

# Knowledge integration for lab. Safety in University.

-Possibility of risk assessment as educational tool-

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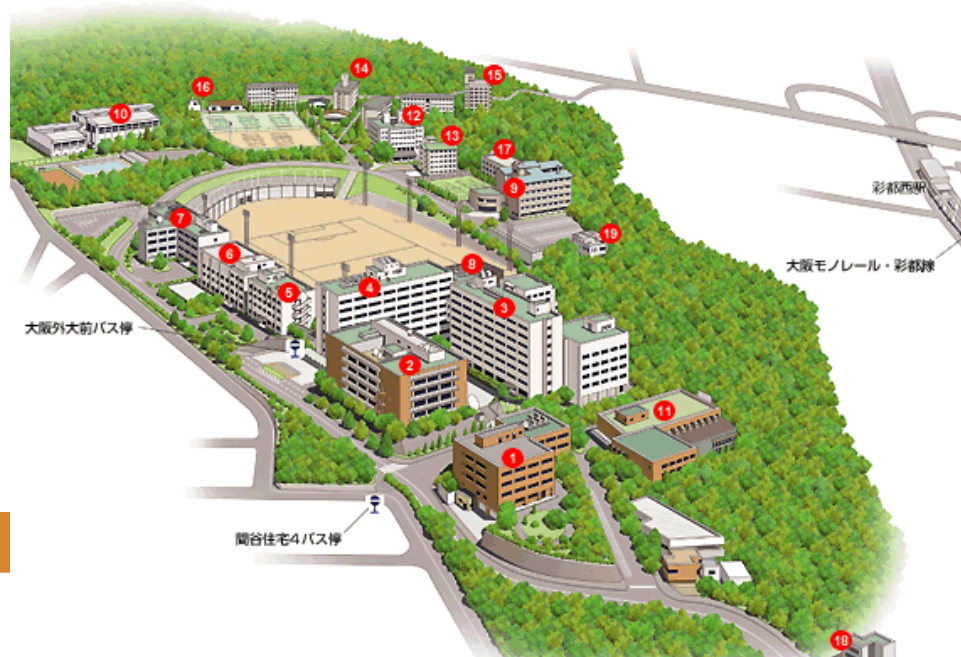
# About Osaka University

Three Major Campuses  
(Suita, Toyonaka, Minoo)

