iGEM x COVID-19

When the team was formed in February, we were all in the same university, and most of us in our last year of our bachelor's degrees. We knew that when the next school year starts a lot of the members are not going to be in the same city as us for their masters. It is often the same every year, as shown by the survey carried out with last year's team. We had more than enough time to find an organization plan for the last few months of the iGEM competition which are usually the most stressful ones and demand a lot of time and effort. What we did not expect though was a lockdown because of the pandemic.

This is why this year our team decided to make a contribution a bit specific to the current situation. COVID-19 hit us unexpectedly and it was not easy to adapt. We were all on lockdown for 2 months and even after that meeting in real life was not advised. Deciding to continue the project and the competition needed adjustments. Having to work together and despite the distance demands effort, extra time and being able to adapt. When we see what is happening around the world and how the pandemic is progressing it is more than clear that it would not end soon.

Newly formed teams for iGEM 2021 could benefit from the documents you will find on this page. You will have access to some organisation plans, some suggestions and a few tips on how to work together without actually being together

Summary

1.   Team Organization

Good organization is key for developing a successful iGEM project. After experiencing ups and downs during the whole year while our project was evolving, we thought that a document like this could prove useful for future teams.

We created this contribution based on our experience, feelings and remarks. You will find tips and suggestions about organizations, but you should know that every team is unique and this might not work for everyone and at the same time it might be perfect for some teams.

1.1 Global team organization

After seeing the success the 2019 team had, we knew we wanted to experience the adventure. That is why for iGEM 2020, a few team members initiated the idea of creating a project for this year.

Contrary to last year when teachers recruited students to form a team, this year the students that took the initiative to participate in the competition, did the recruitment by consulting only at the end with the teachers. We are not yet sure which is the best way to do this. Indeed, members from last year and this year's members would rethink recruitment differently. It would be interesting to ask the other teams about this topic.* according to the survey attached in the annex.

When the team was completed, we were 14 students and 4 advisors and we were all doing a bit of everything. This means that people who are currently in the Human Practice group were doing scientific research and vice versa.

When the lockdown started, we knew we had to be organized and this is how we did it.

We thought a long time about how we are going to organize the team. Some teams give each member different roles. We discussed for a few days, everyone gave ideas about the way the team is going to work, we voted and in the end, we came to an agreement. Even if there are no limits with the distance, choosing the organization that best fits the members is essential.

We divided the team into 3 groups in total: a Scientific group, a Human Practice group and a Finance & Entrepreneurship group. This helped us divide tasks in a logical and organized way so we could move forward fast and steadily.

In each group, there is a member that had the role of a leader. This means that they are in charge of organizing the work that has to be done inside the group, managing and communicating with the other group leaders, making sure that every member knows what is happening with every aspect of the project. They organize meetings with their group and after, they would write a report that is later shared with the whole team. This way everyone knew what the other groups were doing.

Someone who provides directions and guidance in order to achieve our goal is essential. That is why nominating the student team leader is a really important part of the iGEM competition. That person is the link between the groups. Their role is to develop a plan, make sure everyone sticks to it, sometimes assign tasks, and last but not least communicate our progress to supervisors and team members. Setting achievable goals, individual or not, helps the team leader to know that everyone is on the same page.

Something that a lot of teams have to deal with is personality differences. Everyone is different and for

the project to run smoothly and efficiently as possible, the team leader should be available to solve all kinds of problems including personal issues. This does not mean that all of the responsibility falls on the team leader. Everyone should take charge and initiatives when there is an issue that needs to be solved. Keeping a positive set of mind is something we found useful during our adventure.

Our team has a lot of members so we knew that sometimes the leader might be overwhelmed. This is why we decided to select a deputy team leader. His role was to help the leader with all of the work they needed to do.

25% of last year's team members who responded to the survey felt that they could have organized the team differently by mixing the HP group with the finance/entrepreneurship group.

