

Russell Pilgrim:

Hello, and welcome to the special edition of Jacobs Inflection Points Podcast. Today, we are joined by Mark Wild CEO of Crossrail and Donald Morrison, Senior Vice President of People and Places Solutions and Digital Strategies at Jacobs. I'm Russell Pilgrim and I'm a program director at Jacobs overseeing some of the company's key contribution to this iconic project. This podcast will showcase Jacob's role in working in partnership with Crossrail on the development of the Elizabeth Line, amplifying its social benefits whilst providing insightful key lessons, for future major infrastructure investments. Welcome Mark and Donald, how are you today?

Mark Wild:

Thanks Russell. Yes. Delighted to be here. Very much appreciate the invitation.

Russell Pilgrim:

And Donald.

Donald Morrison:

Hey, thanks Russell. Yeah. Great to be here today and great to be speaking about this state of the art new railway and the legacy it's creating.

Russell Pilgrim:

Excellent. So, today, firstly, we'd really like to explore the uniqueness of this project and how you've delivered something as transformative as this in such a scale and complexity. And as we've got listeners from around the world, we should start by giving the introduction to the Crossrail project and program. And also we'll then go on to Jacobs in the UK as well, Donald. So Mark, can we start with you?

Mark Wild:

Yeah. So Crossrail, a lot of people will know what it is, but if I just explain a little bit about the geography of London, that there are many North South Routes in London, in public transportation. And people will know London's uniquely I think, like other major cities has a very dense urban network of mass transit. But for decades, even for 150 years, it's been recognized East West routes in London have been more difficult to achieve largely due to the topography of the river, the ground conditions. So I think since 1834, a new East West route in London has been planned certainly after the Second World War, when London was being rebuilt, people thought about it then, they thought about it in the seventies.

Mark Wild:

And finally in around 2005, we achieved the ability to build this epic project, which is a new railway east to west, west to east, across London and crucially creating, not just big trains coming into terminus stations and they go into little Tube trains. Here we take suburban mainline trains from the east and west, from Heathrow and Redding and Sheffield in the east. We take them directly into the central core. So this is very much a game changer project decades in the planning.

Russell Pilgrim:

And Donald, on Jacobs in the UK. Could you explain to the listeners about this company?

Donald Morrison:

Yeah, thanks Russell. Jacobs employs more than 10,000 people in the UK. We've got 150 year business heritage in the UK, and we've made a long term commitment to invest and grow here. We've got a really highly skilled talent market and a strong infrastructure pipeline in the UK. So, we're really keen to grow and invest in our business here and export that talent globally. We're also really delivering a number of challenging programs which benefit communities in the economy. And I think that's something that we often forget about. And programs like that are critical to building Britain and London's future. We're helping tackle some of the UK's most complex challenges to make the future better, supporting projects, to safeguard the environment and improve security, connectivity, resilience, and productivity. So we don't just do these projects for the sake of it. And I often challenge our people, we should be constantly looking to find better ways and impactful solutions that help adapt and mitigate climate change, drive social change, spread prosperity, and meet the growing challenges facing our communities. So it's not just about the programs.

Russell Pilgrim:

That's great. And Donald, could you describe a little bit about Jacob's role on Crossrail as a program?

Donald Morrison:

Yeah. Keen to do that Russell. I think, so many people don't appreciate the complexity of these challenges and how long and why these programs take so long to just state and then deliver. So our relationship with Crossrail goes back a long way. We've provided a range of services to Crossrail since 2001, right back to the early business case development. And then from 2009, as the program partner, part of the Transcend Joint Venture. Since 2019 Jacobs was also supported as program delivery lead. And we've most recently helped this iconic program move into the Railway and Other Guided Transport Systems Regulations, perhaps the biggest step in the Crossrail journey towards passenger service. Again, the complexity of doing something like that on a program of this scale is often underestimated. So, it's great to be enabling Transport For London to get to this point, where they're controlling a live railway, which is safe, reliable, available, and maintainable.

