EPISODE 344

[INTRODUCTION]

[0:00:00.1] JM: Public data may be public but it's not always so accessible. It's really nice when you can request data simply by making an API call but that's actually the exception rather than the rule when you think about all the data that is available in our world especially when you're talking about data that is managed by the government.

Oil and gas drilling data falls into this category of data that's hard to get, it's publicly available technically but it might be at some government bureaucrat's office on his desktop somewhere in a PDF file.

Oseberg is a company that is building a tool for analyzing oil and gas data. Oseberg is a rich dashboard for knowledge workers to query and visualize the data. It's sort of like a Bloomberg terminal for oil and gas knowledge workers.

Evan Anderson is the CEO of Oseberg and he joins me to discuss building a business where the data is hard to acquire and building a product for oil and gas knowledge workers. Interesting episode, I think you're going to enjoy it.

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[0:01:19.2] JM: Artificial intelligence is dramatically evolving the way that our world works, and to make AI easier and faster, we need new kinds of hardware and software, which is why Intel acquired Nervana Systems and its platform for deep learning.

Intel Nervana is hiring engineers to help develop a full stack for AI from chip design to software frameworks. Go to softwareengineeringdaily.com/intel to apply for an opening on the team. To learn more about the company, check out the interviews that I've conducted with its engineers. Those are also available at softwareengineeringdaily.com/intel. Come build the future with Intel Nervana. Go to softwareengineeringdaily.com/intel to apply now.

[INTERVIEW]

[0:02:14.3] JM: Evan Anderson, you're the CEO of Oseberg. Welcome to Software Engineering Daily.

[0:02:18.5] EA: Thank you for having me.

[0:02:19.6] JM: You're building a tool for analyzing oil and gas data and this is a rich dashboard that knowledge workers can take advantage of. Who are some of the knowledge worker type of roles in the workplace that can take advantage of a dashboard for oil and gas data?

[0:02:36.7] EA: Yes. We serve a diverse group of customers mostly on the upstream side of the oil and gas industry but also on the midstream side of the oil and gas industry. Within the upstream and midstream sectors we work with anybody from business development, commercial development, A&D new ventures, land, engineering, geology, exploration, and then there's a long tail of customers in the service sector whether it'd be attorneys, brokers, mineral buyers. A lot of different groups within the upstream, midstream sector.

[0:03:15.5] JM: There is the analogy of the Bloomberg terminal. A Bloomberg terminal is this thing that you see when you go to trading floors or you go to anybody who is in finance and they're working for a high salary because this Bloomberg terminal is pretty expensive, but it's essentially a dashboard into all of the financial data and financial news that you could ever want. Oseberg is kind like that for oil and gas data. Explain that analogy a little more.

[0:03:43.6] EA: Yes. I would say that we used Bloomberg in Capital IQ as analogs to our business for folks that are just not familiar with oil and gas, because fin tech I feel like has been around a lot longer than energy tech. What we're trying to communicate there is that the fin tech industry figured out a long time ago that there is incredible value from public information but that public information, there's just beautiful paradox about public data. It's supposed to be freely available and you would think that it's pretty easy to access and to aggregate and to extract information from that public data. It's actually very difficult. It's very difficult. It takes a lot of domain expertise to know where this information is.

It takes considerable logistical effort to aggregate this information. It takes a technical effort to extract quality data from public information. You're dealing with a lot of public documents that are unstructured. In many cases in the oil and gas industry, this information can come in the form of microfiche in still paper format.

The fin tech industry for a long time ago that if you create super high quality datasets and then build B2B sass products in order to enable folks to interact with that data and generate insights from that information, that there's value there. That's the extent that we are analogous to a Bloomberg or Capital IQ. We're not doing — We can certainly sell to hedge funds, anybody that's buying or selling equities. We've got some unique data to help there, but we're not a trading platform and the bulk of our users are not in the commodity space making trades, utilizing our data.

