IGEM FOR DUMMIES

A collaboration between the spanish igem teams

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01

BASICS OF IGEM

Welcome to *iGEM for Dummies*. This short guide outlines the base knowledge your team will need to participate in the biggest synthetic biology competition worldwide: iGEM. If you are the type of person who likes science, lab experiments and tinkering with all kinds of biological entities this guidebook is ideal for you.

- ***What is iGEM?***

iGEM acronym means International Genetically Engineered Machine. Now it`s the world biggest synthetic biology competition, but in the beginning, only a few people participated. The competition takes places in the MIT (Massachusetts Institute of Technology) in Boston, USA. In the MIT, along with each course, there are traditions like Tim the Beaver, the mascot of MIT or the gold ring "Brass rat"; and student activities like Steer Roast, Bad Ideas Festival or Independent Activities Period. It was in 2003 during the Independent Activities Period when iGEM began. Each year there are multitudes of student-make activities that enrich the culture of the MIT. In one of them, the student´s design cell biological systems to make the cells blink. Next year (2004), the activity was repeated and 5 teams compete with new projects again. The contest was a success and little by little became internationally known. The participants increased year after year through the different continents.
iGEM has grown exponentially to 310 teams in 2017. The projects of the iGEM are very diverse and varied since synthetic biology is the central axis, the way of using the base allows to execute very different and original ideas. I strongly recommend you to be part of this competition if you have an idea that wants to put into practice. Science and innovation are going to be critical to our future and good ideas and projects are going to be the basis for progress.

- ***Who can participate in the competition?***

Anyone can participate but all teams must register into one of the following categories (each one with different requirements):

- Collegiate.
- High school.
- Community labs.

and depending on your teammate's age, your team will compete in a certain section:

- Undergraduate: if you are under 23 years old.
- Overgraduate: if you are over 23 years old.
- High School: if you are a high school student.

If you have a few members over 23, you can register them as instructors or advisors, so don`t worry.

- ***What is the goal of iGEM?***

The main idea of the iGEM competition is to give the resources to students that have good ideas and projects, to develop them.
One important thing that anyone that wants to participate in iGEM has to know is that what iGEM seeks is a proof of concept.To explain it simply, you have to develop a prototype of your idea, not having it finished in the MIT presentation. The main goal is to know if your idea would be possible with more resources and if you are successful, a lot of companies are going to be in the audience and some of them might fund your project.However, If you are assuming that iGEM is only about building a good project, you are not entirely correct. Even if iGEM is a synthetic biology competition, ethics and values are very taken into account.
Intercontinental ties, cooperation between participants, respect and good sportsmanship, caution and safety when working and effort are also essentials parts of this.

- ***Support from your university and all you can get.***

One of the most important things you must do is inform your university correctly about iGEM and get an active group of supporters. Talk with your faculty decan and with all of the teachers and researchers as possible.
Don´t be shy and take the initiative, because you are going to be helped only if you ask for it.In addition to trying to get the help of the university, try to expand the set of people who could help you. You are going to do a project in a specific area, so search on the internet the researchers that are working in that field and send them e-mails. Most of the emails are not going to have an answer, but do not despair because that's normal.
For making easier for yourself, make an email model in which you only have to change the person, the date and a little more. This will make it easier for you to send emails to more people without taking much time.
Don´t forget to include at the end of the email a message of this kind: *"This email contains confidential and privileged legal information If you are not the recipient to whom you wish to send this message, you will be forbidden to make it known to anyone, as well as to reproduce or copy it. notify the sender immediately and discard it from your system. "*

- ***Organization within iGEM***

In iGEM, there are a lot of people implicated in the championship:

iGEM Board Members: 5 Board Directors rule the iGEM Foundation.

Headquarters: the iGEM Headquarters are the most important group of people who organize and administrate all the events that are going to be part of each iGEM. 10 people are part of the headquarters. You can take a look at all of them in the Staff section: http://igem.org/Staff. You can always contact them by e-mail o even call headquarters.

Ambassadors: the ambassadors are people who participated in previous iGEM competitions and after iGEM, they wanted to help other teams providing them with advice and information. Each part of the planet have some ambassadors assigned, so depending on where the country is your team in, you are going to have one specific for your region, so if you have any doubts about the competition, schedules or everything related to the iGEM, just ask them.

There are a lot of teams who don`t ask the ambassadors because they think their questions are absurd, but they are there to help you, so don´t be shy about questioning.
You can check the ambassadors and their contact in case you need something here:
https://after.igem.org/page/ambassador-program.

Also, before asking any person of the Headquarters or your iGEM ambassador, check the FAQ answers in the iGEM website, as it may be useful.

- ***Organization within a team***

After learning a bit about the organization of the iGEM, it is reasonable to talk about the organization of your team. The team´s members roles are:

