

**Let's work together to
make sure no one gets hurt!**



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I'm excited to see your ambitious ideas!

Toulouse INSA-UPS



sustainable
biomanufacturing of
violet fragrance

LINKS China



leather substitute from
kombucha, spider-silk
and natural dyes

Marburg



rapid prototyping with
cell-free systems from
chloroplasts

Doing real things = encountering real risks

Exposure



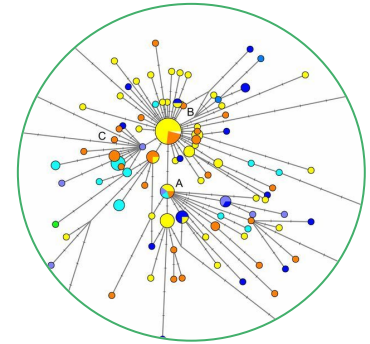
A team of high schoolers working on a biosensor for toxins

Release



A team running field tests of their probiotic for wild bees

Dual-Use



A team designing directed evolution algorithms

Responsibility

How will you make sure that no one gets hurt?



We don't expect you to do this alone

Advisors and Experts



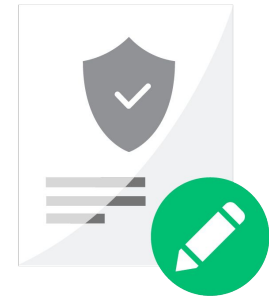
You can ask your advisors and instructors for guidance

Safety Committee



Contact the safety committee (**safety@igem.org**) with questions

Safety Forms



Every team is required to submit two safety forms (once in June, once later on)

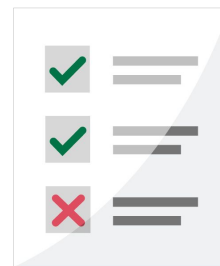
We want you to check in with us

Please consult the **White List** and **safety policies!**

<https://responsibility.igem.org/guidance/white-list>

<https://responsibility.igem.org/safety-policies/introduction>

Check-In Forms



White List

This page provides the details of organisms, parts, and activities teams can use in iGEM, along with those which require approval from the Safety and Security Committee before they can be used. **You must check in before beginning experiments with any organism, part, or activity that is not on the White List.**

Organisms

Organisms on the White List can be used without being checked-in. Teams require permission in advance from the Safety and Security Committee to use all other organisms, such as the examples provided below (right column). Permission should be requested by completing a Check-In Form before using an organism not on the White List.

White List

- * Risk Group 1 microorganisms, other than spore-forming fungi (For example: *E. coli* K-12, *S. cerevisiae*, *B. subtilis*, *Lactobacillus* spp.)

Not on White List

Check-In Required.

- * Spore-forming fungi (including from Risk Group 1)
- * All organisms that require enhanced containment (e.g. BSL2), such as those from Risk Group 2 or plant pathogens, or that otherwise pose a risk should they be released
- * Any organisms obtained from outside the lab or from non-traditional / non-institutional suppliers

White List

- * Commercially available disarmed strains of plant pathogens commonly used to transform plants (such as *Agrobacterium tumefaciens*.)

- * All organisms that require enhanced containment (e.g. BSL2), such as those from Risk

Not on White List

Check-In Required.

- * Wildtype strains of plant pathogens commonly used to transform plants (such as *Agrobacterium tumefaciens*.)

- * Other disarmed strains of plant pathogens

Release Beyond Containment Policy

iGEM teams often do projects that have an immediate practical application. But within the context of the iGEM competition, wet-lab projects should remain at an experimental stage. In general, iGEM teams should not release or deploy any engineered organisms, or the products of engineered organisms, outside the lab. Instead of aiming toward release, we encourage you to focus on producing the best laboratory results.

ALERT

STOP

iGEM teams should not release or deploy any genetically modified organisms outside the lab.

CHECK IN FIRST

You must submit a Check In Form **before** bringing any product of synthetic biology outside of the lab for any purpose, including testing, stakeholder consultations, or presenting it at the Giant Jamboree. Products of synthetic biology include, but are not limited to, biosynthetic fragrances and dyes, cell-derived biosensors, and engineered plants.

What should I do?

Be a responsible scientist

There are many extremely complicated risks involved in releasing a genetically modified organism (GMO) outside the lab. Without extensive testing, you cannot know if your GMO is safe for humans and the environment. It would be dangerous, even reckless, to release a GMO without the proper risk assessment and testing.

Also, releasing GMOs is a sensitive issue in some parts of the world. Because of this controversy, when synthetic biologists seem to act recklessly, they can damage the reputation of the whole field of synthetic biology. As iGEM team members, you are ambassadors between scientists and the public, so it is important that you be excellent scientific citizens!

Keep your activities legal

In most countries, it is illegal to release GMOs or their products into the natural environment without extensive government permits and approvals. Obtaining these permits and approvals would probably take longer than the entire iGEM competition. Instead, you should focus your efforts on producing the best laboratory results. (And, of course, you should not release your GMOs illegally!)

You need **permission** to work with risky organisms, parts, and activities (for now, email safety@igem.org)

We have policies and guidance to help

Do Not Release



Do Not Release
/safety-policies/relas...

White List



White List
/safety-policies/white...

No Human Experimentation



No Human Experiment...
/safety-policies/huma...

Animal Use



Animal Use
/safety-policies/anima...

Human Subjects Research



Human Subjects Resea...
/safety-policies/huma...

Antimicrobial Resistance



Antimicrobial Resistan...
/safety-policies/antim...

Gene Drives



Gene Drives
/safety-policies/gene...

Coronavirus



Coronavirus
/safety-policies/sars-c...

Environmental Samples



Environmental Samples
/safety-policies/entro...

Guidance for Responsibility

You could find guidances for responsible research and innovation here, which cover the human subjects research and biosafety relevant resources.



> RESPONSIBLE DESIGN



> WHITE LIST



> RISK GROUPS



> SURVEYS AND INTERVIEWS



> INFORMED CONSENT



> WORKING SAFELY

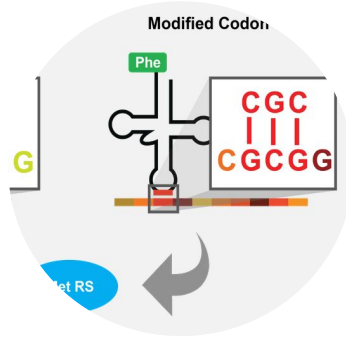
You can be ambitious in safety & security

Containment



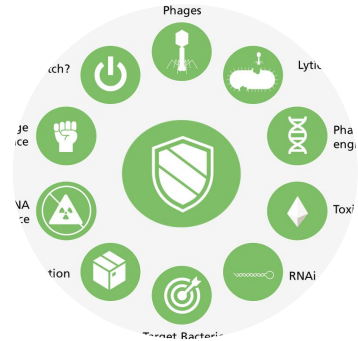
NDNF_China 2021 made a hydrogel containment system, characterized escape rates, and designed barcodes to track escaped organisms

Countermeasures



Lethbridge 2017 developed biosecurity software to make DNA synthesis screening more robust to genetic recoding

Safe-By-Design



TU Delft 2020 made biosecurity a core design requirement for their bacteriophage-based pesticide



Let's work together
I'm excited to learn
about your projects
and ideas!

