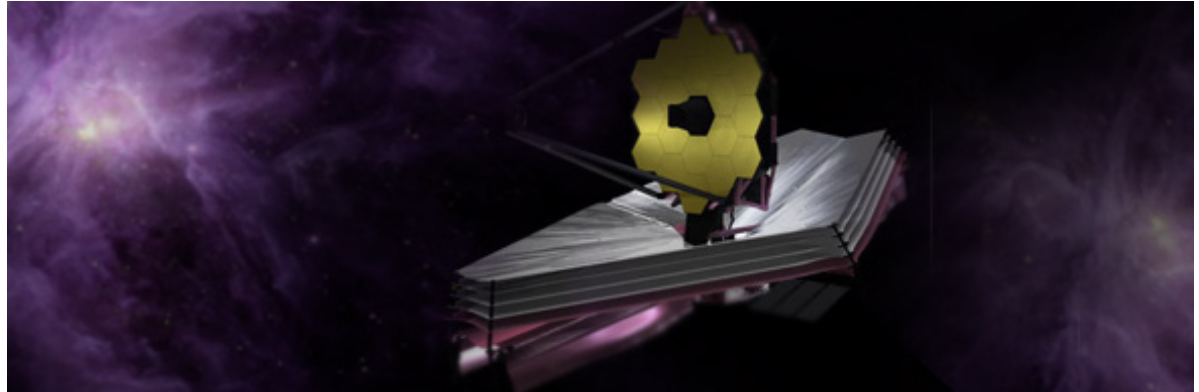




Podcast transcript:

## IBM and NASA: the James Webb Space Telescope



**LANINGHAM:** You're listening to developerWorks interviews where we feature conversations with technical luminaries and thought leaders from a variety of disciplines on topics of interest to technology professionals. I'm your host, Scott Laningham.

Our guests today are Sky Matthews, Senior Manager of Rational Industrial Systems Solutions, and Swati Moran, go-to-market manager for Systems Development, Aerospace and Defense, also with IBM Rational. Thank you both for making time for this today.

**MORAN:** Thanks, Scott. It's a pleasure to be here today.

**MATTHEWS:** Thank you, Scott, and it's great to be here.

**LANINGHAM:** Now, we know that NASA's Hubble Space Telescope which is orbiting around the earth is near the end of its life cycle, and has of course been an enormously valuable tool for astronomers.

We also know that systems development efforts have come a really long way since Hubble went up back in 1990. Tell me about the James Webb telescope if you could, a little bit, and what is the end goal of all the collaborative efforts around this and the replacement of Hubble?

**MORAN:** Sure, Scott. So the James Watt Space Telescope—or, JWST—is basically a large infrared space telescope to find the first galaxies that formed the early universe. And the capability of this telescope is going to be to see stars that formed the planetary system that connects the Milky Way to our solar system.

And it's scheduled to launch in 20-13, so 2013. And the James Watt Telescope is going to reside in an orbit that's one million miles from the earth. So that's just some background on the telescope itself.

And this is an international collaboration effort that involves NASA. And the development specifically is occurring at Goddard Space Flight Center with multiple systems integrators—so, contractors who are building this with NASA.



It also involves the European space agency and the Canadian space agency. So as you can see, it's an international collaborative effort between space agencies to build this next-generation space telescope.

**LANINGHAM:** Wow, a whole lot of coordination to do there then, right?

**MORAN:** Yes, absolutely.

**LANINGHAM:** Did you say a million miles from the earth, the orbit will be?

**MORAN:** Yes.

**LANINGHAM:** Wow, so it's outside of the moon; it's pretty far out, then.

**MORAN:** It is pretty far out.

**LANINGHAM:** Sky, how would you describe the distance between the old approach with Hubble and this new systems development approach with the James Webb Telescope in terms of generations that we've come since that old route?

**MATTHEWS:** Well, in particular in the software development, you know, as you can imagine, you really only get one chance to get things right in developing a space system like this. And the cost of errors and failures is huge.

So NASA is taking great steps to try to improve the quality of their software, and that's where our industrial systems solution comes into play, because it can help them get, you know, an order-of-magnitude improvement in quality.

