

Presenter(s):

Annabel Lee Enriquez, Getty Conservation Institute
Catherine Schmidt Patterson, Getty Conservation Institute
Cyrus Hiatt, Farallon Geographics

Moderator:

Annabel Lee Enriquez, Arches Project

ALE: Good morning, everyone. Thank you for coming to our community call today. Welcome. My name is Annabel Lee Enriquez, and I am a project team member for Arches and Arches for Science at the Getty Conservation Institute. And our community call today is meant to be an informal meeting to discuss Arches for Science and to introduce the new interactive demo site. And joining me today is my colleague, Catherine Patterson, Catherine Schmidt Patterson, who is a scientist here at the Getty Conservation Institute with me. She is also on the Arches for Science team. In addition, we have one of our developers on the Arches Project and Arches for Science project, Cyrus Hiatt of Farallon Geographic, where he is a senior developer.

I think we have a lot of information to go through today, so we're just going to get on with it. So, here's the agenda for today. Catherine and I will be presenting on the first two bullet points. So that means that introduction to Arches, Arches for Science, as well as the new interactive demo site. And then the three of us will come together to have a discussion about the topics and really anything that you want to talk about. Again, this is meant to be informal. We do have presentations, but it is more informal than, say, a webinar.

I will say about the discussion and the Q&A—if you have any questions as we are presenting, feel free to drop—excuse me—feel free to drop your question in the chat. And then alternatively, you can wait until the discussion period and raise your hand if you want to ask the question. But if—I would just say, please wait until the discussion period to raise any hands using the Zoom control for that.

To get started on the actual content. So, this is an Arches community call and generally our assumption is that you know something a little bit about Arches, but since I believe that there are some people here who are new to Arches and the Arches Project I'm going to go over what Arches is. And also—because the thing is, Arches for Science is essentially Arches with additional functionality. So that means that you get all the benefits of Arches and the Arches community. So, it makes sense to briefly go over what Arches is.

And what is Arches? It's free open-source data—it's a free open-source management platform for cultural heritage data. And it was started—the project was started by the Getty Conservation Institute in 2012, along with our founding partner, World Monuments Fund. And that project not only included the software, but it included—it also includes the community to support the software. And the GCI, the Getty Conservation Institute, every project that we do is mission driven and driven by our mission to better the conservation field. And one—and for this project our goal is to promote best practices in data management across the cultural heritage and conservation field. And so, everything we do is for that. And we've been working on this project since 2012—on Arches generally, and Arches for Science a little bit after that. And we're at the point in our project where we've also set up community guided governance and infrastructure and funding for long-term maintenance of the software and the community. So that's—I think one of the hallmarks of our project is that it's not just the software, and it's also the community.

And why is our community so important? It's because Arches is an open-source project, which means that it can be freely downloaded, modified, and installed by anyone and used for any purpose. And although it's supported by the Getty Conservation Institute, it's not owned by any single organization or company. And currently—and our open-source license allows any enhancements to be made to Arches and it also requires any enhancements made to the software be made available to the public and to our community. And no one really has the right to make any proprietary modifications to Arches and lock them behind a paywall.

And again, going back to why our community is so important, I think with any open-source project, especially at this scale, the success of it really depends on how many people are involved in the community. And currently we have over 120 implementations of Arches, which helps to ensure the security and the sustainability of the community and the software. I think the long story short is that Arches is open source and that means it's for you. And I think a point that I do want to make here is that your organization, if you decide to use Arches, your organization owns and controls your own data because you are implementing Arches on your own, with our help, if you need it. But you're implementing Arches or Arches for Science, and you get to decide whether your data is accessible and by whom. So, we've built in a lot of controls into the software to allow you to do that. And it's really up to you on how you want to implement the software.

So, one thing I'd like to say is that Arches enables FAIR data, which means that it enables the creation of data that is findable, accessible, interoperable and reusable. Now, there are many aspects to this, including that Arches automatically embeds semantic data using the CIDOC CRM or conceptual reference model. But one thing I will say about this is that your end users using Arches or Arches for Science do not need to know about CIDOC CRM or the back-end semantics. It's all hidden from them.

And that is something that we made sure of because we wanted to make sure that your end user, the people who are using your Arches or Arches for Science implementation, don't necessarily have to be experts in data and knowledge organization.