[0:05:32.0] JM: When you talking about getting data that is in unstructured documents, you're talking about things like these PDFs where it's some old document that's been scanned in that talks about the location of a well somewhere or some agreement and. If you want to pull that kind of information into a dashboard and present it in a well-formed experience, you've kind of got two options. You can either go to these different companies that are producing the data in an unstructured fashion and request that they do it in a more structured fashion, which is probably intractable or you can take it in house and maybe apply NLP and image recognition and stuff to able to parse text and information out of these documents that are not well structured. Is there a third option or did you pick one of those two and leveraged it?

[0:06:31.7] EA: Yes. First of all, you're lucky if you can find something in a PDF. When we're talking about unstructured, none of these instruments are — The bulk of what we work with, there are no forms. These are agreements. These are paragraphs, multi-five to ten to 40-paged documents where attorneys do reuse some language, but the most part they're all very unique. DPI quality is an issue if you do find documents that are imaged.

Yeah, your options are — I think the incumbents in the space, the problem that they're trying to solve the late 80s, in the early 90s, is to just make this information available online. The way that they were architected and built were kind of like library catalog systems. If you know the name of the book, if you know the author, or keyword, then you can locate the book and you can

read the book. If you look at legal tech and fin tech, we've moved way beyond that. We're much more interested in the contents within the book and we're much more interested in doing time series analysis on all the extracted data or looking at patterns within the information.

In combining information to create new information, derivatives thereof, we do use information extraction technology, so we'll use image recognition, NLP. Then there are a lot of instruments that we have handwriting that unfortunately it's pretty difficult to use technology, and so we also use a lot of humans. That's just the nature of the beast.

[0:08:02.0] JM: Of course. In my last question I was talking about the images, like documents and that sort of information where it's a legal document or something. You've obviously also got all of these data that's streaming off of wells because they have sensors set up and these oil and gas companies are collecting tons and tons of data about how their wells work. Can you get plugged in to those data streams, or are those companies, like Exxon or whoever is drilling. I don't know the drilling industry very well. Are they willing to share those datasets with you?

[0:08:37.7] EA: Yeah, good question. This kind of hardware-software combination and in the oil field is really intriguing. There are a lot of companies working on the problem. What you're talking about are what we call SCADA systems. There are a lot of really interesting problems in that space for sure. That's not really a space that we play in, but we appreciate the work that a lot of technology companies are doing there. They're lowering the cost of SCADA so that more more operators can get real-time information in the field. This is what people talking about when they talk about the digital oil field.

What we love about people solving problems in that space, is that they're helping teach companies how to utilize data. The oil and gas industry is still really trying to figure out how to utilize a lot of the information that they have. For the first time in the last five years we're seeing big EMP companies hire predictive analytic teams. We see companies like Palantir entering the space. Those are all really good signals for us, because with those companies, they are primarily dealing with is proprietary data. Data that these companies own and it tends to be a lot cleaner and easier to work with. We're tackling a much different problem. All that information tells you a lot about the assets that you own. It tells you a lot about the assets that you operate and manage. What we're working to do is tell you a lot about the assets you don't own, about

your competitors. That's, by definition, a much larger problem and a much more difficult problem.

[0:10:11.1] JM: Right, and it's something where you could build a moat around that problem. Build a pretty good business and then when these predictive analytics companies or even Exxon starts to become a data company where they're selling their data, you could buy that data, you could repurpose it into your own dashboard and people could cross reference it with the kind of stuff that you've got, that you've got a moat around. It's good positioning.

Just to give people an idea of what this kind of data is and what you can do with it. I did read a blog post on the Oseberg blog about well spacing. I think this is a good example of a study that somebody could do with your data. Explain what well spacing is and how a study of that can yield business value.

[0:11:00.2] EA: Yeah. Well spacing started because — I don't know if Spindletop means anything to you, but there was a time in Texas and even in Oklahoma where wells were drilled thoroughly right next to each other over and over and over again. What we learned was that that wasn't the most efficient way to drill and produce wells. You are losing the energy, the reservoir pressure quickly that's required to push oil and gas at the wellbore.

