



Conversion of a Biosafety Level 3 (BSL-3) lab to an Arthropod Containment Level 2 (ACL-2) lab

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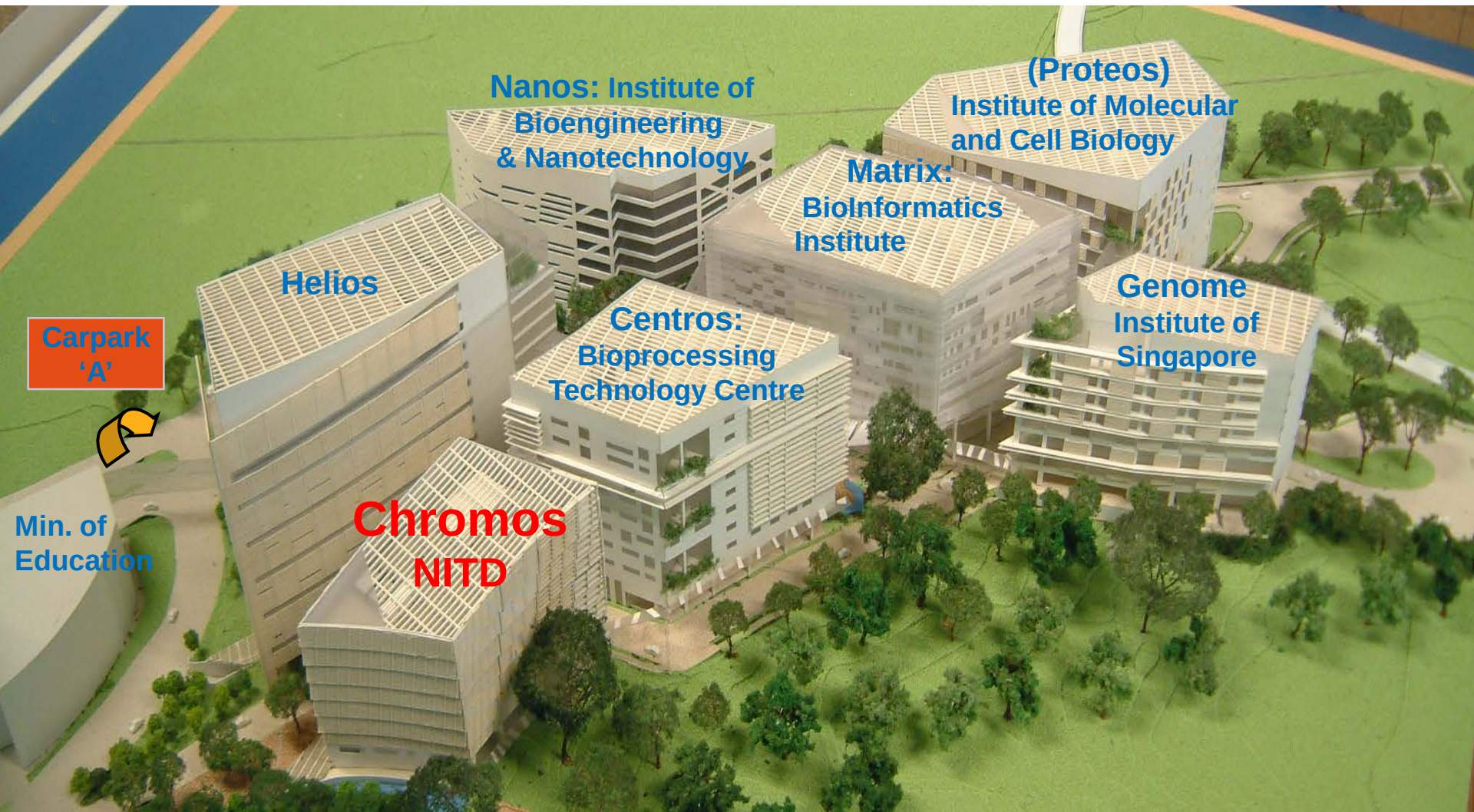
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Novartis Institute for Tropical Diseases (NITD)



