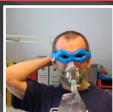


Safety in SISSA's labs



Health and Safety
Service (SPP)

Room 444
Tel. #739



safety@sisa.it

www.sissa.it/safety



International School for Advanced Studies

1/27/2014

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1

Lesson Tasks

- Risks and safety measures in the research lab.
- Organization laboratory and instrumentation.
- Agent risk.
- Emergency plan.
- Waste management.



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2

Goals

In this lesson you will learn:

- Purpose of safety.
- Field of application of safety.
- Protections versus risk.
- Types of Protections.
- Learn about the proper use of the correct PPE for specific risk.

... I HOPE SO!

DURATION: 2hour

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3

Health and Safety Services (SPP)

Decreto Direttore 444 2012



**Servizio direttamente
affidente
al Direttore della Scuola**

• Dal 2013

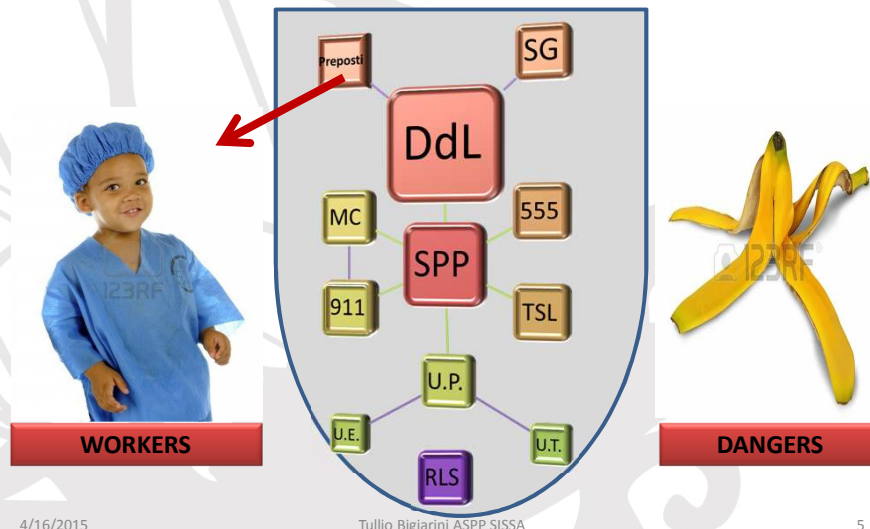
- Tullio Bigiarini 100%
- Marco Cecco 15%
- Massimo Righi 50%
- Amanda Colombo 50%
- Andrea Di Sopra 10%
- Responsabile esterno:
Marco Campestrini
- TOTALE 225%
- 2.25 Persone equivalenti

11/30/2015

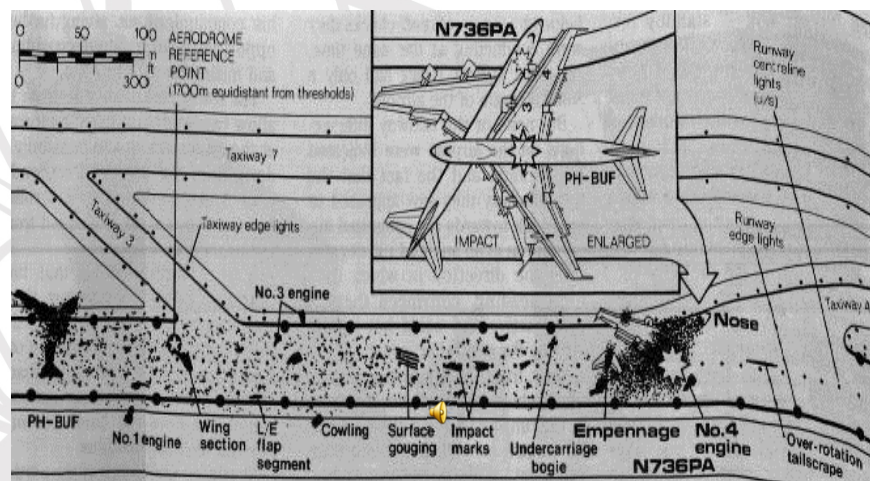
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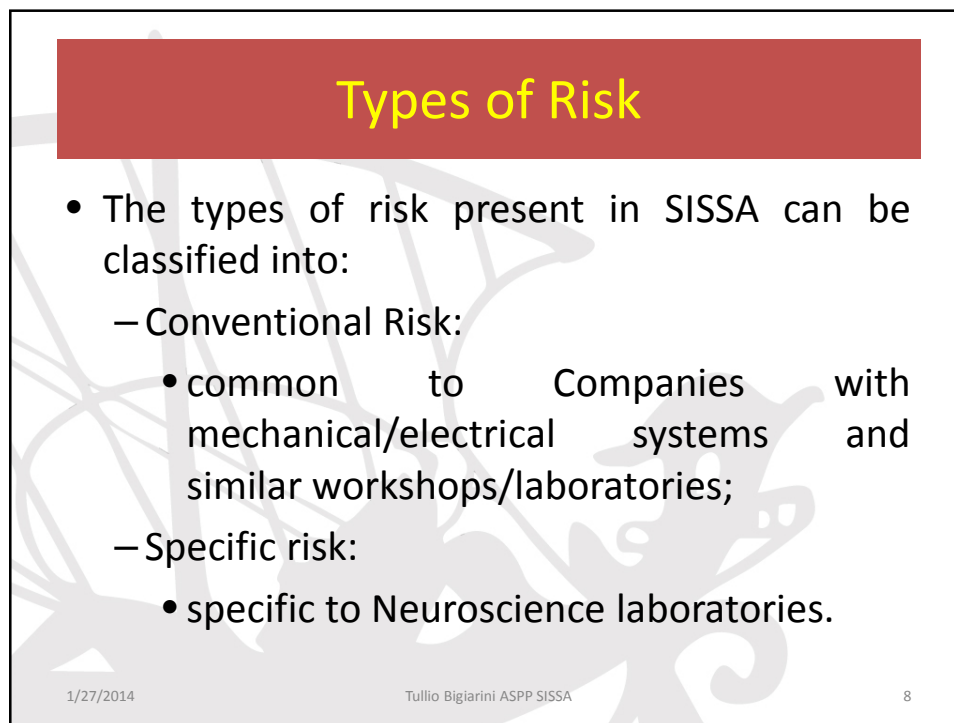
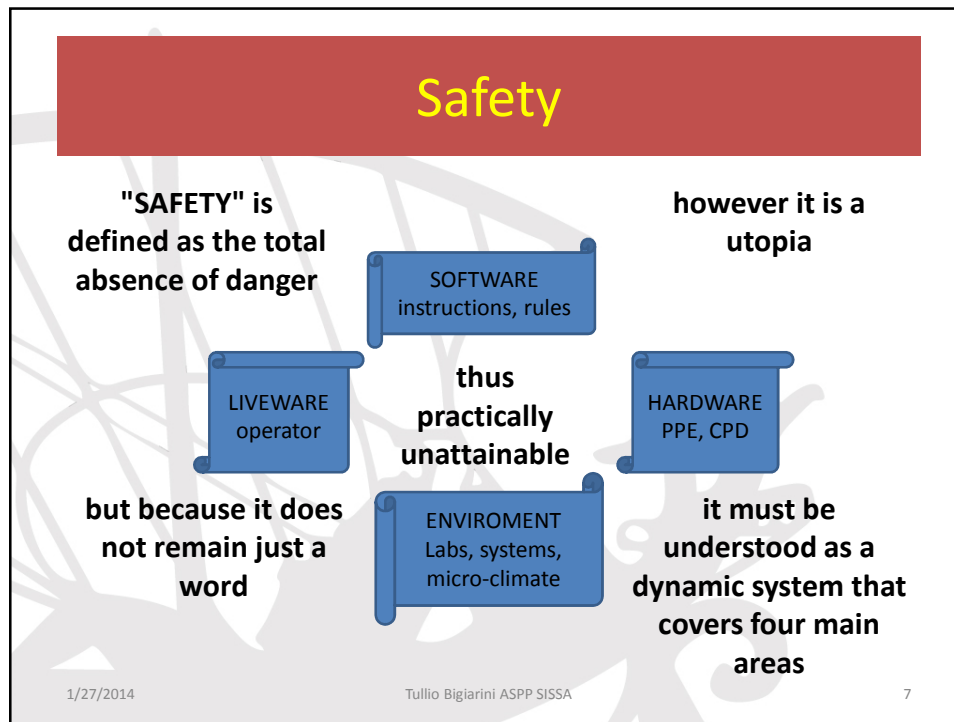
4

