



Integrating safety in science - how to get scientists to buy-in (Building safety as culture rather than a program!!)

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Outline

- Introduction to Duke-NUS
- Safety Management System (SMS)
- Roll out of the lab certification scheme at the University
- Implementation of the safety management system at Duke-NUS
- Conclusion

Introduction to Duke-NUS

- Collaborative initiative between Duke University and National University of Singapore (NUS)
- Medical School and Research Center with Signature Research Programs in cancer, neuroscience, infectious diseases, metabolic disorders and health systems
- Need for a thorough and an efficient safety program!!



What is Safety Management System (SMS)

- Integrated approach to managing safety in an organization
- Systematic, explicit and comprehensive process for managing risks.
- Successful SMS should become part of the culture, the way people do their jobs.

From Wikipedia

Why Safety Management System (SMS) ?

Examples of accidents in academia

Yale senior dies in machine shop accident

(CNN) — A Yale University senior was killed in an accident in a chemistry laboratory's machine shop late Tuesday or early Wednesday, officials at the Connecticut school said.

Michele Dufault of Massachusetts was working on a project in the Sterling Chemistry Laboratory's machine shop when her hair got caught in a lathe, a machine that shapes material by rotating it against a tool, Yale President Richard C. Levin said in an e-mailed statement. Her body was found by other students who were working in the building, Levin said.

The cause of death was asphyxia due to neck compression, and the manner was accidental, said Kathy Wilson, an investigator with Connecticut's Office of the Chief Medical Examiner.

The machine shop at the Yale lab is a place where students can construct or modify research instrumentation, according to the chemistry department's web site.

"The university has programs to train students before they use power equipment. Nonetheless, I have initiated a thorough review of the safety policies and practices of laboratories, machine shops and other facilities with power equipment that is accessed and operated by undergraduates," Levin said.

Levin's statement didn't say whether Dufault was alone in the machine shop when the accident happened. A call seeking additional comment Wednesday from Yale spokesman Tom Conroy was not returned.

INFECTIOUS DISEASES

Early Indications Point to Lab Infection in New SARS Case

A puzzling case of infection with the SARS coronavirus has public health officials scrambling to trace its source but breathing a sigh of relief that it seems to be an isolated event. The Singapore patient, a 27-year-old virologist, has the first confirmed infection with severe acute respiratory syndrome since the worldwide outbreak of the new disease was declared contained last July. He

was released from the hospital on 16 September, having fully recovered from his dry cough and persistent fever.

"We don't know how he was infected, but at this stage the most likely source is the laboratory," says Hitoshi Oshitani, head of the regional SARS response team of the World Health Organization (WHO) in Manila. Klaus Stöhr, a virologist who coordinated

WHO's SARS research efforts, calls such a scenario "reassuring." But even if the infection is traced to a lab accident, the patient's very mild symptoms and the lack of any evident respiratory illness are a reminder, say officials, that SARS could be circulating undetected. "Infectious diseases have a spectrum of clinical symptoms," Oshi-

tani says. "And we don't know how many people could have mild [SARS] infections" that have escaped detection. The new patient is an ethnic Chinese Singaporean postdoc who studies the West Nile virus. He had not traveled outside Singapore recently and had no known contact with any SARS patients. However, he regularly uses a microbiology lab at the National University of Singapore (NUS) and a biosafety level 3 (BSL-3) lab at the Environmental Health Institute (EHI) of the National Environment Agency, both of which have SARS programs. EHI scientists have worked with live samples of the SARS virus in the same BSL-3 lab the patient used for his West Nile studies. The university, by contrast, works with killed virus samples.

The patient's symptoms were so mild they almost escaped detection. On 27 August, a general practitioner prescribed antibiotics for a fever. When the fever persisted, the patient went to Singapore General Hospital on 29 August. He was sent home after x-rays showed his lungs to be normal. On 3 September, still suffering from a fever, he returned to the hospital and was admitted. This time, doctors detected the genetic fingerprint of the SARS virus when they ran a polymerase chain reaction test. Mindful of a recent false alarm in Canada, WHO was skeptical until the results of a second test, an ELISA test, showed that the patient did not have antibodies to the SARS virus at ▶



Taking no chances. Masks were back at Singapore General Hospital, where a SARS case was confirmed this month.

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Something to emphasize...