The concept of well spacing was created in order to protect against waste and drainage and protect relative rights, and it exists in every state but it exist in a — It's executed differently in each state in terms of how they regulate well spacing.

Historically, this has been a regulatory document that is not been part of the workflow of somebody doing expiration. This isn't a document that has been used historically to signal an interesting event. Every well needs to be spaced in every formation, or every depth needs to be spaced before you can drill and produce your Oklahoma. It's upstream from filing an intent in drilling and producing   a well.

There are a lot of different ways that spacing data can be utilized in order to tip off activity. We looked at spacing back in 2007 here in Oklahoma. There was a company, Devon Energy, that filed seven spacings in one day and a formation that hadn't really been spaced on 640 acres

before. It was a six Sigma event and it was the beginning of the Cana-Woodford which is a very big natural gas play here in Oklahoma.

That's never really been done before. Spacing hadn't really been utilized in that way. Oftentimes, you want to see what has been spaced but also what has not been spaced. Oftentimes, formations were spaced in different price environments and then whatever ideas somebody had at the time were abandoned when pricing changed. You can go back and look at historical spaces to get a sense for what some explanation is we're thinking. There's a number of different ways in which you could use spacing data. This kind of plays into what differentiates us from a lot of folks in the market which is well development lifecycle starts in the county court houses. It starts with all the public records.

It starts in the same place where divorce decrees are filed, their probate are filed. That's where you go in order to determine who owns mineral rights because those are the executive rights that you need to lease in order to have the right to go in and drill explore and produce oil and gas. That's a very interesting space because a lot of information is not digitized. The title industry is huge industry in terms of figuring out who owns what and what encumbrances exist on their assets. A lot of that information has been structured in paper format, and we play in that space a little bit.

Then at the other end of the well development lifecycle is the expiration process. Actually, permitting a well, getting a permit from the state to being able to drill well, completing a well, producing it, optimizing production, looking at frack data to optimize your completion techniques. Things like that. What sits in between those two bookends, the courthouse in drilling and producing wells, is the regulatory environment. In Oklahoma there's about 95 different regulatory documents. In Texas, there's something in the scale 200. There's a lot of really interesting information within those regulatory documents that can be used for a number of different things depending on who you are and what you're interested in.

[0:14:42.1] JM: This is all public information?

[0:14:43.3] EA: It's public information but is not necessarily online. It's not going to be necessarily in the TIF or PDF. It might be in an old [inaudible 0:14:52.6] database, if it is in a

database. A lot of it is going to be in microfiche. If it is online, you're not going to be able to go into Google and search for it. You're going to have to know where to look. Many times we have to make requests. There are multiple regulatory agencies. Here in Oklahoma, we have the Tax Commission, the Water Resources Board. You have the Oklahoma Corporation Commission. You have a lot of different governing agencies that have really interesting data sets.

It takes a big of domain expertise to know where to go just to find the information, and then you have the challenge of aggregating it. Then once you've aggregated it, then you have the technical challenge of extracting information out of that data and creating super high quality data sets and then great B2B sass products so that people can actually interact with this data in a meaningful way.

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[0:15:46.2] JM: Don't let your database be a black box. Drill down into the metrics of your database with one second granularity. VividCortex provides database monitoring for MySQL, Postgres, Redis, MongoDB, and Amazon Aurora. Database uptime, efficiency, and performance can all be measured using VividCortex.

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[INTERVIEW CONTINUED]

[0:17:04.2] JM: Not to mention the fact that it's not just banging on their doors once and getting a collection of documents, you actually have to do this on an ongoing basis, right?

[0:17:12.9] EA: Absolutely. If it were easy as writing a web crawler, my life would be much much happier.

[0:17:19.2] JM: But then you wouldn't have a defensible business.

[0:17:21.4] EA: Exactly. Yeah, we definitely have to roll up our sleeves and be creative about how we go and aggregate this data, and it's a big challenge, but it's a lot of fun.

