



COLLECTING INNOVATION TODAY

THE HENRY FORD – CURATOR INTERVIEWS

TRANSCRIPT OF AN

INTERVIEW WITH MARC GRUETHER

ABOUT THOMAS EDISON

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BARRY HURD:

05:00:34;11

You know, it struck me, this process of innovation we were talking about. If you wanted to pick the, maybe the ultimate innovative person in America, at the top of the list has got to be Thomas Edison.

MARC GREUTHER:

05:00:44;08

Right. The poster boy for innovation and invention. Yes. Absolutely, 1,093 patents, still the individual with the most patents to their name. So, yes, he's a very strong figure, let's say. Inspiring, but he's got immense presence, despite the distance between now and then.

BARRY HURD:

05:01:05;12

Well, also, he's more, he was more than just an inventor.

MARC GREUTHER:

05:01:05;27

Uh-huh.

BARRY HURD:

05:01:07;28

The reason he became an innovator is because

he took things to market. He had practical ideas of influence. Tell me a little bit about his...

MARC GREUTHER:

05:01:12;08

His particular brand on invention is rooted in markets. And a demand for particular, technologies, if you will. Which isn't the, it's not that he was providing solutions to problems that people were fully articulating. Some of it's to do with latent needs, if you will.

05:01:30;25

So he's anticipating good markets. So, I mean, people have wanted to light the night for centuries, of course. And there were ways of pushing back the darkness, if you will. Candles. There was arc lights. There were electrical systems. Gas lights. But he was convinced, rightly, that this electrical system that could be developed, with all the various generators and conductors and lamps finally, that that would be a far better solution to that fundamental

problem. So he was really good at identifying perennial fundamental needs. But finding really, really great ways of solving those needs.

BARRY HURD:

05:02:07;18

Now what do we know about his early life? I mean, the rumors he was kicked out of school. He's an argument for home schooling. It worked in his case. Tell us a little bit about that.

MARC GREUTHER:

05:02:15;07

He had very little schooling. Which actually wasn't unusual for the time. Bear in mind, however, his mother had been a school teacher. So the amount of time he spent in school didn't necessarily amount to the amount of time he was educated. He was also from a family that had a background in some political interests. So there were books around. He grew up in an environment where learning was at least regarded as something that should be valued and pursued.

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So he's not so far out of nowhere, with no schooling and no academic underpinnings, that it should be a big surprise that he became what he did. But on the other hand, there's nothing about his early years and his upbringing that suggests anything about the heights to which he climbed in his career.

BARRY HURD:

05:02:59;11

What about the sense that he was at a young age, kind of entrepreneurial?

MARC GREUTHER:

05:03:02;21

Oh, definitely. He was selling newspapers and vegetables on trains between Detroit and Port Huron. Even as a young teenager he was employing other kids to help him on that. So there's multiple layers, if you will, of this sort of entrepreneurial spirit. Very much out there. Very eager to undertake business. Buying and selling. But getting other people involved in

that, as well. So an organizer, as well as an ambitious individual.

BARRY HURD:

05:03:30;20

And, do we know anything about what really sort of sparked him into invention? Was it chemistry? His interest in chemistry, or...

MARC GREUTHER:

05:03:38;00

Chemistry was a huge part of it. Paul Israel, and what I think's probably the best biography of Edison, points out that, of course, Edison grew up in an era where machinery was very visible. So mills, machine shops. He grew up in a period where the technology of the day was legible, one way or another. You could encounter it wasn't necessarily garrisoned away in anonymous buildings. So I think a lot of technology in its raw form grew out of daily encounters. And chemistry was of interest to him. Definitely.

BARRY HURD:

05:04:12;22

And he sort of had that magical relationship with the telegraph and electricity, didn't he? There was something about that.

MARC GREUTHER:

05:04:17;12

Well, the telegraph, don't forget, was one of the high-tech technologies of the day. And he would have encountered that on the railroad, the railroad that the Grand Trunk ran between Detroit and Port Huron. And the story goes that he learned railroad telegraphy, which is a very particular kind of telegraphy, from a gentleman who was grateful for Edison having rescued his youngster from the tracks, where there were some rolling boxcars.

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So Edison's hanging around in environments. He gets this opportunity. And that's a really big opportunity. There are ways of learning telegraphy without being taught by a master, so to speak. There were books. But that really

was a great way in. But, again, to someone interested in scientific things, technologies, telegraphy is intriguing. 'Cause it's based in, well, it's based on electricity.

05:05:00;27

Electrical signals. But the apparatus for sending it and receiving it is visible. It's mechanical. Lots of brass. Lots of gears. So I think these interests of his, these fundamental interests of his, they kind of coalesced, if you will, in that system. And, don't forget, easy for us to look at it now.

05:05:18;28

Brass. Wood. Polished wood. Varnish. It all looks all very quaint. But in that period, along with the railroads, that was supremely high-tech. It really was an amazing technology to encounter.

BARRY HURD:

05:05:29;03

And is it true that he, one of his first inventions

was a way that he could take a nap and still send signals on the telegraph?

MARC GREUTHER:

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No. I hate to say that's not true. No. I mean, he was always looking for ways, though, to automate the sending of signals. So the efficiencies of that system, the ramping up of that system to allow the multiple, sending of messages, in the same direction, and multiple directions at the same time. Those are the kinds of things he attacked. He built those kinds of refinements off the basic technology.

05:05:59;08

And, I think, definitely improving the efficiency of that system. And the speed with which messages could be transmitted. The ease with which they could be read. Those were the kinds of things that he gets involved with.

BARRY HURD:

05:06:09;22

Okay. So he's a telegraph operator. Now, take

us, he goes from there to, he becomes an inventor, at some point.

MARC GREUTHER:

05:06:15;22

Uh-huh.

BARRY HURD:

05:06:15;07

Early on in.

MARC GREUTHER:

05:06:16;06

Well, the thing is, if you've got really good skills as a telegrapher, as an operator, you've actually got a really salable skill. And it's one that would allow you to move around fairly freely. Because a telegraph officer's in all the major cities. So he does travel around. New Orleans, and all the way up into New England. And eventually he's around people who have problems with the machinery.

