Catalyzing Computing Podcast Episode 30 - Open-Source Exhibitions with Andreas Matt

Intro [00:00:10]

Khari Douglas: Hello, I'm your host, Khari Douglas, and welcome to Catalyzing Computing, the official podcast of the Computing Community Consortium. The Computing Community Consortium, or CCC for short, is a programmatic committee of the Computing Research Association. The mission of the CCC is to catalyze the computing research community and enable the pursuit of innovative, high-impact research.

This episode of the podcast is taken from a video interview with Andreas Matt, CEO of IMAGINARY, "a nonprofit organization for the communication of modern mathematics." This interview was recorded as part of traversing separation with the Heidelberg Laureate Forum Foundation, "a nonprofit which was established in 2013 to foster mathematics and computer science. The foundation organizes the annual Heidelberg Laureate Forum, a networking conference where 200 outstanding young researchers in mathematics and computer science interact with the recipients at the most renowned prizes in the field. Another primary focus of the foundation is turning the public's attention towards mathematics and computer science not only to awaken but to strengthen their interest through events and exhibitions held in the Mathematics Informatics Station (MAINS)." In this episode, Andreas Matt discusses IMAGINARY and managing open source exhibitions, as well as the impact of the pandemic.

Enjoy.

Interview with Andreas Matt [00:01:30]

Khari Douglas: Hello, I'm Khari Douglas, the host of the Computing Community Consortium's Catalyzing Computing podcast, and today I'll be interviewing Andreas Matt, founder and CEO of IMAGINARY, a non-profit organization for the communication of modern mathematics. as part of traversing separation with the Heidelberg Laureate Forum Foundation. We'll be discussing open source exhibitions and how the pandemic has altered how the exhibitions are designed. So thanks for being here, Andreas. How are you doing today?

Andreas Matt: I'm fine. It's quite late. The kids are sleeping and yeah, I'm motivated.

Khari: So could you tell me a little bit about yourself? What is IMAGINARY? How did that get started?

Andreas: Ok, so I'm a mathematician by training. I also studied some computer science and philosophy. How did it all start?

I think I was sitting in Pakistan. I did some social, international development work in Pakistan. I got an email that they were looking for somebody to devise a mathematics museum in Germany and that came from the [Mathematisches Forschungsinstitut] Oberwolfach Institute, which is one of the most renowned institutes in mathematics worldwide. It looked like a nice offer, so I told them, "Yes, I am ready for it," and a couple of months later I was sitting in a black forest in Germany planning a mathematics museum.

This was for the German "Year of Mathematics" 2008, quite some time ago. Germany has these science years, and this was the first time that mathematics was chosen as a science year and...yeah, we started, not a museum, we started with an exhibition, that made more sense. We came up with the name IMAGINARY because it had...we wanted to have a very visual exhibition and geometry was a big part; and this kind of image,

imaginary. I think the first title was even "un-imaginary" like to make it show the abstract and so…

Yeah, so this was the idea. I would not say that I'm the founder of IMAGINARY because of course the Oberwolfach Institute and the former director [Gert-Martin Greuel](#) was like a big driving force behind that whole project. And it was a project for one year, a travelling exhibition for one year in Germany. And then from year to year, it changed, it grew, it dynamically became something else.

We kept the name. It's interesting — so it was the name of an exhibition and now it's the name of a nonprofit that was founded four years ago. Oberwolfach is still a shareholder of that non-profit and we are based in Berlin. Now what we do is we communicate modern mathematics. So that's...we still do the same, but we don't focus anymore on purely geometry. This is...maybe for many people if they look at IMAGINARY they still think about these algebraic surfaces, but we do all types of mathematics: mathematics and music, mathematics and AI, mathematics and climate crisis, whatever, but in an open way. Our subtitle would be "imagine open mathematics," so the idea is to have everything open-source, and also to have it open in a way that it's participative, collaborative. So we really, first of all, work closely with researchers but also with the public, you know — and it's like breaking hierarchies in a way that we jointly create. I think that's the thing. It's not like we do something for others, we jointly create. And that creative part has been there from the beginning.