[0:17:32.3] JM: Have you been able to set up relationships at the very worst where it's like, "Could you guys just like FTPS this file every week, once a week?" Do you have those kind of relationships?

[0:17:42.4] EA: Yeah, but they're rare. We love to see state regulatory agencies that offer that. I believe even the state of Louisiana has an API into some of their data, which is amazing, but that's very rare. Here in Oklahoma, for example, one of the big issues that recently came to life was does horizontal drilling and fracking create earthquakes? We had a huge surge in earthquakes here, and it really unnerved the public.

The Corporation Commission is the governing entity that has a lot of the data around solar disposal wells. That was believed to be the issue is that with horizontal drilling and fracking, there's a lot of wastewater, and that wastewater has to be disposed and it's disposed in these formations deep — Tens of thousands of feet below the surface. It's pumped into those formations and creates pressure and if you're in your fault you might conceivably create more earthquakes.

We need to figure out where these saltwater disposal wells and where were they relative to faults. When the public went to the Corporation Commission and get this information, they have six, seven different databases. The data is not all one place. It's not clean. It's very difficult for them to answer those questions because unfortunately they haven't had the resources to do really have the infrastructure in place to collect this information. I'd be surprised if it was all even digitized. They can't — They have a difficult time at answering those kind of basic questions. Important policy decisions are made around that data.

[0:19:18.3] JM: In the process of scaling this business, I think about if you're trying to get all these different data sources to send you documents, because it sounds like a lot of these data is just in documents that, like you said, is unstructured. It's a PDF or it's a scanned document. Is the process of scaling that just like hiring a budget? I do know what you would tell them, account managers or something, where the every week or every day these account manager are emailing a set of people and saying, "Hey, please send us these documents. We need the documents so we can integrate them into Oseberg. Is that what the process is like? I'm just trying to understand how you get the data in a timely fashion when some new court document has been uploaded and you want to quickly get the pipeline of that document sent to you, you want to scan it into Oseberg, you want to apply NLP or image recognition or just have somebody read it in manually into the data, whatever it is. You need to do that in a timely fashion. I'm just wondering how you do that in a scalable way.

[0:20:17.8] JM: Yes. I'll just say the you have to be really smart about it. I mean we went and tackled 72 counties of public information taxes in a period of four months and acquired over probably 100 million records. It was an incredible feat. I was really really proud of our team, but you've got to be really smart about it. Yes, the problem doesn't end after that historical corpus has been built. You have the ongoing maintenance of keeping it updated. You have to be smart about that too.

We spent a lot of time thinking about how to do that. It's not a linear problem so it's not a problem that you just throw more bodies. You do have to be strategic about it or else it can — It is expensive but it can be expensive if you're not smart about it.

[0:21:05.9] JM: Do you put into the product, "Hey, this data may not be up-to-date," because I can imagine like — I'm sure this is way better than whatever these oil and gas knowledge workers had before. They had nothing. They had no Bloomberg terminal like experience, but still there is still going to be times where, "Okay. We haven't gotten this document. This well spacing data may not be up-to-date." Do you tell people that in the interface or do you just kind of like give them the best that you can and just present that as — I don't know. What do you do for that?

[0:21:40.5] EA: Yeah, we definitely communicate, because each document type is going to have a different timeline associated with it. In many cases, we're as up-to-date as we can be. What I mean by that — For example, production data in Oklahoma is report to the Tax Commission. If you read the statutes here in Oklahoma, the Tax Commission has five months to audit production data. If the tax commission were running as efficiently as possible they would be as up-to-date as in five months ago.

In many cases they're not as up-to-date as of five months ago, and the industry just understands that. We don't really have to communicate that to the market. There are cases where we're bringing datasets to market that haven't been historically brought to market. We do need to educate the market as to how timely that information is going to be. In cases where the data is available every day, we get it every day. We're as of up-to-date as of yesterday. We're as near real time as possible.