Safety Organization



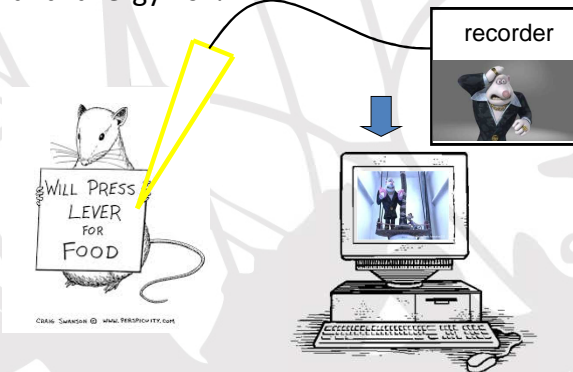
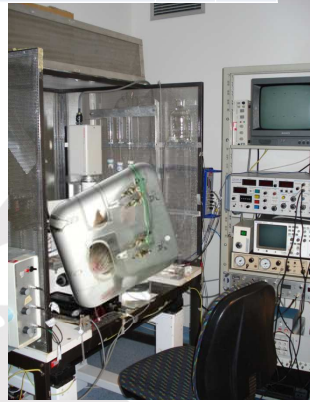
The sequence of events





TASKS CARRIED OUT	lab. / facility	N° stanza	Tipo di rischio CHIMICO/CANCEROGENO	Tipo di rischio BIOLOGICO	Rischio da contatto con animali	Fattori di rischio FISICO	Altri Tipi di Rischi	Videoterminale se >20h/settimana
Cognitive Neuroscience								
(working with animals, use of chemical products) Cognitive neuroscience research	Lab. Diamond	354	Rischio chimico irrilevante; Rischio cancerogeno residuale non pericoloso per la salute in relazione ai quantitativi utilizzati, alle procedure operative e di sicurezza applicate e all'uso dei DPI previsti.	Uso di agenti biologici di gruppo 1 Uso di agenti biologici di gruppo 2 Specificare	Specificare quali animali usati deliberato CONTATTO CON ANIMALI	Specificare [Microclima, Radiazioni ottiche, Non ionizzanti (Laser, RMN)]	Specificare Tempo di esposizione (giorni/anno)	



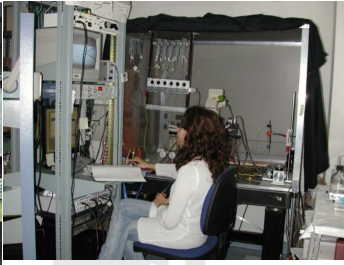
• Mainly physical and electrical risk
and allergy risk!