Arches supports controlled vocabularies and really there are a lot of aspects of this, I'm not going to go into it, but ultimately Arches ensures that your data is portable, machine readable. Because our ultimate goal is that we want to make sure that Arches helps to extend the life and usefulness of your data beyond any initial project in which it was created.

Now, the last thing I'll say about Arches before we move on to Catherine, is that Arches is customizable, so you can decide what data you want to manage and how it is organized. And because it has a flexible and configurable schema. You can also develop an additional functionality to improve the software for your use case because the code is extensible and customizable.

So, some of these concepts I'm kind of touching on very briefly and you very much have the ability to ask us questions at the end if you want me to expand—or any of us to expand on these. But really the point here is that you can create a custom-made data management system using Arches as the platform and Arches for Science is an example of this. So, I'm going to let Catherine talk about Arches for Science now.

CP: Thanks, Annabel. So, if we advance the slides, my job really is to tell you a little bit more specifically, what Arches for Science is, and in particular what it is to me, a working scientist who may be using it.

So, as you can see here on the screen, what Arches for Science actually is an Arches system that is designed to help conservation or heritage scientists do several things. It's meant to allow us to secure our data, to visualize it, to make comparisons about data (that's helpful), retrieve it, search for it, share it, and potentially even manage our projects. So that, sort of big picture, is what it's trying to do.

But—if we could advance—it does all of this by taking advantage of some of what Annabel was just talking about, about Arches. And sort of the key thing that it does is it organizes a whole mess of data in uniform ways. So, everything that we do in the lab, hopefully there's a way to organize that data.

The purpose of doing that is that it helps those secure, retrieve, and share components of the top sentence, in that it helps us to find—it makes the data more searchable, both by computers and by us. And it allows us to find and use data more efficiently and to minimize institutional data loss. So, for example, as project teams grow and shrink and change over time, we want to ensure that the good work that all of our institutions do remains achievable, or accessible to the next group of people.

So, as Annabel just said, Arches for Science is being built by the GCI. It's still undergoing some development now as an application for the Arches platform. And like everything else, Arches will be made freely available to everyone as open-source software.

So, to put a little meat on those bones, I thought the easiest way to do this was to explain sort of when we say we want to manage the data from a conservation project, what does that mean? So, I like to walk through what I think of as a project, which is the technical study of works of art. I'm showing a project that we did a few years back now with this lovely lady, "Jeanne" by Édouard Manet.

So, if I'm doing a technical study of that, the first question we want to ask is, what are the data? What information about this project would we need to save? And make sure that all of the concepts that I'm interested in are built into Arches. So, if we just look at this painting—if you'd advance, Annabel—this—a painting itself, the object that I start with, is part of at least a couple of different concepts that are important. One, it's a physical thing, the painting exists in the world and in Arches we call that a physical thing. So that concept is embedded in this work of art.

It's also part of a collection of things. It's actually a member of many. It's part of the J. Paul Getty Museum's collection. It's a part of a specific subset of Manet paintings that I studied for this work. And Arches has the concept of a "collection" or "set" to let us manage that type of information.

The other concept that's kind of embedded in this painting is the concept of a person. And just to give you a sense of how flexible Arches is, that's embedded in two ways. So, this is a painting by a person. Édouard Manet painted it. So, we have to have a way of capturing that Manet was a person. We also happened to know the name of the sitter—her name is, in fact Jeanne. And so, Jeanne is another person that is embedded—that the concept of that person—that is embedded in this object.

Okay. So now we got concepts with the painting. What else do we need to know about the project? You may want to know in the future who worked on this project. So, you can see my colleague, Debby, and I working on this in the photo there. So again, you have that concept of a person or a group of people, perhaps, because Debby and I are the project team that worked on the analysis.

On my side, we did a lot of science with this work of art. So, for example, you see an image here of us doing scanning x-ray fluorescence spectroscopy on this painting. In the parlance of Arches and Arches for Science, we call that an observation—basically an experiment that I did, some set of information gathering done with some sort of instrument.

We also happened to remove samples from this painting. You can see a peekaboo shot of one of the samples here—we'll look at it a little later. Because we took samples, that indicates that there's a couple of more pieces of data or concepts that we need to understand. One, we have to clock the fact that this is also a physical thing that now exists in the world as, say, "sample 1," so it has an identity separate from the painting once I remove it. But it also has to acknowledge that it was sampled—so a sampling activity. So, you can capture the information around when did I do it, if I want to note the protocols that I used or the size of the scalpel or how I mounted it—those kinds of things could be captured by the concept of the activity of sampling.