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And he starts to see ways of repairing the machinery. So he goes essentially from, he morphs from being an operator, *per se*, into

someone who is becoming way more involved with the fundamentals of the technology, and its repair, its refinements. And then there's this leap into invention from there.

BARRY HURD:

05:06:55;22

And is his first invention that stock ticker, the first practical, he made money, he sold it.

MARC GREUTHER:

05:06:59;02

Well, the first things that he gets identified for are the repairs and refinements to things like stock tickers. But really the first thing's the vote recorder, that's the first patented device of Edison's. And it's perfectly functional, perfectly successful invention. But it had absolutely no market at all. It was of no use to legislators whatsoever.

05:07:19;20

'Cause, in fact, it streamlined the voting process. And it did away with opportunities to undertake politics the way politics is undertaken.

So, he learned a very early lesson from that, which is there's no point inventing something that people really don't want. So that notion of invention for its own sake, go look at patent books. Thick books.

05:07:38;01

We've got hundreds of them sitting on shelves in our, in our library, here. And they're filled with devices you and I have never seen and never will see. They're patentable. But they're not necessarily of interest to people. You know, mechanical hat raisers, and all the rest of this sort of foolishness. He was adamant that he would expend his energies investigating, pursuing, refining and patenting devices that people actually wanted, that people would pay money for.

BARRY HURD:

05:08:01;16

Well, how does he moves from that...

BARRY HURD:

05:08:14;20

How does he move from being an inventor to deciding to sort of open an idea factory, as a popular term was, I guess they say?

MARC GREUTHER:

05:08:19;07

I think.

BARRY HURD:

05:08:19;14

He takes some money from an invention, roll, and decides to...

MARC GREUTHER:

05:08:21;10

Well, he, like Ford, is very much motivated by this notion of plowing your profits back into your business. So there's a sense of growth from that. I think a lot of it is rooted in his confidence. If I was asked to characterize Edison, in terms of his character, there's this immense confidence. And immense optimism.

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And I think the whole notion of the invention factory is really firmly rooted in his very real belief that the degree to which he could invent,

and the amount of inventions he could patent, was huge. And that he could scale it up. So this sort of notion of small is beautiful did not apply. It was, small seems to work. A little bigger seems to work even better. So keep scaling it up. And I gotta say that, yeah, actually, that's true for him. It gets to a point where you've got so many people working on so many things, that your role starts to shift.

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But Menlo Park, that notion of an invention factory, where you're very, very deliberately undertaking a vast amount of researchers, and patenting these things. That was really rooted in his confidence in his, it was actually, and his confidence in his collaborators. Because very early on, in Newark, he's collaborating with people very closely. People he can rely upon.

05:09:35;27

People like John Kruesi, machinist. Charles

Batchelor, who was an experimenter. Sigmund Bergmann, who actually goes off on his own, but carries on working with Edison. People who are interested in the same areas, but have very particular skills that compensate, to a certain degree, for skills Edison didn't have, but actually really allow him to scale up and trust people with elements of the invention process. That ramps up immensely in Menlo Park. It goes from about six people, when he moves there, in what? Spring of '76, to more than sixty people, and beyond, actually, as he gets into production.

BARRY HURD:

05:10:09;19

Now, what do we know about his working method with the people? Did he, did they have a Monday morning staff meeting? And then, I mean, how did he work? Did he, like, watch what they were doing then try to improve it? Or did he have assignments? What do we know about that?

MARC GREUTHER:

05:10:20;29

I think it's a bit of both. There's accounts, good newspaper accounts, of his activities at Menlo Park, in the upstairs laboratory. Going from table to table. Where essentially different experiments related to an over-arching project had taken place. So there's this sense of trust in subordinates and collaborators. But there's also this shaping facility that's going on.

05:10:45;12

I mean, think of this. If you've got half a dozen, twenty, thirty people, similarly motivated, ambitious, technically inclined. And they've got what's an essentially Aladdin's cave of high-tech equipment and materials, there's all the possibility in the world that that's gonna get out of hand as people's personal investigations and interests sort of take flight, if you will.

05:11:07;29

So an awful lot of what he was doing was trying

to direct that creativity. Not stifle it. We know about stifling innovation. But, at the same time, not letting it run so freely that it would fall apart. So one thing we do know about him, I mean, he's referred to as "The Old Man" by people who often were older than he was. So there's a kind of sense of seniority. This is deference, if you will. He's one of the guys. He's happy to be there in the morning, you know, singing songs, making merry.

05:11:36;13

You know, that kind of stuff. But he's also a businessman. And he's recognized as the leader of this laboratory. He's got to make good with politicians and aldermen. He's got to work with investors. So he's in some ways a mercurial kind of individual. Many things to many people. And he plays off of that. He knows he has to.

BARRY HURD:

05:11:53;13

Tell us a little bit about Menlo Park. I mean, at

the time it was sort of like the Palo Alto Research Center, wasn't it? One of the first, maybe it was the first.

MARC GREUTHER:

05:12:00;29 It is recognized, generally, as the first research and development.

BARRY HURD:

05:12:03;16 Tell me that story.

MARC GREUTHER:

05:12:04;15 It has its origins in his eagerness to ramp up his invention output. But also for an environment in which he knew that would reach a fuller flower than if they were stuck in Newark, New Jersey. What Menlo Park offered him was a really, really fine combination of isolation and proximity.

05:12:25;10 So it's pretty close to New York, but not too close to New York. It's got good rail connection, up to Newark and then to the Hudson, and over to Manhattan. So he can get to the investors,

and they can get to him. But they're not gonna be knocking on the door every day. So there's a palpable sense of isolation there, with a good sense of connectivity. And that's a physical connectivity, there's a railroad there, Pennsylvania Railroad. It's also via the telegraph. He's got connections to Western Union.

05:12:51;08

Western Union money is behind his being able to build this laboratory in the first place. And he's got his staff there, which he can often, many of them are boarding in that area. So there's a degree of control. It's a nice concoction, if you will, of freedom to innovate and invent. But to define the environment, and to keep people concentrated. And, again, that's a formula that holds true even now.