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TASKS CARRIED OUT	lab. / facility	N° stanza	Tipo di rischio CHIMICO/CANCEROGENO	Tipo di rischio BIOLOGICO	Rischio da contatto con animali	Fattori di rischio FISICO	Altri Tipi di Rischi	Videoterminale se >20h/settimana
Cognitive/Electrophysiology								
(working with animals, use of chemical products) Cognitive neuroscience research	Lab. Zoccolan	356	Rischio chimico irrilevante; Rischio cancerogeno residuale non pericoloso per la salute in relazione ai quantitativi utilizzati, alle procedure operative e di sicurezza applicate e all'uso dei DPI previsti.	Uso di agenti biologici di gruppo 1 Uso di agenti biologici di gruppo 2 Specificare	Specificare quali animali usati deliberato CONTATTO CON ANIMALI	Specificare [Microclima, Radiazioni ottiche, Non ionizzanti (Laser, RMN)]	Specificare Tempo di esposizione (giorni/anno)	

• Mainly VDU risk!

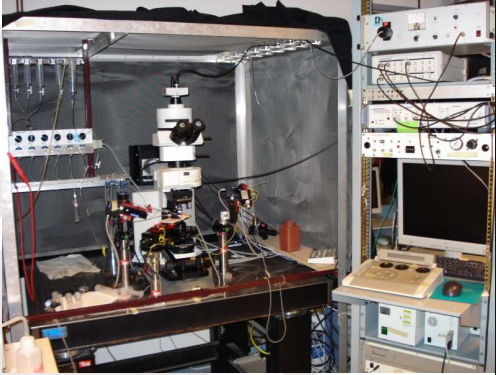





• Have your instruments the CE mark?

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TASKS CARRIED OUT	lab. / facility	N° stanza	Tipo di rischio CHIMICO/CANCEROGENO	Tipo di rischio BIOLOGICO	Rischio da contatto con animali	Fattori di rischio FISICO	Altri Tipi di Rischi	Videoterminale se >20h/settimana
Electrophysiology								
(use of microscopes and/or lasers) Clerical or similar	Lab. Torre	454-455	NO	NO	NO	Altri rischi fisici / infortunistici assenti o trascurabili in relazione alle modalità operative e di sicurezza adottate; USO LASER CLASSE 4 CON DISPOSITIVI DI SICUREZZA IN ATTO; RISCHIO ESPLOSIONE DA SOVRASSIGGENAZIONE PER PRESENZA MISCELA 95% O ₂ - 5% CO ₂	Specificare Tempo di esposizione (giorni/anno)	

•Mainly laser risk!



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TASKS CARRIED OUT	lab. / facility	N° stanza	Tipo di rischio CHIMICO/CANCEROGENO	Tipo di rischio BIOLOGICO	Rischio da contatto con animali	Fattori di rischio FISICO	Altri Tipi di Rischi	Videoterminale se >20h/settimana
Molecular Biology Labs								
(without use of animals, use of chemical products) Biological research	lab. biol. mol. comune	643	Rischio chimico irrilevante; Rischio cancerogeno residuale non pericoloso per la salute in relazione ai quantitativi utilizzati, alle procedure operative e di sicurezza applicate e all'uso dei DPI previsti.	Rischio classe 1	NO	Altri rischi fisici / infortunistici assenti o trascurabili in relazione alle modalità operative e di sicurezza adottate	Specificare Tempo di esposizione (giorni/anno)	



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Precautions for safeguard maternity

Risk factors that are not compatible with being pregnant:

dangerous chemical agents
 dangerous physical agents
 biological agents
 being in a standing position for more than half the working day

As a consequence, *it is forbidden for them to work in the laboratories during pregnancy and up until seven months after the birth.*

The female worker who finds herself in these working conditions must:

immediately inform the **COMPETENT PHYSICIAN and the Head of Lab** of her pregnancy.

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Residual risk

- If after putting in place all necessary measures to prevent, though small, still remains a **RESIDUAL RISK**

- so you need to use **PROTECTIONS**

- COLLECTIVE



- INDIVIDUAL

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First CPD, after PPE



CPD Collective Protection Devices (hoods, ...)

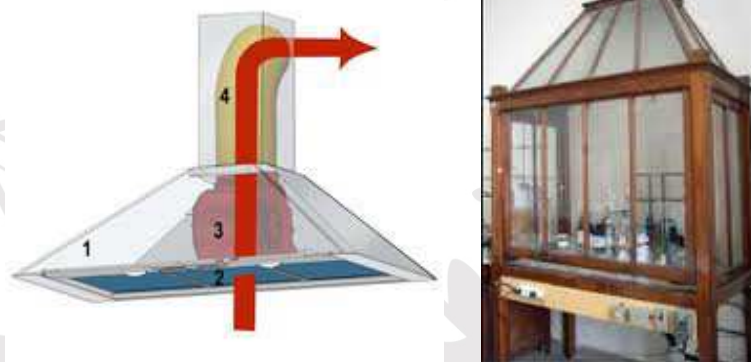
PPE Personal Protective Equipment (mask, goggles, gloves, ...)

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Collective Protection Devices



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The fume hood: where does it go?

Intended use: containment and extraction of hazardous fumes
Actual use: a really expensive storage closet



Ever wonder where it all goes?

Chemicals casually laying about:

Will kill you instantly

Slow and agonizing death

Two chemicals that should never ever be that close together

No idea.

Something you should probably avoid if you plan on reproducing one day.



(What is this anyway? A trap door?)

Ramblings of a mad man

Layers of crud- "research"

It spins by itself! Magic!



The hot plate/stirrer: abused more than the undergrad interns.

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Fume cupboards

Should not be used as storage areas: when you leave something under the hood let it evaporate (empty gas cartridges, containers with residues of solvents,...) **REMEMBER** to take it away.

Never leave unidentifiable material in the lab or inside the hood, for safety and disposal reason.