As I said, we captured a bunch of data. The actual data themselves, whether those are things like images, like the XRF map that you see towards the bottom of the screen here, or spectroscopy data of various types—you can kind of see a screenshot of my folder structure on my computer about the different types of data we collected. But all of those individual files then also are part of the project and need to be managed. So again, in the parlance of Arches we call those "digital resources" and we need a way to be able to link all of those to this project.

And lastly, hopefully, when you get to finish your projects, you might say write them up. In this case we wrote an essay for a catalogue essay since this is part of an exhibition. And the PDF for the document of that research can be captured and presents the notion of a textual work—that could be a report, it could be a book, it could be a paper. Whatever it is, that's part of this project as well.

So that gives you a little bit of an overview of the kinds of information that are important to capture the data around a technical studies project.

But there's something that I've already started talking through that is really important about Arches for Science. And that is the connections between these. So go ahead and advance, Annabel. And as we talked or as I chatted through this, I already kind of made the point that the sample that we removed is a physical thing. But it's a physical thing that has a direct relationship to a different physical thing. In this case, the painting as a whole. So that connection, which I'm showing by that blue arrow, is actually a really important part of the project. We lose information—we lose meaning about the sample—if we lose the connection to the physical object.

Go ahead and advance. And anyone who's done this kind of work knows that those kinds of connections exist between all of these facets of the project that I've just mentioned. So, every observation is done by a person. It's done by an instrument. It creates data resources. It's done on the object. So, there's a whole lot of these blue arrows or these relationships or connections that actually need to be preserved.

So really, what Arches is—yes, we can advance—yes, is a system to help us and secure, retrieve, visualize, compare, etc. our data. But it's a system that does that, importantly, which captures all of those complex components that we just walk through and the relationships between them. So, both those blue boxes that are the way we describe these in Arches and the blue arrows that connect them. Arches is a system or Arches for Science specifically is a system to capture all of them.

So—and go ahead and do one more Annabel—so that was a very quick overview of data—oops sorry forward, and then forward again—so Arches for Science, that was a very quick overview of what it does, but just to recap—if you advance the slide—it is a system designed around projects, designed to capture all the technical information from a technical study. It can document things like the objects that you study, the people, the instruments, the experiments, the documents, the data—that's what it holds.

It also allows—we'll talk about—or Annabel specifically will talk a little bit about, I think during demo—some of the ways it lets you do that. It does also let you report things like where you took the data, where a sample came from thorough analysis, image annotation on an image. It also lets you visualize some data. And it has some basic reporting documents or generation associated with it.

Very briefly I want to touch on a second project that is not Arches for Science but is closely tied to it and is still under active development. So, this isn't available for you guys to play with yet, but it does exist—called Arches RaSColls, which stands for reference and sample collections. And if we advance one more—this is a related application that, rather than being built around the technical projects I do, it's built around collection informations, so it's built around reference items. And that can be a sample, like the sample that I removed from the Manet, or it can be samples like what you see in the image on the right-hand side of the screen there, geological or reference samples that you may have in your institution.

This system is designed to help different types of data like materiality, a little bit of provenance information, safety information, that kind of thing. And has some additional search options, which we won't get into today, but maybe on a future community call we will.

Why this is important and why it matters to Arches for Science—hopefully I will demonstrate for you on the next slide, which is to go back to that lovely cross section from the Manet that we briefly discussed. So, when I'm in the thick of an analysis—think of a project doing the work on Manet—what's important to me about this sample is a certain subset of data. So, if you go ahead and advance Annabel, you can see that, for example, what matters while I'm doing the project is what object, what other physical thing did the sample come from? Who did the work? You can see Debby and I taking that sample in that picture. Where did the sample come from? That image annotation I briefly mentioned. And then, of course, all the data associated with it, which I'm illustrating with the SEN maps that show elemental distribution that you

see at the bottom of your screen. But after I've written that catalog essay, the exhibition is up, all that is done, this sample still exists in my lab. And what becomes important about it shifts a little bit as this point in these sample's lifestyle changes.