Researchers and Staff ca. 8000  
Students ca. 25000

## 箕面キャンパス

MINOH CAMPUS



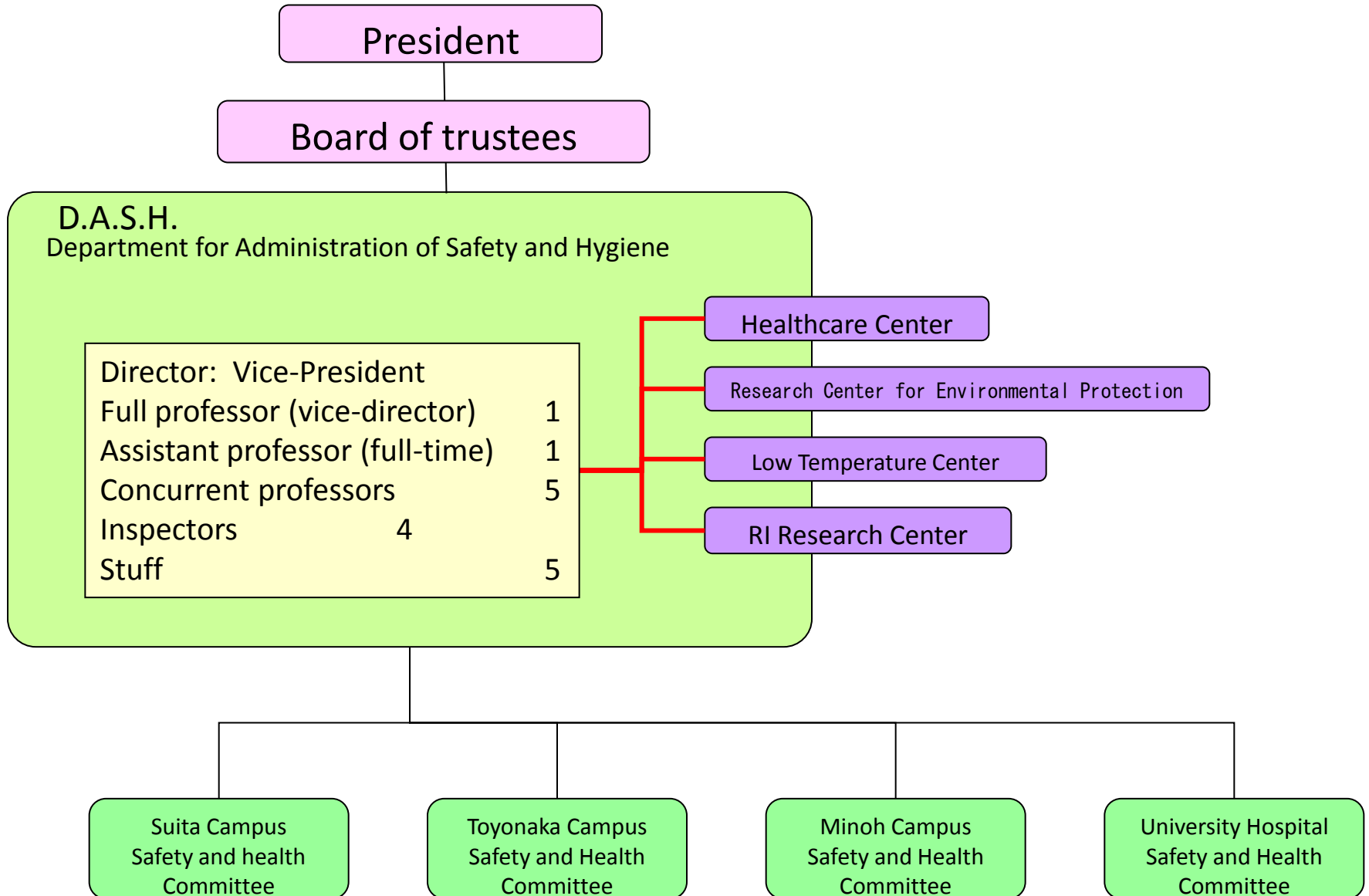
## 豊中キャンパス TOYONAKA CAMPUS



## 吹田キャンパス SUITA CAMPUS



# Management Line of Safety and Health in Osaka University

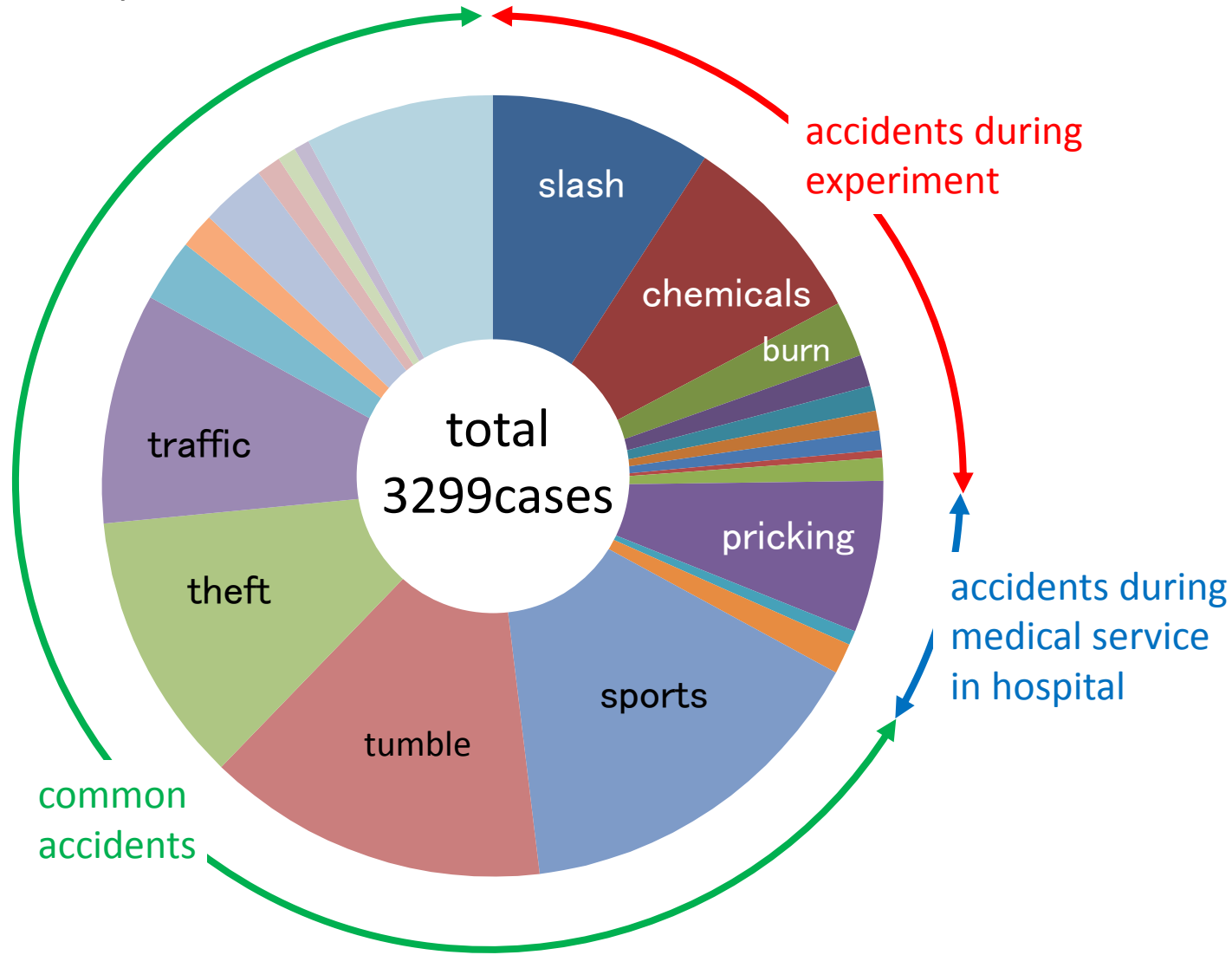