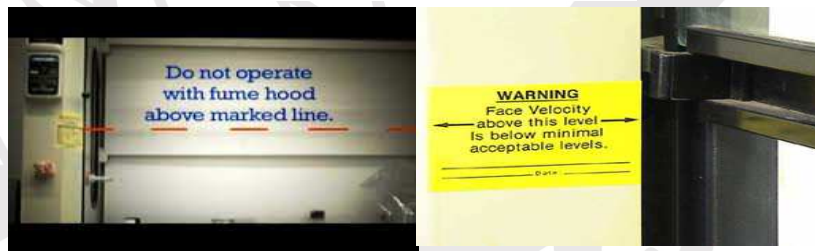
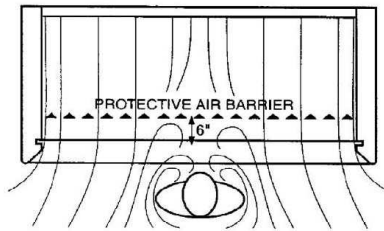


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140mm between the hood and the bench
 300mm from the side walls
 1000mm buffer zone between operators

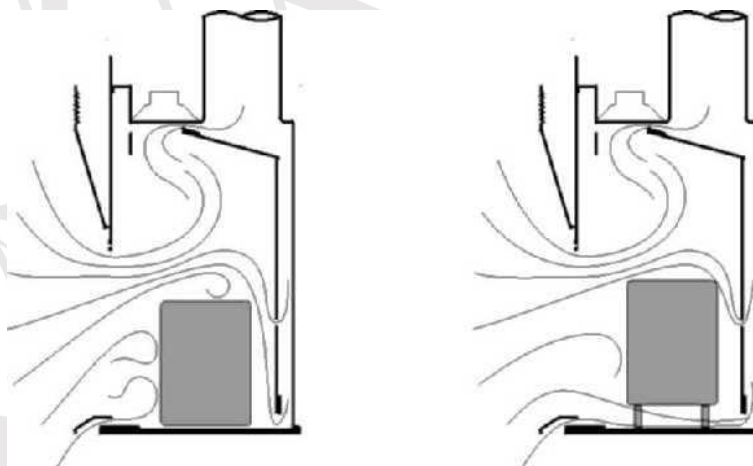


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Raise at least 2cm large tools

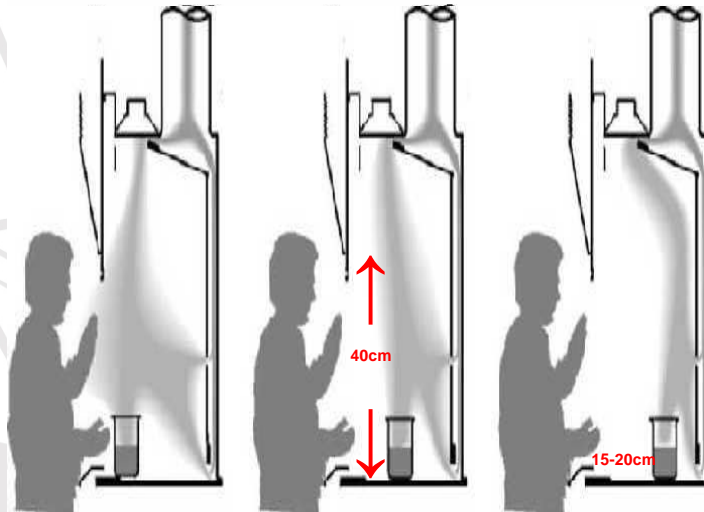


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Placement



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Chemicals

- Typology
- Toxicity
- Physical state
- Concentration
- Frequency of use
- Exposure time



CPD: act directly on the source of pollution to stop its spread.

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Personal Protective Equipment (art.74 Dlgs.81/2008)



"any equipment designed to be worn or held by the worker to protect him **against one or more risks** which may endanger the safety or health at work, and any addition or accessory designed for this purpose"

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Residual Risk Vs Health

You **MUST** normally use PPE during the following activities in SISSA labs:

- Use of dangerous chemical agents;
- Use of hazardous biological agents;
- Use of hazardous non-ionizing radiations;
- Use of cryogenic liquids;
- ...



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Find the differences!

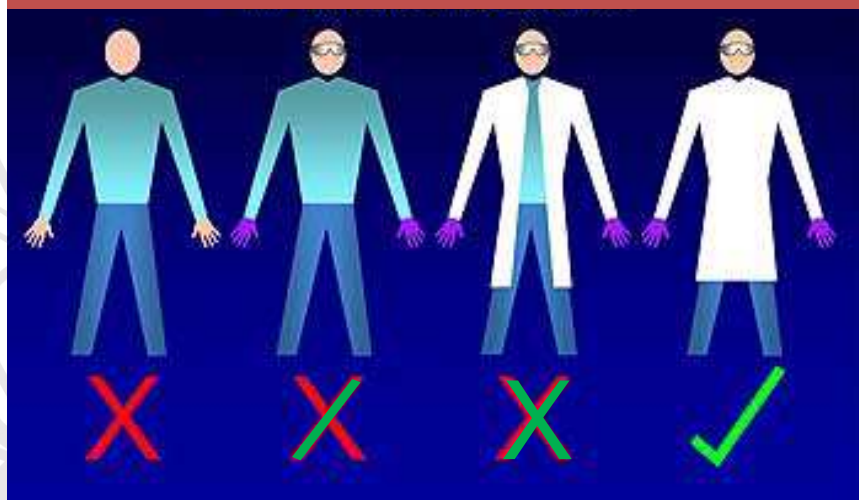


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Wear a lab coat!



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Lab coat rack

WHEREIN THE PURPOSE OF THE LAB COAT IS UTTERLY DEFEATED.



