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| | Secrets of the Prize Papers: The Science of History – Episode 2 | THE NATIONAL ARCHIVES |
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**Secrets of the Prize Papers: The Science of History**

The National Archives holds over 4,000 boxes of letters, papers, and artefacts from ships captured by the British between 1652 and 1815.

In the second episode of our three-part series on the Prize Papers collection,
Oliver Finnegan explores the scientific techniques and conversation skills used to analyse these items. Guests Marc Vermeulen and Marina Casagrande discuss examining and reading letters without opening them and the discovery of a well-preserved century-old, knitted jumper.

For more information about the Prize Papers project, visit https://www.prizepapers.de/.

For more information about the records covered in this episode, look at our research guides to High Court of Admiralty. Read our blog on Letters Unread: Opening closed letters in the Prize Papers project and Letters of Note: Preparing the Prize Papers for digitisation. For help navigating our catalogue, you can watch our top-level tips on using Discovery.

Transcript:

**Chloe Lee**: When working in an archive, you sometimes encounter collections so immense, that they are hard to comprehend. The Prize Papers is one such collection, consisting of objects and papers confiscated from private ships captured by the British between 1652 and 1815.

The Prize Papers collection is so vast that it remained unexamined for years. However, we are now finally making progress on it. The work is expected to take a full team of people 20 years to complete! While we don't have that much time today, we are dedicating three episodes of our podcast to this topic.

I'm Chloe Lee, a Migration and Citizenship Researcher at The National Archives. I also host our podcast, On the Record at The National Archives, where we uncover the past through stories of everyday people.

**Oliver Finnegan**: I'm Oliver Finnegan, and I'm a Prize Papers Record Specialist here at The National Archives. In this episode of On the Record, we're here to look at the physical aspects of the Prize Papers collection. In my previous conversation with Chloe, we were talking a lot about what the letters contained, what our material says. So I'm here with two specialists who work on the more tangible aspects of the Prize Papers collection. The first of them is Marc Vermeulen who uses scientific techniques to understand more about the items and where they came from.

Hello, Marc.

**Marc Vermeulen**: Hello Oliver

**Oliver**: How are you today?

**Marc**: Very well. Thank you. How about you?

**Oliver**: I'm good. I'm good. I'm keen to talk much more about what you both do, because I have to

say, I don't really understand a great deal about it, and it always seems like magic to me. So that'll be fantastic. And our second guest here today is Marina Casagrande, who's responsible for the collections, conservation, preparing documents for digitization, making them safer handling and imaging, and even better, bringing them back to life. Hello, Marina. How are you?

**Marina Casagrande**: Hello, Oliver. I'm alright. How are you?

**Oliver**: Great. Yes, again, I find that what you do with the collection always astounds me, particularly that last sort of thought of bringing the documents back to life, I've seen you recover some documents that are squashed and frayed and very battered looking, and they come back looking almost good as new, yeah? Intrigued to hear more.

**Marina**: Yeah, it's definitely like a bit of magic, right? We try to make them alive again in a certain way.

**Oliver**: Exactly, exactly. So in a sentence, could you tell us a bit about what you each do?

**Marina**: So my everyday job is conserving the documents, making them safe to handle and enabling access for digitization and research.

**Oliver**: So what does that...what does that look like? So for your day to day job, if you receive a document that is sort of frayed around the edges, how would you think about looking at that?

**Marina**: So the first to do is access the document and check how it is. So if the edges are folded, or if something that's very simple, my first thought is to flat them back to life, and then I have a tiny iron that I can just regulate the temperature and make that flatten the paper more, more or less how you do with your clothes at home, and we do exactly the same with paper. If it's dirty and if it's covering any text, then I have a type of sponge that's specific for conservation that we use to try to clean that area with very light touches.

**Oliver**: So I should say here, the collection does need cleaning in many places.

**Marina**: Collection does need a lot of cleaning.

**Oliver**: It's filthy, you can smell it when it comes out of the box. And part of, part of the reason is because it got covered in soot from London air in the 19th century when it was in the basement of the Tower of London. That's a different story. Marc, what do you do? Tell us a bit about what you do here with the Prize Papers?

**Marc**: Sure. So as a scientist in an archives, I'm using a wide area of scientific methods to look and uncover what the materiality of the object is. So what it's made, what it's made from, where it came from, how it moved around, and how to help preserve it for generations to come, which is where I'm working in collaboration with Marina on that last part to kind of make sure everything that we do is for the best of the items and for a greater access for people to get.