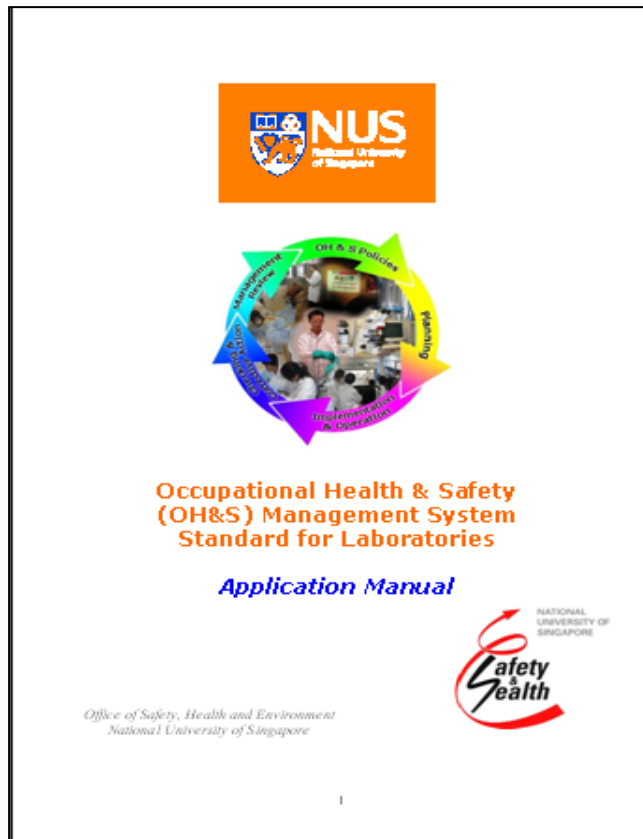
Emphasis for SMS

- Holistic approach of safety management
- Address unsafe practices & capture near misses
- Safety awareness
- Bringing in the right culture

Programs at NUS Office of Safety, Health & Environment (OSHE)



NUS Occupational Health & Safety Management System Standard for Laboratories

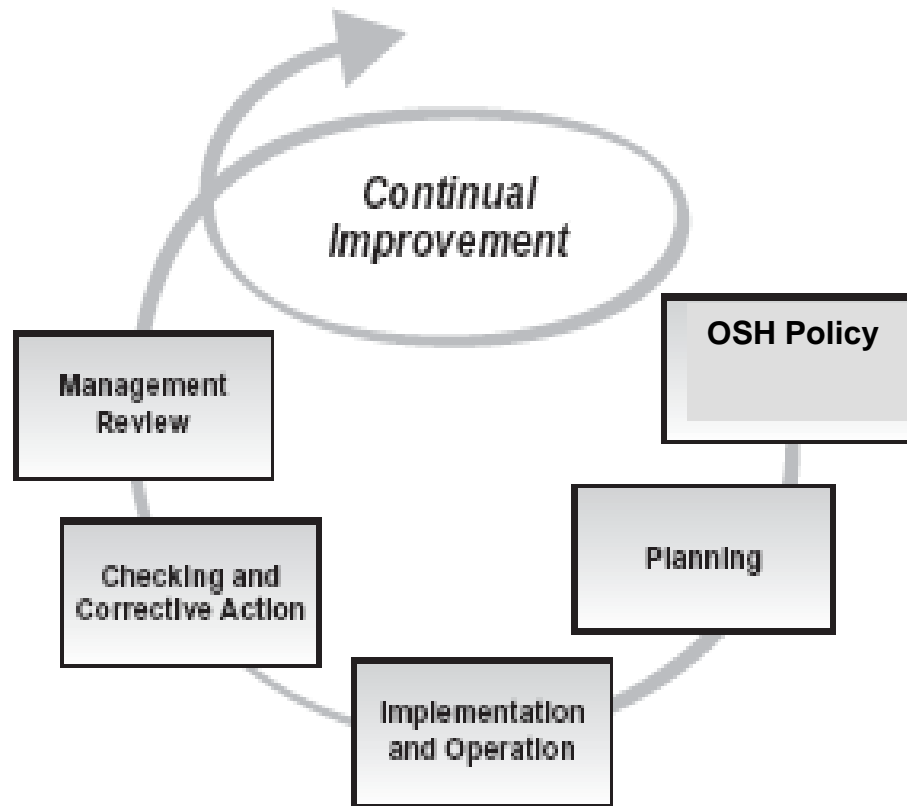


- NUS Occupational health and safety (OH&S) management system standard for laboratories - Part A: Requirements
- NUS Occupational health and safety (OH&S) management system standard for laboratories - Part B: Guidance Notes