It is important to note that everyone needs a break from time to time, either to catch up on classes or to even just relax for a bit and take care of themselves. In this case communication between members is essential. If someone is in need of a break the others need to know this so they could organise themselves. This should not in any case be an excuse for not respecting a deadline or not doing assigned tasks.

We were able to do all of this thanks to the existence of social media and different communication apps.

An application created by iGEM ties called CoSo is a great way to stay on top of things. It was specially designed for iGEM teams so they could report their activities, and facilitate their organization. You can find more information on their official website: https://igem-ties.info

We asked last year's members if they had any advice regarding communication within the team. Here are a few suggestions:

1. *"Always say what's you will do and what did you do"*

2. *"Communication is always complicated in a group of 15 people (approximately). Not everyone has to like each other and not everyone thinks the same. It is also a richness ... it is important to never let resentment set in and deal with tumultuous situations as regularly as necessary. In distance, it is necessary to favor one platform rather than 50,000 conversations from everywhere. "*

3. *"Avoid the formation of subgroups in the team, if possible frequently mix members within the difference workstream or work's group"*

1.2 Organization in groups

As you already know each group had a leader. Every group in our team has weekly meetings during which everyone talks about the tasks they have and what has to be done next.

A document was written after every single meeting and was available for the whole team to read and ask questions if necessary. The whole team had access to a common Google Drive where everyone would put important documents containing essential information for the competition or project.

Each group had a Google Sheets page with things to do and the corresponding deadline. Even if the group leader was the one responsible for the organization of the group, team members have to take initiative, do their task and help others.

Clear communication between groups and members helps everyone stay calm, there is less stress and tension between members with approaching deadlines.

If you need some ideas about the organization or recruiting, the links you will find in the section are interesting to see:

In this video, you can find tips on how to optimize team structure : [Team structure for SynBio projects](#).

Useful documents for the organization or recruitment within the team:
[Team Effectiveness Questionnaire](#)
[Teamwork Questionnaire](#)

1.3 Meetings

As said in the organization section of the document, each group has weekly meetings. We found it easier to create PowerPoint presentations before each meeting which helped us keep track of deadlines and tasks.

The whole team also gets together once a week, and every group does a resumé of what has already been done, and what has to be done. If someone has concerns or something is unclear about the project, the team or the competition, the weekly meeting is the place to talk about that. The day and hour for the meeting were determined at the beginning of each week thanks to a vote. If a member is not available for a meeting, everyone else makes sure that the person is caught up to date afterward.

Every two weeks we get together with our supervisors and we would do quite the same: each group presents what they did, what they will do and what they need. Clearly stating what the team needs from the supervisors is indispensable so that the iGEM experience functions well and becomes something you can be proud of.

Most of our meetings were held online to ensure the security and health of everyone. This did not slow us down or hold us back. On the contrary: being in lockdown meant we had less distraction, so it was easier to organize meetings with everyone. You should not be afraid to rely on the technology of the 21st century.

When we asked last year's team members what they would change about meetings, one answer came up frequently: having shorter and more efficient meetings.

"Shorter and more efficient meetings with less people" a previous member said.

This comment is very interesting. Indeed, the meetings held in each division were more effective than those with the whole team. Each team must think about the organization of its meetings to make them as efficient as possible. Of course, this depends strongly on the way each member functions.

1.4 Agreements

For us being a part of an iGEM team means that everyone agrees on a few basic requirements:
● Mutual respect between members, supervisors and advisors.
● Staying motivated, which sometimes can be hard, but is important for the project to run smoothly.
● Working a certain amount of hours a week. Some weeks it may be less than others.
● No one should underestimate what they are capable of
● Be confident about your own capacities and the ones of the other team members

- Finishing a task and respecting the deadlines.
- To attend team meetings.
- To clearly communicate with everyone.
- Accepting help from others (student members, supervisor and professionals)
- Helping other team members in need.
- Learning more each day.
- And most importantly enjoy the adventure and have fun.