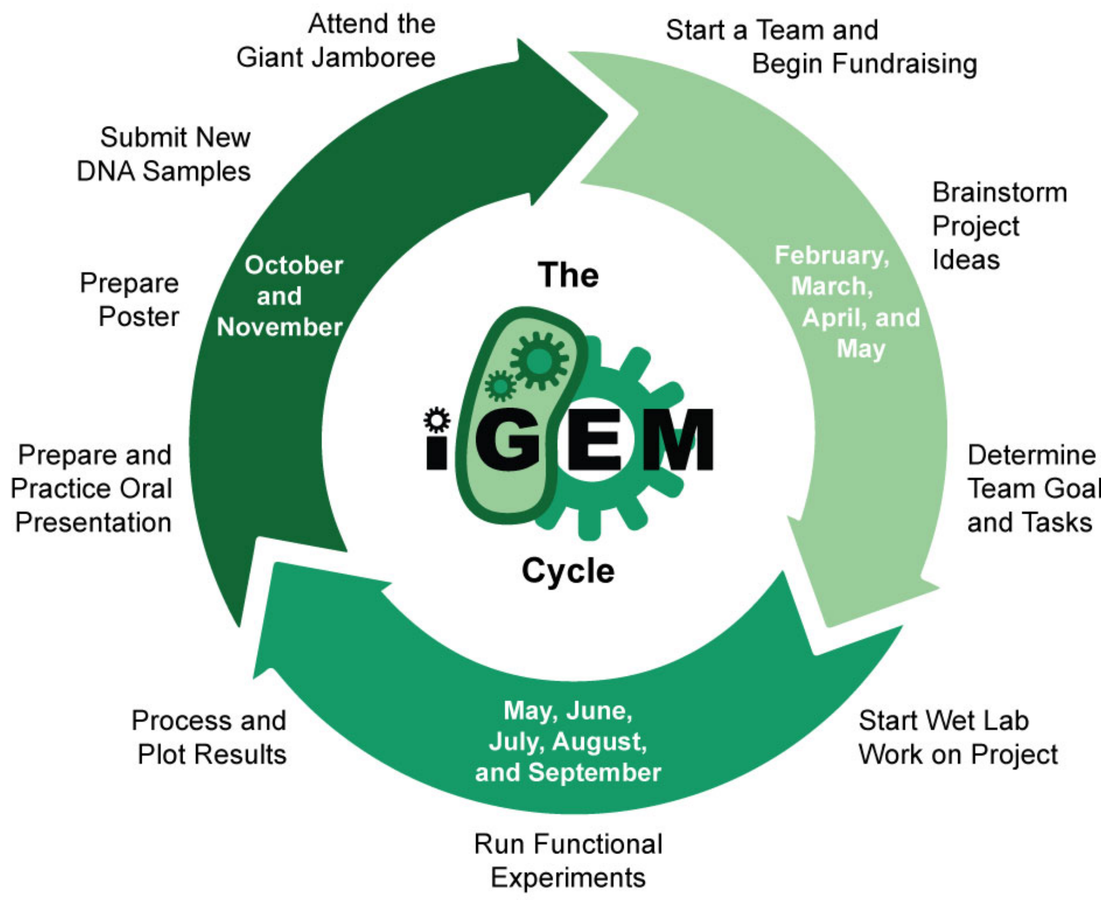
1. **The principal investigator (PI):** this is the teacher that is going to help you when you have some doubts about laboratory experiments, safety, paperwork, etc. It is important to have a PI that is going to have free time to help you frequently. Also, if the team have a big problem the PI is going to be the main person to go, so choose wisely. Also, it has to be someone that is an expert in the fieldin which your project is going to be developed. You need to remember that depending on your team category, the requirements for your PI would change.
2. **Secondary investigator:** with the secondary PI is the same as with the PI.
3. **Instructors:** these usually are more experienced people like a postdoc or a PhD and can guide you in certain aspects of the protocols and experiments. It is good to have some of them in case you need something or you don't know how to use a machine in the laboratory, because they usually are more available than the PI. The instructors should help you in the practical things, especially around the lab.
4. **Advisors:** these are the team members that can help you in designing the protocols, experiments, crowdfunding, presentations,... They are usually postdocs, researcher or other teachers from your university.
5. **Student leader:** coordinate a team is pretty complicated when you are not used to it. For this reason, the student leader must be an organized person with good leadership. The student leader is the glue of the team, he has to know what is happening in each part of the project.
6. **Team members:** there are the rest of the students and, with the student leader, the key to the success of the project. They have to be people committed with the project and wanting to work on it.

- ***Schedules***

The iGEM organization foresees that the laboratory experiments should begin in May and last throughout the summer, after which the students will collect and analyze the data and immediately after preparing the exhibition of their project to be presented at the end of October at the "Giant Jamboree", held in Boston.There are a lot of essential dates throughout the iGEM calendar. You have to be aware of all of them because if you are not and you left some requirements or documents that are mandatory, your team could be disqualified from the competition. You should check regularly the iGEM calendar if you want to avoid “small heart attacks”. You can do it through three methods:

1. You can follow the Headquarters twitter, where they put all the important events weekly and daily. You are most probably going to create a twitter team account, so this is a good option to be informed.
2. Another option is going to the calendar or the iGEM, which is organized by months (http://2018.igem.org/Calendar) and check it frequently.
3. Linked to the previous point, you also can create your team calendar using Trello, Slack or Google Calendar, tools that are pretty useful for not forgetting any critical events.

It is imperative to prevent each of the setbacks that may arise before the time runs out. That is why it is recommended to start preparing the project two or three months before the iGEM registration opens (we will explain the dates later). From our own experience, we know that contacting people in the university, in institutions or companies and seeking funding takes time. Besides, specifying and concreting an idea also requires many hours of thinking. Therefore it is suggested that you start preparing things around November, to make the registration in February or March.



- ***How do I get money? Funding***

Getting the money is one of the key things in iGEM. Assume that you will have to spend many hours on the computer sending emails and making many phone calls, but at the end you are going to receive the money. It is endorsed to make a document describing why you need the money and what are you going to do with them and offer to become a sponsor of your team.
There are a lot of ways of getting money, but the ones that had worked are the following:

1. **University:** the first option you have to try is your high school or university. Universities have an annual budget that they have to spend in a lot of things: events, machinery, scholarships, etc. You have to know if there is a specific department or section in your university responsible for managing the money. You must contact the people in charge, either in your faculty, the university, or both.
2. **Companies:** the first thing you have to do is investigate private companies that are working in your area. In business, the main problem nowadays is not the money, but innovative ideas. That is the reason you are going to be able to get the resources you demand. Also, do not just look for companies in your country, seek some that work within your sector and believe that they may be interested in investing in your project. Added to all the above, look outside the R & D or biotechnology companies. Usually, banks have an annual budget for projects. Search the social branch of many companies, as they have an annual budget for all types of projects. In addition, there are all kinds of non-profit societies that could finance your idea in the iGEM.
1. **State aid:** the government of your city and the State of your country invests money every year in a great variety of projects. Get on the ministry website and research if there are scholarships for projects, money for R & D and all kinds of help you can choose. If you doubt that something can be given to your project always send an email and do not stay with the doubt.
2. **Crowdfunding:** one of the best ways to make your project known is to perform a crowdfunding. If you do not know, crowdfunding or crowdfunding is a collaborative mechanism for project financing. There are many websites like Kickstarter, Indiegogo or Goteo that are designed to help a project. So it might be a good option for expanding your funding possibilities.
3. **Newspapers, lectures, social media:** it is important to make noise. If you have any friend who works in a newspaper, another that has an association or your university has a lecture room, communicate as much as possible. Do presentations, lectures, talk with a journalist, with a scientific popularizer, with a friend in social networks who can share the project, anything you can think of to increase the dissemination of your project.