NITD @ Biopolis Singapore



NITD to move to Biopolis in April 2004 with official opening in July 2004

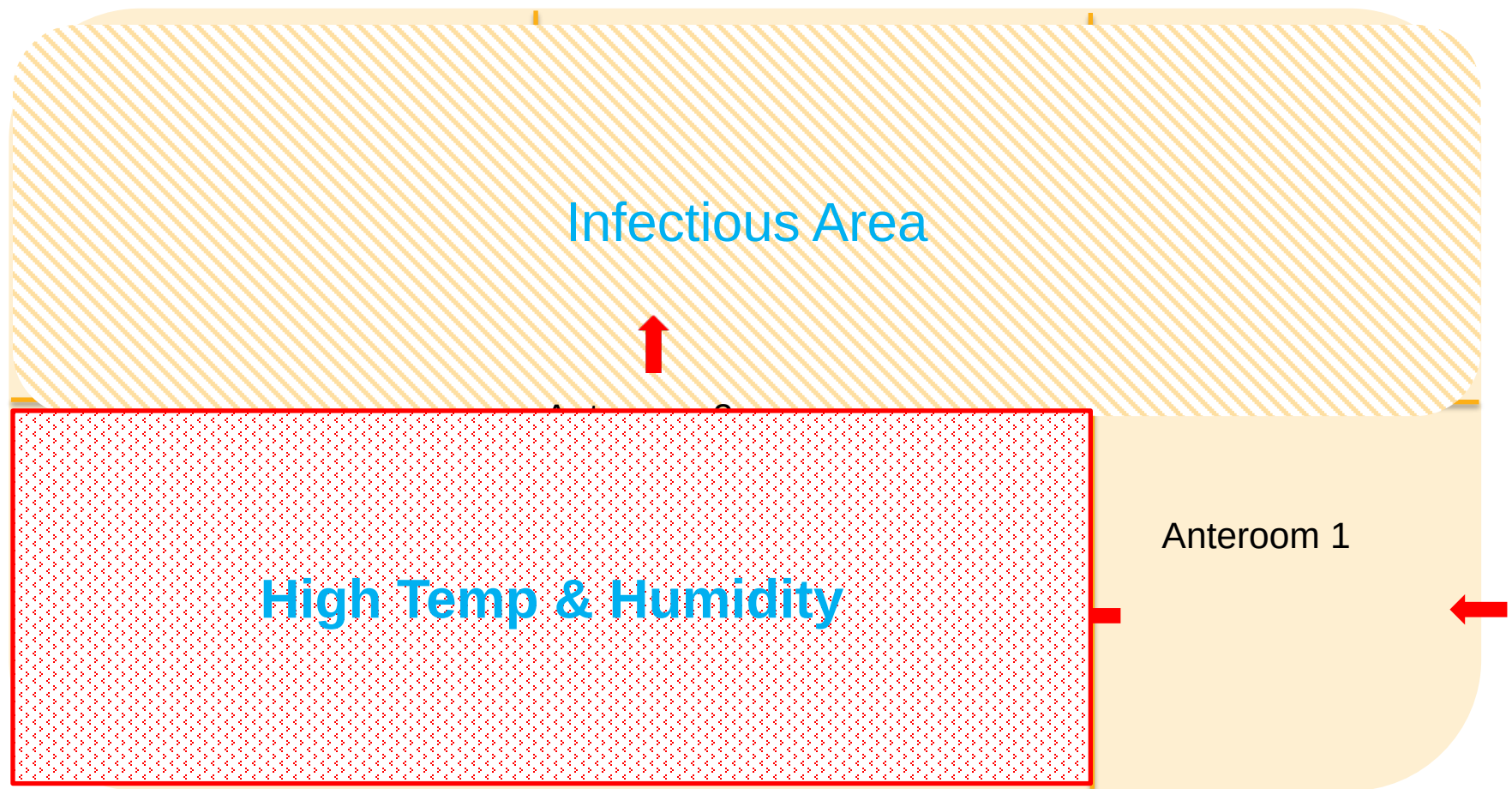
Conversion of BSL-3 to ACL-2

- Decommission of BSL-3 (skip)
- Planning of an ACL-2 lab
 - Space- how many rooms do we need?
 - Conversion-how to deal with the M&E works?
 - Staffing-operation
 - Science
- Construction of the ACL-2 lab