These "rules" may seem obvious, nevertheless when the stress gets the best of us, sometimes it happens to forget a few of them.

Agreeing on a project, a name for the team and the project or simply for a date of a team meeting can sometimes take longer than expected. Members should not be afraid to express their opinions and preferences freely if needed.

Most times we would rely on a voting system, or if required an anonymous vote is also an option. After all of the votes were in, we took the time to debate and mutually decide what is the best option for us. Each member has time to express their opinion and offer an alternative is needed.

Everyone is welcome to propose a solution, an idea or a concept. And it is important for this to be met with respect.

iGEM is a decisive experience for the majority of students that has a potential impact on career choice as evidenced by last year's membership survey. That's why it's better to keep a good memory of it !

Did the iGEM experience have an impact on your choice of career orientation ?
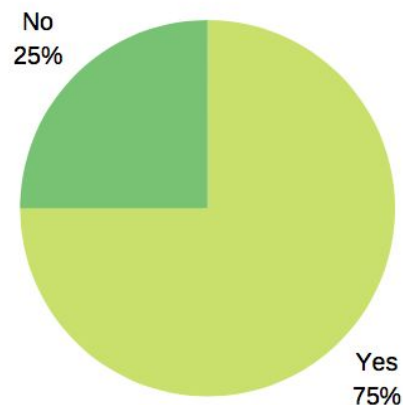
2.   Team-Building ideas

Team-building activities are a great way for people to bond, learn how to work together, improve communication and collaboration skills. Effective team building should positively affect the team. Some people might find this tedious and sometimes a waste of time, nevertheless when a team is formed not

everyone knows each other. Therefore, this is a way to learn how every person works, communicates and thinks.

This task became almost impossible to do when the pandemic hit. We were planning on doing a small trip for the team where we can bond, talk and get to know each other while playing games, solving problems and simply spending time together. When the lockdown started we did not have a choice, so we improvised.

Here, you can read and find tips on how to bond with your colleagues despite the distance.

2.1 Distance team-building

While doing meetings, we were sharing stories, laughing about all kinds of stuff and joking around. This was not enough though. When we were not working on our classes or on our project, we would organize activities online. This helped us build trust and interaction between people that would not naturally bond.

We organized team movie nights on Netflix, we would all watch something together, share our thoughts and opinions and just enjoy this type of bonding. We would do this at the end of the day when we needed to decompress and think about something else other than iGEM and our project. As we mentioned before, everyone needs a break from time to time, so we found a way to do this together.

We have played board games online like *The Werewolves of Millers Hollow,* a French board game that can be played with 8 to 47 players. Every person has a secret role in the game and debating is a key to winning. Everyone had time to talk, and express opinions and this is why we found this a great alternative for a team-building activity.

We have several group chats with a different role: a general group chat where we discussed purely the development of our project and the competition and a second one which is dedicated to sharing funny pictures (a lot of iGEM memes), telling funny or sad stories.

Further down you can read about how each group worked together during the lockdown, and how everything evolved after it ended.

3. Science

The scientific group has a total of six student members and two advisors. Most of the time they would work together, verifying the research done and making sure the protocols are clear and detailed enough. After every meeting with the supervisors, the scientific group got new ideas on how to improve the project.

3.1 Finding a project

Finding a project is never easy, does not matter if we are on lockdown or not. First, we tried just brainstorming with no specific instructions. This did not help us move forward fast so we decided to narrow our research. Focusing on a local problem could be really beneficial for your project. With our project we offer a socio-economic and environmental solution to the issue. It is not only well seen but it could also facilitate the work for the integrated Human Practice part.

Overall the brainstorming phase and finding a project is one of the hardest parts of the competition. Sometimes teams also get inspired by other iGEM teams. Continuing a project that was done a few years prior could be a good idea as well.

Because of the pandemic, we did not have access to the lab. This means all of the work we did was purely theoretical. We read a lot of articles, every team member did and it is important for everyone to know exactly where and how the project evolves.