## Activities of D.A.S.H.

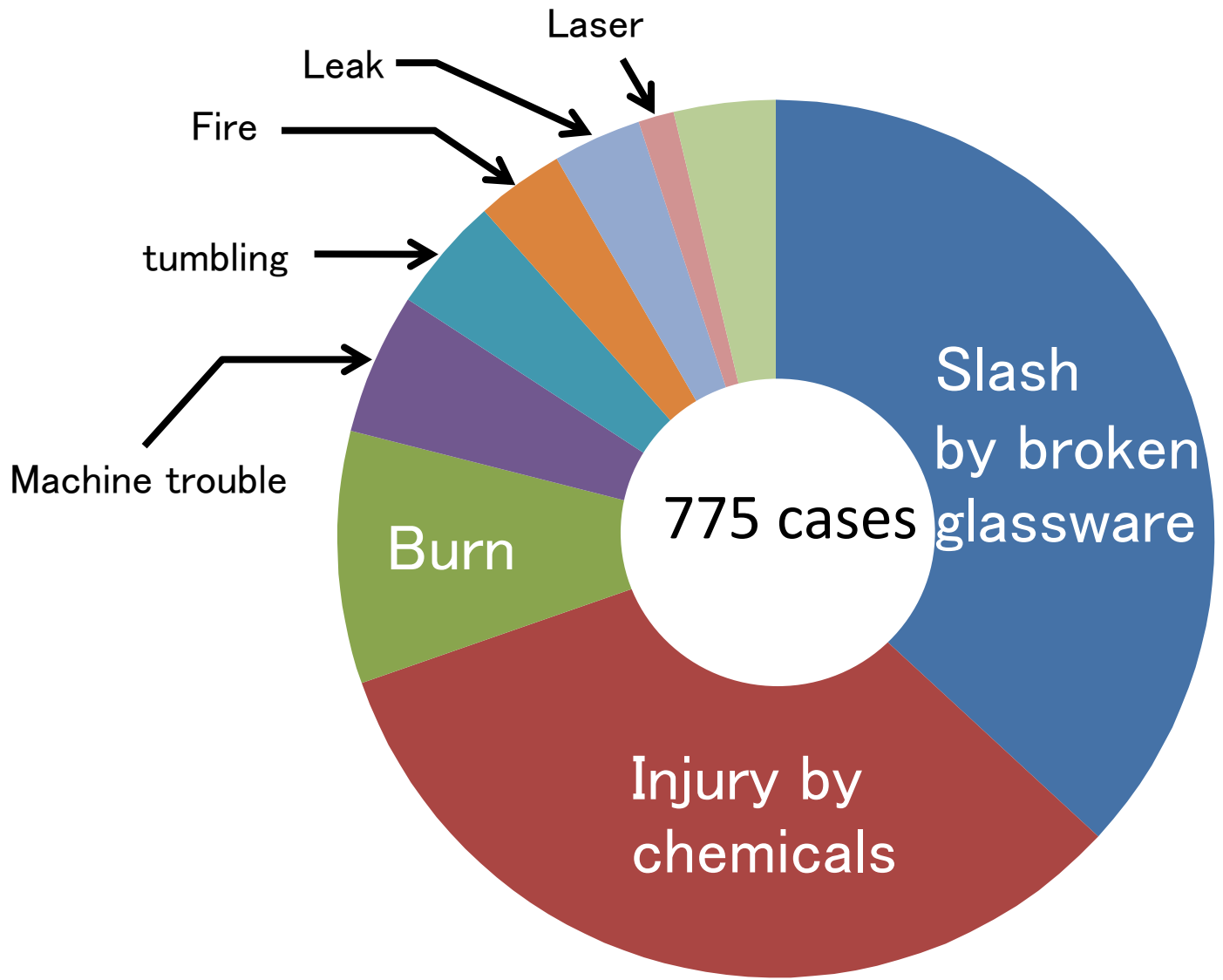
- Daily Inspection of Laboratories
- Collection and Analysis of Accidents
- Making Safety Manuals
- Planning and Management of Safety Lectures
- Promotion for Getting Safety Licenses
- Organization of Safety and Health Committee