02

COMPETITION

Now that we have made an introduction about iGEM, we are going to focus on the different sections of the competition. You will have to follow a series of steps to complete as you carry out the project. It should be emphasized that these steps are mostly mandatory, so remember to check the calendar periodically.

- ***Registration***

Registration is the first step of the iGEM process. After choosing the category of team (collegiate, high school or community lab) you will have to do the registration. All the details are here:
http://2018.igem.org/Competition/Registration#CLReg

Take a look because if you are going to register a high school team and you are under 18, you will have to fill some legal documents. There are three periods of registration:

1. **Early registration:** usually starts in the middle of February, but may vary a bit from one year to the next one. The best option is to do this first one. The reason is the next register fees increase their price. Of course, to do it, you need to have already had the money. For this reason, it is recommended to begin with the project two or three months before the date the early registration date ends, as previously mentioned.
2. **Regular registration:** this second registration date ends typically at the end of March. It is more expensive than the previous one.
3. **Late registration:** the final registration and the most expensive of all 3, around 1000$ more expensive than the early registration.

Each member of the team is going to have an account to log in. The PI is the person that has the code to add new members to the team.This registration of the team gives you:
1-access to log in in the igem website.
2-the distribution kit, which includes the biobricks that you are going to use for your project.
3- the access to the event in the MIT called the Giant Jamboree.
4-3000$ in IDT. IDT is one of the main sponsors of the iGEM. Because of your participation, you have that amount of money to order anything you need.

The registration gives your team access to the Giant Jamboree. However, for each team member that is going to go to the competition you will have to pay 695$ extra, so be careful about the amount the money you have and how many funding you need to put together. For a 10 member team, if all of you want to go to the Giant Jamboree, you will have to pay 6950$, plus the 4500$ of the early registration. This is why it is recommended to start looking for fundings two or three months before the registration.

- ***Medals:***

The medals are the most important judging form in iGEM for evaluating a project.
The medals are win by completing a list of steps that are published in the iGEM website. Each team can win one medal. This is going to depend on the number of things that a team has completed at the end of the competition. There are three medals: bronze, silver, and gold (http://2018.igem.org/Judging/Medals).

Of course, the goal is always to win the gold medal, but it's also the most complicated of the three. The works that must be completed to win the medals are collected on this page.

Bronze: this medal is the easiest to gain.
The things that you usually have to complete are:
-registration: already done.

-wiki: the wiki is the website when is going to be all the information about your project. It will be explained later.

-poster and presentation: that are going to be the two things to present in the MIT in the Giant Jamboree.

-judging form: 150-word document that you have to fill around 3 weeks before the Giant Jamboree.

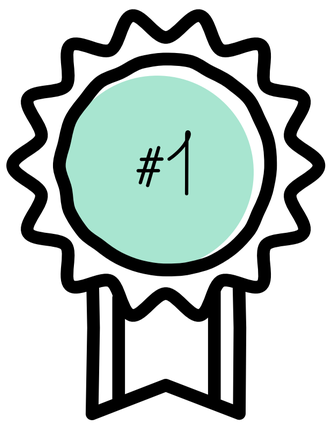
-Interlab experiment or adding a new BioBrick experimental data: since 2014, teams worldwide have contributed making a baseline protocol for synthetic biology fluorescence measurements. Interlab is an experiment that a lot of teams do. Consist of following a protocol that is given by iGEM. It is a necessary step to win the bronze medal.

Silver: the Silver medal is a bit more complicated to obtain than the bronze medal, but it is possible. Added, to the previous aspects completed you will need:

-validated part of Biobrick: as in the bronze medal was explained, first, you have to design a BioBrick than theoretically will work. However, now you will need to advance another step and prove that your design works as expected.

-collaboration: in iGEM is pretty essential making contact and communicate with other teams. This is why any type of collaboration is needed for winning the silver medal. Check the list of the teams in the iGEM website and look for some team that is in your same track or doing a similar experiment. Contact them and try to do complemented experiments.
Another way to complete the collaboration part is hosting/going to a meet-up. The meetups are congresses that gather a lot of iGEM teams and ambassadors in one place. They are organized by one or two teams and is very essential to go to one or two. You can also organize a meet-up and contact with other teams. This will be explained later.

-human practices: the human practices is going to be explained later. But basically what you have to write is the impact that is going to have your project in society: the dissemination of your project to society and how people will benefit from it.



Gold: this is the most challenging medal to obtain, and not all the teams are able to get it. If you want to gain a gold medal, your team must work hard because the things you have to do are not easy. To get the gold medal it is imperative that you know that your team will have to properly complete two of the following four tasks:

-integrated human practices: this time your team will have to take the human practices to the next level. You will have to go to the street and use your project in practice. Depending on your type of project you will have to think about how to carry it out. The most important thing is that after you have developed the model it can be applied in an industry, as a diagnosis, measuring a particular molecule, etc. Innovation is critical in this step, so try to think how would you use your idea to help the society.

-improve the Biobrick: if previously in the bronze and silver medals we have developed, first new data to a Biobrick, and later prove that this part works, now we will require to experiment with your Biobrick. You will perform a demonstration that you Biobrick can be used in practice.

-modelling: the *in vitro* modelling has improved immensely in the last decade with the rise of bioinformatics. Nowadays it is essential in any project to have a proper modelling of what you are doing. Therefore, it is necessary to perform molecular, statistical and chemical simulation models.-prove that your project works: basically, test your system and prove that the results are good.

- **Track selection.**

The Track selection is a significant part of the iGEM. Because each track has their prizes. The two main tracks sections are standard and special tracks.
There are different subsections of tracks in each of the main sections. Before the end of August, you have to fill in your team iGEM website what are your tracks. You can choose 3 different tracks (maximum) that will frame your project in a certain field. This track/s must be definitive by the end of August. This is because the schedule on the Giant Jamboree is going to depend on the track your team select. The presentations are going to be scheduled depending on the track. The first question your team has to know to was a section of the two to choose is if you are going to use DNA parts. If the answer is yes you team belong to the standard tracks. If the answer is no, you have to answer another question. This question is if you are going to focus only on a project based on simulating and software design. Whether the answer is yes you have to choose the software track. But if the answer is no your team will choose the Open track. After choosing the section tracks, you will need to adjust your project to a subsection one.
The standard tacks are:

Diagnostics: this track is highly related to the therapeutics track. That is why usually the teams that select this track also select the therapeutics at the same time. This is going to fit well in your team if your project is inside the health field. The most common projects are applied biosensors to detect any kind of molecular related to a disease. Detection of hormones, biological proteins, the expression of individual genes related to illness and chronic diseases, etc.