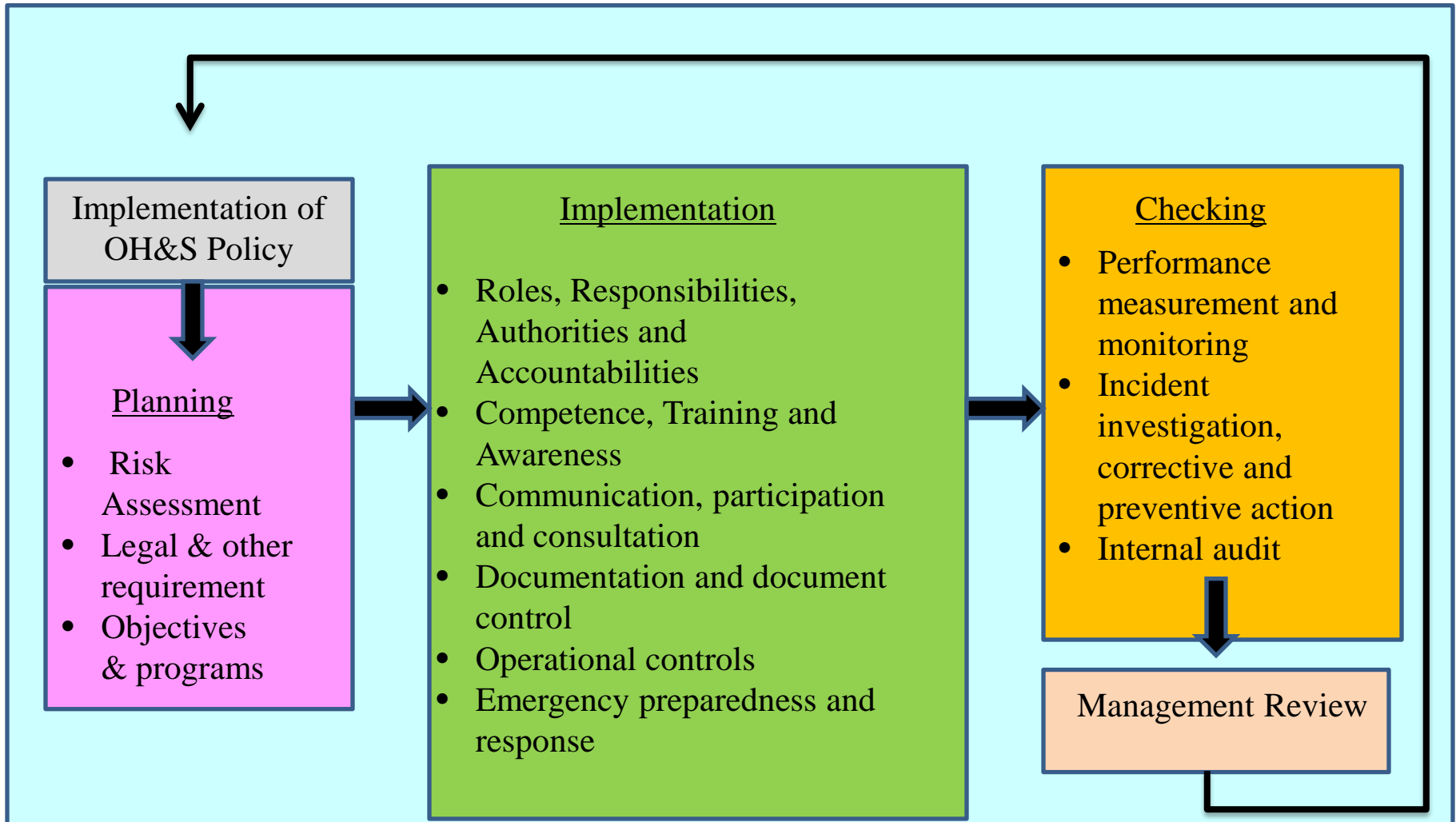
<http://www.nus.edu.sg/osh/programmes/ohscert.htm>