Experimental accidents in university  
-the actual situation-

# Tendency of accidents in Osaka university (2004.5 ~ 2013.03)

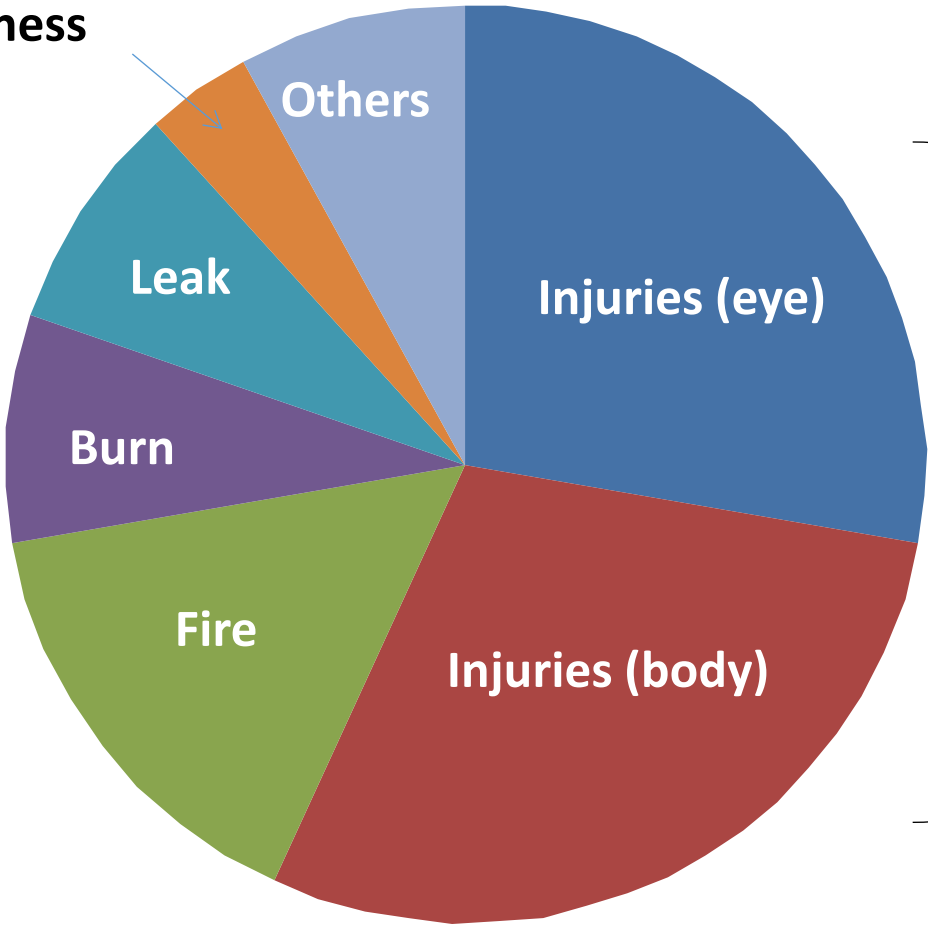


# Tendency of Experimental Accidents (2004 – 2013)



# Detail of accidents by chemicals

Sickness



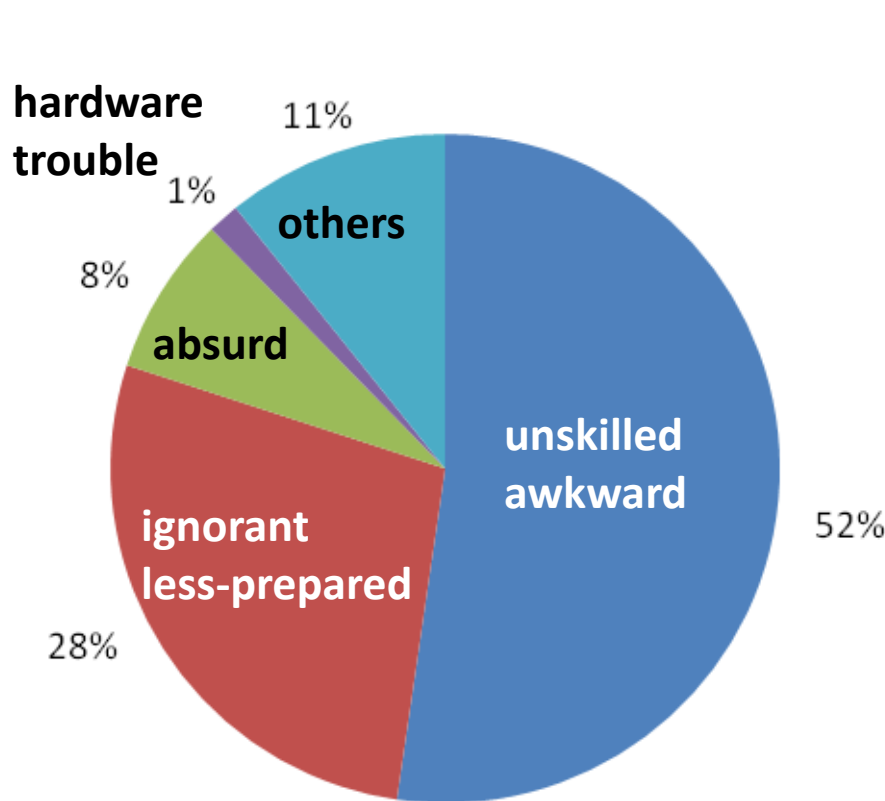
In many cases, they do not wear the protective equipments (lab coat, goggle etc.)



