

In the paper we “tidy-ed” up the quotes from the transcripts for legibility. Here we provide the quotes in the form they appear from the transcript. All quotes can be found in Sections 4 + 5 of the paper.

Paper Quote	Original Quote
You spend your time talking to us. And what you get at the end is a tool. PI-6	Like you spend your time talking to us. And what you get at the end is a tool.
I mean, after three years you work together with like three other people, you become friends. Right? So if they ask for help, you cannot say: “No, the project is done.” You cannot do this, right? Because the personal relationship is something important in everything you do. GS-12	I mean, after three years you work together with like three other people you become friends. Right? So if they if they ask for help, you cannot say: No, the project is done. You cannot do this, right? Because that the personal relationship is something important everything you do.
Yeah, there are some bugs ... I'm making a list each time that I see [bugs]. I'm doing this, and I hope that maybe in the future, we could do another version update to it. Even if it's like, I already know that for everybody [maintenance] will be a nightmare ... But at least I have this list. DE-12	Yeah, there are some some bugs that not yeah, errors, mistakes. I'm doing like, I'm doing a list each time that I see. I'm doing this, and I hope that maybe in the future, we could like do another version update it. Even if it's like, I already know that for everybody will be a nightmare. So, whatever. But at least I have this list.
We need to update [the database] every year. Every time we go into the field, we need to give her new data [to] add to it. DE-8	We need to update it every year, every time we go into the field, we need to give her a new data and we can add to it.
100% convinced that I will be using [the tool] in the next year, two years, five years. DE-8	And we can, I'm 100% convinced that I will be using it in next year, two years, five years.
But in the end, I became the expert of the [collaboration] ... I became the expert in [the visualization tools] in that project and in that collaboration, not [my] supervisor. So he wouldn't even know about the database. GS-8	But in the end, I became the expert of the, of the [collaborators] and the [collaborators from the other domains]. Okay. But the [collaborators] is what you're interested in, I became the expert in that and into that project and into that collaboration, not the supervisor. So he wouldn't even know about the database.
[Our] code was, you know, open-source, it's posted on our GitHub that's on our lab's GitHub ... [People] can use this, you know, if you want it ... I would love to, like, keep it up, but there's not much of an incentive to keep it up. GS-11	<p>Yeah. So I mean, our code was, you know, open-source that like, it's, it's posted on our, you know, our GitHub that's on our lab's GitHub. So all the code is there, including the preprocessing code. So there was kind of like, yeah, you can use this, you know, if you want it.</p> <p>Like, I would love to like keep it up, but like, there's not much of an incentive to keep it up.</p>

<p>I mean, I guess I would handle it like other issues that may be posted on GitHub. So I would, like, consider [the posted issues] and consider the effort and gain. And apart from that, it's open source. So if [someone] wants to change something, they are free to do it... GS-2</p>	<p>I mean, I guess I would handle it like, other issues that may be posted on GitHub. So I would like consider them and consider the effort and gain. And apart from that, it's open source. So if they want to change something, they are free to do it, if it's, like, not interesting for other people as well.</p>
<p>I hate saying this, but like, you know, that sense of structure isn't there for me to go work on that code when I could be doing family things, you know? GS-11</p>	<p>I hate saying this, but like, you know, that sense of structure isn't there for me to go work on that code when I could be doing family things, you know?</p>
<p>If you build a tool to solve a specific problem, but it doesn't get used or breaks down, what are we really doing? What [is the point of] the tools that we're building for people? But um, yeah, I don't know. It's tough. I don't really know. Because I think it's also a ton of work. Right? For whoever is going to take [maintenance] on. GS-3</p>	<p>And there's a sense in which, which is like, yeah, if you build a tool to solve a specific problem, but it doesn't get used, you know, or breaks down. What are we really doing? What are the tools that we're building for people? But um, yeah, I don't know. It's tough. I don't, I don't really know. Because I think it's also a ton of work. Right? For whoever is going to take that on.</p>
<p>If you just provide [a] prototype as an output, plus a paper, and you're not able to maintain that, to support that, to extend that, then the collaboration is dead afterwards ... And there, you need to also be somehow able to support this other phase that comes after publishing your paper. And that's also what motivated us to start the spin-off company because there we have this ability to support [long-term use] and to ensure that [the tool is] working. PI-2</p>	<p>And then if you just provide like this, this prototype as an output, plus a paper, and you're not able to maintain that, to support that, to extend that, then the collaboration is dead afterwards.</p> <p>And there, you need to also be somehow able to support this other phase that comes after publishing your paper. And that also what motivated us to start the spin off company because there we have this ability to support that and to ensure that it's working.</p>
<p>And so there's one guy who was previously working at our lab, who was also involved with developing the tool [in the beginning] ... And he now works [at the startup] to develop [the tool] further. So in that sense, there is this person who worked on both sides more or less ... Yeah. And [my] code is public on GitHub. And basically, I guess they [took my code] GitHub and changed what they needed to. GS-2</p>	<p>And so there's one guy who was previously working at our lab, who was also involved with developing the tool in the first time.</p> <p>And he now works actually at a company that that they have a contract now, to develop it further. So in that sense, there is this person who worked on both sides more or less.</p> <p>Yeah. And the code is public on GitHub. And basically, I guess they used it as it was on GitHub and changed what they needed to.</p>

