Conversation transcript Markus Große Ophoff

Stine: We noticed, for example in a sponsoring video, that others who work with mushrooms have presented the dragon figures and we as an iGEM team only thought that they don't have to do that childishly. There's always such a fine line for me. I think especially if you do an iGEM presentation, this (schematic) is surely the more sensible form. I can rather imagine, that it could be more sensible to go in that direction, if we want to go to the public, like this target group "your mom".

Markus: Childlike characters are always very, very dangerous and if you use such a children's comic, there problems can arise. First of all these comic figures only work with young children and also give the impression as if this was not serious, which it is. So I would rather see to it that you do it schematically, use as little text as possible and rather explain the principles. So what I understood quite well was that when I have the key then I can unlock it and the resistance works. I can select them and continue working with the selected one. I understood that well. And I would really just think about these steps. What are the steps and I would represent them if it's okay with the schematic drawings, even if you can think of something better. So, then that would be the goal, so to speak, to make all those who come by understand that. How is the selection process? Probably judges running around, right?

Merrit: Exactly and additionally each team has a website where they present themselves. Also the protocols, lab book are uploaded, then the team is introduced and what we actually do.

Markus: Thern it would be my assumption, if they do a selection process there, and the essential part takes place at the event. Then they will run around, talk to you and only those who get into the top 5% will have a look at the rest. Otherwise, the rest is almost a waste of time. That means, the first thing is to be convincing. But there is still another important thing that works. So I mean, you are there at a scientific event, but scientists don't tick any differently than normal people: There's always one thing that the human brain is talking about and says, where I have to bring my attention to, and that's emotionality. We have this amygdala in the brain, it's kind of the amygdala nucleus. It's like something that's emotional is stored and it's like attention is only being focussed on things that are emotional. And emotion can be all great emotions: love, hate anything else; and maybe you should think about, how you get emotionality into it. I don't think it's bad to put faces on it, what you're doing; maybe a photo from the lab, so you can say wow to what we're doing. Faces always look emotionally that's also a thing that can be done with almost everything you have. So, I come from environmental communication, so if someone presents something about soil, then these soils cuts are typically shown, with a tape measure on it; boring for everyone; But if I there is a child, who smiles and has soil in his hands it works quite differently, so I think. Somehow, I would try to bring something like that into it. So how can you bring emotionality into it? Then the next step is, that it is not only convincing to the iGEM community, but one step further it should bring something for society.

Mathias: Exactly. We want to develop a strategy that we make our website understandable for iGEM participants, so to speak, in a scientific language, that can also be a bit more demanding, and also to the general public. That we can explain to them that's our goal, that's what we do and that's what you get out of it; without the need to go to Wikipedia and look up: what is a plasmid? what is RNA? and things like that. How you can communicate something like that at eye level without being arrogant by explaining everything in detail and perhaps with analogies that don't fit.

Markus: So the first question I'd ask myself is, what does the society have from your research. Where are the advantages? And it's no question that for parts of scientific research knowledge itself is the answer. We become smarter and in the strongest case, you would say self-blasphemous, then you end up in some scientific magazine and your scientific work is only somehow 10 -20 times quoted, what I think would be average. I mean, I put a lot of work into it and 10-20 people on average read it. Then there's of course work that are quoted 1000 times, but that are of course the top article. So that science is supposed to be more than an end in itself. And now you would have to think again about, what is here? So I think, you have a small disadvantage, namely that you actually develop a tool, what we can use universally, but which is the main purpose per se. So the main advantage is, that you can get there, perhaps faster, better I think. So you end up with a relatively challenging task, because you have to say this: "yes, what can you do with the bacterium? Is there in synthetic biology something similar? Can you explain that again, what is the benefit of it and then why does your procedure bring advantages?" Here, I have to say I don't know that for myself so well, that I could tell you now. I can say: y"es, speed!" I don't know, how it is with the antibiotic resistances? Can that also lead to problems? Or can you perhaps reduce some of the problems of antibiotic resistance? That's what everyone has heard from their grandparents, who have just caught themselves in the hospital with a germ or something like that.

Stine: In that direction (with the antibiotic resistance) rather not. So the focus is rather on the stress.

Merrit: For the cells themselves that you want to work with.

Stine: That's exactly, where the metabolic problems could be. If the resistance is always a relatively large protein and if the factories are running permanently to make this resistance protein, because the resistance is permanent there. There are not enough resources for all other metabolic things. Therefore the cells grow slower, but it can also lead to faster mutations rates, because they don't work so cleanly. Generally this stress for a cell is always not so good, so any resistance of any antibiotic you put on a bacterium, doesn't make the bacterium healthier. So that means, if you want to have, somehow, clean data about a certain gene that you express in the cells, the data becomes unreliable. This can have a lot of effects that you haven't researched yet.