So, if you advance Annabel—you'll see that that is what RaSColls is designed to capture, is how to manage information about this sample at the end of its lifecycle. When what becomes important is the ability to make sure that the sample is available for another scientists to look at 50 years from now, or for me to come back to ten years from now when my conservators and curators ask a different question about this object, rather than taking a new sample, I want to go back to this one.

So, the questions that are important and the information that I need to capture are things like, well what's left of the sample? Is it a mounted cross section? Or is it a little bit of smudge on a glass slide? I need to know that. I really need to know where did I stick it? What drawer in my lab is it in? So that kind of information that's really specific about the sample is being managed by RaSColls.

So, I just wanted to give that a sort of highlight reel. We're not going to dig into RaSColls today. We are going to talk a little bit more about Arches for Science, and I'll turn it back over to Annabel to do that.

ALE: Thank you, Catherine. Just want to note that these little squiggle marks, I think someone has made an annotation on this slide. So, if you've done that, if you could delete that, that would be helpful.

So, we talked a bit about Arches and Arches for Science and now we're going to talk about the demo, which we recently launched for the purpose of giving you all the ability to get a hands-on—essentially get your hands on Arches for Science without having to install it.

As a note Arches and Arches for Science are enterprise level software packages and they require installation—thank you—and they require installation on a server so that your end users can access your Arches implementation, your Arches for Science implementation on their own browsers using the internet. And, you know, if you want to evaluate Arches, you might not necessarily want to go through the whole process of installing it and so we've provided this demo for you to be able to take a look at Arches and use it before you decide to implement it or do a heartier evaluation of the software.

Also, we have another purpose for making this available in this way and making it more available to people to take a look at is that we're really looking for feedback from you, from our community, but also others outside of our community to essentially help us take Arches for Science to the next level. We are currently on Arches for Science version 2.1 beta and we've gotten a lot of great feedback from people,

from scientists, other people that have used the software and have given us some great feedback. But we'd like to get even more so that we can then take Arches for Science to the next level.

Some information about the demo before I actually go into the demo—is that you are automatically logged in when you visit the demo site as a demo user. You don't have to log in. You don't need any kind of credentials. If you end up in an area that asks you for credentials, that means that you're not supposed to be there. And that area is not available to you because it's really the back end of the system.

There is data that comes in this demo to help show the functionality of Arches for Science and that data is refreshed every couple of days. You are able to enter data into this Arches for Science—this Arches for Science interactive demo, but you should not expect that is going to persist because we will refresh it every—I think it's every even every even numbered day that we refresh it.

And speaking of that data—the test data—we have some test data that is generated by our GCI science—actually by Catherine. Catherine generated this data along with her graduate intern at the time, Veronica Biolcati. And then we also have donated data from Open Context on pottery shards from Anatolia.

And then something to let you know, anyone who accesses the interactive demo can enter data, so you may also encounter data from other sources, from other people who are using the demo. So just be aware of that.

So, let's go and do this demo of the demo. I don't normally—when I present on Arches or Arches for Science, I don't normally do a live demo. But again, these community calls are meant to be informal, so let's do it!

Alright. Let me switch. So, I'll just quickly ask to make sure that you can see my browser here. Yeah? Great! So, the link that we give you is to the web page on our Arches for Science interactive demo page on our website. And here, there's a lot of information that we kind of went over, some of it that we went over, and additional information on Arches for Science. And in addition to that, we have more information on the data that you'll find in the demo as well as a roadmap. We are constantly—we're hoping to constantly refresh this based on our development of the software and we're about to do another—I believe we are about to do another update of the demo, which you will not notice, unless you've been using it.

We provided some materials, some documentation for the demo to help you as you explore. There is a video—a demo orientation video—which will kind of cover some of the same things that I cover today. So,

I will say that if you miss something that I go over as I demo the demo site, please—you can go to this page and find some information on anything that I talk about, really. Or you can watch this video. It's about ten minutes.

And here we also have tutorials on various aspects. Again, I'll be covering some of this, but you can dive deeper by looking at these tutorials on how to explore some features and also how to use some of the Arches workflows.

So enough of that. I'm going to go ahead and jump into the demo.

Alright, so as a new user you will get this pop up, which will let you know that Arches and Arches for Science is best viewed on Chromium-based browsers and is not really meant to be viewed on your mobile phone. So really, a large tablet or a desktop is something that is what you'll want to use when looking at Arches.