Russell Pilgrim:

And with Donald talking about Jacobs and their role, Mark, and the current phase we're at with the program, it would be good to explain to the listeners a little bit about the current status.

Mark Wild:

Yeah. Well, first of all, thanks to Jacobs. I remember one of my first jobs in the railways. I started in an energy background, but in the late nineties, I had a job in York, which was in the middle of England that people might know. And in the next office were Jacobs people are working on something called Crossrail. Little did I know, 24 years later, I would be shoulder to shoulder with Jacobs getting this project over the line. I suppose, where are we at the moment? We're very much in the home straight. We are right in the middle of what we call trial operations, which is the fares, which is kind of the dress rehearsal.

Mark Wild:

The infrastructure's complete, we're tuning up this digital infrastructure to be the highest reliability and crucially, and it might become a theme of this podcast, we are helping the operations and maintenance people get used to it. So on the day of opening night, people expect this system to be flawless. We spent the best bit of 20 billion pounds on Crossrail over the years. And for that investment, our customers

have every right to expect it to work seamlessly when it opens. So where we are right now, Russell, is we are in the process of finishing trial operations and preparing for the opening of the railway, which will be in the next couple of months.

Russell Pilgrim:

Excellent. And that moves into a really good area in the learning legacy side of Crossrail. We can't talk about the development of the Elizabeth Line without discussing some of the fundamental challenges we faced, both technically and delivery and integration. I think the listeners will really be interested to hear, how we tackled these Mark and also the gaps, how we found those gaps and intervention on the project. Could you just give us an overview of the key challenges and how we overcome them?

Mark Wild:

So construction on Crossrail started 12 years ago, 2008, 2009, is when we started. And it's fair to say, 75,000 people have worked on this program. And in the early years of this program, the biggest risk that was perceived was the tunneling drive underneath London, which is one of the most difficult places on earth to drive a tunnel 30 meters down with big underground stations that are typically 10 stories high buried in the ground. So for the first four or five years of Crossrail, it was an outstanding success. So, all the talk about building Elizabeth Line, we have to recognize the incredible job done by the civil engineers at the very, very beginning. Probably I think in this century, one of the greatest engineering achievements to produce a 22 kilometer dual bore tunnel, 30 or 40 meters below London with 10 stations in it.

Mark Wild:

But really the challenges of Crossrail are worth thinking about, that by the time we got to 2018, we had an end date, an aspiration, that was fixed many years ago to open the railway in December 18. And it's, as everybody would probably know, the project got into a lot of difficulty in 2018.

Mark Wild:

The volume of system integration, assurance, reliability, growth, what you might term the technical end of completing the project was greatly underestimated by the project team at the time. And I took over at the end of 2018, and as much as we're at the end now, it has taken us three and a half years to really integrate the system. So I think the key lessons Russell will be something around preserving the great things that have happened on Crossrail, the civil engineering, the business benefits, the oversight developments, the community engagement, but there are many lessons in how this railway has been brought together at the end. And in many ways we haven't just built a railway. We've built an epic digital system, which I know is a particular interest of Donald and Jacobs. And I guess my real passion is that the lessons of Crossrail good and bad are kind of learned.

Russell Pilgrim:

And Donald, you're involved in a number of major projects internationally at the moment. Why is this such a technically complex project to work on? And how can we help similar projects of the future?

Donald Morrison:

You know, it's a great question Russell, and I'm sure it's one that's in so many individuals minds around this program. I think one of the first times I ever really saw detail on the program. It was in the BBC

documentary. And I think at that point it was described as threading the eye of the needle through one of the most congested subterranean London environments. And I think, in a number of programs, I think we need to take a really open view and actually realize where some of the biggest risks lie. And they're not actually in some of the civil engineering. They are around the integration. And I think it's been said of our industry in the past that we're not clever enough to make any new mistakes. I really think we're at an inflection point or we've been moving through that over recent years where we are really learning from some of the most iconic programs, things like the London Olympics.