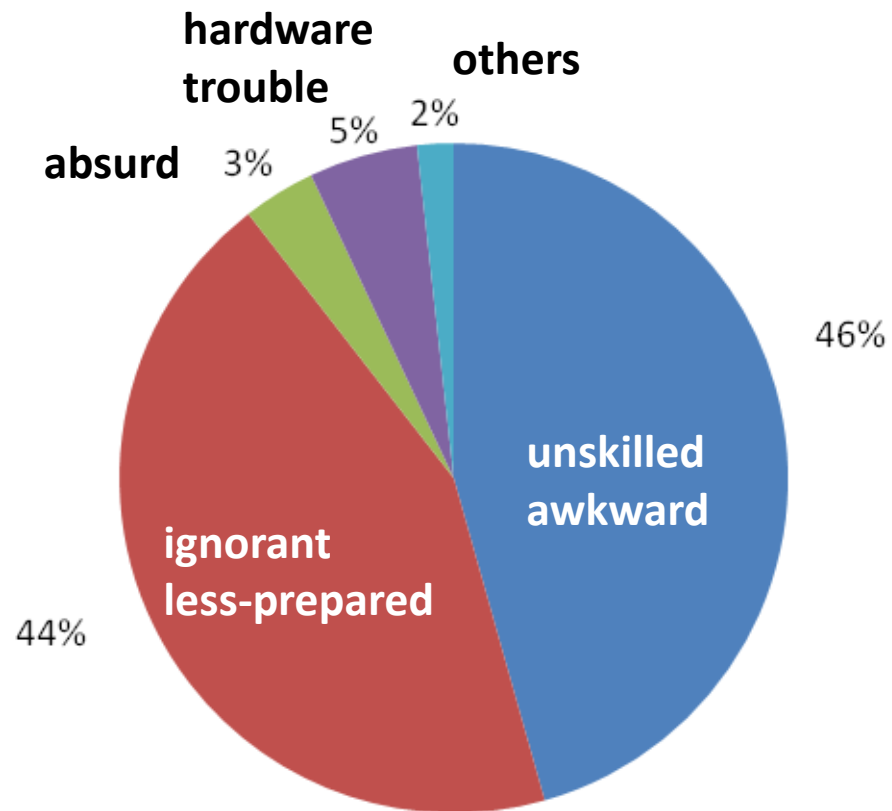
# The Cause of the accidents

There were no accidents caused by unknown phenomena due to research work at frontier edge.

All accidents were caused by well-known reasons, lack of knowledge, insufficient prep, mistake, slip, skip etc.



Chemistry



non-Chemistry

# General trend of accidents by chemicals

Underestimation of risk of the chemicals

## Chemistry

Carelessness and/or negligence

by easy thinking based on plenty of experience of handling chemicals

Refresh researcher's attention on experimental risks regularly

## Non-Chemistry

Using chemicals as "tools"

→ Chemical properties are NOT their research interest

Insufficient investigation about the properties of chemicals

Give them opportunities to get proper information and knowledge

# Risk Assessment of Chemicals in Laboratory

-----Why Now ?

Researchers always think about risk or hazardousness of chemicals which they use in the next experiments, regardless of being conscious.

Big-scale revision of Japanese occupational safety and health law (2014, Ministry of Health, Labor and Welfare)

→ Risk assessment of chemicals was made mandatory.



Good opportunity to reconsider the chemical risks in laboratory

# Steps of risk assessment

defined by the Ministry of Health, Labor and Welfare

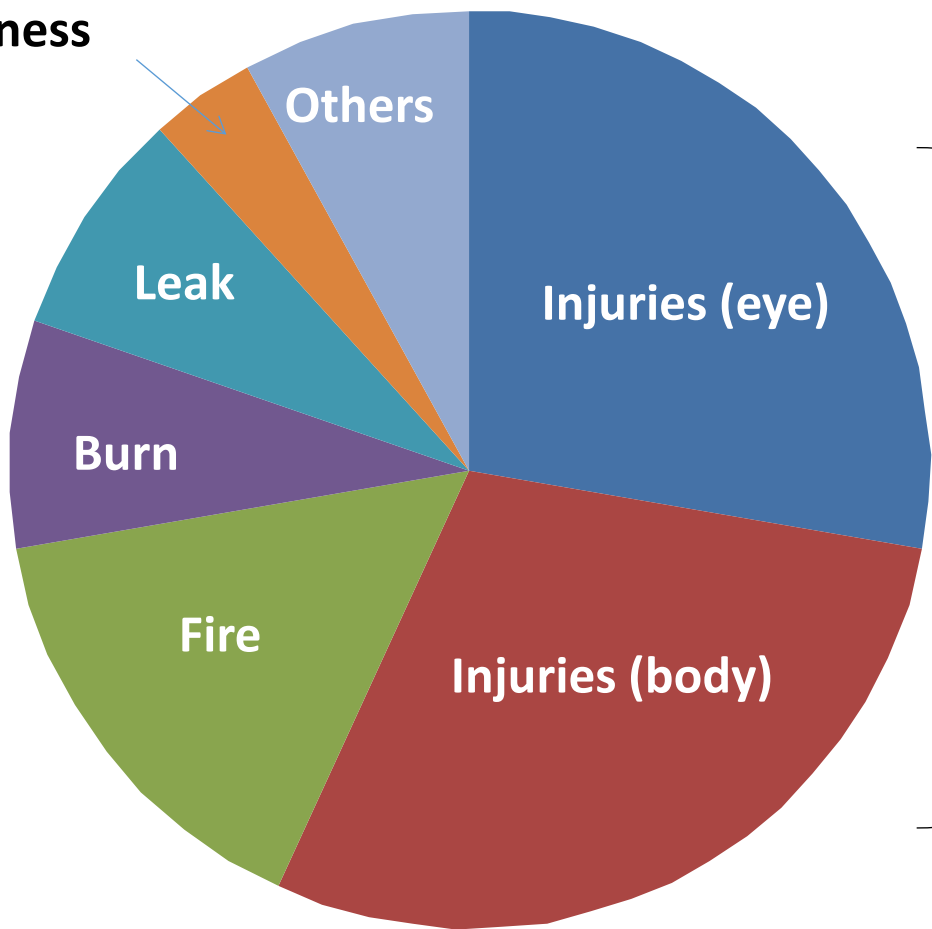
1. Identify the hazardousness of chemicals in all operations.
2. Estimate the risks by combination of seriousness and frequency of each hazards.
3. Decision the order of priority of counter measures.
4. Consider the concrete methods to eliminate or reduce the risks.
5. Record all of results of this sequence.

The words “all operations” lead researchers think about the risks in each experiment.

Is it enough?