BARRY HURD:

05:13:16;14

Now, did they have certain assignments they

were working then? Did he have clients? Or did he have perceived needs, what, how did they know what to do when they came here?

MARC GREUTHER:

05:13:22;10

There's, from a higher altitude view, there's a mixture of things going on there. We know this production going on in Menlo Park. They're making carbon buttons, which are used in the microphones for telephones, which essentially allow Bell's telephone invention to be a practical one.

05:13:38;11

So there's some production going on. They're building some of these telephones, as well, for private purchases. There's the schemes that are being dropped in his lap by people like Western Union, refinements, certain arrangements he has with them to provide them with new inventions, new innovations. And then there's the self-directed things.

05:13:56;02

What's, I think, quite spectacular if you look at it from a certain angle, is the scale of those self-directed projects. 'Cause if you look at, you know, many people think it's the light bulb. You know, Menlo Park, Edison, the light bulb. The light bulb's the most visible result of his successes. 'Cause his successes are rooted in devising an electric lighting system.

05:14:20;18

So that's the over-arching project. And then it's all the subsidiary elements of it. So as that advances, he's got people working more on dynamos, some people working on conductors, insulation, filaments, the lamp. He's the orchestrator who's got the overview. He's probably got the best sense of the overall progress that's going ahead. But, again, he's got to provide a sense of connection for all these people.

05:14:45;06

One of the, I think we heard this when we were talking to folks at SpaceX. You know, you can work on a part for, you know, a major company like NASA, or JPL, for that matter. And it's a tiny part of a tiny thing in a large project, that after ten years gets cancelled. The appeal of SpaceX was being able to work on a part where you could see a sort of tangible progression and its incorporation into something that's tested. And that's then refined. And I think that's a part of what was going on at Menlo Park. It was scaled to a level where people, even if they had a very small part of this larger scheme, they could see their place in it.

BARRY HURD:

05:15:20;00

Now, did he have to come in and motivate his employees? Did he, how did he do that? How did he keep his idea factory running?

MARC GREUTHER:

05:15:25;09

I think his, the power of his personality is part of that. We do know, for instance, that people turned up on the doorstep just to work there. People traveled from overseas to do so. So there's a certain appeal to, there's a certain appeal rooted in his reputation. I think it's probably like anything. It's a bit like 901 Washington Boulevard with the Eameses. It's probably a bit like SpaceX or anywhere else. It probably looks immensely appealing, but for some people it actually, it doesn't play out.

05:15:52;17

There's a sort of romanticized side of it. So we know there's turnover there. But at the same time, there's very longstanding collaborators that initially are there with him, but then join him there. People like Francis Jehl and William Hammer. I think his approachability, he was a, how to put it? An uncomplicated individual. He did not come off as a prima donna.

05:16:14;21

I think he was one of the guys. "The Old Man."
You know, there's accounts of him being interviewed, and he's just, it's pretty obvious he's just wiped his hands, you know, dirt all over him. His shoelaces were untied. So he's not someone who seems remote, or ethereal, or stuck up in an ivory tower. I think he was quite obviously one of the guys. And he'd also worked his way up. You know, it's not like he had one flash of brilliance and made a pile of cash and then suddenly found himself a laboratory. He starts as an itinerant telegrapher and works his way up to it.

05:16:44;09

So I think people could see themselves in him. I actually think that's still part of the power of the Edison myth. It's not that we all see ourselves as Edison. But if you look into what he did and how he did it there's an understandability about

it. I think that's one of the reasons why he still is a phenomenal example as an inventor/innovator.

BARRY HURD:

05:17:05;13

And one, if we look at the Menlo Park years, I mean, in terms of inventions, the phonograph came from there.

MARC GREUTHER:

05:17:10;25

Yeah.

BARRY HURD:

05:17:11;25

Electric light. Take us through.

MARC GREUTHER:

05:17:12;28

The electric lighting system, refinements to the telephone. The electric lighting system's the big thing, though. There's other investigations, I mean, there are 1,093 patents, but not all of the, there's not 1,093 industries that come out of those patents. So a great many of his patents were refinements.

05:17:27;08

And I think if you start looking at the individual patents at Menlo Park you would find a great many of them also seem like dead ends, or they were later refined by Edison. But, really the phonograph. And he didn't take that to a kind of fully finished offering. He relinquishes that. He sort of puts that aside and concentrates on the electric lighting system. It's the electric lighting system that's the signature innovation that comes out of that. And all the component parts of that system.

BARRY HURD:

05:17:55;17

So, but then after Menlo, he moves to larger quarters, right?

MARC GREUTHER:

05:17:57;21

Well, actually right after Menlo he does what he has to do, based on his achievement at Menlo Park. Because the promise really is a workable electric lighting system. And that's another thing that puts him apart from, you know, prior

inventors, people like Michael Faraday.

05:18:12;11

It wasn't about just coming up with an invention, a device, or having observed a phenomenon and reporting out to your peers and walking away from it. It was about delivering on that promise. So, selling that system for use on the Columbia steam yacht, his electric lighting system on there. Small, isolated stations in factories and in wealthy dwellings, and in small communities. Those are the things that are going on after the beginning of 1880. But really his activities start to shift in New York City, because the ambition is, of course, to build a central generating system, providing power to primarily businesses in Manhattan. That's the proof of the pudding, if you will.

05:18:50;05

So he doesn't go directly from Menlo Park to another laboratory. There's a period, in fact,

where his laboratory is the real world. I mean, he's at that point trying to capitalize on his inventions. He's building dynamos.

05:19:01;25

He's got Sigmund Bergmann building fixtures. He's got separate companies building conduits and junction boxes. And all those other things. But he's trying to create the equipment that coalesced together at Pearl Street will provide power commercially.

BARRY HURD:

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Is this the point that he founds General Electric?
Or?

MARC GREUTHER:

05:19:19;02

No. General Electric comes later. That's 1892.

BARRY HURD:

05:19:21;23

Hold that one off.

MARC GREUTHER:

05:19:22;27

Hold that one off.

BARRY HURD:

05:19:24;12

So you do know more about it than I do.

BARRY HURD:

05:19:30;10

So, take us through the story now. He decides to go and electrify parts of New York City, and prove that this would all work. Tell us how did that all happen?