Energy: the energy track also can be It has many points in common with the environment. Innovation in the energy field is a critical factor for humanity. Any new biological energy source or system that can be used may be what we will need in the future. That is why, if your team is developing anything related to improving energy resources, or investing in new ways of obtaining all kinds of energy with a biological scaffold this is your track.

Environment: the grey biotechnology is the one that research for improving the environment. Any project that wants to make a progress in this field by a new idea will need to select this track. Getting rid of the plastics, diminish the pollutants in the air, reduce any kind of contamination, etc. These are basic examples of why to choose the Environmental track.

Food and nutrition: in 2050, we are going to need 70% more food according to estimations of ONU. New prebiotics, probiotics, cellular agriculture, optimizing the productions of food by bacteria, etc. If your project is related to anything that can improve the food industry, this is your track.

Foundational advance: this is a very specific track. The other ones are easier to understand, but this one is a bit more complex. The foundational track is focused on optimizing a technique of process than implies usage of synthetic biology. This track is very related to bioinformatics and the informational processing. Arduino is also often used in combination with synthetic biology in this kind of projects. The primary goal of the track is to advance in the synthetic biology field, either by improving biobricks, either by optimizing a biological process or by simulation.

High School: this is you track if you do the registration of your team in the High School register.

Information processing: this is a very different track. The information processing track could be a frame in the basic science field. The project that fits this track is one that doesn't have at first sight-a practical application.
This track is deeply related to bioinformatics and big data processing. The biological microorganisms can also be used for improving the process of information, that is why the synthetic biology applied to this field has been increased in the latest years.

Manufacturing: this is the purest biotechnology track. If you are thinking of redesigning of the metabolism of a microorganism, genetic engineering, protein production, enzyme modification, etc combine with synthetic biology, this is your track.

New application: this is the most innovative track. If you have a crazy idea and you want to make that idea practical you would like the new application track. There are a lot of application ideas that can change science and the way we live. Recent examples of these are the PCR or CRISPR/Cas9.

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Therapeutics: this track is highly related to the diagnostics track. The therapeutics track is more focus in the treatment of a disease, that is the main difference with the diagnostics track. For example, if there is already a method of detecting a disease but not a treatment, that could fit in the therapeutics track.

If there are doubts about whether your project should be in one of the previous sections, it is recommended to look in the list of teams from previous years to see what types of projects were carried out in each track. This is going to help your team from selecting a track. Don´t worry if you don't know where to place your team, because you can change as many times as needed the tracks until the end of August.

The other section is the Special Track. The only thing you must know is that the Special track teams cannot compete to win the Grand Prize of the iGEM. Apart from that, they can go for any of the other prizes and also the three medals.They are:

Software: this is a very specific track. Includes a team that knows a lot about software, bioinformatics, simulation of bioprocess and in general computer science. Big data and bioinformatics have become indispensable for any kind of research.

Open: this track is for teams that have their focus on other fields apart from DNA parts and laboratory. If you are going to do something that implies a lot of hardware, painting, fashion, art or education this is your track. You also can use the laboratory work as something secondary or complementary to your project.

- ***Awards***

iGEM has an award for each of the categories. The most important is the Grand Prize Undergraduate, that is given to the best undergraduate project. There is also a second and third award for the other two best projects.
In the over graduate section, there are two awards and in the High School, there is one award.
Every track has an award for the best project, so there are 11 more awards apart from the generals. Apart from these, there are another 15 awards that are known as special prizes. There are evaluated a lot of things like the wiki, the Biobricks, etc. If you want to know specific things about each of the awards please check this website: http://2018.igem.org/Judging/Awards

- **Biobricks**

A biobrick is a DNA sequence that makes a building block, used to assemble synthetic biology constructs.
The first time a standard biological part appeared in a publication was in 1996. Three years later an overview from Arkin and Endy saw the potential of developing standard DNA parts and the idea to form a catalogue The combination of different biobricks is one of the main goals in iGEM. This is crucial because you can design what you want to build depending on your project and choose between an extensive catalogue of BioBricks.
There are around 20000 biobricks in the iGEM catalogue. So if you don´t know how to use the website looking for something you need sometimes is a bit complicated.
After going through the catalogue (http://parts.igem.org/Catalog), you can see that there is a lot of categories for the biobricks. They are classified by type of DNA sequence. It is recommended to explore the catalogue and try to understand how the website is made. Each of the biobrick has a unique number that starts with BBa_. This is useful because, after finding a biobrick that you like, you should write in an excel sheet the biobrick and do a list with all the ones that you are going to use. When you want to review the characteristics of the biobrick you only have to write the specific biobrick number and don´t waste any time in looking for it.

Instead of looking at specific biobricks, that is going to take you more time, you should check first the well documented and frequently used parts. This is a list with the most used biobricks in iGEM history.
The times a biobrick is use demonstrates that the biobrick is more reliable and have less error when using it. Some biobricks that are used once or twice, may not be as good as others that are used more often. So, if you can use a biobrick that has been used more times, choose that before another one less used. Apart from the information of usage, each biobrick can be available or out of stock. So take a look at this, because you may have to try another one if that specific is not in stock. If your team has read all the most common biobricks and none is useful or wants a specific one don´t worry.