The lockdown allowed us to detail our protocols and prepare our lab work in a really complete and exhaustive way. Having "extra" time to work on theoretical work is also a good thing. The only thing we are waiting for now is for the labs to open their doors so we can prove everything we worked on for a whole year.

3.2 Helpful video, tools and websites

In this section we wanted to give you a few videos we found useful, made by iGEM:

1. Biological circuits engineering
2. Cell-free systems Part 1 / Cell-free systems Part 2 / Cell-free systems Part 3
3. Clonage and Assembly Plans / Cloning Strategy
4. CRISPR 1 / CRISPR 2 / CRISPS 3
5. Flow Cytometry 1 / Flow Cytometry 2 / Flow Cytometry 3
6. Gibson Assembly 1 / Gibson Assembly 2
7. Golden Gate Assembly
8. How to use SimBiology and Matlab ?
9. How to use databases
10. Modelling for synthetic biology /
11. Modelling Part 1 / Modelling Part 3 / Modelling Part 2 / Modelling Part 4 / Modeling Part 5 / Modeling Part 6
12. Primers design
13. Protein Purification and Characterization 1 / Protein Purification and Characterization 2 / Protein Purification and Characterization 3
14. Quantifying fluorescence and cell count with plate readers Part 1 / Part 2 / Part 3
15. Transformation and DNA sequencing 1 / Transformation and DNA sequencing 2 / Transformation and DNA sequencing 3

The list just below consists of a few tools that you can use throughout the iGEM competition

➔ Data to build models: https://datanator.info (How to use this website? https://youtu.be/aKdYsXw4PKc)
➔ Genomes databases : https://biocyc.org
➔ Enzymes databases : https://www.brenda-enzymes.org :
➔ Protein sequences and functional information : https://www.uniprot.org
➔ Protein structural data : https://www.rcsb.org
➔ Biomedical and genomic information : https://www.ncbi.nlm.nih.gov
➔ Multiple sequence alignment program : https://www.ebi.ac.uk/Tools/msa/clustalo/
➔ Bioinformatics resource portal : https://www.expasy.org
➔ MATLAB and SimBiology (modeling) : https://fr.mathworks.com/academia/student-competitions/igem.html
➔ Xmind allows you to make mind maps but not only! You can also schematize metabolic pathways: https://www.xmind.net

4. Human Practice

The Human Practice group has a total of five student members and one advisor. Each member had to accomplish different tasks. Sometimes when a mission is complicated or long we would make groups of 2-3 members and like that we can move forward faster and in an efficient way. We did a Google Sheet document where we would follow our progress, make sure that we respect the deadlines and where each one chooses the task they would like to do.

Learn how to do HP during a pandemic with this video.

4.1 Integrated Human Practice

Integrated Human Practice is a crucial part of the iGEM project. This is where the Scientific group and the Human Practice group have to put a lot of effort and work together. The main question we have to ask ourselves is if our project is good and safe for the world. This is achieved by doing interviews with stakeholders which means that a lot of research should be done before asking someone to do an interview.

Doing background research on the professionals you want to interview is essential. Teams must prepare in advance, which means knowing why you are contacting this specific person, preparing all of the questions you have for them, knowing how exactly to present your project in front of them and always be prepared to answer their questions.

Every interview this year was done online, with an app created especially for video calls. Doing a report after every interview is really important so the team can track the development of the project and explain why and how it changed.

For some people having a meeting online could be a lot less stressful, which could result in better communication. This is, on one hand, a good thing but because of the lockdown we could not travel and meet with professionals and visit with them for example.

We started with one idea, that changed quite a bit after doing different interviews. You should not be scared of changing the project. This is how the perfect project is built - through adaptation and evolution.

A helpful video that can help you understand how the work you do affects the world and how the world affects your work: Maximizing Benefits, Minimizing Risks.