Common among all SMS Standards

(Plan-Do-Check-Act cycle)



Requirements of SMS elements



Comparison of SMS and OHSAS 18001 elements

No	OHSAS 18001 clause	OHSAS 18001 Element	SMS Elements
1	4.2	Occupational Health & Safety Policy	Safety & health policy
2	4.3.1	Hazard Identification, risk assessment & control	Hazard Identification and risk assessment
3	4.3.2	Legal and other requirements	Legal and other requirements
4	4.3.3	Objectives and programs	Objectives and programs
5	4.4.1	Resources, roles, responsibilities, accountability and authority	Resources, roles, responsibilities, accountability and authority
6	4.4.2	Competency, training and awareness	Competency, training and awareness
7	4.4.3.1	Communication	Communication, participation and consultation
8	4.4.3.2	Participation and consultation	
9	4.4.4	Documentation	Documentation, control of documents and control of records
10	4.4.5	Control of document	
11	4.4.6	Operational control	Operational control
12	4.4.7	Emergency preparedness & response	Emergency preparedness & response
13	4.5.1	Performance, measurement & monitoring	Performance, measurement & monitoring, evaluation of compliance
14	4.5.2	Evaluation of compliance	
15	4.5.3.1	Incident investigation	Incident investigation, non-conformity, corrective and preventive action
16	4.5.3.2	Non-conformance, corrective and preventive action	
17	4.5.4	Control of records	See No. 9 & 10
18	4.5.5	Internal audit	Internal audit
19	4.6	Management review	Management review

Roll out of the Scheme by NUS

- NUS scheme titled “*Laboratory Occupational Safety & Health Management System Certification Scheme*”, supported by the NUS President’s office.
- In line with Singapore’s Workplace Health and Safety Act.
- Principal Investigators (PIs) required to develop and implement a Lab SMS for their laboratory activities, including those undertaken at collaborator’s laboratories.

Roll out of the scheme by NUS

- Participation of PIs was made mandatory
- PIs were required undergo internal and external audits.
- Upon successful demonstration of safety awareness & practices, the PI is issued a certificate valid for three years
 - Self regulation & maintenance of the SMS
 - No IBC approval required for new grants if risks remain the same

Roll out of the scheme by NUS

- Annual surveillance audits
- Duke-NUS embarked on this Scheme in 2010
- Pilot batch of 7 PIs taking part in the Scheme
- Pilot run used as a learning process for subsequent enrolment of the remaining 27 PIs.

Lab SMS implementation @ Duke-NUS

- 3-member Safety Team
- Works with OSHE, regulatory bodies and the staff of the School to ensure high standards of safety
- To help the PIs and their team to develop the Lab SMS, the safety team conducted several briefing and training sessions

