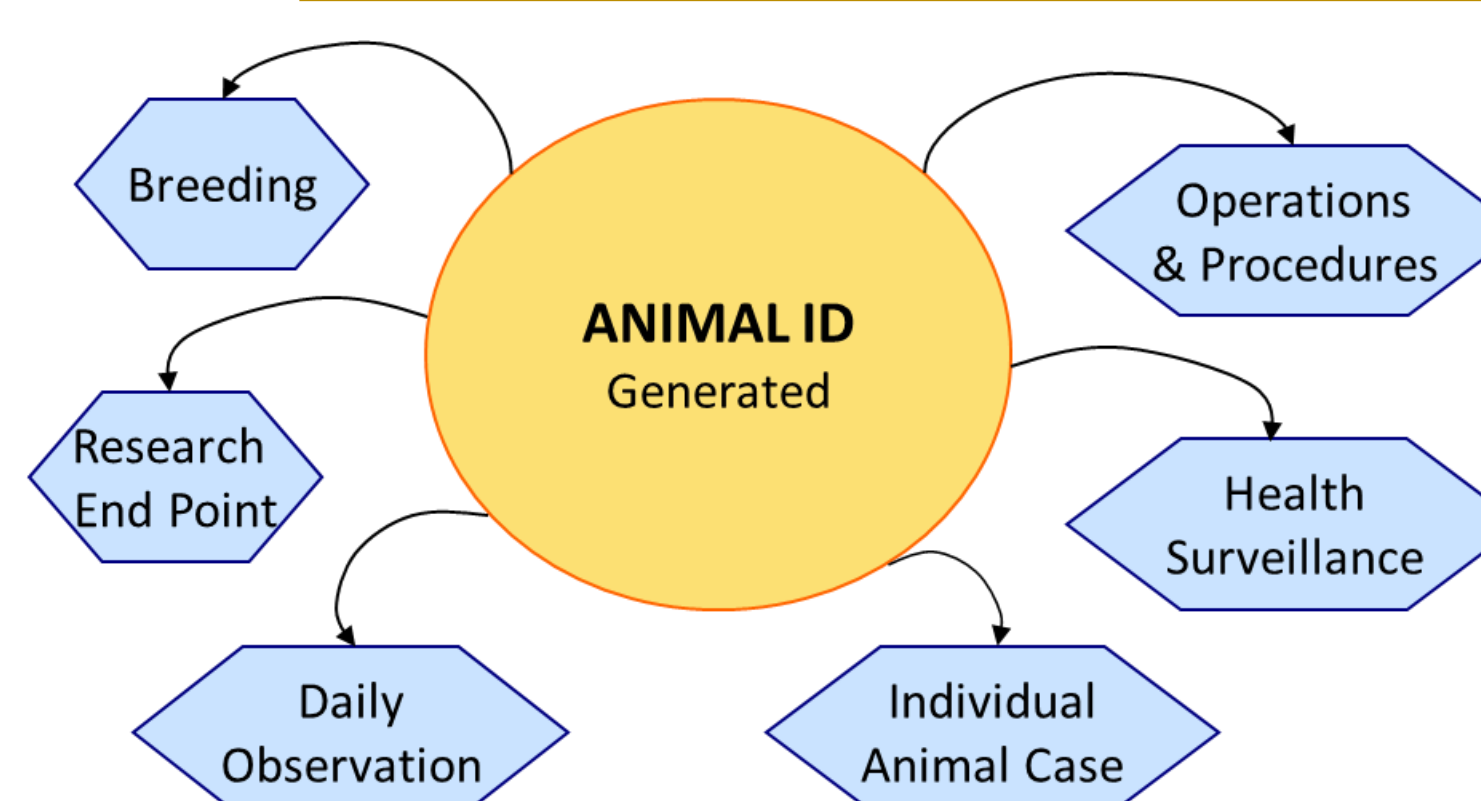- Real-time updates
- Allows tracking of animals' location