First, go again to the catalogue and click in the browse part you want (promoter, RBS, terminator, DNA,...). After, there will be a subsection inside each one, choose the specific type and click again. Keep doing this until accessing to the specific catalogue of each one. You can now read the whole list of biobricks available and a specific description of each one of them.
For example, if we click on terminators and after in catalogue, we are going to have all the terminators by number, a description of each one, the direction, the efficiency, the chassis, and the length. If you click on the BBa name it is going to say the number of uses of the biobrick and the availability to order it. Most of the biobricks have been developed or modified by other iGEM teams, so you can also contribute adding more biobricks to the catalogue. This is also one of the objectives of iGEM for improving the knowledge of the synthetic biology community. If you want to know how to add a part to the registry follow this URL: http://parts.igem.org/Add_a_Part_to_the_Registry

- **Dissemination of the project.**

One of the crucial parts of the iGEM to be known and communicate with everyone. If the people know what you are doing in the project, they are going to share it with more people. Also, if more people know about the project, more people will be able to finance it. It is indispensable to tell the project to as many people as possible. There are a lot of ways to do it, but here we will highlight some.
Talk to your teachers and try to do a seminar to them. They might have contacts that would be interested in the project. Also, try to reach the companies that are associated with your university that are in the field of your project.

1. **Social media:** it could be handy to contact people that may help you because they work in your project field. Besides, many companies have social media accounts. If you think about getting support for a startup, this is a great option. The most recommended social media are LinkedIn, ResearchGate, Gust, Quibb, Angelist, Gadball, and StartupNation. There might be also a lot of blogs and exciting websites, so take google and try to find the best for your project. Apart from the "professional" social media, you may also use Twitter of Facebook. Create a Facebook and Twitter team account and try to keep it as much updated as possible. You should follow other iGEM teams, companies and people who might be excited by your ideas.
2. **Lectures and seminars:** the physical presence in the research community is indispensable if you want to disseminate your project as widely as possible. An easy way to accomplish this task is by doing workshops.
3. **Local newspapers, university website:** there is usually a science of innovation section in each newspaper, so it is an excellent idea to contact someone inside the news world. Moreover, try to be part of the news in your university, talk with the people that rule the news and tell them what is your team doing. Try anything that you think might get you more diffusion, because it will help the team.

03

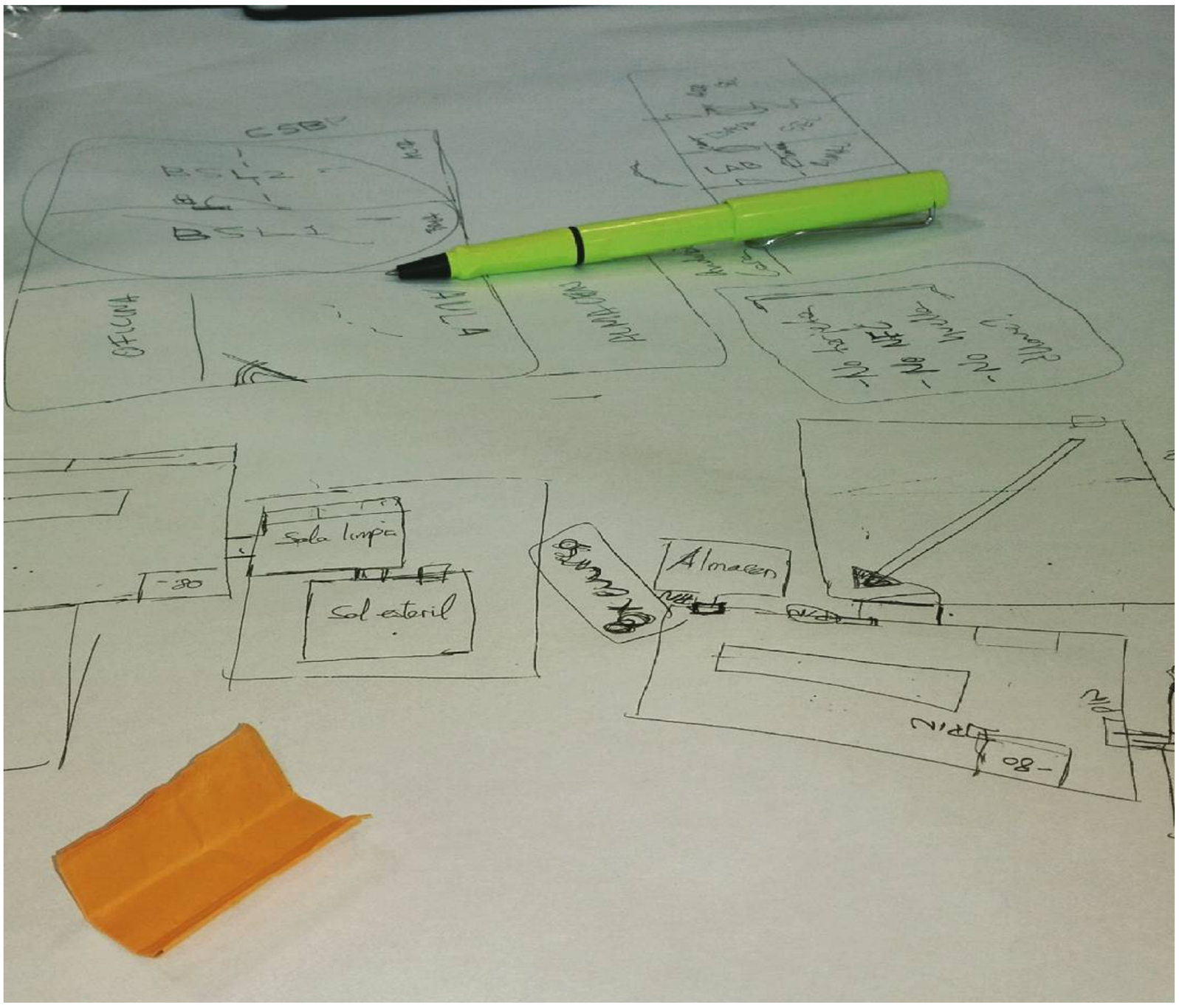
HOW TO FORM A TEAM

- **A multidisciplinary team**

This is going to be the most important things you have to do the previous months of the registration. It is recommended to start forming the team at the beginning of September. This is because it is not easy to find people committed to work for so long in a project of this magnitude; Also, most of the work will be carried out in summer and giving up practically all summer is not something that everyone is willing to do. For this reason, every person that wants to be part of your iGEM team must know exactly what this means. If you are studying in a big university with a lot of different areas of research is going to be easier to gather a multidisciplinary team. Independently of the project you are going to do, removing a few exceptions, you will need a multidisciplinary team.
Keep in mind that you are going to need knowledge about biology, biochemistry, chemistry, physics, biotechnology, web design, bioinformatics, maybe electronics or hardware and marketing. This is why gathering a very diverse team with a bit insight in a lot of aspects are going to give your team more flexibility when working. The main reason is that your team is not only going to have to do a research project but also design the wiki, get fundings, model your project..etc.