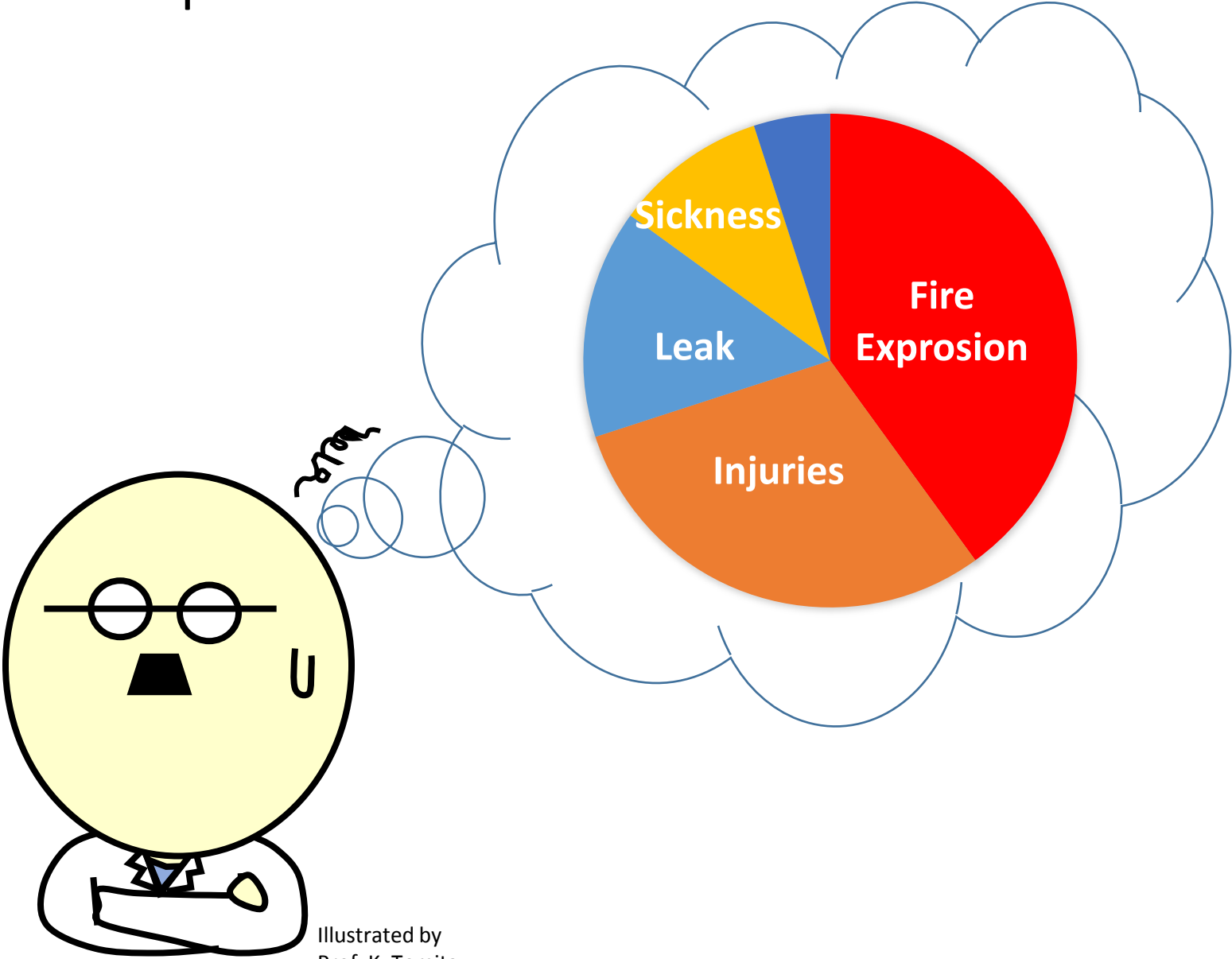
# Detail of accidents by chemicals

Sickness



In many cases, they do not wear the protective equipments (lab coat, goggle etc.)