**Oliver**: So you develop new techniques?

**Marc**: We do. So we do both develop new techniques that kind of push the boundaries of what we can get out of the objects right now, but we also use very established techniques to get different types of information. So yeah, it's a bit of both research and development and application.

**Oliver**: So you would describe yourself as a heritage scientist?

**Marc**: Yes.

**Oliver**: So I've asked you both to have a bit of a think about some of the items in the collection that you've worked with over the years. Could you both give us a bit of a sense of the breadth of what you've worked with?

**Marina**: So recently, I just found...I opened one letter from the collection, and it was a message from some memory family members, and there was a bean inside, which is a toxic bean

**Oliver**: Oh wow!

**Marina**: And it... we never expected to find that inside a letter, and then you have, like a process. I talked to Marc and how to safe, handle that and keep away, separate from the collection because

it's toxic, so you could not just leave it there. And we also found a box of seeds a while ago, and we had to unpack that, and we didn't know what was inside, so it was very curious to touch that, and a feeling you had with the seeds, you don't really know what it is. It was, was magic to try to open that and see that you had, like, an entire package of barley. So all these materials come very often to the table, and you never know what you are receiving.

**Oliver**: It's amazing to think that you've got all these products of the natural world that have survived in the collection through all these years... seeds and all kinds of things.

**Marina**: They look like new, like they're just there waiting for you to open.

**Oliver**: It's one of the most amazing things about having unopened letters in the collection you can delve into.

**Marc**: Yeah. So we mentioned letters before, so this is something definitely that I've come across quite often. I've also found quite a few and worked on quite a few playing cards, which is always very nice and an object that we would not expect in a collection like this. Like a letter basket that was squashed in between different documents. It's also something that you would not expect in an archive either. It was very nice to kind of work on that. And I think one of the most striking thing that we've worked on recently has been a pristine sweater from 1807 so I think that was also very cool to find that in the Prize Papers collection.

**Oliver**: So what are the challenges that you face when you're working with a collection like this?

**Marina**: I think the most the main one is what to do when you find this collection, and what, who is getting involved in that, and how we can preserve that without damaging the material, without doing any harm? And how and when and why what we are doing? So, are we housing this in a different way? Are we separating this to the collection? Are we opening? How we deal with this?

**Oliver**: So everything is basically dealt with on a case by case basis.

**Marina**: Yes, in this collection it is pretty much one by one, and depends what you find, what? What's the community that belongs to? How? What is the historical, cultural value of that object?

We have different... we have different conversations and how to get to the best solution for everyone, and mostly for the object. And then I think I need to say here, at the same time it is imaging is a digitization project, so we also need to work with speed. So we have to think about all this, and at the same time, it needs to be sent to the imaging in the next month, so we don't have all the time in the universe to do what we wanted, and that plays a bit with our aims.

**Oliver**: I think people, when they see something digitized as a flat image on the internet that comes straight to them, they don't necessarily think of the long chain that has gone through before it gets to them, of which conservation is a very important part. If it's not in a good physical condition, it can't be imaged with a collection like this.

**Marina**: It is a long way between the historian and the image online.

**Oliver**: Exactly

**Marina**: And you need to remember that sometimes.

**Marc**: Yeah I think I'll add to that by saying that I think one of the challenges with this collection is also the fact that a lot of it is non, non-textual items. So it's not what one would expect in an archive either. It's like, it's almost like a museum collection in itself, because of the three-dimensionality of most of the items it can encompass what you would expect in a botanical garden in a museum. And so I think this is one of the challenges that we found in collection care, but also as a scientist, is also to deal with all of those various materials that are not what this necessarily... we are equipped for in the scientific department of the archive. So I think this is where the challenge lies for the scientific analysis is the three-dimensionality and the materials they are made of.

**Oliver**: So Prize Papers puts you through your paces

**Marc**:
Exactly.

**Oliver**: Trying new things.

**Marc**: Exactly, it's never boring, always, always something new, something to learn, something to look for.

**Oliver**: In the first episode, I was taking Chloe around, and I was showing her an awful lot of letters, which you have an enormous amount in the Prize Papers, we estimate around 150,000 so I think we need to talk about how each individual letter still needs some kind of preparation, still needs to be worked on. So when I think about what that looks like, how it's done, how you work with the humble letter that we have in the collection.