Additionally, the suggested number of people for a team is between 10 and 12 students. From previous team experiences, more than 15 people it is a bit complicated to coordinate. Likewise, the tendency is that some people work more than others and that is not the way to manage the project. And less than 8 might not be enough with the time you are given.

Holidays footnote: A good idea that some of the past iGEM teams have done is leave a week or two of summer vacation. This is merely a proposal, but each person resting one or two weeks during the summer is recommended. What can be done is to plan when each person is going to go so that the project does not stop on any summer day. This way, each person on the team can rest for one or two weeks, but the iGEM project will continue uninterrupted. You might need to agree in advance what is the best date for each member of the group and square them perfectly.



- **Forming the team**

Now that we know how many people have to be part of the group, let's go to the way of gathering it. There are a few ways that can be used to bring together team members. The best and most easy way is to look for them at your university. Build an attractive poster introducing the iGEM and that you are forming a team. Spread the cartels in each of the faculties where you want to obtain people to form the iGEM team. Let a contact in the cartel and wait some time, because you are going to receive a lot of student proposals.

Organize a reunion with all the people that are interested in the iGEM and explain them all. It is important to be very clear, say that this is going to be a big project, that is not going to be easy because the team is the one that will build practically all. Repeat a lot that iGEM implies also the whole summer working in the project. It is important to be concise to select the people who are genuinely interested in the project. Most of the people are going to be there only for listening or to inform themselves about what is the idea of iGEM, but only a few are going to be excited to do it. If you Whether you have a lot of proposals, don´t reject some, organize individual or faculty reunions instead of doing only one with all the participants. After doing the selection, organize another reunion to explain more deeply to your new team the things you are going to start doing.

- **The action begins**

When your team is already ready, make a to-do list and distribute the tasks among all. For example, you can use Trello, Slack or Google Keep to not forget anything. The first things you are going to need is:

1. **Design the project:** it is essential to have an idea that is accepted by the entire team. The advisable thing is that, after your first meeting, you stay within two or three days and make a brainstorming. During those days think about projects that you see adequate and that you would like to realize.Do a debate altogether and come up with one or two possible projects.
2. **Find a good PI:** it is extremely important to contact with a teacher or researcher implicated in the project. It could be someone you already know or not. It must be someone related to the field of your idea, because, along with the secondary PI they are going to help you plan the project. Be extremely clear about how iGEM works and that the team must have good coordination. Tell the PI that they must be available if needed weekly. Also, it is suggested to do a weekly reunion all the team together, this implies the students and the PIs. It is very important that all the team members are all in the weekly meetings and that you do one a week at least.
3. **Contact with the rector of your faculty and the deans of the different faculties:** in this area ask the PIs, because they have more experience and the maybe know much better than you the deans of the rector of the university. Set a meeting and explain the what you are going to do. Be persuasive and confident, iGEM is a very prestigious championship and it is going to improve the image of the university. The first thing your team needs is a workplace, so prompt the deans and the PIs about some laboratories in the university. If it is possible to use an empty of a laboratory that is not used. Also, assure them to give you a pc room to work because it comes in handy. Generally, the faculties are full of space and some of that is not often used, so try to get all you can. If the unexpected happens and they do not give, do not be alarmed, there are many professors in each faculty of the university, contact those you think can help you.

Having formed the team don´t mean that the teamwork is going to work correctly. In the workplace is essential to be productive and don´t waste time. Also, it is indispensable to have a lab notebook. If you are going to be doing three parts of the project have one lab notebook for each part. Write everything you do in detail, because when an experiment goes wrong, or you have doubts about what you did you will check the lab notebook. Good aspects to have in mind to work well as a team are:

- **Crucial things to have success as a team**

1. **Coordination:** you need to know what are you going to do every week. Don´t be two or three people watching what does one person, unless it is a two or three person task. In the same team or laboratory groups, you have to be like one person, you need synergy at work because you will optimize time much more.
2. **Order and cleaning:** add to the coordination is essential to be neat and clean.
1. **Communication**: following the previous points, you also have to communicate with your other teammates. Communication in the team is essential. Do it formally and professionally, talking and using the work networks like Trello or Slack. Also, it is important to do a weekly reunion with all the people including PIs, students, instructors, and advisors. Talk about your progress during the week, the results and the future objectives from the next weeks. Remember always that “alone we are strong, together we are invincible”.
2. **Critical thinking:** think before you start in the lab, perfect the protocols, have everything clear before moving on to practice. After doing the experiments, analyze the results. Think about why the experiment has not come out and what may be wrong or poorly thought about in the protocol. Address any questions with the rest of the team and try to think of reasonable and reasoned solutions.
3. **Optimism:** do not despair, be positive, things do not come to you the first time. Also, rest, do not work too much and also try to enjoy what you are doing with your teammates. Remember: “When I was a young man I observed that nine out of ten things I did were failures. I didn't want to be a failure, so I did ten times more work”.
4. **Planification:** as a team, you have to be aware of all on the to-do list. Plan the objectives of the team in a long-term. Print the medals tasks, plan how you are going to carry them out and who is going to take care of each task.

04

WIKI

Now that we have made an introduction about iGEM, we are going to focus on the different sections of the competition. You will have to follow a series of steps to complete as you carry out the project. It should be emphasized that these steps are mostly mandatory, so remember to check the calendar periodically.

- **How wikis work in iGEM**

First of all the wiki of each team will be hosted within the server of iGEM, being wholly forbidden to use any element that is not uploaded to the server files (be it scripts, images, videos, fonts or templates). This is due to a straightforward reason, the organizers of iGEM want that all the material generated within the contest does not depend on external variables and that if by chance an external server goes down, some content can no longer be seen.
If everything is uploaded to the server itself, everything will always be there (or nothing if everything is dropped).