[0:22:42.3] JM: There are some third-party data providers I imagine in the space, because I know in all the spaces like whether you're doing container shipping or healthcare logistics, there will be some third-party data provider that aggregates data and can sell it to you as an API. Are there some of those that you can pull data from, or do you want that data at all?

[0:23:08.8] EA: In some cases, yes. We're always looking to see who has data and information and we've got kind of a business development team that kind of vets that out. We've made some acquisitions, we've done some partnerships. Absolutely, we don't take the position that we have to build it ourselves. It wasn't that long ago that data has really become currency. What we find is that when people build data, often is the case that they're not doing a lot of analysis of the data to figure out how accurate it is or how clean it is.

In many cases we ended up building our own datasets because there's a lot that we want to do with this data and we want it to be clean. We want to be able to statistically prove that would 98% confidence we have less than 1% error rate. When you're acquiring or partnering, it's sometimes more difficult to do that. Our preference would be that we create all of our data, but it's not a requirement. We've partnered and we've acquired data before.

[0:24:15.1] JM: You mentioned Palantir as an example of a company that does predictive analytics. They do a build your own dashboard sort of experiences. It's similar to Bloomberg. It's a big tool for knowledge workers. When you think about Palantir, you think about Bloomberg, maybe you think about any of the other interfaces for manipulating and working with data at a high level. How do those products inspire the interface that you built for Oseberg? I guess more generally, how do you think about the user interface that you want to present to the oil and gas knowledge worker? What kinds of widgets and features are you trying to provide to such a diverse group of people who are looking at oil and gas data?

[0:25:02.8] EA: Yeah, good questions. You can start research. We would like to bring NLP search across our data sets to the industry. That's something that really excited about that we haven't seen in the space. Then you can talk about mapping. This industry maps are integral to this industry. Contextualizing the information and visualizing it on a map, you walk into any oil and gas company or midstream company and you're going to see maps on the wall, and they're static, but the industry loves it static maps.

Mapping is important and some of the things that you can do with maps today and layer visualization on top of that whether you're using D3 or whatever is pretty fascinating and cool. Then in our space, [inaudible 0:25:46.2] really has a foothold in the industry when it comes to mapping. There's a lot of really exciting things that we can bring to this space.

For example, one of the things that we did early on which wasn't really prevalent at all was animation, time series animation. Being able to throw the data on a time bar and see a least trend evolve over several counties over a period of months and kind of see where things are trending. That was revolutionary for the time. You go into fin tech and those types of things have existed for a decade. If you go into oil and gas and you're needing to pass that [inaudible 0:26:25.4]. If you look at some of the BI tools, Spotfire has really got a foothold in the space when it comes to analytics. The industry loves Spotfire.

[0:26:38.0] JM: I don' know what that is.

[0:26:38.5] EA: Tableau — Are you familiar with Tableau?

[0:26:40.4] JM: Sure. It's like Tableau for oil and gas.

[0:26:42.4] EA: Yeah, exactly. They do a lot more than oil and gas, but they've really done well in oil and gas. Those types of BI tools you see in the space. Those things all resonate with us, but for us we are perfectly happy popping our data into a Spotfire dashboard. We have plans to build — To continue to build visualization tools like that, but we don't need to own the desktop so to speak. That's not necessarily something that we feel like is part of our mission and our charge.

[0:27:15.1] JM: It's smart because you're picking your battles and you're looking at your core competency and saying okay were really good it gathering this data that's difficult to parse, difficult to collect. It could just be that backend of data that's really defensible as opposed to being the backend of data plus a bunch of shiny interfaces.

[0:27:37.3] EA: Yeah, don't get me wrong. I think we have a great product. We've got a large number of abusers that love our interface and application, and for certain companies it's everything they need. We don't feel like we absolutely have to own the desktop. It is a combination of our ability — It's a combination of our vision and domain expertise knowing what information is out there and having a vision for how it could be leveraged to create value for these organizations. There's a lot of creativity that goes into that.