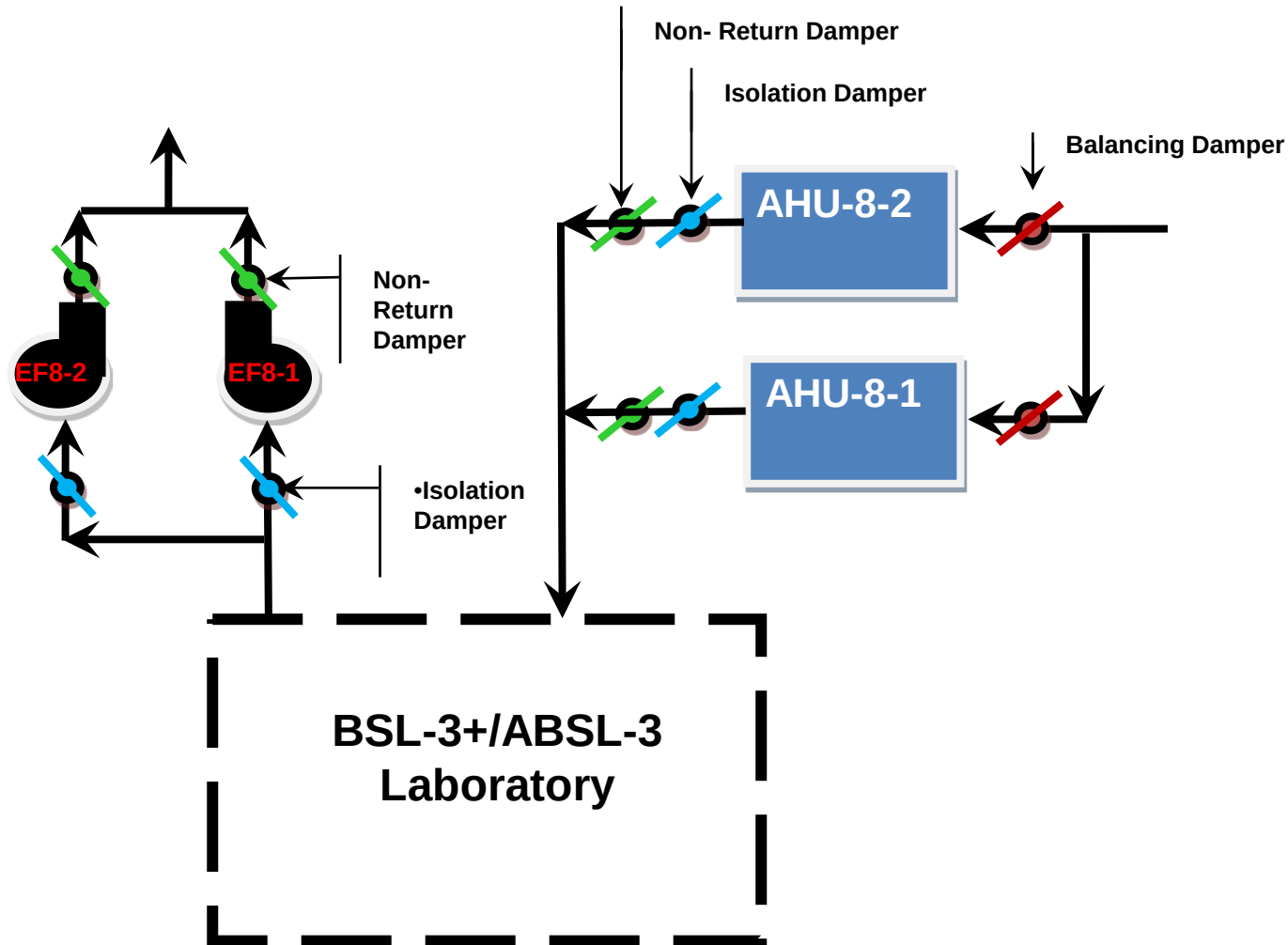
Why ACL-2 (Arthropod Containment Level-2)

- Support the Malaria drug discovery program
- Reference 'ACME'
- I. Arthropod Containment Guidelines by The American Committee of Medical Entomology of the American Society of Tropical Medicine and Hygiene
- II. Arthropod Containment Level 2 (ACL-2) must be practiced if **working with exotic and indigenous arthropods infected with BSL-2 agents** associated with animal and/or human disease, or that are suspected of being infected with such agents.