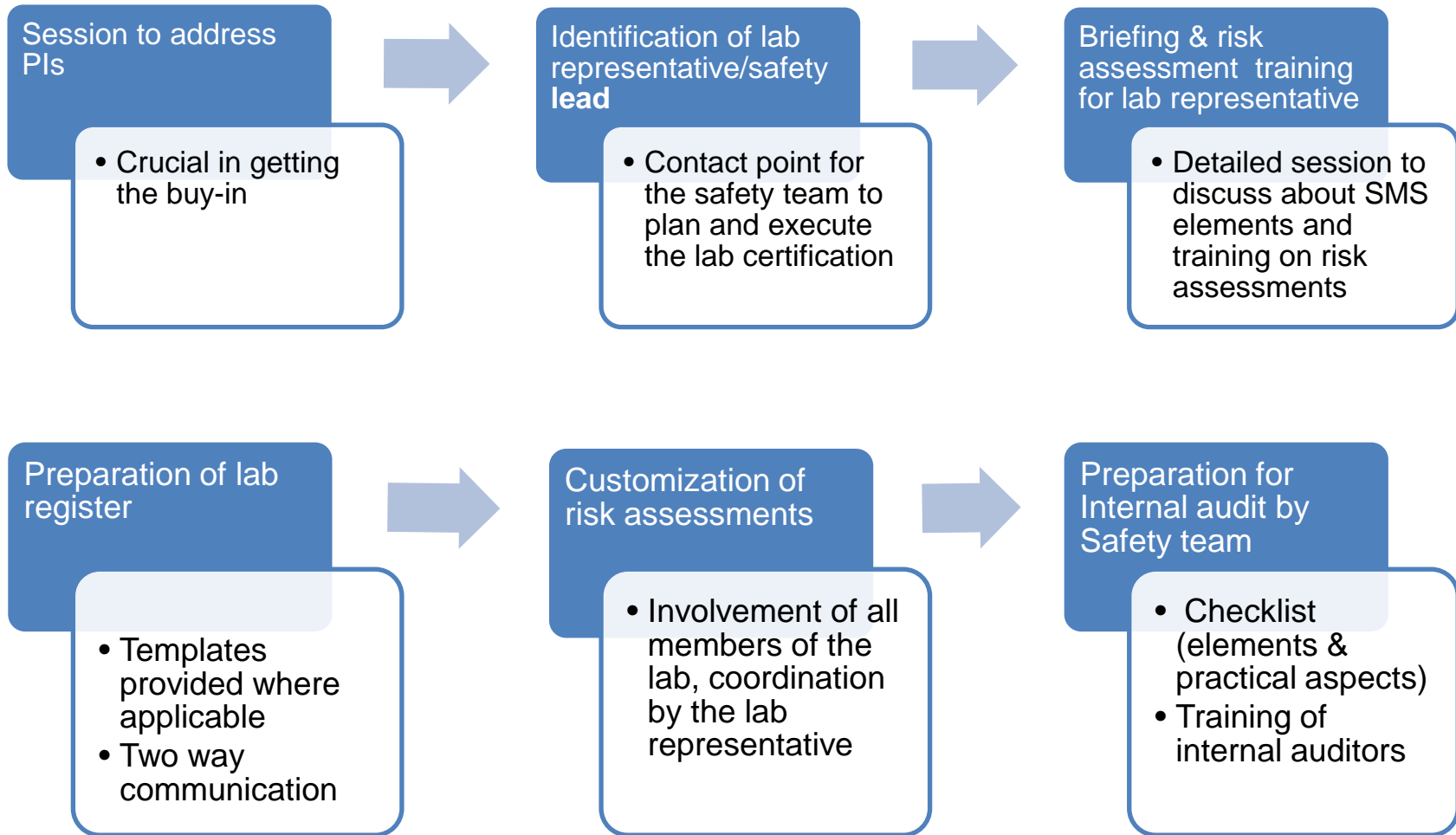
Lab SMS implementation @ Duke-NUS

- Formed key users group to

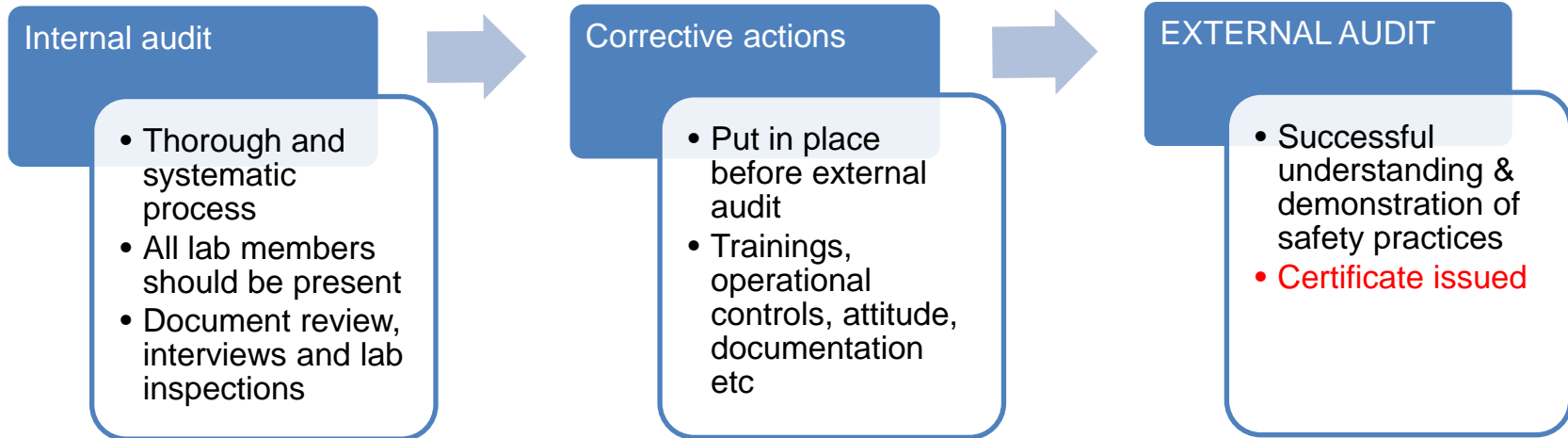
- Create a framework
- Create the **subheadings** for lab registry