Then it's the ideas around what you can actually do with this data and how it can be applied and then productizing and commercializing that. That's, I think, more of an edge for us than just the application side.

[0:28:21.4] JM: Did you try to surface ideas for how that data can be applied?

[0:28:25.5] EA: Absolutely. We have to. We do three things as a business. We aggregate and create unique and impactful datasets. We build B2B sass products to enable folks to interact with that data. Then the third part of our business is we've brought client success management to be industry which is less about training and more about education. We really get to know the goals and strategies of our customers and introduce them to datasets that may be weren't part of their workflows prior to working with us to help them achieve those goals and strategies.

When there 200 and something regulatory documents in the oil and gas industry in Texas, a geologist may not be aware of the strict regulatory documents that they could use to signal that there's been a big find in some parts of Texas.

[0:29:15.5] JM: How do you know if your engineering team is organized?

[0:29:19.2] EA: We have dev ops front-end, backend. Those are kind of the three main groups and we have functional leads that report up to a director of engineering.

[0:29:27.9] JM: What are the responsibilities of those different teams? What projects are they focused on right now?

[0:29:32.3] EA: Yeah. On the data side you're going to see you anything — I'm not technical, so I'll probably —

[0:29:40.4] JM: You can punt completely if you want.

[0:29:42.1] EA: Yeah. No, I can make an attempt at least. If something that came to an ETL on the backend that — The challenge there is we have huge volumes of information that we're trying to get into our product at the same time. I know a lot of thought went into the architecture behind being able to get our data into these pipes and into the product so that we're not limited in the volume or the number of datasets that need to stream into the product.

I know that they're also working on the information extraction piece, so using machine learning, some of the technologies in order to build content models to read these unstructured documents, extract the information out, and then a lot of that data is going to go to QA and QC team that is doing the sampling to ensure the accuracy of the data, the back-and-forth process there.

We've got kind of a logistics team that is kind of bringing in the data from a number of different sources out there in the market and making sure that we're getting all the records back and making sure we're not getting duplicates and things like that.

Then on the application side, what I guess I call front-end developers, but they don't particularly like because they do server side develop too. Application developers, they're building our application out, so we've got a web-based desktop application that has visualization tools, mapping, search, mining and we continue to build out that application. Then you've got all the dev ops related work.

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[0:31:24.6] JM: Your application sits on layers of dynamic infrastructure and supporting services. Datadog brings you visibility into every part of your infrastructure, plus, APM for monitoring your application's performance. Dashboarding, collaboration tools, and alerts let you develop your own workflow for observability and incident response. Datadog integrates seamlessly with all of your apps and systems; from Slack, to Amazon web services, so you can get visibility in minutes.

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[INTERVIEW CONTINUED]

[0:32:51.6] JM: I mostly interview people who are building software companies either in San Francisco or New York or Seattle, that's probably 95% of the interviews that I do. Many of the people who listen to the show they request, like, "Hey, can you tell us how engineering works outside of those places?"

What are the pros and cons of building a technology company in Oklahoma?

[0:33:16.5] EA: Yeah, great questions. I recruited engineers from all over the country. For me I wanted —

[0:33:22.2] JM: Is it the remote team?

[0:33:23.4] EA: We do have a remote team but we also have a lot of folks that — We have two offices, Oklahoma City and New Orleans, and we got a lot of folks in both. On the backend, these are SCALA developers, all functional programmers, and our team loves SCALA but it makes it challenging because there are not a lot of SCALA developers in the tallgrass prairie.

We find someone that's certainly capable picking up the language, but the onboarding is difficult, right? For us, time and money are two scarce resources and so getting somebody in and get them to speed and onboarding, getting them to commit code when maybe they were a Java developer but not a SCALA developer, it takes time. That's definitely challenging, but like I said, we have a remote team and so we've got you folks all of the country there.