# Inside head of professor



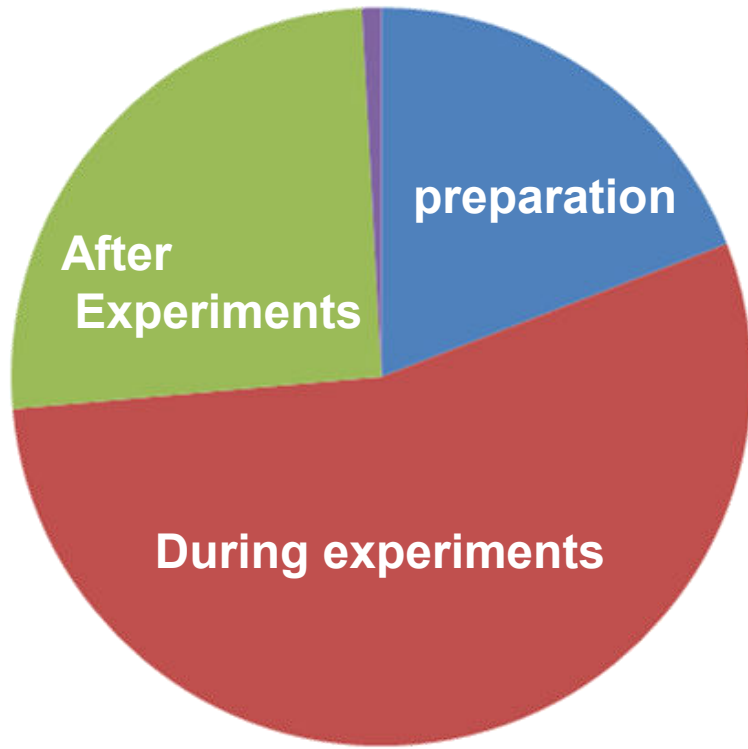
Illustrated by Prof. K. Tomita

# Important factors for risk assessment in chemical laboratories

1. Risk assessment method should include higher risks in chemical lab. such as fire and injuries.

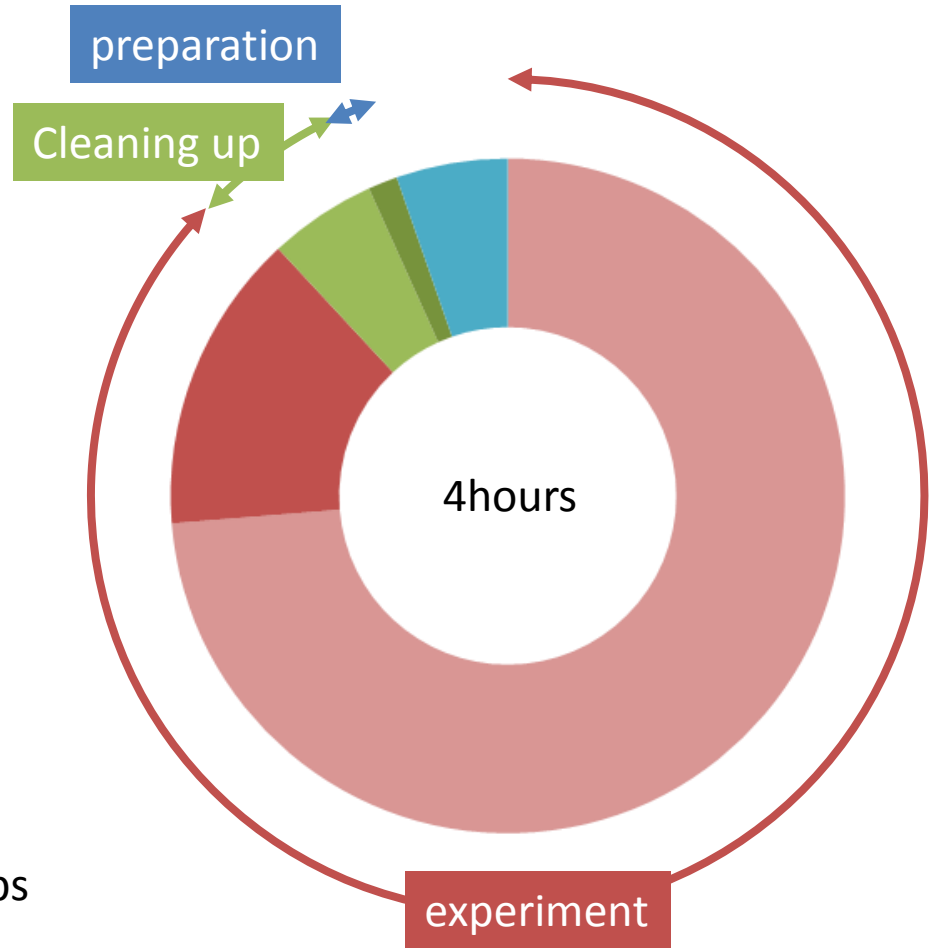
Because the method exemplified by the Ministry of health, labor and welfare was too emphasized against the risk of long term exposure to chemicals.

# When accidents occur?



Distribution of accidents by experimental steps in Osaka University

Risk of other operations than experiment itself is higher



Distribution of experimental time of a graduate student

Yukiko Nezu, Doctoral thesis, The university of Tokyo



# Important factors for risk assessment in chemical laboratories

1. Risk assessment method should include higher risks in chemical lab. such as fire and injuries.

Because the method exemplified by the Ministry of health, labor and welfare was too emphasized against the risk of long term exposure to chemicals.

2. Risks during preparation, waste disposal, cleaning up are higher.  
It is crucial to let researchers think about the risk other than experiment itself.

# Difference between factory and laboratory

## Factory

Arranging equipment, operations, and things in space

- Routine work
- Fixed location of each work
- Working space divided by type of works
- Expert of each work