<p>[The lab], they're building the, I think they're building the actual software platform in-house. But so [GS-3]'s working in depth with the programmers there to to make it work. DE-3</p>	<p>Like they, they're building the, I think they're building the the actual software platform in house. But so he's working in depth with the programmers there to to make it work.</p>
<p>So I think one thing that I've tried to ensure in the long run is that I'm working in the same development environment that the internal IT team uses, that I understand what coding practices they use, and to kind of help them have some influence on the architecture of the tools that I built. [I'm working to understand what] their practices are basically. So there's a good hand-off with the technical team. And then beyond that, documenting, creating documentation for the tools, both for the [collaborators] and others around the [the collaboration team]. GS-3</p>	<p>So I think one thing that I've tried to ensure in the long run is that I'm working in the same development environment that the internal IT team uses that I understand what coding practices they use, and to kind of help them have some influence on the architecture of the tools that I built, they're hearing, their practices are basically. So there's a good hand off with the technical team. And then beyond that, documenting, creating documentation for the tools on both for the [collaborators] and others around the design.</p>
<p>You know, there are things like students graduate and go on and don't continue doing things or funding runs out ... Or the funding ran out long ago and all of the server infrastructure that you had for providing the data is now not compliant with whatever the current security stuff is. Therefore, who's going to take the effort to modernize that, given that we have no resources to do it, and it's not fun? PI-11</p>	<p>You know, there are things like, students graduate and go on and don't continue and don't and don't continue doing things or funding runs out.</p> <p>Or the funding ran out long ago and all of the server infrastructure that you had for providing the data is now not compliant with whatever the current security stuff is, therefore, who's going to take the effort to modernize that and given that we have no resources to do it, and it's not fun.</p>
<p>[Maintenance] requires that you are using a tool prominently in the long run ... we're really coming to this question: How good can our software be? I don't know what happens if [GS-9 graduates and] goes somewhere else. Then systems are changing, hardware is changing ... Also, your collaboration partner must be interested in the same question for a long, long time ... And then a new question pops up. And probably the tool is not interesting anymore. Therefore, in general, yes [maintenance is important], but it doesn't apply to all applications. PI-9</p>	<p>This kind of requires that you are using a tool prominently in the long run. This requires I think altogether, yes, for sure. Would be great. But suddenly, we're really coming again to this question: How good can our software be? If my, I don't know what happens if [vis-student] goes somewhere else. Then systems are changing, hardware is changing.</p> <p>Also, your collaboration partner must be interested in the same question for a long, long time.</p> <p>And then a new question pops up. And probably the tool is not interesting anymore. Therefore, in general, yes, but it doesn't apply to all applications.</p>