Markus: I think again, if I now think about my mother or your mother, because mine is already very old, it will be quite difficult if you want to explain it. She has never studied biology. How can you explain it to her? So, I would first try to say, why is it actually so

exciting to deal with the bacteria. The first step for me is really to say, what is the advantage of this whole procedure itself.

Merrit: So right from scratch.

Markus: Yes, so really quite a long way to go. So a little bit about, why are you actually studying biochemistry. On the one hand, of course it's your interest, but you study it somehow always, because you want to achieve something positive. You want to have positive impact in the end and that's supposed to be a better product or a better procedure or something like that. And I believe that this could also be a unique selling point for you, that you really say again: "hey, that's why it's important" and also in as few words as possible. So it's like I said at the beginning, we have two different target groups: the first target group is for all those, who are rather the science cracks; there you would not need something like that; and the second target group would be society. And for me it's always so communicating to a target group is incredibly exhausting, because we all like to communicate so much that we tell our friends and your study friends. You're all more or less professional idiots, so you tell it from one professional idiots to the next and everybody's excited about it. You might know, I studied chemistry, now my three siblings studied medicine so far. It is not at all apart, but if my three siblings have their medical talk the family meeting then I felt pretty fast hung out and then have to said: "oh?" And I look to talk to someone else. So to communicate to target groups fairly is my very clear recommendation. You should imagine a person you want to explain it to. So for what you want to explain on the technical track, I would think of someone. In the end your task not only to convince all the others at the Giant Jamboree, but especially to convince the jurors there. I would now introduce myself to some professor, who is good willing in itself, but who does not come from your main discipline because you get the easiest convinced there. It can also be technical, but rather a computer science professor, or something else, where you say that I should get convinced now. Imagine the person concretely and say, that's him and think about how we get to convince him in case of doubt. If you have a good-will here is even a fantastic thing, because you can try out and can ask him how convincing you were. So you just look and take one person, that is typical for the target group and try to communicate with the whole thing. You can only try that once for some people, so if you want to try it afterwards to make it better, you should go to the next person who is similar. For the social discussion I would do the same there; I would take someone and I would not take someone, who somehow has no interest at all in science, but definitely none of the natural science corner, but someone who says: "oh, yes. I'm interested in science already. I read the science part in the newspaper, or I watch a science show in the television." But no one, who comes from the natural sciences. And then to say, how do I explain, why is what I do important, that would be the first task. What brings it to society? What perhaps even brings it to you indirectly? And then in the next step we become concrete. You can say: "We want to work with these cells, which are supposed to do something." And so to make that possible we just need new tools. And there again these work with figures is again the best. And working with metaphors only means simplifying it, so that you transfer it to something that everyone knows. Metaphors can still be abstract, but you compare it with

something that is there in the real world. With enzymes everyone knows the lock-and-key model, which you also use in science. And that's just a nice picture, if you say: "ah, yes, look somehow the enzyme structure has to fit exactly to the receptor and only then the thing works, like a key in lock." Such images work really well. Sometimes you have to really brainstorm about, what metaphors you can use and to come up with something like a lock-and-key. Then of course I can quickly paint a key or a lock and then display it graphically.

Stine: Then I have another short question. We found out that it is extremely difficult to get to iGEM teams and figure out what they actually do. They have often pretty cool projects but if you read the abstracts even we often have problems understanding them and have to look up three or four words.

Markus: There we are now exactly with the problem what I described earlier.

Stine: Exactly, we are working on it. Now we have considered that we would like to make a world map on which all teams who take part can be represented. We want to encourage all teams to write an abstract in simple language or perhaps in different levels. Like level 1 is elementary school, level 2 would be then high school graduate because they have just left school and should remember most of biology lessons and then specialised scientists so that you can actually go through the details. We should probably name them a little bit differently. We have decided that we might want to give the other teams a guide for it. So we have to think about how the abstract has to be written to understand the idea behind it. And if you are interested you can still go to their wiki page and take a closer look at it. We wanted to have this rough information available for everyone because iGEM is trying to be open source and it is not open source if not everyone can understand the ideas.

Markus: Yes, I think it would make sense for all projects because what you have described is really the standard case, that you even read from your broader field of expertise and you can not immediately understand. In the Communication industry there is again a picture, they call it the elevator pitch. The idea behind it is: I meet a stranger in the elevator and I have exactly the time of the five floors. There I should explain to him what I do but that is difficult. On the other side is my very clear statement: There is no scientific work that you can not convey somehow. So if someone says: "My work is too complex" than I say you have not strained yourself enough. You must actually make it in these 2, 3, 5 sentences to pass on the message. You just have to think about it. The one big difficulty is you have to simplify very much.

Stine: Without losing the context in any way.

Markus: And then if possible everything in mother tongue ideally completely without scientific terms. If one takes this first level, I really like the idea, then it should actually be really completely without something like RNA.