And you probably—you're going to come to this, the home page for the demo site. And where you want to go is—I'd say the best place to start is here: "Search." Now click on that.

And just as a note, I will be breezing through this, but if there is anything that you want me to go over during the Q&A and during the discussion, I can do that. And so, feel free to ask that question.

This is the general interface for Arches for Science. You can start off with a map filter or any of these other tabs. But I'm going to search for a physical thing. And actually, I want to find a physical thing that has chromium in it. I'll just type "CR." And I can find that I have 860 physical things that have that. And you don't have to pay attention to this map that tells me that there are some physical things that are based in Los Angeles that have chromium and that's exactly what I'm going to be looking for. But I'm going to go ahead and further search for the painting I'm looking for, which is the "19th century pigment mockup." And so, this was painted by Veronica Biolcati, that graduate intern of Catherine's that I mentioned. And I'm going to go straight into looking at this painting as the center point for this graph, which shows you the relationships to many different resources within Arches, including—there's Veronica, there's Catherine. But you're able to explore data in this way in addition to searching for it. And there are other ways to search for data, which you can explore when you come to this demo site.

But one thing I'd like to take a look at is—I'll take a look at the report for the "19th century pigment mockup." And there's a lot of information here on this painting, but in particular, I'm interested to see some of the annotations that were made on this painting to signify where the measurements were taken, whether it's through spot XRF, I think Raman and FORS—those are the methods that were used for this

painting—to observe this painting. And you can see here that all of these spots that were used are annotated on the painting itself. So, you can see that.

Alright. And if I wanted to see where spot 10 is, I can highlight that there. So that just kind of shows you how you can annotate an image to show where you're taking your measurements from.

But I'm coming back to this—to the related resources graph—and I want to look at spot 5. So, this spot. And I'm going to expand it to see what else is connected to this spot. And I see that I actually have an XRF dataset that's connected to that. So, I'm going to click on this and let's take a look at it and see what data we have here for that particular spot on this painting.

And I can see in my tree here that I have four files here. There are four files, two are proprietary data files and two of them are the ASCII text files that have been—or that were exported from those files—or that are exported versions of those files. And I want to take a look at them. In Arches for Science, you are able to click on the ASCII text files to see a visualization—an interactive visualization—of that particular file. And another thing that you can do here is you can compare—and you see we have two files—we can compare that file to take a look—a deeper look here.

I will say, as an aside, that we built this into Arches for Science not to replace any of your primary analysis methods or for any data packages or any software packages that you use for your primary analysis. This is really meant to facilitate the retrieval and sharing of files. Alright, so there's that.

Another thing I'll show you is that you're able to compare images. And what we're going to compare are some elemental maps that were created from the painting that we were just looking at. So, there's our painting and we can compare that to some elemental maps. And I don't know why I gravitate towards chromium, but I do. So, there we have that, and you can do that. These are elemental maps, but you could also do that if you had registered images with other spectrum, so like if you have infrared, you could also do that. And this is just a way to compare images. And I'll just—for those of you who are interested in such things, this image service manager is based on the IIIF, or the International Image Interoperability Framework standard. And so, I think—I believe a lot of museums subscribe to that standard for the handling of their images and Arches for Science bases the image handling on that standard.

Now, so that's some functionality. But as I mentioned, you are able to enter data into this demo site and there are multiple ways to do that. One is to just add a new resource and start entering data and it's a pretty intuitive process. If you want more information, you can go to the tutorials again. But I'm actually going to explore a workflow. And what workflows are—they're essentially step-by-step data entry modules that you can customize for your Arches implementation. If, for example, you know, you've got a data

model or you've got a lot of data fields, but maybe you want, say, an intern or someone who is not as familiar with the data to enter data and you only want them to enter—or you only want a certain group of people to enter specific data in a particular order, that's what workflows are.

And we've got many workflows here in Arches for Science. But I'm actually going to take a look at this project report workflow. And essentially, this workflow—once you've entered all of the data for a particular project in Arches for Science, you are able to then create a workflow and create a project report template—that workflow and the project report template—will then work to insert data into a particular template. So, let's just go through it.