<p>I have thought about, you know, studies where you go back five years later, and you talk to all these people, and you're like, are you still using your system? And I bet the answer will be no, and if not, why not? And you know, is it going to be that the software bit rotted or the data pipeline died, or actually turns out, it wasn't useful, or, I don't even know if it was useful, because blah blah left the company, or actually have all [collaborators] left the company and none of us are there anymore. So like, there's all these reasons why people don't use your research prototypes in the long run. And I sort of agonize about that as a researcher. PI-6</p>	<p>I have thought about, you know, studies where you go back five years later, and you talk to all these people, and you're like, you know, are you still using your system? And I bet the answer will be no, and if not, why not? And you know, is it going to be that the software bit rotted or the data pipeline died, or actually turns out, it wasn't useful, or, I don't even know if it was useful, because blah blah left the company, or actually have all left the company and none of us are there anymore. And so I can't even talk to you about that. So like, there's all these reasons why people don't use your research prototypes in the long run. And I sort of agonize about that as a researcher.</p>
<p>I imagine this world, you know, vis prototypes that are basically like broken down, pod racers, as web standards evolve, most of their stuff is just like, yeah, this junkyard, really cool tools that are basically unsupported and broken now. GS-3</p>	<p>I imagine this world, you know, vis prototypes that are basically like broken down, pod racers, as web standards evolve, most of their stuff is just like, Yeah, this junkyard, really cool tools that are basically unsupported and broken now.</p>
<p>And it was also good to reflect on the data. Because when you're explaining your data, you're also reflecting on it. [And thinking about] what kind of data do I really have, which is also something you don't always think about ... That was also helpful. DE-8</p>	<p>And it was also good to reflect on the data. Because when you're explaining your data, you're also reflect on your data, what kind of data do I really have, which is also something you don't always think about, at some point. So and that was also helpful.</p>
<p>I think [the team has] appreciated [GS-3]'s research into their process, because it has allowed them to articulate how they're actually doing [their research] and to think about how they use data and what they're paying attention to ... And so actually talking about this explicitly has been kind of a nice opportunity for them to reflect. DE-3</p>	<p>I think [the team] have appreciated [GS-3]'s research into their, or questions about their process, because it has allowed them to articulate how they're actually doing this and to think about themselves how they use data and what they're paying attention to and just kind of allowed them to, to speak about this in an open way, in some ways like, like, they do this every day. And so it's become quite intuitive for them to navigate through the stuff and come up with their assessment. And so, so actually talking about this explicitly has been kind of a nice opportunity for them to reflect.</p>
<p>This, this has changed my perception of the research and my eye to the [objects of study] forever. I can now choose to look at the [objects of study] in a more traditional way or in this [data-oriented] other way. And [the visualization tool] doesn't matter because of course I had this</p>	<p>This, this has changed my perception of the research and my eye to the like the [data source] forever. I can now I can choose, we can choose to look at the [objects of study] in a more traditional way or in this other way. And were, it doesn't</p>

experience with [the visualization researchers]. DE-12	matter the [the visualization tool] because of course I did the experience with them.
I also didn't know what to expect, because, you know [GS-8] showed me some cool graphs, but I was thinking, that's not for my type of data, maybe. But suddenly, she made it really interactive, and like, really a tool that you can use. And so yeah, it was beyond my expectations to be honest. DE-8	I also didn't know what to expect, because, you know she showed me some cool graphs, but I was thinking, that's not for my type of data, maybe. But suddenly, she made it really interactive, and like, really a tool that you can use. And so yeah, it was beyond my expectations to be honest.
Maybe, fun and success are partially the same. PI-9	Maybe I I don't know whether fun and success is partially the same.
[Success is] that I learned something, I had fun, and to the extent that other people working with me ... learned. PI-11	Well, from my point of view, that I learned something, I had fun, and to the extent that other people working with me, with my students, scare quotes around my, the CS contributors, or the visualization, contributors learned, you know, it helped in their development.
I'm always looking for interesting projects that people can do and try out and where they have fun and where something useful comes out. PI-7	I'm always looking for interesting projects that people can do and try out and where they have fun and where something useful comes out.
So I want to make sure that the time [domain experts] spent with us, was time that was worth it to them as well. And so maybe they also just have fun with us. That's good, assuming that we're all working and getting towards something that is using the resources that we've been granted well. PI-4	So I think that I really value other people's time. So I want to make sure that the time they spent with us was time that was worth it to them as well. And so maybe they also just have fun with us. That's that that's good, assuming that we're all working and getting towards something that is using the resources that we've been granted well.
My real product is not papers, my product is people. I view it very important that the people that I'm working with [are] getting the training they need and [are] developing as they should. PI-11	Right now, I kind of feel like, my real product is not papers, my product is people. And not systems, not my product. My product is people. So I I view it very important that are the people that I'm working with getting the training they need and developing as they should.
Most of the time, the students do [a requirements analysis] for the first time. And so I'm really trying hard to be in the room together with the student and the potential user ... After the interview is over, I usually also try to spend time with the students [asking them]: did that make sense? What do you think about it? How did it work for you? Do you see this, and that, and the other thing? PI-7	Yeah. So, you know, we usually start with requirement analysis of sorts. And most of the time, the students do it for the first time. And so I'm really trying hard to be in the room together with the student and the potential user. Just and then, you know, after the interview is over, I usually also trying to spend time with the students as you know: did that make sense? What