**LANINGHAM:** Yes, and you know, I was reading the press release and they talked about the challenges they faced with Hubble at times when things would break down, and they were having to track down people who wrote the original code to solve problems and they weren't even working at NASA anymore. I mean, that must be pretty common with old space systems like that, then.

**MATTHEWS:** Yes, that's a huge problem. And one of the reasons that the government is very interested in moving towards more open-standards-based development is so that they, you know, they have a much easier time maintaining the system down the road. And that the skills to maintain these systems are more widespread.

**LANINGHAM:** So with this new approach at least and certainly more than this it will not be proprietary to an individual [LAUGHTER] and their knowledge, right?

**MATTHEWS:** No, absolutely. And there's a much more disciplined approach to capturing the architecture of the system so somebody else can step in. Also, the other agencies can collaborate much more easily. There's this shared sort of view of the system architecture.

**LANINGHAM:** Now, could you and or Swati talk a bit about the benefits of a systems development solution? I mean, how will it enhance the development and the maintenance process for NASA with the James Webb Telescope?

**MORAN:** Sure, Scott. So basically an integrated systems development solution, IBM



Rational Systems development solution, will help NASA and the James Webb Space Telescope program architect, build and govern these complex systems of systems.

So often on these projects the challenge is hardware and software co-development of these systems. So NASA used Rational Requisite Pro to implement basically systems requirements for the James Webb Space Telescope. In Rational Rose RealTime, they implemented the full systems model using the Unified Modeling Language which allowed them to communicate and reuse their models and code across this project or program.

And that helped to increase predictability and reliability of these systems and the quality of these systems. The quality is extremely important especially in something that's a national treasure here, which is the James Webb Space Telescope.

And then finally, they also used [Rational] ClearCase and ClearQuest to facilitate collaboration between the agency and the contractors—so the systems integrators that are building this James Webb Space Telescope allowing for asset reuse of the artifacts across the project.

**LANINGHAM:** How big is the extended team of people and parties working on this project? Do you have some sense of that?

**MORAN:** I know that there are several agencies. As mentioned there's the NASA Goddard Space Flight Center who is the prime, and it has several systems integrators like Northrup Grumman and other smaller integrators.

And then finally the European Space Agency and the Canadian Space Agency. So multiple...multiple contractors, many people building this telescope.

**LANINGHAM:** It's probably hundreds, even thousands of people involved I'm sure.

**MORAN:** Yes, possibly.

**LANINGHAM:** It makes you wonder how on earth they ever did something like this before real systems development solutions, doesn't it?

**MORAN:** Yes, exactly. So there's a lot of distributed development that's involved, and governance of these systems are extremely important.

**MATTHEWS:** The complexity of the software I'm sure in the James Webb Space Telescope is much, much greater than that that was in the Hubble, you know, and probably orders of magnitude more complicated, a lot more people working on it.

**LANINGHAM:** So trying to do it the old way would probably be impossible then, wouldn't it?

**MATTHEWS:** Yes, it just wouldn't work. Exactly.

**LANINGHAM:** Well, it's got to be a very exciting project to be a part of, and I'm sure you're both enjoying your involvement with it, I would assume.

**MATTHEWS:** Oh, it's very exciting. I've always been a big fan of NASA, and it's tremendous to be a part of something that is going to play such an important role for so many years.



**LANINGHAM:** And it's supposed to be launched into orbit in 2013, is that correct?

**MATTHEWS:** That's right.

**MORAN:** That's correct, yes.

**LANINGHAM:** Well, thank you both for your time on this. This has been very interesting. We appreciate it.

**MATTHEWS:** Thanks very much, Scott.

**MORAN:** Thank you, Scott. Appreciate the time.

**LANINGHAM:** Our guests again have been Swati Moran, Rational go-to-market manager for Systems Development, Aerospace and Defense; and Sky Matthews, software engineer and senior manager with IBM Rational.

Find out more about developerWorks podcasts or subscribe to our syndicated feeds at [ibm.com/developerworks/podcasts](http://ibm.com/developerworks/podcasts). I'm Scott Laningham. Talk to you next time.

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