MARC GREUTHER:

05:19:39;08

How did it happen? Well, he's got investors, for starters. So there's a kind of momentum created by people wanting a return on their investment. And he's persuasive. And he's got credibility. If you actually look at the story arc of him as a public figure, its origins are in his reputation within the field of telegraphy. So he's known within that field, but that's a small field. About you and I knowing the real experts in smart phone technology. They're probably out there, but we, we don't know of them. They're just, they're known within the field.

05:20:09;02

What launches him into an entirely different arena is the tinfoil phonograph. That's where he essentially comes up with the device that would seem to cheat time. You know, you can recreate something that's actually finished. Which doesn't seem odd to us. We're recording this, we can replay it endlessly, if we want to.

05:20:25;25

But, you know, back then, the notion that you could reenact something that had taken place, and ended was, actually, it really is the origin of the Wizard of Menlo Park notion. And it is that notion, we think of that in a cutesy way, perhaps, but it's almost this notion of a cult capability. So he's seen as someone, my point is, he's seen as someone who really does have his act together, and is capable of doing things that are outrageously significant. And successful.

05:20:51;28

So if you combine that reputation with the investment in it, and with the very, very strong entrepreneurial streak, those are the ingredients that come together. I think the danger is, you know, looking back and seeing the inevitability of it all. And it's, like, well, there isn't any. It could have floundered a number of times.

05:21:09;28

My sense is his strength of character kind of works against that possibility. But the fact of the matter is, after he has his success there's a lot of other people move in on the field, as well. So, there's a lot of people looking for their main chance. But he's in that cutting edge. But those, I think, are the factors that allow him to do that.

BARRY HURD:

05:21:24;29

But to create this system you have to invent all sorts of things. It's more than just wires. There's, I guess there's engine behind this.

MARC GREUTHER:

05:21:32;10

The engine behind is actually, is more testament to the way the technology takes off. That engine behind is, dates from 19, 1891.

BARRY HURD:

05:21:39;04

Oh, I thought it was later than that.

MARC GREUTHER:

05:21:40;10

It's a little bit later. Yeah. It's, like, eleven years later than the tiny dynamo over there, which is the first one he made a commercial sale of. So in the space of a decade, and that's from the second major station in New York, the Duane Street Station, which took over from Pearl Street. So there's, that offers, I think, a really tangible sense of how eagerly embraced the technology was, but how it took off with a whole slew of other entrepreneurs, inventors, people looking for a main chance.

05:22:06;21

People who were actually refining small

components of it. And this testament to that whole critical mass of interest. The fact of the matter is the other thing that allows it to happen is you know, the system works. And it has advantages. If you're, if you got a textile mill, if you're working at night, you know, you need safe forms of lighting a plant.

05:22:27;01

If you're *The New York Times*, you know, you're printing in the off hours. So he's very, very, smart about where he installs that system. Down near Wall Street. People who want to extend the day for as long as possible. Deny it perhaps. Those are the kinds of people that they're gonna look at this and say, "Absolutely. Let's go with it."

BARRY HURD:

05:22:45;10

So was there a big moment that they flipped the switch, and suddenly...

MARC GREUTHER:

05:22:49;19

There's a series of moments. I think the testing and rolling out of that system had its problems, for sure. But, September, 1882 is when it's made operational. And it rolls out in phases. There are a lot of problems associated with it. There's leakage of current into the streets. You know, there's horses dancing because there's electrified pavement. There's all kinds of crazy things going on.

05:23:11;28

But again, it's part of the growing pains of a new technology. Right?

BARRY HURD:

05:23:15;21

And how did the world react, even though there were growing pains? Were, was it as amazing as the phonograph? Was he still the wizard, or...

MARC GREUTHER:

05:23:21;12

I think it's part of that. I'm not sure anything quite matched the impact that the phonograph did. That really had an uncanny, that kind of

jarred people's sense of what should and shouldn't be happening. I think, in some ways, if you're attuned to, excuse me, railroad networks, and telegraphy networks, the idea of a network system, there were canal networks, too, prior to that. But the idea of a network system is already, it's already in people's minds.

05:23:49;14

The idea of lighting systems wasn't entirely alien. There's gas lighting systems. So I think this nestled a little more comfortably in technologies that already existed. But it was certainly absolutely understood to be a major breakthrough. There's no getting round the fact the demonstration that took place in Menlo Park on December 31st, 1879, that's essentially when all the public turns up to see this fairyland, if you will, of lights. This laboratory and numerous houses had been illuminated by the system. That is a magical experience. And,

yeah, I think, as I recall, special trains were put on, to even get people there. That was seen as something just amazing.

05:24:30;24

But I think, you know, this gets to what technologies do for us. They're startling. They're eagerly embraced and then they become invisible. And they become taken for granted. I'm not suggesting that by 1891 that it was taken for granted.

05:24:45;02

It was actually probably the 1920s before regular middle class homes were built with electric wiring as part of them. It's not a technology that all of a sudden is everywhere. But it's all part of the Edison achievement. And I think the scale of it was appreciated.

BARRY HURD:

05:24:58;27

Where is Edison and his life? What age is he now? He's famous. He must have made a lot of

money. He's electrifying the world.

MARC GREUTHER:

05:25:04;24

He's plowing all that money back into research, in essence. And he starts another larger laboratory at West Orange, New Jersey. And decides to scale up the experimental activities. What starts to happen through the 1880s, as well, is he loses control, if you will, of the electric company and the patents.

05:25:27;07

And he starts looking at other inventions that he put aside. So the phonograph starts to become of more interest to him. He gets involved in motion pictures. He gets involved in awfully expensive venture into using magnetism for separating iron ore from low-grade ore. And loses millions on it. But, actually, repurposes much of that technology into Portland Cement. He becomes a major producer of cement. So he's someone who diversifies into other

industries. And, again, that's an interesting lesson. I think he's someone who didn't especially regard failure as failure. He's found ways of not doing things, right?

05:26:03;03

He lost millions on the magnetic ore separating project. But he had a lot of fun doing it, you know? So he's full of quips. You know, again, it's that optimist. It's that dust yourself off, start up, keep moving. But he carries on experimental ventures. And he dies a wealthy man.