I'm going to select the project “Technical analysis of the 19th century pigment mockup,” and the object that I want to include in the report, and I'm going to choose this sample word template, and the template that we've added in the interactive demo site—it's a sample template. But you basically—you can imagine that you can create your own templates whether it's word or PowerPoint here.

And then I can grab a screenshot to insert into that particular template. I will grab this screenshot. If I wanted to, I could also grab another one, grab a couple. Save that. And then I can also add data or really not add data in this case, but we're essentially adding information on some of the files that we have associated with this project. And I'm going to select this grouping of files. And then I can download this. And I'll go and save and complete this workflow. I believe I can then—I can now download this file. I can now download this file and let's take a look at it. Alright, you can see here that one of the things it did is it downloaded the screenshots that I created and also the files that I specified. And I'm going to open this Word document so that we can take a look and see what actually was the result of this. Alright, so essentially it inserted the name, “19th century pigment mockup” with some information about that, an executive summary, and it inserted data that had been entered into Arches for Science into a table, let me know what instruments were used for this project. And the assumption here is that you will be automatically inserting these screenshots, and you can play with the layout, but it essentially deposits all the information that you want to have deposited from your implementation into this template. And here are all of those files with some with the associated observation and the parameters that were used and any interpretations that are associated with any of these individual files.

So that's all I will be showing for the demo, but if you have any questions about any aspect of the demo, please do feel free to ask us questions. And it's actually that time to ask questions. So, if you have any questions, please do feel free to ask. Or you can also raise your hand if you have any questions.

So, do we have any questions?

Karl, what is your—

Karl Fogel: Thanks. Thanks for that presentation. I learned a lot. At one point, you—there were—in the resources there were a collection of text files, there were some data text files, which were some proprietary format and then text files apparently generated from. And when you clicked on a .txt file, Arches for Science showed a graph. And where did—since it's just a text format like how—it's not even a SPX file, like how did Arches know how to interpret the data in that text file, which, after all, a text file could be anything.

It could be played by Shakespeare, right. How did it know how to make a graph from that?

ALE: Well, so Arches, when you are uploading this data with those text files, you're able to define a way to parse that data and essentially plot the data. And most of the file they're x, y.

KF: Yeah, yeah, sure. OK. Yeah, I know you only have time for so much in the demo, but I'll go explore how to do that. That's an interesting capability.

ALE: And I'll say this, that if you go through the workflow that deals with the uploaded x, y data, I don't really go into how you parse it, but it actually is in that workflow, that shows how you can parse the data. So, we have some built in parsers that are associated with the instruments that were associated with that particular data set. But you can also—there's an interface where you're able to do that—where you're able to define how you want Arches to parse your text file.

KF: Thank you.

ALE: Alright. Are there any other questions? If there are no questions I actually have some for my colleagues, Catherine and Cyrus. I think something that I think would be interesting to know and to talk about is what to do next, really, if you're interested in implementing Arches for Science for your project, for your organization, what are the next steps? And I think an interesting thing to explore there is, well let me take a step back, you know, we didn't really talk about this, but what kind of organizations is Arches for Science geared towards? And what kinds of use cases? So, Catherine, I was going to ask you if you'd like to talk about the use cases or the types of organizations that could use Arches for Science?

CP: Yeah. So, to really just kind of recap some of what you heard in the presentations, which are to say that again, the sort of target audience for Arches for Science are people doing conservation science work. So, organizations that have those people is probably who are looking at. But I want to stress this is not software that I as an individual scientist go download and install on my computer and use by myself. I work with the Annabel's and the Cyrus's of the world to have it as more of an enterprise level piece of

software that the whole organization is using. And it's at that organizational level that decisions can be made about, for example, what types of parsers do you need in your implementation? What do your report templates need to look like? All of that customization that's important to your organization, that may be different than, say, what the GCI needs. All of that kind of gets handled at the organizational level. I don't know, Cyrus, do you want to add anything to that?

CH: So, I was having some difficulty with Zoom, so I dropped off for a second. But that sounded good. Yeah, there is a parser that will parse ASCII files that are generated by instruments. Of course, if it's a proprietary format, then that would require proprietary software in most cases, to read. So, you would need the ability to export the data in an open format like text in order to chart the data and to develop a parser against it, like Catherine mentioned.