Donald Morrison:

And there was a great government report on the 12 lessons learned there. And I think now more than ever the actual emotional and behavioral skill are as important I should say, as the technical skills. So I would think, your areas like that Mark's laid on like, the connectivity, the collaboration, and the convergence of teams to get the right behaviors there. And I think we are really changing the delivery, and we are capable of so much more through the approach that we're taking to really operationalizing lessons learned on some of these major programs.

Russell Pilgrim:

And would you like to say something Mark?

Mark Wild:

Like totally agree with Donald. And if you think about these mega programs and the time that they take to just state and the time to build, in this version of Crossrail has taken 25 years. And if you do think of the build fairs the past 10 years when we started Crossrail, I don't think the iPad existed when we first started to drill the tunnels in Crossrail. And really the profound change in the past 10 years of digitization happened during the development and the building of the project. And I think the opportunity for future customers, clients, big organizations like Jacobs, is somehow to anticipate where the risks might occur.

Mark Wild:

And they not be the conventional one, which as Donald said, was perceived in Crossrail, biggest single risk was to drill the tunnels underneath London. Once that was finished, I think the team thought there was pretty much a relatively more straightforward path to the end. In fact, the advent of digitization meant the journey was only just starting. So I think, I'd encourage all clients to start to think a bit more freely about, in the 10 years it'll take to build this, what do customers really want? What will be the technological impacts? And that might get them a bit freer about the types of teams and the types of architecture that they might need.

Russell Pilgrim:

And Mark your comment on timing, in touching on the fixed end date that was in December 2018. I'll start with you Mark, and then I'll move to Donald. But how did you feel when you realized the project was going to be delayed from its original opening date?

Mark Wild:

So Crossrail had a defined end date of the 9th of December 2018 for several years. Many years. And you know, there's a lot of talk about the Olympics, and how Olympic dates and defining dates can be more

diversional. They can, but when you're in mega system uncertainty, end dates can be deadly. And I think by the time we got to 2016 and 2017, with epic hindsight, now, of course, it's clear that the fixed end date of Crossrail drove behaviors and decisions that maybe weren't in the best interest of the whole program. And the system integration risk was hiding in plain sight. And I guess I'm sure it's in every single report that's been done on Crossrail. It's noted that the leadership team at that time were driven by the end date, meeting that with ever more extreme mitigations, rather than the ability to say uncertainty exists.

Mark Wild:

We have a window. Now, this is really tough for leaders. It's tough for Jacobs. It's tough for clients. It's tough for governments. It's tough for treasuries. But the reality is these major programs are very uncertain. There's work by UCL in London and Oxford that says, most mega programs are over budget. It's a reality. So in that context, you might want to think about uncertainty being a core competency of leadership teams, the supply chain. And certainly when I took this over with the chair Tony Meggs, we decided immediately to talk in windows of uncertainty.

Mark Wild:

And that provided an opportunity to give more space to the teams to be more realistic, because I think high performance comes from great achievements and possibilities, but it comes from hyper realism as well. And I think the defined end date, Russell, of Crossrail did distort behaviors. And I'd encourage everybody listening to this to think carefully and talk truth to power, even if it's uncomfortable. But at the end of the day on Crossrail, we probably lost about a year overall by trying to mitigate a date that actually became unachievable. And you can't really blame the leadership team. I think in future though, you have to encourage environments where leaders can speak truth to power

Russell Pilgrim:

And Donald, would you like to add anything to Mark's comments?