Marina, tell us a bit about how you would deal with letters when you receive them. So you receive a box of 3000 letters. Probably be several boxes of 3,000 letters, but say you receive a large box of letters. How would you work with that?

**Marina**: So when I get these boxes, which they come as like...a group of 10 or more with 3,000. I open one by one. They're divided into bundles, and then we go orderly through them. And if it has been decided before that we're going to open them and then seal them. I can cut around the seal, the wax seal, or if they have another material we can use some chemicals to try to open them.

**Oliver**: And what are the chemicals you would use on that?

**Marina:** Now we have a technique to use a gel impregnated with some enzymes, so the enzyme can eat through the starch and release the paper from the seal itself and it releases very nicely. It's beautiful, but we have much more of the wax sealed letters, so usually we just cut around. And it is amazing. When you open one, you do know that they make a noise because they have a lot of sand inside.

**Oliver**: They rattle, don't they. The closed letter.

**Marina**: Yeah it is almost like music, because you know you're going to open a very dirty one, and you know it's going to be full of sand.

**Oliver**: The sand would have been used to dry the ink.

**Marina**: The sand is to be... used to be used to dry the ink and it is it still there, and it's colourful. It's pretty, but you need to unfold that. And I usually would flatten all the folds or the creases. If you have creases, we need to, like, try to maintain that open as flat as possible. And if you have any tears or any damage, if opening the wax seal, if you've torn the paper, or if they've been open before, then we need to fix that so you don't have any edges, you can mistakenly mishandle, and then you can lose a part of your text.

**Oliver**: Don't you use something called Japanese paper?

**Marina**: So we use a tissue, a very thin fibre tissue impregnated with gelatine. And that is, we re-moisten, we put a bit of water when I'm treating, and then we make an infill, and we just put that on top of the paper, and using the iron, we dry really fast, fold back again, without the sand, without the tears, and send to imaging.

**Oliver**: So you, yeah, you really get to sort of see it for the first time. You get to see for the first time somebody else's mail.

**Marina**: Yeah, it's amazing, because you have, like, the history in your hands, and we open for the first time, you find samples of rings or textiles or silks or beans. But it is also quite sad, because you know that that person never received that letter. And yeah, we found some of people saying that the father passed, passed away, or something happened in the family, and you know, they never got that information, because it's here with us.

**Oliver**: Now, we just have to hope that they sent it in duplicate, put the letter on another ship and sent that off.

**Marina**: Yes.

**Oliver**: So with sealed letters, there is also the possibility, I believe, although I don't understand very much about it, to view what is inside the letter without physically unsealing them so they still remain with a wax or a starch seal closing the letter up. Marc, can you tell us a bit more about this technique?

**Marc**: Sure. Um, so there are different ways of doing it, and so I think one, one of the key, important aspects of it is that in the 17th and 18th century, a lot of the letters were written with iron gall ink. So it's an iron-based ink which will show up very well in a lot of different techniques.

**Oliver**: Can you tell us where iron gall ink comes from?

**Marc**: So the main ingredient from the iron gall ink is this oak gall, which is this oak tree fruit in which a worm died inside. And so this is what has been used to create the dark colour of the ink and then mix with different chemicals to make to make it an ink. And so because of the iron content of it, it's very easy to identify it with different techniques. So what we have looked into is using x-ray fluorescence technique, where we shoot-ray to the letter to map the distribution of the iron across the letter. And so you can get that from different layers of the letter, so you can recreate the content of the letter without opening it up.

**Oliver**: So when a letter is closed, you've got to imagine that it has multiple layers

**Marc**: Yes

**Oliver**: Of paper inside, because it's been folded up in on itself.

**Marc**: And it's often written on both sides of the paper as well. So you have to kind of differentiate between different layers. And so one way of doing it is with this technique. But we also worked recently on another technique, using Raman spectroscopy, which uses, instead of using x-ray, we're using a laser. And so we were able to recreate partially the sentences in between lines from one layer of paper inside. So not the paper you were seeing as part of, like the envelope, almost, but the layer underneath. And so we were able to get like, three layers of writing in one go, which was very exciting.

**Oliver**: Am I right in thinking that what the testing is doing is basically picking up the iron? In the ink and displaying it on a screen?