4.2 The power of social media

In 2020 teams should take advantage of social media. You can choose and personalize the message you want to send. In this part of the document, we will give you some tips and things we learned this year.

Every platform has a different audience. You should think about who you want to reach with your project.

Judging on this year, Instagram is the account we got a lot of success from. Most teams are really active there so we had opportunities for collaboration that came from there. It is important to know that being

consistent with your post frequency proved important for us - stories or posts should be planned ahead. There are options on the application that gives you statistics that tell you at what time and what day the posts or stories are viewed the most. Adapting your posting frequency with the statistics provided helps to gain popularity. Thanks to our Instagram account we managed to do a lot of collaborations with other teams.

A website we used a lot to create unique and creative content is www.canva.com. There is a free version and it is really easy to get used to.

In the team, we have a few creative and artistic people who would often create interesting content. They would use apps like Photoshop or Procreate to draw on a tablet. These are applications that require a bit more training and are not free but are really accessible.
Pixelmator Photo is another app that allows you to apply non-destructive modifications to photos. Same as Photoshop and Procreate it is not free and it takes a bit of time to get the hang of it but it is worth it.

With our Facebook account, we mostly managed to communicate with students and teachers from our university and city. We posted from time to time but a lot less than Instagram.

LinkedIn is a platform that is underappreciated. For example, it could be used to find professionals that could be a part of the Integrated Human Practices. It is used for professional purposes so you should not forget to adapt your post accordingly.

Whenever you create posters, flyers or other types of communication tools you should not forget to write all of the accounts you use.

Every team member added to their personal bio, on all of their personal accounts, that they are members of the iGEM team. This brings different audiences, other than the iGEM community.

Do not forget that social media is used not only to talk but to listen as well.

4.3 Popularising science

Popularising science is not an easy task. It is essential to know who your target audience is and adapt your speech accordingly. Being in the scientific field, when we talk between us using terms like plasmids, inoculation, bacterial transformation or insert does not confuse us. Those are words we use often and it seems obvious. Nevertheless, a lot of people would be lost if we start explaining science like that.

Most teams try to popularise science and more specifically synthetic biology by creating events. During the lockdown and the pandemic, this may not be a good idea. A few ideas we thought about doing and will probably do in the future are:
- Creating an account where we wanted to post simple definitions of different scientific terms.
- Creating videos to explain our project. Doing a few of them is a good idea in order to reach more people. One with simple explanations and another one going into a lot more detail about the science behind the project.
- Explaining often misunderstood terms and research again through social media.
- Creating conferences where we talk about science with kids and adults not necessarily in the field.

These are just a few of the ideas we came up with. Taking this and making it better by adding a theme, animations and design would make it more attractive for people.

iGEM organizes global meet-ups with a lot of useful information. The two videos here explain really well how to present a project and how to communicate with the public:

1. [Communicating science to the public.](#)
2. [Present your project in such a way as to catch the attention of storytelling.](#)

4.4 Events and science communication

Like we said in the "Popularising science" section, creating events seemed almost impossible this year. Nevertheless, if you do manage to create a scientific event do not forget that there are rules that have to be respected. Keeping a safe distance between members and people participating, wearing a mask correctly and disinfecting hands is something that the team has to make sure is respected.

If you decide to create an online event here are a few platforms you can use depending on what your final goal is:
- Wooclap is an app that allows everyone to participate. There is a dynamic interaction between the scientists and the audience. It requests preparation in advance but it is worth it because, in the end, the app gives you exploitable statistics which can allow the team to adapt their presentation and explanations for next time.
- Zoom is an app that we are pretty sure everyone is familiar with now. Nonetheless, it has the potential that most people do not take advantage of. You can invite scientists that explain their work to the public, there is a huge participant's capacity.
- Discord is another application for communication. You can create servers, games and join big communities.
- Kahoot! is an app on which you can create questions, and people who have the code can answer the questions. This could be used to make a survey or even a game and you are the one that can choose the rules.