Donald Morrison:

Probably very little I could add to that. I think, because Mark said there it is absolutely around that environment you create and that, leaders creating an environment where they can coalesce around some of these challenges. And I think if you, again, go back to the point I was making earlier about the gestation period for these programs. I think political expediency sometimes drives the wrong decision making and we need to create that vulnerability, that transparency in the teams where they can actually, come forward and to say, "Have we thought about doing it this way?" "I see this as a risk." "How do you see that?" "How do we mitigate this as a team?" And you know, like all good programs, it's really got to be the collective effort of the team. And I think if we can really focus on that. It sounds so simple, but I think it is simple things that will take us to that next level of program delivery.

Mark Wild:

Yeah, I agree Donald and it's everybody, isn't it? It's your organization. It's governments. It's client organizations. And it's very difficult by the way, because you can see it from a government point of view. It's taxpayers money. Crossrail happens to have a very, very positive cost benefit ratio. Well over two. Even with the delays and the pandemic, Crossrail is still worth the investment. But convincing governments to spend billions and billions of pounds, you can see why it drives people to increase certainty. The real key is, to when you're dealing with windows is to drive everybody to the front edge of

it, but be realistic, that there is a downside risk. And I think future mega programs around the world will really benefit from the lessons of Crossrail.

Russell Pilgrim:

Excellent. And Donald, that goes on to my question regarding assurance. Assurance has played an important role in the handover process. Can you provide an insight into both sponsor assurance and program assurance, which Jacobs has played a pivotal role in?

Donald Morrison:

Yeah. Happy to do that, Russell. One of our key roles at Jacobs is in providing performance and line of defense assurance such as on the Elizabeth Line. Our project representative team has provided independent technical like advice assurance and oversight of Crossrail and the delivery of the new railway. This includes challenging assumptions and work in providing independent clear advice and recommendation on progress of the project to the sponsors, the Department of Transport, Transport For London representatives. And as Mark's already outlined, Crossrail is recognized for its complexities and required integration and all fronts. And I think the behaviors and the leaders that we put in there to drive that were kind of fundamental.

Donald Morrison:

And I think one of the first times I met Mark he reminded me just of the scale of the task, the half a million or so individual physical and digital assets is one area that just springs to mind. You know, how do you assure all of that? Each one of those must go through a rigorous safety and reliability check and each be issued with a safety certification. And I can still remember that day when we first talked about that, Mark. You know, as this process has been going on over the past year or so, Jacobs has provided a number of experts who are embedded into Mark's team. But it's how these experts then work together, and the team, as we talked about in the previous question.

Mark Wild:

I think that's such a great insight Donald, and I've got to say Jacobs have been really excellent partners over the whole of Crossrail, particularly in my three and a half years doing this. And I think one of the keys is you've managed to be in the program delivering and independently assuring us, in a very trustworthy way. And I think that richness has really helped us. I don't know how it's been for you being on kind of both sides of the fence. Have you found that okay?

Donald Morrison:

Yeah, no, absolutely Mark. And I think it is about that partnership that we've referred to a few times in this podcast so far. And I think, the interpersonal relationships that build up, and that foundation of trust, and that focus on creating a long lasting legacy. It's not just about the project. If we keep our eye on the longer term prize, I think that really helps motivate all our individuals. And I think the relationship that Jacobs has formed with Crossrail is absolutely founded on trust. And as you build that trust, that's inevitable, you're going to go through some difficult times, but you build trust through transparency. And I think we've done that really well as a team, with yourselves and many of the other stakeholders.

Mark Wild:

I think so. And I mean, obviously I'm speaking from my role and I think sometimes in my role, in the first year we got it wrong. We got it wrong. You know, we set our first opening window and we underestimated the challenge, even though we were given the opportunity to look at it. And I guess what I really think about assurance, and why is assurance so important? When you're a leader like me in the situation I was in, and I'm certainly not unique in it, there is a lot of pressure to deliver the goods on a date. And I think one reflection I have for people maybe listening to this podcast who are thinking of dealing with CEO's and leaders in this situation. I think they can often have three biases that are very important.