05:26:19;13

But not the same way that Henry Ford did. You know, there's this eagerness to satisfy his curiosity. And, again, we've heard curiosity numerous times. I think that is another fundamental element of Edison's makeup. Just this insatiable eagerness to investigate. You know, he's got a holiday home down in Fort

Myers, right? He's got a laboratory there, too. He wouldn't go on vacation without an opportunity to do more experimenting. So, you know, you can't get away from it. It's part of the DNA.

BARRY HURD:

05:26:48;04

Let's go back and talk a little bit about the electric light bulb. I mean, there's the popular notion, a lot of people think he invented the light bulb. We know that's not true. But put it in the historical perspective. What should we really credit with him, credit him for, with that?

MARC GREUTHER:

05:27:00;29

With the light bulb?

BARRY HURD:

05:27:01;29

Yeah.

MARC GREUTHER:

05:27:01;28

Well, it's the refinement of an incandescent lamp, working within, in an integrated way within a larger electric lighting system. Reliably

and producibely. It's generally understood that there were twenty or so workable, to a degree, electric lamps, incandescent lamps, prior to Edison's.

05:27:22;17

I think it's safe to say a good number of them were effectively parlor tricks. There's some you could get to work for a while. But you couldn't put it in a box and sell it to anybody. And they weren't part of [an] integrated, workable lighting system. So I think that, you know, the light bulb is, again, it's another one of these enduring, iconic artifacts. It still stands for inspiration.

05:27:44;06

It's reviled as an inefficient example of electricity usage, you know? So, I think its days as a symbol for inspiration, well, they'll probably continue, but with this other darker side to their personality. But it's the most visible part of that

system. Most people are not gonna focus on buried electrical conduits or generators. Drove of generators tucked away in buildings. Although, as you can see they're rather spectacular when you can see them.

05:28:11;02

So, yeah, the lamps, the other things is you look at the early lamps, and the very earliest ones are, they're gorgeous concoctions. I mean, the thick glass, those tiny screws. You get a sense of this hand-built apparatus. A couple of hundred hand, sort-of, actuated actions to assemble one of those things.

05:28:32;25

They kind of crystallize an awful lot of what Menlo Park was about, which is the dogged pursuit of all these component parts coming together in an effective way. In this case in a vacuum. Part of a system.

BARRY HURD:

05:28:43;15 A lot of his quotes which, as I was looking at, he seems to talk about hard work. I mean.

MARC GREUTHER:

05:28:47;18 Yeah.

BARRY HURD:

05:28:47;19 There's the famous, but there's just quote after quotes, all about, just, you got to think it through, you gotta apply. So tell us a little bit, was that, he wanted everybody to be like that, or that was just the way he was?

MARC GREUTHER:

05:28:57;03 I think it's the way he was. I mean, I think he, there is that notion of the inventor/innovator as, you know, someone beset by just flashes of outrageous brilliance, and everything sort of tumbles out. And we can talk about more people like that, perhaps.

05:29:10;08 But, he, I think, was someone who did have insights, who did become inspired by things that

he observed, and investigating, and investigations he was undertaking. But he was happier to acknowledge that actually realizing those things took an awful lot of work. And, again, you align that with this eagerness to sell the fruits of those labors. And you can't sell a half-finished, half-baked, poorly made, poorly conceived idea, even if it's a phenomenally good idea. You know, ideas need to be realized.

05:29:41;07

So I think it's who he was. And I think, to be honest, he had very little patience for that notion of the, you know, the cerebral kind of out-of-this-world inventor/innovator. It just, those weren't his kind of people, to be quite honest.

BARRY HURD:

05:29:56;13

Yeah, there's a quote I saw, who knows if it's true, with Tesla talking, he said if he'd known anything about math, Edison could have saved

all the time and invented far more things. But he was puttering around. If had been a scientist.

MARC GREUTHER:

05:30:06;11

Well, you know. There's some degree of truth to that. But, again, Edison knew, and sometimes it was his investors who knew when those sorts of people should be brought in. So people with a scientific background, people like Francis Upton, who were good with mathematics, they were brought in at key points. They were encouraged often, to turn up. And once there was a kind of grass roots involvement of such people with Edison's activities more came in as well.

05:30:32;11

So, no, he, I think, was quite prone to poking fun at folks who had more letters past their name than he cared for. But he understood that that was part of the makeup. So, yeah, Tesla's,

well, of course, there's animosities there.

There's criticism, back and forth.

BARRY HURD:

06:00:56;24

Well, tell us. Edison hired a young scientist, Nikola Tesla.

MARC GREUTHER:

06:01:00;23

For a little while, yeah.

BARRY HURD:

06:01:02;05

And there's a famous, what's that famous story about how they got along and it, what it eventually led to down the road.

MARC GREUTHER:

06:01:07;03

Well, they sort of didn't get along. They got along well enough, probably to, long enough to figure out that they weren't gonna work well together. The story goes that Edison had suggested that if the efficiency of a particular dynamo could be improved that a certain sum of money, I forget what the sum of money was, would be forthcoming for Mr. Tesla.

06:01:27;23

And of course, Mr. Tesla went ahead and undertook said refinements. But then was told at the end of it that, "Well, you know, you don't understand our American humor," you know. So, yeah. At that point, the relationship ends. And then later on, of course, animosity sort of deepened somewhat. But that's the point of contact.

06:01:43;07

Actually, Tesla, comes to the Edison Machine Works with a recommendation of Charles Batchelor, who was Edison's closest collaborator. So, he came with good credentials. And he came with high hopes. Batchelor thought very, very highly of Tesla, rightly so. But they didn't hit it off.

BARRY HURD:

06:02:01;16

And later they would sort of do battle, perhaps indirectly in the famous war of the currents,

right?

MARC GREUTHER:

06:02:04;19

War of the currents, yes. And you know, that has immense appeal for people. I think rightly. I think it's rooted in, how to put it? Those inclinations to find which side you support, you know, whose side are you on kind of thing. It's, and in this case, it's really not so much Edison and Tesla. If you're gonna look at [it] from a real industry standpoint, it's more Edison and Westinghouse. Perhaps with Thomson-Houston is the other AC-oriented company.