There's a lot of great engineering talent in the tall grass prairie. It's difficult to find. We've been really working to build the community. There's not much of the engineering community in this part of the country and a lot of the developers are .net developers. Some of them have experience working open source but it's tough to find — It's tough to find talent everywhere. That's a problem that you hear coast-to-coast.

We work with some cutting-edge technologies and we're tackling very difficult challenging problems in an industry that represents 67% of our GDP that spends 200 billion a year in Cap, and the space as barbaric. It's the Wild West. To be able to bring things like AI to that space is incredibly exciting.

I'm all for renewables and would love to see companies like Exxon lead the charge and the change there, but the reality is, is that we're going to be a carbon-based economy for the next 10, 20 years, and so we've got some big problems that need to be solved in the interim and it creates tremendous opportunities for businesses like ours.

[0:35:23.7] JM: The positioning is really good because there are a lot of these oil and gas companies they're going through the innovator's dilemma on a number of fronts. I mean if your Exxon right now, you're trying to figure out how to ship your strategy to renewables and at the same time you've got all these questions about IOT. How much should we invest in putting sensor data around our oil wells? Should we completely reposition the company to do that? Trying to do that kind of thing, like digital transformation on the oil and gas part of your business while also disrupting the oil and gas part of your business. They are entirely preoccupied, and I just make this point to say that everybody in the oil and gas business is trying to do that while you can kind of be over here and just be like, "We're just doing the data stuff," and you're very focused on that. Great positioning in terms of the business.

[0:36:20.4] EA: Yeah, absolutely. I truly believe that the consumer space is fascinating. It's great to see new products built there. When you look at places like the tallgrass prairie, there's a lot of heavy industry problems, technology problems. There's a lot of interesting problems in agriculture. There's a lot of interesting problems in manufacturing. There's a lot of interesting problems in aerospace, even defense still. Those are the industries that states like Oklahoma, Texas, Kansas and Nebraska know well. You don't see a lot — When I look at the number of ad tech companies for a $30 billion market, and then I look at the number of energy tech companies for $30 billion market. It's night and day. You'll have thousands of ad tech companies and you won't have 100 energy tech companies. I love bringing technology to heavy industry, in oil and gas in particular.

[0:37:19.8] JM: Yeah. Talking about the renewables and the bigger picture — Actually, I just want to jump to a more ambitious question. Obviously, a lot of discussion going on right now in our country about what are these displaced coal miners going to do, or what are these displaced manufacturing people going to do? You have just mentioned that there's all of this low hanging fruit to be done in terms of agricultural technology. My impression is that the technological acumen is kind of scarce because you need technical people to be able to implement the systems that will update a farm or update a fracking well with the newest and greatest technology.

I'd love to hear your perspective on where the market frictions are between the available labor and the jobs that's are available for that available labor.

[0:38:26.1] EA: Yes. You're asking me — I think what I'm hearing is are you asking how do you match the domain expertise with the technology expertise?

[0:38:36.8] JM: I'm sorry. I worded that question really poorly, but I'm trying to ask about the question of jobs in America, people who are trained for manual labor jobs who are being displaced by technology and maybe they need to retrain or maybe they have the skills already. I'm just trying to get your perspective when you talk about heavy industry. Since you spent a lot of time in the intersection of heavy industry and technology, what is the outlook for a coal miner who has been displaced or a factory worker who has been displaced? How hard is it to retrain or are there jobs that are available right now? I'm just trying to understand the difference between the reality and the narratives that I hear in the news.

[0:39:22.0] EA: Right. I would say this; oftentimes we see particularly in the oil and gas industry, especially folks in the service side of the business, they're reluctant to embrace technology because they do fear that it's going to, in some way shape or form, replace some aspect or replace some aspect of their job or replace their job entirely.

When I talk to folks in the service industry I try to encourage them to embrace technology because the one thing that I've noticed is that you often talk — You often hear about the generational crew shift change in the oil gas industry. In the 80s there is a bust and an enormous of professionals left the oil and gas industry. What left with the industry wasn't just a generation, it was also a bunch of technology, right? That's why the opportunities exist in the oil and gas industry today is because the folks that stayed with 34 years' experience, they're really not all that familiar with what's possible with technology. They don't understand what NLP or AI is.