Mark Wild:

They are, tend to have an optimism bias. They tend to have a confirmation bias. They tend to surround themselves by people who confirm that this is right. And certainly in Crossrail, there's a uniqueness bias, where you tend to think "No, I'm alone and nobody else has done this before." Now, obviously those three biases are a perception of reality. And it's why I think the levels of defense and assurance are so important. And I certainly think Jacobs have done brilliantly for me and we certainly wouldn't have got here without Jacobs and our other partners. And I'd encourage every future leader, every future CEO doing a major program, to think about that 360 degree assurance, in the context of making sure your optimism bias, your confirmation bias, isn't resulting in management override. Which to be absolutely honest is what happened in Crossrail in 2017, 2018. It wasn't that the assurance wasn't identifying these things. It was just that the management had got ever, ever stronger into achieving a date that was impossible. And I think that might be one of the core behavioral lessons about why 360 degree assurance is so important.

Donald Morrison:

Yeah. And I couldn't add anything else to that, Mark. Totally agree.

Russell Pilgrim:

And Donald, I'd like to pick up on your comment about the longer term price, because really the Elizabeth Line's going to be great for London globally and nationally as well. If you think of the interconnection with Heathrow, Great Western and the Great Eastern Railways. What will it do for the era in terms of regeneration, house building and access to employment and jobs?

Donald Morrison:

Yeah. Legacy is an area I often focus on in Jacobs. We've been on a behavioral safety journey over a number of years now. And one of the best analogies I was ever given of that safety journey was, how do we actually go beyond zero? We run beyond the hundred meter line, like the hundred meter sprinter did. And that analogy worked until you Usain Bolt came along in the Beijing Olympics. I think it was in 2008, where he was so good was able to turn around at 85 meters and realize he was ahead of the pack and slow down. But I think on everything else, when you look at just where we're going, let's think about the phenomenal legacy, as a proud Londoner these days. You know, I look around the legacy that was created in London so many years ago that we still thrive on today.

Donald Morrison:

So I think that the line, the Crossrail Line we need to see as something that's going to be here for generations. And I think we need to take that step back, particularly at the moment, with all the different dynamics that are facing major infrastructure investment, and take that long term view that

infrastructure actually paves the way for social environmental and economic opportunities of national significance. You asked me specifically there Russell, around just what are some of the direct impacts and, in the back of the success of the London Olympics, in which Jacobs played a significant role, the Elizabeth Line will be a valuable enabler to Stratford's regeneration. You know, that's already been exponentially accelerated on the back of the London Olympics. But if I look at just some of the other statistics around the Stratford area at the moment. By 2030, more than 10,000 new homes will have been built on the park. Five neighborhoods with fantastic green spaces planned in will be built.

Donald Morrison:

And around a third of these houses will be affordable. And your academy has just been built, which is going to be used to educate around 2000 pupils between the ages of three to eighteen. None of that would've happened if it wasn't for that vision of that program, but the Elizabeth Line will now accelerate that. Stratford is now one of the best connected areas of London. I think last year, or sorry, at pre pandemic Stratford station was the busiest station in the UK, carrying 14 million passengers. But commuters will now be able to travel to work much more easily from that area because of the Elizabeth Line, and new jobs in construction and tourism have created a multiplier effect as so often is the case. And it's estimated that over 20,000 jobs could be created by 2030, bringing more than five billion to the local economy of just one area of London.

Russell Pilgrim:

I particularly like your point, Donald on Stratford. If we can all remember Stratford 20 years ago was one of London's most deprived areas. And now it's a thriving destination, and the local community are proud of what's been produced there. I can also Mark, give other examples, both you and I can, on Woolwich, for example, with Berkeley Homes, Custom House, et cetera, with the regeneration there, I recently saw you given update at Tottenham Court Road, which was the same. The urban realm around there has really been transformed. Can you add a bit to what the Elizabeth Line will bring from a transformative point of view in the city?