06:02:30;21

It's definitely a fact of technological history that through the 1880s and into the 1890s there were these systems that were vying for prominence. And there were good reasons for both to be supported by the people who supported them. It's, unfortunately, involves the recommendations of alternating current for

execution purposes. So, it becomes tied into electric chairs and all the rest of it.

06:02:57;12

A gentleman by the name of Harold Brown, who gets involved rather at the, with the support of Edison. Although Edison's not directly involved, necessarily. But Brown's out there electrocuting sundry cats, dogs and other four-legged creatures to demonstrate the lethal effects of alternating current. So, there's a kind of nasty side to it. AC and DC, there's advantages to both. It's not so clear-cut, certainly not in the 1880s.

06:03:24;10

And the Edison companies recognized alternating current systems as a form of competition. But they rooted it more in economic, and sort of business issues, and to some degree, the safety issues. But it does turn bitter, as the defense mounts, if you will.

Edison is often seen by people as this hopeless sort of stick in the mud, sort of squaring off with people who simply knew better.

06:03:52;09

And of course it's easy now to look around and say, "Well, of course, this is all AC, Edison was wrong." And well, the fact of the matter is, Edison was defending the industry that he had founded and that all his patents were in. And that he understood there is an element of the degree to which DC systems were part of Edison's makeup. And the fact of the matter is, if you're going to really investigate and refine and pursue alternating current, you need mathematics.

06:04:18;00

And mathematics was not the way, you know, most of the analogies that Edison were using were flowing materials in pipes. That kind of sense of flow. So, that's not to excuse things,

certainly not to excuse the sundry execution of animals in the, with a view to proving a point. But it's very real. What you find by the end of the 1890s, you find it in a place like Detroit with a company that morphed into Detroit Edison. You've got hybrid systems.

06:04:46;24

You've got companies generating AC and DC. You've got the adoption and investments in DC and industrial installations that carries on well into the 20th century. Same with railroads. Very, very good reasons for DC motors having applications in heavy industry. So, it's not as clear-cut as people would often think.

BARRY HURD:

06:05:09;05

And so, at what point do Henry Ford and Thomas Edison become friends and I guess they, in Fort Meyers, they had...

MARC GREUTHER:

06:05:16;02

Yeah, they had adjacent holiday homes, right?

BARRY HURD:

06:05:17;26

Tell me a little bit about how they met.

MARC GREUTHER:

06:05:19;12

Well, they meet initially in 1896. Henry Ford, at that point, is chief steam engineer at the Edison Illuminating Company in Detroit, which wasn't owned by Edison. It was not exactly legally speaking, a franchise. But Edison's name was on it. The company that had been created, that investors had created here in Detroit, had Edison's name on it because of the relationship with the Edison companies with equipment.

06:05:44;20

So, Ford's chief engineer there. And he and his boss Alex Dow, and the company attorney go to a convention in 1896, at which Ford finally ends up at the same table as Edison one evening. I'm gathering Edison would go there in a kind of an honorary capacity and would presumably flip from table to table for each evening of this, to

have an opportunity to meet with people.

06:06:07;15

And, I think as Alex Dow mentions this fellow Ford's got this, you know, this four-wheel contraption he's working on in this out building. And, why don't you ask him about it? There's a sense he's being set up as a bit of a joke almost, you know, as if Edison's gonna say, "That's silly. You should drive a battery car." Turns out Edison's interested and he encourages Ford. That's how the story goes. Ford repeated it numerous times.

06:06:28;08

And that that encouragement from Edison, for want of a better term, galvanized him. And he really felt he was on the right track. He, Ford was also very confident in his own abilities, as was Clara, and I think Bob Casey's talked a little bit about that. But really, that encouragement from someone he regarded so highly. 'Cause for

someone like Ford, Edison was kind of like a rock star. Ford, mechanically inclined, highly interested in technologies. Here's this man who breathes technology. So, that's the first point of contact.

06:06:57;11

They become friendly, in the teens, once Ford has started having successes at Highland Park with Model-T production, high production. He reestablishes contact. And eventually they go on camping trips. And it becomes apparent that, you know, they were very like-minded. I think their values were very similar. Their interests were very similar. Both interested in sort of visible machines and technologies. Great belief in the use and benefits of technology.

06:07:24;22

Both kind of seat-of-the-pants experimenters, hands-on. Both more comfortable, it would seem, with folks who were more oriented

towards the machine shop than the library. So yeah, they hit it off. Of course, Edison's born 1847, Ford, 1863. So, there's always, even though in terms of their, how to put it, their stature as industrialists or innovators, Ford's probably clearly ahead.

06:07:48;23

Edison's stature is that much greater. And he's slightly older. So, he's always the senior figure to Ford. And we're sitting in a building as part of an instillation that's named for Thomas Edison, the Edison Institute is what it was originally called. So, Ford follows through on his belief in Edison as a worthy example and figure. And creates a learning-by-doing environment with a recreation from extant parts of the Menlo Park laboratory as a kind of, I don't know, kind of critical mass of how to do that kind of invention, innovation.

BARRY HURD:

06:08:25;28

Yeah, let's talk about that a little bit. It's almost like there's a proof of concept theory there. Build the first industry research laboratory. And that's been done several other times in America. Bell Labs, PARC, things like that. So, is it almost a methodology, if you apply that you can become innovative? Did Edison sort of show us the way?

MARC GREUTHER:

06:08:46;07

It's hard to answer. He showed a way. I think the notion that you can simply do what he did though and get similar results is foolish. Let's backtrack a little and wonder why Ford did what he did. We know a little bit because of a book that was published, I'm trying to think, was it 18, 1930, '31? It was prior to Edison's death, called, *Edison as I Know Him*.

06:09:10;09

And Ford, many of Ford's books were, of course, written by other parties transcribing or

articulating Ford's ideas. But in that book there's a comment about Menlo Park being capable of teaching more than books can teach. And there's an elaboration that talks about creating this environment so that school kids out there and other visitors don't have to imagine it.