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Gloves

Guide Chemical resistant chart

Chemical group	Latex	Nitrile	Neoprene	PVC	PVA	Butyl
solvents	x	x				
ketones	x		x		x	x
acids	x	x	x	x		
hydrocarbons		x	x			
oils		x	x	x	x	
greases		x	x	x	x	
organic solvents		x	x			

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Acceptable Quality Levels

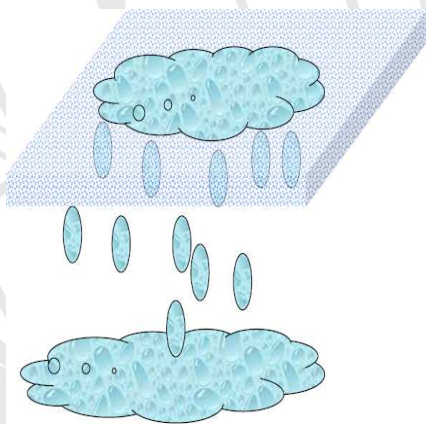
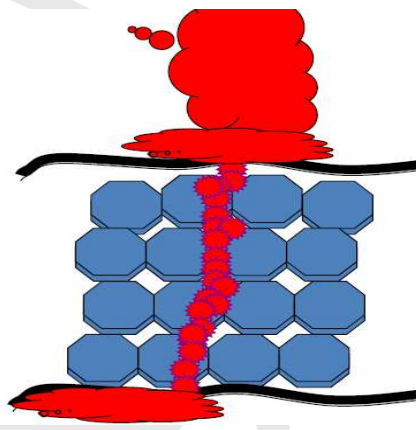
- AQL (acceptable quality level) is an arbitrary, self-imposed specification that allows manufacturers to monitor their production processes on an ongoing basis.
- **The meaning of this is that if you use very hazardous substances, it is better to use 2 pairs of gloves!**

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The gloves length of life

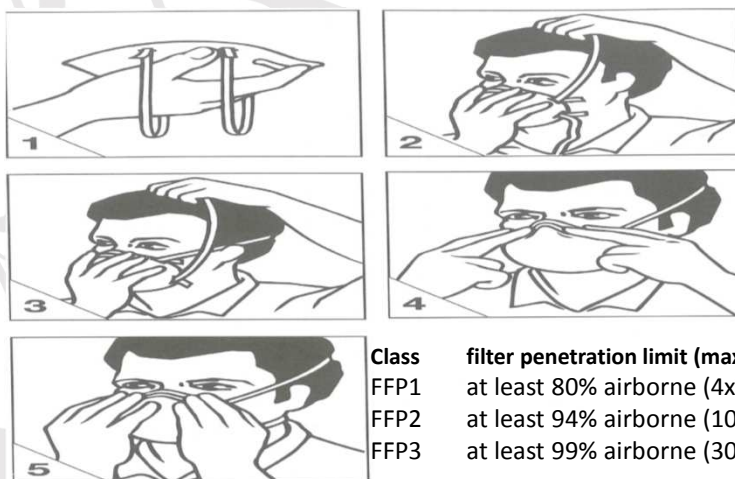
PENETRATION**PERMEATION**

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How to use the mask



Class	filter penetration limit (max conc.)
FFP1	at least 80% airborne (4xTLV)
FFP2	at least 94% airborne (10x TLV)
FFP3	at least 99% airborne (30xTLV)

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How to wear the mask



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General Operating Rules (1)

- Leave backpacks and coats out of working zone and regularly use personal protection equipment (PPE).
- Avoid wearing open shoes, sandals, or high-heel shoes; long hair should be gathered up and held back; dangling jewellery (earrings, bracelets, etc.) may present risks.



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General Operating Rules (2)

- Maintain neat and clean jobs, surfaces decontaminated.
- Use only automatic pipettors, NEVER MOUTH.
- It is FORBIDDEN TO EAT, DRINK, SMOKE and make-up in the labs!
- Read the instruction manual of the instruments, labels and consult safety data sheets.
- Do not use gloves with telephone, handles, etc...
- Do not throw anything down the sink.
- Wash your hands before leaving the laboratory.
- Document and communicate all laboratory near-misses and incidents.

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Operative Standard Procedure

The image shows a digital document viewer displaying two pages of a laboratory safety manual. The left page is titled 'HAND TOOL SAFETY' and the right page is titled 'HAND TOOL SAFETY' and 'LABORATORY MANUAL'. Both pages contain detailed instructions and safety protocols. The left page includes sections for 'GENERAL INTRODUCTION', 'ANALYSIS OF THE PRODUCT', 'HAZARDS IDENTIFICATION', 'MEASURES OF PREVENTION', and 'OPERATIONS FOR PERFORMING THE PROCEDURE'. The right page includes sections for 'MANAGEMENT OF EMERGENCY', 'CONCLUSIONS', 'IDENTIFICATION OF PEOPLE INVOLVED', and 'ANNEXES'. The document is dated 1/27/2014 and is authored by Tullio Bigiarini ASPP SISSA.

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Lab tasks involving increased risk

Laboratory members understand that:

1. Require adequate training and safety equipment (gloves, lab coat, goggles, hood, etc.)
2. Must be carried out only after informing surrounding lab workers who will provide help in case of an accident
3. Must be performed only during normal working hours (8.00-17.30) when Emergency personnel is present.

You are absolutely forbidden to work by yourself (especially during off-hours) in refrigeration room, or when engaging in complex and dangerous operations!

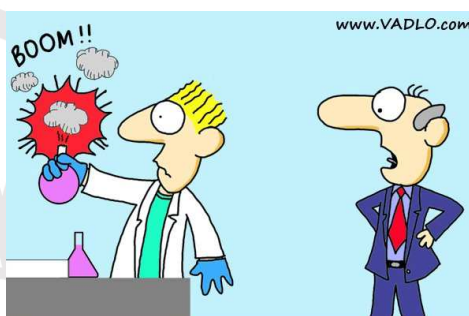
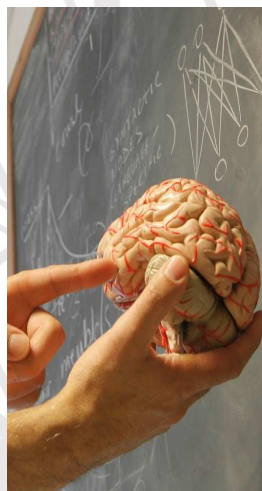
Whenever a piece of equipment is left on outside the normal working hours of the lab, attach a card to it with information about its task, how to turn it off, and the name of the person to contact in case of emergency.