Mark Wild:

Yeah, and I'll speak as an engineer and somebody who's proud of this, like Jacobs and we are building a better world. Aren't we? And I think we should dream big. And the Elizabeth Line is a bold act of will. It shouldn't really be able to be done. It's an incredible achievement. And in one strike, we add 10% to the whole of London's rail network. We bring one and a half million people into employment opportunities. We create accessibility opportunities. At the end of our railway is a station called Abbey Wood. It's where our terminus is. It's a relatively deprived area of London. And one of the most emotional moments of taking this job is I went to Abbey Wood and I met a mother and her son who is a wheelchair user. And he can't get a job cause it's quite inaccessible.

Mark Wild:

And they were really quite upset and angry that the railway wasn't going to open in 2018, because he can't get a job. Because when it opens, this young man would only be 25 minutes away from Bond Street. And they implored me to make every effort to get it open because it mattered to them. And I think that's what we're here for. We're here to build a better world. To make it more inclusive, more accessible, make people mobile. And I certainly think the Elizabeth Line meets all of those things. And I think the raw facts are, even if it'll cost us about 19 billion pounds to build this, there are 42 billion of agglomerated benefit and it'll be here for 200 years. And I think when we look back at it, people



someday soon will look back and think it's always been there. And I think we shouldn't be shy about being bold and advocating for how infrastructure changes people's lives for the better

Russell Pilgrim:

And Donald, the World's attention is now our firmly on climate change. Hosting Cop 26 in Glasgow pushed the UK further on our target and our roads to net zero. I read recently that it's well documented that the design life for the Elizabeth Line is estimated to save over two million tons of CO2. As this forms part of Jacobs strategy, it'll be good to gain your perspective on this subject?

Donald Morrison:

Yeah, I think it's great to actually celebrate some of these achievements Russell. And as Mark said earlier, it was my 40th birthday. I got one of the first iPads, Mark. So it is just over 11 years ago. So I think Crossrail was one of the first projects really to scale sustainability across a whole program level and embed sustainable thinking into its decision making. And Crossrail and Network Rail used the Department of Environment, Food and Rural Affairs, biodiversity accounting methodology to determine the value of habitats lost, enhanced and created as a result of the project. And I think there are so many statistics that, again, going back to my first point here, we could celebrate in terms of the program. You know, things like the green roofs is delivered to a number of the stations, new landscaping, a number of the portals.

Donald Morrison:

And despite the constrained urban the nature of the fact that there was 85 trees planted in central London stations. And I think if you think about the way we're changing and redefining standards, as well as we deliver iconic programs like this, massive achievements have been made in Crossrail and programs like Tideway with regard to health and safety. But you know, the achievements on air quality alone on the Crossrail program have been significant. If a bar is set on a program of this scale, we can redefine standards in the industry have stepped up to do that. So I think there's a number of really strong legacies that we will look back on and will become just the ingrained behaviors of the future, as we then look to step up the behavior again.

Mark Wild:

It's like a ratchet, isn't it? That I spoke before that in the build of Crossrail digitization happened. The other thing that happened in the build of Crossrail is thankfully a real genuine commitment to net zero. And Crossrail is the starting point now, I think for where the journey commences for everybody else. But even Crossrail, we've done some fantastic things. You know, all of the clay that we took out of London, we built an island in Essex. It's now is a wild bird sanctuary. It has just done incredible things. And all the things Donald said about we've set the standards for environmental management.

Mark Wild:

But if you look at Crossrail, the bit I would be thinking about, and I'm sure Jacobs are onto this, we did put a lot of concrete and rebar and steel in the ground. And I think the next frontier from mega programs will be to work out how to really minimize the use of very, very carbon expensive materials, because there's no doubt we put a lot of concrete down there. And I think that'll be the next challenge. How do you build mega programs like this, sustainably? So as good as Crossrail is, I think it's the start of a journey, not the end.

Russell Pilgrim:

And Mark what's on that subject. What your view on modularization then?