Total risk of the space  $\cong$  Sum of each operation

## Laboratory

Arranging researchers in space

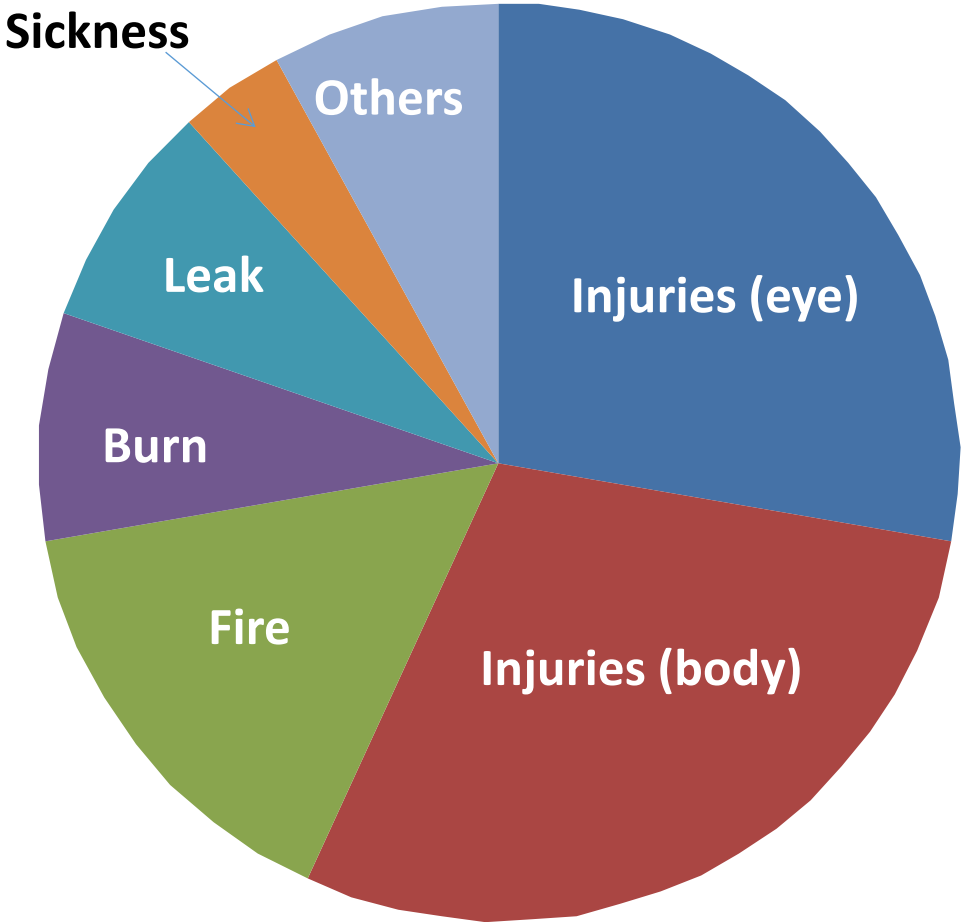
- Non-routine work
- Fixed location of each researcher
- Sharing limited space by researchers
- Existence of students (beginner)



Total risk of the space  $\neq$  Sum of each experiment

It is insufficient only by risk assessment of each experiment

# Detail of accidents by chemicals



Over 50% of chemical injury accidents, victims got involved in the accidents of other researchers.



Researchers are sharing limited space in laboratory

# Important factors for risk assessment in chemical laboratories

1. Risk assessment method should include higher risks in chemical lab. such as fire and injuries.

Because the method exemplified by the Ministry of health, labor and welfare was too emphasized against the risk of long term exposure to chemicals.

2. Risks during preparation, waste disposal, cleaning up are higher.  
It is crucial to let researchers think about the risk other than experiment itself.

3. Risk assessment of whole laboratory is essential  
in addition to that of each experiment.

Laboratory is a space that many researchers do their own experiments independently at a time. → Total risk will be always changing by the combination of experiments.

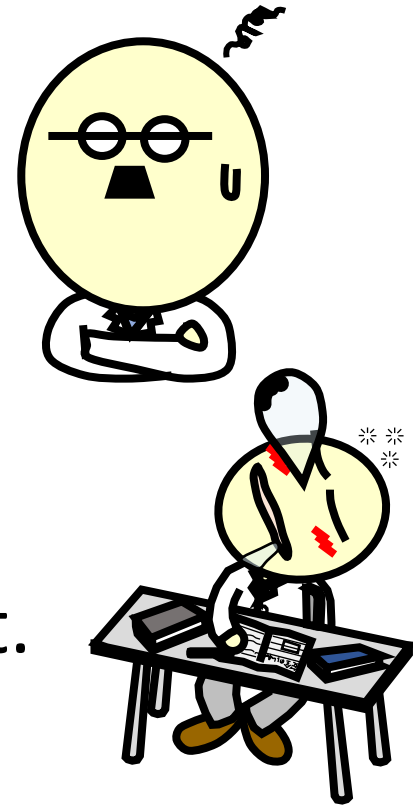
# Who carries out risk assessments in laboratory?

Principal investigator, who is a person in charge of lab. and/or research work.



or

Students , for each experiment.



Illustrated by  
Prof. K. Tomita

It is very important that the risk assessments should be carried out with their consent.

# The actual situation of students

A student put organic solvents  
in front of active heater.  
When we found the tray, the  
bottles were too hot to pick up.

He knows.....

Organic solvents are flammable

Organic vapor ignites easily

Heating accelerates evaporation

Heating of sealed bottles causes a burst



Students (even researchers) have extensive knowledge.

But...

Their knowledge do not become wisdom of living in laboratory.

# Possibility of risk assessment as educational tool

## Requirements for risk assessment

- Collection of basic information

  - Kinds of hazards

  - Hazardous properties

  - Experimental procedure

  - Etc.

- Integration of collected information

  - Clarifying hazardous steps in the experiments

  - Finding potential dangers

  - Estimation and taking effective measures against unknown dangers



The most important effect of risk assessment is reminding researchers about well-known matters to be attended to!

# Possibility of risk assessment as educational tool

From the analyses of over 3000 accidents in our university, there was no accident caused by unknown phenomena.



Awareness of matters to be attended to is the most crucial for the safety of experiments.



It is easily expected that reduction of experimental accidents will be achieved by letting students carry out risk assessment before their experiments.



Thank you for your kind attention!