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So at the end, in laboratory...



"I asked you not to mix Science with Religion."

... the first ingredient in your experiment, is your brain!

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Safety Signs



Fire Emergency Signs

Square form, white on a red background

Danger Signs

Triangular form, black on a yellow background

Prohibitory Signs

Circular form, red edging on a white background

Mandatory or Warning Signs

Circular form, white on a blue background

Rescue and Emergency Signs

Square or rectangular form, white on a green background

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Some signs...



It highlights the need to gather at the meeting point of the color on the operational areas covered

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Safety Prank

MINDCRAP



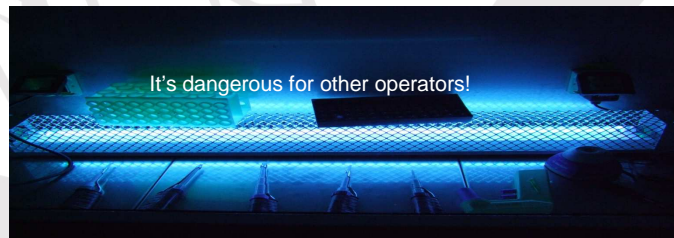
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UV

- All major internationally recognized technical standards **discourage significantly the use of germicidal lamps** (255nm, band UV-C).
- Italian tipycal need.
- The UV can not replace daily disinfection.



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SISSA plug

- White plug: normal
- Green plug: under generator
 - Start in few minutes (freezer and refrigerator)
- Red plug: UPS
 - (long analysis instruments)
- Black plug: clear ground
 - Pay attention the difference: in corridor are black plugs with dirty ground



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Electrical Systems



- Electrical installations must be constructed and maintained so as to prevent the following risks:



- direct contact (contact with a part of the system normally live, as a conductor, a clamp, the attack of a lamp, a fuse, etc. ..., become casually accessible)



- indirect contact (contact with a part of the system does not normally live, such as the carcass of an engine, but which has accidentally taken a dangerous voltage for an insulation failure)



- fire or explosion (due to overload or short circuit)

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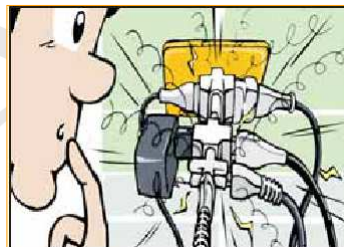
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Electrical system Risk (1)



- Do not use multiple mobile sockets, adapters, extension connections, etc. in humid, wet, cold, hot or dusty environment, with corrosive emanations, with risk of fire, with danger of explosion.
- Do not feed more appliances from a single wall outlet.



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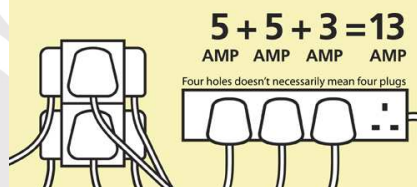
Electrical system Risk (2)



- Do not connect an appliance to a plug not suitable: danger of fire or deterioration of the power system.
- Check that the connected loads do not exceed in total the current value of the socket.



Don't overload and know the limit!



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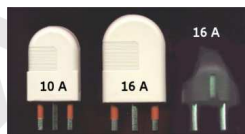
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Electrical system Risk (3)



- You can not insert a plug from 16A (large and distant) into a socket from 10A (tight holes and close).
- Do not insert the plugs of the German type (Shuko) in Italian type sockets because you do not allow earthed of the appliance (tabs on the sides).



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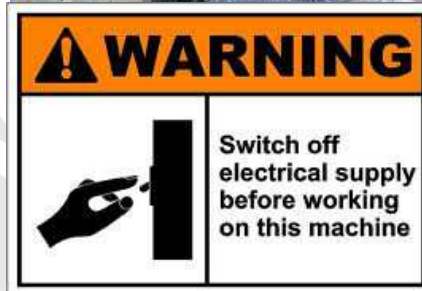
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Electrical system Risk (4)



- Should not be carried out maneuvers on switches, plug sockets, electrical equipment with wet hands.
- Plugs should be inserted and turned off from the sockets with appliances SWITCHED OFF with the power switch on the appliance itself.



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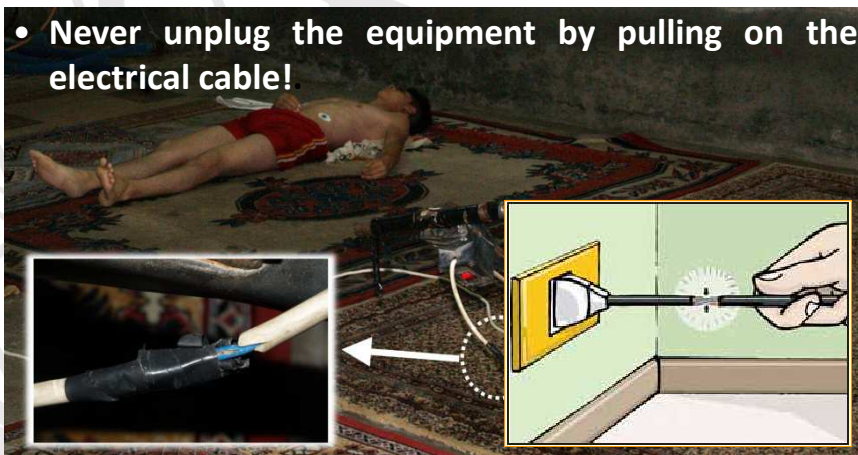
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Electrical system Risk (5)