ALE: Right. Yeah. And that's if it's essential for you to actually view the data in Arches for Science and in that graph format. You can also, if you wanted to, you can also just upload your data, and you saw that there were proprietary files there, even though we couldn't view them using the graph, they're there so that—as a convenience, so that if you wanted to use Arches for Science to hold that data so that you can retrieve it relatively easily, that that's something that you can do.

So, another thing in regards to the implementation, I think—and thank you, Catherine, for answering the question about who is this for? But the other thing I wanted to say about that is that you know, we've built this to serve that kind of generic use case, but the nature of Arches is such—and Arches for Science even—is that our hope is that organizations take it and run with it. Whether—we hope that that happens alongside us, where we're developing it as a good for—a common good for the entire community. But also, I think, if you want to use Arches for Science and you have kind of an edge case where it really—where you have a very bespoke use for Arches for Science you can take it and customize it to that use and build upon all the work that we've done with developing the software. So that's something that it's possible. And you know, for example, something that kind of came out of Arches for Science—and I know that Catherine said we weren't going to talk about this, but I'll talk about it—is, as we were working with—as we were developing Arches for Science and we were talking to people in our community, we realized that there was this need beyond Arches for Science, that is Arches for Reference and Sample Collections to kind of capture that part of the lifecycle of an object, as Catherine went through. And so, we decided to create—to start this new project where we're extending Arches for Science and creating a new application to deal with that. And so that is very much within the realm of what we do with Arches, is that we want the use to expand because ultimately, if data management—we ultimately want to improve data management for all aspects of work in cultural heritage. So yeah, and I think—I know that there are a lot of people who are interested in RaSColls, so yeah. Thank you, Emily, for dropping that in the chat. So yeah.

Are there any other questions? No? Oh yeah, Melissa?

Melissa Harvey: Hi! I'm really a newbie on all of this. I'm wondering, like, if you have to build a new team where this these team has to just take the Arches and implement it to, like for example, your organization with different type of needs for different types of clients. What are the key members to have this thing work? Like, of course, like because we're trying to figure out technically who we could target? What type of professional provides a target to be able to have this project successful that only like project manager, but like do we need like a developer? Do we need like—who's on the team for this to work?

ALE: Sure. I mean, I'll just start off by saying that if Arches does everything that you need it to do, you don't necessarily need a developer. I mean, you might want a front-end developer to customize Arches so that it looks the way you want it to look. But if you do—if you're taking a look at the Arches platform or Arches for Science and you realize okay, this is a great platform and we want to use it, but we want it to do these additional things, we want it to have additional functionality. I'd say that you probably should have a developer who has experience using Python and using and working with Postgres. Cyrus, are there any other—was there anything else that you would say regarding the development if people want to extend Arches?

CH: Yeah, I would say that they, you know, a developer on the team would probably need some JavaScript skills as well because usually to develop a custom Arches component—you can develop components at many different levels. You could develop new workflows, you could develop new reports. But there's usually a Python component and then a front-end JavaScript component. So, somebody with those skills, particularly someone with Knockout.js. And we are moving slowly to Vue.js. So, JavaScript skills in those areas would be very helpful.

ALE: Yeah, and thank you to our Arches project team member, Kevin, who dropped a link in the chat to let you all know and to remind me to say that that we also have—in addition to just developing our community generally—we've also fostered some service providers to provide services for Arches community members. So, if you don't have that in-house capacity, you can also hire a service provider from the list that is in the chat there.

CP: And Annabel, to add to the question by asking you—do you want to talk about whether that team needs to have somebody that does the work that, for example, you do for us on things like vocabularies?

ALE: Yeah. So, I think that's the other part of it. Thank you for reminding me. And I did have that thought, that also too, in addition to the development specialists—or technical, that sort of technical specialists—

you probably also should have a knowledge organization specialist to help you. So that's someone who'll help you to organize the data so that it actually delivers on the promise of what Arches can do in terms of sustaining your data. So, whether that's someone who has some semantic expertise—and again we do have service providers for that as well—but you might want someone who is really experienced with organizing knowledge.

CP: One more thing, Annabel. It would also be very helpful to have somebody that has experience in deploying enterprise software. Arches will run on Windows.

It's a little bit easier to install on Linux system, but that could be somebody in the IT department, but you may want—you may need to hire additional staff that have those skills.

ALE: Great. So, the next question, I'll take her from Marei.