Because of this, all the content will have to be encoded from 0, so it is recommended that the person or persons who will work on the wiki know HTML, CSS, and Jquery. Or that at least they know how to defend themselves with programming languages and they do not have a hard time dealing with code. The HTML language is the skeleton of the web page, where the different divisions, the images, the links will be described. The CSS language is the language of the style, it is the one that will define dimensions, sizes, colours of all the elements of the web page.
The Jquery language is the function scripts, they are the ones that will allow performing more complex actions within the web page. The own iGem proposes to use some own CSS files, so it would not be so necessary to know this language. However, they are dull styles and the teams usually incorporate their own, and make style modifications to taste. Therefore the only most important requirement is to know how to work with HTML. Another relevant section is everything related to images, in HTML code, the images are incorporated through a link that leads to a set where that image is hosted, they are not inside the file as we can find it in a word. So these images will have to be uploaded to the server.

To understand this we will explain how information is uploaded to iGEM. The server allows uploading files in 2 ways:

1. Plain text, but in HTML format, where we will introduce the code of each of the pages of our wiki. Each team has a "home" address where the code of the main page of the wiki will be introduced (this home has a common address with all the teams and then the name of each team) and from here you can create a new page addresses always and when the following format is maintained (so that they are stored inside the server):
http: // year_of_the_contest.igem.org/Team: name_of_the_computer / the_proposed_page
You should also upload the CSS and JQuery files in this way (as plain text, but keeping your language), however, the address will be a little different, since in it the word Team is changed by Template:
http: // year_of_contest.igem.org/Template: team_name / proposed_page

2. Any other file within its format. There is a tool to upload files within the iGEM (in the top menu within wiki tools) that allows a diverse series of formats, both multimedia, and office or sources. Here we will put whatever we want to include in the wiki and the resulting address (ie where our file is hosted) is what will be linked in the code of the page.

When building the page in HTML format you have to take into account a series of tips:
• CSS files cannot be entered as in conventional HTML. The iGEM server has its rules and for these files, you have to put them before the <html> tag (or after closing it for the footer) in the following way (or as you see in the picture our example): {{team_name / proposed_page}}

```
1   {{Madrid-OLM/1}}
2 ▼ <html lang="en">
3 ▸       <style> ••• </style>
16 ▸      <head> ••• </head>
22
23 ▸      <body class=" "> ••• </body>
195
196   </html>
197   {{Madrid-OLM/footer}}
198
```

• The JQuerys should always be called at the end of everything that is loaded (since it is JAVA structure), so we recommend putting them at the end of each page or in the footer (as it is our case since it always goes to the end of all the pages). And they are called by the following HTML command:

<script type = "text / javascript" src = "http://2018.igem.org/Template:Madrid-OLM/jquery?action=raw&ctype=text/javascript"> </ script>It is important to see that where the address where the query is placed is to be added "? Action = raw & type = text / javascript" to interpret it well.

-Pieces of Advice for the wiki elaboration

1. Whoever is in charge has to have programming knowledge and know how to handle code.

2. Watch the tutorials and become familiar with the functioning of the server and the languages as soon as possible.

3. Observe how the teams of other years have been organizing their wikis to have ideas.

4. Start to organize the wiki even if you do not have results. See if they serve the original templates or if the team prefers to have others (in our case we decided to buy some professional templates that we incorporate as we have explained).

5. Although the final structure of the wiki is not known, as long as a result is finished, write it and give it a uniform format intending to saving time in the end.6. Consult teams that are known to have support from participants of previous years to answer questions about any problem that appears.

- **Interesting links with tutorials**

First video of a series of 5 where they explain how wikis are built in iGEM (explain the languages and how to use them)
https://www.youtube.com/watch?v=Yrwcet6VN1Y&t=5s

PDFs of the University of Murcia of initiation to understand the HTML and CSS languages:or https://www.um.es/docencia/barzana/DAWEB/Lenguaje-de-programacion-HTML-1.pdfor
https://www.um.es/docencia/barzana/DAWEB/Lenguaje-de-programacion-HTML-2.pd

05

COLLABORATIONS

As previously pointed out in the medal section, it is a very important feature of iGEM to collaborate with other teams. It can be a project collaboration, a human practice collaboration, doing an information about something specific in collaboration and many other things.

The values of the iGEM imply a capacity of an interrelation between the competitors of the different teams. This is mainly because together we contribute much more to synthetic biology than separate. Therefore, this is much more taken into account that many teams think.

Meetups: Meetups are the best way to know what other teams are doing before the Giant Jamboree. These events are like iGEM congress but led by students.
One or two teams of a specific region are the organizers of the meet-up, and all the teams that want to go are welcome to the event.
We strongly encourage you to go to them for several reasons:

1. **First:** is going to be a very enriching experience, both personal, because you are going to do new friends, and intellectual, since you observe the diversity and variety of each project. The participants are going to be people of your same age. Usually, there is a wide variety of nationalities and that is splendid for your personal development. Don't be shy and try to talk to the different team members. For my own experience, the majority of teams are polite, charming and friendly people.
2. **Second**: is one of the requirements to win the silver medal. If you have the goal to win the silver or the gold medal, it is essential to do a collaboration and the best way to do it is with a Meetup.
3. **Third:** in the Meetups, there are not only members of different teams, but there are also judges and ambassadors. Therefore, it is a perfect opportunity to make contacts that will be very useful in the future.
4. **Fourth:** it is going to be very good oppotunity for you to practice. Your team will have to explain a poster and make a presentation to the different people of the meet-up. Try to do your best, but especially reflect after presenting what you can improve. The judges and the ambassadors will give you advice and constructive criticism about your project and how to approach it, so take the opportunity to ask any questions. Take the meet-up as a simulation of the Giant Jamboree.
5. **Fifth:** usually, the Meetups include lectures of relevant people in the field of the hosting team. These talks are pretty useful because you are going to learn a lot from experts.

Footnote: the information of the Meetups is usually in the following URL of the iGEM. They are ordered in the calendar, so check the ones that are closer to your region and try to go as many as possible:
http://2018.igem.org/Teams/Meetups

Or you can always host one!

06

HUMANS PRACTICE

These are only a few ideas of how you can focus your Human practices. But there are probably a lot more ways to do it. Because of this, it is advised to do a meeting, let the whole team talk and brainstorm on how to approach this topic.