**Marc**: Yes, so basically, while the technique will either look at the iron and display its distribution

on a screen, so basically, whatever you are scanning, you will be seeing the distribution of the iron on a computer screen, or whatever image you're producing. Or you're using whatever signal for the Raman using another type of signal, but you're displaying the signal in the scanned area of what you're looking in the letter,

**Oliver**: So we can see the iron and the iron gall ink.

**Marc**: Yes.

**Oliver**: Displays, and you can read...

**Marc**: Exactly

**Oliver**: At least part of the letter, and then scan through the different layers and theoretically piece the letter back together exactly.

**Marc**: And so I think sometimes it's enough to get the content. Sometimes it can be used to just figure out if it's worth going through the opening of the letter and doing what Marina has been talking about. Which is kind of cutting around the wax seal to unfold the entire letter and get a full on visual access to the content. So it can be either a full on alternative to opening a letter, or it can be the first step prior to opening the letter, depending on how much content we access, non invasively.

**Oliver**:That's fantastic. And I think this speaks to what we were talking about earlier. Where we talked about the decisions that are made on a case-by-case basis with the collection as far as conservation goes. So from here, there's a really good example we can move on to when we're talking about exceptional things in the collection. Which is we can talk a little bit about a sweater that we found recently.

So Marina, start with you, because you were probably the first person to see this object, weren't you? So tell us a little bit about the sweater that we found.

**Marina**: Yeah, so that's some amazing collection that we discovered, byy chance. a reader was

searching through the boxes and found these sealed packages that we knew could be from the Faroe Islands. But no one here could read Faroese, so we were a bit... we weren't sure where we could go from that, and we just after a lot of decision making, we decided, as Marc told was talking now... For this specific collection, it would be more interesting to open most of the packages so we would know what was inside. We could work with that. And we don't have anything like that in a collection. So it would be the first time for us to understand what was this material. We had the package. One of the packages was torn in the side. So we knew we were like, dealing with a knitted material, but we are not sure about exactly what, and so that was the first side of the collection was opening this package.

**Oliver**: So these are amazing things, these packages, weren't they?

**Marina**: They are beautiful.

**Oliver**: Because It looked like how you would wrap a package up today. So sort of tied round with string, yeah, around the around the outside. And then they were kind of round. They weren't that large. Were they?

**Marina**: They were not large. They were quite small, maybe like 20 centimetres. Yeah, and very well wrapped full of wax seals everywhere to protect the documents. And the letter itself that was explaining what the packages are, was inside this wrapping. So we could not even only open the letter, the letter and try to figure out what was the package, because everything was wrapped together. So we, we first imaged everything. So we have now the images to do photogrammetry, and then we record every single step so we can recreate it if we need it, and we know how exactly the packages were preserved and made. And then I had the privilege to open to unseal all these packages, we left one behind for scientific reasons and yes, was a magic moment to unwrap this tiny package and find a pristine, amazing red sweater that we later on discovered was a gift. That from to a lady to another lady, and from 1807, in the Faroe Islands. And, yes, it is exactly, what I think conservation should be, that all the time discovering new things and finding this pristine material, is the time capsule.

**Oliver**: And it's exactly, exactly right. I mean, when we're thinking about this, this jumper, it seems very small, doesn't it? When you look at it, and when the package opened, it stayed right in its

place because it had been rolled up, yeah, for so long, it was rolled up into a small ball, almost. And it's, it's red. It almost, to me, it looks like when you think about how a Scandinavian jumper looks, it looks like that, but it was quite a special example.

**Marina**: Yeah, it was a very unique pattern. Afterwards, when people started researching about it, they don't have another one, another pattern like that in the Faroe Islands. Or as far as we know in the world, so it's unique. And then we see the significance of opening. And now we have that, and we have a very close partnership with the Faroe Islands. So they are here. They are researching on that. And, yeah, once you open, you have that tiny packaging, you have this entire piece that is so important for them. It makes everything worth it.

**Oliver**: Knitting is so important in the history of the Faroe Islands.

**Marina**: Yeah, the shapes and, like all the culture of like knitting. We did also have other pieces in the same collection that were amazing too, but not as... It doesn't look the same as the red sweater.

**Oliver**: The jumper was The Showstopper, right there?

**Marina**: Yeah

**Oliver**: Marc, so Marc, I know that you've looked at the jumper, you've done some testing on it. Can you tell us a little bit about what you found out about it through your work?