	do you think about it? How did it work for you? Do you see this, and that, and the other thing?
So I really want to make it explicit to my students saying sometimes: "You can ignore this. We are not in the service position here. And we cannot do this." PI-9	So I really want to make it explicit to my students saying sometimes: "You can ignore this. We are not in the service position here. And we cannot do this."
When you're working with students, there's this inherent power imbalance ... So my suggestions probably take on a lot more weight than they would otherwise. PI-4	Now, when you're working with students, there's like this inherent power imbalance, right? So my suggestions probably take on a lot more weights than they would otherwise.
Is [the design study] worthwhile to have a student spend half a year, year, or even longer on this? What's the outcome for that student? Is it worthwhile? PI-7	Is it worthwhile to have a student spend half a year, year, or even longer on this? What's the outcome for that student? Is it worthwhile?
But how do we sort of scope these other pieces so that [GS-3] will actually not do the 100 year PhD? PI-3	That's extra work that [vis-student] does and working for an institute to do but how do we sort of scope these other pieces so that [GS-3] will actually not do the 100 year PhD?
But yeah, probably if a student wants to be building systems, and the collaborator doesn't need a system, then that's a bad match, right? And part of my role is to make those good matches. PI-11	But yeah, probably if a student wants to be building systems, and the the collaborator doesn't need a system, then that's a bad match, right. And part of my role is to make those make those good matches.
It's not just the funding, it's the time commitment, I need this amount of [the domain] expert's time ... It's [also] about saying, we might need to bring in, for example, this person with a more of a social science, ethnographic background, we need this type of expertise to come in and tell us about X ... The students need to come into an infrastructure like this. PI-3	<p>It's not just the funding, it's the time commitment, I need this amount of your expert's time, whether it's I'm sitting on the side watching it or I'm actually interviewing them and explicitly taking their time as opposed to watching what they're doing.</p> <p>It's about saying, we might need to bring in, for example, this person from with a more of a social science, ethnographic background, we need this type of expertise to come in and tell us about x.</p> <p>And so that it's from the point of view of a professor, trying to get this going and get the students this is before you even have the students, the students need to come into an infrastructure like this.</p>

<p>If you cannot prove that you did what you promised, you might have a hard time next time to get funding ... it's not his problem, this is my problem to get this solved. And he had to think about his future and his future looks different. PI-9</p>	<p>If you cannot prove that you did what you promised, you might have a hard time next time to get funding.</p> <p>It's not his problem, this is my problem to get this solved. And he had to think about his future and his future looks different.</p>
<p>For this shorter term [collaboration], the project['s goal was] to also motivate [the collaborating company] to invest more in a research collaboration. So there was basically for me, the metric for success was to show what added benefit we can provide, like going beyond just the publication. So for us researchers, of course, and for [GS-2], also, the publication is still the most important thing that comes out of that. But for me as a PI, it's also about, like, what comes after that, what's the bigger picture? PI-2</p>	<p>So it's so basically for this for this shorter term thing, it was the project to get like to, to also motivate [the collaborating company] to invest more in a research collaboration. So there that was basically for me, the metric for success was to show what we can like what added benefit we can provide, like going beyond just like just the publication. So for us, researchers, of course, and for [GS-2], also, the publication is still the most important thing that comes out of that. But for me as a PI, it's also about, like, what comes after that, what's the what's the bigger picture? And so on.</p>
<p>I guess there is the case where you just suck it up and build them an engineering tool. I don't think we've ever done that in my group, because I feel like that would be so destructive for the senior student involved that I don't know if I could bring myself to do that. PI-6</p>	<p>I guess there is the case where you just suck it up and build them an engineering tool. I I don't think we've ever done that in my group, because I feel like that would be so destructive for the senior student involved. That I don't know if I could bring myself to do that.</p>
<p>If something is useful [for domain experts], at the end, you will find the research project or research theme to write about ... So from my point of view, I was not looking for novel visualization designs, I was looking for things that actually worked for [my collaborators]. GS-8</p>	<p>That if something is useful, at the end, it will be useful in research, you will find the research project or research theme to write about and if it ends up really solving a real problem in real life. So from my point of view, I was not looking for novel visualization designs, I was looking for things that actually worked for them.</p>
<p>So for a while, there was attention to, I wanted to make something shiny and cool and complex and complicated and blah, blah. But you know, I think that's completely outweighed by the fact that I want to make something useful for people. As a researcher, I think that's an interesting path. That leads to a lot of interesting questions and what role visualization plays in a broader ecosystem of analytic tools, rather than just being constricted to a very narrow definition of what visualizations could be. GS-3</p>	<p>I'd say, for a while, yeah, there was attention, where, I want to make something shiny and cool and complex and complicated and blah, blah. But you know, I think that's completely outweighed by the fact that I want to make something useful for people. Yeah. As a researcher, I think that's an interesting path. That leads to a lot of interesting questions and what role visualization plays in a broader ecosystem of analytic tools, rather than just being constricted to a very narrow definition of what visualizations could be.</p>