Human practices is a significant section in the iGEM competition.
As previously it was said it is essential to complete the human practices for winning the silver and the gold medal. Human practices are the part of iGEM when you come out from your comfort zone and go to the outside world. You have to face the society and explain how your project is going to help it. The future of our societies is going to depend on science and technology.

For this reason, human practices are about scientific and technological dissemination of your project. As we explained in the medals section, there are two levels of human practices in iGEM.

Silver: the first is to document you project on a how is made and the issues that it is going to cover in the society.
This is a first step it is extremely recommended to do it, because, apart from checking another task of the silver medal, is going to help you understand what your team is doing to help the world. For this reason, your team's morale will increase and you will also be more proud to know how you are going to contribute to improving the world.T

Gold: the second step of the human practices is called integrated human practices. We can call the first step the more theoretical and bibliography one, and the second step of the human practices the more practical, the field work. In this section, you are going to demonstrate that you have validated your project with facts. These are going to be obtained due to the events you are going to organize.

There are plenty of events, lectures, symposia,... you can organize to validate the human practices… We only name a few, but innovative ideas could help to make even better this part:

1. **Professional lectures:** it is important to organize a simple seminar or a lecture. You have to establish a qualified mini congress. The better is to contact with experts in your project ´s field, explain to them what to do you and do a series of professional talks at the university. This is not going to be easy to organize, but announcing a scientific-technological congress with relevant speakers in the field will make your project look very qualified. You can hang posters and banners by the faculties and spreads the event through social networks. Another idea is to do for one side talks for specialized people and other talks for the general public, more informative and less technical.
2. **Workshops:** this is oriented for the society in general. You have to think about how to could teach your project to the public in a practical manner. Try to be as short as possible in your explanation, but very clear. How people learn best is through some simple experiment or something practical.
3. **Polls:** a good poll about what the people think about the project could be a reliable proof that your project idea is attractive. It is important to not only do a very skilful proof, but you also need to have a large number of people answering, not only a few. The best way is to spread the poll as much as possible. Try to do an online not too extensive one. Also, do simple questions and leave people with an option to respond in a limited way, with only two or three answers to each question. You will need to perform a good statistical analysis. This analysis is going to give you clues about the significance of your polls.
4. **Market analysis:** even if, at first, you don't seek anything that has to do with the entrepreneurship or the sale of a product, it is a point in favour to perform a market analysis. This is not for you, but for the companies or the people that may be interested in your project. Also, this gives your team an extra point, because usually is something that not many teams do.

07

GIANT JAMBOREE

The final has come. All the work you have been doing for a long time is going to be rewarded here. The Giant Jamboree is the culmination event when iGEM will finish. Usually, there are 4 days of presentations, posters, and events held in the MIT. The schedule of each day is put in the iGEM website (http://2018.igem.org/Giant_Jamboree). We are going to explain you the steps needed for going without worrying about other aspects apart from the project.

- **Registration:** your team doesn´t need to register anywhere for the Giant Jamboree. This is because you already did it if you don´t remember when you did the registration process to sign up for iGEM. But keep in mind your team is the only one that is registered, your team members don´t. This is why you have the website of the iGEM and do the registration long before going. For this, it is advised to organize the money well to know who is going (http://2018.igem.org/Giant_Jamboree/Register). The idea is that the whole team must go, but that is up to your personal circumstances in regards to the remaining money. Added to the previous things, it is best to do an early registration, because you are going to save money. So keep an eye on the website of the Giant Jamboree to know the exact dates when the registration closes.

- **Accommodation:** the Sheraton Boston Hotel is the official iGEM accommodation place. If you can go there because there is going to be a lot of teams from worldwide. If you prefer another place, just book something that fits your team wishes.

- **Flights:** you can save a lot of money if you buy the flights in summer. Especially if you are not from America because a flight to Boston from Europe can be really expensive. We did the reservation of airline tickets at the end of July and we paid 350€ each round trip to Boston from Madrid. A plane reservation can be very expensive if it is done a month or weeks before the Giant Jamboree. Fortunately, these are not very busy dates, so the price is usually not more expensive until the date of the flight approaches. Because of this do the flight reservation as soon as possible.

- **Visas:** this is a point that a lot of people is missing when going to the USA. The visa is an additional document that the USA requires for travelling to the country. Depending on your nationality the legislation may change, so check it before on your government website. It is very important to know that if you are a citizen of certain countries, you are not going to need a visa, you can go with another document. This document is known as Electronic System for Travel Authorization (ESTA) and was made by the USA some years ago. This system was created to strengthen protection measures and to guarantee the safety of visitors from the United States. The ESTA online authorization process is a selection procedure that analyzes applicant information and determines eligibility to travel to the US. within this program. Only citizens of countries participating in the Visa Waiver Program must request an ESTA.

- **Presentation:** the presentation is going to be the most important moment of the Giant Jamboree. Your team has to be concentrated on the whole presentation and try to be explicative and technical at the same time. This is why is recommended to not speak fast and try to explain correctly. It is better to have 15 good explained slides than having 30 fast explained ones. The judges are going to value a lot of aspects of the presentation. Because this changes a bit every year I suggest checking the Judging Forms that are in the iGEM website (http://2018.igem.org/Judging).

- **Banner:** the banner is going to be presented in a convention room. You will need to upload the file in the iGEM website and they are going to print it. Be careful with the specifications before uploading anything. When you are in the banner room, try to follow all the advises that you received in the meetups from the judges and ambassadors there. The figures are essential to creating a good impression in the judges and the way of explaining should not be forced, but natural. Don't be nervous and do your best.
  http://2018.igem.org/Giant_Jamboree/Information_for_Teams/Team_Banners

- **Sell your project:** there are two different kind of approaches. You can do a pretty innovative and excellent project, but you are not good at selling it. This is a pretty common problem in iGEM. There are a lot of projects that are pretty good, but the way of explaining and selling that project is not as good as it should be. The second approach is, it doesn´t depend on what you have, it matters how you explain what you have. The approach and the way of presentation do a lot.To sum up, all of this, do a good project but sell it even better.

08

AFTER IGEM

- Use bullet points to illustrate the bottom line conclusions of your research.
- Try not to extend your text too much. Explain the main points of your investigation in a few lines.
- Explain the main points and conclusions of your investigation in a few lines.
- Make sure there’s enough spacing and that you’re making use of white space between the lines.

Thank you