**Marc**: Sure. So I think with the jumper from the get-go, it was very interesting because it picked the attention of everyone from this little piece of wool that kind of showed up in the corner of the of the package. And so from that moment on, there was a very collaborative approach with conservation, where, and if we can see the package and the jumper as like a patient, for example, I as a scientist, I was kind of acting as a GP where I was doing some tests to figure out what it is... what may have gone wrong, what could it be, so that Marina, as a conservator, could act as a surgeon. Kind of like fix whatever needs to be fixed in order for the item to kind of go on display, or be able to be displayed and ready for the press and everything else. So I think when you come to all the testing that I've done, the same way GP would do tests on a patient, I did a lot of imaging

in different modalities, which allowed to identify the colourants, which allowed to identify the fibre. So, for example, the red and the blue in the in jumper, were made of wool, when the white was cotton.

**Oliver**: So the wool could have come from the Faroe Islands, whereas the cotton would have been imported

**Marc**: Exactly.

**Oliver**: So it shows kind of the object has these sorts of global connections.

**Marc**: Exactly. And then I think on top of that, we were kind of also looking at the idea of the wool to try to understand the trade that could have happened in the Faroe at the time. Because in the 1600s and 1800s there was a massive reduction in sheep in the Faroe Islands, so they had to import a lot of them from other places. And so identifying what type of breed it could be could also give a lot of information about how it came to be created and how the Faroese kind of viewed the global trade.

**Oliver**: You can tell us about the genealogy of Faroe Islands, sheep?

**Marc**: Well, yeah. I mean, I can do it here. It's not something we can do in-house, but we are partnering with the National History Museum here in London to do those DNA kind of analysis the on the wool, to get that?

**Oliver**: So are we going to be able to tell what the sheep's name was?

**Marc**: Oh, maybe. Who knows? Yeah.

**Oliver**: Yeah, one thing that I often feel when I work on the Prize Papers is that I don't know anything. I've been working with this collection for about five years now, and it has this constant capacity to surprise you. You look over something, it's the first time you've ever seen it, you think, what is this? And then you look it up online, and it's a well-known thing that one particular community knows. But because you have to discover things about so many different parts of the

world, I find the challenge of knowing about a lot of different places to a kind of moderate extent is a really challenging aspect of this collection. So that's how I found working with the Prize Papers. Marc, how about you?

**Marc**: For me, I think one of the challenges that I can see is the diversity of the materials that are being used. I think again, as a scientist, we are kind of used to working on a singular type of material. So when you have to deal with the price paper, it can be colourants on one end, pigments on the other one, fibres and so it's, it's a lot of things that come our way, that we are not, I mean, similar to what you talked about, that we are not necessarily expert in. So we have to, kind of like, really delve into every single project, every single item, with a brand new eye and be open to any discovery that may happen, because also some items might come from the Caribbean, some items might come from Africa, some items might come from the northern countries. So it's also a very vast origin, which also comes with a massive amount of materials that are very different from one place to another. So I think that's one of the aspects. And then the other aspect, to me is the technological aspect of our instrumentations against the materials, because obviously, dealing with such a vast array of materials, you need to have the instrumentation that can tackle that type of large possibilities in materials.

**Oliver**: What kind of range of materials have you dealt with? You dealt with the wool and you deal with cotton?

**Marc**: Yeah and then it's colourant. I mean, when it comes to organic colours, it's, it's a plant that is different from another in different countries, so it will be very location specific. And so I think that's when, for example, it becomes very challenging. And then when it comes to the letter basket, it's the fibre, and then the dyeing. And so we believed, originally was painted because we were able to see iron, but it's actually mud dyeing, which is something that is very typical from Africa, but might also be something that has been used in the Caribbean. So it's, it's all of those kinds of various types of materials, organic, inorganic, from all over the world, which makes it super interesting, but also super challenging.

**Oliver**: And you have to work, collaborate with other people who know more.

**Marc**: Exactly. So that's that point that you have to be open to, to open up what you're doing to

other institutions that may know much more than what you do, or more equipped to tackle those kinds of challenges.