06:09:35;13

So, and there is a sense I have reading that book, that you're rather hearing Ford's, there's something about the terminology, something about the cadence in there that seems to be kind of Ford's voice. So, I get a sense it's very close to what Ford was saying at that time. And evidently, what he's trying to do is create this, I don't know, envelope, vessel, that you don't have to imagine.

06:09:54;14

So, at that point you can imagine what went on in there. You don't have to magic Menlo Park up out of nothing. That's provided for you by Ford.

But if you're part of the school system here, you could go in there and see how things were done. So, it's about unpeeling the layers of the methodologies and the opportunities at a place like Menlo Park. I don't think Ford, and I think we'd be foolish to think this. But I think Ford really thought that by doing that you could simply replicate it and get the same results.

06:10:28;01

You know, Ed Applewhite talking about someone like Bucky Fuller. Talked about Bucky Fuller saying how foolish it would be to hang out at the patent office in Bern, hoping for the next Einstein to sort of bubble up out of nowhere. And Bucky Fuller made comments like that about Black Mountain College, where he had immense successes with students working on geodesic domes.

06:10:44;25

But these things come together. We talked a

little bit yesterday about Cranbrook. There's certain opportunities that converge at certain times. And that's not to say they don't have value in their continuation. But, it's not quite that literal, I guess, is my point.

BARRY HURD:

06:10:58;10

If I were starting a business, I was a manager and tasked with this idea and I wanted to create an innovative environment, what lessons could I pull out of, Edison, that if it's not something I can duplicate, how can I...

MARC GREUTHER:

06:11:08;09

I think there's elements of it you absolutely can duplicate. I think that's the point. And it's to do with behaviors. It's to do with strategies. And it's to do with scrutinizing the way in which work was done, and the kinds of talent that you approach and you encourage, and that you take care of. I think the beauty of it is that it's kind of kaleidoscopic, if you will. You can still take all

those things and hopefully something good would come out of it. But it could be something very different from what took place at Menlo Park.

BARRY HURD:

06:11:36;23

But is there a commonality here, if you pick something where there is a need that you perceive, or you believe there'll be a need. Then you start to approach it and work on it every day, that's the path to innovation.

MARC GREUTHER:

06:11:46;28

Absolutely. Yeah.

BARRY HURD:

06:11:47;08

Didn't Edison sort of show us, wasn't that sort of his.

MARC GREUTHER:

06:11:49;11

Absolutely. I totally agree.

BARRY HURD:

06:11:50;22

Just riff of that a little bit for me.

MARC GREUTHER:

06:11:51;12 I'm not sure I can riff on that. I think you just explain it.

BARRY HURD:

06:11:53;05 Well, that (UNINTEL), that need, that practical need and then work on it until you fulfill the need and make sure you can sell it and mass produce it.

MARC GREUTHER:

06:12:01;01 No.

BARRY HURD:

06:12:01;21 No? It's not (UNINTEL PHRASE). You hit the wall.

BARRY HURD:

06:12:24;05 Metcalfe tells us that you can absolutely manufacture innovation if you set up the proper system. Not that I'm trying to force you say that, but that's...

MARC GREUTHER:

06:12:28;16 He says that, but someone who's never been a serial innovator myself, I can't really lay claims

to how simplistic that is an approach. That's.

BARRY HURD:

06:13:15;06

What are some of the lessons that people who were trying to be inventive and creative and innovative can learn from the way Edison, ran his life and his business?

MARC GREUTHER:

06:13:23;07

I think we're gonna hear words that we've heard from people like Don Chadwick. It's like tenacity. It's, it's working hard. I begin to start sounding like a finger-wagger, if I'm not careful. But really, that's the fundamental part of it. It's also about equipping yourself in an appropriate way. And scaling your personnel and your ideas according to what you're trying to achieve.

06:13:46;25

And I think all of those things were apparent in Menlo Park, even if you look at the story arc of Edison's investigations, you know, from a smaller shop in Newark to Menlo Park. Then to

sort of on the street in New York, essentially making something work in the field. But then building a larger installation. It's about understanding what the problem actually is and being able to articulate it. That was said about Robert Probst, he was a designer that we're also very interested in here.

06:14:12;25

If you can articulate the problem, you're gonna be able to get to solutions perhaps a little better. So, it's about clarity. It's about tenacity. I guess back to what I said earlier, though, it's about confidence and optimism. And those are sort of signature elements of Edison's makeup. Again, you've got all those things together. You're not sorta gonna be successful necessarily. But if any of those things are lacking you're certainly heading for a certain kind of failure, it seems to me.

BARRY HURD:

06:14:39;00

And, if we were to look around today, could we compare Edison to anybody? I mean, is there's anybody like him now, or times changes, or is it possible to have a (UNINTEL).

MARC GREUTHER:

06:14:46;01

I think often you, often people who have looked at Edison's achievement say, "Well, of course, that was possible then because things were a whole lot simpler." And now you'd have to do all kinds, you've got all kinds of PhDs to even do a fraction of what Edison did. And I think it's sometimes easier to think the whole joint's sewn up, you know.

06:15:01;29

I think the fact of the matter is, though, we've actually spoken to people who are working very much in the way that Edison did. And I'm thinking of people like Elon Musk. I'm thinking of people like Dean Kamen, who again, have got this ability to think really big, have this really

high-altitude perspective. But know where to drill down, where to descend and how to work on the ground and how to appeal to people who can undertake the tasks you need done, to get that expertise, to tool-up accordingly.

06:15:31;26

Think even of Dean's house. Think of those workshops in there. You know, that's kind of like his Fort Meyers, you know, holiday lab. That's home, you know? It's well beyond that in the research laboratories. You know, think about Elon Musk with the fairly open cubicle there in the midst of that office, right adjacent to an assembly room, next door to a machine shop. So, there are people who are on the ground, working directly with people who have all kinds of expertise. We do have this much bigger picture, much higher-altitude perspective. Those are the kinds of people I'd cite.

BARRY HURD:

06:16:04;18

And even though we kind of have this myth of Edison as the inventor who would go off and invent, he was actually very collaborative, wasn't he, with, I mean, he had all those people. He must have been watching them every day, coming up with ideas, tweaking what they were doing. Do we know anything about that?