- **Never unplug the equipment by pulling on the electrical cable!**



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Maintenance and repairs



- In the event of fault does not intervene, stop what are you doing and promptly report the problem to authorized personnel.
- Immediately let the Supervisor know about any electrical equipment malfunctions.
- **THE ELECTRICAL SYSTEM MUST BE MAINTAINED AND MODIFIED ONLY BY PROFESSIONAL PERSONNEL!**

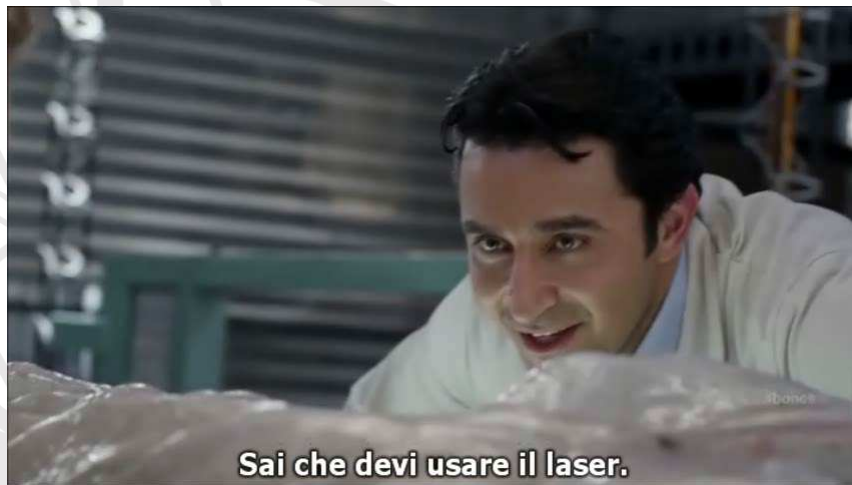


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"Bones" Safety



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Under/over oxygen atmosphere



In case of ALARM DETECTOR CO₂, O₂, in the absence of technical personnel:

- people inside the room must leave immediately after having the windows open, if possible without personal risk, and closing the laboratory door behind you;
- no one is allowed to enter in the laboratory;
- promptly notify the SSP Officer (#739 - #555) or the Technical Officer at the Presidio (#681).

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Under/over oxygen atmosphere

The following actions are prohibited:

- alert directly to the switchboard of the Fire Brigade;
- occupy the telephone lines;
- perform actions dangerous for your safety.

Only trained and equipped with breathing apparatus can access to the premises to verify the incident and open windows for ventilation, allowing the fastest possible.



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In case of accident

- NO PANIC!
- ALERT the Safety Service and the Supervisor!
- According to the type of substance concerned shall apply normal first aid procedures:
 - Procedures for inhalation / ingestion / contact eye / skin contact (#911);
 - Procedures recovery kit (collection) in case of spillage;
 - Procedures handling and identification systems for waste disposal.

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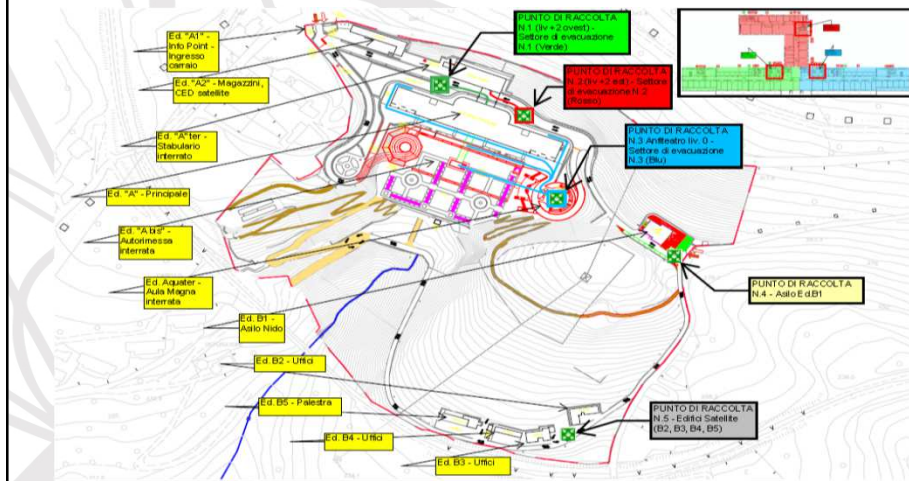
Useful phone numbers

Members of the FIRST AID UNIT (from 09 to 17 working days)	040 3787 911
Members of the EMERGENCY MANAGEMENT TEAM (from 09 to 17 working days)	040 3787 555
CONTROL ROOM (24H24H)	040 3787 681
BIGIARINI TULLIO (safety@sisa.it)	040 3787 739
SISSA COMPETENT PHYSICIAN antfiorito@yahoo.it	040 399 2518 347 4287695
SISSA INFIRMARY only Wednesday	040 3787 495

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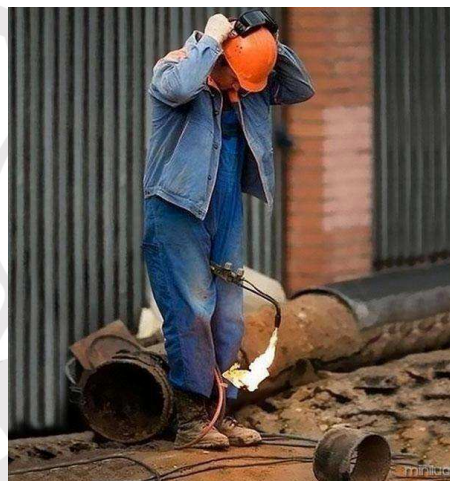
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Never stop to think!