Mark Wild:

Well, I think that will be one of the keys, Russell, because one of the main reasons that the system integration effort in Crossrail became insurmountable at one point was, it's pretty much, we wired this thing up in the ground. It's like building two nuclear submarines, which is kind of the equivalent of the asset base we've built. We've put them 40 meters under London and we've actually sent an army of 10,000 people down there to wire it up. It's all a bit mad really. What we should have done is really think carefully about modularization and build things in factories, tested them in factories, made them sustainable in factories, ship them to site and plugged them in.

Mark Wild:

And design for manufacturer is one of the key strands, I'm sure Jacobs are all over this. And one of your key strands to improve productivity, improve cost certainty, greatly increase sustainability benefits, will be to go for design for manufacturer. It's probably the single biggest breakthrough that could happen. Because if you can test something in a factory in the middle of England and then bring it sustainably, to site and plug it in. I think there'll be a huge breakthrough. And unfortunately the industry doesn't quite think like that. I don't know if Donald agrees, but it's quite slow to adopt design from manufacture. Do you find that Donald?

Donald Morrison:

Yeah, absolutely. I think one of the big challenges we face is that every project is perceived as unique. And there is some great work done at program level on scaling up DFM type facilities, but there's no continuity in the pipeline. And I think you then, some of these issues then just contribute to the social divide. Because you scale up and train competent labor forces who then can't be redeployed or there's a hiatus for 18 or 24 months. So I think getting some more certainty and looking at the adaptability of skills across different markets. I think this is also another really key challenge for us. We often see clients rejecting staff because they don't have experience in such and such a market. I think as we've already said in this podcast, I think actually behaviors are as if not more important now than the basic technical skills. So how do we recognize that in the industry that we don't need a railway engineer to deliver the majority of a railway project. And you could translate that into every market that we face.

Russell Pilgrim:

It's great to have this conversation on the benefits of Crossrail and also ideas for the industry, which is really good. Three questions, please. I'll start with Donald. And then I go onto Mark. But a number of people will be wondering to see whether the benefits of the Elizabeth Line, Crossrail will be still there post pandemic, post COVID 19. Perhaps people won't be traveling into the city in the same way as they used to. Do we really need to continue to invest in infrastructure over the world?

Donald Morrison:

Absolutely, Russell. You would expect me to say that. But I think as we've illustrated in this discussion so far, there's just such a compelling case. And I think sometimes we don't look even enough at the sophistication of the case. And I'll love these really personal examples like Mark shared of that young lad earlier, about the impact of this program for him. You cannot monetize that. We've got experts in

monetizing some of that. They'll probably correct me now that they can monetize that. But I think these are all the reasons why we do need to continue to invest in infrastructure. But I think we have to do it in a much more purposeful way. And you know, is it absolutely providing the most sustainable connected solution for the world at this point?

Donald Morrison:

And I would also challenge as an industry to actually think much more cross market. And are we really delivering integrated infrastructure solution? That's something I'm really passionate about. It's looking at the connectivity and trying to solve multiple problems with one piece of infrastructure. I think one of the biggest challenges we need to overcome at the moment is actually trying to solve a transport problem just with a transport solution and not being bold enough on the actual outcomes that we want to deliver for a community or for society.

Mark Wild:

Yeah, I agree. 100%. I mean, if you take a big historical context, by 1905, 90% of London's deep tube lines were built. 1905. Do we think that they shouldn't have been bold? You know, do you think we shouldn't have the Piccadilly Line? So I think in the long historical context, the pandemic is important and clearly very, very serious in patronage. But over 150 to 200 years, I think obviously this infrastructure will stand the test of time. I would say though, for all clients leaders of Jacobs leaders of train building companies, I think there is an accountability though for infrastructure. To get it as right as you can, because there's no doubt Crossrail has damaged confidence. Because there's no doubt Crossrail is 15% over budget and three years late. And we're accountable for that. So I think the industry, there's two sides of this coin.