Khari: Right, very cool. I did go to the "[La La Lab](#)" exhibition when I was at HLF last year.

Andreas: Oh did you see it? Cool.

Khari: Yeah it was super cool. So what exactly is the connection between IMAGINARY and the HLF foundation and the [Mathematics Informatics Station](#) (MAINS)?

Andreas: Yeah, I mean, the MAINS has a lot of public outreach activities outside the HLF. During the year they organize all types of events, like a film festival, and also exhibitions. And we did several exhibitions with them. So the first "[IMAGINARY – through the eyes of mathematics](#)" exhibition was shown there, our other exhibition "[The Mathematics of Planet Earth](#)." Now, the "La La Lab" exhibition was kind of jointly created for MAINS or with MAINS, and so they're very, very close ties. I mean, now we've known each other for so many years, so I think we jointly communicate mathematics now.

It's really cool that they have this big space. It's probably even, if you look at the square meters, one of the biggest math museums or computer science museums in the world. At the HLF we also had a small "La La Lab" exhibition last year and we presented some of our latest project, "[Snapshots of Modern Mathematics](#)," together with Oberwolfach was shown there. So they're close, very close ties.

Khari: Nice. So how do you think, like in general, making math "real" helps people to better understand and connect to it? By making it so hands on?

Andreas: Yeah, so I think it's a good question, especially the word "real." What does it mean "real?" I mean, it's entering philosophy you know. Like mathematics for me it's real in my mind, in my brain, I don't have to make it also real in different ways; but what I think is very cool or extremely attractive, if you make mathematics….how would you call it….interactive in a way, and, of course, interactive through your senses or through your...I don't know, by being able to manipulate it, change it quickly to get some feedback in a way, and to create with mathematics.

And for the general public, of course, very often you cannot only work with equations. We usually don't hide the equations, or the equations are always there, or the theory, but we add other layers. So I don't know, we don't show you the algebraic equations only, we also show you the surface that it creates. And if it's in three variables you can show it, and then you change the equation you change….the image, which is the same,

would also change. It's so nice to have this kind of direct feedback and to be able to play, to experiment, also to break things.

I don't know, to make it like a sand toolbox, you know, and that's what mathematics is. And if you have in your communication formats, you have this kind of open, free, creative toolbox then it's kind of cool. And by playing with this toolbox you start understanding or you start being interested in...your curiosity level, your motivation level would go up. And once it's up, then you read all the papers you want. Then you read the book or then you think about it.

[Laughter]

Khari: Yeah, that introductory level I think is important for sure. So can you discuss any, like, major exhibits? I know...poking around on your website, the "SURFER" exhibit looked really cool, and I know the "I Am AI" exhibit...you're going to be talking about that at HLF this year. So what are those?

Andreas: So, I mean, the "SURFER" exhibit was maybe one of the first um...I don't know if you want to call it a killer exhibit...but it's an exhibit that is so attractive in many terms for all types of audiences. That's cool if you manage, and the idea is...it's like, in technical terms it's a real time rate tracing program for algebraic surfaces; in non-technical terms, you have a simple equation: $(X^2 + Y^2 - whatever)^3 = 2$ and then you just change the X, the Y, the cube, whatever, and at the same time you see the creating surface.

So you have the three variables in the three directions, and you can point on/display all the points that solve this equation and this kind of real-time relation that you have the equation, I change it and I see the surface and I can turn it. You can supply colors, whatever, but in terms of exhibit it's so amazing in terms of how many things you can do. You can do all types of really, really complicated solutions, visualizations, or you just play around. You take the equation of a sphere and instead of squares, you put cubes and then you see what happens. So it's like a lot of experiments you can do.

And that exhibit inspired so many things. I mean, it was updated...I don't know, for ten years we were constantly working on it and we did worldwide video competitions using SURFER image competitions. It was used for, I don't know, for fashion show. There was a Michelin star chef and he made, like, dishes...five star dishes in his restaurant based on the SURFER surfaces and so many things like outdoor exhibitions; indoor workshops for schools; they use the program at university level. It's so nice that it can really go to all types of target groups and ages.