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Special waste management

- **Harmful chemical waste:** put solid waste in the bin with a blue ribbon (CER 150110*) or in the bin with a white ribbon (CER 150202*).
- Incompatible chemicals have to be storage differentiated, both of the substances and the waste.



Chemical Waste Disposal

CER 150110*	CER 150202*	CER 070704*
Material contaminated with dangerous chemical substances	Absorbing contaminated material with dangerous chemical substances	Chemical liquid waste
Pipettes, tips, tubes, glass and plastic bottles contaminated by dangerous chemical substances	Paper and gloves contaminated by dangerous chemical substances, agarose and acrylamide gels	Methanol, dyes, acids, PFA, formamide, fenol/chloroform, Tris buffers, NaOH....
		
Close the plastic box and deposit in the designated temporary disposal room	Close the plastic box and deposit in the designated temporary disposal room	Close securely and deposit the tank in the designated temporary disposal room

Transfer the waste in the temporary disposal room (room 458)

Biological Waste Disposal



Biohazard Waste disposal

Sharp implements
needles, blades, razors,
glass slides, coverslips,
glass Pasteur pipettes

**Plastic disposable
pipettes**



Solid waste
Petri dishes, tubes, gloves,
paper contaminated by
biological fluids, cellular
lines, bacteria or viruses



TEMPORARY DISPOSAL ROOM



Liquid waste
Supernatants from cell
and bacterial cultures,
blood

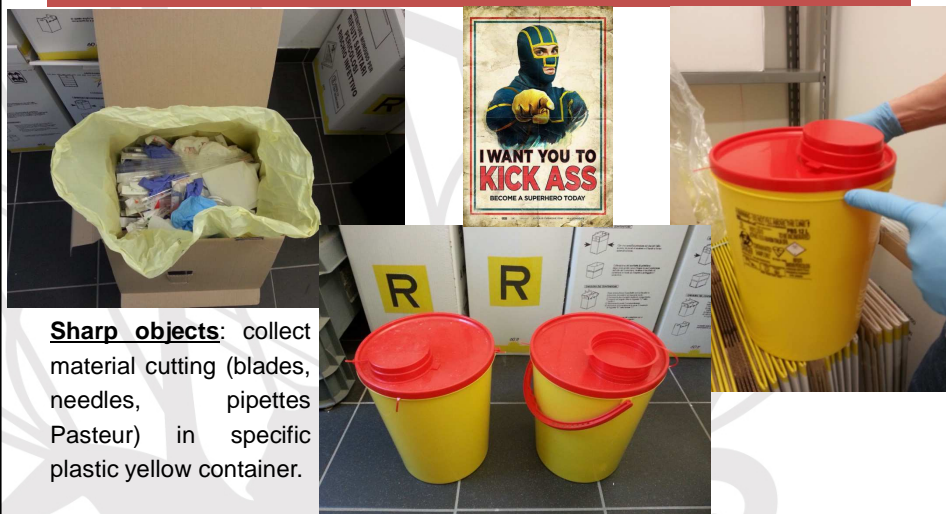


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Beware!



Sharp objects: collect
material cutting (blades,
needles, pipettes
Pasteur) in specific
plastic yellow container.

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Pay attention!



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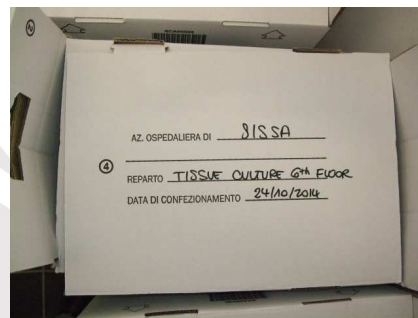
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Pay attention!



- We need to know where they are came from!
- Don't write the DATA!



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Right waste in right bin!



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What's wrong with you?



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What's wrong with you?



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What's wrong with you?



Biological waste:

dispose of waste in the cardboard box with yellow bag. When the box is full for $\frac{3}{4}$ close properly, write the name of the laboratory and put it in temporary storage.

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Large glass and plastic containers

For disposal, either intact or broken, use the 220 liter bin dedicated in the temporary disposal room (room 458).



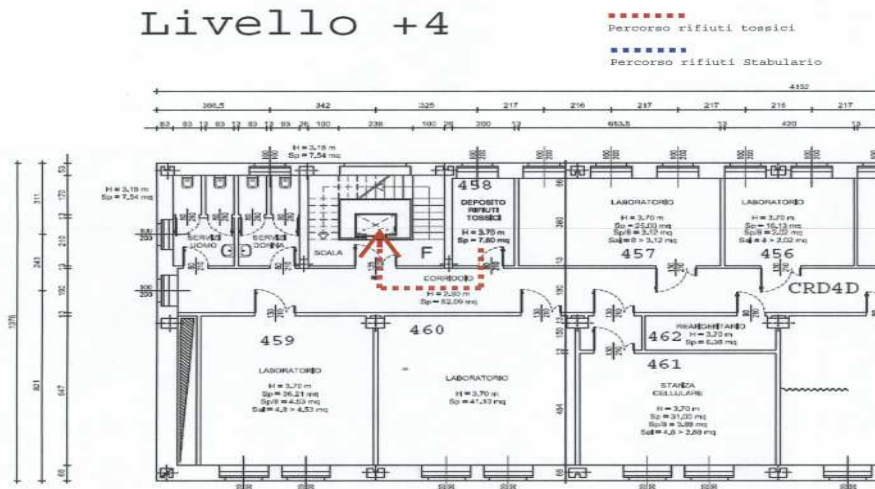
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Path waste and sample

Livello +4



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Video Surveillance

THIS AREA IS UNDER VIDEO SURVEILLANCE

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Safety is not a game

Questions?