Staff & students list, applicable legislations, roles & responsibilities, training records, occupational health records, protocols/SOPs, risk assessments, accident/incident reporting, inventories

Roll out of the scheme at Duke-NUS



Roll out of the scheme at Duke-NUS



Legislations applicable to the lab

No	Legislations/ guidelines	Applicable to lab
1	Workplace Safety and Health Act	YES
2	Petroleum And Flammable Materials (PFM) Regulations	YES
3	Chemical Weapons Convention (NACWC)	
4	Poisons Act	
5	Environmental Protection & Management Act	YES
6	Environmental Public Health Act	YES
7	Sewerage and Drainage Act	YES
8	Misuse of Drug Act	
9	Arms and Explosives (Amendment) Act	
10	Radiation Protection Act	
11	Fire Safety Act	YES
12	Biological Agents and Toxin Act	
13	WHO guidelines for biosafety	YES
14	Singapore Biosafety Guidelines for Research on Genetically Modified Organisms (GMOs)	YES
15	Singapore Guidelines on the Release of Agriculture-Related Genetically Modified Organisms (GMOs)	
16	Any other Acts or Guidelines (if yes, please provide details)	-

Break down of processes for risk assessments

INPUT

1. Hazardous materials
2. Equipment
3. Sample collection /transportation
4. Sample & chemical storage
5. Personnel

Laboratory activities and operations

1. Extraction/isolation/ Purification
2. Manipulation/Reaction/Analysis
3. Nature of work (field work etc)

OUTPUT

1. Waste storage
2. Handling
3. Waste Treatment/Disposal

Example for Risk Assessment

No	Description / Details of Steps in Activity	Hazards	Possible Accident/III Health & Persons-at-Risk	Existing Risk Control	Severity	Likelihood	Risk Level	Additional Control
1	Handling of influenza viruses	Possible exposure to virus due to spillage	Lab-acquired infection	Wear gloves, lab coat and covered shoes and work in BSL2 facilities. Flu vaccination (done annually) N95 mask fit testing for all involved in the project	3	1	3	
2	Storage of influenza viruses	Possible exposure to virus due to spillage	Lab-acquired infection	Wear gloves, lab coat and covered shoes and work in BSL2 facilities. Flu vaccination (done annually)	3	1	3	
		Possible exposure to surfaces at extreme low	Burns to the skin	Wear cryo gloves, lab coat and covered shoes	2	1	2	-
3	Disposal of influenza viruses	Possible exposure to virus due to spillage	Lab-acquired infection	Wear gloves, lab coat and covered shoes and work in BSL2 facilities; Dispose the waste into biohazard bags and tape them up; Autoclave before sending for waste collection. Flu vaccination (done annually)	3	1	3	

Key Challenges in establishing SMS

- Right attitude of staff
- Involvement of all stake holders
- Support from Senior Management
- Resources to roll out program
- Time required from all parties

Benefits of laboratory certification/SMS

- Standardize practices
- Identify gaps and tighten up procedures
- Clearer understanding of roles & responsibilities
- Researchers are trained and empowered to identify and address the safety issues in their laboratory activities
- Evaluating safety has become an integral part of science and every team devotes 5-10 minutes of every lab meeting to discuss safety issues that arise.

Causes of failure of SMS

- Not customizing system to the organization' s needs
- Impose **without** consultation
- Poor commitment from senior management
- Poor employee involvement /buy-in

Conclusion

34 PIs have successfully enrolled in this Scheme at Duke-NUS.

- Stakeholder confidence for multi- & cross institutional research is addressed
- Regulatory inspections simplified
- Sharing of safety and health best practices & paves way for continual improvement
- Greater level of Organization's Safety & Health performance

“If we sweat the small stuff we may never have to sweat the big stuff”

- G. Dupont

THANK YOU!