Khari: Yeah, so IMAGINARY is open-source. So how does that work? How can someone who's interested contribute to that?

Andreas: Yeah, I mean, when we did the very first exhibition — and this was even in 2007 before the German year started — I think on the second day (the exhibition started on the second day) we got an email from a visiting school that said, "Can we have these images to make a small school exhibition?"

I said "Yes, of course," and I sent them a ZIP package of all the images. And then this happened at almost any exhibition, and at one point sending big download links, and always asking the authors like, "Would it be ok if they show it too?" So we established this open-source exhibition platform, also with the support of the Klaus Tschira Foundation, which is also behind the HLF or connected to the HLF. So this was really cool.

In 2013, we started the platform and the idea was, of course, to make all the exhibits we had open in a way, and the idea is the digital data of everything we have. So it's not only whatever digital data of images, of software programs, but also all the design packages, you know, the posters and the flyers, but also maybe the funding proposals, the exhibition guides, whatever we have in a neutral way we can offer.

And of course, once you have that infrastructure, we made it open for everybody to create a user content and upload exhibits in different formats: 3D data for 3D prints or, I

don't know, construction manuals for physical exhibits, whatever in a way, you could upload. A lot of the infrastructure changed a lot and also this open source philosophy. When we started it was very new. We had to explain to everybody what is a [Creative Commons license](#).

[Laughter]

Nowadays it's different. You have really cool platforms that you can use too, and it's changed. Still is kind of a hybrid because it's not software. You know, it's like a hardware open-source thing. It's an open-source exhibition. And like we are constantly advocating to museums to make them open-source. There are some museums now open-sourcing, and it's so cool, like there's a lot happening also with this [open science movement](#). So it's going into the open science communication, which is cool.

Khari: So have any notable exhibits come about because of people just uploading stuff that you found interesting?

Andreas: Yeah, I mean, it's interesting because nowadays when people do exhibitions, of course, they look at the whole catalogue and all the exhibits that create our exhibitions, they're also contributions. It's never...of course, maybe the software exhibits we did a lot of our own development work, but it's always, constantly in close collaboration with researchers. So if you look at La La Lab, there are so many contributors and they created their own exhibits and modules and uploaded them. And then they became that exhibition, and then at one point...for example, the second exhibition "[The Mathematics of Planet Earth](#)," the whole exhibition was a competition. So who has a cool exhibit? And then we created this competition together with [UNESCO](#). And then at one point the winner entries and the good entries became the exhibition. So it's, yeah, it's interesting.

But we have this kind of, there's a quality filter. So whenever you upload something, it goes into the user playground exhibits and then once the exhibit is shown at one exhibition, it becomes an "exhibit." So then it goes into the exhibition category. And of

course, there's a difference, I mean, if you have any software programs, it might not be super useful in terms of user interface or stability or if you have any image, the resolution would not be high enough to really be using an exhibition. You have to also apply some quality control, but that kind of happens automatically.

Khari: So how do you think the pandemic has altered how exhibitions are designed? I mean, obviously, it's tough to be in a large group of people so...

Andreas: Yeah that's super interesting. I mean, at the moment, we have this one exhibition, La La Lab, which is still on show. They changed the way, how you interact with the touch screens. So now you have like a kind of plastic extension to your finger that they can disinfect. Now for the new exhibitions that we are doing, we are looking, and everybody is looking into, of course, how the pandemic is changing...nobody knows.

Very often we are in touch with the museums; some museums are very positive they will say "no." It's fine. I mean, in one year do the exhibit as you usually do it. But then we are also exploring...there are a whole series of technologies that you can use, be it eye tracking or foot control, all types of things that are not directly crossing touches. But I think so far we are still in the hopes of exploring new technologies, but also not just to use them also to maybe...maybe they add another value so it's not an "excuse technology." It's maybe a new idea.