Mark Wild:

I think governments and funders should back it. For all the reasons Donald and I spoke about. On the other side of the coin, I think there is a real responsibility of the industry not to see this as a money tree, cause there's plenty things governments can spend their money on. It doesn't have to be infrastructure. So I think there's two sides of the coin. And I know Jacobs, you're well onto this, aren't you? But confidence and certainty of delivery and realism of how much these projects will take is utterly critical Russell, to retain the confidence. Because once you've, as I found out to my cost, once you've lost your reputation, it takes a long time to claw it back. Best never to lose your reputation.

Russell Pilgrim:

So, so your conclusion Mark, in the post COVID world is that the overall long term benefits of Crossrail outweighs the expenditure.

Mark Wild:

Oh, as long as people like me and Donald can be trusted to deliver it. I think it is a dual relationship, I think. Yeah, of course it's makes a lot of sense. But governments can spend their money on a lot of things that would provide social value and social benefit. I happen to think, and I'm sure Donald does, that infrastructure's a good bet. I think the industry's accountability and responsibility is to take that very seriously. Because it costs a lot of money and we could have spent a lot of other things on 19 billion pounds. I happen to think Crossrail's going to be well worth it, but you could see why there'd be a degree of skepticism. And I guess it's our job Donald to give that feeling of certainty and confidence to our funders and stakeholders.

Donald Morrison:

Yeah. And a hundred percent Mark. And I think actually to really lead more overtly with selling the outcomes. I don't think we do a good job of that, and I think we need to be much more proactive, as we engage the multiple stakeholders. And you I use this phrase a lot, but it was said to me once I think we really need to turn the narrative around here and make sure that the general public realized that we're doing these things for them and not to them.

Donald Morrison:

And I think that's been one of the biggest challenges over many years that we have not really been as overt on the benefits. And I think we actually look at maybe the general public as a key stakeholder, as not being as sophisticated as they really are. So I think if we can really change that narrative and I think Mark, you and the team have done a brilliant job of that in Crossrail. And I know there'll be a lot more to come in the months ahead as the line opens. But I think really being much more overt around that is going to be fundamental.

Mark Wild:

I mean, one, I mean that's brilliant, "For them rather than to them." I think one thing to reflect on with Crossrail that couldn't be anticipated. One thing that happened in the digitization space. And I know Donald's done a lot of work on this. Crossrail occasionally at the very, very beginning with the emergence of digital, we've ended up with a lot of digital. That is what I might term gismology. It's actually not for the end purpose, but it's very useful. But the addition of complexity, isn't very clever. So I think going forward with digital particularly, it's got to serve a purpose, and the purpose has to be safety, reliability, cost benefit, obsolescence. Crossrail, unfortunately because it was probably the first mega program to embrace a fully digital railway, we've ended up with an incredibly complex system that could have been simpler.

Mark Wild:

And I'd encourage every future major project at the very beginning to get to things like minimum viable product, obsolescence management, computer off the shelf technology. On Crossrail we ended up on the bleeding edge in far too many areas. And I think organizations like Jacobs, I think one core competency you might want to develop is the ability to simplify. Might be the key core competency that governments and funders need. Cause it's very easy to get carried away, isn't it? With technology that we all find fascinating, but eventually doesn't serve the purpose or even worse in Crossrail sense, got in the way.

Donald Morrison:

Yeah. To totally agree in that relentless focus on why.

Mark Wild:

Yeah.

Russell Pilgrim:

So, so it's been great to have this discussion on the program in as much depth. This brings this podcast to an end. I'd just like to thank you so much on behalf of myself and the listeners. Both you Mark and Donald. So thank you.

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Mark Wild:

I've enjoyed it. Thank you Donald. Thank you, Russell.

Donald Morrison:

No, thanks both.

Mark Wild:

We'll see you on the Purple Line one day soon.

Russell Pilgrim:

Thank you.