MARC GREUTHER:

06:16:17;01

We know he must have had immense charm and charisma. And we know that he could communicate on the same level as a variety of people that he would attract. In terms of his collaborative behaviors, yes, hugely collaborative. By the same token, though, he was recognized as the leader. We see a little bit of that with Charles and Ray Eames, the animosity, who designed what?

06:16:39;07

Was it really Charles and Ray or was it all these other people? And similar kinds of things were

playing out, oh, I suppose in the early part of the 20th century, where people who'd worked closely with Edison had moved on and said, "Well, it's not all Edison. I had a lot to do with it." So Edison's a collective now. You know, that was one of the things we heard.

06:16:56;07

But the fact of the matter is, there wouldn't have been this huge collection of people converging on Menlo Park without Edison. So, it's that sense of leadership, that sense of taking the risks, being out there, being persuasive, as well as experimenting. The folks complaining are doing the experiment, and they don't have to do all that stuff. Just at the bench, so to speak, which is perhaps what they'd rather be doing.

06:17:15;28

So, he always ensured that he was recognized, as the lead man, who undoubtedly there's

known issues with, who gets credit for what. But no, he was a charming, driven, confident individual. He attracted people who found that irresistible.

BARRY HURD:

06:17:37;21 Okay, cut, thanks.

BARRY HURD:

06:17:48;02 So, as part of Edison's process, when they came up with an invention, they had to apply for a patent.

MARC GREUTHER:

06:17:52;18 Yes, yes.

BARRY HURD:

06:17:53;23 And, this artifact in front of us, that's part of that process. Tell us about it.

MARC GREUTHER:

06:17:57;03 This is part of the patenting process. By the time this model was created and this was submitted to the patent office in late January of 1880, you didn't actually have to submit a

model. You had to submit a written description and diagrams. But they didn't say you couldn't submit a model.

06:18:13;15

And if you're going to patent something complex, something difficult to understand, something you're obviously eager to patent, want to hedge your bets and send a model along. So this model would have been made in Menlo Park. And it is a kind of three-dimensional diagrammatic representation of the electrical distribution system that Edison had been working on there.

06:18:37;06

So, this is really, really fundamental. So, what you've got here are little dynamos, lined up. Long-Legged Mary-Ann dynamos. Some rheostats, the lamp, the meter and a switch. And here, these are the tags that would have been associated with it in the patent office. A

now faded tape that would have been a bright red, originally red tape. Written descriptions, as I fumble around. There's a diagram in here, underneath. There we go. Then there's the receipt here. You'll notice, as well, they received it February 4th. And it was actually finally offered up in August of 1887.

BARRY HURD:

06:19:46;25

Okay, now tell me and show me why, what was that tag? And how was that used? Why was that important?

MARC GREUTHER:

06:19:51;04

This tag's a way of identifying the model. But this includes the written description, and the diagram of the system, as well. Although, there would have been other documents with that on there. Also includes the receipt. So, February 4th.

BARRY HURD:

06:20:52;28

Let me ask you this. Did it make it easier to get

a patent with this model? I'm not quite
(UNINTEL).

MARC GREUTHER:

06:20:55;24

It would certainly allow a better understanding, perhaps, of the material that was in the written and diagrammatic submissions, as well. Fact of the matter is, though, if you're not making sense in the written submission, if your diagram's not proving the point, this model's probably not going to help. Now, this is a good example of what it took to get something patented.

06:21:20;12

This is submitted, in late January of 1880, received by the patent office in early February. But it actually wasn't allowed as a patent until 1887. There was, in fact, an awful lot of back and forth between Edison and the patent office. He's accused of what they called aggregating, which is in fact putting together previously

patented things and suggesting that the combination is worthy of being recognized as a new patent.

06:21:46;04

So, there were new rewrites of various parts of the submission. But finally, of course, he gets the patent. This gets to, like I say, the fruits of all those labors. And it gets to the networked nature of the innovations he was pursuing at Menlo Park.

BARRY HURD:

06:22:03;15

Was he really as prolific as we're led to believe? There's a famous quote about something, I mean, something.

MARC GREUTHER:

06:22:09;16

Yeah, something every ten days or so and a big thing every six months. Absolutely. That really is a straight-forward claim about the possibilities of Menlo Park and his ideas and the market and the people he was collaborating with there. And

he delivered on that promise. Like I say, it's, you've gotta realize that even with 1,093 patents, not all of those even when he was alive were especially important. But certain, there were very, very many fundamental patents in there that were supremely important.

BARRY HURD:

06:22:42;18

And as an historian, just as an artifact that has great value, you can't come and see this down on display, right? I mean.

MARC GREUTHER:

06:22:48;04

This actually, it's quite well traveled. We've been very eager to loan this out. So, it's appeared in places as diverse as a local community center with an exhibit on innovation, and an exhibit associated with Disney in Los Angeles, in Hollywood. So no, you can't see this, you can see in Menlo Park, in the laboratory, a huge number of patent models.

06:23:11;20

Edison, in fact, was very eager to get his patent models back. You didn't ordinarily have to. But these were evidence, tangible evidence of the kinds of activities he was undertaking there. So, when you went into Menlo Park, when you went into the main laboratory, you'd see two large glass-fronted cases filled with this kind of thing. So, it's an attempt to kind of overawe people. Certainly would have given investors confidence.

BARRY HURD:

06:23:35;11

Now, I don't know if you mentioned this before, but is this built to scale? Is it, like, a quarter inch.

MARC GREUTHER:

06:23:38;29

No, it isn't. It's, really things are very outsize[d] here. This lamp would be as big as a dynamo, sort of six feet tall. It never quite got to that scale with Edison. So, no, this is, it's a diagrammatic expression that scales up certain things for legibility, if you will.

BARRY HURD:

06:23:56;11

Okay. Is there anything else we would want to know about this, that we haven't talked about? Why do you like that question?

MARC GREUTHER:

06:24:03;02

No.

BARRY HURD:

06:24:03;29

Okay, no.

MARC GREUTHER:

06:24:05;00

How do you like that answer?