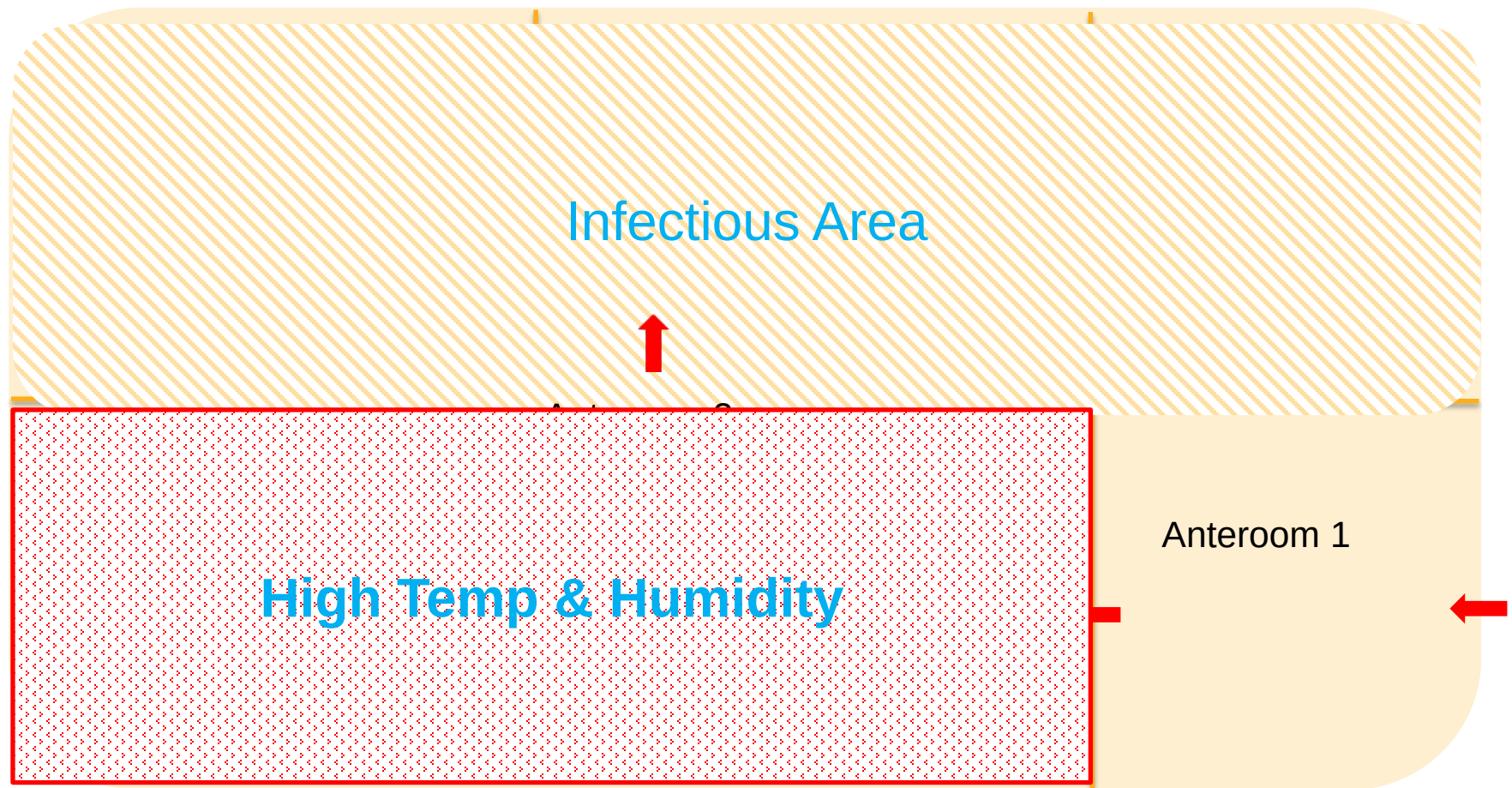
ACL-2 lay-out



Configuration of BSL3 HVAC system



Separate supply air only for the breeding room



Conversion

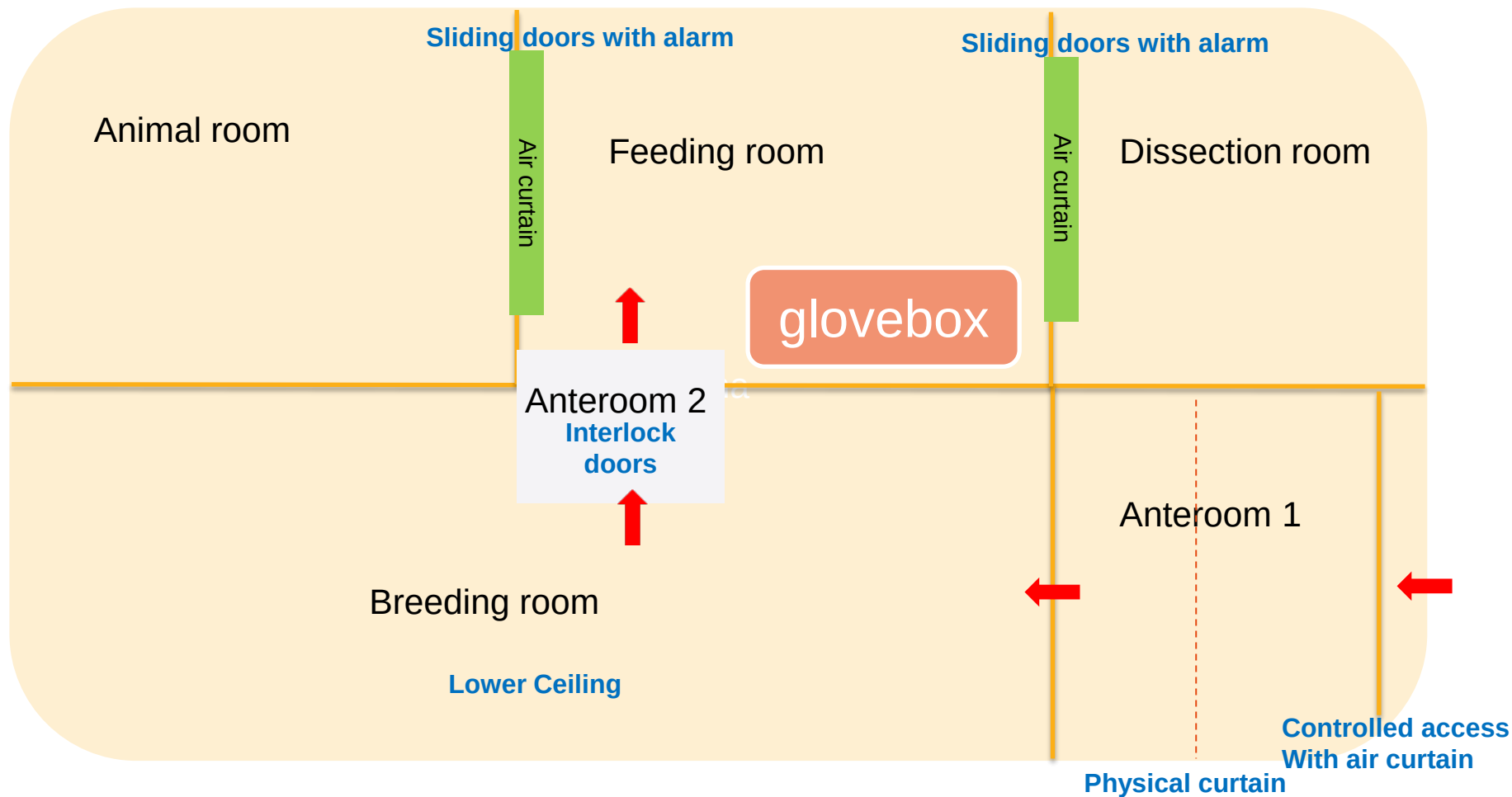
- Retained most of the BSL-3 infrastructures e.g. ACMV, gowning rooms, clean corridor area etc. etc.
- Except for the breeding room, which used a FCU to supply air, still using the old BSL-3 AHU/Exhaust->single pass, high ACH
- Bag-in Bag-out system ✕
- Brand new and white lab furniture, lighting system under benches
- Installed two humidifiers for the breeding room to back-up each other

Comparison of BSL-3 and ACL-2 (differences and similarities)

- Different type of risks → difference in Risk Assessment

	BSL-3	ACL-2
Room filter	HEPA filter	Air exhaust and supply covered with fine mesh, including structures like sprinklers etc.
Room Pressure	Negative	Slightly negative
Waste disposal	Decontamination tank and pass-through autoclave	A small stand-alone autoclave for solid waste and a 'rice cooker' for non-infectious liquid waste like larvae culture water
Safety equipment	BSC/Glovebox/ Respiratory protection program	Glovebox (no ventilation!) and mosquito traps

How to contain a tiny mosquito- facility features



Prevention of Mosquito Escapees



- Non-infected mosquito escapees

- Not very unusual but it can be serious too
- How and where does it happen? Look at the details in the procedure e.g. change glucose etc etc

- Infected mosquito escapees

- Mosquito infection happens in **strictly controlled environment** so escapee should be very rare and serious case
- Evacuation
- Review each step in the infection and dissection process and plan in advance
- Perform mock experiment with non-infected mosquitoes
 - be familiar with the procedure
 - build up confidence!!!**

Prevention of Mosquito Escapees contd.

- Regular check of mosquito traps → it is good to have more than one trap for a relatively bigger room!
- Regular (quarterly) change of attractant in the traps
- Understand the mosquito life cycle

Insectary Safety and Operational Challenges

- Staffing
 - Back-up system absolutely necessary!
- Weekend/holidays duties
 - directly impact the safety standard
- Working environment
 - Hot and humid
 - Low ceiling and no window

Insectary Operational Challenges contd.

★ Housekeeping is crucial for both of safety and scientific purpose!!!

- No clutter
- freeze the dirty trays or cages and then wash them immediately
- mop floor frequently
- regular change of lab coat

Thank for your attention!

NITD insectary team and our collaborators (Duke-NUS and Environmental Health Institute):

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Novartis Institute For Tropical Diseases Management