They are still trying to wrap their head around data analytics and what's possible, but they have some qualitative experience that computers just can't replace. They have this qualitative experience that you need in order to understand what products need to be built, what datasets need to be built.

When I talk somebody in the industry that's concerned about technology may be taking their job, if they would just embrace technology and become a thought leader around how technology should be built, they'd be creating opportunities for themselves, because I don't think a lot of folks in the technology space truly understand those problems because they do lack that domain expertise. You can be a great product manager and empathetic as possible and ask wonderful questions. Without that domain expertise, at least what I see are space, It's absolutely critical.

I've seen a number of really smart amazing technology companies, household names that have gone into the oil and gas industry and really struggled because they may be exceptional at data science, they may be exceptional at building products, but they have a very difficult time understanding the domain, understanding the problems in the space. I really can't answer your question in the sense that I know how difficult it is to you to go find another job if you are displaced by technology, but I would say that if that's a possibility, I would embrace technology and try to find a way that I could utilize my qualitative experience to build better technology.

[0:42:14.9] JM: Do you think is a generational thing? Because the people who grew up with smartphones and laptops, getting that fluency with technology early, that comfort with technology early on, that seems like a generational difference rather than some sort of skill set difference.

[0:42:31.4] EA: Yeah, I do. I do, but I just can't stress the importance of — When I think about building technology, I think about augmenting experience. I think about the human experience. I think about kind of — Technology in my mind is supposed to be like the Iron Man suit. It's supposed to take you your wealth of knowledge and everything that you've seen in your 30 year career and it supposed to enable you to apply that and be a force multiplier.

[0:43:00.4] JM: You shouldn't need some proficiency in typing or using specific interfaces.

[0:43:05.4] EA: Absolutely. That's all about human computer interaction, in good UI, UX. I never want to be in a position where I'm just selling to the millennial's or to you to the folks that grew up with technology, because I would be missing out on all that wealth of experience for folks that

have seen things for 30 years. That's what I'm trying to tap into. That's what I'm trying to —
That's the value I'm trying to maximize.

[0:43:39.7] JM: Got it. Okay, to close off, you mentioned a 10 to 20 year time horizon to getting
to renewables. What is that roadmap look like for us as a society?

[0:43:50.7] EA: I think it gets down to battery technology. We've got to find a way to —
Seasonal storage I think is what's really going to change the landscape. Transportation is a start
for sure, and I think that that's in our immediate future. I think we've got to find a way to tackle
the seasonal storage problem, and I know that there are lot of really smart people working on
that problem.

[0:44:13.2] JM: What about nuclear?

[0:44:14.9] EA: I don't really have an opinion on it.

[0:44:16.0] JM: Okay. Any other interesting predictions about where the global energy market
is going?

[0:44:23.0] EA: I think — I mean, listen. I would love for us to live in a world that is less polutive,
that is more thoughtful about how we impact our environment, whether it's wind, farms that are
interfering with bird migratory patterns, whether it's oil and gas wells that are just a blight on the
landscape. I'd love a world where solar, what have you, is fueling the economy. The reality is is
that we're long ways away from the. I'm focused on making the upstream industry more efficient
because it's what we've got right now. It's the best thing that we've got, natural gas after oil.

[0:45:08.3] JM: Great. All right, Evan, thanks for coming on Software Engineering Daily, and
thanks to Tom McCabe for connecting us.

[0:45:15.5] EA: Yeah, it is my pleasure. I enjoyed it. Thank you.

[END OF INTERVIEW]

[0:45:20.3] JM: Thanks to Symphono for sponsoring Software Engineering Daily. Symphono is a custom engineering shop where senior engineers tackle big tech challenges while learning from each other. Check it out at symphono.com/sedaily. That's symphono.com/sedaily.

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