The poster is a part of the competition that does not change. Do you want to learn how to create an interactive poster? This video is a [poster walkthrough](#) created by iGEM.

5. Funding and entrepreneurship

Fundraising and entrepreneurship are very essential for the realization of the project. But like all other parts of the project, it was challenged by the health situation.

All grant application commissions were done by videoconference. Based on our experience, we can advise you to anticipate problems with internet connections. Always make sure you have several people available to present the project in front of the audience. After responding to public tenders, it is interesting to target private firms to raise funds. It is even better if you target companies interested or concerned about your project.

In our case, we have made a list of companies to contact. We scanned the websites to find the right approach and customize our emails. As an attachment, we always send an attractive flyer about our project and our team. In some circumstances, especially if the company is closely or remotely related to your project, it is more appropriate to contact them first for information. After that, it's much easier to obtain financial support!

In addition, in some countries such as France, companies that finance non-profit organizations or this type of project are compensated by a tax reduction. This can be a good argument to put forward (with moderation). Nevertheless, the lockdown has restricted the possible financing of companies.

Fortunately, there are other alternatives such as crowdfunding. It's a good solution that respects sanitary barriers! But this does not mean that you should forget about communication and rapprochement with your potential donors. To make the public want to participate financially in your project, you must explain to them how much money is needed for each purchase. In this way, they will have confidence in your project. To boost the donations, you can define levels with surprises for each. It is very motivating to know that his name will appear on the team's wiki or that the donor will receive a tote bag.

You can go through several sites to set up crowdfunding. You should favor websites that don't take a percentage of your profits. There are also mobile apps for making donations. See which audience you're targeting. Mobile applications would be more interesting for a young population. It depends on your goals. Define your aims before setting up crowdfunding.

In conclusion, the distance between members does not in itself prevent the obtention of financing. Because of the sanitary and economic crisis, a lot of companies are a lot more hesitant about giving some kind of financial aid. But lockdown has also taught us that the image reflected by our team on social networks is very important.

Here you can learn more about entrepreneurship: Essential Entrepreneurship

6.   Conclusion

We hope that this handbook will help you to make iGEM a success and to overcome difficulties more easily. This handbook will be developed and updated each year by the iGEM Nantes team. Our handbook is a complement to two previous handbooks produced by iGEM teams in 2008 and 2014 :

http://2014.igem.org/wiki/images/c/c7/Virtus_Parva_Manual_TeamManual.pdf

http://2008.igem.org/wiki/images/3/3b/Running_a_successful_iGEM_Team_Final.pdf

Annex 1.

4 students from last year's team responded. But this survey will be proposed each year to the teams in Nantes to improve their organization.

Survey for the 2019 iGEM Team :

1. **When you started iGEM, what was your level of study and your field of study?**
2. **At the end of iGEM, what studies did you start?**
3. **Did the iGEM experience have an impact on your choice of career orientation? If so, how?**
4. **How did your team members share tasks? (Extremely well / Very well / Relatively well / Not very well / Poorly)**
5. **Were responsibilities shared equally among team members (Extremely fair / Very fair / Fairly fair / Not very fair / Not at all fair)**
6. **How often were team meetings held?**
7. **Were team meetings conducted efficiently (extremely efficient / very efficient / relatively efficient / not very efficient / not at all efficient)?**
8. **What would you change about your team meetings? (time / content / frequency etc)**
9. **How did your team members communicate with each other? (Extremely well / Very well / Relatively well / Not very well / Poorly)**
10. **Were you more effective at working alone than with your team? If so, why?**
11. **Do you have any advice on how to communicate better in an iGEM team?**
12. **How many members did you have on your team? (members + advisors)**
13. **Was your team the right size? (much too big / too big / the right size / too small / much too small)**
14. **If you had to do the iGEM competition with a new team, what would be the first thing you would change?**
15. **Afterwards, do you think your team was well organized?**
16. **Would you have organized the team differently? If so, how?**