Merrit: But this is also difficult to explain without RNA, without plasmid.

Stine: You have to use pictures. An idea: describe the gate as a gate and the triggers are keys that you have to put together, like a safe and you only get what you need if you have the combined key, for example the fire extinguisher if you stand in a burning room.

Stine: Well you have bacteria, but I believe you can use that term if necessary. That would be such a picture without RNA.

Markus: But I think start if possible at 0. So you say: "With bacteria we can produce valuable drugs, new substances or similar environmentally friendly because they consume little energy, because they live in water and do not need solvents or something like", that would be almost a bit long. And then you say: "We now develop a tool how to select the right bacteria reasonably without getting too stressed. Maybe you have to say one more sentence that if you try to get the right information into it then you have to choose a marker too.

Stine: Then perhaps as a consideration that it could make sense to have a short elevator pitch on this world map about synthetic biology. A short explanation why we all work on the topic and then one could understand the motivation of each individual project a little better.

Mathias: Should you also mention such an ethical topic in the explanation, like are that many pros, but also these problems and we can handle like this and this?

Markus. So I don't know what you should do to yourselves. At the end I would rather advise you not to do too much at once.

Stine: iGEM actually has the guidelines for this, so iGEM also has guidelines for certain organisms, which we are not allowed to use at all. There is the safety form where we have to enter everything: what we use, how we use it. A question that we had thought about otherwise is, we want soon start a survey and scatter as far as possible about family friends and all possible people to find out how much people actually know about it. Can you go further and use more media? What do you know about which media are most useful to reach people?

Markus: So reaching people actually starts again with the target group analysis. I actually have to define which target group I want to reach and then I have to derive everything about it. Then come for example how can I communicate it best. For very young generation, there I would say today social media are good and then maybe rather Instagram. If you then have people who are not so now social media or electronic media affine, then you can look for certain magazines that they read. There come at least 5 barriers in between that you will not get on your own for worldwide spread so therefore prefer to define a target group exactly, then look at this target group which media they use. Then think about the communication strategy. In the communication strategy is always the most important how do I talk to emotions. it is really quite definite that we only ever really keep things memorized about emotions. For yourself for example now just do a simple thing and say you want to now remember what was 5 years ago and want to say. What they did on that day usually nobody knows anymore. I like to do the test, but that doesn't fit for you anymore because it doesn't work anymore, when I've been with older people I've often taken such a picture of the 9/11

where the plane flies in there and asked the people what they did on that day. And if you ask the people can tell you I've sat at my desk and first I talked to that person about it although it's now 20 years ago. This is simply due to principles of our ancestry. Tthe Stone Age man meets lion and he survives. If he does not survive then he doesn't need to keep much but he survives. That is a super emotional event and then the brain says save everything.So that the next time I have the same again: running away from the lion or coming out of it or crawling down there or using the fire or something like that. And that's how our brain works so when we get emotions you will remember. What you can always do is work with pictures. What is emotional is also that you bring in something personal so that you say why you are interested in these things. That makes people much more emotional. So just look again: how do you get a little tension, how do you get emotionality work with pictures. It works the same with scníentists, so scientists are not other people than everyone else.

Mathias: I've now thought about that maybe you just want to arouse the interest, maybe not the emotions in the topic but the interest that you might go into products that are necessary.

Markus: So telling a story is good. Better than a cost thing is from my point of view the real use. So I think rather that your best arguments are social benefit, if that is the only finance is also good. Where I would warn you is too much handling numbers. When numbers become big we must there we must abstractly remember that is so much and that is so much more. But it works really only when you think about it. We do not have an intuitive commitment for such numbers

Bjarne: Looking at our poster now, you could never present that at a conference so that would be very unusual. To do something so figurative.

Markus: So from my point of view, the tendency is quite clearly towards it. To make more and more figurative, also for scientific posters. I am in the selection committee for an international climate protection fellowship programme. This is basically a postdoctoral programme and there are many very high-ranked scientists in it. We have at the end a poster prize award and there is a tendency that those with the least text have won the most, as well as those with the most pictures.

Bjarne: Yes, last year also a poster from Marburg has won and that was really good with not ten words in a row so it was really headline, explanatory caption or something.

Markus: That's also my very clear recommendation to work with pictures, with pictorial language. So always try to explain clearly what you do and then rather work with such captions instead of continuous text. Put as little text as possible on your poster and describe as vivid as possible with pictures and schemes.

Bjarne: That also struck me last year. You end up explaining for 6-7 hours in front of your poster and then you go to another poster and talk with the people about it because I understand it much better than if I read a text. I then also can ask and I believe in these 3 to 4 days I have not met anyone who has read the poster really because you ultimately always talk about it. People are always looking at me or on the Figure to which I point on the poster.