Small Animal Hotel
- Mobile setup in rodent rooms
- On-site animal inventory updating
- Print cage cards:
  ▶ Project information
  ▶ Number of animals
  ▶ Animal details (species, strain, age)
- Barcode scanning for rapid identification
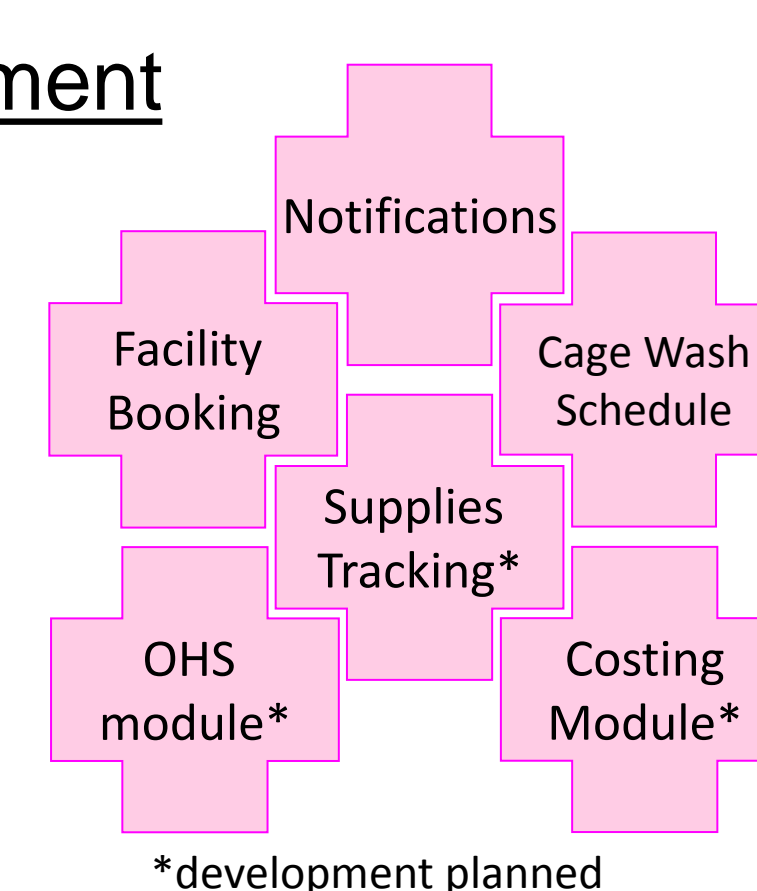
Workflow 2: Animal Use activities

Breeding · Operations & Procedures · ANIMAL ID Generated · Research End Point · Health Surveillance · Daily Observation · Individual Animal Case

ARDMS Functions
- Input procedures, daily observations records
- View health statuses.
- Update location ID during movement

Workflow 3: Management of administrative processes

Facility Management
- Book facility
- Receive notifications
- More potential developments

Notifications · Facility Booking · Cage Wash Schedule · Supplies Tracking* · OHS module* · Costing Module*

*development planned

Generate Reports
- Vets can generate **Animal Medical History** for complete health reports
- Admin staff can compile reports like **Animal Use** and **Facility Bookings** for costing purposes.

4 Results

- Serves as a central repository for all data and records
  - One portal for project information, animal location and records. Reduced the time spent in finding different people / records for different information.
  - Centralised workflow like animal ordering and facility booking into one system and database.
- Improved workflow and minimise manual recording on hardcopy records
  - Clear, streamlined workflow from protocol approval to animal ordering, receipt, and usage, to end of project.
  - Online animal data, no need for hardcopy filing.
  - Reduced occurrence of human error as system performs tabulations and calculations, eg. animal inventory numbers.
- Ensured compliance with NACLAR guidelines
  - Animal quota check, previously by manual tabulation from different excel sheets, now performed by system at point of ordering.
  - Ensures project does not exceed approved animal quota.
- Highest standard of animal care is met
  - All animal-related records are centrally available on the system which allow Veterinarians to obtain complete and timely information on animals, to ensure animal welfare.

5 Conclusion

ARDMS has helped improve work efficiency and animal care quality. There is potential for further development to streamline administrative workflow. In light of increased research activities, the need for an effective and reliable database system is important to better manage workflow to ensure compliance while continuing to upgrade the standard of animal care and research.

[1] NACLAR is National Advisory Committee for Laboratory Animal Research, which publishes the *Guidelines on the Care and Use of Animals for Scientific Purposes*. It is a national guide which establishes the best practices in the use and care of animals for Scientific Purposes, and sets out the responsibilities of all the parties involved in the care and use of animals, in accordance with widely accepted scientific, ethical and legal principles.
[2] IACUC is Institutional Animal Care and Use Committee. All proposed use of animals for scientific purposes must be evaluated by the IACUC in compliance with the NACLAR Guidelines, to ensure humane and responsible care and use of animals for Scientific Purposes in accordance with the principles of Replacement, Reduction and Refinement.