Marei Hacke: Thanks. I'm wondering about what the idea is, how to make the project data FAIR. So is it that you contain everything in Arches and collect your project and use it to build your reports, and then you can click to share this as a web page or is there like a shared Arches interface where everybody can upload their own Arches projects. And then they become searchable as—you know, in general? Yeah. So, at the moment, we are using the Zenodo to make our data FAIR and of course, it's not—there are none of these interfaces and visualizations and all that. It's basically just a repository. You just dump your data there and you hope that someone at some point might find it useful. Yeah.

ALE: Absolutely. So with Arches, I think and, and I probably, we probably glossed over this—that Arches is not necessarily—the typical way Arches is implemented is that it's accessible via the internet and you can—and this is, I mean, there are some policy questions here for your individual implementation in that you can close it or open it as much as you like. And make your data available and accessible that way. But I think probably what I think what you might be referring to is how accessible is that to external searches and that sort of thing. And there are multiple—there are a couple of ways that that can happen in an Arches for RaSColls and actually a new Arches development, which is called Arches Lingo, which will be released—it's currently been released in beta, but it will be released fully as version 1 next year. Arches Lingo, which deals with controlled vocabularies. And what we're definitely embedding the use of URIs within Arches. And I don't—I'm not actually involved in those particular projects, but I know that that's something that we're doing. But also too, I think something that's been expressed in our community is exposing the data and Arches more broadly via search browsers and I know that—I know that we've had some conversation about that. Cyrus, I don't know if there's anything that you want to add about it, but that's something that we have discussed as well—making sure that the data is just not locked—that data is not just dumped into an Arches implementation and that people just need to find the Arches

implementation. So, I know that that's something that's been discussed and will be explored further in the future. Yeah.

CH: Yeah. I would just add that, yeah, that there are tools in Arches to export your data into different formats and there's also the ability to customize exporters. So, you can get the data out into a format that that Arches exports by default, it can be customized to export it into other—

CP: And just to add on to what Cyrus just said, I would say from the point of view of the scientist, I think one of the benefits is that Arches can sort of package all of the data about, for example, an object, a project, whatever, and download it in that way that Cyrus just talked and that Annabel showed with the downloading for the report, which it sounds like kind of a simple thing, but it does mean that if you're managing your day to day work in Arches, you can download that complete data package so you have something that's easy to upload to other services, if you do, for example, want to keep using Zenodo. So, you kind of remove that step where your staff has to figure out, well, what do they want to make available? It sort of simplifies that process on the user side. So, whether you choose to make your Arches open and make your data FAIR that way or just use it as a way to package the data into packets that you then share using other repositories in public searchable domains, that's also an option.

ALE: Mm hmm. Yeah. And thank you Eric, for adding that in the chat that yes, the Arches does have APIs. And I think that I mentioned the semantic data in that we are embedding semantic metadata so that you can export that data and that it would be more portable and machine readable.

Are there any other questions?

One thing I did want to say is that on the screen, what you should see is the URL, and I know that we also dropped that in the chat, but also, if you have additional questions, you can go to our community forum. So that's community—yes, so thank you, Emily, for dropping that in. And you can actually ask questions, not just of us, but of our entire community. So, you have the benefit of our entire community to ask the questions that you would like to ask about Arches and Arches for Science.

Also too, if you are interested. Like I said, we are very interested in feedback regarding the platform. And so, if you're interested in engaging with us and helping us to essentially enhance Arches for Science or just Arches generally, please do feel free to get in touch with us.

You can and you can contact us through our community forum or any other means. I'd say that, yeah, our community forum is probably the best way, but if you'd like to get in contact with us, I will say that an email address you can use is contact@archesproject.org if you want to get in touch with us that way.

And also, too—yes, thank you, David. Regarding the questions about FAIR, there is—we do have a page on our website that addresses standards and interoperability. So, you can take a look, and I'll just say generally—and I didn't say this—is that our website has a lot of information, and some might say that there's so much information that it might be a little bit overwhelming. And we're always trying to improve that. But—excuse me. But you can definitely take a look at our website to find more information about what you're looking for. Excuse me, I've been talking this entire time. Let's see, we're almost at the end of our time. So, if there are any other questions, please you can chime in right now. But if not, again, if you have questions if you'd like to engage with us, please do. And thank you for attending this community call. All right. So, I'm just going to close it. Thank you all.