But we are still observing how everything's happening. And at the moment, a lot is happening online, so there is no touch there. So that's maybe the other thing that we are bringing exhibitions online and we do, I don't know, digital exhibitions, which is new for us. And somehow it felt a bit more boring because you don't have to, you don't feel the visitors. But now we do a lot of guided school tours and online workshops and things. So people are there virtually, but they're still there and you still get a lot of feedback and you have good collaboration tools, so that's interesting. So that's maybe the...like adding these digital conferences, you know. So it's like adding a new layer which doesn't replace the old format at all, but which adds some other really cool, really

nice things. And you can attend a conference without traveling there. That's cool, that's cool too.

Khari: Yeah. I was playing with the [digital "I AM AI" exhibit](#) online. Was that always supposed to be online or was that only because of the pandemic.

Andreas: No, no, no. The idea was….Actually, when was it? April 20 was the opening ceremony at MAINS in Heidelberg. Everything planned and of course we had to postpone that. And then at one point, [Carl Zeiss Foundation](#), who was financing, or is financing, the physical exhibition...was always planned to be only physical. But we came up with that idea to bring parts of it online. It's difficult because, I mean, these are exhibits, AI exhibits, that take a lot of computer power and it's not so easy just to put them in the web. So that's why we couldn't put all the exhibits online yet. But we are still now...we'll probably add some more. It's been a nice adventure for us also to explore new formats like this trail format, we have this interactive video format. So it's interesting.

Khari: Yeah. The interactive video thing was something I hadn't really experienced before, so people should [go check that out](#) so they know what we're talking about. What advice would you have for someone who wants to create a similar kind of open-source project?

Andreas: I would say, just be, I don't know, be bold and make it as open as possible, and do what you want to do, and do what you like, and this would spread motivation. And maybe....just putting things open source doesn't mean that people are using it. You say, "OK, I'll make it open source," and then you wait and nobody looks at your repository.

[Laughter]

Andreas: So, of course, you would need marketing. I mean, collaborate, talk to a lot of people, network, collaborate and stay positive. And I think that's the most important

thing, is that you identify; and if you do good work, and you identify, and you stay open people will join you and then it will spread somehow. Yeah, I mean, if you need more advice, there is a lot of...I think we even wrote about this, so I don't know. Maybe be non-formal and be quick in communication. That's maybe good advice. So if people want to join you, don't let them wait two week for your reply. It might sound logical, but it's small advice that they would help.

Khari: Yeah, that makes sense. I guess we should probably wrap up soon, but do you have any other thoughts that you hope people take away from this, related to the IMAGINARY project?

Andreas: Yeah, I mean, maybe coming back to that creative toolbox, I think if you think of exhibits...I have this is one story: I was in India giving a workshop on mathematics communication and I was invited to a museum, and they showed me this super brand new exhibit on nuclear power. They said, "It's highly interactive."

I said, "Wow. Cool, can I see it?" And then they had this screen, information screen and below that, twenty seven buttons. They said, "Now, here you can choose the language."

[Laughter]

So it's interactive but it was a clear example of interactivity with very limited options logically: you change the language. But you can also scale this up and say, "OK, most of the exhibits have N options. It's N and N high doesn't matter, but it's limited. You cannot surprise the author of the exhibit, you cannot surprise yourself at one point. And it doesn't mean that you can do...out of every exhibit is this kind of toolbox.

But, I don't know, also looking at my kids, it's so nice just to play openly, you know. Create, and break, and experiment, and do crazy things. And if you have an exhibit or exhibitions, you have these options to do something super creative. That's just nice, and that's motivating, and that's also probably close to mathematics. You know play, create.

You know, think, brainstorm, observe, create. And if you can manage this, that's cool. So let's try to build this type of exhibitions or exhibits or collaborations.

Khari: Yeah, I think that's a good way to close things out. So thanks for being here and have a good night.

Andreas: Thanks, Khari. See you.

[Outro 00:21:15]

Khari: That's it for today's podcast. I hope you enjoyed it. Learn more about IMAGINARY at their website, imaginary.org.

We'll be back soon with new episodes. Until then, remember to, like, subscribe, and rate us five stars on the Apple Podcasts or wherever you download. Until next time, peace.