One problem here is that when you're straddling these two domains, if you have, you know, the concrete application domain, and then you have the visualization community, you're kind of stuck in between, right? Because, like, what is really interesting from the visualization perspective might not really be something which is, you know, has meaningful application in the end, right? And vice versa. GS-9	One problem here is like that when you when you're straddling these two domains, right, if you have, you know, the concrete application domain, which is the [domain], for example, and then you have the visualization community, you're kind of stuck in between, right? Because and then you kind of have to, because, like, what is really interesting from the visualization perspective might not really be something which is, you know, has meaningful application in the end, right?
It's kind of nice to have people testing your system and trying out use cases and also providing datasets, and yeah, that's nice. And also having input from a domain expert, which if you don't have a collaboration with such a group of experts, it's not so easy. GS-2	Um yes, mostly, because it's, it's kind of nice to have people testing your system and trying out like use cases and also providing datasets and yeah, so yeah, that that's nice. And also like having input from an expert domain, which is, I guess if you don't have a collaboration with like, with such a group of experts, it's not so easy.
And I sometimes spent weeks working on an older version, and finding issues or [problems] that were actually solved in a later version. So this communication of which is the current version, how do we get it? That was lacking. But after I raised the issue, that improved, [but] I was still kind of pissed to have wasted some time. But what can you do? DE-2	And I sometimes spent weeks working on an older version, and finding issues or words that were actually solved in a later version. So this communication of which is the current version, how do we get it? That was like, lacking? And yeah, but after I raised the issue, that improved, I was still kind of pissed to have wasted some time. But what can you do?
My lab is awful at testing ... it's like pulling teeth to get anyone in my lab to spend, like, 30 minutes testing, to make sure that a new version doesn't have breaking features. DE-11	My lab is awful at testing, and it's, you know, the the mission critical systems that we use to manage our data, it's like pulling teeth to get anyone in my lab to spend, like 30 minutes testing, to make sure that a new a new version doesn't have breaking features.
I think that's the main problem ... some people take data ... and they just analyze them ... And then they ask the domain scientists: "What do you think of that?" ... And I don't even understand what I'm seeing. ... So [it's] probably a great visualization, ... but I'm not really able to understand it. And at this point, I'm fine that they're playing with my data. But don't ask me for a physical interpretation. DE-9	<p>I think that's the main, the main problem is that I mean, in the group, some people did take data from coming from [domain data set] from things like that, you know, and they just analyze them, you know, and then there's the exit some data and numbers, reps, whatever. And then they ask ask the domain scientists: "What do you think of that?"</p> <p>And I don't even understand what I'm seeing. I don't, and they are not even able to explain to me what I'm seeing in terms of physical meaning.</p>

	<p>So that's, that's, but that's probably a great visualization, I mean, concept, tool, but I'm not really able to understand it. And at this point, I'm fine that they're playing with my data. But don't ask me for a physical interpretation.</p>
<p>It's an issue when you have to work together and publish together ... It's complicated, when you have poking deadlines [for] visualization articles that we need to submit, right? ... So you just develop this concept, this prototype, and then you sell it to the visualization conference of your choice. And sorry if I'm being sarcastic. DE-9</p>	<p>I mean, issue, I don't know if it's an issue, but it's, it's an issue when you have to work together and publish together.</p> <p>It's, it's complicated, when you have always poking deadlines about visualization article that we need to submit, right?</p> <p>So you just develop this concept, this prototype, and then you're going to sell it in, in the, to the visualization conference of your choice. So take two of them. And sorry if I'm being sarcastic.</p>
<p>Yeah. It's not that straightforward. And it requires understanding from the [domain experts]. I think it's also not that straightforward for the students at all times. Because we all like to, we all like to fiddle around and have happy [tool users] ... and the writing of papers is probably not necessarily a favorite activity if you can build some fancier visualization tools ... Yeah, so it just requires finding a good balance. DE-3</p>	<p>Yes. Yeah. It's not that it's not that straightforward. And it requires understanding from the partners. I think it's also not that straightforward for the students at all times. Because we all like to, we all like to fiddle around and have happy clients, if you so want in the end, and the writing papers, probably not necessarily the favorite activity of what -- if you can build some fancier visualization tools at the same time. Yeah, so it's. So it just requires finding, finding a good balance.</p>