Markus: And I guess there you even have a real advantage, if you do not have the judge on the first day as the first team, but if I have already explained 20 other participants, I can explain it better to the Judge. I notice what works and where people ask more and adapt.

Stine: I would now aks briefly about another point. We have considered using simplified abstracts on a world map. It is a different than a poster but maybe it could also be useful to ask everyone for example to add a picture because it is always more explanatory than if one has only a continuous text and arouses little interest.

Markus: So if I could I would do that.

Stine: Well you can say to teams then: "Hey we would like somehow if you to add a picture.

Bjarne: In the Journal of molecular biology you always have to submit a graphical abstract.

Stine: Ok, that's cool.

Bjarne: So there are really journals that want an abstract and a graphical abstract and then you have to summarize your research or summarize your approach within a picture. That's not bad. You could work with it.

Stine: That's a cool thing.

Bjarne: Because of course there are already examples from literature.

Markus: Of course it's not quite trivial because it's unusual.

Stine: But hey we are at iGEM, to learn what I think nobody is at iGEM, to just stubbornly always do exactly the same thing I mean if we weren't at iGEM we would never have had this conversation we would do our master thesis and fail if you want to explain something.

Markus: And even for the master thesis that can help. I think I have a different viewpoint. I am already a little bit out of the classical science and rather am the cross-sectional thinker. I think we have too complicated speech in science. In parts also for example for your thesis we use scientific language to say it now it is something special. You have so to speak what in language research is called the elaborated code. Then you take a cloistered complicated language and say it makes me a scientist. I also find very fascinating because we have taken scientific article and then we have translated every sentence into normal German. It was exhausting and then it is quite funny. Sometimes you have a text afterwards where you say then: "Oh yes really great substance!" Sometimes you then translate it into normal German and they have written a nonsense of nullities. One technical term after the other and only one password after the other and actually there is not much behind it. Sometimes it is a chance to hide things if you use this highly scientific language.

Bjarne: What code did you translate it to?

Markus: We just sat it down and briefly thought about what to do to say it in simple language.

Bjarne: Because that would be interesting how you did it. For the Wiki that you can really think about, so you can translate any text passage in simple language and make them more understandable.

Stine: That is difficult because there are long texts. We had thought about using something similar to Wikipedia, where you can hover with the mouse over it and a picture pops up with a brief explanation. And if you click on it a dictionary opens, where words like plasmid are explained. There are probably so many terms we have to explain. So anyone interested can spend the time reading, because it is difficult to translate it for entire texts.

Markus: But now you have to watch out again. As I said there is a bubble. That is not a problem if you want to communicate with a specific target group for example with your generation as you are using the internet. Also people are going to lose interest after checking every 5th word. It is too exhausting.

Stine: Or explain it in the beginning once and then try to use a low amount of technical term?

Markus: Well. At my the job I'm doing that. I always have to translate a lot of texts from environmental sciences in such a way that they're not completely unrelated but people from other areas understand it. For example we've made the rule we don't use abbreviations and I write the abbreviation behind it the first time and then I can use it, because it is explained. But you need to be careful, because people tend to forget abbreviations.

Stine: Whereby you have to say that there are also abbreviations that are commonly understood whereas people don't know the whole world for example DNA.

Markus: Yes there are a few very common abbreviations there I would say you can already use them.

Merrit: But we actually had that problem on our poster. There we had genes of interest abbreviated as GOI.

Stine: GOI because gene of interest.

Merrit: Exactly and many didn't understand that. I didn't understand it myself. I think Daniel told me in the end.

Stine: Yes, that's also partly the case with other posters.

Merrit: We actually had that case, too.

Stine: Where then suddenly was GOI and you think GOI? G-O-I?

Markus: And the next thing I would do is short sentences. Always use short sentences. So even if I make complicated sentences easy, the first thing I always start with is to look at what text goes over more than 3 lines and then I hack it into single sentences. You can always make a sentence that actually only consists of subject, predicate, object and then the next sentence. And sometimes you don't even need connecting words and short sentences are more and more understandable and clearly understandable.

Mathias: How does it look with metaphors so what is such a set that you can use and when does it look like a children's book?

Markus: So I think well made metaphors can't be used too much because it's more the question what fits the target groups, so there are of course childish metaphors. You have to be careful that you do not take the wrong metaphor or the wrong image. But pictures and also metaphors work and actually they have to be super just fitting. What has been increasing a lot lately is authentic communication. You shouldn't try to do something for everyone, but work specific. If you're giving your lecture don't hide your personality but communicate as you are with me. So for example you probably can hear my accent. One should not try to bend too much. At some point it is no longer authentic and people notice that. And if one is not authentic, then one sometime also is not credible. With all the advertising language we have all developed a lot of antennas to quickly figure out if something is not true or somehow untrustworthy. That feeling arises quickly if you try too artificially make it somehow professional, but it actually has nothing more to do with yourself.