**Oliver**: And how about you? Marina, how have you found working with Prize Papers?

**Marina**: I think working with the Prize Papers is humbling. It's every day is a different day. You never know what's going to get in each box. And is, yeah, it is, is a challenge, because I don't have a lot of conservation experience. I'm a new conservator, and my degree is in paper, and maybe, like, a third of the collection is parchment. So that's already a simple thing that we deal in an archive every day, but it is new, and every piece of parchment is different as every piece of paper. And then every time you open a box you do have textiles or seeds or notebooks or covers you have, it's every day you don't know what you're gonna get, and you're gonna learn something different, and you're gonna need to talk to someone different, to like, explain to you what you are dealing with. And I think, I think it's like, is a learning curve, but it's is an amazing opportunity.

**Oliver**: And it all comes initially squashed together in boxes, in an order that is not clear, and then someone like me puts it into what's roughly an order. But what you have to do is you have to make a decision about, how can this be kept together in a way that can be used by people and be preserved in the long term, right? So you have to think about how it's to be housed and things like that as well.

**Marina**: Because it's not just been well, you need to make them accessible and proper to image. But then how you do that, and you still after, when the reader comes in to see. Can they touch that? Is that safe? Can it say... some of these things are maybe stolen. They might be stolen. So you also need to think about security, and then how, how fragile they are, and how fragile for the light they are. So everything you need to do, and if you need to put in a different box, if you need to change the folder, or how we're going to manage all that and still make that to fit in an archive. Because we still need to lead with deal with all the space. It's yeah, you have a million things in your mind every single second, and it's just amazing.

**Oliver**: As just a thought on that, I once found a quill in the Prize Papers used for writing, and it was pressed between the pages of a captain's notebook. And I think you told me that it had been treated with mercury chloride, so obviously

**Marina**: It cannot stay there anymore.

**Oliver**: No, it can't stay there where everybody can handle it. So that's sealed off in a box now, and I think it says “caution, mercury chloride” on the outside.

**Marina**: Yeah, you can find pretty much everything.

**Oliver**: What do you think that you could both do in your respective fields now that you weren't able to do five years ago?

**Marina**: Well, five years ago, I wasn't a conservator at all, so I think that's a big change for me. But yeah, I think learning new techniques, and maybe with the Prize Papers, working with parchment is something that I love doing now and I couldn't definitely do five years ago.

**Oliver**: So what do you need to do when you think about working with parchment? What are the concerns that you have?

**Marina**: I think your first instinct is similar to paper, because you are writing, it’s a letter, is exactly the same, but then it is completely different. It is from an animal, as is much more sensitive to everything. And so, yeah, every treatment I've learned how to do it when applying to the parchment, it doesn't work the same. So if I can put a piece of paper in a bath of water, I can never do that with some parchment. But I also, I also need to have them flatten. So how do I do that? How I hold that? And it's, yeah, it's learning.

**Oliver**: How do you put paper in a bath of water?

**Marina**: Oh, you can just, you can just put it there.

**Oliver**: But what does it do?

**Marina**: It cleans. It removes the yellow. Or if you have foxings, if you have any stains, you can clean the entire paper putting in there. Is, we don't do that all the time. Is that, is very interventive,

and you need to consider it all the aspects, the ink and everything you have on top. But yeah, we can. We can do that. We can clean letters and documents, putting them in water,

Oliver: Okay, and Marc how about you? What? What do you think that you can do? I mean, you've been a heritage scientist for a while now, so what could, what could you do now that wasn't possible five years ago?

**Marc**: So I think for me, what I can do now that I didn't do five years ago is probably around imaging and 3D rendering. So that's first, even though I've been a scientist for heritage for a while now, this is not something I was trained in when I started, so it's something that I got into much later on. But it's also, while it's not necessarily a new technique, it's a technique that has been around for different fields for a long time. It is something that kind of arrived in heritage, in the heritage science field, with a bit of delay, and so I think we are using it quite extensively now, but five years ago, it was not that accessible to a lot of collections. So I think this is kind of where a lot of our research kind of revolves around with the imaging in 3D rendering, which was not that prominent five years ago.

Oliver: So what does it look like when you image something in this way? To me, it just looks like a large device that you kind of take some kind of picture or scan with,

Marc: Depends on the type of imaging. So you can, you can do photogrammetry. I think Marina mentioned that earlier, you can do photogrammetry with just a camera. Then it just like you just take hundreds of pictures from slightly different angles, and then you just create a 3D lattice, and then put all that together, and then you can just recreate a digital object that you can just move around to look at it from very, a lot of different angles. So it's, it's, it depends

**Oliver**: Is that when you put the object in a dome?

**Marc**: No, that's RTI. So that's reflectance transformation imaging. And this is used to kind of get the topology of an object. So if you, if you have a textile, for example, if you have a basket, you can get a much better, much better idea of the way it has been weaved and so but again, you get an image that is a 3D rendering of something that otherwise would be 2D on a computer screen. So it's a much nicer way for the audience to really enjoy the object in all of its dimensionality.

**Oliver**: In great 3D models that look almost exactly like the physical object.

**Marc**: We do, yes

Oliver: Which is remarkable. So talking a lot about technology and the advancements in technology, instead of what was possible five years ago, what's going to be possible? In five years time. Marc, what do you think?

**Marc**: So, I think I mentioned a bit earlier, trying to get access to content without opening the items. And I think this is something that is of quite of interest to the field in general right now. And I think this is something in five years time that will allow to get … that will be much more feasible. So we, I think in five years time, I mean, I don't, I wish I had a crystal ball, but in five years time, I think we'll be able to read all of those documents without opening them, without, like with conserving the entirety of the material, the letter locking, for example, will be conserved, but we'll still be able to get access to the letter content.

**Oliver**: It's interesting to hear about this, because a lot of the developments that we think about with heritage science here is about becoming less interventive. That's a term that we often hear, right, or I hear from you guys, which is that it's about trying to minimally change the object of your research when you're trying to access it for research if people want to access it for research or to find out more about it.

**Marc**: Yes, I think a lot of a lot of the development in heritage science is trying to be less invasive. We really like in the field the non-invasive, non-destructive techniques. And I think all of those imaging techniques are the epitome of that is definitely not invasive, is not destructive. So you keep the integrity of the material, but still get a full understanding of the materiality and the content, which I think is working in an archive with the work on paper is something that is something very well received.

**Oliver**: So thinking about advancements, advancements in conservation, I think back to some of the material we see that's been conserved from about the 1950s or the 1930s and how it's been very, sort of interventively conserved, if that's the correct term, almost looks like it's been put on

card and had a mesh put over the top of it, and you can almost barely read the writing. So Marina, how do you think from this kind of I've seen already, that a lot of what's done now is much more delicate, shall we say, and is still just as strong? So where do you see conservation in five years, or techniques that you can use? Do you see anything that's going to be..?

**Marina**: That's quite a big question. Where I see conservation. I can answer where I see myself in five years with conservation. Yeah, I'm gonna agree with Marc and mimic you, I think intervening less is the answer. Is the key. I think we are walking to... we are following a path to intervene less, and now we know we don't need to do so much that the paper is strong enough if you house that correctly if you preserve it in a certain way. We can understand better the material with help of the science and understanding better conservation itself, I hope we can do always less but it's still helping. It's still trying to conserve everything we have, not stopping doing conservation, but just doing it in a better way that's going to keep the materials as much as possible in the way they should be naturally.

**Oliver**: Because we don't know how people are going to interact with this collection in the future, do we? We don't know what they will care about or what they will value in the collection. So the more we change it, the more we possibly impede the use of the collection by future people.

Thank you both for coming, Marc and Marina. I feel like I know somewhat more, but I would still be out of my depth if I were trying to do any of the work that you do. So thank you for taking the time to explain it to me and to the listeners as well, because I'm sure it's this is a new world for most people.

**Marc**: Thank you, Oliver, looking forward to working on all of the other objects from the Prize Paper collection.

MARINA CASAGRANDE:
Thank you, Oliver. It was great to be here, and I hope people like and understand a bit more of conservation now.

**Oliver**: For the next episode I'm going to hand back the mic to Chloe. It will be the third and final episode in this mini-series on the Prize Papers, and Chloe will be meeting the historians Lucas

Haasis and Annika Raapke Öberg. Lucas and Annika have been researching some fascinating stories discovered in the Prize Papers collection - stories that give clear insights into global trade, colonialism, and the lives of the people caught up in these huge shifts in the 17th and 18th centuries. Thank you for listening.

**Chloe**: Thanks for listening to On the Record from The National Archives. Please rate and review us where you listen, if you can.

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Finally, thank you to all our experts and guests who contributed to this episode. This episode was written, edited, and produced by Tash Walker and Adam Zmith of Aunt Nell, for The National Archives.



You'll hear from us soon!